



massDOT
Massachusetts Department of Transportation





CAPE COD CANAL
TRANSPORTATION STUDY



Prepared by:
Stantec

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Appendix A:
Public Involvement Plan

March 23, 2015

Public Involvement Plan

The Public Involvement Plan is designed to elicit detailed and comprehensive comments on the study concept. The Public Involvement Plan includes the forms of communication, the target audiences, and the draft agendas for the organized meetings. The Public Involvement Plan is designed and will be executed to the fullest extent possible for full and fair participation of minority, low-income, and other disadvantaged populations.

Public Participation Principles

The Public Involvement Plan has been developed in consistency with MassDOT's Accessible Meeting Policy Directive, and it will also guide civic engagement for the study by emphasizing the following principles:

The public will learn about or become engaged in the study in a variety of primary ways: Methods will include public informational meetings, Working Group meetings, the study website, local newspapers articles, and study newsletters.

The public shall have access to information about the study: A record of all the study's public informational and Working Group meetings will be kept, such as meeting presentations, summaries and handout material. These documents will be posted on the website in a timely manner and in compliance with Section 508 of the U.S. Rehabilitation Act of 1973 that provides accessible electronic documents to those with disabilities. Additionally, copies of the draft and final report will be available at the local public libraries.

The public shall be presented with clear and accessible information: Information will be clearly written, and technical terms and regulatory procedures will be explained to the extent possible. Language translation will be provided for written materials such as meeting flyers and newsletters/bulletins, as well as at public informational meetings.

The public shall be able to engage with a responsive study team: The public and Working Group will receive sufficient notice of meetings, and all efforts will be made to schedule the meetings at a time and place that is convenient, comfortable, and accessible. Ample time to review any materials will also be provided to the extent possible. All public questions and inquiries will be answered in a timely manner.

The public shall be able to participate in a process that is well coordinated: Good coordination, communication, and collaboration among all involved agencies and community organizations will be provided to the public with the most current and accurate information and material.

All public outreach will be conducted in a manner that is inclusive and sensitive, especially to the needs of identified Environmental Justice and Title VI populations. Meetings will be held in facilities that are ADA compliant and follow MassDOT's Accessible Meeting Policy directive. The Cape Cod Commission's analysis of Limited English Proficiency populations within the study area was utilized to determine language translation needs for publicity materials (press releases and newsletters) and interpretive services at public informational meetings. Cape Cod Commission's analysis conducted for the Cape Cod Metropolitan Planning Organization determined a need for Portuguese and Spanish language translation in the outreach program.

Communications Lists and Forms of Outreach

In consultation with MassDOT, prepare a list of individuals and entities that will receive communications about the project. Send information through multiple levels of communication including:

- Broadcast e-notices [e-mail] of website updates and meeting notices,
- Media notices
- E-mail notices and attachments of project documents, specifically for Working Group members and individuals participating in the Working Group meetings,
- E-mail notices of meetings and project documents to MassDOT Highway Division for coordination.

The public email account and the Working Group e-mail account will be processed through govdelivery.com. Social media will be monitored for trending comments related to the project.

Confirmation of Working Group Members

The consultant and MassDOT will confirm membership of the Working Group, with the options for different levels of membership; full members, with alternate and associate members. The main group of participants to be invited include:

- Legislators: William Keating, Dan Wolf, Marc Pacheco, Robert Hedlund, Therese Murray, Randy Hunt, David Viera, Timothy Madden, Susan Williams Gifford, with additional legislators on the

notification list,
- Massachusetts Department of Environmental Protection,
- Massachusetts Office of Coastal Zone Management,
- Massachusetts Historical Commission,
- Massachusetts Division of Marine Fisheries,
- National Heritage and Endangered Species Program,
- Massachusetts Division of Energy Resources,
- Army Corps of Engineers
- Federal Highway Administration
- Cape Cod Commission,
- Southeastern Regional Planning and Economic Development District,
- Old Colony Planning Council,
- Cape Cod Canal Area Traffic Task Force,
- Cape Cod Canal Region Chamber of Commerce,
- Cape Cod Chamber of Commerce,
- Representatives from the municipalities of Bourne, Sandwich, Plymouth and Wareham (invites to the Boards of Selectmen).

In addition, the recommendation is to consider participation from:
- Wampanoag Tribe of Gay Head (Aquinnah)
- Massachusetts Maritime Academy
- CCRTA
- GATRA
- Woods Hole, Martha's Vineyard & Nantucket Steamship Authority
- Peter Pan Bus Lines
- Plymouth & Brockton Bus Lines

Working Group Meetings

Working Group meetings will be scheduled at key project milestones with input from the members, and will be conducted by MassDOT Planning and the consultant. Up to eight (8) Working Group meetings are proposed to be scheduled, as needed, with rotating meeting locations within the Upper Cape towns of Wareham, Bourne, Mashpee, Sandwich, and Falmouth.

The first Working Group meeting will be scheduled with an agenda to present and discuss:

- Study Area limits;
- Draft Mission Statement, Project Goals and Objectives;
- Draft Evaluation Criteria for the project alternatives;

- Outline and explanation of current and future project phases; and,
- Working Group comment on these elements.

The subsequent Working Group meetings will have the following agendas:

- Review and discussion of the Final Problem Statement, Mission Statement and Project Goals
- Review of the Project Assessments and Evaluation Criteria
- Review of Preliminary Alternatives and application of Evaluation Criteria
- Recommendations for Advancement of the Project
- Review the results of the Public Informational Meetings

An option includes the formation of subgroups from the membership of the Working Group to focus on specific issues.

Public Informational Meetings

Public meetings will be scheduled and publicized by MassDOT Planning and the consultant. The consultant will prepare draft public notices for MassDOT to review, approve and distribute. The publicity will include notice of the availability of foreign language (at a minimum Spanish and Portuguese) and sign language interpreters, and the ability to provide other accommodations for disabilities and for full and fair accommodation to attract broad participation.

MassDOT and the consultant will conduct public informational meetings at major project milestones. Proposed are four Public Informational Meetings to be scheduled. The Public Informational Meetings will have the overall purpose of responding to public questions and confirmation of the content of the presentation, and will be organized according to the following agendas:

- Presentation of the Problem Statement
- Presentation of the Conditions Assessments
- Presentation of Preliminary Alternatives and Evaluations

- Presentation of the Future Project Schedule with points identified for input and participation

The Public Informational Meetings will be scheduled to present information to the general public between Working Group meetings where the information will be presented and discussed together with review of the results of the Public Informational Meetings.

The Public Informational Meetings will be located at venues within the Upper Cape area of Plymouth, Wareham, Sandwich, Falmouth and Mashpee. Two additional Regional Public Informational Meetings will be held on the Lower Cape [Orleans, Brewster, Harwich, Chatham], and Mid-Cape [Barnstable, Yarmouth, Dennis]. The regional meetings will include presentation of the drafts of the problem statement, condition assessments, preliminary alternatives and evaluations, and future project schedule.

Special Events

Participation in special, open public events that may be scheduled by others during the course of the study would be opportunities for further dissemination of information. These may include special events and summer festivals such as the regional oyster and cranberry festivals, or institutional events where a booth or table could be arranged, or project specific historic events such as the 100th anniversary of the bridges and canal. Up to four (4) events could be planned and included in the work program.

Presentation and Display Materials

The consultant shall be responsible for the preparation of presentation and display materials for Working Group meetings and Public Informational Meetings. These materials shall be prepared one week in advance to allow MassDOT time for review and approval. The consultant will be available one week in advance of the meetings to present presentation materials to MassDOT.

Coordination

The consultant will share materials prepared as part of this study with the MassDOT Highway Division to support the public involvement plan for the traffic improvement project for Belmont Circle (Buzzards Bay Bypass – Routes 6 and 28, Route 25 and Main Street) and attend up to four (4) meetings on this project to provide input and information generated from the Canal study project.

Project Website

Any project website will be created, maintained, and updated by MassDOT. The consultant will provide content data for development of this website from the project tasks including relevant historical documents, task deliverables, and both pre-and post-meeting materials. These will be submitted to the MassDOT project manager for posting on the project website.

The web content provided by the consultant will be presented as Web Content Accessibility Guidelines (WCAG) 2.0 compliant and with each digital file sized at or under 4Mb.

Proposed Project Meetings:

- Working Group – Eight (8) meetings
- Public Informational Meetings – Four (4) meetings
- Regional Public Informational Meetings – Two (2) meetings
- Special Events – Four (4) events
- Highway Division Coordination - Four (4) meetings

Appendix B:

MESA Information Form and MNHESP Response

MASSWILDLIFE

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

Jack Buckley, *Director*

December 15, 2016

Sean Hale
Normandeau Associates, Inc.
550 Forest Ave, Suite 201
Portland, ME 04101

RE: Project Location: Cape Cod Canal Bridge
Town: BOURNE
NHESP Tracking No.: 14-33419

To Whom It May Concern:

Thank you for contacting the Natural Heritage and Endangered Species Program of the MA Division of Fisheries & Wildlife (the "Division") for information regarding state-listed rare species in the vicinity of the above referenced site. Based on the information provided, this project site, or a portion thereof, is located **within** *Priority Habitat* and *Estimated Habitat* as indicated in the *Massachusetts Natural Heritage Atlas* (13th Edition). Our database indicates that the following state-listed rare species have been found in the vicinity of the site:

Bourne Bridge

Scientific name	Common Name	Taxonomic Group	State Status
Acronicta albarufa	Barrens Dagger Moth	Butterflies and Moths	Threatened
Catocala herodias gerhardi	Gerhard's Underwing Moth	Butterflies and Moths	Special Concern
Cicinnus melsheimeri	Melsheimer's Sack Bearer	Butterflies and Moths	Threatened
Hemileuca maia	Barrens Buckmoth	Butterflies and Moths	Special Concern
Metarranthis pilosaria	Coastal Swamp Metarranthis Moth	Butterflies and Moths	Special Concern
Speranza exonerata	Pine Barrens Speranza	Butterflies and Moths	Special Concern
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern

Middle Bridge

Scientific name	Common Name	Taxonomic Group	State Status
Euchlaena madusaria	Sandplain Euchlaena	Butterflies and Moths	Special Concern
Hemaris gracilis	Slender Clearwing Sphinx	Butterflies and Moths	Special Concern
Hemileuca maia	Barrens Buckmoth	Butterflies and Moths	Special Concern
Metarranthis pilosaria	Coastal Swamp Metarranthis Moth	Butterflies and Moths	Special Concern
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern

Relocated Exit 1

Scientific name	Common Name	Taxonomic Group	State Status
Euchlaena madusaria	Sandplain Euchlaena	Butterflies and Moths	Special Concern
Hemaris gracilis	Slender Clearwing Sphinx	Butterflies and Moths	Special Concern
Hemileuca maia	Barrens Buckmoth	Butterflies and Moths	Special Concern

Scientific name	Common Name	Taxonomic Group	State Status
Metarranthis pilosaria	Coastal Swamp Metarranthis Moth	Butterflies and Moths	Special Concern
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern

Route 3 to Route 25

Scientific name	Common Name	Taxonomic Group	State Status
Hemileuca maia	Barrens Buckmoth	Butterflies and Moths	Special Concern

Route 3 to Route 6 HOV

Scientific name	Common Name	Taxonomic Group	State Status
Caprimulgus vociferus	Eastern Whip-poor-will	Bird	Special Concern
Cingilia catenaria	Chain Dot Geometer	Butterflies and Moths	Special Concern
Circus cyaneus	Northern Harrier	Bird	Threatened
Euchlaena madusaria	Sandplain Euchlaena	Butterflies and Moths	Special Concern
Hemaris gracilis	Slender Clearwing Sphinx	Butterflies and Moths	Special Concern
Hemileuca maia	Barrens Buckmoth	Butterflies and Moths	Special Concern
Metarranthis pilosaria	Coastal Swamp Metarranthis Moth	Butterflies and Moths	Special Concern
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern

Route 6 to Route 25 HOV

Scientific name	Common Name	Taxonomic Group	State Status
Caprimulgus vociferus	Eastern Whip-poor-will	Bird	Special Concern
Cingilia catenaria	Chain Dot Geometer	Butterflies and Moths	Special Concern
Circus cyaneus	Northern Harrier	Bird	Threatened
Euchlaena madusaria	Sandplain Euchlaena	Butterflies and Moths	Special Concern
Hemaris gracilis	Slender Clearwing Sphinx	Butterflies and Moths	Special Concern
Hemileuca maia	Barrens Buckmoth	Butterflies and Moths	Special Concern
Metarranthis pilosaria	Coastal Swamp Metarranthis Moth	Butterflies and Moths	Special Concern
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern

Sagamore Twin

Scientific name	Common Name	Taxonomic Group	State Status
Caprimulgus vociferus	Eastern Whip-poor-will	Bird	Special Concern
Cingilia catenaria	Chain Dot Geometer	Butterflies and Moths	Special Concern
Circus cyaneus	Northern Harrier	Bird	Threatened
Euchlaena madusaria	Sandplain Euchlaena	Butterflies and Moths	Special Concern
Hemaris gracilis	Slender Clearwing Sphinx	Butterflies and Moths	Special Concern
Hemileuca maia	Barrens Buckmoth	Butterflies and Moths	Special Concern
Metarranthis pilosaria	Coastal Swamp Metarranthis Moth	Butterflies and Moths	Special Concern
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern

Sandwich Road

Scientific name	Common Name	Taxonomic Group	State Status
Acronicta albarufa	Barrens Dagger Moth	Butterflies and Moths	Threatened
Catocala herodias gerhardi	Gerhard's Underwing Moth	Butterflies and Moths	Special Concern
Cicinnus melsheimeri	Melsheimer's Sack Bearer	Butterflies and Moths	Threatened
Hemileuca maia	Barrens Buckmoth	Butterflies and Moths	Special Concern

MASSWILDLIFE

Scientific name	Common Name	Taxonomic Group	State Status
Metarranthis pilosaria	Coastal Swamp Metarranthis Moth	Butterflies and Moths	Special Concern
Speranza exonerata	Pine Barrens Speranza	Butterflies and Moths	Special Concern
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern

Scenic Highway

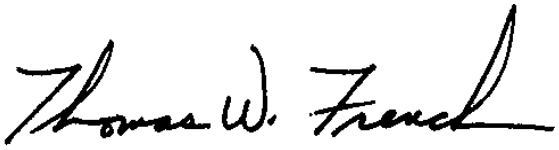
Scientific name	Common Name	Taxonomic Group	State Status
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern

Focus Area

Scientific name	Common Name	Taxonomic Group	State Status
Abagrotis nefascia	Coastal Heathland Cutworm	Butterflies and Moths	Special Concern
Acronicta albarufa	Barrens Dagger Moth	Butterflies and Moths	Threatened
Caprimulgus vociferus	Eastern Whip-poor-will	Bird	Special Concern
Catocala herodias gerhardi	Gerhard's Underwing Moth	Butterflies and Moths	Special Concern
Cicinnus melsheimeri	Melsheimer's Sack Bearer	Butterflies and Moths	Threatened
Cingilia catenaria	Chain Dot Geometer	Butterflies and Moths	Special Concern
Euchlaena madusaria	Sandplain Euchlaena	Butterflies and Moths	Special Concern
Hemaris gracilis	Slender Clearwing Sphinx	Butterflies and Moths	Special Concern
Hemileuca maia	Barrens Buckmoth	Butterflies and Moths	Special Concern
Leptodea ochracea	Tidewater Mucket	Mussel	Special Concern
Lycia ypsilon	Pine Barrens Lycia	Butterflies and Moths	Threatened
Malaclemys terrapin	Diamond-backed Terrapin	Reptile	Threatened
Metarranthis pilosaria	Coastal Swamp Metarranthis Moth	Butterflies and Moths	Special Concern
Ophioglossum pusillum	Adder's-Tongue Fern	Plant	Threatened
Speranza exonerata	Pine Barrens Speranza	Butterflies and Moths	Special Concern
Sterna dougallii	Roseate Tern	Bird	Endangered
Sterna hirundo	Common Tern	Bird	Special Concern
Terrapene carolina	Eastern Box Turtle	Reptile	Special Concern
Triosteum perfoliatum	Broad Tinker's-Weed	Plant	Endangered
Zale lunifera	Pine Barrens Zale	Butterflies and Moths	Special Concern

The species listed above are protected under the Massachusetts Endangered Species Act (MESA) (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00). State-listed wildlife are also protected under the state's Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and its implementing regulations (310 CMR 10.00). Fact sheets for most state-listed rare species can be found on our website (www.mass.gov/nhesp). If you have any questions regarding this letter please contact Emily Holt, Endangered Species Review Assistant, at (508) 389-6385.

Sincerely,



Thomas W. French, Ph.D.
Assistant Director

NORMANDEAU ASSOCIATES
Environmental Consultants

November 21, 2016

Dave Paulson, Regulatory Review
Natural Heritage and Endangered Species Program
MA Division of Fisheries & Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

RE: MESA Information Request Form - Cape Cod Canal Transportation Study
NHESP Tracking No. 14-33419

Dear Mr. Paulson & Regulatory Review Staff:

On behalf and at the request of the Massachusetts Department of Transportation, Highway Division ("MassDOT" or the "Project Proponent"), Normandeau Associates, Inc. ("Normandeau") is pleased to submit this MESA Information Request Form and supporting materials associated with MassDOT's ongoing Cape Cod Canal Transportation Study.

Cape Cod Canal Transportation Study Overview

MassDOT, in collaboration with others, is currently conducting the Cape Cod Canal Transportation Study. The goals of the study are to improve multimodal mobility in the Cape Cod Canal Area and to establish an alternative or replacement crossing of the Cape Cod Canal to address the diminishing quality of year-round connectivity over the canal. The Sagamore and Bourne Bridges are the primary means of access to and from the mainland for the 15 towns and 215,000 people who live on Cape Cod. While in previous years off-season mobility over the bridges was unimpeded, the two functionally obsolete bridges are 80 years old and have required increased maintenance by the U.S Army Corps of Engineers. This maintenance has and will continue to necessitate lane closures and resulting delays with increasing frequency. This will have a significant impact on emergency access and safety, community connectivity, and impacts to the economic activity of Cape Cod.

The Cape Cod Canal Transportation Study seeks to identify existing and future multimodal transportation deficiencies and needs around the Cape Cod Canal area in Bourne and Sandwich. The study entails the development and analysis of a full range of transportation alternatives including highway, interchange, and non-highway improvements, as well as options and design elements that will improve access for all modes. The alternatives considered also include the

evaluation of potential alignments for an additional or replacement crossing over the Cape Cod Canal.

MESA Information Request

As part of the study, MassDOT is assessing potential impacts to natural and cultural resources that may result from transportation improvements in the Cape Cod Canal area. To facilitate this impact analysis, potential project areas have been divided into a larger Focus Area and eleven (11) Canal Crossing and Approach Options, as listed below and presented in the attached figures (see MESA Information Request Form & Canal Crossing & Approach Options in Attachment A):

- Middle Bridge 1
- Middle Bridge 2
- Sandwich Road
- Relocated Exit 1
- Route 3 to Route 25
- Sagamore Twin
- Scenic Highway
- Bourne Bridge & Connections at Belmont Circle and Bourne Rotary
- Route 3 to Route 6 HOV
- Route 6 to Route 25 HOV SH Alt
- Route 6 to Route 25 HOV
- Focus Area

Natural resources in the vicinity of these options include waterways and wetlands, FEMA Flood Hazard Areas, fisheries resources, and rare and endangered species habitat as mapped by the Natural Heritage and Endangered Species Program ("NHESP"). A prior Information Request submitted to NHESP (Tracking No. 14-33419) identified 43 reptile, bird, butterflies and moths, mussel, and plant species listed as endangered, threatened, or special concern and occurring in Priority and Estimated Habitats within the overall study area.

This Information Request is being submitted with potential transportation improvements divided into the above-listed project options. Each option consists of a potential work area consisting of the roadway section and a conservative 200-foot buffer (i.e. limit of work). This second Information Request is being submitted to enable a direct comparison of all canal crossing and approach options with regard to potential impacts to rare species and their habitats. As such, MassDOT is requesting that NHESP provide separate inventories of state-listed rare species for each project option as identified above and in the attached figures. In order for NHESP to review

each project option and provide specific project option species lists according to the NHESP species database, this submittal includes GIS datalayers of the project options and focus area.

Please do not hesitate to contact me with any questions regarding this request or if additional information or materials is required. I can be reached via email at shale@normandeau.com or by telephone at 207-518-6763. Thank you.

NORMANDEAU ASSOCIATES, INC.



Sean D. Hale, CWS, PWS
Senior Scientist

CC: Timothy Dexter, MassDOT
Ethan Britland, MassDOT
Michael J. Paiewonsky, Stantec
Tory Fletcher, Normandeau Associates, Inc.

Attachment A – MESA Information Request form & Figures

MESA Information Request Form

Please complete this form to request site-specific information from the Natural Heritage & Endangered Species Program (Please submit only one project per request form).

Please include a check for $50.00 made out to Comm. of MA – NHESP.*

Requestor Information

Name: Susan McArthur

Affiliation: Massachusetts Department of Transportation, Highway Division ("MassDOT")

Address: 10 Park Plaza, Room 4260

City: Boston State: MA Zip Code: 02116

Daytime Phone: 1-857-368-8807 Ext. Email address: susan.mcarthur@state.ma.us

Project Information

Project or Site Name: Cape Cod Canal Transportation Study

Location: Proximate to Cape Cod Canal Town: Bourne, Plymouth, Sandwich

Name of Landowner or Project Proponent: MassDOT

Acreage of the Property: Focus area-7,272 options-1,303

Description of Proposed Project and Current Site Conditions: (If necessary attach additional sheet)

The goal of the Cape Cod Canal Transportation Study is to improve multimodal mobility in the Cape Cod Canal area, including evaluation of transportation improvements in the canal area to address diminishing connectivity quality over the canal due to the aging Sagamore and Bourne Bridges. Objectives include creation of reliable multimodal connectivity and mobility such that quality of life on Cape Cod is not diminished by unreliable connectivity. Reliable multimodal connections across the canal will also maintain and enhance public safety. See attached letter/figures.

☑ Will this project be reviewed as a Notice of Intent by the local Conservation Commission?
☑ Will this project be undergoing MEPA review for reasons other than rare species?
☑ Have you enclosed the required copy of a USGS topographic map in the scale 1:24,000 or 1:25,000 (not copy reduced) with the site location clearly marked and centered on the copy page? (Copies of Natural Heritage Atlas pages are not accepted)

Please **mail** this completed form and topographic map to:

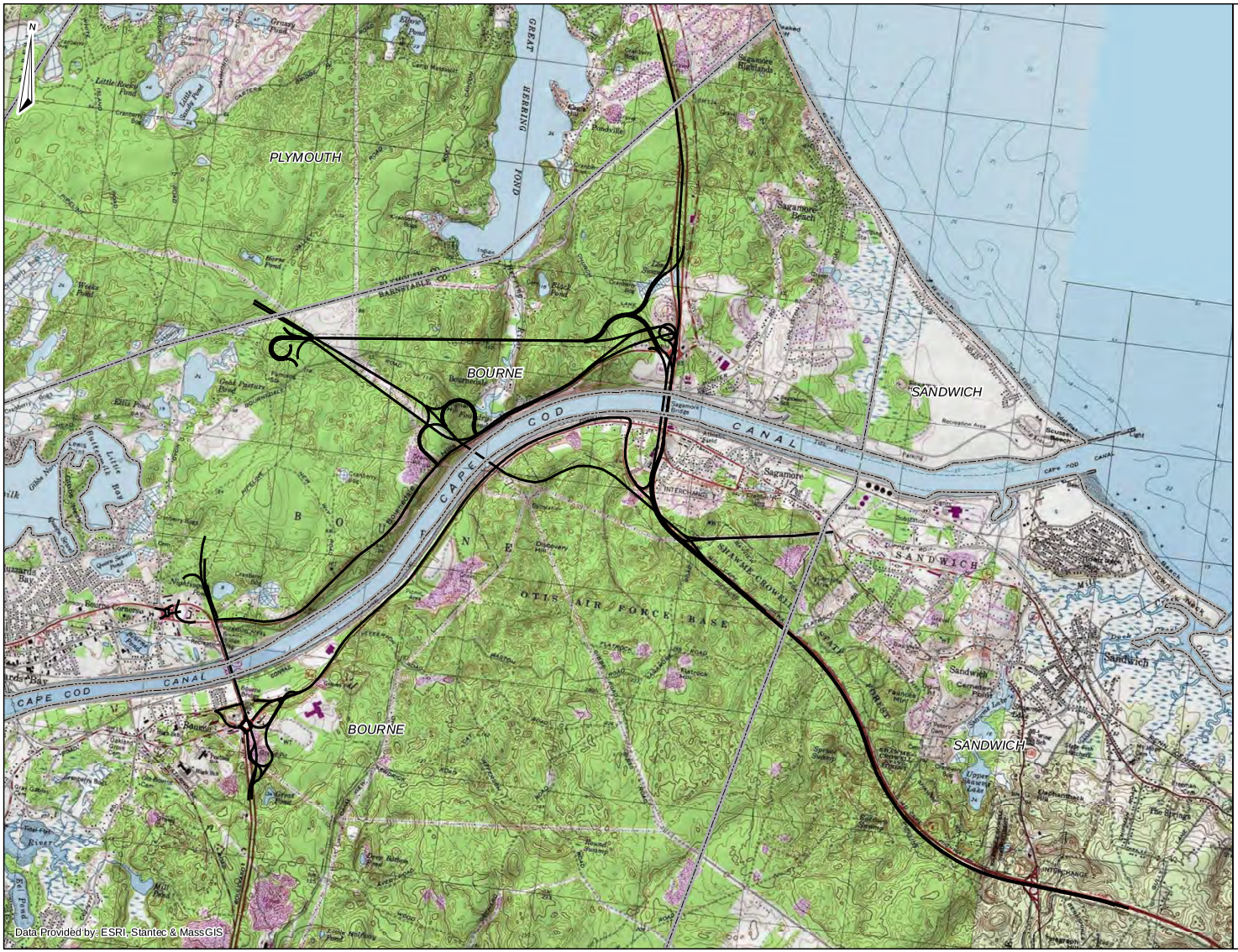
Regulatory Review
Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

Questions regarding this form should be directed according to the county that the property is located:
Berkshire, Essex, Franklin, Hampshire, Hampden, Middlesex & Worcester Counties call: 508-389-6361
Barnstable, Bristol, Dukes, Nantucket, Norfolk, Plymouth & Suffolk Counties call: 508-389-6385

Persons requesting information will receive a written response within 30 days of receipt of all information required. Please do not ask for an expedited review. ***If you are requesting information for habitat management or conservation purposes and you are a non-profit conservation group, government agency or working with a government agency please fill out a Data Release Form.

September 2014


N
PLYMOUTH
BOURNE
SANDWICH
BOURNE
SANDWICH
Data Provided by: ESRI, Stantec & MassGIS
G:\Projects\GIS_Projects_2016\Cape_Cod\MXD\CC_Overview_REV1_091916.mxd
MESA Information Request
Canal Crossing and Approach Options,
Cape Cod Canal Transportation Study
OVERVIEW
Plymouth, Bourne & Sandwich, MA
MASSACHUSETTS
PLYMOUTH CO
BARNSTABLE CO
Index Map
Potential Roadway Sections & Features
Middle Bridge 1
Middle Bridge 2
Sandwich Road
Relocated Exit 1
Route 3 to Route 25
Sagamore Twin
Scenic Highway
Bourne Bridge & Connections at Belmont Circle and Bourne Rotary
Route 3 to Route 6 HOV
Route 6 to Route 25 HOV SH Alt
Route 6 to Route 25 HOV
200-foot Buffer
Focus Area
1:36,000
Miles
0 0.25 0.5 1
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Environmental Consultants



MESA Information Request
Canal Crossing and Approach Options, Cape Cod Canal Transportation Study
TOPO OVERVIEW

Plymouth, Bourne & Sandwich, MA



Index Map

Potential Roadway Sections

Proposed Routes

1:36,000

0 0.25 0.5 1 Miles

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G:\Projects\GIS_Projects_2016\Cape_Cod\MXD\CC_TopoOverview_112116.mxd


WAREHAM
PLYMOUTH
SANDWICH
BOURNE
WAREHAM
BOURNE
SANDWICH
Data Provided by: ESRI, Stantec & MassGIS
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MESA Information Request
Canal Crossing and Approach Options,
Cape Cod Canal Transportation Study
FOCUS AREA
Plymouth, Bourne & Sandwich, MA
MASSACHUSETTS
PLYMOUTH CO
BARNSTABLE CO
DUKES CO
Barnstable Town
South Yarmouth
Index Map
Site Features
Focus Area
N
1:32,000
0 0.25 0.5 1 Miles
NORMANDEAU ASSOCIATES
Environmental Consultants



MESA Information Request
Canal Crossing and Approach Options, Cape Cod Canal Transportation Study
BOURNE BRIDGE & CONNECTIONS AT BELMONT CIRCLE & BOURNE ROTARY
Plymouth, Bourne & Sandwich, MA



Index Map

Potential Roadway Sections & Features

Bourne Bridge & Connections at Belmont Circle & Bourne Rotary

200-foot buffer

N

1:10,000

0 500 1,000 2,000 Feet

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MESA Information Request
Canal Crossing and Approach Options, Cape Cod Canal Transportation Study
MIDDLE BRIDGE 1 & 2

Plymouth, Bourne & Sandwich, MA

Index Map

Potential Roadway Sections & Features

- Middle Bridge 1
- Middle Bridge 2
- 200-foot Buffer

N

1:16,000

0 500 1,000 2,000 Feet

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MESA Information Request
Canal Crossing and Approach Options,
Cape Cod Canal Transportation Study
RELOCATED EXIT 1

Plymouth, Bourne & Sandwich, MA

Index Map

Potential Roadway Sections & Features

Relocated Exit 1

200-foot Buffer

N

1:6,000

0 250 500 1,000 Feet

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BOURNE
SANDWICH
BOURNE
SANDWICH
Data Provided by: ESRI, Stantec & MassGIS
G:\Projects\GIS_Projects_2016\Cape_Cod\MXD\CC_SagamoreTwin_051016.mxd
MESA Information Request
Canal Crossing and Approach Options,
Cape Cod Canal Transportation Study
SAGAMORE TWIN
Plymouth, Bourne & Sandwich, MA
MASSACHUSETTS
PLYMOUTH CO
BARNSTABLE CO
DUKES CO
Index Map
Potential Roadway Sections & Features
Sagamore Twin
200-foot Buffer
N
1:20,000
0 5001,000 2,000
Feet
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Environmental Consultants



MESA Information Request
Canal Crossing and Approach Options, Cape Cod Canal Transportation Study
SANDWICH ROAD

Plymouth, Bourne & Sandwich, MA



Index Map

Potential Roadway Sections & Features

Sandwich Road

200-foot Buffer

N

1:16,000

0 500 1,000 2,000 Feet

NORMANDEAU ASSOCIATES
Environmental Consultants

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MESA Information Request
Canal Crossing and Approach Options, Cape Cod Canal Transportation Study
SCENIC HIGHWAY

Plymouth, Bourne & Sandwich, MA



Index Map

Potential Roadway Sections & Features

Scenic Highway

200-foot Buffer

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MESA Information Request
Canal Crossing and Approach Options,
Cape Cod Canal Transportation Study
ROUTE 3 TO ROUTE 25
Plymouth, Bourne & Sandwich, MA
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PLYMOUTH CO
BARNSTABLE CO
DUKES CO
Index Map
Potential Roadway Sections & Features
Route 3 to Route 25
200-foot Buffer
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NORMANDEAU ASSOCIATES
Environmental Consultants



MESA Information Request
Canal Crossing and Approach Options, Cape Cod Canal Transportation Study
ROUTE 3 TO ROUTE 6 HOV

Plymouth, Bourne & Sandwich, MA



Index Map

Potential Roadway Sections & Features

Route 3 to Route 6 HOV

200-foot Buffer

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Environmental Consultants

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MESA Information Request
Canal Crossing and Approach Options, Cape Cod Canal Transportation Study
ROUTE 6 TO ROUTE 25 HOV

Plymouth, Bourne & Sandwich, MA



Index Map

Potential Roadway Sections & Features

Route 6 to Route 25 HOV

200-foot Buffer

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Environmental Consultants

Appendix C:

Cultural Resources Identification and Evaluation

Cultural Resources Identification and Evaluation

Cape Cod Canal Transportation Study
Bourne, Sandwich and Plymouth, Massachusetts



Prepared for submission to:
The Massachusetts Department of Transportation

Prepared by:
Archaeological and Historical Services, Inc.

May 18, 2017

ABSTRACT AND MANAGEMENT SUMMARY

The Cape Cod Canal Transportation Study is being conducted by the Massachusetts Department of Transportation (MassDOT). The purpose of the study is to develop and analyze potential improvement alternatives to the transportation system around the Cape Cod Canal, including possible new crossings of the canal and new highway, interchange, and non-highway improvements.

This report presents the results of the identification and evaluation of cultural resources that may be affected by the project. It was prepared by Archaeological and Historical Services, Inc. (AHS), under contract to Stantec, the engineering firm that is conducting the Study. For the purpose of this study, cultural resources are defined here as historic, archaeological and cultural/ethnographic resources. Historic resources include above-ground manmade resources such as buildings, structures, objects, districts, landscapes, and sites that meet the criteria for listing in the National Register of Historic Places (NRHP). Archaeological resources are buried pre-colonial Native American and historic-period sites. Cultural/ethnographic resources are above and below-ground areas of cultural sensitivity and importance to the Mashpee, Gay Head (Aquinnah) and Herring Pond tribes.

The Project Focus Area, located almost entirely in the town of Bourne, is rich in above-ground cultural resources. The Bourne Bridge and the Sagamore Bridge have already been identified by MHC as eligible for individual listing in the National Register of Historic Places (NRHP). The Cape Cod Canal itself and associated resources are considered potentially eligible as a National Register historic district. In the surrounding neighborhoods in Bourne, some buildings are individually listed in the NRHP, one has been determined by MHC as NRHP-eligible, and many others have been identified as potentially eligible for individual NRHP listing. Some Bourne neighborhoods have been identified as potential NRHP historic districts.

Several historic areas in Plymouth and Sandwich are also within and adjacent to the Project Focus Area. In Plymouth, one historic cemetery was identified in the Project Focus Area, potentially NRHP-eligible as part of a district. Several historic areas in Sandwich were identified in the vicinity of the proposed Route 6 lane addition extending to the Route 130 interchange, and the Route6A/Route 130 intersection. All the Sandwich resources are listed in the State Register of Historic Places and included in the Old King's Highway Regional Historic District; some are potentially NRHP-eligible as districts.

The Project Focus Area is also rich in archaeological and cultural resources. The river, marsh, and coastal resources available on the Cape made the area a prime place for Native American settlement for thousands of years. Villages were present, as evidenced by archaeological finds during the construction of the canal, and by oral tradition among the Wampanoag tribes. Archaeological surveys previously undertaken as part of cultural resource management projects in the Focus Area have identified dozens of archaeological sites. Areas of cultural importance to the Wampanoag tribes are present in numerous locations in the Project Focus Area.

In addition to archaeological sites associated with Native Americans, historic-period Euro-American sites are also likely present, due to the colonial settlement on the Cape in the early 17th century. As a result of the thousands of years of human habitation of Cape Cod, the potential for archaeological resources in undeveloped portions of the focus area is high, in even in residential lawn areas and areas that have been capped with gravel or asphalt, such as parking lots.

In summary, substantial modifications to the existing transportation systems related to the Cape Cod Canal will likely have potential direct and indirect adverse effects on a number of historic resources, including the canal itself, its bridges, and surrounding neighborhoods, as well as archaeological and cultural resources.

MassDOT is currently studying a number of alternatives to improve transportation over and around the Cape Cod Canal. The conclusions and recommendations presented in this document are subject to change as the designs progress and further work is undertaken to assist MassDOT and FTA in evaluating impacts to historic resources. The conclusions and recommendations are the opinion of the historic preservation consultant. Actual determinations of National Register eligibility and assessment of effects are properly part of the ongoing consultative process among FTA, MassDOT, and MHC, and will continue to develop as the project progresses.

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1.0 INTRODUCTION AND SCOPE OF WORK

1.1 INTRODUCTION

The Massachusetts Department of Transportation (MassDOT) is conducting the Cape Cod Canal Transportation Study to develop and analyze improvements to the transportation system around the Cape Cod Canal, including potential new crossings of the Canal and new highway, interchange, and non-highway improvements. MassDOT is reviewing a number of alternatives to improve transportation over and around the Cape Cod Canal (Figure 1, Appendix A). The study is at the preliminary, feasibility level, and the locations and design requirements of the alternatives are not sufficiently developed to precisely assess their potential direct effects on cultural resources. However, based on preliminary plans, evaluation of the potential effects of the alternatives is possible in a general sense.

The project is receiving state funding, thus requiring it to comply with the Massachusetts Environmental Policy Act (MEPA), which mandates consideration of possible effects to significant historic and archaeological resources. The project may eventually involve the U.S. Army Corps of Engineers (ACOE), which would require the project to comply with the National Environmental Policy Act (NEPA), Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800). These laws require consultation with the Massachusetts Historical Commission (MHC), regarding possible project-related effects to archaeological and historical resources eligible for listing in the National Register of Historic Places (NRHP).

This report presents the results of the identification of existing conditions with respect to cultural resources, inclusive of historic, archaeological, and cultural/ethnographic resources within the alternatives and within the Project Focus Area, roughly one mile north and south of the Canal (Figure 1, Appendix A). The report also presents an evaluation of potential effects of the various alternatives on historic, archaeological and cultural resources.

For the purposes of this report, historic resources are defined as above-ground cultural (i.e., standing) resources: buildings, structures, objects, districts, landscapes, and sites that meet or likely meet the criteria for listing in the NRHP. Archaeological resources are defined as below-ground pre-colonial Native American or historic-period sites. Cultural/ethnographic resources are defined as areas of significance identified by the Mashpee, Gay Head (Aquinnah) and Herring Pond Wampanoag tribes.

The report was prepared by Archaeological and Historical Services, Inc. (AHS) for Stantec, project engineers. This report is organized as follows: Section 2 presents the methodology used. Section 3 provides the historical background of the Project Focus Area. Section 4 discusses the existing conditions of the Cape Cod Canal and its three bridges. Section 5 addresses the existing conditions of the Project Focus Area's non-canal architecture and other historic resources. Section 6 presents existing conditions related to archaeological and cultural resources. Section 7 presents a preliminary evaluation of potential effects to historic resources. Section 8 presents an evaluation of potential effects to archaeological and cultural resources. Section 9 contains conclusions and recommendations.

1.2 SCOPE OF WORK

The scope of work is an assessment-level survey of existing conditions with respect to cultural resources, within the Project Focus Area, with specific reference to a variety of alignment alternatives presented by MassDOT. In addition, an assessment of potential effects of various alternatives was made. The study area for the Cape Cod Canal Transportation Study is the Project Focus Area, the area within a roughly one-mile radius of the Bourne Bridge, the Sagamore Bridge, and the roads that parallel the Cape Cod Canal between the bridges (Route 6/Scenic Highway to the north and Sandwich Road to the south) (Figure 1, Appendix A). The Project Focus Area is located almost entirely within the Town of Bourne, with a small portion in Plymouth. The Cape Cod Canal Transportation Study also includes road improvements outside of the Project Focus Area's one-mile radius in two locations: at Belmont Circle in Buzzards Bay, north of the Bourne Bridge; and at Route 6, south of Sagamore and to the 130 interchange. Two of the proposed alternatives (the Sagamore Twin and relocated Exit 1 options) also extend a short distance into the town of Sandwich.

The survey was conducted in accordance with *The Secretary of the Interior's Standards and Guidelines for Identification* and *The Secretary of the Interior's Standards and Guidelines for Evaluation* (1983 and ongoing revisions). AHS personnel inspected the Project Focus Area in May, July, September, and October 2016. A survey of the immediate vicinity of the canal was conducted on foot, resulting in field notes and about 500 photographs of historic properties. In addition to the walking survey, all public streets in the Project Focus Area were assessed in a windshield survey to identify additional historic properties that could be affected. Assessment of noise and vibration effects on National Register-listed or eligible resources will be deferred until information from those studies becomes available. Standing historic resources within and adjacent to the 200-foot buffer zone were identified in these areas.

AHS conducted background research to evaluate the potential for effects on historic resources in the Project Focus Area. A series of historic maps and views was assembled (see Appendices B and C), and existing National Register nomination forms were reviewed for individual properties and districts. AHS also reviewed survey information from the MHC's Massachusetts Cultural Resource Inventory System database (MACRIS) database. The research identified a significant number of standing historic resources in the Project Focus Area, including buildings, structures, sites, landscapes and objects.

In addition to consulting histories of the Cape Cod Canal, Bourne and adjacent towns, and of Cape Cod in general, AHS undertook additional background research to clarify the historic contexts for evaluating resources in the project vicinity. Sources included the collections of the Bourne Historical Society, the Bourne Archives, and the Cape Cod Canal Visitor Center and Museum, operated by the U.S. Army Corps of Engineers.

Additional research was conducted to collect data on recorded archaeological and cultural properties, and to assemble data sufficient to evaluate the archaeological sensitivity of an area (i.e., the potential of an area for containing significant, NRHP-eligible buried archaeological resources). The research also permitted the assessment of potential effects to known and possibly significant archaeological and cultural resources; recommending additional studies, if necessary, to identify specific archaeological sites rather than broader areas of archaeological sensitivity; and developing strategies for avoiding or mitigating effects to potential significant archaeological and cultural resources.

1.3 PROJECT PERSONNEL

Architectural Historian Marguerite Carnell Rodney conducted the historical background research and historic resource identification. She and Architectural Historian Stacey Vairo field-checked historic resources in the Focus Area and photographed them to document existing conditions. Together they also evaluated the historic resources for potential listing in the NRHP. Senior Archaeologist Sarah Sportman and Project Archaeologist Brianna Rae conducted the archaeological, historical, and environmental background research. Senior Archaeologist and GIS Specialist David Leslie prepared the figure graphics. AHS President Mary Harper served as project manager. Mary Harper and Senior Archaeologists Ross Harper and Sarah Sportman conducted Native American consultation.

2.0 METHODOLOGY

2.1 HISTORICAL RESOURCE RESEARCH

The scope of work included the identification and evaluation of standing (above-ground) historic resources, listed in or potentially eligible for listing in the NRHP, within the Project Focus Area and immediately adjacent to its borders. The study tasks included documentary research to identify historic properties and to establish an historic context to interpret the significance of canal- and non-canal-related historic resources. Site-specific resources included maps from the late 18th century to ca. 1937, Sanborn insurance maps from 1941-1959, and the Historic American Building Survey (HABS) documentation of Camp Edwards. AHS assembled a series of historic maps and images (see Appendices B and C) and reviewed existing National Register forms for individual properties and districts. Previous survey information from the MHC MACRIS database was also consulted, including review of inventory forms for individual resources, area inventories, and reconnaissance town reports.

In order to establish an overall historical context and help in the identification of historic resources, AHS consulted general Cape Cod and local published histories such as Freeman (1862) and Cumbler (2014). Additional research was undertaken to establish the historic contexts for evaluating resources in the project vicinity, including the records and photograph collections of the Bourne Historical Society and the Bourne Archives, as well as the Cape Cod Canal Visitor Center and Museum, operated by the U.S. Army Corps of Engineers.

2.2 ARCHAEOLOGICAL AND CULTURAL RESOURCE RESEARCH

The tasks of the archaeological assessment survey included researching the past environmental and historical development of the Project Focus Area and adjacent areas affected by design alternatives, and researching previously-documented archaeological resources in the vicinity of the Project Focus Area and alternatives. This included a review of historical maps to compile a capsule history of documented land use in the Project Focus Area, and to assess the potential of the Project Focus Area and alternatives to contain historic-period archaeological resources related to past use of the land. AHS also consulted with the federally-recognized Mashpee Wampanoag Tribe, Gay Head (Aquinnah) Wampanoag Tribe, and the Herring Pond Wampanoag Tribe about culturally sensitive areas that may be affected by the proposed improvements.

AHS researched the files of recorded archaeological sites and reports of past archaeological surveys conducted in the Project Focus Area on MACRIS and at the MHC. Relevant cultural resource management reports and archaeological publications were reviewed to help develop a pre-colonial Native American and historical context preparatory to assessing the potential for significant buried archaeological sites to be present in the Project Focus Area. Environmental sources on hydrology, geology, and soils were reviewed to establish an understanding of the natural environment that existed in the Project Focus Area prior to modern development, because these resources have known associations with pre-colonial Native American occupation.

2.3 EVALUATION OF SIGNIFICANCE

2.3.1 National Register of Historic Places Criteria

The criteria for listing in the National Register of Historic Places are generally used in historic and archaeological surveys as a bar metric for assessing the significance of historic, archaeological and cultural resources. Resources determined by the State Historic Preservation Office or a federal agency to be National Register-eligible are provided a measure of protection from federally funded or federally-permitted projects. Such resources are also accorded protection under Massachusetts Environmental Policy Act (MEPA).

Some historic resources within or adjacent to the Project Focus Area are already listed in the National Register of Historic Places (NRHP), or have been determined to be NRHP-eligible by MHC. Other resources identified by the project historians were evaluated for their potential eligibility for listing in the NRHP by applying the National Register criteria of significance, which state the following:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

Criterion A *That are associated with events that have made a significant contribution to the broad patterns of our history; or*

Criterion B *That are associated with the lives of persons significant in our past; or*

Criterion C *That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or*

Criterion D *That have yielded or may be likely to yield, information important in history or prehistory.*

Resources may qualify under one or more of the National Register eligibility criteria.

2.3.2 National Register of Historic Places Integrity

Historic properties were also evaluated for their integrity, which is the ability of a resource to visually convey its significance. The seven aspects of integrity are: location, design, setting, materials, workmanship, feeling, and association. The property must still possess several, if not most, aspects of the historical identity for which it is significant. The National Register defines these aspects of integrity as follows:

1. ***Location*** *is the place where the historic property was constructed or the place where the historic event occurred.*

2. ***Design*** *is the combination of elements that create the form, plan, space, structure, and style of a property.*
3. ***Setting*** *is the physical environment of a historic property.*
4. ***Materials*** *are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.*
5. ***Workmanship*** *is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.*
6. ***Feeling*** *is a property's expression of the aesthetic or historic sense of a particular period of time.*
7. ***Association*** *is the direct link between an important historic event or person and a historic property.*

2.3.3 State Register of Historic Places

Properties listed in the National Register of Historic Places are automatically listed in the Massachusetts State Register of Historic Places. Properties located in the Old King's Highway Regional Historic District are also automatically included in the State Register; see Section 5.5.1.

2.3.4 Other Criteria for Evaluation

For many known archaeological resources, and for areas of identified archaeological sensitivity (i.e., areas with high potential for containing intact archaeological sites), State or National Register-eligibility has not been determined. Such determination would require additional research beyond the scope of this feasibility-level study. However, there are areas and landscape features considered to have high cultural importance to Native American tribes; these areas and features may qualify for NRHP listing as Traditional Cultural Properties.

3.0 HISTORICAL BACKGROUND OF THE PROJECT FOCUS AREA

3.1 ENVIRONMENTAL CONTEXT AND ARCHAEOLOGICAL SENSITIVITY

Cape Cod is located in an ecoregion identified as the Cape Cod and Long Island Pine Barrens (Griffith et al. 2009). The topography in this ecoregion consists primarily of level to rolling plains, with some steeper slopes on moraines. Parts of the Cape are characterized by a "knob and kettle" topography, consisting of an undulating landscape with knolls or ridges of glacial debris interspersed with irregular depressions and pits that may contain swamps or ponds (Natural Resources Canada 2016). Coastal areas are defined by bays and inlets, dunes, beaches, tidal flats. Elevations are generally low, ranging from 0-150 feet above mean sea level (amsl).

The bedrock on the Cape is comprised of Precambrian granite, gneiss, and schist covered by 200-400 feet or more of gravel, sand, silt, and clay. The surficial geology, formed as a result of the Wisconsin glaciation (21,000 to 13,600 ya) is primarily comprised of quaternary outwash sand and gravel, and loose sandy till related to the kame moraine.

Cape Cod and the Islands are characterized by abundant natural resources. Cape Cod has over 350 ponds, 209 of which are classified as Great Ponds, because they are ten or more acres in area (MHC 1986). The vegetational patterns on the Cape and Islands are influenced by the proximity to the ocean, drainage, soil, and the history of human land use (MHC 1986). Vegetational zones include a mix of inland forests and woodlands, coastal forests, maritime woodlands, swamps and bogs, dunes, sandplain grass and heathlands, and salt marshes (Griffith et al 2009). These zones result in a range of microhabitats supporting a variety of plants, animals, birds, and fish. The region's rich and varied wild flora and fauna resource bases made Cape Cod attractive for pre-colonial Native American and later colonial and historic-period European settlement. As a result, most undeveloped portions of Cape Cod are considered to have high archaeological sensitivity for both pre-colonial and historic-period resources.

3.2 GROWTH AND DEVELOPMENT OF BOURNE

The town of Bourne was incorporated in 1884. It is the western-most town on Cape Cod and in Barnstable County, consisting of several villages formerly in the northwestern part of Sandwich (Maps 1-2, Appendix B). Bourne includes the following communities: Buzzard's Bay (previously Cohasset; Map 3), Bourne Village (previously Monument, Manomet; Map 4), Pocasset and Cataumet (previously North and South Pocasset, south of the Project Focus Area), Bournedale (previously North Sandwich, Herring River, Comassakumanit/Comassukumkanet, Maps 5-6), and Sagamore (previously West Sandwich, Scusset; Map 7) (Dimock 2013: 7).

The first European settlement in the Bourne area was established in 1627, by the Plymouth colony, for the purpose of trade. Known as Aptucxet, the trading post was located on the south side of the Manomet River, close to the shore of Buzzard's Bay. Settlements at Manomet and Pocasset soon followed. Missionaries such as Richard Bourne and Thomas Tupper worked to convert Native peoples to Christianity; a settlement of Christian Natives was founded in the area now known as Bournedale, where a meeting house was built for them south of Great Herring Pond. Economic activities during this early period including agriculture, livestock, fishing, shell-

fishing, and trade with Plymouth and settlements further east on Cape Cod. Later in the colonial period, these pursuits continued, and gristmills were built to process corn, oats, wheat, and rye. Cutting of wood and production of pine products (e.g. turpentine, pitch and tar) were other important sources of income (MHC 1984: 2-7).

By the early 19th century, small settlements had been established at Sagamore (Scusset), including an inn and a Methodist church. In the Bournedale area, a small textile mill and a factory that produced axes and triphammers were established. In Bourne Village (Monument), a Congregational church was built in 1794 and the settlement continued to grow. Other new communities were associated with a salt works north of Monument. Pocasset emerged as a local transportation center, and it also had ironworks. The majority of these villages were located along the coasts of Buzzard's Bay and Cape Cod Bay, while inland was primarily undeveloped woodland (Maps 1-2, Appendix B). In Sagamore, the Herring River provided power for small industries, including a woolen mill and a nail factory, both built in 1831. The nail factory was later turned into the Manomet Iron Works, a foundry. These economic pursuits flourished in concurrence with agriculture, wood cutting, and maritime activities (MHC 1984: 7-8) (Image 1, Appendix C).

In the mid- to late 19th century, transportation routes were expanded and new markets developed. The Cape Cod Branch Railroad was established in 1848, first running from Middleboro to the center of Sandwich. On the north side of the Monument River, the railroad's arrival fostered the growth of wharves and facilities to transport coal. The railroad also contributed to the cranberry industry in Bourne. The Woods Hole Branch Railroad began providing service in 1872, running from Buzzard's Bay through Bourne Village (Monument) south to Cataumet (MHC 1984: 8-13).

The late 19th to the early 20th century constituted the period of fastest growth in Bourne, mostly due to the railroad. By 1915 Bourne was the fourth largest town on the Cape (after Barnstable, Falmouth, and Provincetown). The railroad provided transportation for tourists, and hotels were erected near the railroad depot in the village of Buzzard's Bay, which began to develop into a commercial center (Images 2-3, Appendix C). Summer estate properties sprang up along the Buzzard's Bay coast and Buttermilk Bay. In Bourne Village and Buzzard's Bay, municipal buildings were constructed in this period, including the town hall, the library, and the high school (Images 4-5, Appendix C). In Sagamore, the Keith Manufacturing Company (founded in 1829 for blacksmithing and wheel production, later shifting to tools, carriages, stage coaches, schooners, and railroad cars) built a large factory (Image 6, Appendix C). Housing was also erected to accommodate its workforce. By 1910, Sagamore Beach to the north had a hotel and small collection of houses. Industry such as ironworks and tool production continued to flourish in Bourne, along with the emerging tourist economy (MHC Reconnaissance Survey Town Report 1984: 10-16) (Image 7, Appendix C).

3.3 CAPE COD CANAL

The Cape Cod Canal is located at an eight-mile isthmus separating Buzzard's Bay from the Cape Cod Bay. Before the canal, the isthmus was crossed by the Monument (Manomet) and Scusset rivers and Herring Brook. In order to avoid navigating around Cape Cod, Native populations would travel on the Manomet and Scusset rivers (about five miles were navigable) and portage their boats between the river valleys. Plans for a canal through the isthmus had been proposed in 1627 by William Bradford, Governor of Plymouth Colony, and possibly as early

as 1623 by Miles Standish, the colony's military leader. George Washington ordered the first survey of the area in 1776 (Map 8, Appendix B). A series of surveys was undertaken in the late 18th century and throughout the 19th century, and several canal building campaigns began and were subsequently abandoned (Orwig 2013: 7-8)(Map 9, Appendix B).

The successful completion of the canal was accomplished by August Perry Belmont (1853-1924), who purchased the Boston, Cape Cod and New York Canal Company. Led by engineer William Barclay Parsons (1859-1932), work began in 1909. The canal was constructed with dredges, steam shovels, and narrow-gauge railroad equipment (Images 8-11, Appendix C). It first opened in 1914 on a limited basis as a privately-owned toll waterway (Image 12, Appendix C). The original crossings comprised a ferry service for passengers in Bournedale, two highway drawbridges, and a railroad drawbridge. Dredging continued until 1916 to increase the canal depth to 25 feet (Orwig 2013: 7-8; MHC Area Form BOU.AF 2000: 6-14) (Map 10, Appendix B).

When German submarines threatened U.S. vessels off of Cape Cod during World War I, the federal government assumed jurisdiction and operation of the Cape Cod Canal in 1918, made improvements, and returned it to private ownership in 1920. The U.S. government purchased the canal in 1928 and the U.S. Army Corps of Engineers was tasked with its improvements and operation as a free waterway. During the Great Depression in the 1930s, the Corps undertook an extensive canal reconstruction, straightening the Buzzards Bay approach channel, widening and deepening the waterway, and replacing the bridges (Map 11, Appendix B; Image 13, Appendix C). The bridges were completed in 1935 and the canal work was finished in 1940. At 480 feet wide and 32 feet deep, the Cape Cod Canal was the widest sea-level canal worldwide (MHC Area Form BOU.AF 2000: 17-18).

3.4 CAPE COD CANAL BRIDGES

Before the canal was built, the Monument River had a wooden bridge built in 1824, which was replaced in 1892. The later bridge was removed in 1914. These bridges were located near Bridge Street, now known as Old Bridge Road in Buzzards Bay and Keene Street in Bourne Village.

The canal necessitated the construction of three new bridges and related railroads and roadways. During canal construction, the railroad was relocated and a new steel Strauss trunnion bascule railroad bridge was completed in 1910. The Bourne Highway Bridge (1911), included a streetcar sidetrack for the New Bedford & Onset Street Railway, which operated in Bourne 1901-1926 (Image 14, Appendix C). The north abutment of this bridge is still extant, west of the Bourne Bridge. The Sagamore Highway Bridge was completed in 1913, on the site of the Willow Dam on Swift Mill pond, which was drained when the canal was built (Image 15, Appendix C). The two highway bridges were steel, on concrete footings, with deck girders and truss spans that flanked Scherzer double-leaf rolling bascule bridges. Road improvements followed the bridge construction. In the 1920s, the new Route 3 was extended to reach Sagamore, and Route 6 was built through Buzzards Bay and Sagamore. Route 28 was an upgraded county road that led to Falmouth (MHC Area Form BOU.AF 2000:11).

The location of the 1934-1935 Cape Cod Canal highway bridges that accompanied U.S. Army Corps of Engineers' canal reconstruction had been a source of debate. The government had proposed a single new highway bridge mid-way along the canal. The single-bridge plan was rejected by local communities, however, and the new Bourne and Sagamore bridges were constructed close to the 1911 and 1913 drawbridges (MHC Area Form BOU.AF 2000:13). The

award-winning, nearly identical bridges were designed by Fay, Spofford, and Thorndike of Boston, in collaboration with architectural firm Cram and Ferguson (Images 16-19, Appendix C). Accompanying traffic circulation upgrades were upgraded four-lane highways, the rotaries, and the Route 6 Sagamore bypass (MHC Area Form BOU.AF 2000: 13-14).

The new Buzzards Bay Railroad Lift Bridge was located to the east of the 1910 railroad bridge (Image 20, Appendix C). It was designed by Parson, Klapp, Brinckerhoff and Douglas of New York, in collaboration with the architectural firm of McKim, Mead & White for the towers' decorative treatment. It was completed in 1935 (MHC Area Form BOU.AF 2000:14).

4.0 EXISTING CONDITIONS: CAPE COD CANAL AND BRIDGES

4.1 CAPE COD CANAL

The Cape Cod Canal (MHC ID BOU.AF, SDW.Z, and WRH.V), owned and operated by the U.S. Army Corp of Engineers, is located within the towns of Bourne, Sandwich, and Wareham (Figure 1, Appendix A; Photographs 1-4, Appendix D). The Cape Cod Canal and its approach channels are roughly 18 miles long, extending from the Cleveland Ledge Lighthouse in Buzzards Bay to the North Breakwater in Sandwich, on the Cape Cod Bay.

The land-cut canal section (visible above water) is about 8 miles long, extending from the Buzzards Bay village in the town of Bourne to the Cape Cod Bay in Sandwich. The canal is a man-made, sea-level waterway, with an average width of 540 feet at the water's surface that narrows to 480 feet at the bottom. There are access roads on both sides of the canal that are used for biking and pedestrian recreation. Three bridges span the canal: the Bourne Bridge, the Sagamore Bridge, and the Buzzards Bay Railroad Lift Bridge.

The MHC survey of the Cape Cod Canal identifies it as a district that is potentially eligible for the National Register of Historic Places (NRHP), consisting of 23 historic resources. Eighteen of the 23 retain a significant amount of historic integrity and would be contributing resources. The five non-contributing resources are located at the ends of the canal, outside of the Project Focus Area. The eastern end of the canal, and the land just north of it in Sandwich (but not in Bourne), is included in SDW.R (the Old King's Highway Regional Historic District) and is listed in the State Register. (See section 5.5.1 regarding the Old King's Highway Regional Historic District.)

4.2 BOURNE BRIDGE

The 1934 Bourne Bridge (BOU.919) carries a highway (Route 6W and Route 28) over the canal in Bourne, from the village of Buzzards Bay to Bourne Village (Figure 2, Appendix A; Photographs 5-6, Appendix D). The three-span bridge has a continuous swinging-type deck and through riveted steel Warren-type truss. Its overall length is 2,384 feet. The arched center span is 616 feet long, and the highway deck is suspended from the lower truss chords by steel wire cables. The center span is flanked by Warren deck truss spans that are each 396 long, as well as 2 additional approach spans on each side. The overall deck width is 487 feet. Vertical clearance under the bridge is 135 feet. The bridge has concrete open-web column piers and concrete abutments. The concrete piers feature Art Moderne stylistic elements. MHC has determined that the Bourne Bridge is individually eligible for the NRHP.

4.3 SAGAMORE BRIDGE

The 1935 Sagamore Bridge (BOU.918) is almost identical to the Bourne Bridge (Figure 2, Appendix A; Photographs 7-8, Appendix D). It carries Route 6 over the canal from North Sagamore to South Sagamore in the town of Bourne. The three-span bridge has a continuous swinging-type deck and through riveted steel Warren-type truss. Its overall length is 1,408 feet. The arched center span is 616 feet long, and the highway deck is suspended from the lower truss chords by

steel wire cables. The center span is flanked by Warren deck truss spans that are each 396 long supported by concrete abutments. The overall deck width is 487 feet. Vertical clearance under the bridge is 135 feet. The bridge's concrete piers feature Art Moderne stylistic elements. MHC has determined that the Sagamore Bridge is individually eligible for the NRHP.

4.4 BUZZARDS BAY RAILROAD LIFT BRIDGE

The 1935 Buzzards Bay Railroad Lift Bridge (BOU.901) is a Waddell patent vertical lift bridge with Warren-type trusses (Figure 2, Appendix A; Photograph 9, Appendix D). It has two approach spans, two towers, and an arched center lift span is that 544 feet long; all are of riveted steel frame construction. The steel superstructure is supported by granite block substructure. The approach spans are each 128 feet long, with 4-panel X-braced through-trusses. The control booth is located on the east side. When the center span is lifted, the vertical clearance under the bridge is 135 feet. Each tower is surmounted by conical openwork pinnacles that rest on the bridge drive houses. The Buzzards Bay Railroad Lift Bridge is potentially eligible for individual listing in the NRHP. It is located just west of the Project Focus Area.

5.0 EXISTING CONDITIONS: NON-CANAL HISTORIC RESOURCES

5.1 NORTH OF CANAL: BOURNE

5.1.1 Head of the Bay & Surrounding Area

Head of the Bay (BOU.C) is a small MHC-inventoried area on the east side of Buttermilk Bay, north of the Cape Cod Canal, along Head of the Bay Road (Figure 2, Appendix A). There are 4 inventoried houses (BOU.28 through BOU.31) dating from the 1680s to ca. 1840 in a rural setting (Photograph 10, Appendix D). Further research will be necessary to determine this area's NRHP eligibility. It is located northwest of the Project Focus Area.

Just southeast of BOU.C, the ca. 1725 Gibbs House was identified in 1999 as a potential NRHP individually-eligible resource. Since that time, its integrity of setting has been compromised by a large new house built adjacent to it (Photograph 11, Appendix D).

The Head of the Bay Cemetery (BOU.803) is located south of BOU.C, on the west side of Head of the Bay Road, and within the Project Focus Area. It is a small cemetery, less than one acre and with about 25 grave markers, dating from 1885 to 1996 (Photograph 12, Appendix D).

5.1.1.1 NRHP Potential Individually-Eligible Resources

- The ca. 1725 Gibbs House (BOU.60), 295 (formerly 291) Head of the Bay Road, is located south of BOU.C and is just north of the Project Focus Area.

Refer to Appendix E, Table 1.

5.1.2 Buzzards Bay Main Street & Surrounding Area

The Main Street Commercial Area (BOU.J) is located in the village of Buzzards Bay on the north side of the Cape Cod Canal (Figure 2, Appendix A). The Project Focus Area overlaps the east end of this inventoried area. BOU.J is about 35 acres in size, with architecture ranging from the late 19th to the early 20th centuries, including commercial and residential uses along Main Street. There is little landscaping and most buildings are sited close to the street. Infill buildings from the second half of the 20th century are located throughout the area, and many of the earlier buildings have been altered. Stylistically, the area includes several examples of the Gothic, Spanish, Classical, and Colonial Revivals, Art Deco, Craftsman Bungalows, but many of the commercial buildings and modest houses have no particular style. The Bourne Family Cemetery (BOU.804) is set back from Main Street behind a parking lot. It has about 12 grave markers dating from 1862 to the early 20th century. This area contains 20 inventoried resources.

According to the MHC survey, the eligibility of this area as a NRHP district appears to be low. The Buzzards Bay Railroad Station at the west end of the area is a potential NRHP individually-eligible resource (Photographs 13-14, Appendix D). The Bourne Town Hall, just south of the area

boundaries, is individually listed in the NRHP and the State Register (Image 5, Appendix C; Photograph 15, Appendix D).

The Mass. Army National Guard Armory (BOU.388), just north of the BOU.J boundary, has been determined by MHC to be individually NRHP-eligible (Figure 2, Appendix A; Photograph 16, Appendix D). The Abraham F. Swift House, also south of the area boundary, is potentially NRHP individually-eligible (Photograph 17, Appendix D). These resources are located within the Project Focus Area.

South of the district along the Cape Cod Canal, the First Bourne Bridge Abutment (BOU.940) and the Cape Cod Canal Electrical Substation (BOU.389), at the south end of Perry Avenue, are part of the Cape Cod Canal area (BOU.AF), potentially eligible as a NRHP district (Photographs 18-19, Appendix D). These resources are located with the Project Focus Area.

5.1.2.1 NRHP-Listed Individual Resources

- Bourne Town Hall (BOU.AE; BOU.68), 24 Perry Ave. is just south of BOU.J.

5.1.2.2 NRHP Individually Eligible Resources per MHC Opinion

- Mass. Army National Guard Armory (BOU.388)10 Armory Rd, just north of BOU.J.

5.1.2.3 NRHP Potential Individually-Eligible Resources

- Buzzards Bay Railroad Station (BOU.65) and Tower (BOU.66) on Main Street at Academy Drive, just west of the project focus area.
- Abram Swift House (BOU.67), 37 Old Bridge Street, is located southeast of BOU.J adjacent to the Cape Cod Canal and within the Project Focus Area.

Refer to Appendix E, Table 1.

5.1.3 Bournedale & Surrounding Area

The Bournedale Area (BOU.I) is located on the north side of the Cape Cod Canal between the Bourne and Sagamore bridges (Figure 2, Appendix A). It lies entirely within the Project Focus Area. The inventoried area is about one mile in length, beginning at the south end at Route 6 (Scenic Highway) and extending north along Bournedale Road and Herring Pond Road. The resources in Bournedale include examples from the 17th, 18th, 19th, and 20th centuries. The area is sparsely settled, with some late 20th-century infill located mostly along residential side roads. The streets are lined with mature trees. The Bournedale area includes 16 inventoried resources.

The architecture of the Bournedale area is primarily residential, but includes several commercial buildings and a former school. This area includes examples of the Federal, Greek Revival, Gothic Revival, and Victorian Eclectic styles, as well as traditional "Cape Cod" houses with few stylistic details, and other buildings of no particular style from the 19th and early 20th centuries.

There are several important sites and structures in Bournedale. Burying Hill (BOU.920) on Herring Pond Road is a focal point as the site of the First Meeting House (non-extant) and Native

American burials (Photographs 20-21, Appendix D). This hill is one of the highest points north of the Cape Cod Canal. The Herring Run (BOU.921), at the west end of the Carter Beal Conservation Area located west of Bournedale Road (Photograph 22, Appendix D). Just outside the southwest corner of the Bournedale area is the 1936 Herring Run Fish Ladder (BOU.938), which runs along Route 6 east, adjacent to the Cape Cod Canal (Photograph 23, Appendix D). The Herring Run Fish Ladder is inventoried as part of the Cape Cod Canal area (BOU.AF), which is potentially eligible as a NRHP district.

Further research will be necessary to determine Bournedale's NRHP eligibility. The 1897 Village School is individually listed in the NRHP and the State Register (Figure 2, Appendix A; Photograph 24, Appendix D). Three properties are potential NRHP individually-eligible resources: the Wilson D. Bent, Sr. House, the Josiah Ellis House, and the Nathan Bourne Ellis House and Bournedale Lodge (Photographs 25-27, Appendix D). The Mason White/Battles House was previously identified as a potential NRHP individually-eligible resource, but its integrity has since been compromised by incompatible door and window replacement and vinyl siding (Photographs 28, Appendix D).

North of the Bournedale, within the Project Focus Area, is the Indian Cemetery (BOU.800) located on the south shore of Great Herring Pond (Photograph 29, Appendix D). The cemetery straddles the Bourne/Plymouth town line and is the same resource as Indian Cemetery (PLY.800). It comprises 16 grave markers, with the earliest marker dating to 1849, and likely includes earlier unmarked graves. The cemetery is still in use. It is potentially eligible for the NRHP as a contributing resource to the Cedarville Area in Plymouth (PLY.G). See Section 5.2.

5.1.3.1 NRHP-Listed Individual Resources

- Bournedale Village School (BOU.57), 29 Herring Pond Rd.

5.1.3.2 NRHP Potential Individually-Eligible Resources

- Wilson D. Bent, Sr. House (BOU.55) and garage (BOU.56), 9 Bournedale Rd.
- Josiah Ellis House (BOU.209) and barn (BOU.210), 166 Herring Pond Rd.
- Nathan Bourne Ellis House (BOU.211) and Bournedale Lodge (BOU.212, 213), 854 Route 6 (Scenic Highway).

Refer to Appendix E, Table 1.

5.1.4 North Sagamore

North Sagamore (BOU.O) is located on the north side of the Cape Cod Canal, east of the Sagamore Bridge, and entirely within the Project Focus Area (Figure 2, Appendix A). It is north of Savery Avenue (BOU.P), and south of Sagamore Beach (BOU.U). North Sagamore is about 90 acres in size, with architecture that ranges from the early 18th through the early 20th centuries, including houses and several garages, a school, and a church. Most are located along Old Plymouth, Williston, and Hunters Brook roads. North Sagamore's architecture includes traditional "Cape Cod" houses with few stylistic details as well as examples of the Greek Revival, Classical Revival, and Victorian Eclectic styles. BOU.O contains 13 inventoried resources; some historic resources in this area remain un-inventoried.

Further research would be necessary to determine this area's NRHP eligibility. Three properties within it are potential NRHP individually-eligible resources: the Swift Memorial Methodist Episcopal Church, the Sagamore Grammar School, and the Captain William Crowell Gibbs House (Image 21, Appendix C; Photographs 30-32, Appendix D).

5.1.4.1 NRHP Potential Individually-Eligible Resources

- Swift Memorial Methodist Episcopal Church (BOU.118), 10 Williston Rd.
- Sagamore Grammar School (BOU.119), 30 Williston Rd.
- Captain William Crowell Gibbs House (BOU.281) and outbuildings (BOU.282, 282), 252 Old Plymouth Rd.

Refer to Appendix E, Table 1.

5.1.5 Savery Avenue

Savery Avenue (BOU.P) is located along the north side of the Cape Cod Canal, east of the Sagamore Bridge, and entirely within the Project Focus Area (Figure 2, Appendix A; Image 22, Appendix C; Photographs 33-34, Appendix D). It is just south of North Sagamore (BOU.P). The Savery Avenue area contains about 3 acres, with closely-spaced houses of 2 types (Dutch Colonial Revival and hipped-roof Four Squares) constructed ca. 1908-1909. It contains 15 inventoried resources. Further research would be necessary to determine this area's NRHP eligibility.

Refer to Appendix E, Table 1.

5.1.6 Sagamore Beach

Sagamore Beach (BOU.U) is an MHC-inventoried area located on Cape Cod Bay, on the north side of the Cape Cod Canal (Figure 2, Appendix A). It consists of about 100 acres, with residential properties ranging from the late 17th to the early 20th centuries; most date to the early 20th century. There are 13 inventoried resources and additional un-inventoried historic resources. Sagamore Beach is located just northeast of the Project Focus Area.

Further research would be necessary to determine this area's NRHP eligibility. Three of its inventoried properties, the Crowell Farm, Assembly Hall, and the Rev. William E. Wolcott House, are potential NRHP individually-eligible resources (Photographs 35-37, Appendix D).

5.1.6.1 NRHP Potential Individually-Eligible Resources

- Crowell Farm (BOU.27), 31 Crowell Rd.
- Assembly Hall/Harold S. Clark Hall (BOU.175), 30 Robinson Rd.
- Rev. William E. Wolcott House, (BOU.323), 39 Robinson Rd.

Refer to Appendix E, Table 1.

5.2 NORTH OF CANAL: PLYMOUTH

5.2.1 Cedarville

The Project Focus Area includes a small area in Plymouth at the southern edge of Great Herring Pond. This area is part of Cedarville (PLY.G), an MHC-inventoried area on the east and south sides of the pond (Figure 2, Appendix A). It consists of residential and commercial properties ranging from ca. 1800 to the present along with a church and five cemeteries. Most of the houses are mid-19th century Greek Revival. Before European settlement, the area was a large Wampanoag settlement known as Comassukumkanet, and later as the Herring Pond Indian Reservation.

Within the Project Focus Area is the Indian Cemetery (PLY.800), the same resource as Indian Cemetery (BOU.800), located on the south shore of Great Herring Pond (Photograph 29, Appendix D). The cemetery straddles the Bourne/Plymouth town line. It comprises 16 grave markers, with the earliest marker dating to 1849, and likely includes earlier unmarked graves. The cemetery is still in use. It is potentially eligible for the NRHP as a contributing resource to the Cedarville Area (PLY.G). See Section 5.1.3.

Refer to Appendix E, Table 1.

5.3 NORTH OF CANAL: SANDWICH

5.3.1 Sagamore Hill Gun Battery

The Sagamore Hill Gun Battery (SDW.AA) is just east of the Project Focus Area on Cape Cod Bay, located within SDW.Z, the eastern end of the Cape Canal in the town of Sandwich (Figure 2, Appendix A). The Sagamore Hill Gun Battery area is about one acre in size, located at the top of Sagamore Hill in the Scusset Beach State Reservation (Photograph 38, Appendix D). It consists of two “Panama”-type gun mounts and two accompanying shelters. This installation dates to 1941-1942, constructed by the U.S. Army Corps of Engineers for the protection of the Cape Cod Canal during World War II. It is potentially eligible for the NRHP.

The Sagamore Hill Gun Battery is included in SDW.R (the Old King’s Highway Regional Historic District and is listed in the State Register. See section 5.5.1 regarding the Old King’s Highway Regional Historic District.

Refer to Appendix E, Table 1.

5.4 SOUTH OF CANAL: BOURNE

5.4.1 Keene Street – Sandwich Road

Keene Street – Sandwich Road Area (BOU.A) is located in Bourne Village, on the south side of the Cape Cod Canal and west of the Bourne Bridge (Figure 2, Appendix A). It lies entirely within the Project Focus Area. It is about 24 acres in size, with architecture that ranges from the late 17th to the early 20th centuries, including a mix of residential and institutional uses. The area extends

along Sandwich Road from the intersection of Perry Avenue and Sandwich, Trowbridge, Waterhouse, Cotuit, and Shore roads at the west end, to the intersection of Sandwich Road and Coastal Way at the eastern end. It also includes Keene Street, which is a loop road on the north side of Sandwich Road, adjacent to the Cape Cod Canal. The area includes 23 inventoried buildings.

The architecture of the Keene Street – Sandwich Road Area is primarily residential but also includes several institutional buildings. This area provides a remarkable view of Bourne Village's history, including buildings and structures from its inception as a settlement through the early 20th century, as Bourne was developing into a vacation destination. Architecture in this area includes the Federal, Greek Revival, Italianate, Victorian Eclectic, and Classical Revival styles, as well as traditional "Cape Cod" houses.

According to the MHC survey, the Keene Street – Sandwich Road Area is eligible for listing in the NRHP as a district. Three buildings are already listed in the NRHP and the State Register: the George I. Briggs House (BOU.1), the Jonathan Bourne Public Library (BOU.13, now the Jonathan Bourne Historical Center), and the Bourne High School (BOU.4, now the Waldorf School of Cape Cod) (Figure 2, Appendix A; Image 23, Appendix C; Photographs 39-41, Appendix D).

In the Keene Street – Sandwich Road Area (BOU.A), 6 properties in the Project Focus Area are potential NRHP individually-eligible resources: the Arabella Parker-George Ellis House, the Moses Waterhouse House, the Ordello Swift House, the Alonzo E. Booth Blacksmith Shop, the Jonathan Bourne Public Library (former Bourne Grammar School), and the Albert E. Eldridge House (Photographs 42-47, Appendix D).

East of BOU.A, also in the Project Focus Area, is the Deacon Gershom Ellis/Henry S. Blackwell House (BOU.50), previously identified as a potential NRHP individually-eligible resource. The integrity of the house has since been compromised by incompatible door and window replacement and vinyl siding (Photograph 48, Appendix D).

5.4.1.1 NRHP-Listed Individual Resources

- George I. Briggs House (BOU.1), 22 Sandwich Rd.
- Jonathan Bourne Historical Center (former Jonathan Bourne Public Library) (BOU.13), 30 Keene St.
- Old Bourne High School (BOU.4), 86 Cotuit Rd.

5.4.1.2 NRHP Potential Individually-Eligible Resources

- Arabella Parker-George Ellis House (BOU.49), 66 Sandwich Road
- Moses Waterhouse House (BOU.12 and barn (BOU.200), 59 Keene St.
- Ordello Swift House (BOU.45) and barn (BOU.46), 60 Keene St.
- Alonzo E. Booth Blacksmith Shop (BOU.48), 22 Sandwich Rd.
- Jonathan Bourne Public Library (former Bourne Grammar School) (BOU.14), 19 Sandwich Rd.
- Albert E. Eldridge House (BOU.10) and barn (202), 43 Sandwich Rd.

Refer to Appendix E, Table 1.

5.4.2 Shore Road North

Shore Road North Area (BOU.AH) is located in Bourne Village, just west of the Keene Street – Sandwich Road Area (BOU.A), on the south side of the Cape Cod Canal and west of the Bourne Bridge (Figure 2, Appendix A; Photographs 49-52, Appendix D). It lies entirely within the Project Focus Area. Much of its architecture dates from the19th and early 20th centuries and is primarily residential in use. The area extends west along Shore Road from the intersection of Perry Avenue and County Road. The area includes over a dozen inventoried resources, including the Oakland Grove Cemetery (BOU.802).

The architecture of the Shore Road North Area is primarily residential, with good examples of the Greek Revival, Italianate, Colonial Revival, and Craftsman styles. The MHC survey of this area is still in production and a full draft was not available to review for this report. Information will be updated as it becomes available. The NRHP eligibility of BOU.AH as a district has not been fully evaluated.

The Rev. Herman Perry House has been identified as a potential NRHP individually-eligible resource (Photograph 53, Appendix D).

5.4.2.1 NRHP Potential Individually-Eligible Resources

- Rev. Herman Perry House (BOU.51), 7 Shore Rd.

Refer to Appendix E, Table 1.

5.4.3 Aptucxet Trading Post

The Aptucxet Trading Post Area (BOU.AG) is located in Bourne Village, west of the Keene Street – Sandwich Road Area (BOU.A), on the south shore of the Cape Cod Canal and west of the Bourne Bridge (Figure 2, Appendix A). It lies entirely within the Project Focus Area. The Aptucxet Trading Post building is a 1930 replica of the trading post established in 1627 by Plymouth Colony, representing the first European settlement in Bourne (Photograph 54, Appendix D). The current building was constructed on the foundation of the original trading post. The area contains 10 inventoried resources, including an outbuilding associated with saltworks.

The MHC survey of this area is still in production and a full draft was not available to review for this report. Information will be updated as it becomes available. This area is potentially eligible for listing in the NRHP as a district.

Refer to Appendix E, Table 1.

5.4.4 County Road North

County Road North Area (BOU.AJ) is located in Bourne Village, just west of the Keene Street – Sandwich Road Area (BOU.A), on the south side of the Cape Cod Canal and west of the Bourne Bridge (Figure 2, Appendix A; Photographs 55-57, Appendix D). It lies almost entirely within the Project Focus Area. Much of its architecture dates from the19th and 20th centuries and is primarily residential. The area extends south along County Road from the intersection of Shore Road and

Trowbridge Road. The area includes over three dozen inventoried resources, including the Oakland Grove Cemetery (BOU.801).

The MHC survey of this area is still in production and a full draft was not available to review for this report. Information will be updated as it becomes available. The NRHP eligibility of BOU.AJ as a district has not been evaluated.

The Deacon Elijah Perry House (BOU.43 and barn (BOU.44) have been identified as a potential NRHP individually-eligible resource (Photograph 57, Appendix D).

5.4.4.1 NRHP Potential Individually-Eligible Resources

- Deacon Elijah Perry House (BOU.43) and barn (BOU.44), 203 County Rd.

Refer to Appendix E, Table 1.

5.4.5 Cape Cod Air Station – Otis Air Force Base

Cape Cod Air Station – Otis Air Force Base (BOU.B), sometimes also referred to the Camp Edwards, is now known as the Joint Base of Cape Cod (JBCC) (Figure 2, Appendix A). It serves as the base for several military commands training for missions in the USA and international missions. The base has about 22,000 acres on the south side of the Cape Cod Canal. The northern 15,000 acres are largely undeveloped (the largest undeveloped parcel on Cape Cod) and is used for soldiers' training. Within this area, there are several inventoried resources (BOU.351 through BOU.358) associated with the Cape Cod Air Station's PACE PAWS radar station, located on Flatrock Hill. These buildings and structures were constructed 1978 to 1985, of insufficient age to be NRHP-eligible. Many Camp Edwards resources have been documented by the Historic American Buildings Survey (HABS) program. Further research would be necessary to determine this area's NRHP eligibility.

No inventoried resources in the Cape Cod Air Station – Otis Air Force Base area are within, or adjacent to, the Project Focus Area or the proposed Route 6 lane addition.

Refer to Appendix E, Table 1.

5.4.6 South Sagamore

South Sagamore (BOU.V) is located on the east side of the Sagamore Bridge and is separated from North Sagamore by the Cape Cod Canal (Figure 2, Appendix A). It is located entirely within the Project Focus Area. South Sagamore is about 55 acres in size, with architecture ranging from the 18th through the early 20th centuries, including a mix of residential and commercial buildings as well as a church. It is a linear area with most resources located along Sandwich Road, with several on Pleasant and Burgess streets. Stylistically, the area has examples of the Federal, Greek Revival, Italianate, Victorian Eclectic, Queen Anne, Shingle, Colonial Revival, and Craftsman styles, as well as a number of buildings of no particular style. The South Sagamore area contains 41 inventoried resources, including houses, four apartment buildings, a cemetery, and three stone road markers. The cemetery is about seven acres, with roughly 500 grave markers dated from1803 to the present day.

South Sagamore's eligibility for listing in the NRHP as a district appears to be high. In the South Sagamore Area (BOU.V), eight properties are potential NRHP individually-eligible resources: the Burgess Homestead, the Isaac N. Keith House, the Old Gurney Store, the S. Harlow/Benjamin Harlow Pope House, the Crowell/Hannah Rebecca Burgess House, the C. G. Ellis House, the Rogers House, and the Freeman Farm Foreman's House (Photographs 58-65, Appendix D).

There are numerous historic buildings within the surveyed area that remain un-inventoried; a cursory walking survey identified over 30 additional buildings. In addition, side streets outside of the surveyed area such as Adams, Commonwealth, and Westdale streets include many un-inventoried late 19th to early 20th-century buildings that, although modest, retain historic integrity. The walking survey identified close to 20 such buildings (Photographs 66-69, Appendix D).

5.4.6.1 NRHP Potential Individually-Eligible Resources

- Burgess Homestead (BOU.177), 11 Burgess St.
- Keith House (BOU.184) and garage (BOU.185), 66 Pleasant St.
- Old Gurney Store (BOU.186), 896 Sandwich Rd.
- S. Harlow/Benjamin Harlow Pope House (BOU.188), 941 Sandwich Rd.
- Crowell/Hannah Rebecca Burgess House (BOU.192) and barn (BOU.193), 1005 Sandwich Rd.
- C. G. Ellis House (BOU.344), 1071 Sandwich Rd.
- Rogers House (BOU.345), 1085 Sandwich Rd.
- Freeman Farm Foreman's House (BOU.194) and barn (BOU.195), 1101 Sandwich Rd.

Refer to Appendix E, Table 1.

5.5 SOUTH OF CANAL: SANDWICH

5.5.1 Old Kings Highway Regional Historic District

This regional district, which includes the area north of Route 6 in the towns of Sandwich, Barnstable, Yarmouth, Dennis, Brewster, and Orleans, was established in 1973. It is the largest historic district in the United States. Its purpose is to "promote the general welfare of the inhabitants of the applicable regional member towns so included, through the promotion of the educational, cultural, economic, aesthetic and literary significance through the preservation and protection of buildings, setting and places within the boundaries of the regional district and through the development and maintenance of appropriate settings and the exterior appearance of such buildings and places, so as to preserve and maintain such regional district as a contemporary landmark compatible with the historic, cultural, literary and aesthetic tradition of Barnstable County, as it existed in the early days of Cape Cod, and through the promotion of its heritage" (Old King's Highway 2008: 3).

The district is administered by the Old King's Highway Historic District Commission of six members, who also serve as chairmen of the six member towns' Historic District Committees. Within the district, new buildings, structures, or parts thereof must receive a certificate of appropriateness or certificate of exemption issued by the town's Historic District Committees. No building, structure,

or part thereof may be demolished or removed until an application has been filed with the Historic District Committee and a certificate for demolition has been filed with the town. Signs and billboards are also regulated (Old King's Highway 2008: 5-8).

The Sandwich section of this regional historic district is area is included in the MHC inventory as SDW.R (Figure 2, Appendix A). It is located within the Project Study Area but outside the Project Focus Area. The proposed relocated Exit 1 is adjacent to the west end of this district. All SDW.R resources are listed in the State Register (SR). Resources in the Old King's Highway Regional Historic District that are located within or adjacent to the Project Focus Area are discussed in sections 4.1, 5.3.1, and 5.5.2 to 5.4.4.

Refer to Appendix E, Table 1.

5.5.2 Shawme Road

The Shawme Road Area (SDW.F) is located outside the Project Focus Area, just north of Route 6, on the west side of the highway's interchange with Route 130 (Figure 2, Appendix A). It is a small inventoried area consisting of a ca. 1900 summer colony, with 5 inventoried houses, several outbuildings, and an open-air theater (Photograph 70, Appendix D). It is a good example of the many summer colonies built on Cape Cod in the late 19th and early 20th centuries, and it is the only such colony in Sandwich.

According to the MHC survey, the Shawme Road Area is eligible for listing in the NRHP as a district. It is located in the Old Kings Highway Regional Historic District (SDW.R). All resources in this local district are listed in the State Register.

East of the Shawme Road Area are two bridges (SDW.906 and 907) that carry Route 6 over Route 130 (Photograph 71, Appendix D). They are located in the Old King's Highway Regional Historic District (SDW.R) and are listed in the State Register. They would likely be affected by work at this interchange.

Refer to Appendix E, Table 1.

5.5.3 Route 6A West

The Route 6A West Area (SDW.G) is a section of the road that was built in the 1930s as a bypass to Main Street/Route 130 (Figure 2, Appendix A). It is located within the Project Study Area but outside the Project Focus Area. This inventoried area is a modern suburban landscape, with motor courts and other commercial buildings with paved parking lots, along with houses and lawns (Photographs 72-73, Appendix D). All buildings were constructed in the 20th century, and most date to after World War II. It also contains the Saddle and Pillion Burial Ground (SDW.802), a small late 17th-century cemetery (Photograph 74 Appendix D). The proposed relocated Exit 1 is adjacent to the west end of this inventoried area, close to this cemetery and a collection of 20th-century motor courts and houses.

According to the MHC survey, the eligibility of this area as a NRHP district appears to be low. It is located in the Old King's Highway Regional Historic District (SDW.R). All resources in this local district are listed in the State Register.

Refer to Appendix E, Table 1.

5.5.4 Main Street – Route 130

The Main Street – Route 130 Area (SDW.I) is a section of road that traverses the original Old King's Highway route (Figure 2, Appendix A). It is located within the Project Study Area but outside the Project Focus Area. Most of the buildings in this area are 20th-century houses, representing the trend toward suburbanization after World War II (Photographs 75-76, Appendix D). It also includes a number of 17th, 18th, and 19th-century buildings, along with two cemeteries. The proposed relocated Exit 1 is adjacent to the west end of this inventoried area.

According to the MHC survey, the eligibility of this entire area as a NRHP district appears to be low, but a small portion at its east end might be eligible as boundary increase of the NRHP-listed Town Center Historic District. This area is located in the Old King's Highway Regional Historic District (SDW.R). All resources in this local district are listed in the State Register.

Refer to Appendix E, Table 1.

6.0 EXISTING CONDITIONS: ARCHAEOLOGICAL AND CULTURAL RESOURCES

6.1 PRE-COLONIAL ARCHAEOLOGICAL RESOURCES

The Cape Cod Canal is a 17.5-mile-long artificial water passage that connects Buzzards Bay to the west and Cape Cod Bay to the east. The canal lies mainly within the limits of the town of Bourne, though a small eastern portion falls within the town of Sandwich. Initially constructed between 1910 and 1914 by August Belmont, the canal widened and conjoined the path of two previously disconnected rivers, the Manomet (or Monumet) and the Scusset (Davin and Herbster 1994:102). The Manomet River originally ran from the extant Great Herring Pond to Buzzards Bay, while the Scusset was a tidal river surrounded by a saltwater marsh system (Figures 3a and 3b).

Due to the canal's location, there is a high probability that intact areas surrounding the present channel contain pre-colonial archaeological resources. This includes the yard areas of existing houses and other structures, as well as areas that may simply be capped with asphalt or gravel, such as parking lots. The Project Focus Area encompasses different environmental settings that would have been attractive for food procurement, habitation, transportation, water sources, or burial grounds. In addition to the rivers that once flowed through this area, there are several freshwater ponds including Bourne Pond, Great Herring Pond, Nightingale Pond, Foundry Pond, Goat Pasture Pond, Black Pond, Great Pond, and Horse Pond. Kettle ponds would have been a vital resource from the earliest days of human settlement on the Cape, but seem to have been especially attractive during the Middle Archaic Period (Herbster and Laskoski 2011:34). The current marsh systems at both mouths of the canal would also have provided important resources once sea levels stabilized, beginning around 3,000 B.P.

To date, there are over 30 documented pre-colonial archaeological sites within the Project Focus Area, as well as an additional 23 sites located along proposed alternatives that extend beyond the Project Focus Area (Figure 4, Appendix A; Table 10, Appendix E). Identified sites date from the Middle Archaic through Contact period and there are also several sites without diagnostic materials or features that cannot be assigned to a particular period.

6.1.1 Identified Pre-Colonial Sites

A number of sites were identified along the canal in the first half of the 20th century. In 1911, the Grove Field Ossuary site (19-BN-612) was accidentally discovered by Frederick F. Bumpus while digging a cesspool. This probable Late Woodland site was located just south of Bourne Pond, on the north side of the canal and about 2000 feet west of the Bourne Bridge and Connections option (Figure 4). The portion of the ossuary that was excavated contained a mixture of cremated and non-cremated remains of at least 15 individuals in a shallow trench. No artifacts were recovered from the investigation; the remains appeared haphazardly arranged, and the ossuary is believed to be the result of a massacre or an epidemic (Bradley 1989).

Further west, and on the opposite side of the canal, an inscribed stone slab called the Aptucxet Petroglyph (19-BN-218) was documented in 1939 by E.B. Delabarre (MHC Site Form 19-BN-218,

1967). According to Delabarre, the stone served as the doorstop at an Indian meeting house in 1658, with "pictographs made by Indians at that time or later." At the time of the report, the stone was being curated at the Aptucxet Trading Post. The trading post area, which is discussed in greater detail below, is located approximately 4300 feet west of the Bourne Bridge and Connections option (Figure 4).

In the 1940s, local avocational archaeologist Jesse Brewer documented several sites in the area surrounding the canal. In 1940, Brewer reported the destruction of a shell midden (19-BN-225) located on the north bank of the canal, between the Sagamore Bridge and the western edge of Scusset Beach State Park, about 2000 feet east of the Sagamore Twin option (Figure 4). In 1942, he recovered sherds from a large castellated Native pot along the northern bank of the canal where the Herring River now empties into the canal (Brewer 1961). The sherds were reassembled into an almost complete pot that is now housed in the Wampanoag Collection of Plimouth Plantation (Plimouth Plantation 2016). The pot is thought to be residual evidence of a Late Woodland/Contact village site (19-BN-224) destroyed by canal and road construction. Site 19-BN-224 is located along the path of the Scenic Highway option (Figure 4). In 1947, Brewer, along with William Whiting, excavated a rock shelter (19-PL-345), known as the Wampsett Rock site, on the Bourne/Plymouth line, located north of Goat Pasture Pond in the vicinity of Route 25 (Davin and Herbster 1994: 45). This rockshelter site did not produce diagnostic materials indicative of a particular time period, but excavations yielded several pre-colonial artifacts, including dozens of flakes and a possible hearth feature (the feature was not radiocarbon-dated). This site is located at the northern extent of the Project Focus Area along the Middle Bridge 1 option.

In 1977, an archaeological survey conducted prior to the construction of Route 25 located the Nightingale Site (19-BN-244), a pre-colonial site found west of Nightingale Pond and immediately northeast of the Bourne Bridge (Mueller et al. 1977), just west of the Bourne Bridge and Connections option (Figure 4). Artifacts included quartz debitage and a quartz biface fragment. The site has since been destroyed by a gas pipeline (Mueller et al. 1977). Another survey was conducted to the east of Nightingale Pond in 1977 by the Public Archaeology Laboratory, Inc. (PAL) for a proposed land development project (Mowchan and Gallagher 1988). Excavations produced two small loci of artifacts—one represented by two quartz flakes, and the other by a possible hearth feature. The lithic artifacts appeared to be isolated and were not considered significant enough for further testing, and the hearth was also not recommended for further testing because it could be avoided by construction.

A 1982 archaeological survey for the Route 25 alignment project identified several areas of pre-colonial artifact concentrations (Cheney 1982). The sites are located between Goat Pasture Pond and Horse Pond, east of Bourne Road and along the current path of Route 25. Valley Road, a former native trail that connected Great Herring Pond to Buttermilk Bay, runs through the survey area. Site 1 (19-BN-821) was identified based on a test pit with a quartz flake and charcoal fragments. Site 2 was located northeast of Wampsett Rock, which is the rockshelter site 19-PL-345 discussed above. The site contained 13 quartz flakes from two test pits adjacent to the rock, and additional test pits within the rock shelter displayed disturbance from the 1947 excavations. Site 3 contained two possible hearth features with fire-cracked rock but no further artifacts. In addition, three other areas that were collected by local residents clustered immediately south of these sites, and produced a variety of projectile points, most commonly small-stemmed quartz points.

A series of sites was located during a 1991 survey for a proposed wastewater treatment plant at the Otis Air Force Base in Bourne and Sandwich (Macomber 1991) (Figure 4). Most of the sites were found within a half-mile of the southern bank of the canal, between the Bourne and Sagamore bridges. The closest site to the canal's edge was located only about 150 meters south of the canal, directly across from Foundry Pond on the northern side. This site (19-BN-654) reflects an isolated quartz small stemmed projectile point base that was recovered from the topsoil in a test pit. An isolated quartz biface preform (19-BN-651) was found on the surface at the edge of a dirt access road on a power line right-of-way just northeast of Donnely Pond. Site 19-BN-655 consisted of an isolated surface find of a quartz small stemmed projectile point on a sloping edge of a dirt power line access road, about seven kilometers from the banks of the canal. About a mile northeast of this site, another isolated quartz small stemmed projectile point (19-BN-650) was recovered in the same manner. An isolated piece of quartz debris (19-BN-653) was found in the B horizon of a test pit just north of Discovery Hill. Less than a kilometer northeast, an isolated quartz small stemmed projectile point fragment (19-BN-656) was found on the ground surface. All of these sites represent isolated finds, and were not considered to be archaeologically significant at the time of survey. However, based on the number of identified sites and cultural materials, the Mashpee Wampanoag consider this portion of the base to have high cultural sensitivity (Figure 5; Ramona Peters, personal communication, September 2016).

In 1994, a PAL survey for a proposed gas pipeline located the Ridge Site (19-BN-685) in Bourne. The site was found on a ridge about 500 feet west of the Herring River, west of the terminus of Harding Lane (Figure 4). This location also abuts the eastern edge of the Carter Beale Conservation Area. The site contained six rhyolite flakes from a test pit and an array. The flakes were found within the first 30 centimeters of the test pits, which includes the upper B horizon. The site is described as a small upland temporary campsite or habitation site.

Also in 1994, PAL conducted an archaeological reconnaissance/inventory survey along the canal for the U.S. Army Corps of Engineers (Davin and Herbster 1994). The purpose of the survey was to locate areas of archaeological sensitivity to inform future construction plans. Several areas were considered to have low archaeological sensitivity due to prior disturbance. At the Buzzards Bay entrance to the canal, PAL ruled out the Rocky Point and Stony Point Dikes because both areas were artificially constructed to maintain the canal passage. The Army Corps Canal Field Office, located west of the railroad bridge on the north side of the canal, was found to be too developed to warrant testing. All of the bridges that traverse the canal—including the Bourne, Sagamore, and Railroad—were found to have disturbance in the areas below and adjacent to the structures. At the eastern mouth of the canal, the East Boat Basin was found to be heavily paved and developed.

Several areas were determined to have moderate to high archaeological sensitivity, resulting in further walkover assessment and subsurface testing. A total of 337 test pits were dug in nine areas along the canal (Davin and Herbster 1994). At Sagamore Hill, which is located in Sandwich at the eastern end of the canal within Scusset Beach State Reservation, two different loci of pre-colonial activity were located in undisturbed contexts. Sagamore Hill Locus 1 represents three flakes from two test pits on the hilltop, while Locus 2 represents eight flakes from seven test pits southeast of the hill, adjacent to wetlands. These loci were designated site 19-BN-687. This site, along with a village site identified immediately to the north (19-BN-227), fall just outside the Project Focus Area.

PAL also tested a linear transect between Route 6 and Canal Access Road on the north side of the canal in Bourne, immediately west of where the Herring River drains into the canal. The area

is considered highly sensitive due to the proximity of the Herring Run as well as site 19-BN-224 (Figure 4), which was found in the same area along the banks of the canal. In addition, U.S. Army Corps construction in this area in 1984 uncovered flakes and fragments of grit-tempered, decorated aboriginal ceramics. PAL's survey produced a total of 44 artifacts from nine test pits at depths of 0-70 cmbs. One of the test pits produced the highest density of pre-colonial materials from the entire canal survey, and also contained a possible feature. Another test pit produced a diagnostic Late Woodland Levanna projectile point. The site (19-BN-690), which was ultimately found to extend about 130 meters within the linear testing area, is likely a slice of a larger Late Woodland/Contact site that includes the artifacts previously discovered. These two sites are located within the path of the Scenic Highway option (Figure 4).

At the Midway Recreation Center in Bourne, PAL excavated 49 test pits within a 150-acre-area. Although a large portion of the area consisted of a gravel pit, the remaining intact area was thought to be archaeologically sensitive due to the proximity of the five findspot sites from the 1991 survey of the adjacent property (Macomber 1991). While PAL's excavations revealed natural soil profiles, no cultural materials were recovered.

PAL also surveyed two areas situated on either side of the canal to the east of the Bourne Bridge, about a half mile south of the Nightingale Site (19-BN-244) and Nightingale Pond. At the Bourne Recreation Area, which is located on the south side, PAL excavated 89 sterile test pits (i.e., contained no artifacts). Some of the test pits contained intact soils, while others were disturbed. On the north side, 26 sterile test pits were excavated at Bourne Scenic Park, most of which exhibited layers of fill over intact soils. A mile west of this area, PAL tested the Bourne Pond project area, a grassy strip paralleling the canal between Canal Service Road and residential housing. A transect of 28 test pits produced 26 flakes from seven pits, many of which exhibited disturbed soils. This since-named Bourne Pond-Canal Locus (19-BN-689) is within the vicinity of several archaeological sites, including the Grove Field Ossuary site (19-BN-612) and the Canal Place 1 and 2 sites (19-BN-886, 19-BN-887) (Figure 3). The site form also notes that residents of the immediate area have collected artifacts from their property that range in age from the Middle Archaic to Contact periods. The presence of these sites suggests that undisturbed areas in the westernmost portion of the Bourne Bridge and Connections option on the north side of the canal is highly sensitive for archaeological resources (Figure 4).

In the same survey, seven test pits were excavated at the Aptucxet Trading Post area, which is located west of the Bourne Bridge near the southern banks of the canal. The test pits contained intact soils and a small number of historic artifacts. The area was considered to be sensitive due to the high amount of cultural material found on the property. The Aptucxet Trading Post itself is a known historical site (BOU.5; discussed in greater detail below), and two other pre-colonial sites—the Hammond Site (19-BN-787) and the Cattail Site (19-BN-788)—have also been identified (Figure 4). The Hammond Site, which was excavated in the 1990s by Barbara Luedtke's field schools, produced over 140 flakes, four utilized flakes, one pestle fragment, an Onondaga chert Jack's Reef Pentagonal point, and a quartz point that is either a Jack's Reef Pentagonal or Fox Creek, as well as a Native American storage pit feature. Northwest of this area, adjacent to a small wetland, excavations at the Cattail Site produced over 300 flakes, two quartz cores, and one quartz biface or possible preform fragment in undisturbed soils. The trading post and adjacent sites are located in the southwest corner of the focus area and will not be directly impacted by any of the proposed options.

A 2003 University of Massachusetts Amherst survey of the Bourne and Sagamore rotaries identified an isolated quartz flake in a test pit. While no additional artifacts were found, the

authors surmised that the flake may be related to the series of sites located south of the Great Herring Pond, and the site was designated 19-BN-870 (Figure 4).

In 2005, PAL conducted a survey for a proposed housing development along the north side of the canal in Bourne, just west of Bourne Pond (Herbster and Millard 2005). Two sites were identified. Canal Place I (19-BN-886) produced a rhyolite Levanna projectile point, unidentified stone tool, 29 flakes, and a shell fragment. All of the artifacts were recovered from the plow zone except for one flake, which was found in intact subsoil. At Canal Place 2 (19-BN-887), a total of four flakes were found within the plowzone (Figure 4).

In 2007, PAL conducted a survey for improvements to Route 6 in Bourne, MA, on the north side of the canal, east of the intersection between Edgehill Road and Route 6 (Graves and Herbster 2007). About one-half-mile to the east is Foundry Pond and the outlet of Herring River into the canal. No artifacts were recovered from the excavation of 20 test pits. However, several artifacts were identified on the ground surface by Wampanoag Tribe of Gay Head/Aquinnah Tribal Historic Preservation Office members during the monitoring of construction. Artifacts included two rhyolite Levanna projectile points, as well as an unspecified number of flakes and bifaces.

A 2011 PAL survey for an NSTAR pole replacement project identified several areas with pre-colonial artifacts (Herbster and Laskoski 2011). The area with the highest artifact density was located at Pole 5, an area about 1.5 kilometers from the southern banks of the canal and west of the canal power plant. The site is bordered by a wetland to the east. Soil profiles indicated one or multiple layers of fill overlying a truncated plowzone and intact subsoils. At Pole 5, 37 of the 60 test pits contained cultural material, amounting to 1405 pre-colonial artifacts from both the plow zone and natural B subsoil. This included two Levanna projectile points, a Brewerton point, four untyped points, over 500 flakes, quartz bifaces, a steatite bowl fragment, aboriginal ceramic fragments, lithic cores, a drill, shell, charcoal, and calcined bone. At adjacent Pole 6, which is just east of 6A, 11 test pits were excavated, two of which contained a total of three flakes. To identify site boundaries, transects were placed between the Pole 5 and Pole 6, and between Pole 5 and the adjacent wetland. Between Poles 5 and 6, 15 of the 35 test pits produced a total of 387 flakes, three quartz projectile points, three bifaces, one quartz core, one calcined bone, and a shell fragment. Between Pole 5 and the wetland, 11 of the 15 test pits produced a total of 207 flakes, a quartz Levanna point, three bifaces, a groundstone fragment, and two shell fragments. Ultimately, the site extended from Pole 6 to about 40 meters east of Pole 5, where the wetland prevented any further testing. Due to evidence of site use from approximately 6,000 to 450 B.P., and the existence of previously identified findspots in the area, PAL recommended the site as eligible for listing in the NRHP.

6.1.2 Pre-colonial Archaeological Sensitivity

Despite the fact that the Project Focus Area surrounding the Cape Cod Canal includes small neighborhoods, major roadways, a rail line, and an artificially created waterway, there are many pockets of undeveloped and apparently undisturbed land, and these areas are likely to contain archaeological resources. Thus far, a combination of scattered professional testing and avocational collecting activities have revealed evidence of human occupation and activity in this area that ranges from the Middle Archaic Period to the present. While many sites have been officially recorded throughout the past century, there are likely numerous private collections with artifacts from this area as well. Overall, it is likely that cultural materials are broadly spread throughout the entire Project Study Area. As such, any area that is not already developed or

disturbed must be considered as potentially containing pre-colonial sites. These areas include clearly undeveloped parcels, as well as the yard areas of existing structures and any areas that may simply have been capped by asphalt, gravel or fill.

6.2 HISTORIC-PERIOD ARCHAEOLOGICAL RESOURCES

6.2.1 Identified Historic-Period Sites

Research in the files of MHC and the MACRIS database indicate that there are a total of seven documented historic-period archaeological sites in the focus area (Figure 4). These sites include three historic residential sites, two large boulders, and the Aptucxet Trading Post. The Herring Pond Wampanoag Burial Ground (BOU.800) does not have an archaeological site number, but should also be considered in an evaluation of historic-period archaeological sites.

Site BOU.1, the Gas House Site, is located in the Nightingale Pond conservation area, situated east of Route 25 as it approaches the Bourne Bridge. The site, which sits on a low, flat area on the west bank of Nightingale Pond, consists of the remains of a late 18th- to mid-late 19th-century house. The structure was identified during an archaeological survey conducted in 1976 as part of the Routes 25 and 28 Environmental Impact Statement. The survey identified the corner of a dressed fieldstone house foundation, as well as a kaolin pipe, redware, and creamware sherds (Mueller 1977).

Site BOU.2, the Chamber Rock Site, is large, flat-topped boulder located immediately west of the intersection of the AGT pipeline and Chamber Rock Road (Figure 4). The cultural use of this rock dates back to the European Contact period, if not earlier, and both European and Native oral tradition gives significance to the site (Keen 1937; Torrey 1953; Ramona Peters, personal communication, 2016). One account of Chamber Rock has a very Christian, European bent. In the *History of Bourne*, Betsey Keene (1937) indicates that the site was originally known as "Sacrifice Rock" due to sacrifices that Native Americans carried out there. Supposedly, when Richard Bourne attempted to put a stop to the practice, lightning struck and broke the rock, killing some Indians. Another version of the events surrounding Chamber Rock was recorded by Howard Torrey in 1953. In this account, the Wampanoag villagers from Comassakumkanet were suffering from a poor, dry growing season and their crops lay wilted on the ground. Allegedly, the sachem and his sagamores decided that a great sacrifice to the Thunder people was required to end the drought. They took a captive and brought him to rock to be sacrificed. As they prepared to burn the captive on the rock, the sky darkened and lightening flashed. Suddenly the storm broke and a huge bolt of lightning struck the rock, rendering it into pieces. The strike killed all of the Native leaders involved in preparing the sacrifice and left the intended victim unharmed. The Wampanoag took this as an indication that the Thunder people did not approve of human sacrifice, and the practice was ended. It is important to note that this version of the story was related to Torrey by Nathan Bourne Hartford, a Bourne descendent. To date, no archaeological testing has been carried in the immediate vicinity of the rock, so there are no recorded archeological materials associated with the site. Given its size and shape, it is possible that Chamber Rock may have served as rockshelter in the past.

Site BOU.3, Wishing Rock, is another large boulder located a short distance from Chamber Rock (Figure 4). The significance of this site is also related to oral tradition and dates at least as far back as the Contact period. Keene (1937) stated that a worn Native path ran past Wishing Rock. As local Native Americans passed the site, they would toss a stone upon the rock and

make a wish. Given this account, it seems likely that the site served as a memory pile. Information provided by the Tribal Historic Preservation Office of the Mashpee Wampanoag indicates that both Chamber Rock and Wishing Rock are important cultural sites in the present day (Ramona Peters, personal communication, September 2016).

The Bog Site, BOU.4, is located between Head of the Bay Road and Route 25 (Figure 4). The site consists of the remnants of an abandoned, undated cranberry bog and includes sand quarries, two sub-rectangular pits for pumping and holding excess water, the bog enclosure, and an irrigation ditch. BOU.4 was documented in 1977 (Mueller 1977).

The three remaining sites are located in the vicinity of the Aptucxet Trading Post Museum. These sites were all identified by Professor Barbara Luedtke in 1995, when she carried out an archaeological survey of the trading post area with field school students (Luedtke 1997). The Aptucxet Trading Post Museum Site (BOU.5) is located off Aptucxet Road along the Cape Cod Canal (Figure 4). The site is the purported location of an early (17th-18th century) English trading post. Archaeological testing at the site resulted in the recovery of a variety of archaeological materials believed to related to the trading post: whetstones, a button mold, fire-cracked rock, architectural stone, gun flints, strike-a-lights, lithic debris, and nails (Luedtke 1997). Site BOU.6, known in the MHC files as Site #4, is located east of the Aptucxet Trading Post Museum on Aptucxet Road. Recovered cultural material include domestic materials, charcoal, and shell. The associated features included a cellar hole, stone-lined well, trash dump areas, ornamental plantings, and part of a stone wall. Finally, BOU.7 or Site #5 is a 19th-20th-century cellar hole located west of the museum access road on Aptucxet Road. Associated features and materials included dump areas, abandoned farm equipment, glass, ceramics, brick, coal, and shell.

The 1825 Canal Survey map (Perrault, et al. 1825; Figures 3a and 3b) shows the "Old Indian Burial Ground," within the Project Focus Area at the southern end of Herring Pond along the Megansett Trail. This location is an historic-period cemetery associated with the Herring Pond Wampanoag tribe. Ground penetrating radar, conducted around the periphery of the cemetery in 2015, identified likely burials outside the accepted boundaries of the cemetery (Gately 2015).

6.2.2 Historic-Period Archaeological Sensitivity

Contact between Native American and Europeans occurred early on Cape Cod. It is likely that European fishermen fished the Cape waters in the early 16th century and by the second quarter of the century several European explorers had visited the coast of New England. The early 17th century brought English, French, and Dutch traders to the area and the start of hostilities between the Europeans and the local Native people (MHC 1986:56). The Monument and Scusset Rivers, now the Cape Cod Canal, were important local transportation routes and numerous Native American sites, including habitation areas and cemeteries, were located along their banks. The Native population on the Cape is believed to have been quite large in the early Contact Period, although the epidemics of 1617-1619 likely resulted in a rapid and dramatic population decline.

Following Contact, the Native residents of Cape Cod quickly became commercially and politically entangled with their new European neighbors. By 1627 the Aptucxet trading post (BOU.5) was established in the Project Focus Area and the first permanent European settlement was organized at Sandwich in 1637. New settlements at Barnstable, Yarmouth, and Nauset soon

followed. As the European population increased, Native groups were displaced and encouraged to settle on reservations and in praying towns (Christianized Indian settlement). The three major reservations on the Cape in this period were established around 1660 and included Mashpee, another reservation at the outlet of Herring Pond, straddling what are now the towns of Bourne and Plymouth, and the Potanunquut reservation in the Nauset area. By 1674, Richard Bourne reported seven congregations of "Praying Indians" (MHC 1986:72-73), although many of these were short-lived.

The 1825 Canal Survey map (Perrault, et al. 1825; Figures 3a and 3b) shows several Native sites at the southern end of Herring Pond and along Herring Pond Road, including two farmsteads and "Indian Hill." The "Old Indian Burial Ground," an historic-period cemetery associated with the Herring Pond Wampanoag tribe, is also located within the Project Focus Area at the southern end of Herring Pond along the Megansett Trail. Ground penetrating radar, conducted around the periphery of the cemetery in 2015, identified likely burials outside the accepted boundaries of the cemetery (Gately 2015). The documented presence of these sites, as well as the long-established history of the Wampanoag people in the Project Focus Area, suggests that the potential for contact and historic-period Native American sites is high throughout much of the study area. The 1825 map also depicts the locations of numerous Euro-American homes and farmsteads, most of which were located along the route of the proposed canal (Figures 3a and 3b). The presence of identified 17th-19th century house remains such as sites BOU.1, BOU.6, and BOU.7, suggest that more such sites likely exist in portions of the focus area that have not been greatly disturbed by modern development. Therefore, undisturbed and minimally-disturbed portions of the focus area are considered sensitive for historic-period archaeological resources.

An 1880 map of the Project Focus Area (Figure 6, Appendix A; Walker 1880) shows the most intensive settlement along existing roads, rather than along the rivers, as was the case in 1825. The most heavily settled areas in the focus area at this time appear to have been along the Herring Pond Road and present-day Head of the Bay Road. A "Herring House" is depicted in the location of the present-day Herring Run, near Foundry Pond between Bournedale Road and Route 6. The Old Colony Rail Road is shown on the map, running alongside much of the proposed canal route. Based on the 1880 map, it is likely that archaeological materials related to 19th-century farmsteads and railroad-related sites exist in minimally-disturbed portions of the focus area.

6.3 NATIVE AMERICAN CULTURAL SENSITIVITY

Archaeological sensitivity is largely based on environmental factors, the presence of documented archaeological resources and ethnographic and historic information. However, several portions of the Project Focus Area are also considered to have high levels of cultural and archaeological sensitivity by local Native American groups. These determinations are made on the basis of oral tradition, known archaeological sites, known burial sites, and other cultural knowledge. Coordination with federally-recognized Native American tribes on the Cape (the Mashpee and Gay Head [Aquinnah] Wampanoag) resulted in the identification of several areas of cultural sensitivity (Figure 5). These include most of the northern and eastern portions of the military base at Camp Edwards, and a linear area that runs south from Herring Pond, along Herring Pond Road, crosses the canal and extends into the northern portion of the base, and the locations of Chamber Rock (BOU.2) and Wishing Rock (BOU.3). The Wampanoag Tribe of Gay Head (Aquinnah) also indicated that any undeveloped areas along the north and south banks of the canal should be considered culturally sensitive (Elizabeth Perry, personal communication,

2016). These areas overlap with areas identified as archaeologically sensitive, indicating that their importance to Native people extends into the deep past. The Herring Pond Wampanoag Tribe, whose traditional lands are in the northern portion of the focus area in the vicinity of Herring Pond, consider the area surrounding Herring Pond to have a high level of cultural sensitivity (Melissa Ferretti, personal communication, September 2016) (Figure 5, Appendix A).

7.0 EVALUATION OF POTENTIAL EFFECTS ON HISTORIC RESOURCES

The new bridges and road improvement options in the Cape Cod Canal Transportation Study can be expected to affect historic properties in the Project Focus Area that are listed in the National Register of Historic Places (or are potentially eligible for listing in the NRHP), the State Register of Historic Places, and the Inventory of Historic and Archaeological Assets of the Commonwealth.

Below is a preliminary review of the anticipated effects of the options as depicted on the MESA Information Request Canal Crossing and Approach Options, Cape Cod Canal Transportation Study Overview (received by AHS on September 9, 2016).

7.1 MIDDLE BRIDGE 1

Middle Bridge 1 involves a new highway bridge roughly halfway between the Bourne and Sagamore Bridges that would be accessible on the north side from Route 25 via a traffic circle, and from Route 6 (Scenic Highway) via a partial cloverleaf interchange (Figure 2, Appendix A).

Middle Bridge 1 could have a direct and indirect adverse effect on the Cape Cod Canal itself (BOU.AF), which is potentially NRHP eligible (Photographs 1-3, Appendix D). Middle Bridge 1 is very close to the Herring Run Recreation Area Fish Ladder (BOU.938), a contributing resource to the potential Cape Cod Canal NRHP district. It could have a potential direct or indirect adverse effect on the Herring Run Fish Ladder (Photograph 23, Appendix D).

This option could have a potential indirect adverse effect on integrity of setting for the southwest part of Bournedale (BOU.I). The Nathan Bourne Ellis House/Bournedale Lodge (BOU.211, 212, 213) at 854 Route 6/Scenic Highway in this area of Bournedale are potentially individually eligible for the NRHP (Photograph 27, Appendix D).

The type of proposed construction will affect the total number of resources that would be adversely affected, either directly or indirectly.

Refer to Appendix E, Table 2.

7.2 MIDDLE BRIDGE 2

Middle Bridge 2 involves a new highway bridge roughly halfway between the Bourne and Sagamore Bridges that would be accessible on the south side from Route 6 via a new road (Figure 2, Appendix A).

Middle Bridge 2 could have direct and indirect adverse effects on the Cape Cod Canal itself (BOU.AF), which is potentially NRHP-eligible.

It could also have a potential direct adverse effect on the Cape Cod Air Station – Otis Air Force Base (BOU.B) if that entire area is NRHP-eligible, which has not been determined (see section 5.4.5).

The type of proposed construction will affect the total number of resources that would be adversely affected, either directly or indirectly.

Refer to Appendix E, Table 3.

7.3 SANDWICH ROAD

Sandwich Road work involves improvements to the existing roadway and its interchange with Route 6, and a new connection to the Bourne Rotary (Figure 2, Appendix A).

Potential Sandwich Road improvements not appear to have direct or indirect effects on any inventoried areas (such as BOU.A Keene Street-Sandwich Road Area), or other identified standing historic resources.

The type of proposed construction will affect the total number of resources that would be adversely affected, either directly or indirectly.

Refer to Appendix E, Table 4.

7.4 RELOCATED EXIT 1C 4 LEG ROUNDABOUT EFFECTS

Relocated Exit 1C involves a new Route 6 exit and new road to Route 6A (Figure 7-9, Appendix A). The road would be constructed within an existing power transmission line corridor, terminating in a roundabout at the intersection with Route 6 and Main Street.

Relocated Exit 1 could have a possible indirect adverse effect on west end of the Route 6A West Area (SDW.G), which is listed in the State Register and is located within the Old King's Highway Regional Historic District (SDW.R). Inventoried resources that appear to be in close proximity to the proposed Relocated Exit 1C include the Saddle and Pillion Burial Ground (SDW.802) and a collection of 20th-century buildings including motor courts and houses (SDW.489, SDW.490, SDW.491, SDW.492, SDW.493, SDW.494, SDW.495, SDW.496, SDW.497, and others.) See Photographs 72 to 74, Appendix D. The Watson Freeman House (SDW.100) has been demolished.

It could also have an indirect adverse effect on the west end of the Main Street – Route 130 Area (SDW.I), which is listed in the State Register and is located within the Old King's Highway Regional Historic District (SDW.R). Inventoried resources that appear to be in close proximity to the proposed Relocated Exit 1C include houses at 8, 12, and 14 Main Street (SDW.504, 505, and 506). The road alignment appears to encroach on the front yards of these three properties.

The proposed Relocated Exit 1C could have a direct or indirect adverse effect on the east end of South Sagamore (SDW.V), which is potentially NRHP eligible as a district. Inventoried resources that appear to be in close proximity to the proposed Relocated Exit 1 include the early 20th-century Sagamore Inn (BOU.346), stone markers BOU.925 and BOU.927, the early 18th-century Freeman House and Barn (BOU.194 and 195), and the early 20th-century Rogers House (BOU.345).

The road alignment appears to have a direct adverse effect on Bourne Highway Marker BOU.927, located in front of the Sagamore Inn at 131 Sandwich Road (BOU.346), and also Town Line Marker BOU.927, located across the street from the Sagamore Inn. These markers are not individually eligible for the NRHP.

The type of proposed construction will affect the total number of resources that would be adversely affected, either directly or indirectly.

Refer to Appendix E, Table 5.

7.5 ROUTE 3 TO ROUTE 25

Route 3 to Route 25 would construct a new road connecting Route 3 and the Sagamore Bridge with Route 25 (Figure 2, Appendix A). The new road would connect to Route 25 via a rotary, and to Route 3 and the Sagamore via ramp interchanges.

A potential new connector from Route 3 to Route 25 does not appear to have direct or indirect effects on inventoried areas (such as Head of the Bay BOU.C, Bournedale BOU.I, North Sagamore BOU.O, Savery Ave BOU.P or the Cape Cod Canal BOU.AF), or on other identified standing historic resources.

The type of proposed construction will affect the total number of resources that would be adversely affected, either directly or indirectly.

Refer to Appendix E, Table 6.

7.6 SCENIC HIGHWAY

Scenic Highway work would involve improvements to the existing highway (Figure 2, Appendix A).

Improvements to the Scenic Highway (Route 6) between the Bourne and Sagamore bridges could have an overall indirect adverse effect (integrity of setting) on the Cape Cod Canal (BOU.AF), a potential NRHP-eligible district. The Scenic Highway is very close to the Herring Run Recreation Area Fish Ladder (BOU.938), a contributing resource in the potential canal historic district. Improvements to the highway could have a potential direct or indirect adverse effect on the fish ladder (Photograph 23, Appendix D).

In Bournedale, historic resources close to the Scenic Highway that are potentially individually eligible for the NRHP include the Nathan Bourne Ellis House/Bournedale Lodge (BOU.211, 212, 213) at 854 Route 6/Scenic Highway (Photograph 27, Appendix D). Improvements to the highway could have a potential direct or indirect adverse effect on this property.

Other inventoried resources that are close to the Scenic Highway include several mid 19th-century houses and commercial properties (BOU.204, BOU.205, BOU.206, BOU.207). The eligibility of Bournedale as a NRHP-eligible district has not been fully assessed. Improvements to the highway could have a potential direct on BOU.204 or BOU.205, or an indirect adverse effect (integrity of setting) on all of these properties.

The type of proposed construction will affect the total number of resources that would be adversely affected, either directly or indirectly.

Refer to Appendix E, Table 7.

7.7 SAGAMORE TWIN

Sagamore Twin would construct a new bridge immediately west of the existing Sagamore Bridge (Figure 2, Appendix A). New ramps would connect the existing and new bridges with Route 3 and Route 6/Scenic Highway north of the canal, and to Route 6 south of the canal.

The new twin bridge would have a potential adverse and definitely indirect adverse effect on the Sagamore Bridge, which MHC has classified as individually NRHP-eligible (Photograph 7, Appendix D).

The new twin bridge and its approaches would have a potential direct or indirect adverse effect on the Cape Cod Canal, a potential NRHP-eligible district.

The new twin bridge approaches could have a potential indirect adverse effect on North Sagamore and Savery Avenue, possibly affecting their integrity of setting if they are determined to be NRHP-eligible districts.

The new twin bridge approaches could have a potential indirect adverse effect on South Sagamore, especially the Adams Street area, which could be included in a South Sagamore NRHP district (see Figure 2, Appendix A).

The type of proposed construction will affect the total number of resources that would be adversely affected, either directly or indirectly.

Refer to Appendix E, Table 8.

7.8 NEW ROUTE 6 EB TRAVEL LANE

New Route 6 EB Travel Lane would extend from the Sagamore bridge to the Route 130 interchange. The new lane would be located on land currently owned by MassDOT, within the wide ROW (Figures 10-11, Appendix A).

SDW.906 and 907 are two Route 6 bridges over Route 130. They are within the Old King's Highway Regional Historic District (SDW.R) and they are SR-listed (Photograph 71, Appendix D). The new Route 6 EB travel lane would have a direct adverse effect on bridge SDW.907 (eastbound), and an indirect adverse effect on bridge SDW.906. (westbound) (Figure 11, Appendix A).

The new Route 6 EB travel lane could have a potential indirect adverse effect (integrity of setting) on the Cape Cod Air Station – Otis Air Force Base (BOU.B) if that entire area is NRHP eligible, which has not been determined. Such a potential indirect adverse effect would result only if work extends beyond the existing ROW.

In Sandwich, the area north of Route 6 is included in the Old King's Highway Regional Historic District (SDW.R) & SR listed. The new Route 6 EB travel lane could have a potential indirect adverse effect (integrity of setting) for the overall area, only if work extends beyond the existing ROW.

Shawme Road (SDW.F) in Sandwich is a potentially NR-eligible area. It is also included in the Old King's Highway Regional Historic District (SDW.R) & is SR-listed. The new Route 6 EB travel lane could have potential indirect adverse effect on integrity of setting, only if work extends beyond the existing ROW.

The type of proposed construction will affect the total number of resources that would be adversely affected, either directly or indirectly.

Refer to Appendix E, Table 9.

7.9 BOURNE BRIDGE REPLACEMENT & IMMEDIATE APPROACHES

Bourne Bridge involves the replacement of the Bourne Bridge and improved ramps and roadways to access the bridge (Figure 2, Appendix A).

This option would have a direct adverse effect on the Bourne Bridge, which MHC has classified as individually NRHP-eligible (Photograph 5, Appendix D). It would have a potential direct or indirect adverse effect on the Cape Cod Canal, a potential NRHP-eligible district.

The type of proposed construction will affect the total number of resources that would be adversely affected, either directly or indirectly.

Refer to Appendix E, Table 10.

7.10 BELMONT CIRCLE AND SCENIC HIGHWAY TO ROUTE 25 RAMP

Belmont Circle involves a new rotary and road alignments to replace the Belmont Circle in Buzzard's Bay north of the Bourne Bridge (Figure 12, Appendix A)

Improvements to Belmont Circle and its connections in Buzzard's Bay do not appear to have direct or indirect effects on inventoried areas or other identified standing historic resources.

The type of proposed construction will affect the total number of resources that would be adversely affected, either directly or indirectly.

Refer to Appendix E, Table 11.

7.11 BOURNE ROTARY ALTERNATIVE 2

Bourne Rotary Alternative 2 involves new intersections to replace the Bourne Rotary south of the Bourne Bridge (Figure 13, Appendix A). It also includes improved ramps and roadways to access the bridge.

The Bourne Rotary Alternative 2 and its connections east of Bourne Village could have indirect adverse effects on inventoried areas and National Register-listed properties in Bourne Village to the west. The proposed realignment of Sandwich Road could have a direct or indirect adverse effect on the Arabella Parker-George Ellis House (BOU.49) at 66 Sandwich Road, which is potentially NRHP-eligible as an individual property (Photograph 42, Appendix D).

To the east on Sandwich Road, these improvements might have had a potential direct or indirect adverse effect on the Gershom Ellis/Henry S. Blackwell House at 201 Sandwich Road (BOU.50). This property was formerly identified as a potential individually-eligible NRHP resource, but has since been modified and is no longer eligible (Photograph 48, Appendix D).

The type of proposed construction will affect the total number of resources that would be adversely affected, either directly or indirectly.

Refer to Appendix E, Table 12.

7.12 BOURNE ROTARY ALTERNATIVE 3A

Bourne Rotary Alternative 3A involves new intersections to replace the Bourne Rotary south of the Bourne Bridge (Figure 14, Appendix A). It also includes improved ramps and roadways to access the bridge.

The Bourne Rotary Alternative 3A and its connections east of Bourne Village could have indirect adverse effects on inventoried areas and National Register-listed properties in Bourne Village to the west. The proposed realignment of Sandwich Road could have a direct or indirect adverse effect on the Arabella Parker-George Ellis House (BOU.49) at 66 Sandwich Road, which is potentially NRHP-eligible as an individual property (Photograph 42, Appendix D).

To the east on Sandwich Road, these improvements might have had a potential direct or indirect adverse effect on the Gershom Ellis/Henry S. Blackwell House at 201 Sandwich Road (BOU.50). This property was formerly identified as a potential individually-eligible NRHP resource, but has since been modified and is no longer eligible (Photograph 48, Appendix D).

The type of proposed construction will affect the total number of resources that would be adversely affected, either directly or indirectly.

Refer to Appendix E, Table 13.

8.0 EVALUATION OF POTENTIAL EFFECTS ON ARCHAEOLOGICAL AND CULTURAL/ETHNOGRAPHIC RESOURCES

AHS conducted an archaeological sensitivity assessment of the Cape Cod Canal Transportation Improvement Project Focus Area and potential new roadway alignments (Figure 1). The Project Focus Area includes the land that begins one mile west of the Bourne Bridge and extends to a point one mile east of the Sagamore Bridge. It is located almost entirely within the town of Bourne, with a small section in Plymouth. Two of the proposed alternatives (the Sagamore Twin and Relocated Exit 1 options) also extend a short distance into the town of Sandwich. Archaeological sensitivity was assessed based on a review of previously identified archaeological sites, historical maps and documentary sources, environmental characteristics, and consultation with local Native American groups regarding areas of cultural sensitivity.

Based on a review of the environment, archaeology, history, and areas of contemporary Native American cultural sensitivity, AHS assessed the sensitivity of the Project Focus Area for pre-colonial Native American and historic-period archaeological resources. In general, the proximity of the focus area to the Cape Cod Canal, which widened and joined the previously disconnected Manomet (or Monumet) and Scusset rivers, indicates that, in general terms, most of the Project Focus Area has very high archaeological potential. The Manomet River originally ran from the extant Great Herring Pond to Buzzards Bay, while the Scusset was a tidal river surrounded by a saltwater marsh system. These waterways were once a locus of extensive and intensive Native American settlement and subsistence activities and large-scale villages, as well as smaller settlements traditional burial grounds are documented along the former river channels. In the historic period, following the arrival and establishment of European communities on the Cape, these areas continued to be an important locus of settlement. As noted above, the 1825 map of the proposed canal area shows a series of farmsteads along the banks of the two rivers (Figures 3a and 3b).

Areas of cultural sensitivity were identified by the Mashpee and Gay Head (Aquinnah) Wampanoag Tribes, and by the Herring Pond Wampanoag tribe. Some of these areas overlap /coincide with recorded archaeological sites, but some do not. All of the Wampanoag tribes concur that the entire Project Focus Area is highly sensitive for buried archaeological resources related to Native American occupation of the Cape for thousands of years.

A more-detailed sensitivity assessment of the individual potential alternatives is provided below, along with a discussion of AHS's recommendations for archaeological testing and/or monitoring in sensitive areas and the areas considered to have archaeological sensitivity. Table 14 (Appendix E) presents a summary of the archaeological sensitivity and recommendations for each potential construction alternative based on proximity to documented archaeological sites and areas of identified Native American cultural sensitivity.

8.1 MIDDLE BRIDGE 1

The Middle Bridge 1 option runs from just north of the Plymouth/Bourne town line to the canal along the path of an existing utility corridor and extends to Route 6 on the north side of the canal. The northern portion of this option traverses an area containing two known archaeological sites, 19-PL-345 and 19-BN-821 (Table 14, Appendix E; Figure 4, Appendix A). While neither site contained diagnostic artifacts, the presence of these sites indicates that this area was used by past Native people. The Middle Bridge 1 option also includes two proposed ramps, located at the juncture of the alignment with Route 6 (Scenic Highway). The proposed west ramp overlies an obviously disturbed gravel pit area, but undeveloped areas exist around the periphery of the pit, and site 19-BN-937 is located immediately to the west. The proposed east ramp lies directly adjacent to Foundry Pond, which is part of Great Herring Pond and Herring River drainage. Documented sites in the vicinity of the ramps include 19-BN-690, 19-BN-224, and 19-BN-685. This entire area may have once been part of a Late Woodland/Contact village site and is considered to have a high level of archaeological sensitivity.

Refer to Appendix E, Table 14.

8.2 MIDDLE BRIDGE 2

The Middle Bridge 2 option, which extends across the canal from the north bank to join Route 6, also follows a portion of the existing utility corridor. Documented archaeological sites in this area include 19-BN-654, which falls within the path of the proposed option, as well as sites 19-BN-656 and 19-BN-653, which are adjacent to the alignment (Table 14, Appendix E; Figure 4, Appendix A). All three sites are low density lithic findspots, but the presence of these materials indicates Native American activity in this area and suggests that there is strong potential for additional archaeological resources nearby.

Refer to Appendix E, Table 14.

8.3 SANDWICH ROAD

The Sandwich Road option runs along existing Sandwich Road, from the Bourne Rotary, along the south side of the canal. While this option only intersects with one identified site (19-BN-654) (Table 14, Appendix E; Figure 4, Appendix A) its proximity to the canal, which was built roughly along the course of the Cape's major rivers, indicates that undeveloped portions of this option should be considered highly sensitive for archaeological resources. Unlike much of the Project Focus Area, the course of the Sandwich Road has not been subjected to extensive archaeological survey, increasing the potential for as yet undiscovered archaeological resources.

Refer to Appendix E, Table 14.

8.4 RELOCATED EXIT 1C 4 LEG ROUNDABOUT EFFECTS

The Relocated Exit 1C involves a new Route 6 exit and new road to Route 6A (Figure 7-9, Appendix A). The road would be constructed within an existing power transmission line corridor, terminating in a roundabout at the intersection with Route 6 and Main Street.

Most of this route does not directly impact any known archaeological sites, but the proposed rotary and road realignments at the junction of Route 6A, Main Street, and Tupper Road, at the eastern end of the alternative is situated in close proximity to the artifact-dense pre-contact Town Line Site and Town Line Findspots (19-BN-943, 19-BN-908, 19-BN-913, 19-BN-914, 19-BN-915) identified along the town line during a gas pipeline project (Table 14, Appendix E; Figures 4 and 7, Appendix A). The presence of these sites suggests that undeveloped portions of the eastern end of Exit 1C option have high archaeological sensitivity. Refer to Appendix E, Table 14.

8.5 ROUTE 3 TO 25

The proposed Route 3 to Route 25 option, which follows a powerline for most of its path, will require careful assessment due to the proximity of Great Herring Pond and Herring River. The roundabout located on the western end of this route is not far from Goat Pasture Pond, as well as documented pre-colonial site 19-BN-345. The proposed alignment crosses pre-colonial site 19-BN-821 and historic archaeological site BOU.2. Additionally, site historic site BOU.3 is located a short distance south of the roadway (Table 14, Appendix E; Figure 4, Appendix A). These historic sites represent Sacrifice Rock and Wishing Rock, two places on the landscape that are identified as having cultural significance to contemporary Native groups, as well as historical and archaeological significance.

Refer to Appendix E, Table 14.

8.6 SAGAMORE TWIN

The alignment for the proposed Sagamore Twin option should be carefully assessed as it is likely highly sensitive for archaeological resources in the areas immediately to the north and south of the canal, as well as along Route 6 as it extends to the southeast into Sandwich. Undeveloped areas near the canal may contain remnants of past Native American settlements or cemeteries and numerous archaeological sites are identified along Route 6 where it skirts the edge of the military base (Table 14, Appendix E; Figure 4, Appendix A).

Refer to Appendix E, Table 14.

8.7 SCENIC HIGHWAY

The Scenic Highway option, which follows the path of existing Route 6 along the north bank of the canal, crosses several documented sites (19-BN-224, 19-BN-690, and 19-BN-937), as well as long stretches of undeveloped land adjacent to the canal (Figure 4, Appendix A). The proximity of this route to the canal suggests that much of the area is highly sensitive for buried cultural resources. Any alterations to or widening of the road in the area have the potential to impact as yet undiscovered archaeological sites.

Refer to Appendix E, Table 14.

8.8 NEW ROUTE 6 EB TRAVEL LANE

The New Route 6 EB Travel Lane would extend from the Sagamore bridge to the Route 130 interchange. The new lane would be located on land currently owned by MassDOT, within the

existing ROW (Figures 4, 10, and 11, Appendix A). Numerous archaeological sites have been identified along this stretch of Route 6 (19-BN-631, 19-BN-632, 19-BN-633, 19-BN-634, 19-BN-635, 19-BN-901, 19-BN-902, 19-BN-903, 19-BN-907, 19-BN-910, 19-BN-911, 19-BN-912, 19-BN-914, and 19-BN-987; Figure 4, Appendix A) and the expansion of the road would likely result in direct effects to several of these sites (19-BN-634, 19-BN-687, 19-BN-902, 19-BN-910, 19-BN-911, 19-BN-912, and 19-BN-987) and potential effect to sites 19-BN-631, 19-BN-632, 19-BN-633, 19-BN-901, and 19-BN-903. At the southern end of the Route 6 EB Travel Lane, near the Route 130 interchange, one additional archaeological site, 19-BN-909, is located adjacent to Route 6, and the expansion of Route 6 in this area would result in a direct effect to that site (Figures 4 and 11; Appendix A).

Refer to Appendix E, Table 14.

8.9 BOURNE BRIDGE REPLACEMENT AND IMMEDIATE APPROACHES

The Bourne Bridge portion of the project involves the replacement of the Bourne Bridge and improved ramps and roadways to access the bridge (Figures 4, Appendix A). The Bourne Bridge Replacement and Immediate Approaches option may encounter components related to historic sites BOU.1 and BOU.4 and pre-colonial site 19-BN-244 (Table 14, Appendix E; Figure 4, Appendix A). Numerous archaeological sites have been identified in the area west of this alignment. Undeveloped areas along this route are likely sensitive for archaeological resources.

Refer to Appendix E, Table 14.

8.10 BELMONT CIRCLE AND SCENIC HIGHWAY TO ROUTE 25 RAMP

Belmont Circle involves a new rotary and road alignments to replace the existing Belmont Circle in Buzzard's Bay north of the Bourne Bridge (Figures 4 and 12, Appendix A). There are no documented archaeological sites within the proposed option footprint, however, there are two documented archaeological sites (19-BN-244 and BOU.1) adjacent to areas of proposed alteration (Table 14, Appendix E; Figure 12, Appendix A). Undeveloped portions of the overall area are highly sensitive for pre-colonial archaeological resources. Two Late Woodland/Contact periods Native American sites, the Grove Field ossuary site19-BR-612, and site 19-BR-689 were identified a short distance south of the Belmont rotary near Bourne Pond. The area around the pond is highly sensitive for archaeological resources. Two additional sites, 19-BN-986 and 19-BN-987 are identified on the west side of the pond (Figure 4, Appendix A; Table 14, Appendix E).

Refer to Appendix E, Table 14.

8.11 BOURNE ROTARY ALTERNATIVE 2

Bourne Rotary Alternative 2 involves new intersections to replace the Bourne Rotary south of the Bourne Bridge (Figures 4 and 13, Appendix A). It also includes improved ramps and roadways to access the bridge. No archaeological sites are documented within the planned road alignment areas, but undeveloped portions of the overall area are considered sensitive for archaeological resources. Numerous archaeological sites have been identified approximately one mile east of Route 28, south of the rotary within Camp Edwards. To the west of the Alternative 3A alignment, documented archaeological sites include 19-BN-218, the Aptuxet Petroglyph, and several sites associated with the Aptuxet Trading Post (BOU.5, BOU.6, BOU.7). Two pre-contact sites (19-BN-

786 and 19-BN-787) are also identified along the present-day canal, about one mile west of the alternative 3A alignment (Table 14, Appendix E; Figure 4, Appendix A).

Refer to Appendix E, Table 14.

8.12 BOURNE ROTARY ALTERNATIVE 3A

Bourne Rotary Alternative 3A involves new intersections to replace the Bourne Rotary south of the Bourne Bridge (Figures 4 and 14, Appendix A). It also includes improved ramps and roadways to access the bridge. No archaeological sites are documented within the planned road alignment areas, but undeveloped portions of the overall area are considered sensitive for archaeological resources. Numerous archaeological sites have been identified approximately one mile east of Route 28, south of the rotary within Camp Edwards. To the west of the Alternative 3A alignment, documented archaeological sites include 19-BN-218, the Aptuxet Petroglyph, and several sites associated with the Aptuxet Trading Post (BOU.5, BOU.6, BOU.7). Two pre-contact sites (19-BN-786 and 19-BN-787) are also identified along the present-day canal, about one mile west of the alternative 3A alignment (Table 14, Appendix E; Figure 4, Appendix A).

Refer to Appendix E, Table 14.

9.0 CONCLUSIONS AND RECOMMENDATIONS

The Project Focus Area contains a large number of historic resources, including bridges, buildings, districts and more, many of which are listed in or eligible for listing in the NRHP. Besides the Bourne and the Sagamore bridges (determined by MHC as individually eligible for the NRHP), and the Cape Cod Canal itself, relatively few resources would be directly affected by the project alternatives, with the caveat that design specifications for the alternatives have not been developed. Depending on the actual build specifications of the selected alternative, the assessment of the project effects may change.

The majority of the Project Focus Area, that is, all undeveloped or undisturbed land, including lawns, is considered to have high potential for archaeological resources. As an alternative is selected and project plans are refined, detailed walkover survey and close visual assessment of potential alignment routes by professional archaeologists would be necessary to refine the archaeological sensitivity of these areas. The archaeological potential of undisturbed ground surfaces would be assessed based on soil composition (i.e., are the soils well-drained, poorly-drained, glacial till, etc.) and the proximity of the alignment to natural resources such as fresh water. The walkover and visual inspection would also facilitate the identification of above-ground historic resources that may signal an area's archaeological potential for historic archaeological sites. In addition to the visual assessment, a series of hand-powered soil probe samples would be taken across the Project Focus Area to further assess the integrity of the soils.

Refined areas of archaeological sensitivity in the Project Focus Area should then undergo systematic subsurface testing in the form of an intensive (locational) archaeological survey. An intensive (locational) survey is defined as "a systematic and detailed archaeological field investigation for the purpose of locating and identifying the sites which exist in a given area" (950 CMR 70.04). The tasks of the intensive survey include preparation of a detailed research design and application for a permit from the Massachusetts State Archaeologist (as mandated by Massachusetts General Laws, Chapter 9, Sections 26-27c and its implementing regulations 950 CMR 70); manual subsurface testing, laboratory processing and curation of any recovered artifacts; and preparation of a technical report.

The conclusions and recommendations herein are the opinion of the historic preservation consultant. Actual determinations of National Register eligibility and further assessment of effects are properly part of the ongoing consultative process among MassDOT and MHC, and will be further developed as the project progresses.

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APPENDIX A: FIGURES

Figure 1: Cape Cod Canal improvement alternatives and study focus area.

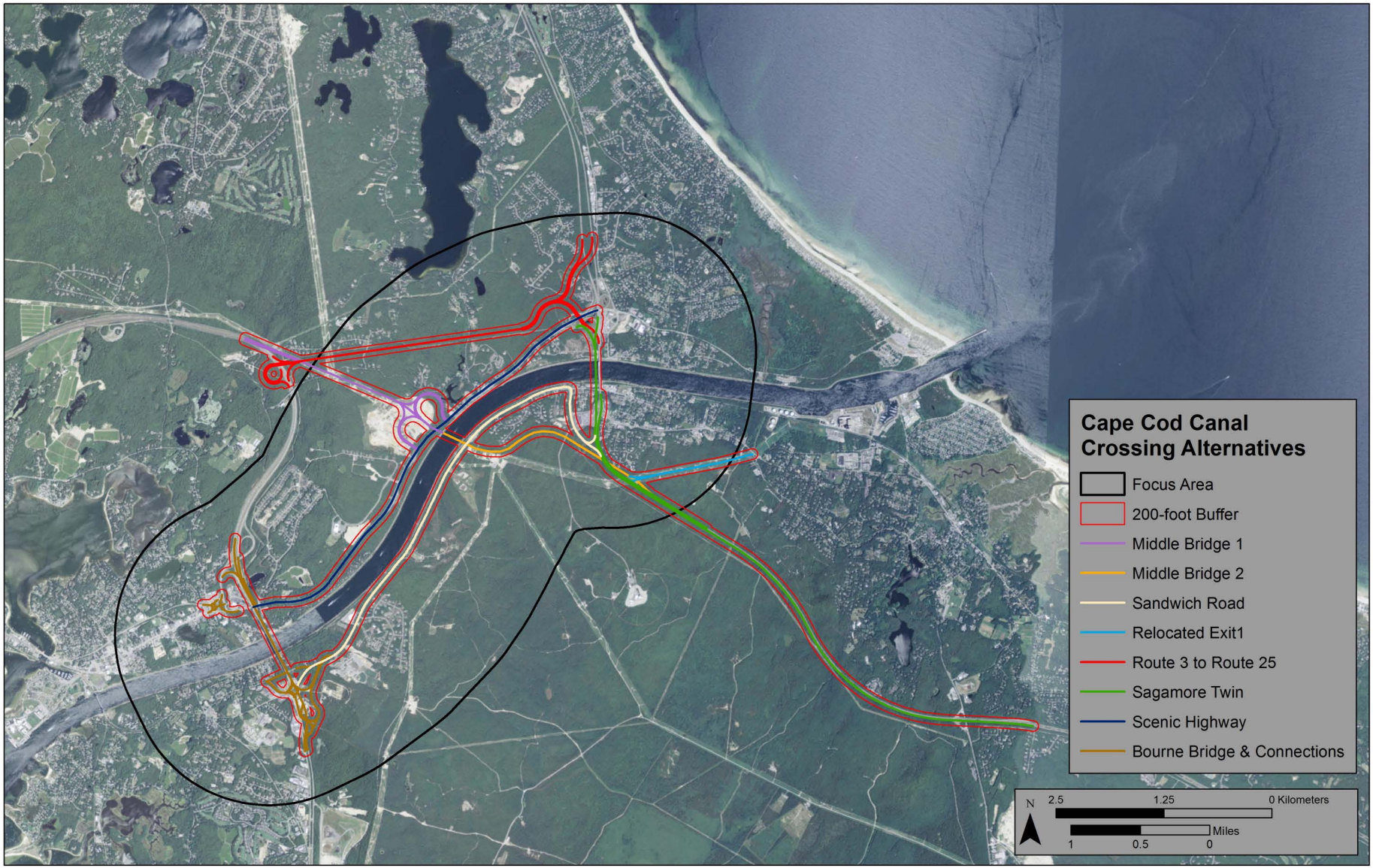


Figure 2. Historic resources in the project focus area and surrounding areas.

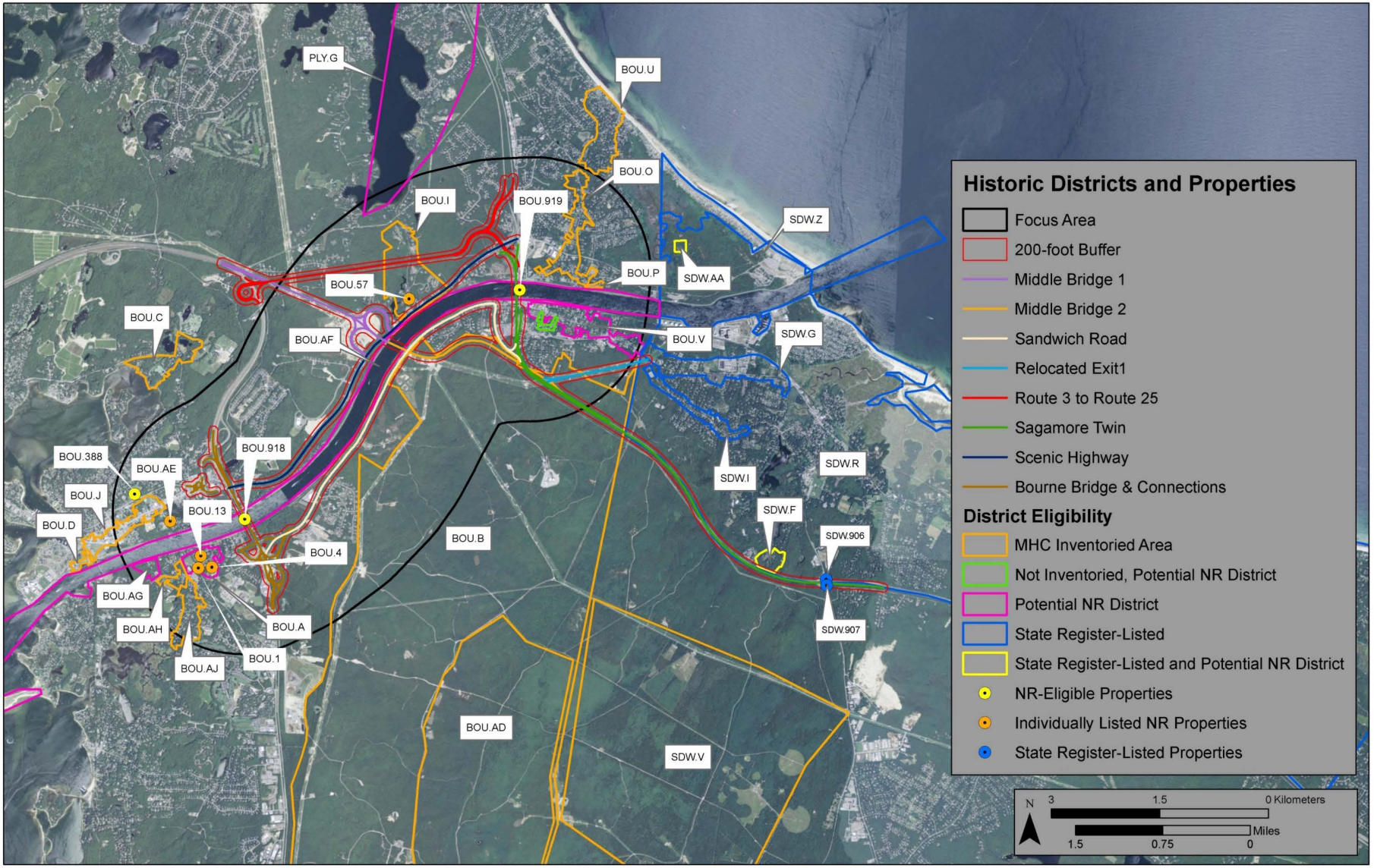


Figure 3a: West half of the 1825 Perrault map of the proposed Cape Cod Canal, showing the approximate locations of the Cape Cod Canal improvement alternatives.



Figure 3b: East half of the 1825 Perrault map of the proposed Cape Cod Canal, showing the approximate locations of the Cape Cod Canal improvement alternatives.

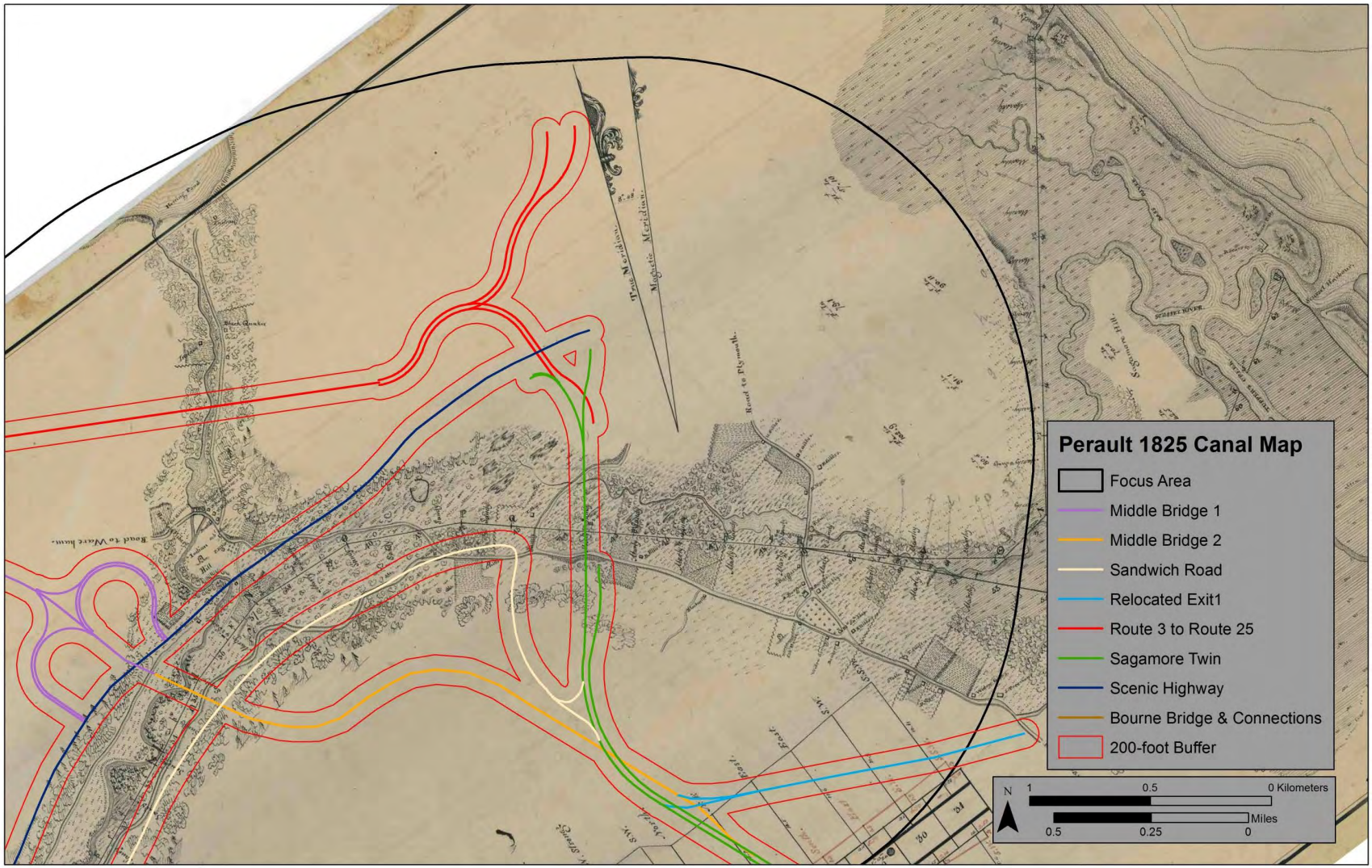


Figure 4: Aerial view of Cape Cod Canal showing focus area, Cape Cod Canal improvement alternatives, and documented archaeological sites.

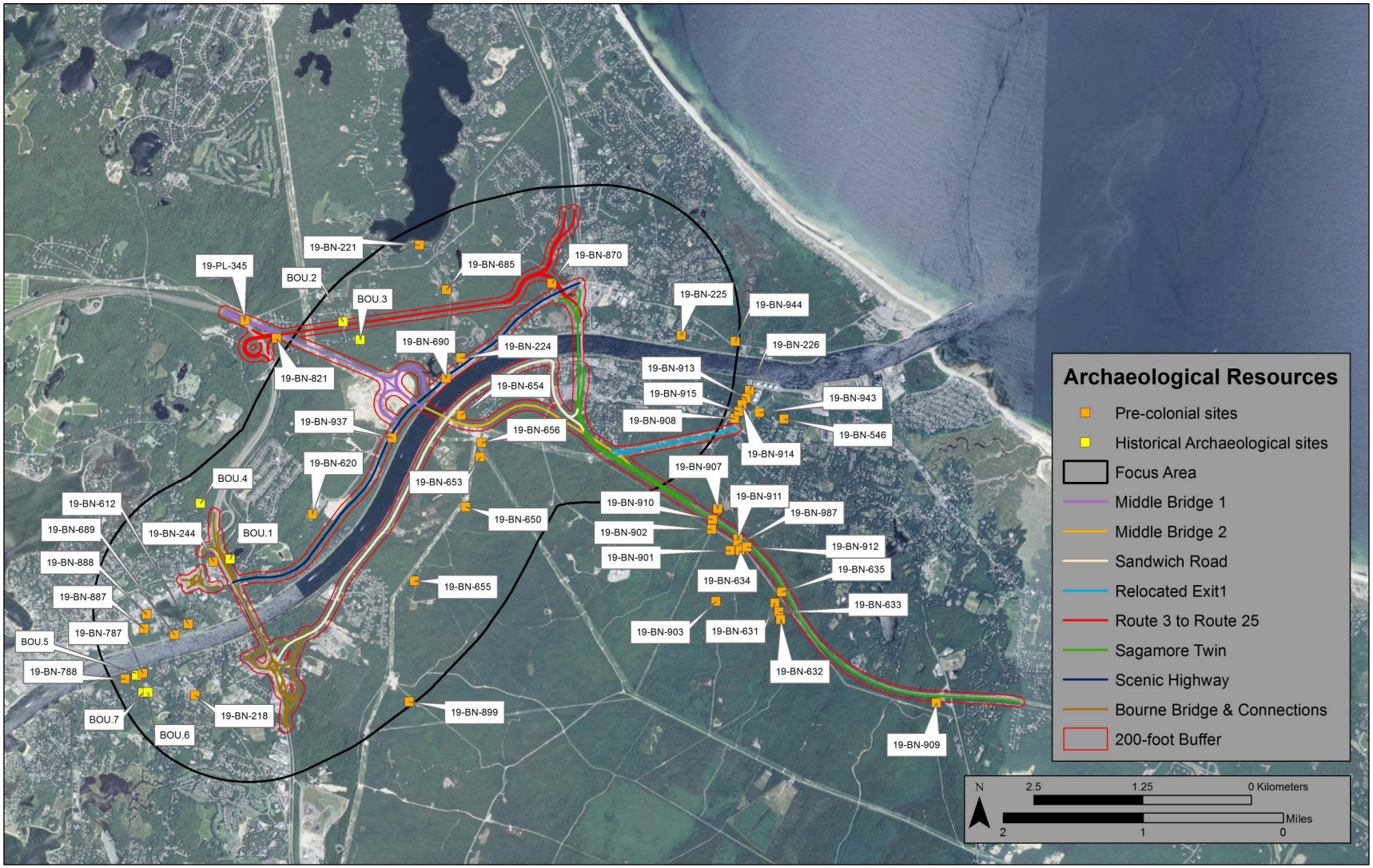


Figure 5: Aerial view of the Cape Cod Canal, showing focus area, improvement alternatives, and specific areas deemed culturally sensitive by the Mashpee Wampanoag . all unbuilt land within project area is considered archaeologically and culturally sensitive by the Mashpee, Gay Head (Aquinnah), and Herring Pond Wampanoag.

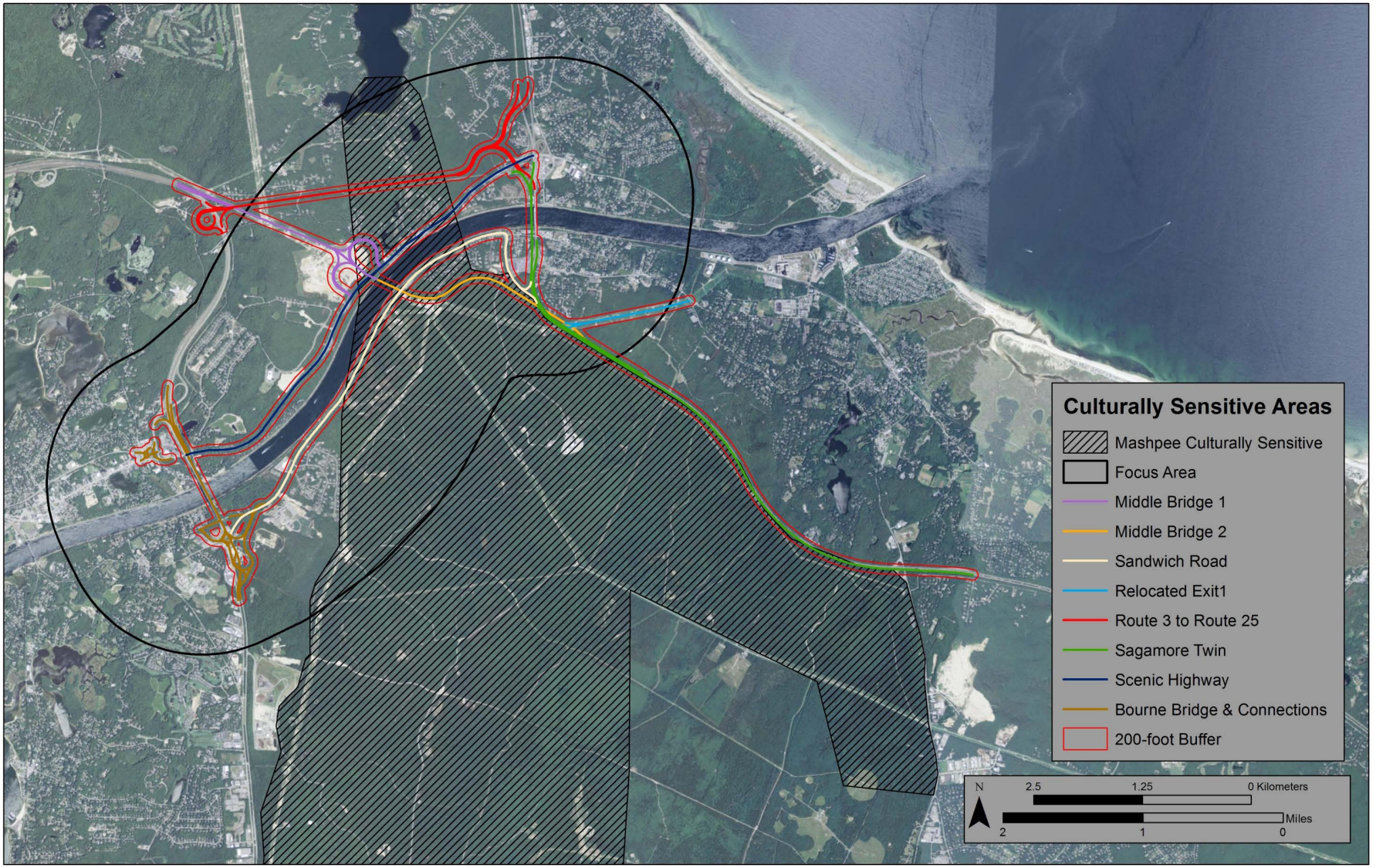


Figure 6: Detail of the 1880 map of Sandwich, showing the approximate locations of the focus area and improvement alternatives.

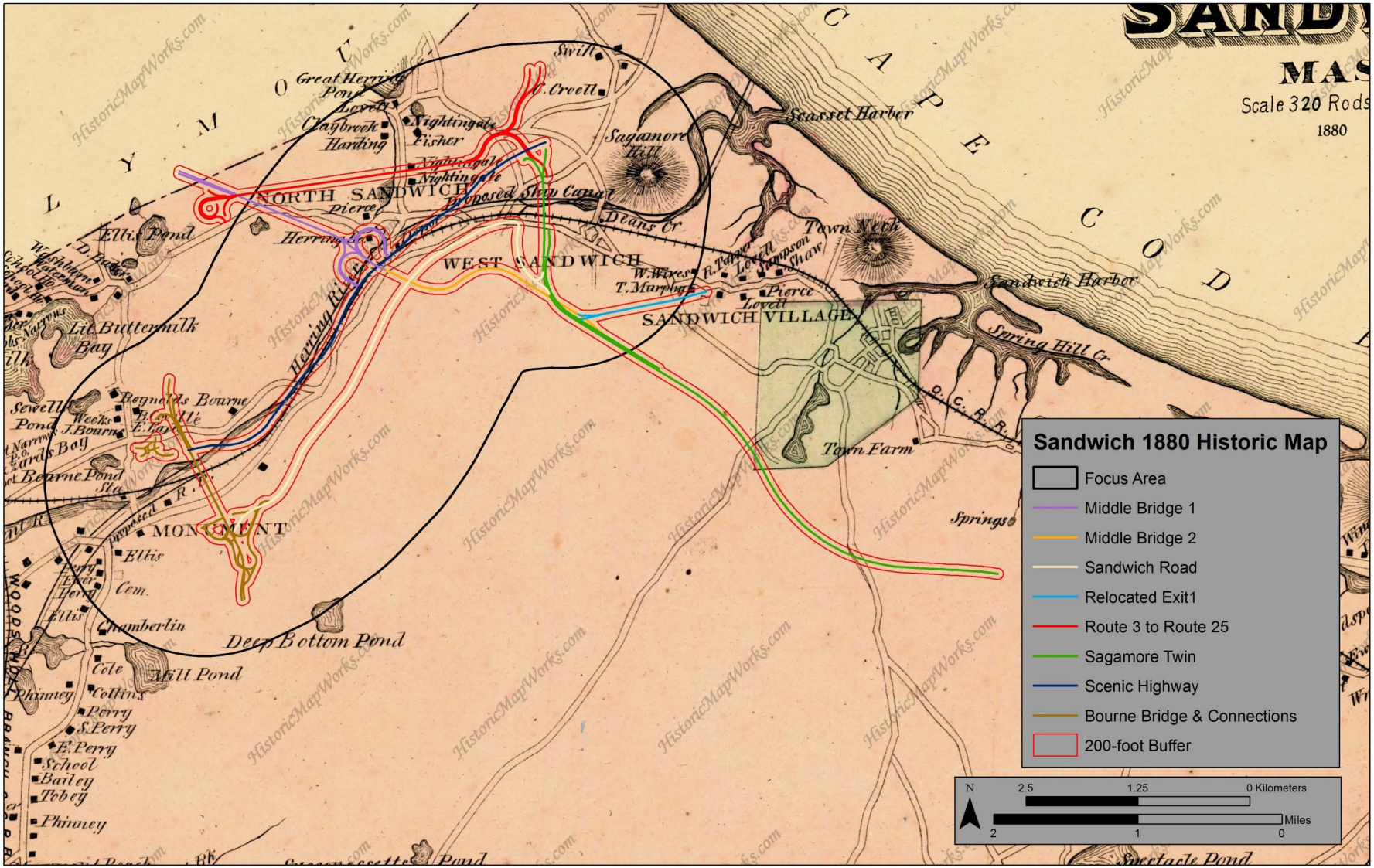


Figure 7: Relocated Exit 1C Design Concepts 4 Leg Roundabout Alternative.

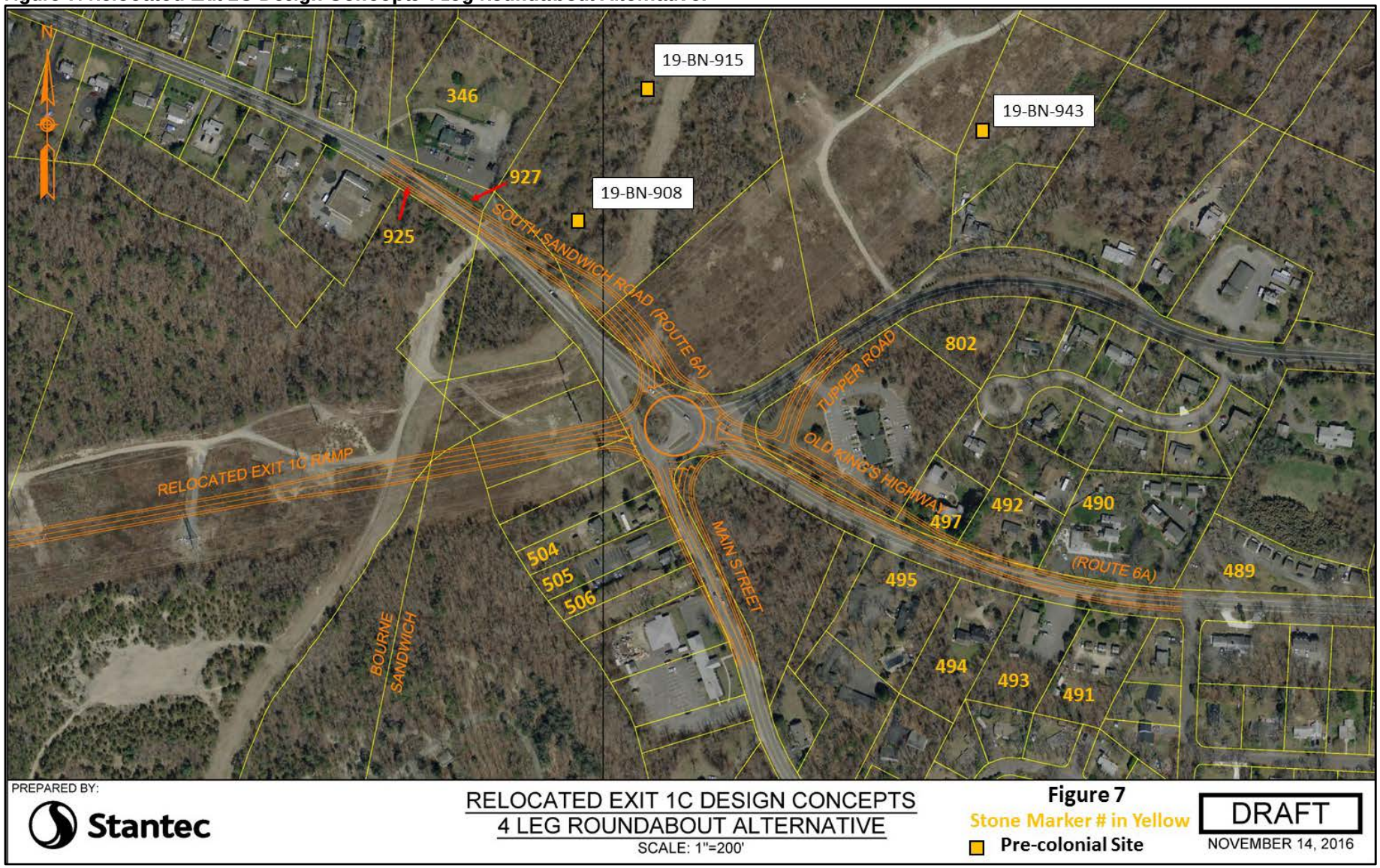


Figure 8. Relocated Exit 1C Design Concept Route 6 EB On and Off Ramps.



Figure 9. Relocated Exit 1C Design Concept at Grade Ramp along Utility Corridor.

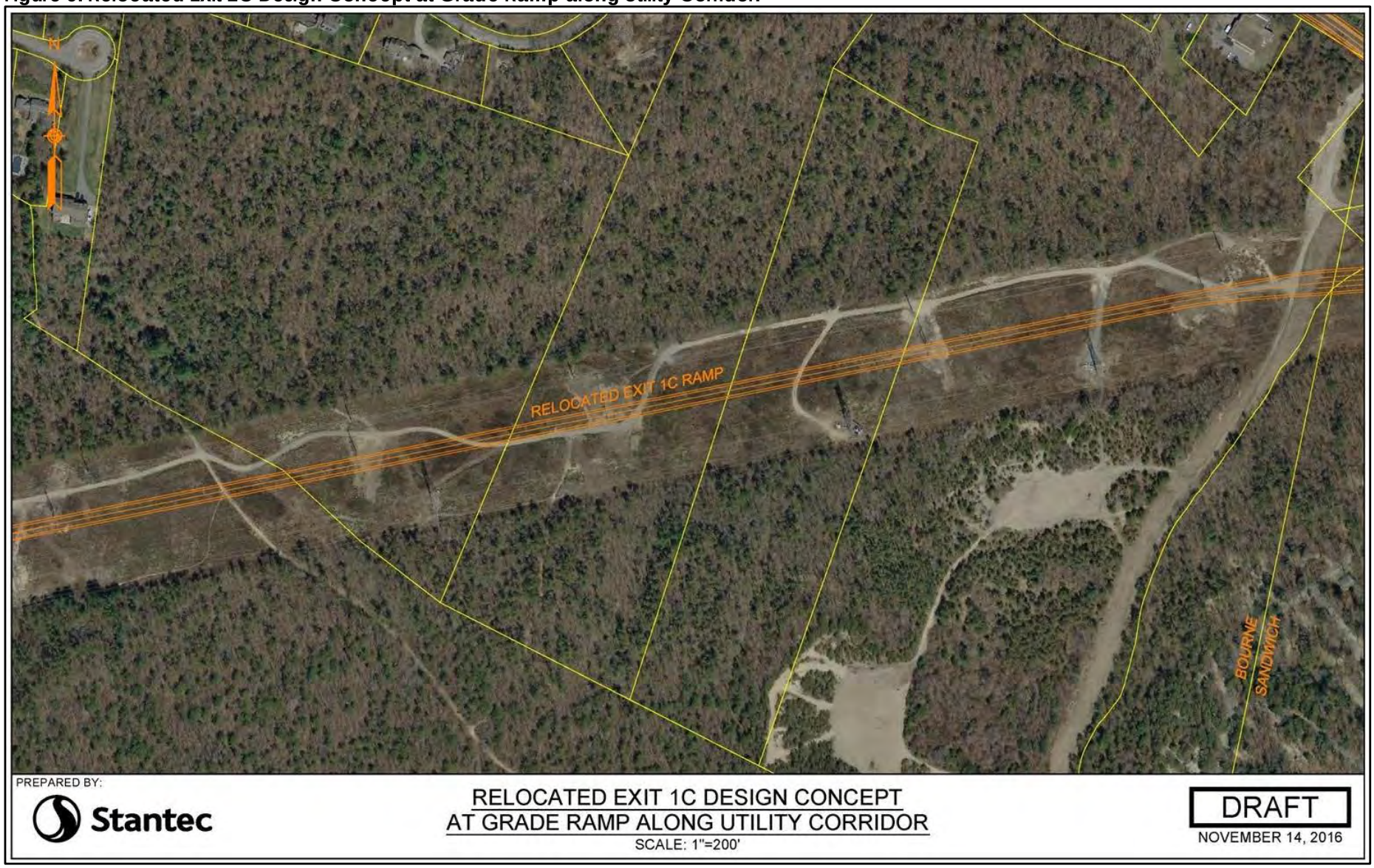


Figure 10. Route 6 Add-a-Lane Design Concepts, Northern End.

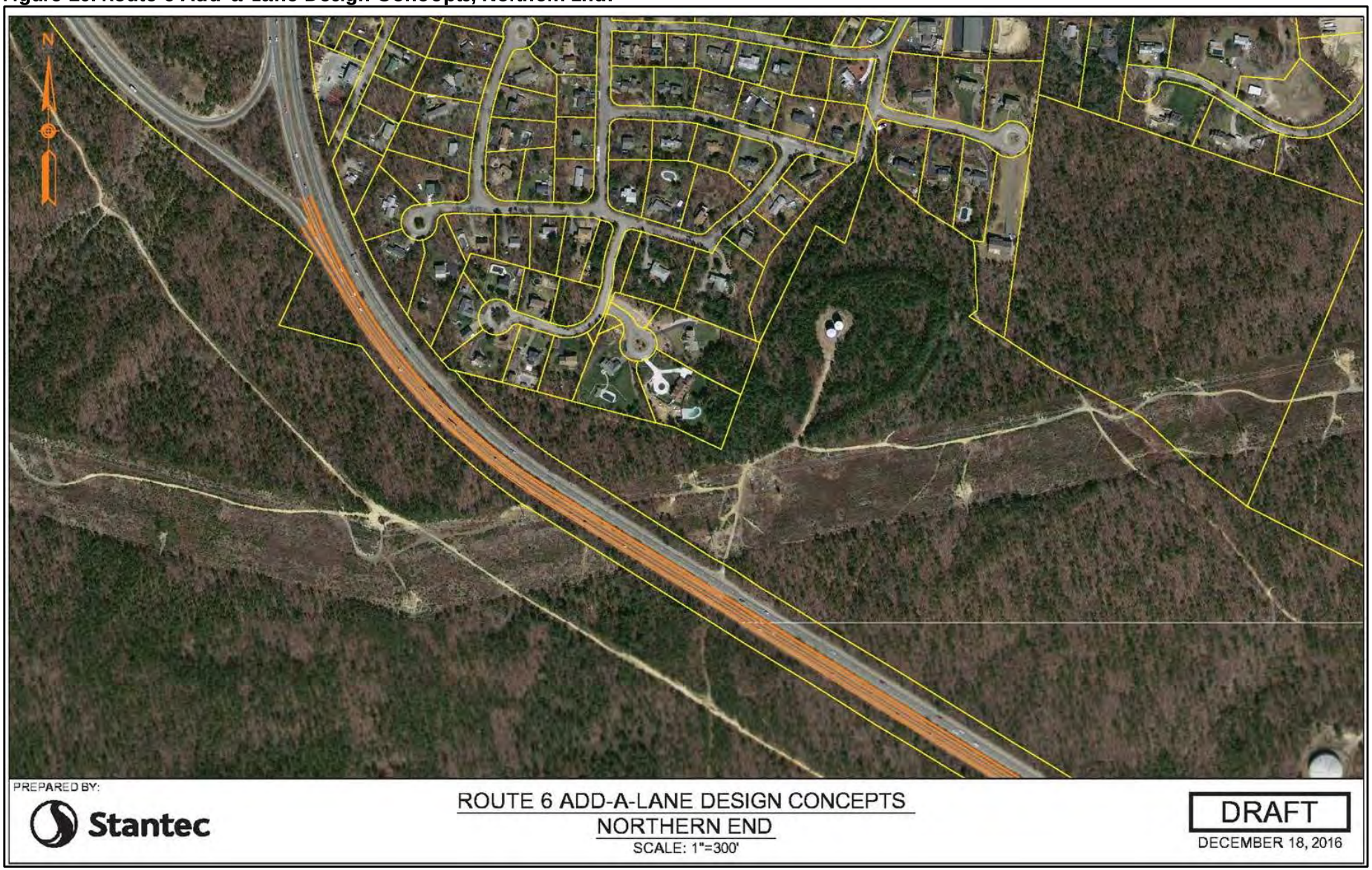


Figure 11. Route 6 Add-a-Lane Design Concepts, Southern End.

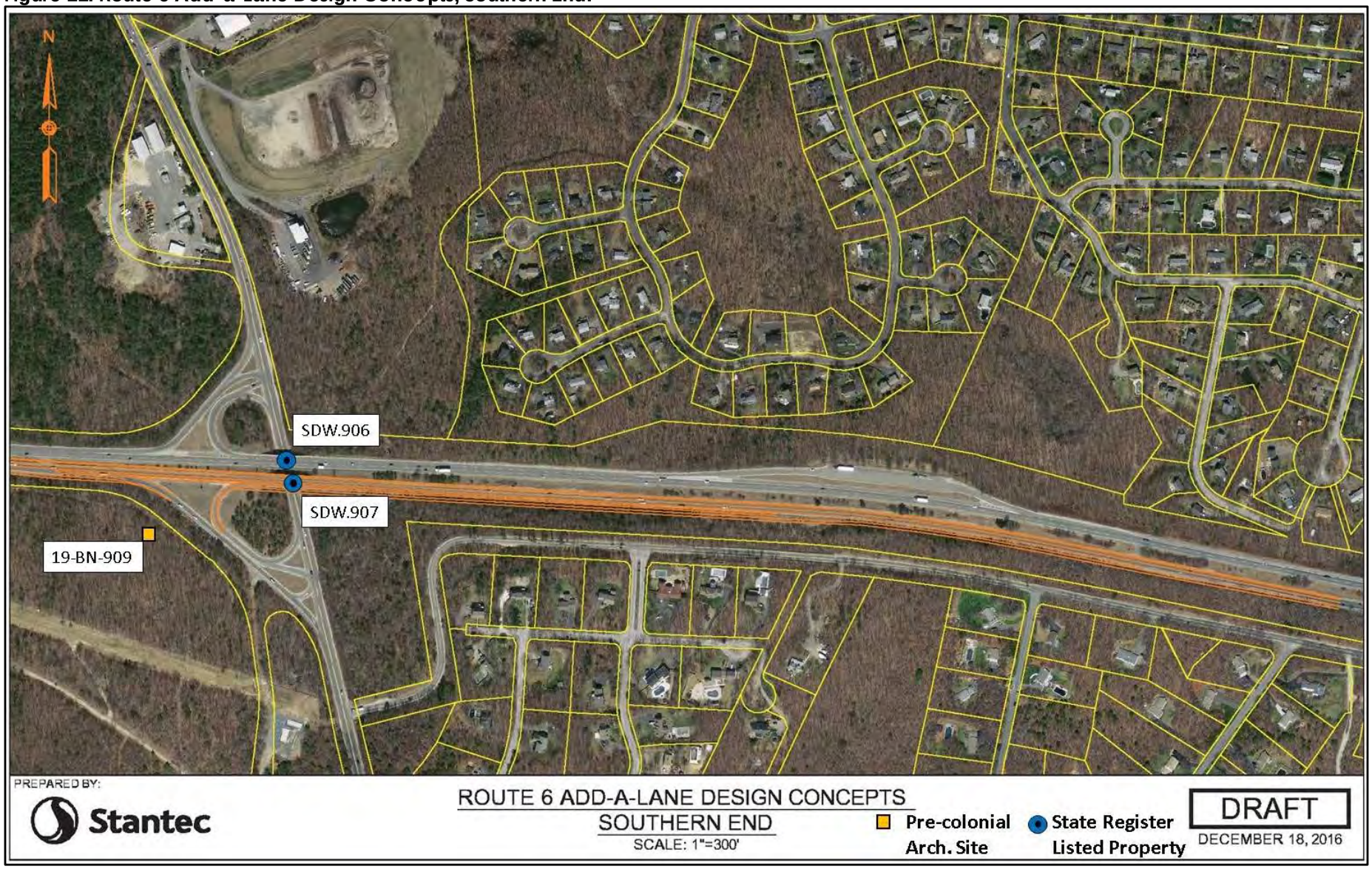


Figure 12. Belmont Circle Design Concepts, Alternative 1.

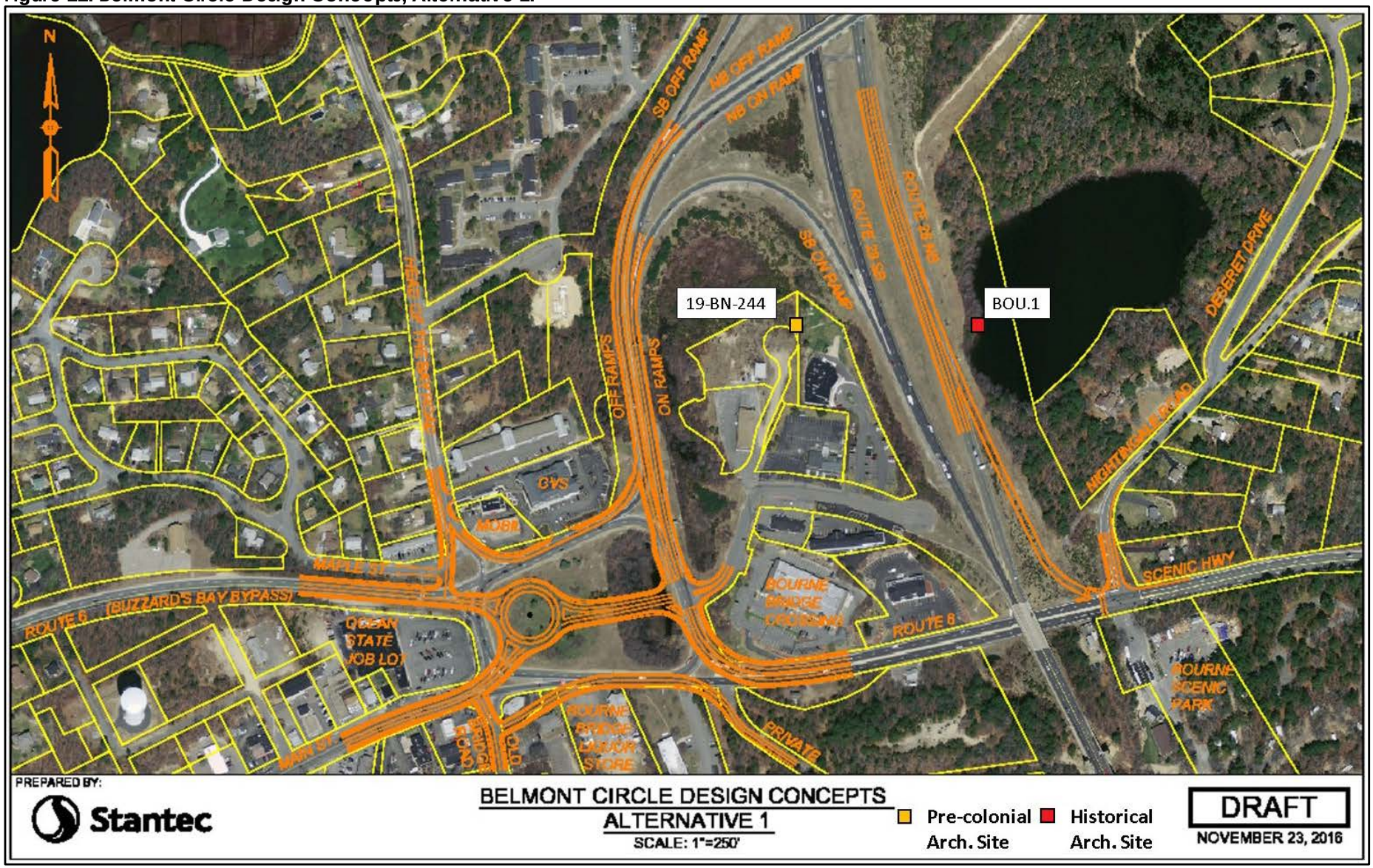
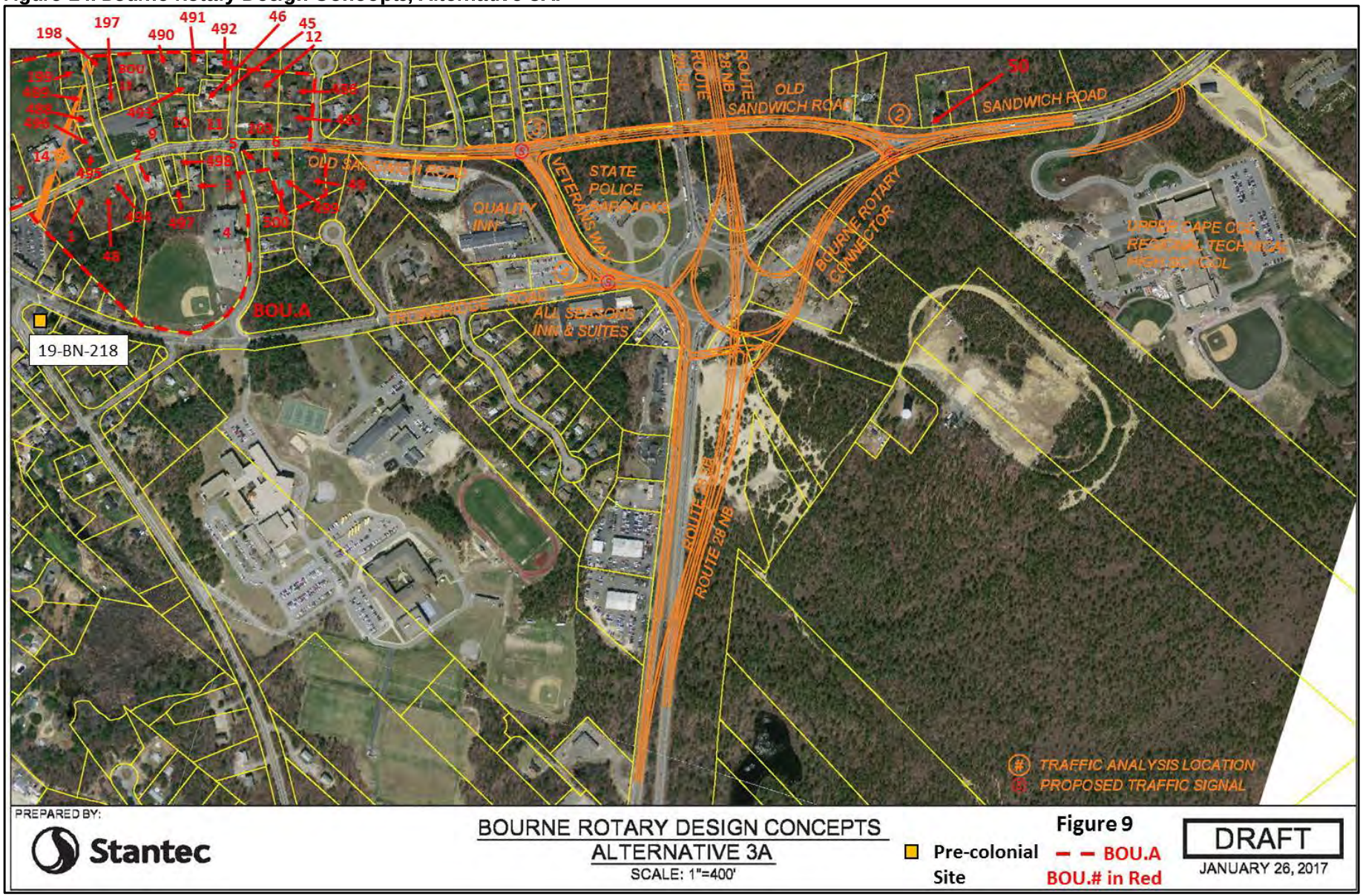


Figure 13. Bourne Rotary Design Concepts, Alternative 2.



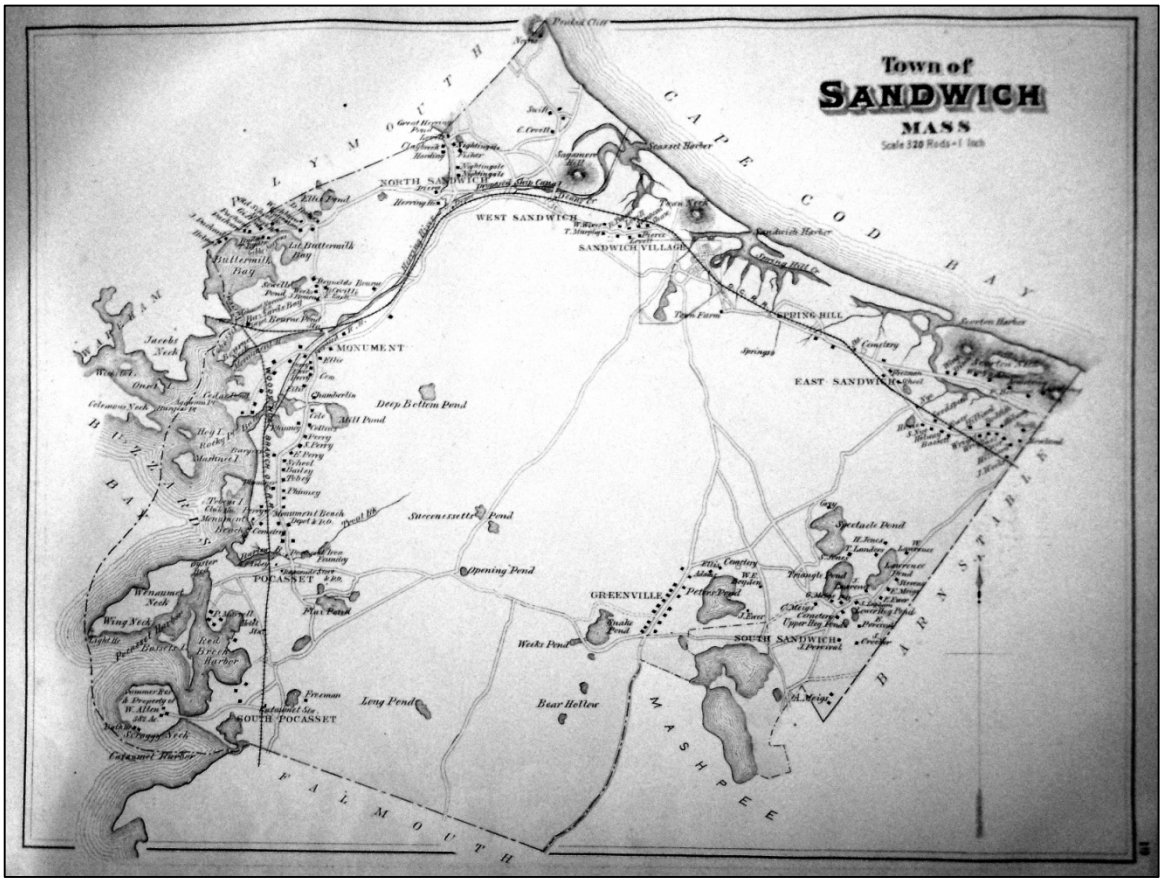
Figure 14. Bourne Rotary Design Concepts, Alternative 3A.



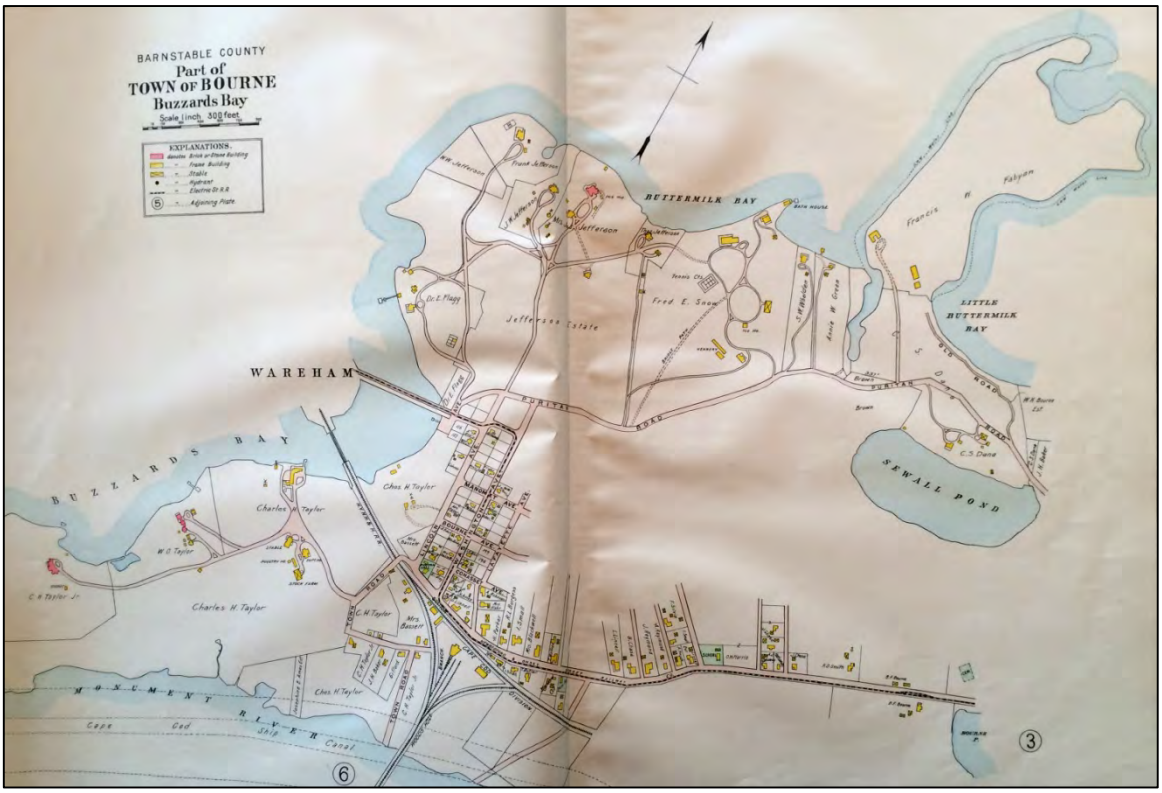
APPENDIX B: HISTORICAL MAPS



Map 1. Map of the Town of Sandwich, Barnstable County, Mass. by H. F. Walling, 1857.



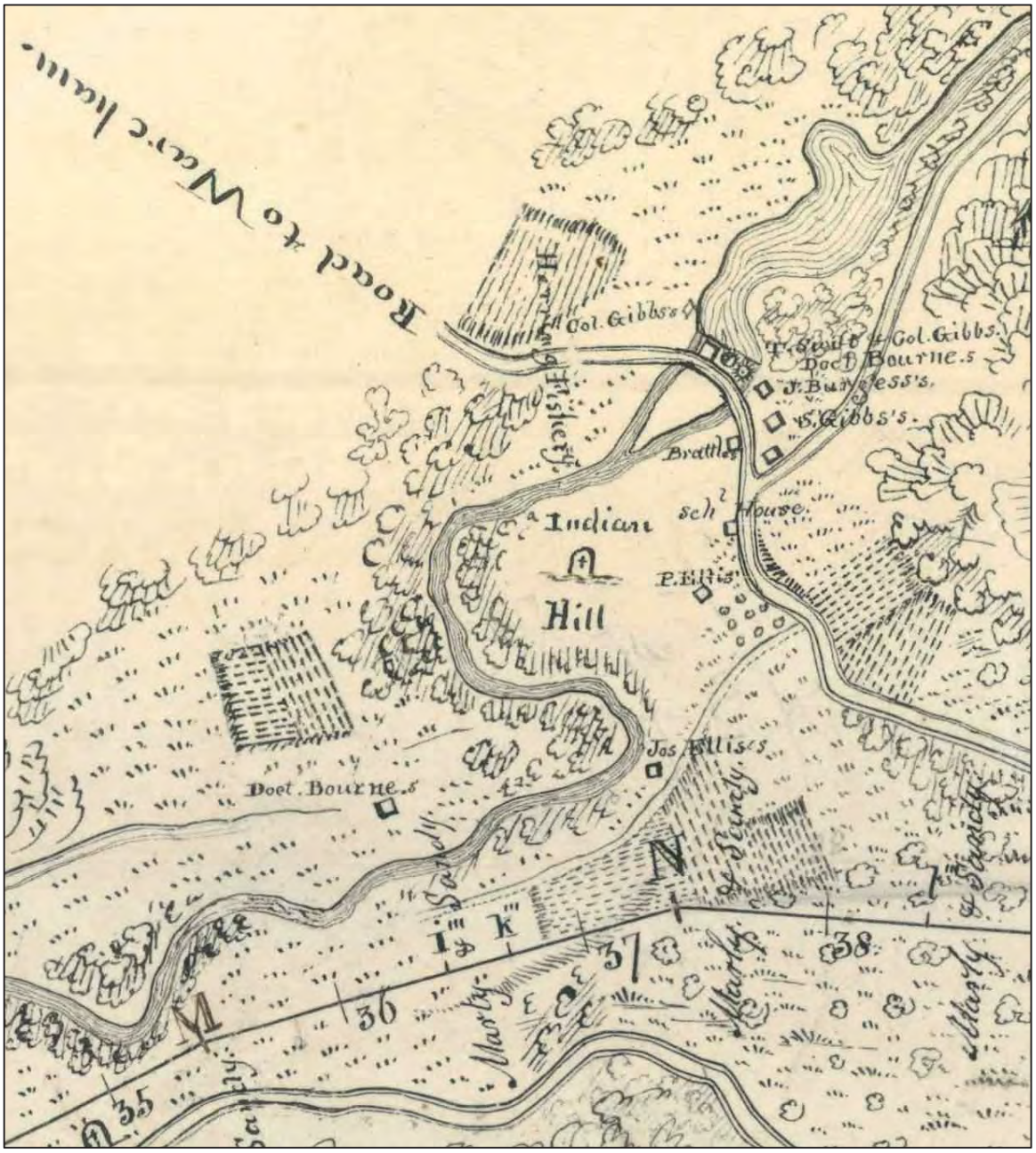
Map 2. Town of Sandwich, Mass. from Atlas of Barnstable County, Massachusetts. Boston, Mass.: Geo. H. Walker & Co., 1880.



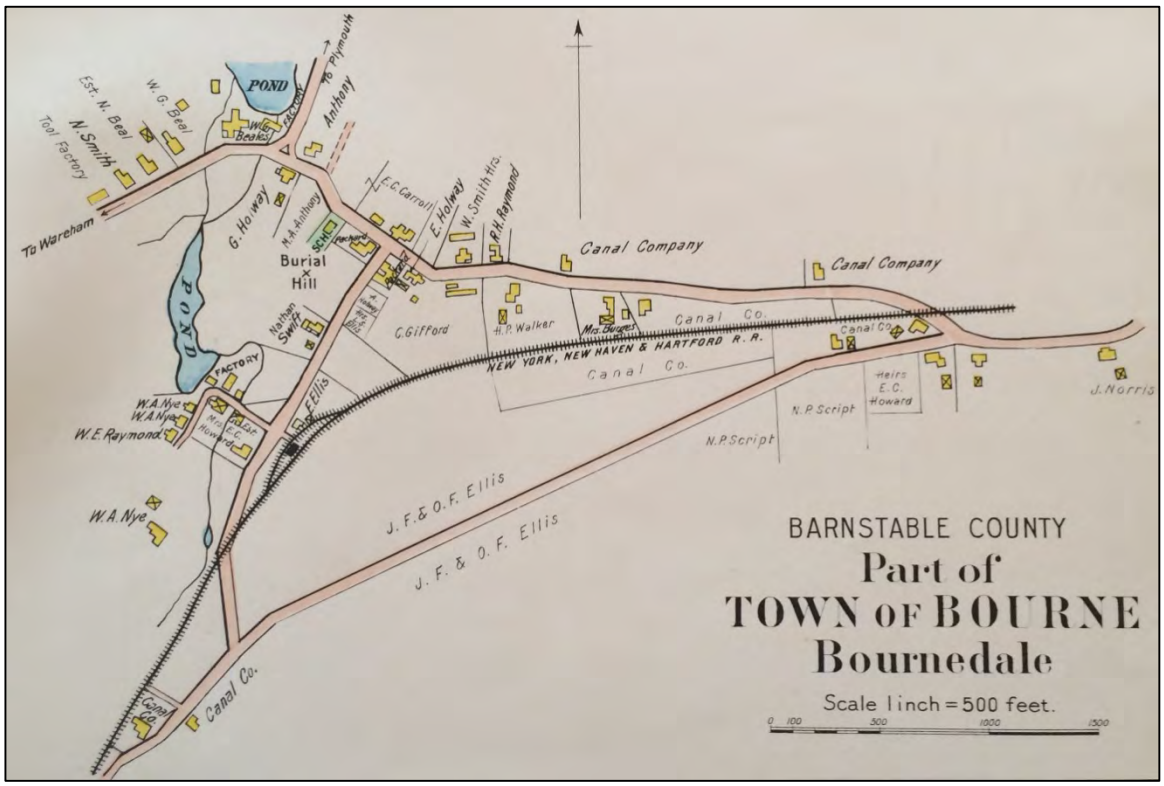
Map 3. Barnstable County: Part of Town of Bourne: Buzzards Bay. Atlas of Barnstable County, Massachusetts. Boston: Walker Lithograph & Publishing, Inc., 1905, page 2.



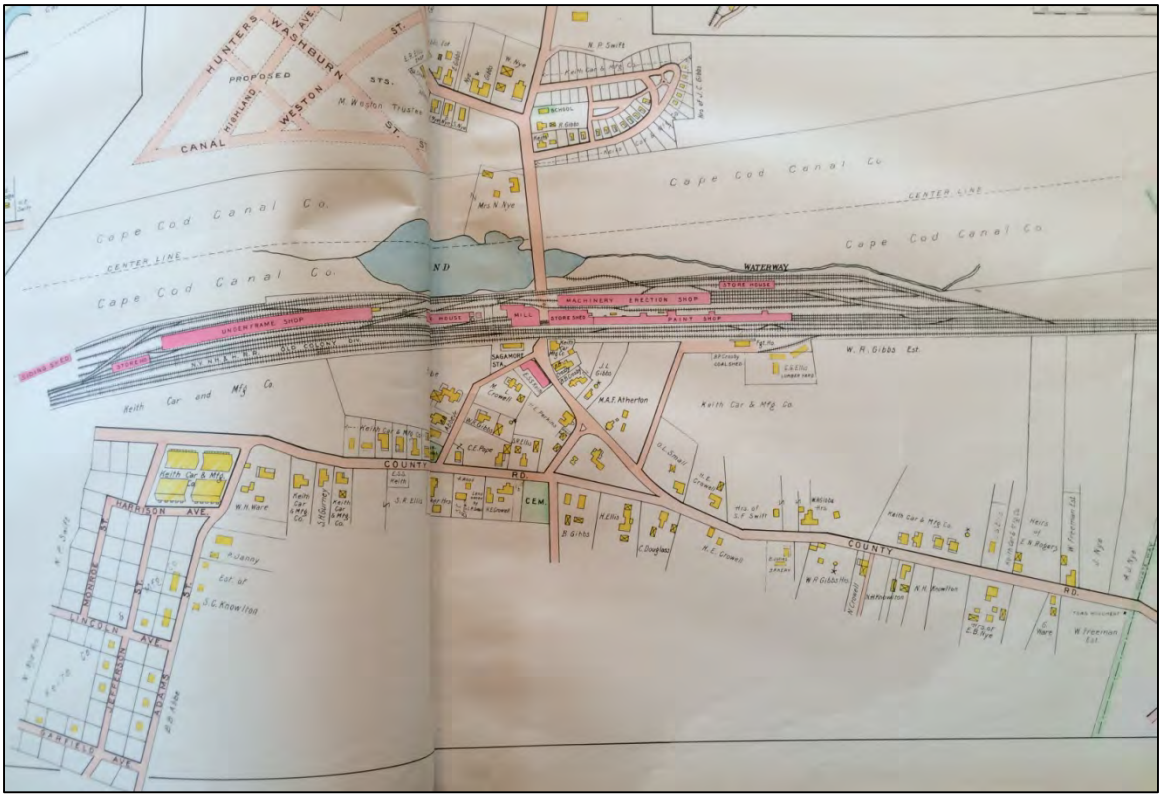
Map 4. Barnstable County: Part of Town of Bourne. Atlas of Barnstable County, Massachusetts. Boston: Walker Lithograph & Publishing, Inc., 1905, page 3.



Map 5. Indian Hill detail, Herring Brook at Road to Wareham, from A Map of a Survey Across the Isthmus of Cape Cod, State of Massachusetts and Town of Sandwich, of a Proposed Canal Between Buzzard's and Barnstable Bays, 1825. Surveyed under the Direction of Major P. H. Perrault.



Map 6. Barnstable County: Part of Town of Bourne: Bournedale. Atlas of Barnstable County, Massachusetts. Boston: Walker Lithograph & Publishing, Inc., 1905, page 3. Collection of Bourne Archives, Bourne, Mass.



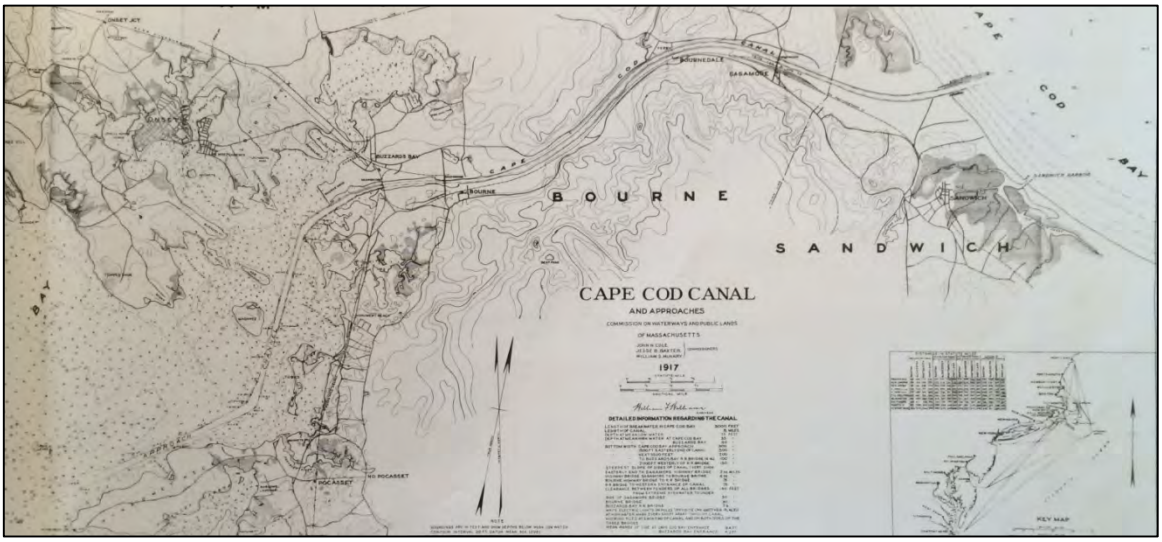
Map 7. Barnstable County: Part of Town of Bourne. Atlas of Barnstable County, Massachusetts. Boston: Walker Lithograph & Publishing, Inc., 1905, page 3.



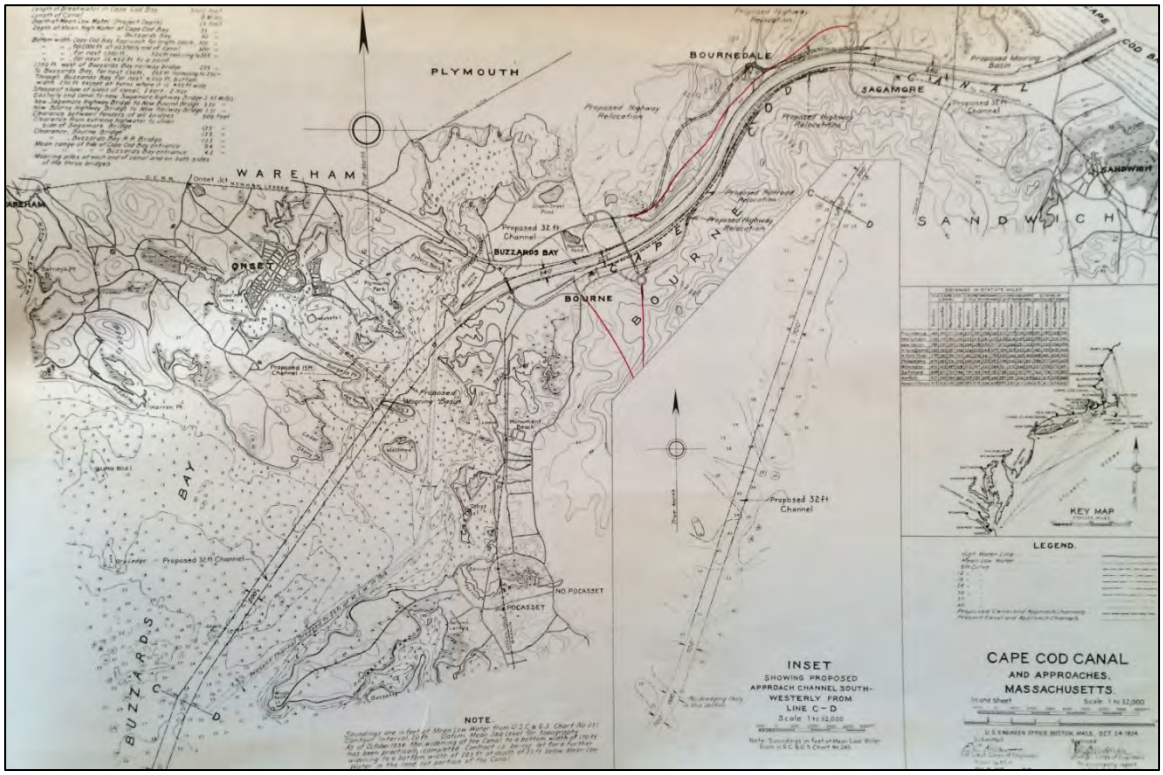
Map 8. "Machin's Map of a Canal from Barnstable Bay to Buzzard's Bay," 1776.



Map 9. Map of the Route of a Proposed Ship Channel Across Cape Cod from Buzzards Bay to Barnstable Bay. Geo. R. Baldwin and J. G. Chase, 1862.



Map 10. Cape Cod Canal and Approaches, Commission on Waterways and Public Lands, 1917.



Map 11. Cape Cod Canal and Approaches, Massachusetts, U.S. Engineer Office, Boston, 1934.

APPENDIX C: HISTORICAL IMAGES



Image 1. View of the Bourne town dock on the Monument River, late 19th century (from Dimock, Bourne, page14).



Image 2. View of Buzzards Bay Rail Road Station (BOU.65) ca. 1912 (from Orwig, Cape Cod Canal, page 51).



Image 3. View of Buzzards Bay Village, late 1920s (from Orwig, Cape Cod Canal, page 105).



Image 4. View of Bourne Village across the Monument River, late 19th century. At left is the Bourne United Methodist Church (BOU.9), next to the Jonathan Bourne Library (BOU.13), and single-family houses (from Dimock, Bourne, page 14).



Image 5. View of Bourne Town Hall (BOU.68; BOU.AE) in Buzzards Bay (from Dimock, Bourne, page 17).



Image 6. View of Keith Car and Manufacturing Company ca. 1910, camera facing southeast. Houses on Savery Avenue are in the foreground (Bourne Historical Society).



Image 7. Bird's eye view of Kings Hi-Way Cabins, a 1930s tourist camp (from Orwig, Cape Cod Canal, page 102).



Image 8. View of excavation of the Monument River at the Collins Farm House, 1912 (from Town of Bourne website historical photos).

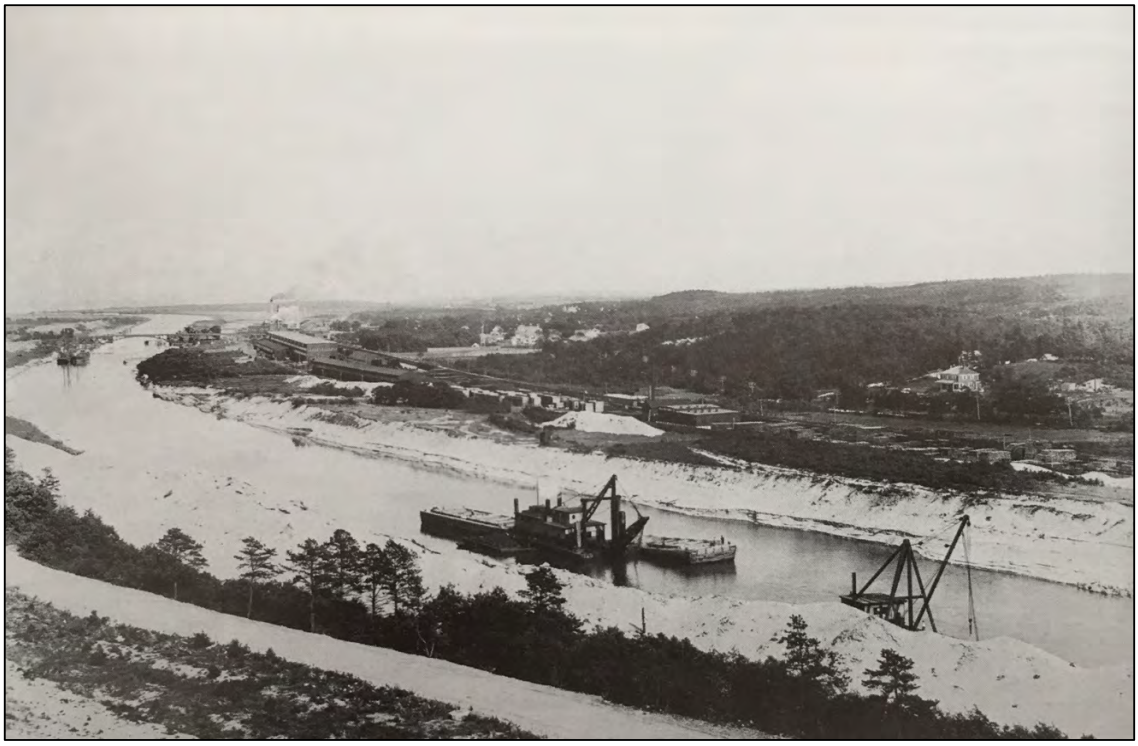


Image 9. View of canal excavation in front of the Keith Car and Manufacturing plant in South Sagamore, ca. 1913 (from Orwig, Cape Cod Canal, p. 115).



Image 10. View of excavation of the Monument River, with two dredges working toward each other, ca. 1912 (from Town of Bourne website historical photos).



Image 11. View of the waters from each end of the new canal meeting after the construction dam was broken through, ca. 1914 (from Town of Bourne website historical photos).



Image 12. View of the completed canal, ca. 1914-16 (from Town of Bourne website historical photos).



Image 13. Aerial view of the Cape Cod Canal, 1936 (from Howard, "Bourne Maps," page 20 (Bourne Historical Society).

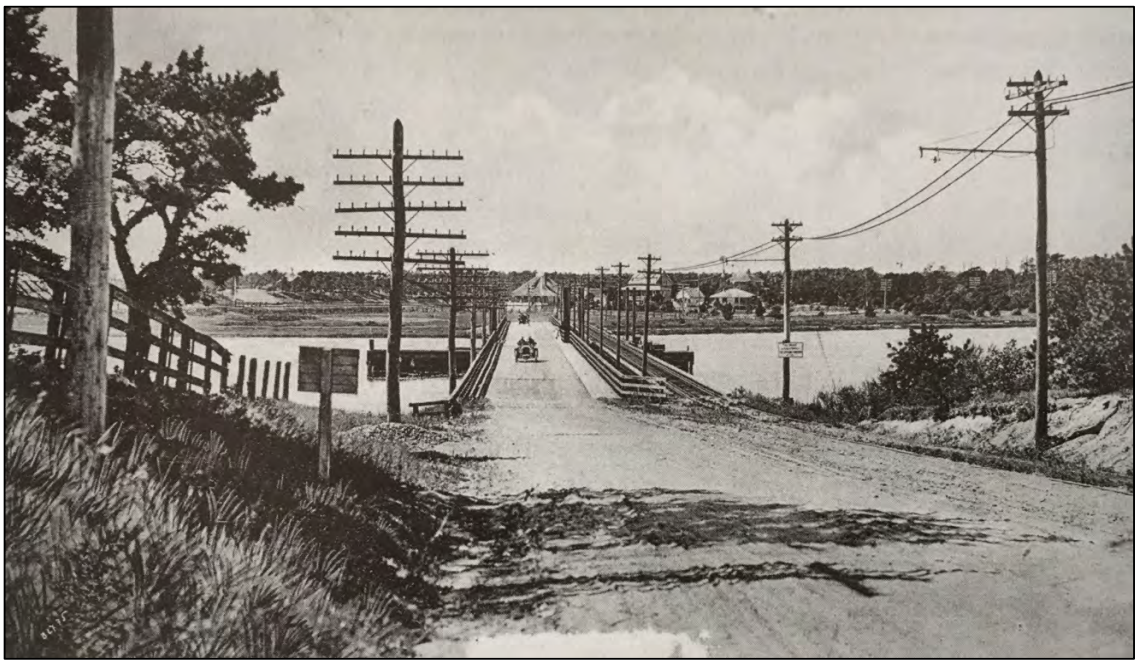


Image 14. Undated view of the 1911 Bourne Highway Bridge (from Orwig, Cape Cod Canal, page 55).



Image 15. Undated view of the 1913 Sagamore Highway Bridge (from Orwig, Cape Cod Canal, page 58).

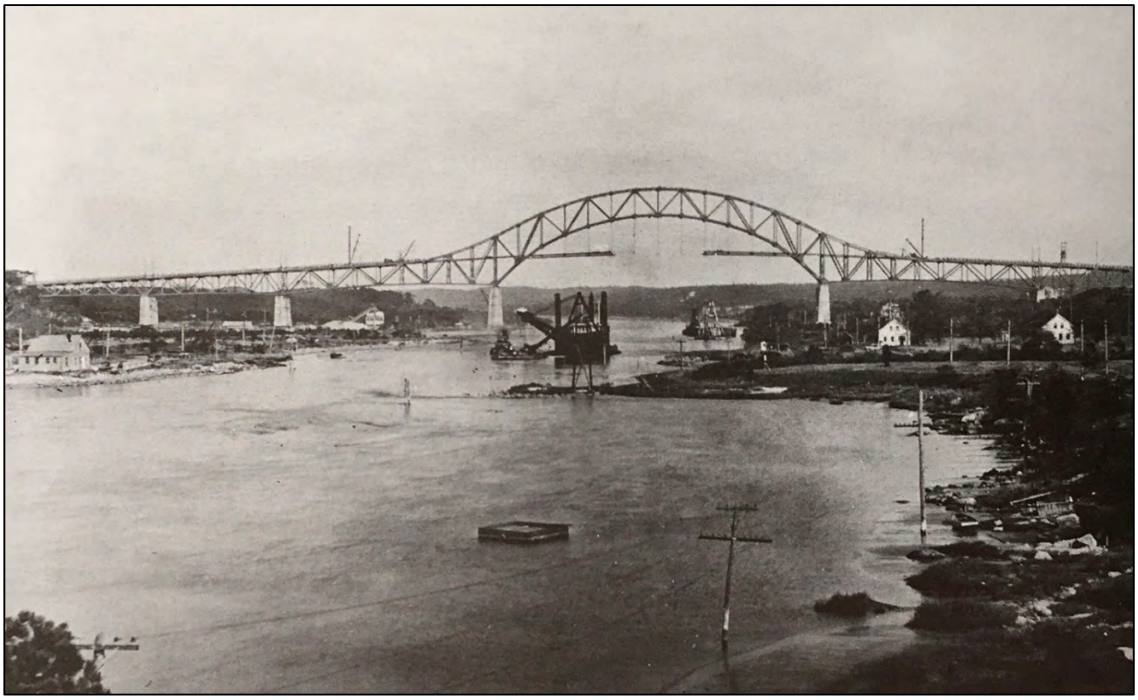


Image 16. View of the Bourne Bridge under construction, ca. 1933-1934 (from Orwig, Cape Cod Canal, page 108).



Image 17. View of the Sagamore Bridge under construction ca. 1933-1934 (from Orwig, Cape Cod Canal, page 113).



Image 18. View of the Bourne Bridge at completion, 1935 (from Orwig, Cape Cod Canal, page 124).



Image 19. View of the Sagamore Bridge at completion, 1935. The canal was widened after the new bridges were completed (from Orwig, Cape Cod Canal, page 115).

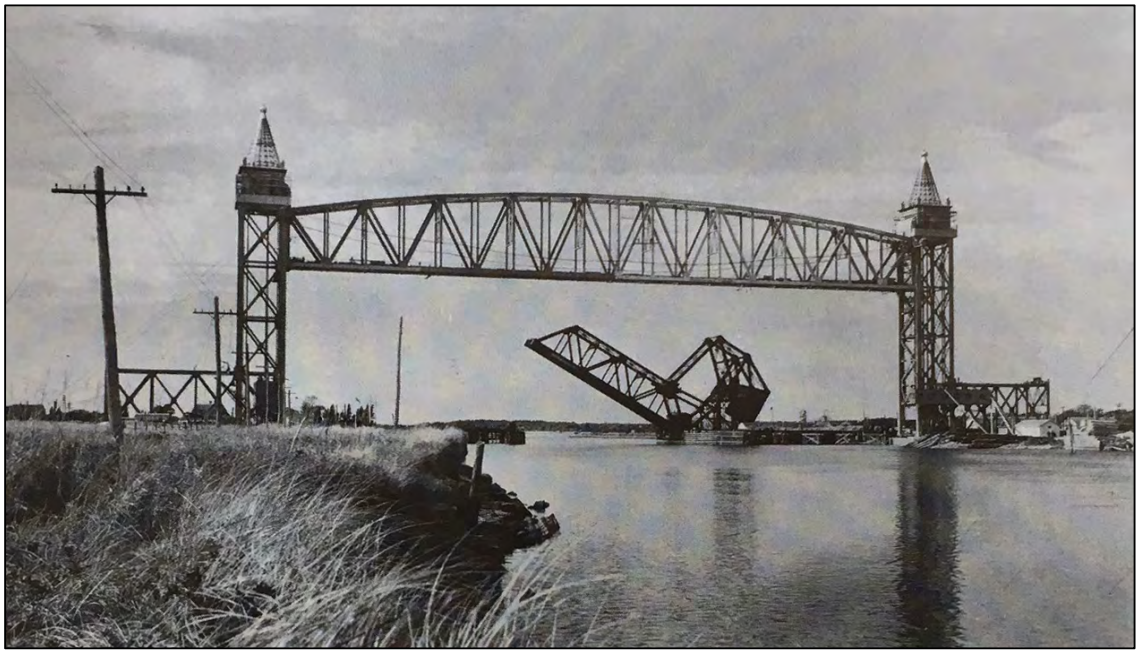


Image 20. View of the Buzzards Bay Railroad Bridge at completion, 1935 (from Orwig, Cape Cod Canal, page 117).



Image 21. Swift Memorial Church (BOU.118) in North Sagamore ca. 1910 (from Dimock, Bourne, page18).



Image 22. View of Keith Car and Manufacturing Company worker housing on Savery Avenue (BOU.P) in North Sagamore (from Orwig, Cape Cod Canal, page 15).

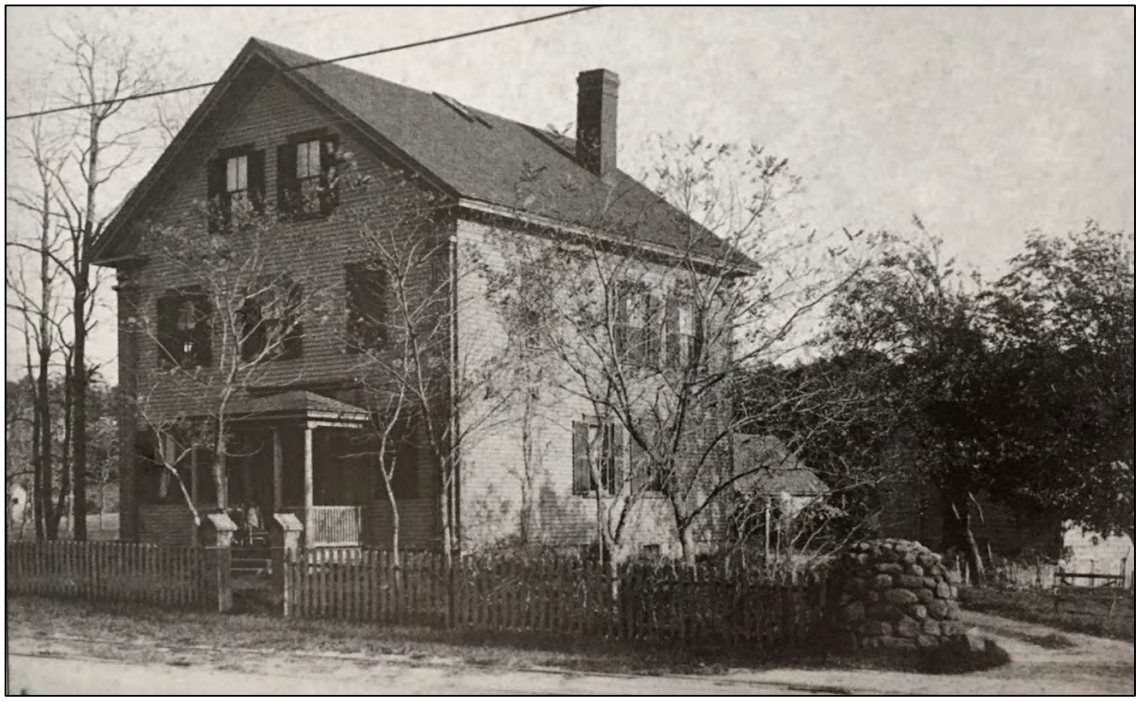


Image 23. View of the George I. Briggs House (BOU.1) in Bourne Village, early 20th century (from Dimock, Bourne, p. 30).

APPENDIX D: PHOTOGRAPHS



Photograph 1. Cape Cod Canal (BOU.AF; BOU.937), view from Cape-side mid canal overlook, camera facing northwest.



Photograph 2. Cape Cod Canal (BOU.AF; BOU.937), view from canal path near Bourne Village, camera facing northeast.



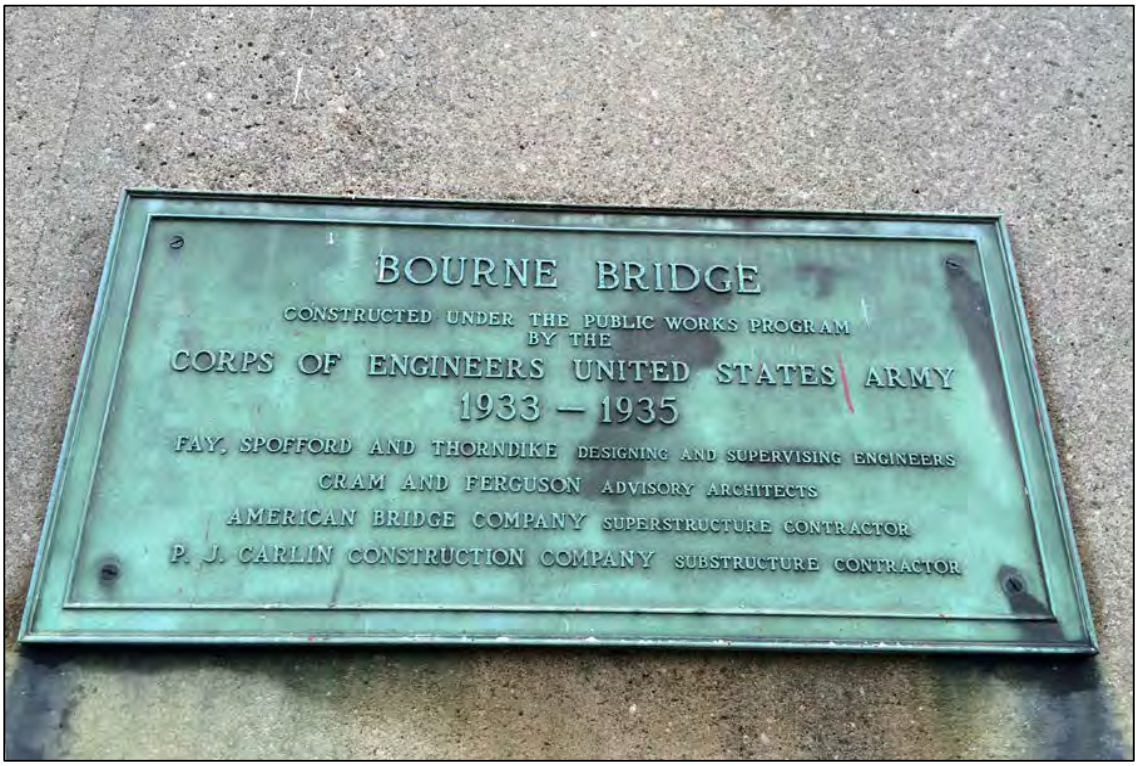
Photograph 3. Cape Cod Canal (BOU.AF; BOU.937) & Sagamore Bridge, view from the Quartz Marker (BOU.939), camera facing east.



Photograph 4. Quartz Marker (BOU.939 camera facing southeast.



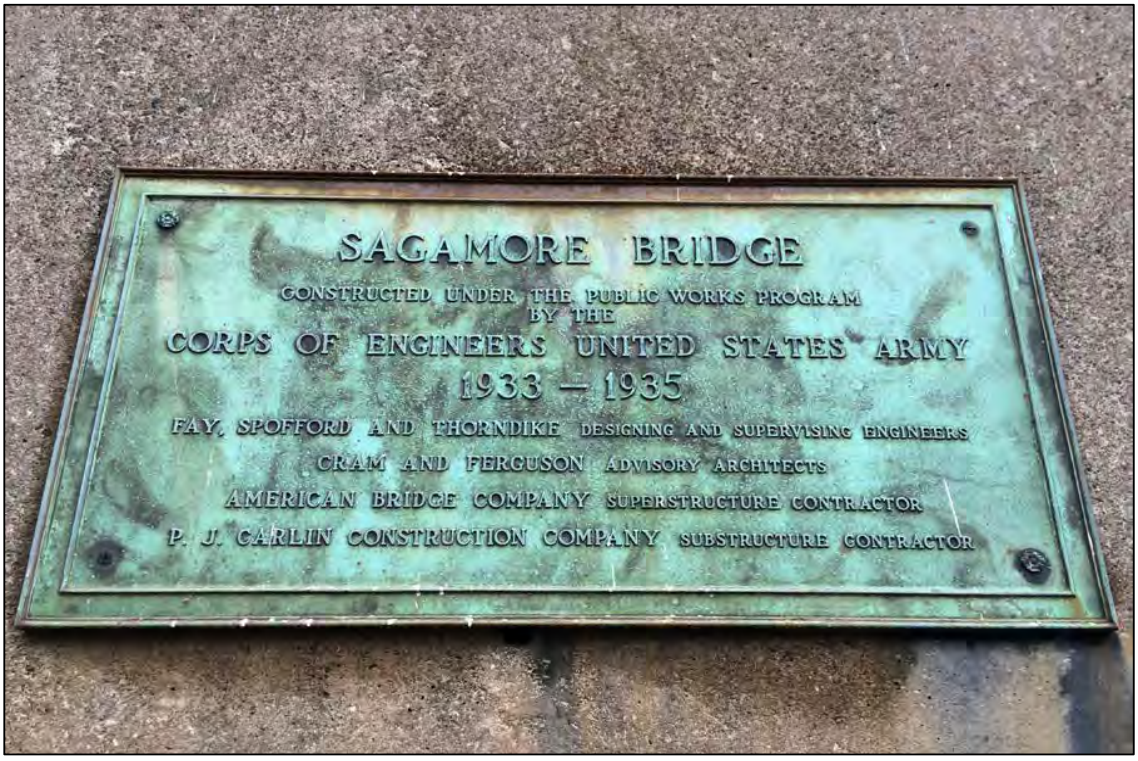
Photograph 5. Bourne Bridge (BOU.919) and Railroad Bridge (BOU.901) in background, camera facing southwest.



Photograph 6. Bourne Bridge plaque, camera facing west.



Photograph 7. Cape Cod Canal and Sagamore Bridge (BOU.918), view from the Quartz Marker(BOU.939), camera facing northeast.



Photograph 8. Sagamore Bridge plaque, camera facing east.



Photograph 9. Buzzards Bay Vertical Lift Railroad Bridge (BOU.901), camera facing southwest.



Photograph 10. Capt. Sylvanus Gibbs House (BOU.29) on Head of the Bay Road, camera facing northeast.



Photograph 11. Gibbs House (BOU.60) at 295 (formerly 291) Head of the Bay Road, camera facing southwest.



Photograph 12. Head of the Bay Cemetery(BOU.803)on Head of the Bay Road, camera facing southwest.



Photograph 13. Buzzards Bay Rail Road Station (BOU.65) on Main Street, camera facing northeast.



Photograph 14. Buzzards Bay Rail Road Station & Tower (BOU.65, 66) on Main Street, camera facing northeast.



Photograph 15. Bourne Town Hall (BOU.AE; BOU.68) at 24 Perry Avenue, camera facing northeast.



Photograph 16. Massachusetts Army National Guard Armory (BOU.388) at 10 Armory Road, camera facing northeast.



Photograph 17. Abram F. Swift House (BOU.67) at 37 Old Bridge Street, camera facing northwest.



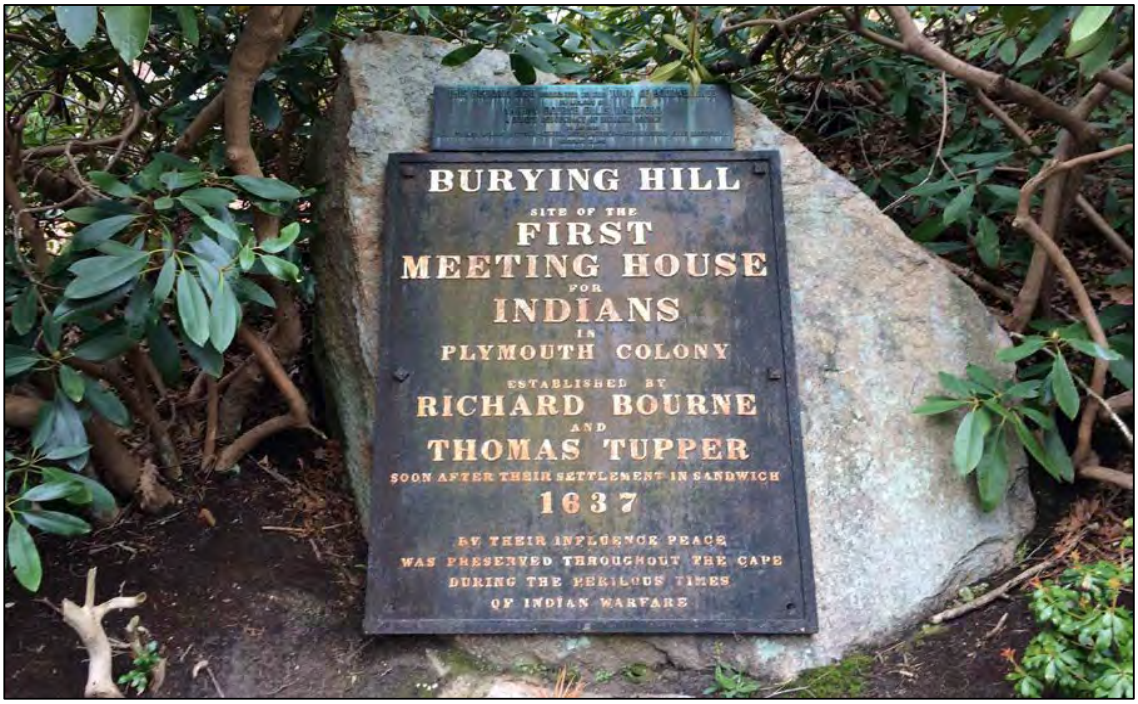
Photograph 18. First Bourne Bridge Abutment (BOU.943), camera facing west.



Photograph 19. Cape Cod Canal Electrical Substation (BOU.389), camera facing northeast.



Photograph 20. Burying Hill (BOU.920) on Old Herring Pond Road, camera facing northwest.



Photograph 21. Burying Hill plaque(BOU.920) on Old Herring Pond Road, camera facing northwest.



Photograph 22. Herring Run (BOU.921) at Old Herring Pond Road, camera facing south.



Photograph 23. Herring Fish Ladder (BOU.938) at Route 6 east, camera facing southwest.



Photograph 24. Village School (BOU.57) at 29 Herring Pond Road, camera facing south.



Photograph 25. Wilson D. Bent, Sr. House (BOU.55) at 9 Bournedale Road, camera facing south.



Photograph 26. Josiah Ellis House (BOU.209, 210) at 166 Herring Pond Road, camera facing east.



Photograph 27. Nathan Bourne Ellis House/Bournedale Lodge (BOU.211) at 854 Route 6, camera facing northwest.



Photograph 28. Mason White/Battles House (BOU.54) at 6 Bournedale Road, camera facing north.



Photograph 29. Indian Cemetery (BOU.800; PLY.800) on Little Sandy Pond Road, camera facing northwest.



Photograph 30. Swift Memorial Church (BOU.118) at 10 Williston Road, camera facing northeast.



Photograph 31. Sagamore Grammar School (BOU.119)at 30 Williston Road, camera facing southeast.



Photograph 32. Capt. William Crowell Gibbs House (BOU.283, 281) on Old Plymouth Road, camera facing southeast.



Photograph 33. Keith Company houses (BOU.123, 124, 125) on Savery Avenue, camera facing northeast.



Photograph 34. Keith Company houses (BOU.130 to 134) on Savery Avenue, camera facing east.



Photograph 35. Crowell Farm (BOU.27) at 31 Crowell Road, camera facing northwest.



Photograph 36. Assembly Hall (BOU. 175) at 30 Robinson Road, camera facing southeast.



Photograph 37. Rev. William E. Wolcott House (BOU.323) at 39 Robinson Road, camera facing northwest.



Photograph 38. Sagamore Hill Gun Battery (SDW.AA) in Scusset Beach State Reservation, camera facing northeast.



Photograph 39. George I. Briggs House (BOU.1) at 22 Sandwich Road, camera facing east.



Photograph 40. Jonathan Bourne Historic Center (BOU.13) at 30 Keene Street, camera facing south.



Photograph 41. Bourne High School (BOU.4) at 85 Cotuit Road, camera facing south.



Photograph 42. Arabella Parker-George Ellis House (BOU.49) at 66 Sandwich Road (red house); Arabella Ellis Parker House (BOU.6) at 60 Sandwich Road; Moses Dagget House (BOU.5) at 56 Sandwich Road, camera facing southeast.



Photograph 43. Moses C. Waterhouse House (BOU.12) at 59 Keene Street, camera facing northeast.



Photograph 44. Ordello R. Swift House (BOU.45) at 60 Keene Street, camera facing northwest.



Photograph 45. Alonzo Booth Blacksmith Shop (BOU.48) at 22 Sandwich Road, camera facing southeast.



Photograph 46. Jonathan Bourne Public Library (old Bourne Grammar Schoo)l (BOU.14) at 19 Sandwich Road, camera facing northwest.



Photograph 47. Albert E. Eldridge House (BOU.10, 202) at 43 Sandwich Road, camera facing northwest.



Photograph 48. Deacon Gershom Ellis/Henry S. Blackwell House (BOU.50) at 201 Sandwich Road, camera facing northwest.



Photograph 49. 2 Shore Road (BOU.411, BOU.410), camera facing northeast.



Photograph 50. 10 Shore Road (BOU.412, BOU.413), camera facing northwest.



Photograph 51. 18 Shore Road (BOU.414), camera facing northwest.



Photograph 52. 19 Shore Road (BOU.415), camera facing southwest.



Photograph 53. Rev. Herman Perry House (BOU.51) at 7 Shore Road, camera facing southeast.



Photograph 54. Aptucxet Trading Post (BOU.32) at 24 Aptucxet Road, camera facing northwest.



Photograph 55. 2 County Road (BOU.450), camera facing southwest.



Photograph 56.122 County Road (BOU.481.482), camera facing southwest.



Photograph 57. Deacon Elijah Perry House (BOU.43) at 203 County Road, camera facing southeast.



Photograph 58. Burgess Homestead (BOU.177) on 11 Burgess Street, camera facing northwest.



Photograph 59. Isaac N. Keith House (BOU.184,185) at 66 Pleasant Street, camera facing south.



Photograph 60. Samuel H. Gurney House and Variety Store (BOU.186) at 896 Sandwich Road, camera facing southeast.



Photograph 61. S. Harlow/Benjamin Harlow Pope House (BOU.188) at 941 Sandwich Road, camera facing northwest.



Photograph 62. Crowell/Hannah Rebecca Burgess House (BOU.192) at 1005 Sandwich Road, camera facing north.



Photograph 63. C.G Ellis House (BOU.344) at 1071 Sandwich Road, camera facing north.



Photograph 64. Rogers House (BOU.345) at 1085 Sandwich Road, camera facing northwest.



Photograph 65. Freeman Farm Foreman's House (BOU.194, 195) at 1101 Sandwich Road, camera facing northwest



Photograph 66. 38 and 32 Commonwealth Avenue, camera facing southeast.



Photograph 67. 5 and 9 Adams Street and Keith Car Company Apartments (BOU.328) at 860 Sandwich Street, camera facing south.



Photograph 68. 22 and 20 Westdale Park Road, camera facing northwest.



Photograph 69. 18, 16 and 10 Pleasant Street, camera facing northeast.



Photograph 70. Searle-Davis House (SDW.570) at 41 Shawme Road, camera facing south.



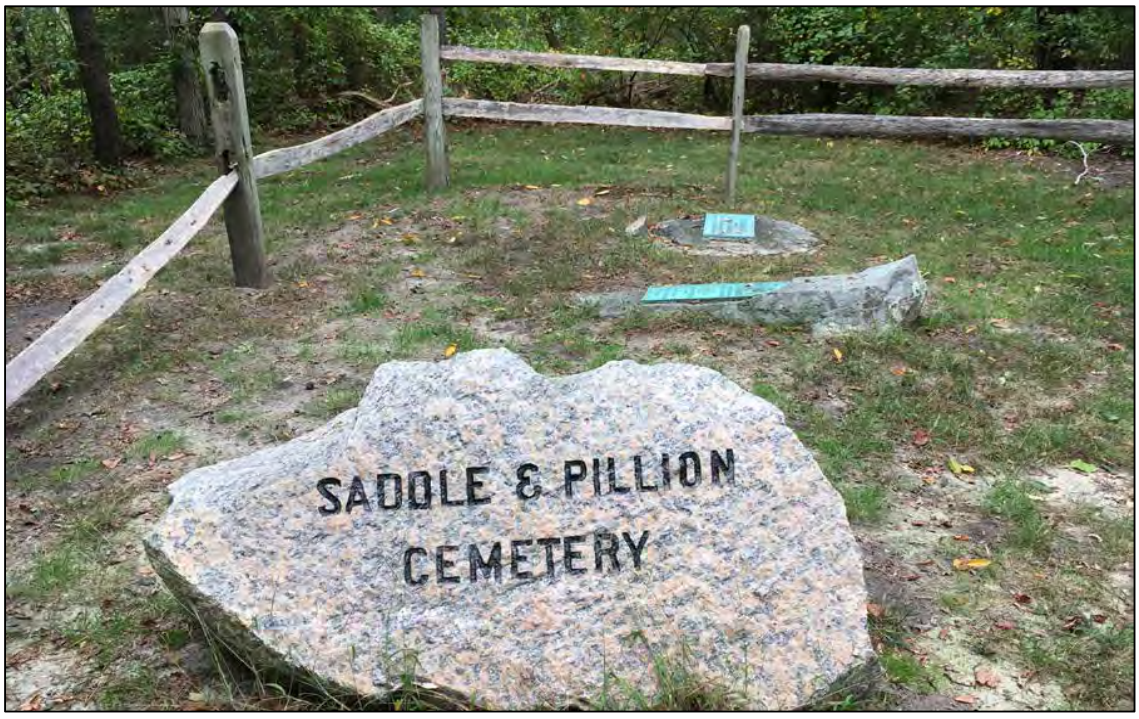
Photograph 71. Route 6 bridges (SDW.907 and 906) at interchange with Route 130, camera facing northwest.



Photograph 72. Motor Court (SDW.495) at 14 Sandwich Road, camera facing southwest.



Photograph 73. Motor Court (SDW.489) at 27 Sandwich Road, camera facing northwest.



Photograph 74. Saddle and Pillion Burial Ground (SDW.802) at 6 Tupper Road, camera facing northeast.



Photograph 75. 8 Main Street (SDW.504), camera facing southwest.



Photograph 76. 12 Main Street (SDW.505), camera facing south.

APPENDIX E: TABLES

Table 1. Historic Status of MHC-Inventoried Resources

MHC ID	Name	NR (# of Ind Prop)	NR Eligible per MHC	NR Pot. Eligible (District)	NR Pot. Eligible (# of Ind Prop)	SR Listed
CAPE COD CANAL						
BOU.918	Bourne Bridge		X			
BOU.919	Sagamore Bridge		X			
BOU.AF	Cape Cod Canal			X		
SDW.Z	Cape Cod Canal			X		X
NORTH OF CANAL						
BOU.388	Mass. Army NG Armory		X			
BOU.C	Head of the Bay				1	
BOU.I	Bournedale	1			3	
BOU.J	Main Street Commercial Area				2	
BOU.O	North Sagamore				3	
BOU.P	Savery Avenue					
BOU.U	Sagamore Beach				3	
BOU.AE	Bourne Town Hall	1				X
PLY.G	Cedarville			X		
SDW.AA	Sagamore Hill Gun Battery			X		X
SOUTH OF CANAL						
BOU.A	Keene St - Sandwich Rd Area	3		X	6	
BOU.B	Cape Cod Air Station - Otis AFB					
BOU.AG	Aptucxet Trading Post			X		
BOU.AH	Shore Road North				1	
BOU.AJ	County Road North				1	
BOU.V	South Sagamore			X	8	
SDW.906	Route 6 Bridge					X
SDW.907	Route 6 Bridge					X
SDW.F	Shawme Road			X		X
SDW.G	Route 6A West					X
SDW.I	Main Street					X
SDW.R	Old Kings Highway Regional HD					X

Table 2. Potential Middle Bridge 1 Effects

MHC ID	Name	NR (# of Ind Prop)	NR Eligible per MHC	NR Pot. Eligible (District)	NR Pot. Eligible (# of Ind Prop)	SR Listed	Potential Effects
CAPE COD CANAL							
BOU.919	Bourne Bridge		X				No adverse effect
BOU.918	Sagamore Bridge		X				No adverse effect
BOU.AF	Cape Cod Canal			X			Direct/Indirect
SDW.Z	Cape Cod Canal			X		X	No adverse effect
NORTH OF CANAL							
BOU.388	Mass. Army NG Armory		X				No adverse effect
BOU.C	Head of the Bay				1		No adverse effect
BOU.I	Bournedale	1			3		Indirect
BOU.J	Main Street Commercial Area				2		No adverse effect
BOU.O	North Sagamore				3		No adverse effect
BOU.P	Savery Avenue						No adverse effect
BOU.U	Sagamore Beach				3		No adverse effect
BOU.AE	Bourne Town Hall	1				X	No adverse effect
PLY.G	Cedarville			X			No adverse effect
SDW.AA	Sagamore Hill Gun Battery			X		X	No adverse effect
SOUTH OF CANAL							
BOU.A	Keene St - Sandwich Rd Area	3		X	6		No adverse effect
BOU.B	Cape Cod Air Station - Otis AFB						No adverse effect
BOU.AG	Aptucxet Trading Post			X			No adverse effect
BOU.AH	Shore Road North				1		No adverse effect
BOU.AJ	County Road North				1		No adverse effect
BOU.V	South Sagamore			X	8		No adverse effect
SDW.906	Route 6 Bridge					X	No adverse effect
SDW.907	Route 6 Bridge					X	No adverse effect
SDW.F	Shawme Road			X		X	No adverse effect
SDW.G	Route 6A West					X	No adverse effect
SDW.I	Main Street					X	No adverse effect
SDW.R	Old Kings Highway Regional HD					X	No adverse effect

Table 3. Potential Middle Bridge 2 Effects

MHC ID	Name	NR (# of Ind Prop)	NR Eligible per MHC	NR Pot. Eligible (District)	NR Pot. Eligible (# of Ind Prop)	SR Listed	Potential Effects
CAPE COD CANAL							
BOU.919	Bourne Bridge		X				No adverse effect
BOU.918	Sagamore Bridge		X				No adverse effect
BOU.AF	Cape Cod Canal			X			Direct/Indirect
SDW.Z	Cape Cod Canal			X		X	No adverse effect
NORTH OF CANAL							
BOU.388	Mass. Army NG Armory		X				No adverse effect
BOU.C	Head of the Bay				1		No adverse effect
BOU.I	Bournedale	1			3		No adverse effect
BOU.J	Main Street Commercial Area				2		No adverse effect
BOU.O	North Sagamore				3		No adverse effect
BOU.P	Savery Avenue						No adverse effect
BOU.U	Sagamore Beach				3		No adverse effect
BOU.AE	Bourne Town Hall	1				X	No adverse effect
PLY.G	Cedarville			X			No adverse effect
SDW.AA	Sagamore Hill Gun Battery			X		X	No adverse effect
SOUTH OF CANAL							
BOU.A	Keene St - Sandwich Rd Area	3		X	6		No adverse effect
BOU.B	Cape Cod Air Station - Otis AFB						Direct/Indirect
BOU.AG	Aptucxet Trading Post			X			No adverse effect
BOU.AH	Shore Road North				1		No adverse effect
BOU.AJ	County Road North				1		No adverse effect
BOU.V	South Sagamore			X	8		No adverse effect
SDW.906	Route 6 Bridge					X	No adverse effect
SDW.907	Route 6 Bridge					X	No adverse effect
SDW.F	Shawme Road			X		X	No adverse effect
SDW.G	Route 6A West					X	No adverse effect
SDW.I	Main Street					X	No adverse effect
SDW.R	Old Kings Highway Regional HD					X	No adverse effect

Table 4. Potential Sandwich Road Effects

MHC ID	Name	NR (# of Ind Prop)	NR Eligible per MHC	NR Pot. Eligible (District)	NR Pot. Eligible (# of Ind Prop)	SR Listed	Potential Effects
CAPE COD CANAL							
BOU.919	Bourne Bridge		X				No adverse effect
BOU.918	Sagamore Bridge		X				No adverse effect
BOU.AF	Cape Cod Canal			X			No adverse effect
SDW.Z	Cape Cod Canal			X		X	No adverse effect
NORTH OF CANAL							
BOU.388	Mass. Army NG Armory		X				No adverse effect
BOU.C	Head of the Bay				1		No adverse effect
BOU.I	Bournedale	1			3		No adverse effect
BOU.J	Main Street Commercial Area				2		No adverse effect
BOU.O	North Sagamore				3		No adverse effect
BOU.P	Savery Avenue						No adverse effect
BOU.U	Sagamore Beach				3		No adverse effect
BOU.AE	Bourne Town Hall	1				X	No adverse effect
PLY.G	Cedarville			X			No adverse effect
SDW.AA	Sagamore Hill Gun Battery			X		X	No adverse effect
SOUTH OF CANAL							
BOU.A	Keene St - Sandwich Rd Area	3		X	6		No adverse effect
BOU.B	Cape Cod Air Station - Otis AFB						No adverse effect
BOU.AG	Aptucxet Trading Post			X			No adverse effect
BOU.AH	Shore Road North				1		No adverse effect
BOU.AJ	County Road North				1		No adverse effect
BOU.V	South Sagamore			X	8		No adverse effect
SDW.906	Route 6 Bridge					X	No adverse effect
SDW.907	Route 6 Bridge					X	No adverse effect
SDW.F	Shawme Road			X		X	No adverse effect
SDW.G	Route 6A West					X	No adverse effect
SDW.I	Main Street					X	No adverse effect
SDW.R	Old Kings Highway Regional HD					X	No adverse effect

Table 5. Potential Relocated Exit 1 Effects

MHC ID	Name	NR (# of Ind Prop)	NR Eligible per MHC	NR Pot. Eligible (District)	NR Pot. Eligible (# of Ind Prop)	SR Listed	Potential Effects
CAPE COD CANAL							
BOU.919	Bourne Bridge		X				No adverse effect
BOU.918	Sagamore Bridge		X				No adverse effect
BOU.AF	Cape Cod Canal			X			No adverse effect
SDW.Z	Cape Cod Canal			X		X	No adverse effect
NORTH OF CANAL							
BOU.388	Mass. Army NG Armory		X				No adverse effect
BOU.C	Head of the Bay				1		No adverse effect
BOU.I	Bournedale	1			3		No adverse effect
BOU.J	Main Street Commercial Area				2		No adverse effect
BOU.O	North Sagamore				3		No adverse effect
BOU.P	Savery Avenue						No adverse effect
BOU.U	Sagamore Beach				3		No adverse effect
BOU.AE	Bourne Town Hall	1				X	No adverse effect
PLY.G	Cedarville			X			No adverse effect
SDW.AA	Sagamore Hill Gun Battery			X		X	No adverse effect
SOUTH OF CANAL							
BOU.A	Keene St - Sandwich Rd Area	3		X	6		No adverse effect
BOU.B	Cape Cod Air Station - Otis AFB						No adverse effect
BOU.AG	Aptucxet Trading Post			X			No adverse effect
BOU.AH	Shore Road North				1		No adverse effect
BOU.AJ	County Road North				1		No adverse effect
BOU.V	South Sagamore			X	8		Direct/Indirect
SDW.906	Route 6 Bridge					X	No adverse effect
SDW.907	Route 6 Bridge					X	No adverse effect
SDW.F	Shawme Road			X		X	No adverse effect
SDW.G	Route 6A West					X	Indirect
SDW.I	Main Street					X	Indirect
SDW.R	Old Kings Highway Regional HD					X	Indirect

Table 6. Potential Route 3 to Route 25 Effects

MHC ID	Name	NR (# of Ind Prop)	NR Eligible per MHC	NR Pot. Eligible (District)	NR Pot. Eligible (# of Ind Prop)	SR Listed	Potential Effects
CAPE COD CANAL							
BOU.919	Bourne Bridge		X				No adverse effect
BOU.918	Sagamore Bridge		X				No adverse effect
BOU.AF	Cape Cod Canal			X			No adverse effect
SDW.Z	Cape Cod Canal			X		X	No adverse effect
NORTH OF CANAL							
BOU.388	Mass. Army NG Armory		X				No adverse effect
BOU.C	Head of the Bay				1		No adverse effect
BOU.I	Bournedale	1			3		No adverse effect
BOU.J	Main Street Commercial Area				2		No adverse effect
BOU.O	North Sagamore				3		No adverse effect
BOU.P	Savery Avenue						No adverse effect
BOU.U	Sagamore Beach				3		No adverse effect
BOU.AE	Bourne Town Hall	1				X	No adverse effect
PLY.G	Cedarville			X			No adverse effect
SDW.AA	Sagamore Hill Gun Battery			X		X	No adverse effect
SOUTH OF CANAL							
BOU.A	Keene St - Sandwich Rd Area	3		X	6		No adverse effect
BOU.B	Cape Cod Air Station - Otis AFB						No adverse effect
BOU.AG	Aptucxet Trading Post			X			No adverse effect
BOU.AH	Shore Road North				1		No adverse effect
BOU.AJ	County Road North				1		No adverse effect
BOU.V	South Sagamore			X	8		No adverse effect
SDW.906	Route 6 Bridge					X	No adverse effect
SDW.907	Route 6 Bridge					X	No adverse effect
SDW.F	Shawme Road			X		X	No adverse effect
SDW.G	Route 6A West					X	No adverse effect
SDW.I	Main Street					X	No adverse effect
SDW.R	Old Kings Highway Regional HD					X	No adverse effect

Table 7. Potential Scenic Highway Effects

MHC ID	Name	NR (# of Ind Prop)	NR Eligible per MHC	NR Pot. Eligible (District)	NR Pot. Eligible (# of Ind Prop)	SR Listed	Potential Effects
CAPE COD CANAL							
BOU.919	Bourne Bridge		X				No adverse effect
BOU.918	Sagamore Bridge		X				No adverse effect
BOU.AF	Cape Cod Canal			X			Indirect
SDW.Z	Cape Cod Canal			X		X	No adverse effect
NORTH OF CANAL							
BOU.388	Mass. Army NG Armory		X				No adverse effect
BOU.C	Head of the Bay				1		No adverse effect
BOU.I	Bournedale	1			3		Direct/indirect
BOU.J	Main Street Commercial Area				2		No adverse effect
BOU.O	North Sagamore				3		No adverse effect
BOU.P	Savery Avenue						No adverse effect
BOU.U	Sagamore Beach				3		No adverse effect
BOU.AE	Bourne Town Hall	1				X	No adverse effect
PLY.G	Cedarville			X			No adverse effect
SDW.AA	Sagamore Hill Gun Battery			X		X	No adverse effect
SOUTH OF CANAL							
BOU.A	Keene St - Sandwich Rd Area	3		X	6		No adverse effect
BOU.B	Cape Cod Air Station - Otis AFB						No adverse effect
BOU.AG	Aptucxet Trading Post			X			No adverse effect
BOU.AH	Shore Road North				1		No adverse effect
BOU.AJ	County Road North				1		No adverse effect
BOU.V	South Sagamore			X	8		No adverse effect
SDW.906	Route 6 Bridge					X	No adverse effect
SDW.907	Route 6 Bridge					X	No adverse effect
SDW.F	Shawme Road			X		X	No adverse effect
SDW.G	Route 6A West					X	No adverse effect
SDW.I	Main Street					X	No adverse effect
SDW.R	Old Kings Highway Regional HD					X	No adverse effect

Table 8. Potential Sagamore Twin Effects

MHC ID	Name	NR (# of Ind Prop)	NR Eligible per MHC	NR Pot. Eligible (District)	NR Pot. Eligible (# of Ind Prop)	SR Listed	Potential Effects
CAPE COD CANAL							
BOU.919	Bourne Bridge		X				No adverse effect
BOU.918	Sagamore Bridge		X				Direct
BOU.AF	Cape Cod Canal			X			Direct/Indirect
SDW.Z	Cape Cod Canal			X		X	No adverse effect
NORTH OF CANAL							
BOU.388	Mass. Army NG Armory		X				No adverse effect
BOU.C	Head of the Bay				1		No adverse effect
BOU.I	Bournedale	1			3		No adverse effect
BOU.J	Main Street Commercial Area				2		No adverse effect
BOU.O	North Sagamore				3		Indirect
BOU.P	Savery Avenue						Indirect
BOU.U	Sagamore Beach				3		No adverse effect
BOU.AE	Bourne Town Hall	1				X	No adverse effect
PLY.G	Cedarville			X			No adverse effect
SDW.AA	Sagamore Hill Gun Battery			X		X	No adverse effect
SOUTH OF CANAL							
BOU.A	Keene St - Sandwich Rd Area	3		X	6		No adverse effect
BOU.B	Cape Cod Air Station - Otis AFB						No adverse effect
BOU.AG	Aptucxet Trading Post			X			No adverse effect
BOU.AH	Shore Road North				1		No adverse effect
BOU.AJ	County Road North				1		No adverse effect
BOU.V	South Sagamore			X	8		Indirect
SDW.906	Route 6 Bridge					X	No adverse effect
SDW.907	Route 6 Bridge					X	No adverse effect
SDW.F	Shawme Road			X		X	No adverse effect
SDW.G	Route 6A West					X	No adverse effect
SDW.I	Main Street					X	No adverse effect
SDW.R	Old Kings Highway Regional HD					X	No adverse effect

Table 9. Potential New Route 6 EB Travel Lane Effects

MHC ID	Name	NR (# of Ind Prop)	NR Eligible per MHC	NR Pot. Eligible (District)	NR Pot. Eligible (# of Ind Prop)	SR Listed	Potential Effects
CAPE COD CANAL							
BOU.919	Bourne Bridge		X				No adverse effect
BOU.918	Sagamore Bridge		X				No adverse effect
BOU.AF	Cape Cod Canal			X			No adverse effect
SDW.Z	Cape Cod Canal			X		X	No adverse effect
NORTH OF CANAL							
BOU.388	Mass. Army NG Armory		X				No adverse effect
BOU.C	Head of the Bay				1		No adverse effect
BOU.I	Bournedale	1			3		No adverse effect
BOU.J	Main Street Commercial Area				2		No adverse effect
BOU.O	North Sagamore				3		No adverse effect
BOU.P	Savery Avenue						No adverse effect
BOU.U	Sagamore Beach				3		No adverse effect
BOU.AE	Bourne Town Hall	1				X	No adverse effect
PLY.G	Cedarville			X			No adverse effect
SDW.AA	Sagamore Hill Gun Battery			X		X	No adverse effect
SOUTH OF CANAL							
BOU.A	Keene St - Sandwich Rd Area	3		X	6		No adverse effect
BOU.B	Cape Cod Air Station - Otis AFB						No adverse effect
BOU.AG	Aptucxet Trading Post			X			No adverse effect
BOU.AH	Shore Road North				1		No adverse effect
BOU.AJ	County Road North				1		No adverse effect
BOU.V	South Sagamore			X	8		No adverse effect
SDW.906	Route 6 Bridge					X	Indirect
SDW.907	Route 6 Bridge					X	Direct
SDW.F	Shawme Road			X		X	No adverse effect
SDW.G	Route 6A West					X	No adverse effect
SDW.I	Main Street					X	No adverse effect
SDW.R	Old Kings Highway Regional HD					X	No adverse effect

Table 10. Potential Bourne Bridge Replacement & Immediate Approaches Effects

MHC ID	Name	NR (# of Ind Prop)	NR Eligible per MHC	NR Pot. Eligible (District)	NR Pot. Eligible (# of Ind Prop)	SR Listed	Potential Effects
CAPE COD CANAL							
BOU.919	Bourne Bridge		X				Direct
BOU.918	Sagamore Bridge		X				No adverse effect
BOU.AF	Cape Cod Canal			X			Direct/Indirect
SDW.Z	Cape Cod Canal			X		X	No adverse effect
NORTH OF CANAL							
BOU.388	Mass. Army NG Armory		X				No adverse effect
BOU.C	Head of the Bay				1		No adverse effect
BOU.I	Bournedale	1			3		No adverse effect
BOU.J	Main Street Commercial Area				2		No adverse effect
BOU.O	North Sagamore				3		No adverse effect
BOU.P	Savery Avenue						No adverse effect
BOU.U	Sagamore Beach				3		No adverse effect
BOU.AE	Bourne Town Hall	1				X	No adverse effect
PLY.G	Cedarville			X			No adverse effect
SDW.AA	Sagamore Hill Gun Battery			X		X	No adverse effect
SOUTH OF CANAL							
BOU.A	Keene St - Sandwich Rd Area	3		X	6		No adverse effect
BOU.B	Cape Cod Air Station - Otis AFB						No adverse effect
BOU.AG	Aptucxet Trading Post			X			No adverse effect
BOU.AH	Shore Road North				1		No adverse effect
BOU.AJ	County Road North				1		No adverse effect
BOU.V	South Sagamore			X	8		No adverse effect
SDW.906	Route 6 Bridge					X	No adverse effect
SDW.907	Route 6 Bridge					X	No adverse effect
SDW.F	Shawme Road			X		X	No adverse effect
SDW.G	Route 6A West					X	No adverse effect
SDW.I	Main Street					X	No adverse effect
SDW.R	Old Kings Highway Regional HD					X	No adverse effect

Table 11. Potential Belmont Circle & Scenic Highway to Route 25 Ramp Effects

MHC ID	Name	NR (# of Ind Prop)	NR Eligible per MHC	NR Pot. Eligible (District)	NR Pot. Eligible (# of Ind Prop)	SR Listed	Potential Effects
CAPE COD CANAL							
BOU.919	Bourne Bridge		X				No adverse effect
BOU.918	Sagamore Bridge		X				No adverse effect
BOU.AF	Cape Cod Canal			X			No adverse effect
SDW.Z	Cape Cod Canal			X		X	No adverse effect
NORTH OF CANAL							
BOU.388	Mass. Army NG Armory		X				No adverse effect
BOU.C	Head of the Bay				1		No adverse effect
BOU.I	Bournedale	1			3		No adverse effect
BOU.J	Main Street Commercial Area				2		No adverse effect
BOU.O	North Sagamore				3		No adverse effect
BOU.P	Savery Avenue						No adverse effect
BOU.U	Sagamore Beach				3		No adverse effect
BOU.AE	Bourne Town Hall	1				X	No adverse effect
PLY.G	Cedarville			X			No adverse effect
SDW.AA	Sagamore Hill Gun Battery			X		X	No adverse effect
SOUTH OF CANAL							
BOU.A	Keene St - Sandwich Rd Area	3		X	6		No adverse effect
BOU.B	Cape Cod Air Station - Otis AFB						No adverse effect
BOU.AG	Aptucxet Trading Post			X			No adverse effect
BOU.AH	Shore Road North				1		No adverse effect
BOU.AJ	County Road North				1		No adverse effect
BOU.V	South Sagamore			X	8		No adverse effect
SDW.906	Route 6 Bridge					X	No adverse effect
SDW.907	Route 6 Bridge					X	No adverse effect
SDW.F	Shawme Road			X		X	No adverse effect
SDW.G	Route 6A West					X	No adverse effect
SDW.I	Main Street					X	No adverse effect
SDW.R	Old Kings Highway Regional HD					X	No adverse effect

Table 12. Potential Bourne Rotary Alternative 2 Effects

MHC ID	Name	NR (# of Ind Prop)	NR Eligible per MHC	NR Pot. Eligible (District)	NR Pot. Eligible (# of Ind Prop)	SR Listed	Potential Effects
CAPE COD CANAL							
BOU.919	Bourne Bridge		X				No adverse effect
BOU.918	Sagamore Bridge		X				No adverse effect
BOU.AF	Cape Cod Canal			X			No adverse effect
SDW.Z	Cape Cod Canal			X		X	No adverse effect
NORTH OF CANAL							
BOU.388	Mass. Army NG Armory		X				No adverse effect
BOU.C	Head of the Bay				1		No adverse effect
BOU.I	Bournedale	1			3		No adverse effect
BOU.J	Main Street Commercial Area				2		No adverse effect
BOU.O	North Sagamore				3		No adverse effect
BOU.P	Savery Avenue						No adverse effect
BOU.U	Sagamore Beach				3		No adverse effect
BOU.AE	Bourne Town Hall	1				X	No adverse effect
PLY.G	Cedarville			X			No adverse effect
SDW.AA	Sagamore Hill Gun Battery			X		X	No adverse effect
SOUTH OF CANAL							
BOU.A	Keene St - Sandwich Rd Area	3		X	6		Direct/Indirect
BOU.B	Cape Cod Air Station - Otis AFB						No adverse effect
BOU.AG	Aptucxet Trading Post			X			No adverse effect
BOU.AH	Shore Road North				1		No adverse effect
BOU.AJ	County Road North				1		No adverse effect
BOU.V	South Sagamore			X	8		No adverse effect
SDW.906	Route 6 Bridge					X	No adverse effect
SDW.907	Route 6 Bridge					X	No adverse effect
SDW.F	Shawme Road			X		X	No adverse effect
SDW.G	Route 6A West					X	No adverse effect
SDW.I	Main Street					X	No adverse effect
SDW.R	Old Kings Highway Regional HD					X	No adverse effect

Table 13. Potential Bourne Rotary Alternative 3A Effects

MHC ID	Name	NR (# of Ind Prop)	NR Eligible per MHC	NR Pot. Eligible (District)	NR Pot. Eligible (# of Ind Prop)	SR Listed	Potential Effects
CAPE COD CANAL							
BOU.919	Bourne Bridge		X				No adverse effect
BOU.918	Sagamore Bridge		X				No adverse effect
BOU.AF	Cape Cod Canal			X			No adverse effect
SDW.Z	Cape Cod Canal			X		X	No adverse effect
NORTH OF CANAL							
BOU.388	Mass. Army NG Armory		X				No adverse effect
BOU.C	Head of the Bay				1		No adverse effect
BOU.I	Bournedale	1			3		No adverse effect
BOU.J	Main Street Commercial Area				2		No adverse effect
BOU.O	North Sagamore				3		No adverse effect
BOU.P	Savery Avenue						No adverse effect
BOU.U	Sagamore Beach				3		No adverse effect
BOU.AE	Bourne Town Hall	1				X	No adverse effect
PLY.G	Cedarville			X			No adverse effect
SDW.AA	Sagamore Hill Gun Battery			X		X	No adverse effect
SOUTH OF CANAL							
BOU.A	Keene St - Sandwich Rd Area	3		X	6		Direct/Indirect
BOU.B	Cape Cod Air Station - Otis AFB						No adverse effect
BOU.AG	Aptucxet Trading Post			X			No adverse effect
BOU.AH	Shore Road North				1		No adverse effect
BOU.AJ	County Road North				1		No adverse effect
BOU.V	South Sagamore			X	8		No adverse effect
SDW.906	Route 6 Bridge					X	No adverse effect
SDW.907	Route 6 Bridge					X	No adverse effect
SDW.F	Shawme Road			X		X	No adverse effect
SDW.G	Route 6A West					X	No adverse effect
SDW.I	Main Street					X	No adverse effect
SDW.R	Old Kings Highway Regional HD					X	No adverse effect

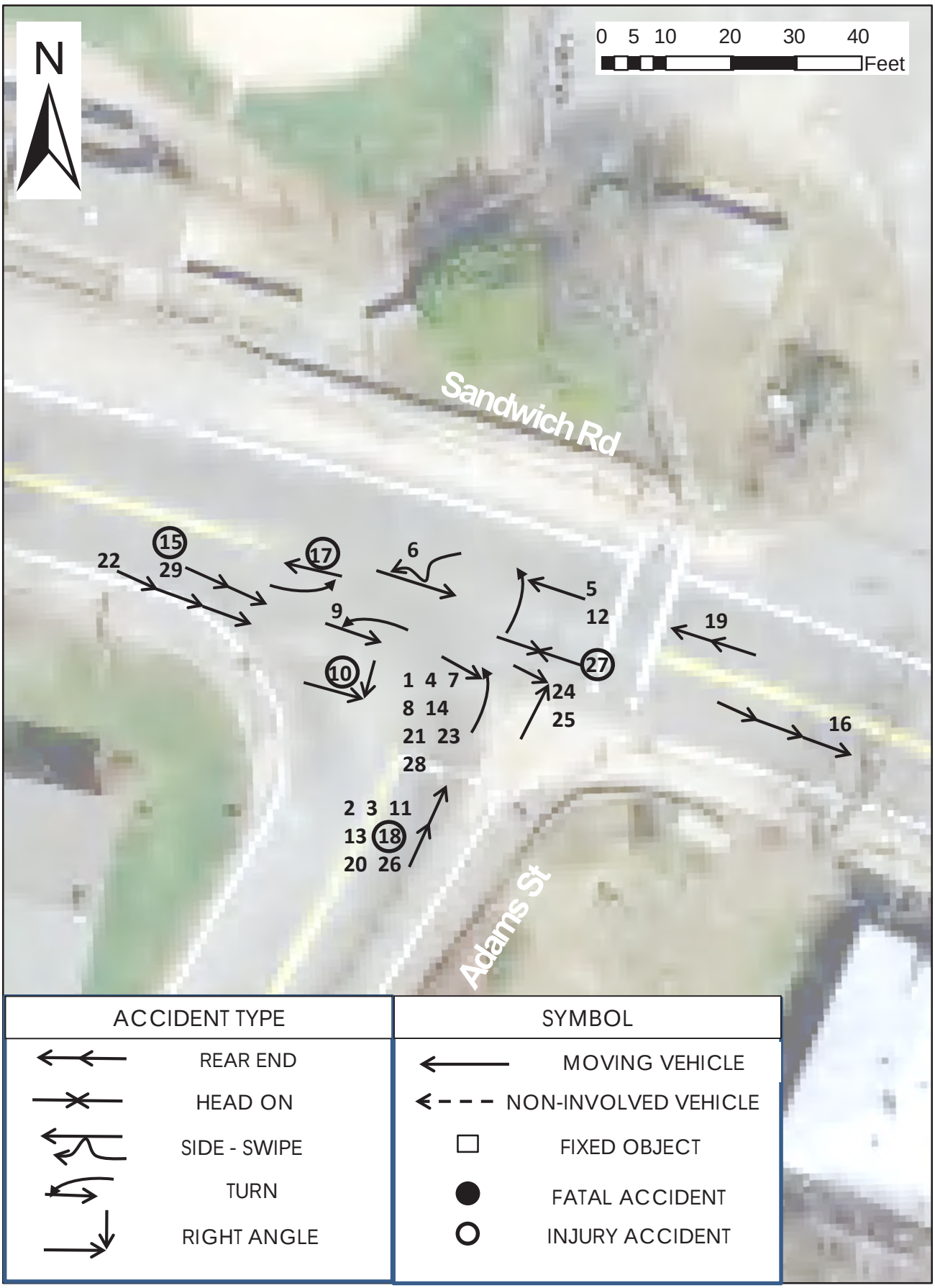
Table 14. Potential Effects to Archaeological and Cultural Resources

Potential Roadway Section Options	Archaeological Sites within/adjacent to Roadway Section Alignment	Archaeological Sites in proximity to Roadway Section Alignment	Recommendations	Potential Effects
Middle Bridge 1	19-PL-345, 19-BN-821	19-BN-224, 19-BN-690, 19-BN-937	Walkover survey and visual assessment to refine areas of sensitivity; Intensive (locational) archaeological survey of sensitive areas	Direct Effect sites 19-PL-345, 19-BN-821; Potential Effect sites 19-BN-690, 19-BN-937
Middle Bridge 2	19-BN-654	19-BN-656, 19-BN-653	Walkover survey and visual assessment to refine areas of sensitivity; Intensive (locational) archaeological survey of sensitive areas	Direct Effect site 19-BN-654; Potential Effect sites 19-BN-656, 19-BN-653
Sandwich Road	19-BN-654		Walkover survey and visual assessment to refine areas of sensitivity; Intensive (locational) archaeological survey of sensitive areas	Direct Effect site 19-BN-654
Relocated Exit 1C 4 Leg Roundabout		19-BN-908, 19-BN-913, 19-BN-914, 19-BN-915, 19-BN-943	Walkover survey and visual assessment to refine areas of sensitivity; Intensive (locational) archaeological survey of sensitive areas	Potential Effect sites 19-BN-908, 19-BN-914, 19-BN-915,
Route 3 to Route 25	19-BN-821, 19-BN-870, BOU.2	BOU.3, 19-BN-685	Walkover survey and visual assessment to refine areas of sensitivity; Intensive (locational) archaeological survey of sensitive areas	Direct Effect sites 19-BN-821, 19-BN-870, BOU.2; Potential Effect Sites BOU.3, 19-BN-685
Sagamore Twin	19-BN-635, 19-BN-909, 19-BN-910, 19-BN-911, 19-BN-912,	19-BN-634, 19-BN-901, 19-BN-902, 19-BN-903, 19-BN-987	Walkover survey and visual assessment to refine areas of sensitivity; Intensive (locational) archaeological survey of sensitive areas	Direct Effects sites 19-BN-635, 19-BN-909, 19-BN-910, 19-BN-911, 19-BN-912; Potential Effect Sites 19-BN-634, 19-BN-901, 19-BN-902, 19-BN-903, 19-BN-987
New Route 6 EB Travel Lane	19-BN-908	19-BN-631, 19-BN-632, 19-BN-633, 19-BN-634, 19-BN-635, 19-	Walkover survey and visual assessment to refine areas of sensitivity; Intensive (locational) archaeological survey of	Direct Effects sites 19-BN-634, 19-BN-687, 19-BN-902, 19-BN-909, 19-BN-910,

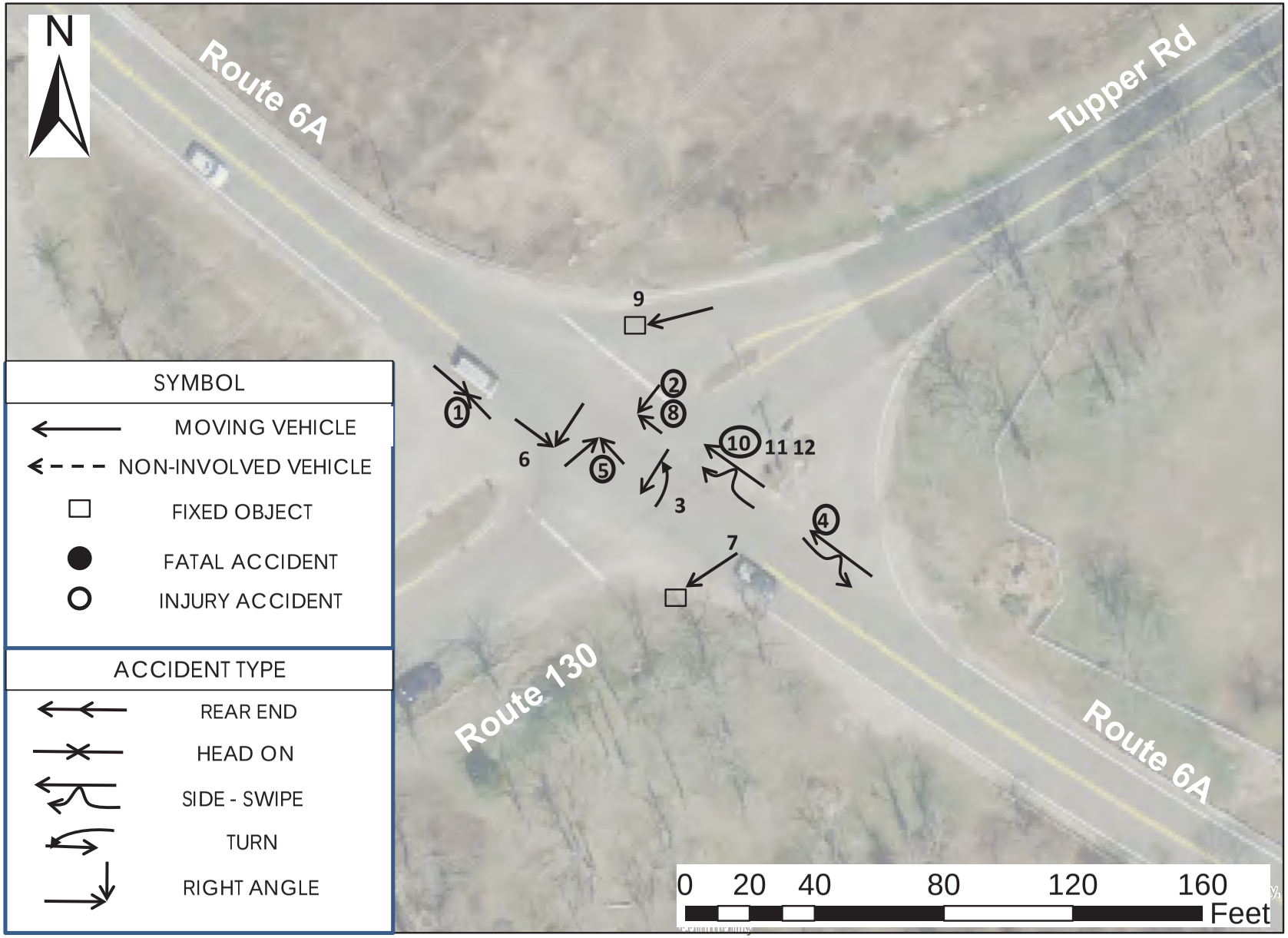
		BN-901, 19-BN-902, 19-BN-903, 19-BN-907, 19-BN-909, 19-BN-910, 19-BN-911, 19-BN-912, 19-BN-914, and 19-BN-987	sensitive areas	19-BN-911, 19-BN-912, 19-BN-987; Potential Effect Sites 19-BN-631, 19-BN-632, 19-BN-633, 19-BN-901, 19-BN-903
Scenic Highway	19-BN-224, 19-BN-690, 19-BN-937	19-BN-224, 19-BN-690,19-BN-937, 19-BN-870, 19-BN-620	Walkover survey and visual assessment to refine areas of sensitivity; Intensive (locational) archaeological survey of sensitive areas	Direct Effect sites 19-BN-224, 19-BN-690, 19-BN-937; Potential Effects Sites 19-BN-870, 19-BN-620
Bourne Bridge Replacement and Immediate Approaches	BOU.1, 19-BN-244	BOU.4	Walkover survey and visual assessment to refine areas of sensitivity; Intensive (locational) archaeological survey of sensitive areas	Direct Effect Sites BOU.1, BOU.4, 19-BN-244; Potential Effect Site BOU.4
Belmont circle and Scenic Highway to Route 25 Ramp	BOU.1, 19-BN-244	BOU.4	Walkover survey and visual assessment to refine areas of sensitivity; Intensive (locational) archaeological survey of sensitive areas	Direct Effect Sites BOU.1, BOU.4, 19-BN-244; Potential Effect Site BOU.4
Bourne Rotary Alternative 2A	N/A	N/A	Walkover survey and visual assessment to refine areas of sensitivity; Intensive (locational) archaeological survey of sensitive areas	No Direct or Potential Effects on documented archaeological resources
Bourne Rotary Alternative 3A	N/A	N/A	Walkover survey and visual assessment to refine areas of sensitivity; Intensive (locational) archaeological survey of sensitive areas	No Direct or Potential Effects on documented archaeological resources

Appendix D:
Vehicle Collision Diagrams

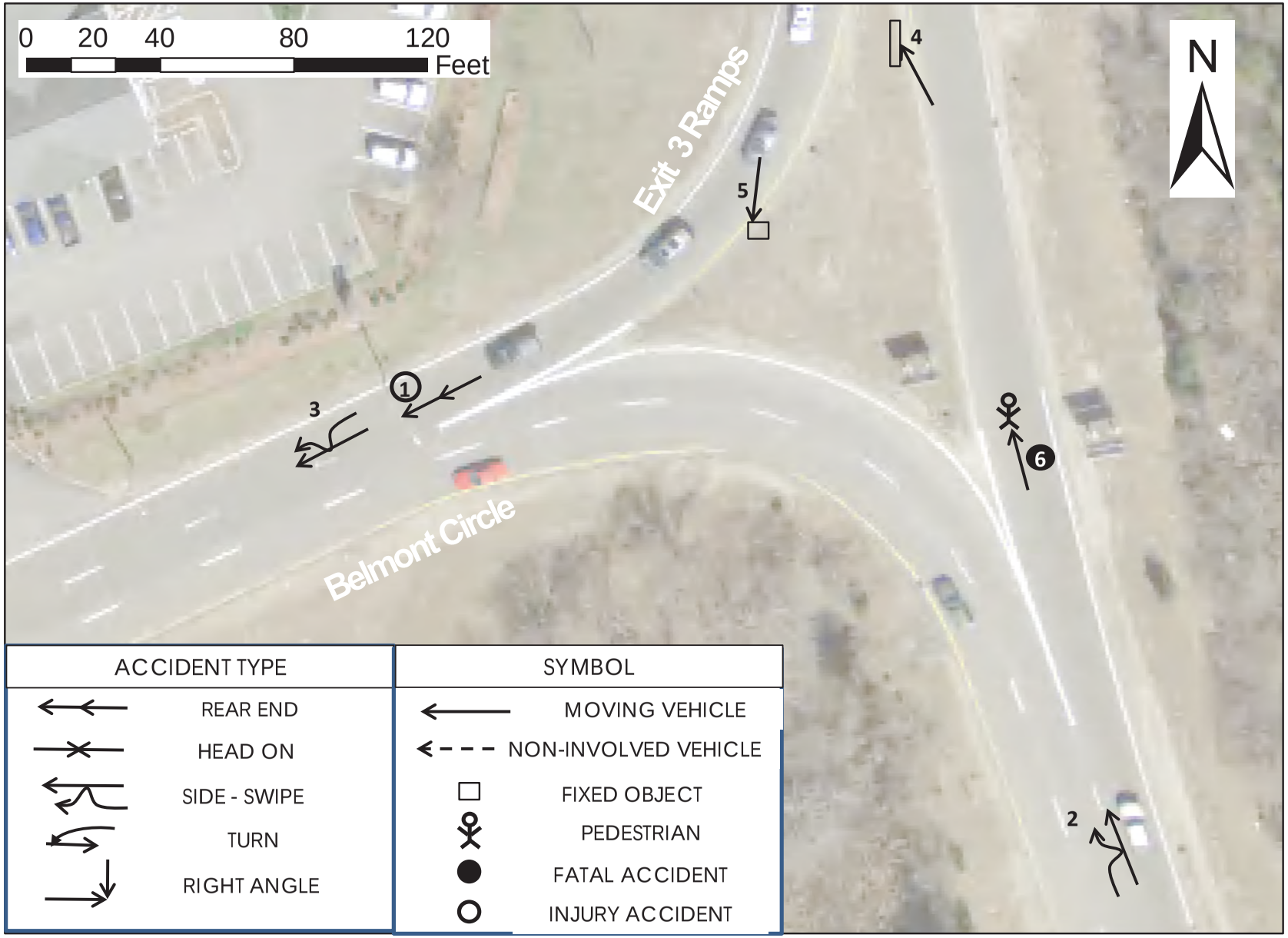
Vehicle Collision Diagram: Sandwich Rd at Adams Street



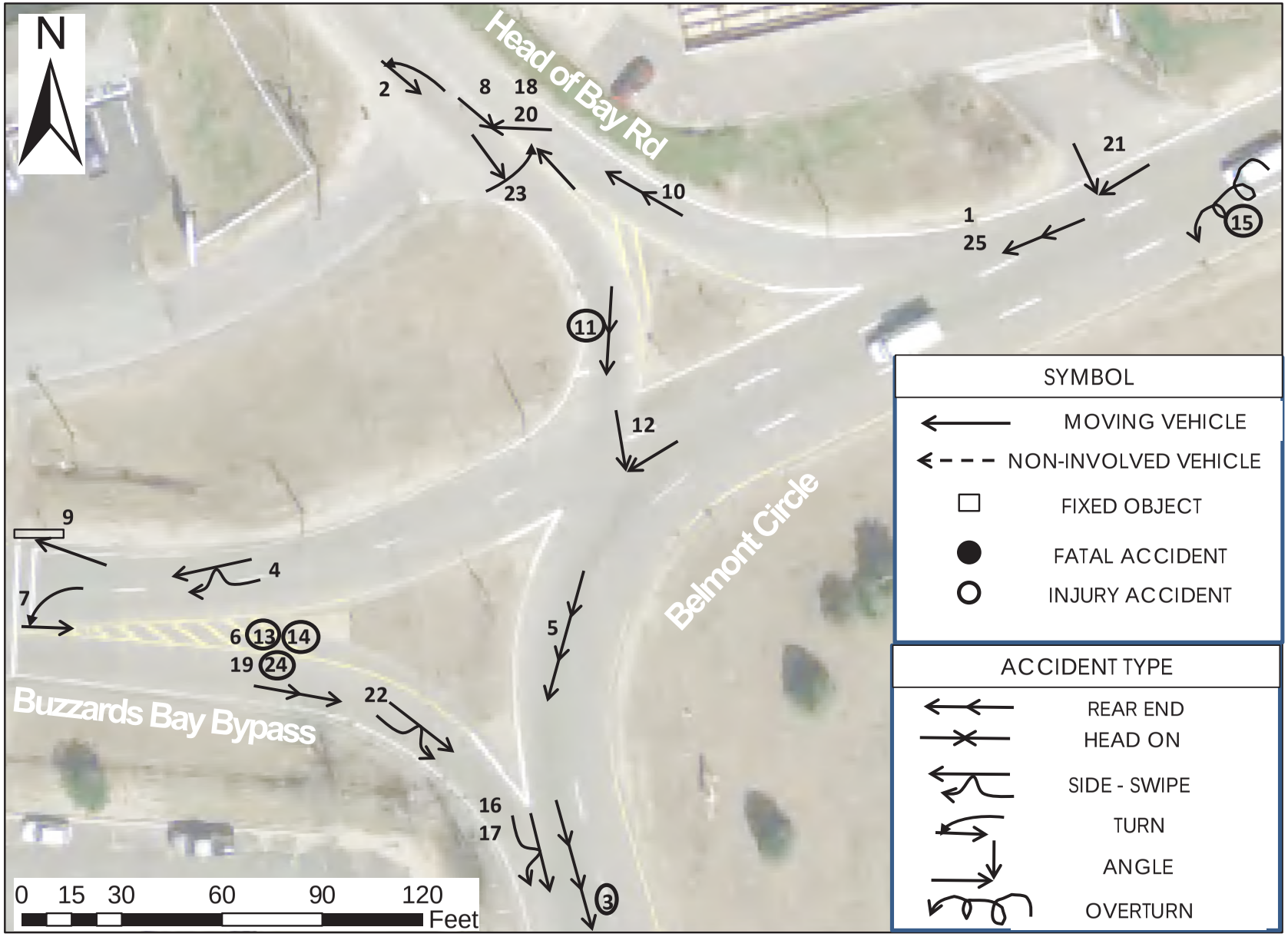
Vehicle Collision Diagram: Route 6A at Tupper Road/Route 130



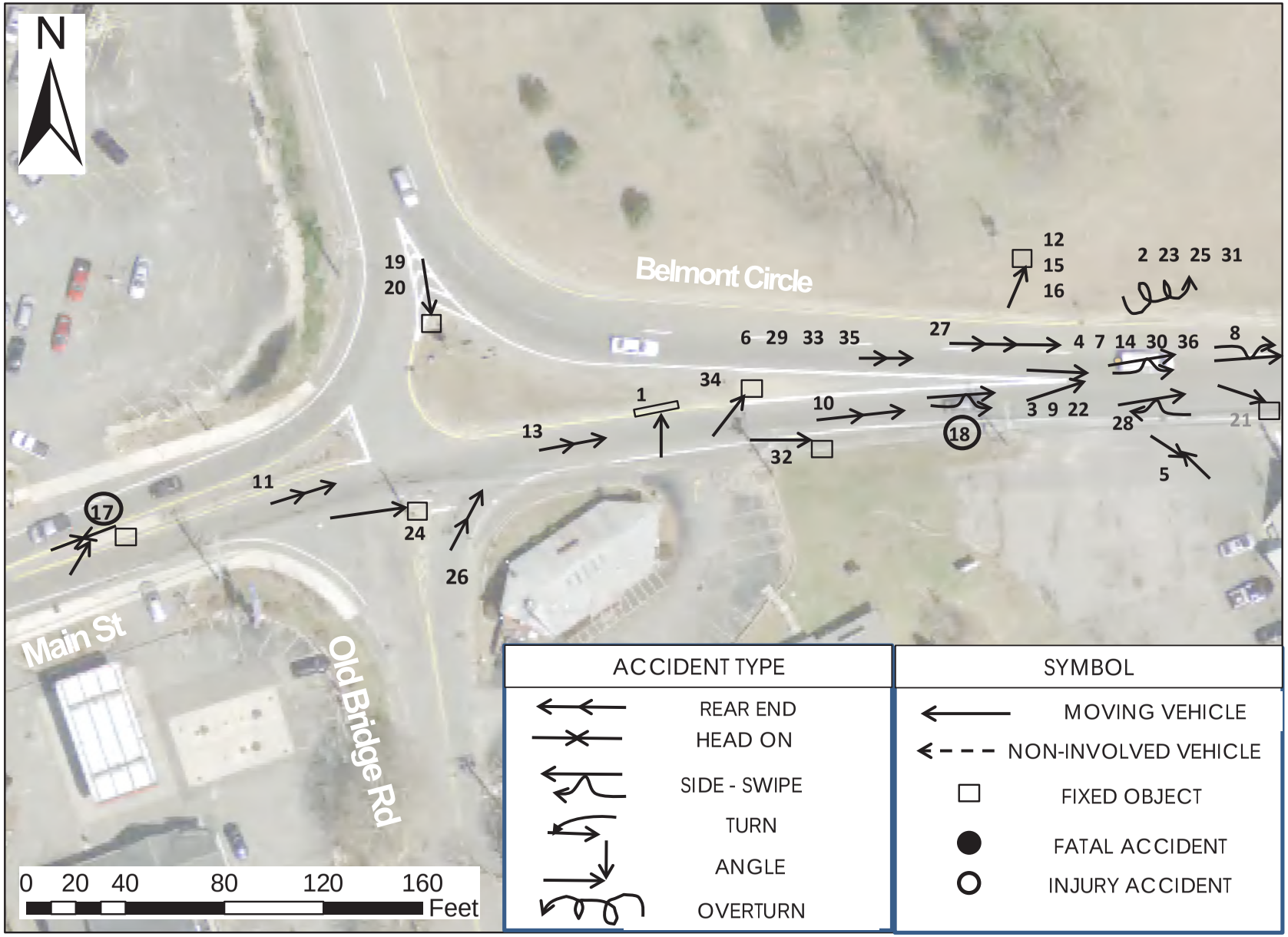
Vehicle Collision Diagram: Belmont Circle at Exit 3 Ramps



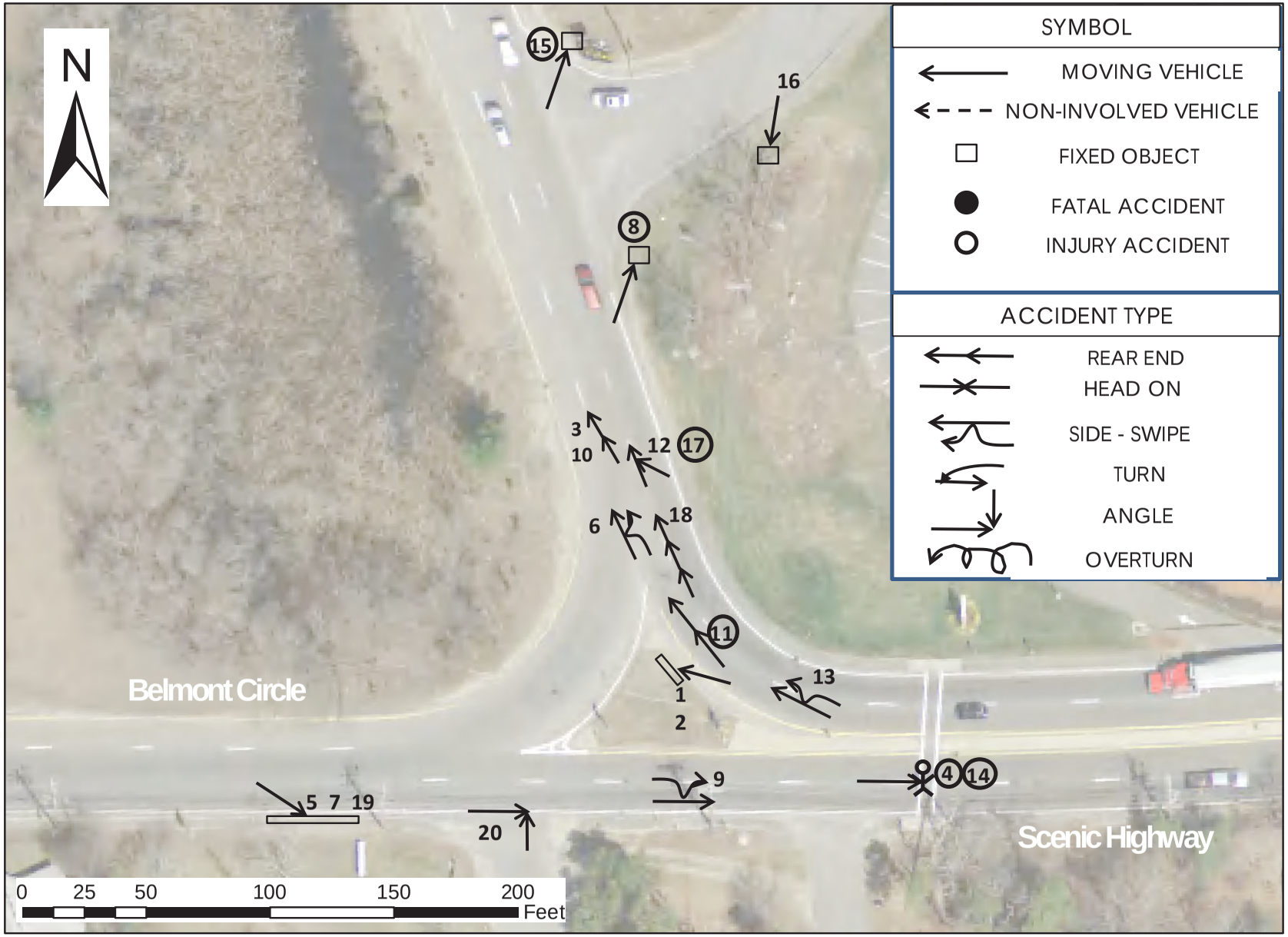
Vehicle Collision Diagram: Belmont Circle at Head of Bay Rd/Buzzards Bay Bypass



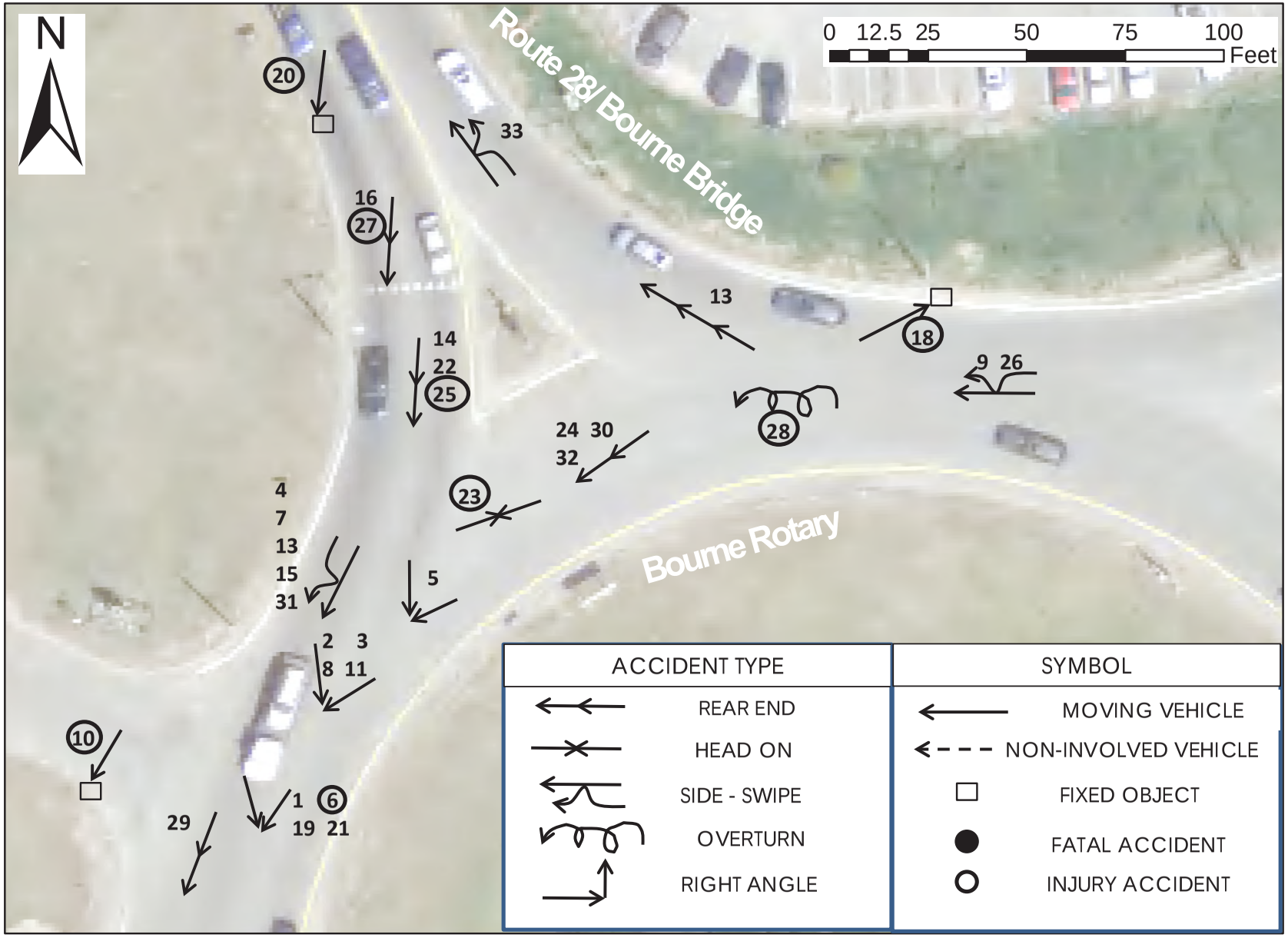
Vehicle Collision Diagram: Belmont Circle at Main Street/Old Bridge Road



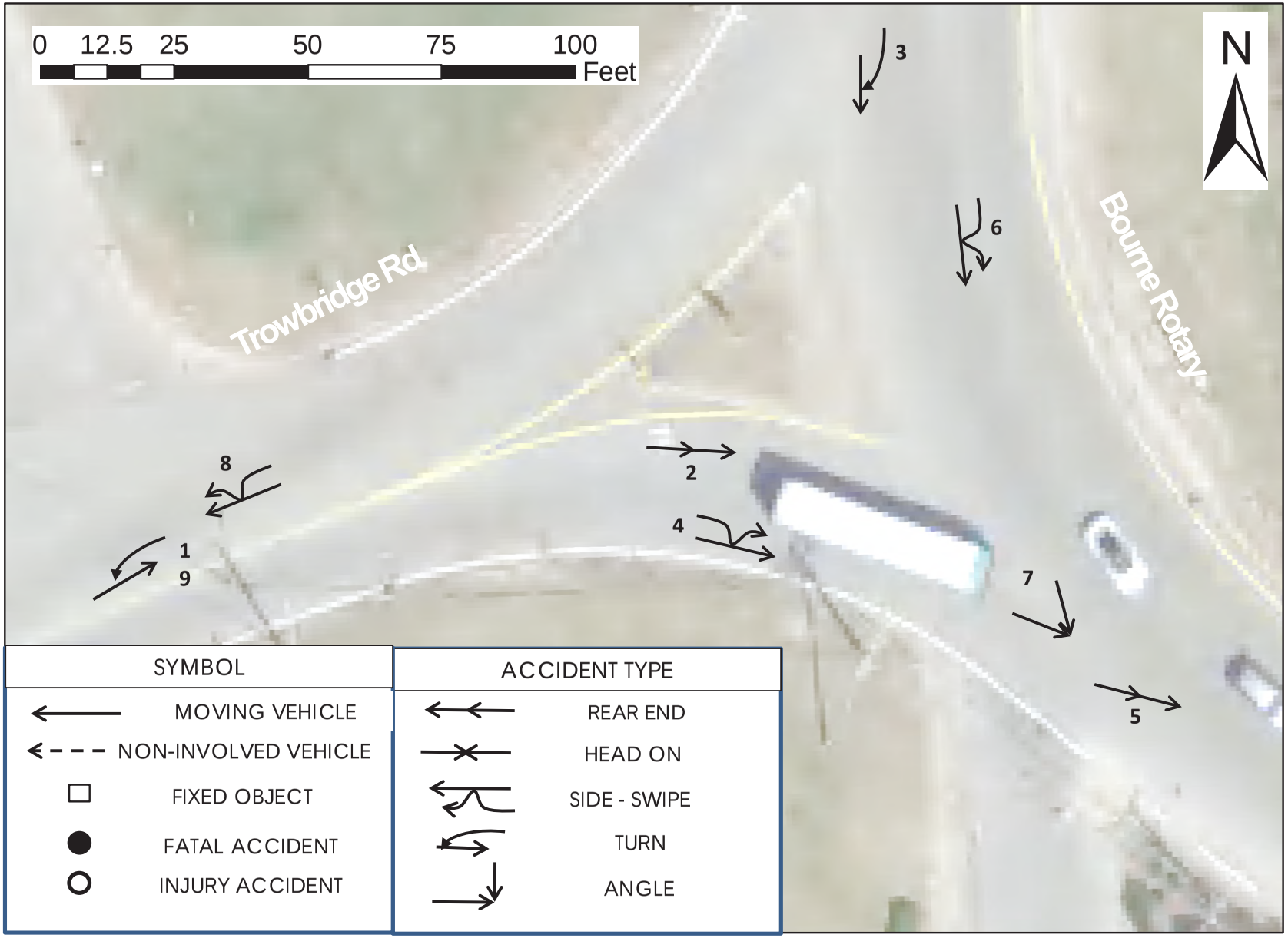
Vehicle Collision Diagram: Belmont Circle at Scenic Highway



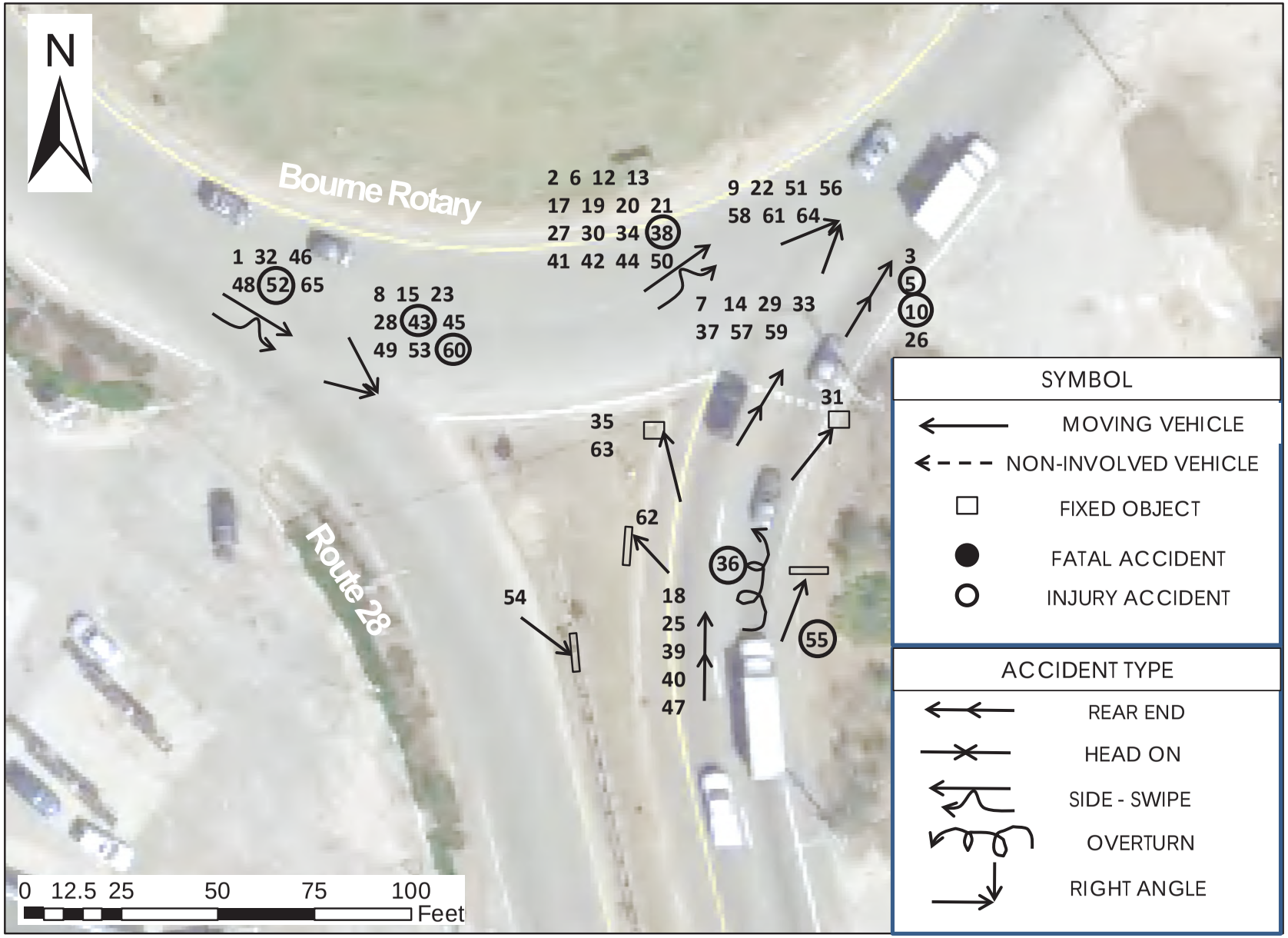
Vehicle Collision Diagram: Bourne Rotary (North)



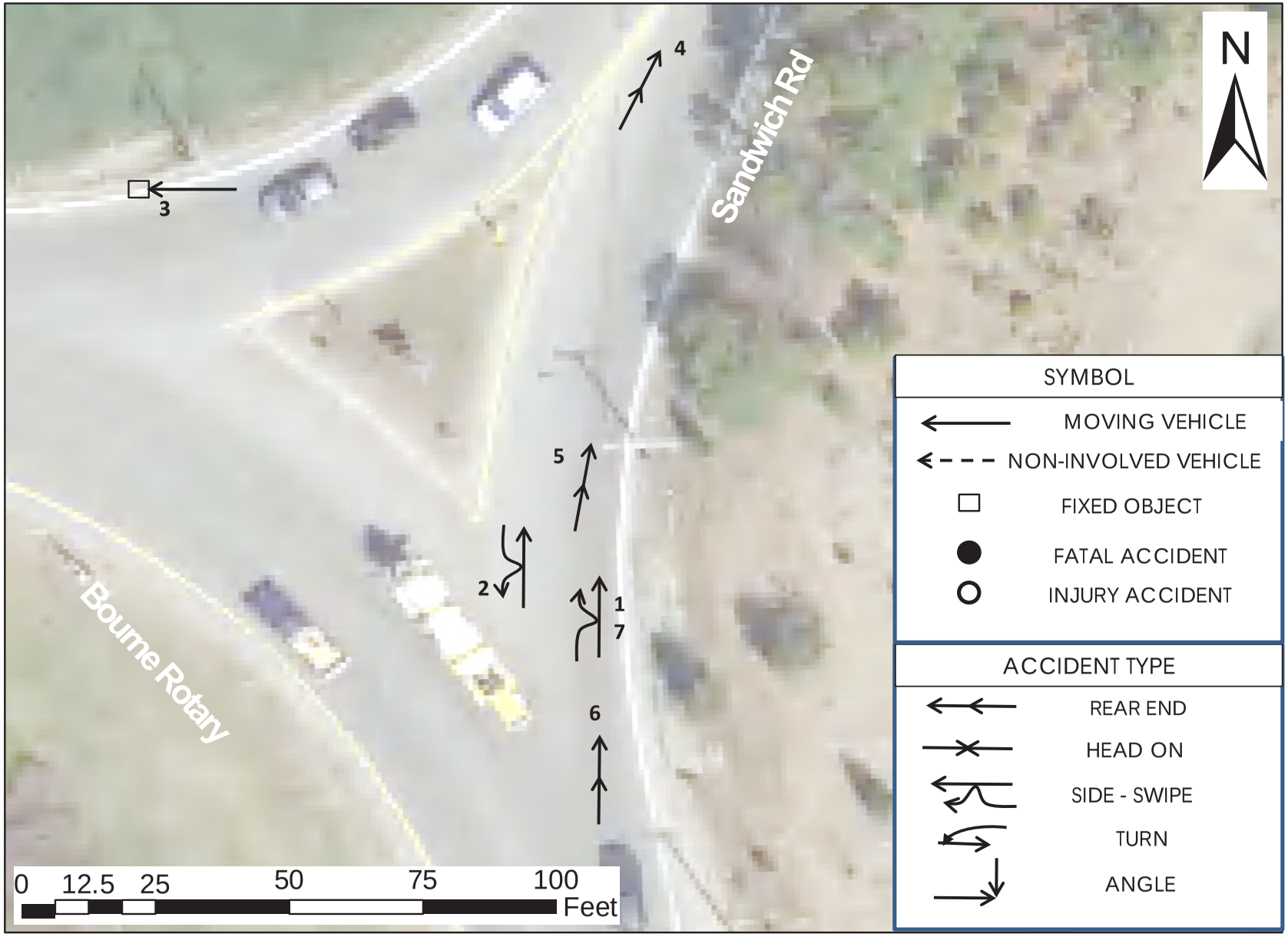
Vehicle Collision Diagram: Bourne Rotary (West)



Vehicle Collision Diagram: Bourne Rotary (South)



Vehicle Collision Diagram: Bourne Rotary (East)



Appendix E:
Conceptual Cost Estimates

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES
Draft April 2018

METHODOLOGY

The conceptual cost estimates for the Cape Cod Canal Transportation Study were developed for the purpose of comparing the order-of-magnitude costs of various transportation alternatives under consideration. These conceptual cost estimates were developed based on MassDOT's 2013 'Order of Magnitude Estimate of Construction Cost' per linear foot of roadway and square foot of bridge costs, for various improvements in the Cape Cod Canal area. This conceptual cost estimate does not include new canal bridge crossings which is being developed by the U.S. Army Corps of Engineers. However it does include the approach sections for new Sagamore and Bourne Bridges in the general vicinity of the existing bridges.

For developing the conceptual estimate, Stantec used the same MassDOT average square foot cost of roadway ($31.67/SF), bridge, and retaining wall sections, escalating these costs by 4.0% per year to account for inflation. In addition, a 25% - 40% contingency was added to these conceptual costs to account for unknown(but not unexpected) costs related to environmental mitigation, utility relocation, traffic management (police details), and additional structural elements. A lower contingency was used for less complex design alternatives (e.g., short-term intersection improvements) while a 40% contingency was used for larger, more complex mid- and long-term design alternatives. A 75% contingency was used for larger projects involving substantial utility conflicts/potential relations (e.g., Route 6 Exit 1C relocation and Scenic Highway to Route 25 ramp). Based on coordination with MassDOT, P.E. design and construction engineering are each assumed to cost 15% of the 2017 estimate.

Future financial planning would require a more detailed cost estimate based on a higher level of design.

CONTINGENCY COST ADDED AT EACH IMPROVEMENT LOCATION

Contingency % added to preliminary cost	Used at Following Locations
25%	1. Park and Ride Lot
	2. Bourne Rotary Reconstruction
	3. Belmont Circle Reconstruction
	4. Route 6 Eastbound Add-A-Lane
	5. Intersection Reconstruction (various locations)
40%	1. Bourne Bridge Approaches
	2. Sagamore Bridge Approach
75%	1. Route 6 - Relocated Exit 1C
	2. Scenic Highway to Route 25 Westbound Ramp

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES
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SUMMARY

SHADED AREAS INDICATE RECOMMENDED ALTERNATIVES

ALTERNATIVE		2017	Cost 2020	Cost 2030	Cost 2040
N/A	**PARK AND RIDE LOT**	$2,776,195	$3,122,942	$4,622,365	$6,841,100
N/A	**SAGAMORE BRIDGE APPROACH ROADWAYS**	$38,651,648	$43,479,239	$64,354,994	$95,245,391
N/A	**BOURNE BRIDGE APPROACH ROADWAYS**	$50,649,334	$56,975,436	$84,331,142	$124,810,090
1	RELOCATED EXIT 1C (ALT. 1 - SIGNALIZED INTERSECTION)	$27,127,514	$30,515,740	$45,167,310	$66,847,619
	WB ON RAMP	$10,917,191	$12,280,748	$18,177,122	$26,902,141
	WB OFF RAMP	$9,545,733	$10,737,995	$15,893,646	$23,522,595
	2 SIGNALIZED INTERSECTIONS	$6,664,590	$7,496,997	$11,096,542	$16,422,882
2	**RELOCATED EXIT 1C (ALT. 2 - 4-LEG ROUNDABOUT)**	$30,487,890	$34,295,827	$50,762,336	$75,128,258
	WB ON RAMP	$10,746,002	$12,088,177	$17,892,093	$26,480,297
	WB OFF RAMP	$6,249,696	$7,030,283	$10,405,744	$15,400,501
	4 LEG ROUNDABOUT	$13,492,192	$15,177,367	$22,464,500	$33,247,460
3	RELOCATED EXIT 1C (ALT. 3 - 5-LEG ROUNDABOUT)	$27,976,746	$31,471,042	$46,581,283	$68,940,298
	WB ON RAMP	$11,516,352	$12,954,744	$19,174,726	$28,378,595
	WB OFF RAMP	$10,144,895	$11,411,992	$16,891,250	$24,999,049
	5 LEG ROUNDABOUT	$6,315,500	$7,104,305	$10,515,307	$15,562,654
1	**SCENIC HWY TO ROUTE 25 WB ON RAMP**	$6,561,688	$7,381,243	$10,925,210	$16,169,311
	ROUTE 25 WB ON RAMP	$6,561,688	$7,381,243	$10,925,210	$16,169,311
1	**BELMONT CIRCLE (ALT. 1 - 3-LEG ROUNDABOUT W/ SIGNAL)**	$13,581,421	$15,277,740	$22,613,066	$33,467,337
	BELMONT CIRCLE - ALT 1	$13,581,421	$15,277,740	$22,613,066	$33,467,337
1A	BELMONT CIRCLE (ALT 1A - W/ FLY-OVER RAMP)	$24,431,995	$27,483,552	$40,679,272	$60,205,323
	BELMONT CIRCLE - ALT 1A	$24,431,995	$27,483,552	$40,679,272	$60,205,323

2	BELMONT CIRCLE (ALT 2 4-LEG ROUNDABOUT)	$12,823,489	$14,425,142	$21,351,108	$26,348,089
	BELMONT CIRCLE - ALT 2	$12,823,489	$14,425,142	$21,351,108	$26,348,089
1	BOURNE ROTARY - ALT 1	$7,823,859	$8,801,059	$13,026,726	$19,279,554
1A	BOURNE ROTARY - ALT 1A	$15,930,888	$17,920,655	$26,524,928	$39,256,893
1B	**BOURNE ROTARY - ALT. 1B MID-TERM**	$6,389,311	$7,187,336	$10,638,203	$15,744,541
2	**BOURNE ROTARY (Alt. 2 - 3 SIGNALIZED INTERSECTIONS)**	$10,692,350	$12,027,825	$17,802,763	$26,348,089
3A	**BOURNE ROTARY INTERCHANGE (ALT 3A - LONG-TERM)**	$41,182,065	$46,325,705	$68,568,138	$101,480,844
	NOTE: EXCLUDES PORTIONS OF ALT 2 ALREADY BUILT				
N/A	**ROUTE 6 ADD-A-LANE (MID-CAPE CONNECTOR TO EXIT 2)**	$28,972,919	$32,591,637	$48,239,910	$71,395,067
Loc 2	**Intersection of Route 6A and Cranberry Highway**	$583,575	$656,464		
Loc 3	**Intersection of Route 130 and Coutuit Road**	$955,650	$1,075,011		
Loc 4	**Intersection of Sandwich Road at Bourne Rotary Connector**	$1,855,781	$2,087,568		

CAPE COD CANAL TRANSPORTATION STUDY
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ROADWAY SEGMENTS

ASSUMPTIONS:

- PRICE PER FOOT OF NEW ROADWAY CONSTRUCTION IS BASED ON LINEAR FOOT COST OF THE 2013 MASSDOT ESTIMATE.
- PRICE PER FOOT OF ROADWAY RESURFACING IS ASSUMED TO BE $5.00 PER SF. RESURFACING PLUS ONE CONCRETE SIDEWALK = $6.00 PER SF. RESURFACING PLUS TWO CONCRETE SIDEWALKS = $7.00 PER SF. NEW CURBING FOR SIDEWALKS OR MEDIAN BARRIERS AN ADDITIONAL $40 PER LINEAR FOOR

ROADWAY RESURFACING (COST PER LINEAR FOOT):

	2017 SF Cost	2017 PRICES
1 LANE RAMP (24 FEET WIDE)	$5.00	$120.00
1 LANE ROADWAY W/ ONE SIDEWALK (28 FEET WIDE)	$6.00	$208.00
2 LANE ROADWAY (34 FT WIDE)	$5.00	$170.00
2 LANE RAMP (36 FEET WIDE)	$5.00	$180.00
2 LANE ROADWAY W/ ONE SIDEWALK (40 FT WIDE)	$6.00	$280.00
2 LANE ROUNDABOUT (43 FEET WIDE)	$5.00	$215.00
3 LANE ROADWAY (44 FEET WIDE)	$5.00	$220.00
2 LANE ROADWAY W/ TWO SIDEWALKS (46 FT WIDE)	$7.00	$402.00
3 LANE ROADWAY W/ ONE SIDEWALK (52 FT WIDE)	$6.00	$352.00
3 LANE ROADWAY W/ TWO SIDEWALKS (58 FT WIDE)	$7.00	$486.00
4 LANE ROADWAY (62 FT WIDE)	$5.00	$310.00
4 LANE ROADWAY W/ TWO SIDEWALKS (70 FT WIDE)	$7.00	$570.00
5 LANE ROADWAY (76 FT WIDE)	$5.00	$380.00
4 LANE ROADWAY W/ MED BARRIER & ONE SIDEWALK (72 FT WIDE)	$6.00	$512.00
4 LANE ROADWAY W/ MED BARRIER (82 FEET WIDE)	$5.00	$450.00
4 LANE ROADWAY W/ MED BARRIER & 1 SW (88 FEET WIDE)	$6.00	$608.00

2013 AVE. SF COST MULTI. BY TOTAL

CAPE COD CANAL TRANSPORTATION STUDY
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NEW ROADWAY RECONSTRUCTION (COST PER LINEAR FOOT):

SEGMENTS FROM 2014 ESTIMATE:		
ROADWAY WIDENING (18 FEET WIDE)	570.06	$666.97
1 LANE RAMP (22 FEET WIDE)	696.74	$815.19
ACCESS DRIVEWAY (24 FEET WIDE)	760.08	$889.29
1 LANE ROADWAY W/ ONE SIDEWALK (28 FEET WIDE)	886.76	$1,037.51
ROADWAY WIDENING (30 FEET WIDE)	950.1	$1,111.62
2 LANE ROUNDABOUT (33 FEET WIDE)	1045.11	$1,222.78
2 LANE ROADWAY (34 FT WIDE)	1076.78	$1,259.83
2 LANE RAMP (36 FEET WIDE)	1140.12	$1,333.94
2 LANE ROADWAY W/ ONE SIDEWALK (40 FT WIDE)	1266.8	$1,482.16
2 LANE ROUNDABOUT (43 FEET WIDE)	1361.81	$1,593.32
3 LANE ROADWAY (44 FEET WIDE)	1393.48	$1,630.37
2 LANE ROADWAY W/ TWO SIDEWALKS (46 FT WIDE)	1456.82	$1,704.48
3 LANE ROADWAY (46 FT WIDE)	1456.82	$1,704.48
3 LANE ROADWAY W/ ONE SIDEWALK (52 FT WIDE)	1646.84	$1,926.80
3 LANE RAMP (58 FEET WIDE)	1836.86	$2,149.13
3 LANE ROADWAY W/ TWO SIDEWALKS (58 FT WIDE)	1836.86	$2,149.13
4 LANE ROADWAY (58 FT WIDE)	1836.86	$2,149.13
PARKING LOT (60 FEET WIDE)	1900.2	$2,223.23
4 LANE ROADWAY W/ ONE SIDEWALK (64 FT WIDE)	2026.88	$2,371.45
4 LANE ROADWAY W/ TWO SIDEWALKS (70 FT WIDE)	2216.9	$2,593.77
4 LANE ROADWAY W/ MED BARRIER (82 FEET WIDE)	2596.94	$3,038.42
4 LANE ROADWAY W/ MED & 1 SW (88 FEET WIDE)	2786.96	$3,260.74

BRIDGE SEGMENTS

ASSUMPTIONS:

- PRICE PER SQUARE FOOT OF NEW BRIDGE CONSTRUCTION IS BASED ON SQUARE FOOT COST OF THE 2013 MASSDOT ESTIMATE. PRICES HAVE BEEN ESCALATED TO 2017 PRICES USING 4.0% ESCALATION FOR 3 YEARS.

NEW BRIDGES:

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES
Oct-18

UNDER 2,000 SF	$550.00	$643.50
2,000 SF - 5,000 SF	$450.00	$526.50
5,000 SF - 10,000 SF	$400.00	$468.00
OVER 10,000 SF	$350.00	$409.50

1 LANE RAMP BRIDGE (25 FEET WIDE)	18,330.00
2 LANE BOAT SECTION	10,000.00
2 LANE RAMP BRIDGE (39 FEET WIDE)	30,820.00
2 LANE ROADWAY BRIDGE (47 FEET WIDE)	31,980.00
4 LANE ROADWAY BRIDGE (85 FEET WIDE)	60,060.00

DECK WIDENING	$650.00

RETAINING WALLS (MSE) / Sq. Ft.	$100

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES
Oct-18
Costs per Travel Demand Model Case

Case 1		**2017**	**2020**	**2030**	**2040**
	Scenic Hwy to Route 25 Ramp	7	7	11	16
	Route 6 Exit 1C Relocation (Alternative 2)	30	34	51	75
	Total	**37**	**41**	**62**	**91**

Case 1A		**2017**	**2020**	**2030**	**2040**
	Scenic Hwy to Route 25 Ramp	7	7	11	16
	Bourne Rotary (Mid-Term Option 1B)	6	7	11	16
	Total	**13**	**14**	**22**	**32**

Case 1B		**2017**	**2020**	**2030**	**2040**
	Scenic Hwy to Route 25 Ramp	7	7	11	16
	Bourne Rotary Reconstruction (Alternative 2)*	11	12	18	26
	Total	**18**	**19**	**29**	**42**

Case 2		**2017**	**2020**	**2030**	**2040**
	Scenic Hwy to Route 25 Ramp	7	7	11	16
	Route 6 Exit 1C Relocation (Alternative 2)	30	34	51	75
	Bourne Rotary Reconstruction (Alternative 2)*	11	12	18	26
	Belmont Circle Reconstruction (Alternative 1)	14	15	23	33
	Total	**62**	**68**	**103**	**150**

Case 2B		**2017**	**2020**	**2030**	**2040**
	Scenic Hwy to Route 25 Ramp	7	7	11	16
	Route 6 Exit 1C Relocation (Alternative 2)	30	34	51	75
	Bourne Rotary Reconstruction (Alternative 2)*	11	12	18	26
	Belmont Circle Reconstruction w/ Route 25 Flyover to Scenic Hwy (Alternative 1A)	24	27	41	60
	Total	**72**	**80**	**121**	**177**

Case 3		**2017**	**2020**	**2030**	**2040**
	Scenic Hwy to Route 25 Ramp	7	7	11	16
	Route 6 Exit 1C Relocation (Alternative 2)	30	34	51	75
	Bourne Rotary Reconstruction (Alternative 2)*	11	12	18	26
	Belmont Circle Reconstruction (Alternative 1)	14	15	23	33
	Route 6 EB Travel Lane	29	33	48	71
	Sagamore Bridge Approaches	39	43	64	95
	Bourne Bridge Approaches	51	57	84	125
	Total	**181**	**201**	**299**	**441**

Case 3A		**2017**	**2020**	**2030**	**2040**
	Scenic Hwy to Route 25 Ramp	7	7	11	16
	Route 6 Exit 1C Relocation (Alternative 2)	30	34	51	75
	Bourne Rotary Interchange**	52	58	87	127
	Belmont Circle Reconstruction (Alternative 1)	14	15	23	33
	Route 6 EB Travel Lane	29	33	48	71
	Sagamore Bridge Approaches	39	43	64	95
	Bourne Bridge Approaches	51	57	84	125

Total	**222**	**247**	**368**	**542**

All costs in $ Millions
* includes cost of reconstruction of Intersection Location 4
** Includes cost of Bourne Rotary Reconstruction (Alternative 2).
Costs of new Canal Bridges (assumed to be included in Cases 3 and 3A) but not included in these costs.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

PARK AND RIDE LOT (ROUTE 6 AT EXIT 2, SANDWICH)

NEW ROADWAY CONSTRUCTION:		
PARKING LOT		$1,222,778.70
550	foot roadway length	
60	feet wide	
$2,223	per foot of length	
ACCESS DRIVE		$177,858.72
200	foot roadway length	
24	feet wide	
$889	per foot of length	
0.5 Factor for Wall Embank., Drainage		$700,318.71
OTHER ITEMS:		
KIOSKS, SHELTERS, ETC.		$50,000.00
TRAFFIC SIGNAL MODIFICATIONS		$50,000.00
SIGNAGE		$20,000.00
	Subtotal:	$2,220,956.13
	Contingencies* (25%):	$555,239.03
	Total (2017):	**$2,776,195.16**
	Total (2020):	**$3,122,941.94**
	Total (2030):	**$4,622,364.95**
	Total (2040):	**$6,841,100.12**
FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION		
	P.E. Design (15%):	$416,429.27
	Construction Engineering (15%):	$416,429.27

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

SAGAMORE BRIDGE APPROACH ROADWAYS

NEW APPROACHES TO AND FROM THE SAGAMORE BRIDGE APPROACHES

NEW ROADWAY CONSTRUCTION:		$14,673,600.00
1,500	feet on both sides of bridge	
2	barrells EB & WB (59 feet wide & 73 feet wide)	
3,000	foot roadway length	
$4,891	per LF ($2,186 per LF & $2,705 per LF)	
0.2 Factor for Embank., Drainage		$2,934,720.00
STRUCTURES:		
RETAINING WALLS		$10,000,000.00
ASSUME AVERAGE HEIGHT OF 20 FEET AND AVERAGE LENGTH 1,000 LF x 2 SIDES x 2 APPROACHES = 4,000 LF		
4,000	feet of retaining wall	
25	feet high (average)	
100,000	square feet of retaining wall face	
$100	per square foot	

Subtotal:	$27,608,320.00
Contingencies* (40%):	$11,043,328.00
Total (2017):	**$38,651,648.00**
Total (2020):	**$43,479,238.84**
Total (2030):	**$64,354,993.92**
Total (2040):	**$95,245,391.00**

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

P.E. Design (15%):	$5,797,747.20
Construction Engineering (15%):	$5,797,747.20

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE BRIDGE APPROACH ROADWAYS

NEW APPROACHES TO AND FROM THE BOURNE BRIDGE APPROACHES

NEW ROADWAY CONSTRUCTION:		$16,630,080.00
1,700	LF (west side 1,300 LF east side 400 LF) of bridge	
2	barrells EB & WB (59 feet wide & 73 feet wide)	
3,400	foot roadway length	
$4,891	per LF ($2,186 per LF & $2,705 per LF)	
0.2 Factor for Embank., Drainage		$3,326,016.00
STRUCTURES:		
RETAINING WALLS		$8,500,000.00
ASSUME AVERAGE HEIGHT OF 20 FEET AND AVERAGE LENGTH 1,700 LF x 2 SIDES = 3,400 LF		
3,400	feet of retaining wall	
25	feet high (average)	
85,000	square feet of retaining wall face	
$100	per square foot	
BRIDGE - ROUTE 25 OVER SCENIC HIGHWAY		$7,722,000.00
ASSUME LENGTH OF BRIDGE IS 150 LF AND WIDTH OF BRIDGE IS 132 LF		
150	feet long	
132	feet long	
19800	square feet of bridge	
$390	per square foot	

Subtotal:	$36,178,096.00
Contingencies* (40%):	$14,471,238.40
Total (2017):	**$50,649,334.40**
Total (2020):	**$56,975,436.27**
Total (2030):	**$84,331,141.78**
Total (2040):	**$124,810,089.83**

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

P.E. Design (15%):	$7,597,400.16
Construction Engineering (15%):	$7,597,400.16

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE BRIDGE APPROACH ROADWAYS

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

RELOCATED EXIT 1C - OPTION 1 (SIGNALIZED INTERSECTION)

SECTION 1 - WB ON RAMP

NEW ROADWAY CONSTRUCTION:

ROADWAY WIDENING AND TAPER		$800,364.24
1,200	foot roadway length	
18	feet wide	
$667	per foot of length	
1 LANE RAMP		$3,358,565.50
4,120	foot roadway length	
22	feet wide	
$815	per foot of length	
0.5 Factor for Wall Embank., Drainage		$2,079,464.87
	Subtotal:	$6,238,394.60
	Contingencies* (75%):	$4,678,795.95
	Total (2017):	**$10,917,190.56**
	Total (2020):	**$12,280,747.66**
	Total (2030):	**$18,177,122.28**
	Total (2040):	**$26,902,140.97**

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

P.E. Design (15%):	$1,637,578.58
Construction Engineering (15%):	$1,637,578.58

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

RELOCATED EXIT 1C - OPTION 1 (SIGNALIZED INTERSECTION)

Page 2

SECTION 2 - WB OFF RAMP

NEW ROADWAY CONSTRUCTION:

ROADWAY WIDENING AND TAPER		$473,548.84
710	foot roadway length	

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

RELOCATED EXIT 1C - OPTION 1 (SIGNALIZED INTERSECTION)

18	feet wide	
$667	per foot of length	
1 LANE RAMP		$3,162,920.90
3,880	foot roadway length	
22	feet wide	
$815	per foot of length	
0.5 Factor for Wall Embank., Drainage		$1,818,234.87
	Subtotal:	$5,454,704.62
	Contingencies* (75%):	$4,091,028.46
	Total (2017):	**$9,545,733.08**
	Total (2020):	**$10,737,995.15**
	Total (2030):	**$15,893,645.58**
	Total (2040):	**$23,522,595.46**
	FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION	
	P.E. Design (15%):	$1,431,859.96
	Construction Engineering (15%):	$1,431,859.96

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, etc.

RELOCATED EXIT 1C - ALTERNATIVE 1 (SIGNALIZED INTERSECTION)

SECTION 3 - TWO SIGNALIZED INTERSECTIONS		**Page 3**
ROADWAY RESURFACING:		
1 LANE RAMP		$24,000.00
200	foot roadway length	
22	feet wide	
$120	per foot of length	

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

RELOCATED EXIT 1C - OPTION 1 (SIGNALIZED INTERSECTION)

2 LANE ROADWAY W/ TWO SIDEWALKS		$381,900.00
950	foot roadway length	
46	feet wide	
$402	per foot of length	
3 LANE ROADWAY W/ ONE SIDEWALK		$123,200.00
350	foot roadway length	
52	feet wide	
$352	per foot of length	
3 LANE ROADWAY W/ TWO SIDEWALKS		$563,760.00
1,160	foot roadway length	
58	feet wide	
$486	per foot of length	
NEW ROADWAY CONSTRUCTION:		
1 LANE RAMP		$228,252.02
280	foot roadway length	
22	feet wide	
$815	per foot of length	
4 LANE ROADWAY		$1,633,335.91
760	foot roadway length	
58	feet wide	
$2,149	per foot of length	
OTHER ITEMS:		
TRAFFIC SIGNALS		$600,000.00
	Subtotal:	$3,554,447.94
0.5 Factor for Wall Embank., Drainage		$1,777,223.97
	Contingencies* (25%):	$1,332,917.98
	Total (2017):	**$6,664,589.88**
	Total (2020):	**$7,496,997.16**
	Total (2030):	**$11,096,542.15**
	Total (2040):	**$16,422,882.38**

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

RELOCATED EXIT 1C - OPTION 1 (SIGNALIZED INTERSECTION)

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

P.E. Design (15%):	$999,688.48
Construction Engineering (15%):	$999,688.48

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, etc.

Grand Total of Sections 1, 2 and 3

Total (2017):	**$27,127,513.52**
Total (2020):	**$30,515,739.96**
Total (2030):	**$45,167,310.01**
Total (2040):	**$66,847,618.82**

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

RELOCATED EXIT 1C - OPTION 2 (4-LEG ROUNDABOUT)

SECTION 1 - WB ON RAMP		
NEW ROADWAY CONSTRUCTION:		
ROADWAY WIDENING AND TAPER		$800,364.24
1,200	foot roadway length	
18	feet wide	
$667	per foot of length	
1 LANE RAMP		$3,293,350.63
4,040	foot roadway length	
22	feet wide	
$815	per foot of length	
	Subtotal:	$4,093,714.87
0.5 Factor for Wall Embank., Drainage		$2,046,857.44
	Contingencies* (75%):	$4,605,429.23
	Total (2017):	**$10,746,001.54**
	Total (2020):	**$12,088,177.13**
	Total (2030):	**$17,892,092.56**
	Total (2040):	**$26,480,296.99**
	FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION	
	P.E. Design (15%):	$1,611,900.23
	Construction Engineering (15%):	$1,611,900.23

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

RELOCATED EXIT 1C - OPTION 2 (4-LEG ROUNDABOUT)

SECTION 2 - WB OFF RAMP		**Page 2**
NEW ROADWAY CONSTRUCTION:		
ROADWAY WIDENING AND TAPER		$473,548.84
710	foot roadway length	
18	feet wide	

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

RELOCATED EXIT 1C - OPTION 2 (4-LEG ROUNDABOUT)

$667	per foot of length	
1 LANE RAMP		$3,097,706.04
3,800	foot roadway length	
22	feet wide	
$815	per foot of length	
0.5 Factor for Wall Embank., Drainage		$1,785,627.44
	Subtotal:	$3,571,254.88
	Contingencies* (75%):	$2,678,441.16
	Total (2017):	**$6,249,696.04**
	Total (2020):	**$7,030,283.08**
	Total (2030):	**$10,405,743.91**
	Total (2030):	**$15,400,500.99**
	FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION	
	P.E. Design (15%):	$937,454.41
	Construction Engineering (15%):	$937,454.41

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

RELOCATED EXIT 1C - OPTION 2 (4-LEG ROUNDABOUT)

Page 3

SECTION 3 - 4-LEG ROUNDABOUT		
ROADWAY RESURFACING:		
2 LANE ROADWAY W/ TWO SIDEWALKS		$192,960.00
480	foot roadway length	
46	feet wide	
$402	per foot of length	
4 LANE ROADWAY W/ TWO SIDEWALKS		$114,000.00

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

RELOCATED EXIT 1C - OPTION 2 (4-LEG ROUNDABOUT)

200	foot roadway length	
70	feet wide	
$570	per foot of length	
NEW ROADWAY CONSTRUCTION:		
2 LANE ROUNDABOUT		$654,186.60
535	foot roadway length	
33	feet wide	
$1,223	per foot of length	
2 LANE ROADWAY W/ TWO SIDEWALKS		$1,874,927.34
1,100	foot roadway length	
46	feet wide	
$1,704	per foot of length	
4 LANE ROADWAY		$1,869,739.79
870	foot roadway length	
58	feet wide	
$2,149	per foot of length	
4 LANE ROADWAY W/ TWO SIDEWALKS		$2,490,022.08
960	foot roadway length	
70	feet wide	
$2,594	per foot of length	
0.5 Factor for Wall Embank., Drainage		$3,597,917.91
	Subtotal:	$10,793,753.73
	Contingencies* (25%):	$2,698,438.43
	Total (2017):	**$13,492,192.16**
	Total (2020):	**$15,177,366.96**
	Total (2030):	**$22,464,499.95**
	Total (2040):	**$33,247,459.92**

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

P.E. Design (15%):	$2,023,828.82

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

RELOCATED EXIT 1C - OPTION 2 (4-LEG ROUNDABOUT)

Construction Engineering (15%):	$2,023,828.82

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, etc.

Grand Total of Sections 1, 2 and 3

Total (2017):	**$30,487,889.74**
Total (2020):	**$34,295,827.17**
Total (2030):	**$50,762,336.42**
Total (2040):	**$75,128,257.90**

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

RELOCATED EXIT 1C - OPTION 3 (5-LEG ROUNDABOUT)

SECTION 1 - WB ON RAMP

NEW ROADWAY CONSTRUCTION:		
ROADWAY WIDENING AND TAPER		$800,364.24
1,200	foot roadway length	
18	feet wide	
$667	per foot of length	
1 LANE RAMP		$3,586,817.52
4,400	foot roadway length	
22	feet wide	
$815	per foot of length	
0.5 Factor for Wall Embank., Drainage		$2,193,590.88
	Subtotal:	$6,580,772.64
	Contingencies* (75%):	$4,935,579.48
	Total (2017):	**$11,516,352.12**
	Total (2020):	**$12,954,744.50**
	Total (2030):	**$19,174,726.28**
	Total (2040):	**$28,378,594.89**

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

P.E. Design (15%):	$1,727,452.82
Construction Engineering (15%):	$1,727,452.82

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, etc.

RELOCATED EXIT 1C - OPTION 3 (5-LEG ROUNDABOUT)

SECTION 2 - WB OFF RAMP **Page 2**

NEW ROADWAY CONSTRUCTION:	
ROADWAY WIDENING AND TAPER	$473,548.84

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

RELOCATED EXIT 1C - OPTION 3 (5-LEG ROUNDABOUT)

710	foot roadway length	
18	feet wide	
$667	per foot of length	
1 LANE RAMP		$3,391,172.93
4,160	foot roadway length	
22	feet wide	
$815	per foot of length	
0.5 Factor for Wall Embank., Drainage		$1,932,360.89
	Subtotal:	$5,797,082.66
	Contingencies* (75%):	$4,347,811.99
	Total (2017):	**$10,144,894.65**
	Total (2032):	**$11,411,991.99**
	Total (2030):	**$16,891,249.59**
	Total (2040):	**$24,999,049.39**
	FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION	
	P.E. Design (15%):	$1,521,734.20
	Construction Engineering (15%):	$1,521,734.20

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

RELOCATED EXIT 1C - OPTION 3 (5-LEG ROUNDABOUT)

SECTION 3 - 5-LEG ROUNDABOUT		**Page 3**
ROADWAY RESURFACING:		
2 LANE ROADWAY W/ TWO SIDEWALKS		$333,660.00
830	foot roadway length	
46	feet wide	
$402	per foot of length	

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

RELOCATED EXIT 1C - OPTION 3 (5-LEG ROUNDABOUT)

4 LANE ROADWAY W/ TWO SIDEWALKS		$302,100.00
530	foot roadway length	
70	feet wide	
$570	per foot of length	
NEW ROADWAY CONSTRUCTION:		
1 LANE RAMP		$317,922.46
390	foot roadway length	
22	feet wide	
$815	per foot of length	
2 LANE ROUNDABOUT		$654,186.60
535	foot roadway length	
33	feet wide	
$1,223	per foot of length	
2 LANE ROADWAY W/ TWO SIDEWALKS		$767,015.73
450	foot roadway length	
46	feet wide	
$1,704	per foot of length	
4 LANE ROADWAY		$1,225,001.93
570	foot roadway length	
58	feet wide	
$2,149	per foot of length	
4 LANE ROADWAY W/ TWO SIDEWALKS		$1,452,512.88
560	foot roadway length	
70	feet wide	
$2,594	per foot of length	
0.5 Factor for Wall Embank., Drainage		$893,086.44
	Subtotal:	$5,052,399.61
	Contingencies* (25%):	$1,263,099.90
	Total (2017):	**$6,315,499.51**

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

RELOCATED EXIT 1C - OPTION 3 (5-LEG ROUNDABOUT)

Total (2020):	**$7,104,305.40**
Total (2030):	**$10,515,306.69**
Total (2040):	**$15,562,653.90**

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

P.E. Design (15%):	$947,324.93
Construction Engineering (15%):	$947,324.93

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

Grand Total of Sections 1, 2 and 3

Total (2017):	**$27,976,746.28**
Total (2020):	**$31,471,041.89**
Total (2030):	**$46,581,282.56**
Total (2040):	**$68,940,298.18**

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

SCENIC HIGHWAY TO ROUTE 25 WB ON-RAMP

ROUTE 25 WB ON RAMP		
ROADWAY RESURFACING:		
3 LANE ROADWAY (NIGHTINGALE ROAD)		$39,600.00
180	foot roadway length	
44	feet wide	
$220	per foot of length	
NEW ROADWAY CONSTRUCTION:		
ROADWAY WIDENING AND TAPER		$400,182.12
600	foot roadway length	
18	feet wide	
$667	per foot of length	
1 LANE RAMP		$611,389.35
750	foot roadway length	
22	feet wide	
$815	per foot of length	
1 Lane Widening Route 28 WB		$815,185.80
1,000	foot roadway length	
22	feet wide	
$815	per foot of length	
STRUCTURAL:		
RETAINING WALL		$500,000.00
200	foot retaining wall	
25	foot high	
5,000	square foot of wall face	
$100	per square foot of wall face	
TRAFFIC SIGNAL MODIFICATIONS		$300,000.00
0.5 Factor for Embank., Drainage		$1,083,178.64
	Subtotal:	$3,749,535.91
	Contingencies* (75%):	$2,812,151.93
	Total (2017):	**$6,561,687.83**
	Total (2020):	**$7,381,242.64**
	Total (2030):	**$10,925,210.24**
	Total (2040):	**$16,169,311.16**
FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION		
	P.E. Design (15%):	$984,253.18
	Construction Engineering (15%):	$984,253.18

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BELMONT CIRCLE - ALTERNATIVE 1 - 3 LEG ROUNDABOUT WITH SIGNALIZED INTERSECTION

BELMONT CIRCLE

ROADWAY RESURFACING:

1 LANE RAMP		$60,000.00
500	foot roadway length	
22	feet wide	
$120	per foot of length	
2 LANE RAMP		$61,200.00
340	foot roadway length	
36	feet wide	
$180	per foot of length	
2 LANE ROADWAY W/ TWO SIDEWALKS		$313,560.00
780	foot roadway length	
46	feet wide	
$402	per foot of length	
3 LANE ROADWAY W/ TWO SIDEWALKS		$388,800.00
800	foot roadway length	
58	feet wide	
$486	per foot of length	
4 LANE ROADWAY W/ MED BARRIER (82 FEET WIDE)		$517,500.00
1,150	foot roadway length	
82	feet wide	
$450	per foot of length	
0.5 Factor for Embank., Drainage		$670,530.00

NEW ROADWAY CONSTRUCTION:

1 LANE RAMP		$163,037.16
200	foot roadway length	
22	feet wide	
$815	per foot of length	
2 LANE ROUNDABOUT		$654,186.60
535	foot roadway length	
33	feet wide	
$1,223	per foot of length	

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BELMONT CIRCLE - ALTERNATIVE 1 - 3 LEG ROUNDABOUT WITH SIGNALIZED INTERSECTION

BELMONT CIRCLE - ALTERNATIVE 1 - 3 LEG ROUNDABOUT WITH SIGNALIZED INTERSECTION

Page 2

2 LANE ROADWAY W/ TWO SIDEWALKS		$1,585,165.84
930	foot roadway length	
46	feet wide	
$1,704	per foot of length	
3 LANE ROADWAY W/ TWO SIDEWALKS		$429,825.24
200	foot roadway length	
58	feet wide	
$2,149	per foot of length	
4 LANE ROADWAY W/ TWO SIDEWALKS		$855,945.09
330	foot roadway length	
70	feet wide	
$2,594	per foot of length	
4 LANE ROADWAY W/ MED BARRIER (82 FEET WIDE)		$1,914,204.47
630	foot roadway length	
82	feet wide	
$3,038	per foot of length	
OTHER ITEMS:		
TRAFFIC SIGNAL		$300,000.00
0.5 Factor for Wall Embank., Drainage		$2,951,182.21
	Subtotal:	$10,865,136.62
	Contingencies* (25%):	$2,716,284.15
	Total (2017):	**$13,581,420.77**
	Total (2020):	**$15,277,740.22**
	Total (2030):	**$22,613,065.58**
	Total (2040):	**$33,467,337.06**

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BELMONT CIRCLE - ALTERNATIVE 1 - 3 LEG ROUNDABOUT WITH SIGNALIZED INTERSECTION

P.E. Design (15%):	$2,037,213.12
Construction Engineering (15%):	$2,037,213.12

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BELMONT CIRCLE - ALTERNATIVE 1A - 3 LEG ROUNDABOUT WITH ROUTE 25 FLYOVER

BELMONT CIRCLE

ROADWAY RESURFACING:

1 LANE RAMP		$96,000.00
800	foot roadway length	
22	feet wide	
$120	per foot of length	
1 LANE ROADWAY W/ ONE SIDEWALK		$104,000.00
500	foot roadway length	
28	feet wide	
$208	per foot of length	
2 LANE RAMP		$306,000.00
1,700	foot roadway length	
36	feet wide	
$180	per foot of length	
2 LANE ROADWAY W/ TWO SIDEWALKS		$221,100.00
550	foot roadway length	
46	feet wide	
$402	per foot of length	
3 LANE ROADWAY W/ TWO SIDEWALKS		$413,100.00
850	foot roadway length	
58	feet wide	
$486	per foot of length	
4 LANE ROADWAY W/ MED BARRIER & ONE SIDEWALK		$128,000.00
250	foot roadway length	
72	feet wide	
$512	per foot of length	
0.5 Factor for Embank., Drainage		$634,100.00

BELMONT CIRCLE - ALTERNATIVE 1A - 3 LEG ROUNDABOUT WITH ROUTE 25 FLYOVER

Page 2

NEW ROADWAY CONSTRUCTION:

1 LANE ROADWAY W/ ONE SIDEWALK	$363,128.22

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BELMONT CIRCLE - ALTERNATIVE 1A - 3 LEG ROUNDABOUT WITH ROUTE 25 FLYOVER

350	foot roadway length	
28	feet wide	
$1,038	per foot of length	
2 LANE ROUNDABOUT		$654,186.60
535	foot roadway length	
33	feet wide	
$1,223	per foot of length	
2 LANE ROADWAY		$314,958.15
250	foot roadway length	
34	feet wide	
$1,260	per foot of length	
2 LANE RAMP		$400,182.12
300	foot roadway length	
36	feet wide	
$1,334	per foot of length	
2 LANE ROADWAY W/ TWO SIDEWALKS		$1,107,911.61
650	foot roadway length	
46	feet wide	
$1,704	per foot of length	
3 LANE ROADWAY W/ ONE SIDEWALK		$732,185.06
380	foot roadway length	
52	feet wide	
$1,927	per foot of length	
3 LANE ROADWAY W/ TWO SIDEWALKS		$429,825.24
200	foot roadway length	
58	feet wide	
$2,149	per foot of length	

BELMONT CIRCLE - ALTERNATIVE 1A - 3 LEG ROUNDABOUT WITH ROUTE 25 FLYOVER

Page 3

4 LANE ROADWAY W/ TWO SIDEWALKS		$907,820.55
350	foot roadway length	

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BELMONT CIRCLE - ALTERNATIVE 1A - 3 LEG ROUNDABOUT WITH ROUTE 25 FLYOVER

70	feet wide	
$2,594	per foot of length	
STRUCTURAL:		
1 LANE RAMP BRIDGE		$9,828,000.00
800	foot roadway length	
30	feet wide	
24,000	square feet	
$410	per square foot of length	
OTHER ITEMS:		
TRAFFIC SIGNAL		$300,000.00
0.5 Factor for Embank., Drainage		$2,605,098.78
	Subtotal:	$19,545,596.34
	Contingencies* (25%):	$4,886,399.08
	Total (2017):	**$24,431,995.42**
	Total (2020):	**$27,483,551.65**
	Total (2030):	**$40,679,272.38**
	Total (2040):	**$60,205,323.12**
	FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION	
	P.E. Design (15%):	$3,664,799.31
	Construction Engineering (15%):	$3,664,799.31

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BELMONT CIRCLE - ALTERNATIVE 2 - 4 LEG ROUNDABOUT

BELMONT CIRCLE		
ROADWAY RESURFACING:		
1 LANE RAMP		$126,000.00
1,050	foot roadway length	
22	feet wide	
$120	per foot of length	
1 LANE ROADWAY W/ ONE SIDEWALK		$135,200.00
650	foot roadway length	
28	feet wide	
$208	per foot of length	
2 LANE RAMP		$36,000.00
200	foot roadway length	
36	feet wide	
$180	per foot of length	
2 LANE ROADWAY W/ TWO SIDEWALKS		$486,420.00
1,210	foot roadway length	
46	feet wide	
$402	per foot of length	
3 LANE ROADWAY W/ TWO SIDEWALKS		$97,200.00
200	foot roadway length	
58	feet wide	
$486	per foot of length	
4 LANE ROADWAY W/ TWO SIDEWALKS		$142,500.00
250	foot roadway length	
70	feet wide	
$570	per foot of length	
5 LANE ROADWAY		$152,000.00
400	foot roadway length	
70	feet wide	
$380	per foot of length	
0.5 Factor for Embank., Drainage		$587,660.00

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BELMONT CIRCLE - ALTERNATIVE 2 - 4 LEG ROUNDABOUT

BELMONT CIRCLE - ALTERNATIVE 2 - 4 LEG ROUNDABOUT

NEW ROADWAY CONSTRUCTION:		
1 LANE ROADWAY W/ ONE SIDEWALK		$415,003.68
400	foot roadway length	
28	feet wide	
$1,038	per foot of length	
2 LANE ROUNDABOUT		$654,186.60
535	foot roadway length	
33	feet wide	
$1,223	per foot of length	
2 LANE ROADWAY W/ TWO SIDEWALKS		$1,960,151.31
1,150	foot roadway length	
46	feet wide	
$1,704	per foot of length	
3 LANE ROADWAY W/ ONE SIDEWALK		$867,061.26
450	foot roadway length	
52	feet wide	
$1,927	per foot of length	
3 LANE ROADWAY W/ TWO SIDEWALKS		$859,650.48
400	foot roadway length	
58	feet wide	
$2,149	per foot of length	
4 LANE ROADWAY W/ TWO SIDEWALKS		$907,820.55
350	foot roadway length	
70	feet wide	
$2,594	per foot of length	
0.5 Factor for Embank., Drainage		$2,831,936.94
	Subtotal:	$10,258,790.83

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BELMONT CIRCLE - ALTERNATIVE 2 - 4 LEG ROUNDABOUT

Contingencies* (25%):	$2,564,697.71
Total (2017):	**$12,823,488.53**
Total (2020):	**$14,425,142.25**
Total (2030):	**$21,351,108.41**
Total (2040):	**$31,599,640.44**

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

P.E. Design (15%):	$1,923,523.28
Construction Engineering (15%):	$1,923,523.28

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

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CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE ROTARY - ALTERNATIVE 1 - ROUTE 28 NB RAMP AND ROTARY RECONSTRUCTION

ASSUMPTIONS:

THIS ESTIMATE ASSUMES INTERSECTION LOCATION 4 WAS BUILT AS A SHORT-TERM IMPROVEMENT

ROADWAY RESURFACING:		
1 LANE RAMP		$36,000.00
300	foot roadway length	
22	feet wide	
$120	per foot of length	
2 LANE ROADWAY W/ ONE SIDEWALKS		$425,600.00
1,520	foot roadway length	
46	feet wide	
$280	per foot of length	
2 LANE ROADWAY W/ TWO SIDEWALKS		$723,600.00
1,800	foot roadway length	
46	feet wide	
$402	per foot of length	
2 LANE ROUNDABOUT		$258,000.00
1,200	foot roadway length	
43	feet wide	
$215	per foot of length	
3 LANE ROADWAY W/ ONE SIDEWALKS		$281,600.00
800	foot roadway length	
58	feet wide	
$352	per foot of length	
3 LANE ROADWAY W/ TWO SIDEWALKS		$170,100.00
350	foot roadway length	
58	feet wide	
$486	per foot of length	
4 LANE ROADWAY		$108,500.00
350	foot roadway length	
70	feet wide	
$310	per foot of length	

BOURNE ROTARY - ALTERNATIVE 1 - ROUTE 28 NB RAMP

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CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE ROTARY - ALTERNATIVE 1 - ROUTE 28 NB RAMP AND ROTARY RECONSTRUCTION

ASSUMPTIONS:

THIS ESTIMATE ASSUMES INTERSECTION LOCATION 4 WAS BUILT AS A SHORT-TERM IMPROVEMENT

4 LANE ROADWAY W/ MED & 1 SW		$364,800.00
600	foot roadway length	
88	feet wide	
$608	per foot of length	
0.5 Factor for Embank., Drainage		$1,184,100.00
NEW ROADWAY CONSTRUCTION:		
1 LANE RAMP		$652,148.64
800	foot roadway length	
22	feet wide	
$815	per foot of length	
2 LANE ROADWAY		$855,945.09
700	foot roadway length	
24	feet wide	
$1,223	per foot of length	
2 LANE ROADWAY W/ ONE SIDEWALK		$296,431.20
200	foot roadway length	
24	feet wide	
$1,482	per foot of length	
0.5 Factor for Embank., Drainage		$902,262.47

Subtotal:	$6,259,087.40
Contingencies* (25%):	$1,564,771.85
Total (2017):	**$7,823,859.24**
Total (2020):	**$8,801,059.26**
Total (2030):	**$13,026,725.64**
Total (2040):	**$19,279,553.95**

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

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CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE ROTARY - ALTERNATIVE 1 - ROUTE 28 NB RAMP AND ROTARY RECONSTRUCTION

ASSUMPTIONS:

THIS ESTIMATE ASSUMES INTERSECTION LOCATION 4 WAS BUILT AS A SHORT-TERM IMPROVEMENT

P.E. Design (15%):	$1,173,578.89
Construction Engineering (15%):	$1,173,578.89

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE ROTARY - ALTERNATIVE 1A - ROUTE 28 NB AND SB RAMP

ASSUMPTIONS:

THIS ESTIMATE ASSUMES INTERSECTION LOCATION 4 WAS BUILT AS A SHORT-TERM IMPROVEMENT

ROADWAY RESURFACING:		
1 LANE RAMP		$24,000.00
200	foot roadway length	
22	feet wide	
$120	per foot of length	
1 LANE ROADWAY W/ ONE SIDEWALKS		$208,000.00
1,000	foot roadway length	
46	feet wide	
$208	per foot of length	
2 LANE ROADWAY W/ ONE SIDEWALKS		$691,600.00
2,470	foot roadway length	
46	feet wide	
$280	per foot of length	
2 LANE ROADWAY W/ TWO SIDEWALKS		$241,200.00
600	foot roadway length	
46	feet wide	
$402	per foot of length	
2 LANE ROUNDABOUT		$258,000.00
1,200	foot roadway length	
43	feet wide	
$215	per foot of length	
3 LANE ROADWAY W/ ONE SIDEWALKS		$246,400.00
700	foot roadway length	
58	feet wide	
$352	per foot of length	
3 LANE ROADWAY W/ TWO SIDEWALKS		$437,400.00
900	foot roadway length	
58	feet wide	
$486	per foot of length	

BOURNE ROTARY - ALTERNATIVE 1A - ROUTE 28 NB AND SB RAMP

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE ROTARY - ALTERNATIVE 1A - ROUTE 28 NB AND SB RAMP

ASSUMPTIONS:

THIS ESTIMATE ASSUMES INTERSECTION LOCATION 4 WAS BUILT AS A SHORT-TERM IMPROVEMENT

4 LANE ROADWAY		$108,500.00
350	foot roadway length	
70	feet wide	
$310	per foot of length	
4 LANE ROADWAY W/ MED & 1 SW		$364,800.00
600	foot roadway length	
88	feet wide	
$608	per foot of length	
0.5 Factor for Embank., Drainage		$1,289,950.00
NEW ROADWAY CONSTRUCTION:		
1 LANE RAMP		$1,874,927.34
2,300	foot roadway length	
22	feet wide	
$815	per foot of length	
1 LANE ROADWAY w/ ONE SIDEWALK		$933,758.28
1,400	foot roadway length	
24	feet wide	
$667	per foot of length	
2 LANE ROADWAY		$1,345,056.57
1,100	foot roadway length	
24	feet wide	
$1,223	per foot of length	
2 LANE ROADWAY W/ ONE SIDEWALK		$296,431.20
200	foot roadway length	
24	feet wide	
$1,482	per foot of length	
0.5 Factor for		$2,225,086.70

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE ROTARY - ALTERNATIVE 1A - ROUTE 28 NB AND SB RAMP

ASSUMPTIONS:

THIS ESTIMATE ASSUMES INTERSECTION LOCATION 4 WAS BUILT AS A SHORT-TERM IMPROVEMENT

Embank., Drainage

BRIDGE CONSTRUCTION

1 LANE RAMP BRIDGE		$2,199,600.00
120	foot roadway length	
26	feet wide	
$18,330	per foot of length	

Subtotal:	$12,744,710.09
Contingencies* (25%):	$3,186,177.52
Total (2017):	**$15,930,887.61**
Total (2020):	**$17,920,655.47**
Total (2030):	**$26,524,927.86**
Total (2040):	**$39,256,893.24**

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

P.E. Design (15%):	$2,389,633.14
Construction Engineering (15%):	$2,389,633.14

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE ROTARY - ALTERNATIVE 1B - ROUTE 28 NB RAMP AND SANDWICH ROAD AT BOURNE ROTARY CONNECTOR RECONSTRUCTION

ASSUMPTIONS:

THIS ESTIMATE INCLUDES INTERSECTION LOCATION 4 AND RELOCATION OF TECH HIGH SCHOOL DRIVEWAY

BOURNE ROTARY - ALTERNATIVE 1 - ROUTE 28 NB RAMP

1 LANE RAMP		$652,148.64
800	foot roadway length	
22	feet wide	
$815	per foot of length	

Location 4 - Intersection of Sandwich Road and Bourne Rotary Connector

Old Sandwich Road		$816,667.96
	3-Lane, 2 sidewalks	
380	foot roadway length	
58	feet wide	
$2,149	per foot of length	
Bourne Rotary Connector		$1,665,572.81
	3-Lane, 2 sidewalks	
775	foot roadway length	
58	feet wide	
$2,149	per foot of length	
Sandwich Road		$1,010,089.31
	3-Lane, 2 sidewalks	
470	foot roadway length	
58	feet wide	
$2,149	per foot of length	
Traffic Control Signal		$300,000.00

Technical High School Driveway Relocation

ACCESS DRIVE		$666,970.20
750	foot roadway length	
24	feet wide	
$889	per foot of length	

0.5 Factor for Embank., Drainage		$2,555,724.46
	Subtotal:	$5,111,448.92
	Contingencies* (25%):	$1,277,862.23
	Total (2017):	**$6,389,311.14**
	Total (2020):	**$7,187,336.11**
	Total (2030):	**$10,638,203.05**
	Total (2040):	**$15,744,540.52**
	FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION	
	P.E. Design (15%):	$958,396.67
	Construction Engineering (15%):	$958,396.67

- Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE ROTARY - ALTERNATIVE 2 - 3 SIGNALIZED INTERSECTIONS

ASSUMPTIONS:

THIS ESTIMATE ASSUMES INTERSECTION LOCATION 4 WAS BUILT AS A SHORT-TERM IMPROVEMENT

ROADWAY RESURFACING:	
1 LANE RAMP	$18,000.00
150 foot roadway length	
22 feet wide	
$120 per foot of length	
2 LANE ROADWAY W/ TWO SIDEWALKS	$269,340.00
670 foot roadway length	
46 feet wide	
$402 per foot of length	
2 LANE ROUNDABOUT	$234,350.00
1,090 foot roadway length	
43 feet wide	
$215 per foot of length	
3 LANE ROADWAY W/ TWO SIDEWALKS	$996,300.00
2,050 foot roadway length	
58 feet wide	
$486 per foot of length	
4 LANE ROADWAY W/ TWO SIDEWALKS	$1,778,400.00
3,120 foot roadway length	
70 feet wide	
$570 per foot of length	
4 LANE ROADWAY W/ MED & 1 SW	$364,800.00
600 foot roadway length	
88 feet wide	
$608 per foot of length	
0.5 Factor for Embank., Drainage	$1,830,595.00

BOURNE ROTARY - ALTERNATIVE 2 - 3 SIGNALIZED INTERSECTIONS

Page 2

NEW ROADWAY CONSTRUCTION:

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE ROTARY - ALTERNATIVE 2 - 3 SIGNALIZED INTERSECTIONS

ASSUMPTIONS:

THIS ESTIMATE ASSUMES INTERSECTION LOCATION 4 WAS BUILT AS A SHORT-TERM IMPROVEMENT

1 LANE RAMP		$774,426.51
950	foot roadway length	
22	feet wide	
$815	per foot of length	
ACCESS DRIVE		$666,970.20
750	foot roadway length	
24	feet wide	
$889	per foot of length	
0.5 Factor for Embank., Drainage		$720,698.36
OTHER ITEMS:		
TRAFFIC SIGNALS (3 LOCATIONS)		$900,000.00
	Subtotal:	$8,553,880.07
	Contingencies* (25%):	$2,138,470.02
	Total (2017):	**$10,692,350.08**
	Total (2020):	**$12,027,824.61**
	Total (2030):	**$17,802,762.89**
	Total (2040):	**$26,348,089.07**

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

P.E. Design (15%):	$1,603,852.51
Construction Engineering (15%):	$1,603,852.51

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE ROTARY - ALTERNATIVE 3A - INTERCHANGE

ASSUMPTIONS:

THIS ESTIMATE ASSUMES BOURNE ROTARY ALTERNATE 2 WAS BUILT AS A MID-TERM IMPROVEMENT

ROADWAY RESURFACING:		
1 LANE RAMP		$54,000.00
450	foot roadway length	
22	feet wide	
$120	per foot of length	
2 LANE ROADWAY		$209,100.00
1,230	foot roadway length	
34	feet wide	
$170	per foot of length	
2 LANE ROADWAY W/ ONE SIDEWALK		$294,000.00
1,050	foot roadway length	
40	feet wide	
$280	per foot of length	
0.5 Factor for Embank., Drainage		$278,550.00
NEW ROADWAY CONSTRUCTION:		
1 LANE RAMP		$3,383,021.07
4,150	foot roadway length	
22	feet wide	
$815	per foot of length	
2 LANE ROADWAY		$1,177,943.48
935	foot roadway length	
34	feet wide	
$1,260	per foot of length	
3 LANE ROADWAY		$1,789,703.37
1,050	foot roadway length	
46	feet wide	
$1,704	per foot of length	
0.5 Factor for Embank., Drainage		$3,175,333.96

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE ROTARY - ALTERNATIVE 3A - INTERCHANGE

ASSUMPTIONS:

THIS ESTIMATE ASSUMES BOURNE ROTARY ALTERNATE 2 WAS BUILT AS A MID-TERM IMPROVEMENT

BOURNE ROTARY - ALTERNATIVE 3A - INTERCHANGE

STRUCTURAL:		
2 LANE BOAT SECTION		$20,600,000.00
2,060	foot roadway length	
34	feet wide	
$10,000	per foot of length	
1 LANE RAMP OVER BOAT SECTION		$744,000.00
40	foot roadway length	
30	feet wide	
1,200	square feet	
$620	per square foot of length	
2 LANE ROADWAY OVER BOAT SECTION		$1,240,000.00
40	foot roadway length	
50	feet wide	
2,000	square feet	
$620	per square foot of length	
	Subtotal:	$32,945,651.88
	Contingencies* (25%):	$8,236,412.97
	Total (2017):	**$41,182,064.85**
	Total (2020):	**$46,325,704.75**
	Total (2030):	**$68,568,137.98**
	Total (2040):	**$101,480,844.21**
FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION		
	P.E. Design (15%):	$6,177,309.73
	Construction Engineering (15%):	$6,177,309.73

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

BOURNE ROTARY - ALTERNATIVE 3A - INTERCHANGE

ASSUMPTIONS:

THIS ESTIMATE ASSUMES BOURNE ROTARY ALTERNATE 2 WAS BUILT AS A MID-TERM IMPROVEMENT

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

ROUTE 6 ADD-A-LANE

NEW ROADWAY CONSTRUCTION:		
ROADWAY WIDENING AND TAPER (ONE LANE)		$13,139,312.94
19,700	foot roadway length	
18	feet wide	
$667	per foot of length	
ROADWAY WIDENING AND TAPER (TWO LANE)		$2,000,910.60
1,800	foot roadway length	
30	feet wide	
$1,112	per foot of length	
DECK WIDENING		$468,000.00
60	foot roadway length	
12	feet wide	
720	square feet	
$650	per square foot of length	
0.5 Factor for Embank., Drainage		$7,570,111.77
	Subtotal:	$23,178,335.31
	Contingencies* (25%):	$5,794,583.83
	Total (2017):	**$28,972,919.14**
	Total (2020):	**$32,591,636.74**
	Total (2030):	**$48,239,910.36**
	Total (2040):	**$71,395,067.34**
FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION		
	P.E. Design (15%):	$4,345,937.87
	Construction Engineering (15%):	$4,345,937.87

* - Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

Location 2 -Intersection of Route 6A and Cranberry Highway

Cranberry Highway		$93,000.00
	4-lane Rd, no sidewalk	
300	foot roadway length	
58	feet wide	
$310	per foot of length	
Sandwich Road		$373,860.00
	2-lane Rd, 2 Sidewalks	
930	foot roadway length	
46	feet wide	
$402	per foot of length	
0.5 Factor for Embank., Drainage		$233,430.00
	Subtotal:	$466,860.00
	Contingencies* (25%):	$116,715.00
	Total (2017):	**$583,575.00**
	Total (2020):	**$656,463.52**
	Total (2030):	**$971,652.38**
	FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION	
	P.E. Design (15%):	$87,536.25
	Construction Engineering (15%):	$87,536.25

- Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

Location 3 - Intersection of Route 130 and Cotuit Road

Forestdale Rd		$222,200.00
	3-Lane Rd, no sidewalk	
1,010	foot roadway length	
46	feet wide	
$220	per foot of length	
Contuit Rd		$87,480.00
	Due to intersection widening and median, effectively a 3-lane with 2 sidewalks	
180	foot roadway length	
58	feet wide	
$486	per foot of length	
0.5 Factor for Embank., Drainage		$154,840.00
Traffic Control Signal		$300,000.00

Subtotal:	$764,520.00
Contingencies* (25%):	$191,130.00
Total (2017):	**$955,650.00**
Total (2020):	**$1,075,010.69**
Total (2030):	**$1,591,157.25**

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

P.E. Design (15%):	$143,347.50
Construction Engineering (15%):	$143,347.50

- Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

CAPE COD CANAL TRANSPORTATION STUDY
CONCEPTUAL ESTIMATES

Location 4 - Intersection of Sandwich Road and Bourne Rotary Connector

Old Sandwich Road		$184,680.00
	3-Lane, 2 sidewalks	
380	foot roadway length	
58	feet wide	
$486	per foot of length	
Bourne Rotary Connector		$376,650.00
	3-Lane, 2 sidewalks	
775	foot roadway length	
58	feet wide	
$486	per foot of length	
Sandwich Road		$228,420.00
	3-Lane, 2 sidewalks	
470	foot roadway length	
58	feet wide	
$486	per foot of length	
0.5 Factor for Embank., Drainage		$394,875.00
Traffic Control Signal		$300,000.00

Subtotal:	$1,484,625.00
Contingencies* (25%):	$371,156.25
Total (2017):	**$1,855,781.25**
Total (2020):	**$2,087,568.33**
Total (2030):	**$3,089,875.78**
Total (2040)	**$4,573,016.16**

FUTURE YEARS ASSUME A 4% ANNUAL COST ESCALATION

P.E. Design (15%):	$278,367.19
Construction Engineering (15%):	$278,367.19

- Contingencies may includes resource area mitigation, utility relocation, traffic management, retaining walls, etc.

Appendix F:

Preliminary Air Quality Evaluation

HMMH
77 South Bedford Street
Burlington, Massachusetts 01803
781.229.0707
www.hmmh.com

MEMORANDUM

To:	Michael Paiewonsky Stantec 226 Causeway Street, 6th Floor, Boston, MA 02114
From:	Philip DeVita, Principal Consultant
Date:	February 20, 2018
Subject:	Cape Cod Canal Transportation Improvements Study Preliminary Air Quality Evaluation
Reference:	HMMH Project Number 308230

This memorandum summarizes the methods and findings of the preliminary air quality evaluation conducted for the Cape Cod Canal Transportation Improvements Study. The evaluation was conducted based on the conceptual design of potential transportation improvements and future year (2040) traffic forecasts. As such, the study did not include roadway prediction modeling of air quality levels with the U.S. Environmental Protection Agency (EPA) and Federal Highway Administration (FHWA) approved air quality models. Instead, a more qualitative evaluation was conducted to assess the potential for increased or decreased air quality impacts within the study areas utilizing EPA and FHWA guideline criteria.

A detailed air quality study would be conducted during the preparation of an environmental document for future projects once the number of alternatives has been narrowed, and the alternatives selected for study have been refined. These future detailed air quality analysis' would evaluate existing and future air quality impacts associated with project roadways. Impacts will be assessed with respect to the methodologies and assumptions for each pollutant consistent with FHWA and EPA guidance as well as that of the Massachusetts Department of Transportation (MassDOT) and Massachusetts Department of Environmental Protection (MassDEP).

Preliminary Air Quality Evaluation Methodology

HMMH reviewed proposed roadway improvements in connection with four future Build scenarios under study, designated Cases 1, 2, 3 and 3A. Case 3A is considered to be the most complete improvement scenario, and includes the replacement of both the Bourne and Sagamore Bridges. Case 2 represents the complete mid-term improvements, including most of the improvements in Case 3A but without the replacement of the Canal bridges, the relocation of Route 6 Exit 1C, or the addition of an additional westbound travel lane on Route 6.

Consistent with the noise approach, Case 2 and Case 3A were chosen for the air quality assessment. Modeled traffic impacts were also reviewed for the summer and non-summer conditions for each Build Scenario. It was determined the worst-case conditions (i.e. higher traffic volumes) occur during the summer peak period which would correlate to higher (i.e. worst case) air quality impacts. Therefore, HMMH assumed worst-case summer peak period traffic conditions when evaluating Case 2 and Case 3A Alternatives.

Accordingly, a qualitative carbon monoxide (CO), Mobile Source Air Toxics (MSATs), greenhouse gas (GHG), and ozone precursor's volatile organic compounds (VOCs) and nitrogen oxides (NOx) analysis have been prepared. The EPA has designated the Project Area as being in attainment for all the National Ambient Air Quality Standards (NAAQS); therefore, transportation conformity requirements do not apply for this project.

Carbon Monoxide: Analysis for potential impacts for CO was conducted for the roadway and associated intersections that might be impacted by the project for the Existing, future No Build, Build Case 2, and Build Case 3A conditions. Typically, CO is used in microscale studies to indicate roadway pollutant levels since it is the most abundant pollutant emitted by motor vehicles and can result in so-called "hot spot" (high concentration) locations around congested intersections.

Comparison of average daily peak hour (AM and PM) volumes and Level of Service (LOS) along with expected delay and vehicle hours traveled (VHT) at each intersection were conducted for each Alternative and are included in Table 1. A total of twelve intersections were included in the analysis, which were comprised of both existing and future intersections.

Analysis of Table 1 shows that, in general, the LOS for the Peak AM and PM conditions either stay the same or is worse for Case 2 and Case 3A when compared to the future No Build conditions. Similarly, the intersection Peak AM and PM delay, peak volumes and VHT also generally increased for the two Build Alternatives compared to the No Build conditions. There were only a few intersections where the LOS, peak hourly volumes and delay were expected to improve with the Build Conditions compared to the No build. Those intersections were:

1. Forestdale Rd & Route 6 EB Ramps Exit 2
2. Forestdale Rd & Route 6 WB Ramps Exit 2
3. Mid-Cape Connector & Sandwich Rd

The Market Basket Drive & Mid-Cape Connector intersection is also expected to show a slight VHT improvement for the AM condition only under Case 3A as well as the Canal Road & Scenic Hwy/Meetinghouse Lane intersection where a reduction in VHT is expected in the PM only under Case 2. All the remaining intersections are expected to either remain the same or result in a higher LOS, delay and VHT compared to the No Build Alternative. It should also be noted that the total VHT for all the intersections for each Build Alternative are expected to increase compared to the Existing and Future No Build Alternative, with the highest increases expected during the peak PM hours and lower increases in the AM peak hours. Figure 1 shows a comparison of the total peak AM and PM VHT for each Alternative.

Intersection selection criteria for a microscale analysis is typically based on a Level of Service ("LOS") D where the project increases traffic volumes by ten percent or greater, or if the intersection operates at LOS E or F and the project degrades conditions at the location. As is shown in Table 1, there are numerous intersections were the LOS is E or F and the project either increases the traffic volumes by ten percent or greater or the project degrades the conditions at the intersection via increase vehicles and delay.

In summary, it can therefore reasonably be concluded the Project Alternatives could increase traffic volumes and delay at most of the 12 intersections evaluated compared to the No Build Alternative, which could result in an increase of CO emissions compared to the No Build Alternative. A quantitative microscale analysis for the worst-case intersections would be conducted during the preparation of the final environmental document to determine if the project would significantly impact air quality and demonstrate compliance with the CO air quality standards.

Table 1 Summer Peak Hour Traffic for Each Alternative

Summer AM Peak Period	Existing				Future No Build				Case 2						Case 3e					
Signalized Intersections	Control Delay	Volume	VHT	LOS	Control Delay	Volume	VHT	LOS	Control Delay	Volume	Volumes Percent Change	VHT	Build - No Build VHT	LOS	Control Delay	Volume	Volumes Percent Change	VHT	Build -No Build VHT	LOS
Forestdale Rd & Rte 6 EB Ramps Exit 2	13.7	1790	6.8	A	32.9	2215	20.2	C	41.1	2210	-0.2	25.2	5.0	C	39.6	2205	-0.5	24.3	4.0	C
Forestdale Rd & Rte 6 WB Ramps Exit 2	18.2	1435	7.3	A	17.1	1650	7.8	A	20	1615	-2.1	9.0	1.1	A	19.9	1615	-2.1	8.9	1.1	A
Tupper Rd & Rte 6A	17.7	980	4.8	A	18.8	1140	6.0	A	19.8	1235	8.3	6.8	0.8	A	19.9	1210	6.1	6.7	0.7	A
Andy Olivia/Nightingale Pond Rd & Scenic Hwy	8.1	2655	6.0	A	12.8	3115	11.1	B	63	3625	16.4	63.4	52.4	E	62.4	3615	16.1	62.7	51.6	E
Canal Rd & Scenic Hwy/Meetinghouse Ln	31.6	1615	14.2	B	54.3	1960	29.6	C	94.1	2275	16.1	59.5	29.9	E	101.3	2315	18.1	65.1	35.6	E
Trowbridge Rd & Veteran's Way	--	--	--	--	--	--	--	--	14.5	1155	1155.0	4.7	4.7	A	7.3	800	800.0	1.6	1.6	A
Mid-Cape Connector & Sandwich Rd	20.5	2135	12.2	B	23	2565	16.4	B	19.4	2245	-12.5	12.1	-4.3	B	19.8	2280	-11.1	12.5	-3.8	B
Market Basket Dr & Mid-Cape Connector	10.6	1290	3.8	A	19.5	1545	8.4	A	18.9	1585	2.6	8.3	0.0	A	15.4	1640	6.1	7.0	-1.4	A
Scenic Highway & Connector Road to Belmont Roundabout	--	--	--	--	--	--	--	--	191.9	3715	3715.0	198.0	198.0	F	195.8	3705	3705.0	201.5	201.5	F
Bourne Rotary Connector & Sandwich Rd	--	--	--	--	--	--	--	--	0.5	2185	2185.0	0.3	0.3	A	10.4	2525	2525.0	7.3	7.3	A
Route 3 EB on-ramp/Church Ln & Scenic Hwy	19.5	2000	10.8	B	21.1	2360	13.8	B	22.2	2970	25.8	18.3	4.5	B	22	3010	27.5	18.4	4.6	B
Old Sandwich Rd & Veteran's Way	--	--	--	--	--	--	--	--	16.1	1090	1090.0	4.9	4.9	A	19.2	1540	1540.0	8.2	8.2	A
Total VHT			65.8				113.3					410.5						424.3		

Summer PM Peak Period	Existing				Future No Build				Case 2						Case 3e					
Signalized Intersections	Control Delay	Volume	VHT	LOS	Control Delay	Volume	VHT	LOS	Control Delay	Volume	Volumes Percent Change	VHT	No Build VHT	LOS	Control Delay	Volume	Volumes Percent Change	VHT	Build -No Build VHT	LOS
Forestdale Rd & Rte 6 EB Ramps Exit 2	19.8	2050	11.3	B	260.8	2675	198.8	F	311.6	2700	0.9	233.7	38.9	F	327.7	2710	1.3	246.7	52.9	F
Forestdale Rd & Rte 6 WB Ramps Exit 2	25.4	1625	11.5	B	25.4	1885	13.3	B	56.8	1905	1.1	30.1	16.8	C	52.6	1895	0.5	27.7	14.4	C
Tupper Rd & Rte 6A	24.1	1715	11.5	B	55	2125	32.5	C	63.8	2170	2.1	38.5	6.0	D	66.4	2160	1.6	39.8	7.4	D
Andy Olivia/Nightingale Pond Rd & Scenic Hwy	9.7	3060	8.2	A	127.2	4095	144.7	F	229.5	4445	8.9	285.1	138.4	F	219.1	4395	7.3	267.5	122.8	F
Canal Rd & Scenic Hwy/Meetinghouse Ln	102.8	1830	52.3	D	227.2	2670	168.5	F	186.7	2765	3.6	143.4	-25.1	F	249.4	2920	9.4	202.3	33.8	F
Trowbridge Rd & Veteran's Way	--	--	--	--	--	--	--	--	14.6	1170	1170.0	4.7	4.7	A	9.7	695	695.0	1.9	1.9	A
Mid-Cape Connector & Sandwich Rd	26.2	2720	19.8	B	61.4	3360	57.3	E	27.7	3015	-10.3	23.2	-34.1	C	60.3	3145	-6.4	52.7	-4.6	D
Market Basket Dr & Mid-Cape Connector	14.8	1325	5.4	A	39.8	1955	21.6	C	48.9	2085	6.6	28.3	6.7	C	50.7	2250	15.1	31.7	10.1	C
Scenic Highway & Connector Road to Belmont Roundabout	--	--	--	--	--	--	--	--	199.9	4075	4075.0	226.3	226.3	F	184.4	4030	4030.0	206.4	206.4	F
Bourne Rotary Connector & Sandwich Rd	--	--	--	--	--	--	--	--	1.5	2920	2920.0	1.2	1.2	A	27.1	3520	3520.0	26.5	26.5	C
Route 3 EB on-ramp/Church Ln & Scenic Hwy	19.1	2420	12.8	B	33.4	3265	30.3	C	52.5	3720	13.9	54.3	24.0	D	51.3	3880	18.8	55.3	25.0	E
Old Sandwich Rd & Veteran's Way	--	--	--	--	--	--	--	--	15.9	1430	1430.0	6.3	6.3	A	10.8	2105	2105.0	6.3	6.3	A
Total VHT			132.8				662.0					1073.1						1164.8		

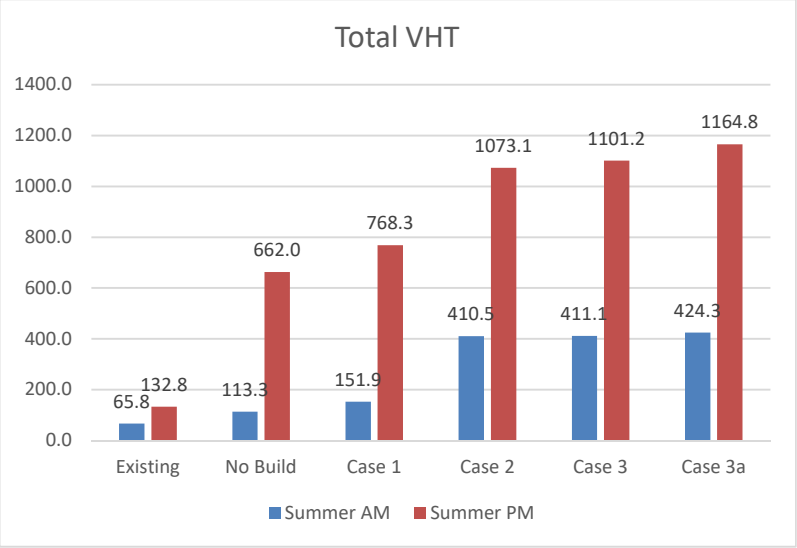


Figure 1 Total Peak Hour VHT for Each Alternative

Mobile Source Air Toxics: The analysis qualitatively evaluated potential impacts from Mobile Source Air Toxics (MSATs) in the Study Area. As the Build Alternatives are not anticipated to add significant capacity to the existing and/or proposed new roadway networks, where design year traffic is projected to be 140,000 to 150,000 annual average traffic (AADT) or greater, the Build Alternatives are best characterized as ones with "Low Potential MSAT Effects" under the 2016 FHWA interim guidance update document[1].

For each alternative, the amount of MSATs emitted would be proportional to the vehicle miles traveled (VMT) which is a function of distance and average daily traffic (ADT), assuming that other variables such as fleet mix are the same for each Alternative. As shown in Table 2, the ADT estimated for each of the Build Alternatives is slightly higher than that for the No Build Alternative, because the additional capacity increases the efficiency of the roadway and attracts rerouted trips from elsewhere in the transportation network. The increase in ADT, which will result in an increase in VMT, would lead to overall higher MSAT emissions in the study area for the Build Alternatives, however as shown in the Table 2, there may be localized areas where VMT would increase and other areas where VMT would decrease. Therefore, it is possible that localized increases and decreases in MSAT emissions may occur for both Build Alternatives. For example, the localized increases in MSAT emissions would likely be most pronounced along the Bourne Bridge, sections of Route 3, sections of Route 6, Route 25, Route 28, and Route 130, the Bourne Bridge Off-ramp to Belmont Circle, and the mid Cape Connector on ramp to Route 6 EB.

MSAT decreases could be expected but not limited to areas along the Sagamore Bridge, portions of Route 3 southbound, portions of Sandwich Road and Adams Street, Belmont Circle, portions of Route 25 and Route 6, portions of Main Street, Herring Pond Onramp, Cranberry Highway On-Ramp, Maple Springs Road Onramp, Route 25 EB Off Ramp, and Scenic Highway Westbound Onramp. The emissions increase may be offset somewhat by lower MSAT emission rates due to increased speeds according to the EPA MOVES2014 model where emissions of all the priority MSATs decrease as speed increases.

[1] https://www.fhwa.dot.gov/environMent/air_quality/air_toxics/policy_and_guidance/msat/

Table 2 Summer Adjusted ADT for Each Alternative

ATR Counting Stations	Summer 2014 Summer Adjusted ADT	Future No Build Summer Summer Adjusted ADT	2040 Build - Case 2: ADT Volumes Summer Adjusted ADT	Delta Change - Case 2 vs Future No Build	2040 Build - Case 3A: ADT Volumes Summer Adjusted ADT	Delta Change - Case 3A vs Future No Build
Bourne Bridge	56,500	61,600	69,600	8,000	72,900	11,300
Sagamore Bridge	65,900	93,300	88,700	-4,600	85,300	-8,000
Route 3 SB Off Ramp To Herring Pond Road	4,600	7,900	6,200	-1,700	6,300	-1,600
Route 3 SB Off Ramp To Scenic Highway	3,400	5,000	7,700	2,700	7,700	2,700
Route 3 between Exits 1A and 2	46,500	72,400	79,000	6,600	77,500	5,100
Route 6 Between Exits 1 & 2	72,300	90,600	91,700	1,100	92,400	1,800
Route 25 west of Exit 2	62,900	78,900	84,800	5,900	85,000	6,100
Route 25 east of Exit 2	24,500	26,200	32,800	6,600	33,000	6,800
Route 6A East of Tupper Road	12,400	15,100	14,700	-400	14,400	-700
Route 6 (Scenic Hwy) east of Nightingale Rd	33,600	36,200	47,900	11,700	47,500	11,300
Sandwich Rd East of Bourne Rotary Connector	30,800	33,400	31,100	-2,300	32,200	-1,200
Sandwich Road west of Jillian Drive	31,200	34,600	33,200	-1,400	34,300	-300
Sandwich Road East of Adams Street	11,700	14,900	15,700	800	15,100	200
Adams Street South of Sandwich Road	7,600	11,800	1,100	-10,700	1,000	-10,800
Belmont Circle On Ramp to Bourne Bridge	8,600	11,800	10,300	-1,500	10,200	-1,600
Belmont Circle On Ramp to Route 25 WB	12,100	12,200	3,400	-8,800	3,400	-8,800
Bourne Bridge Off Ramp to Belmont Circle	7,200	7,100	11,700	4,600	12,600	5,500
Buzzards Bay Bypass	7,900	8,800	8,500	-300	8,600	-200
Cranberry Highway On Ramp to Route 6 WB	6,500	11,100	7,000	-4,100	6,100	-5,000
Glen Charlie Road On Ramp to Route 25 EB	2,200	2,000	2,400	400	2,500	500
Main Street West of Perry Avenue	25,600	28,500	26,800	-1,700	26,800	-1,700
Mid-Cape Connector South of Sandwich Rd	19,100	28,500	30,100	1,600	32,600	4,100
Route 151 On Ramp to Route 28 NB		5500	6800	1,300	6800	1,300
Route 151 On Ramp to Route 28 SB		1,600	2,400	800	2,300	700
Route 28 NB Off Ramp to Route 151		600	1500	900	1500	900
Route 28 SB Off Ramp to Route 151		5500	7300	1,800	7300	1,800
Route 25 EB Off Ramp to Belmont Circle	9,000	11,200	13,500	2,300	11,900	700
Route 25 EB Off Ramp to Maple Springs Rd	7,300	14,800	11,300	-3,500	11,000	-3,800
Route 3 NB Off Ramp to Herring Pond Road	1,800	3,100	3,700	600	3,700	600
Route 6 EB Off Ramp to Mid-Cape Connector	5,900	8,600	8,600	0	8,100	-500
Route 6 EB Off Ramp to Quaker Meeting House Rd	1,300	1,700	1,700	0	1,800	100
Route 6 EB Off Ramp to Route 130	7,000	15,700	19,600	3,900	20,000	4,300
Route 6 WB Off Ramp to Cranberry Hwy	5,500	3,800	4,400	600	4,500	700
Route 6 WB Off Ramp to Meetinghouse Lane EB	4,700	4,500	4,600	100	4,600	100
Route 6 WB Off Ramp to Quaker Meetinghouse Rd	1,000	2,300	1,600	-700	1,600	-700
Route 6 WB Off Ramp to Route 130	2,200	2,000	2,000	0	1,900	-100
Route 6 WB Off Ramp to Scenic Hwy WB	11,800	13,400	13,800	400	13,800	400
Herring Pond Road On Ramp to Route 3 NB	4,400	5,500	5,700	200	5,600	100
Herring Pond Road On Ramp to Route 3 SB	2,500	7,800	6,700	-1,100	6,700	-1,100
Maple Springs Rd On Ramp to Route 25 WB	6,900	11,000	8,900	-2,100	9,000	-2,000
Mid Cape Connector On Ramp to Route 6 EB	12,500	12,500	13,500	1,000	16,000	3,500
Quaker Meeting House Rd On Ramp to 6 EB	2,700	4,400	3,900	-500	3,800	-600
Quaker Meeting House Rd On Ramp to Route 6 WB	1,000	1,100	1,600	500	1,600	500
Route 130 North of Route 6	12,200	12,500	11,300	-1,200	11,400	-1,100
Route 130 On Ramp to Route 6 EB	2300	1800	1400	-400	1400	-400
Route 130 South of Route 6	24,500	28,600	32,300	3,700	32,200	3,600
Route 130 On Ramp to Route 6 WB	9,400	12,300	15,300	3,000	15,100	2,800
Scenic Hwy EB On Ramp to Sagamore Bridge	9400	11100	9900	-1,200	8100	-3,000
Scenic Hwy WB On Ramp to Sagamore Bridge	3600	6700	4000	-2,700	3800	-2,900
State Road North of Ramp to Route 3 NB	5700	8200	8300	100	8400	200
Trowbridge Road West of Veterans Way	7300	12000	10100	-1,900	4400	-7,600
NEW Belmont Circle On Ramp to Route 25 WB				0		0
	Totals	921,700	940,100	18,400	935,700	14,000
	Change		1.99		1.52	

Regardless of the option chosen, emissions will likely be lower than present levels in the design year as a result of EPA's national control programs that are projected to reduce annual MSAT emissions by over 90 percent 2010 and 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases.

Mesoscale Analysis: A mesoscale analysis is typically performed to calculate the potential regional air quality impact of the project using as a measure the total daily emissions of volatile organic compounds (VOCs) and oxides of nitrogen (NOx) within the project area. Calculations are typically performed to compare area-wide emissions for future Build scenarios with the Existing and future No-Build conditions. Typically, emission factors for each pollutant are generated for each roadway link using the EPA emission models based on vehicle miles traveled, vehicle speeds and other roadway data relative to the Project. Table 2 shows the summer adjusted ADT for the Existing, future No Build and Build Alternatives affected links. As discussed above in the MSAT section, Summer ADT is expected to slightly increase with the Build Alternatives compared to the future No-Build Alternative. As a result, overall emissions of VOCs and NOx could also slightly increase with the Build Alternatives. Similar to the MSAT analysis, there are localized areas where increases and decreases could occur and some increases may be mitigated due to increased vehicle speeds. Given the relatively small expected ADT increase associated with the Build Alternatives of approximately 2.0 percent and 1.5 percent relative to the total VMT's in the region, it is unlikely that this portion of the project would result in a substantial change in emissions or any subsequent direct or indirect impacts to the mesoscale analysis. A quantitative mesoscale analysis will be conducted during the preparation of the final environmental document, once the number of alternatives has been narrowed, and the alternatives selected for study have been refined.

Greenhouse Gases: The transportation system is a critical component of the Commonwealth of Massachusetts' infrastructure and contributes over one third of the Bay State's greenhouse gas (GHG) emissions. The Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA), in consultation with other state agencies and the public, released the Massachusetts Clean Energy and Climate Plan for 2020. This implementation plan establishes targets for overall, statewide GHG emissions:

- By 2020, 20 percent reduction below statewide 1990 GHG emission levels;
- By 2050, 80 percent reduction below statewide 1990 GHG emission levels

In 2010, the Massachusetts Department of Transportation (MassDOT) responded to these challenges by launching the GreenDOT Policy. GreenDOT was developed to reduce GHG emissions, improving public health, and leading on environmental stewardship. In addition, Executive Orders 484 *Leading by Example* and 515 *Environmental Purchasing Policy*, require state agencies to invest public resources in ways that support environmental sustainability by conserving energy and water, implementing efficiency measures, and producing or purchasing renewable energy. Taken together, these acts and policies form the foundation for the GreenDOT Policy. The GreenDOT Policy Directive, released in June 2010, set forth the primary goals of reducing GHG emissions; promoting the healthy transportation modes of walking, bicycling, and public transit; and supporting smart growth development. The Cape Cod Regional Transportation Plan (RTP) reflects the vision of the GreenDOT Policy with the Multimodal Options/Healthy Transportation Goal, including a *Performance Measure* reflecting the state Mode Shift Goal. The Cape Cod Commission conducted a GHG analysis as part of the 2016 Regional Transportation Plan[2]. Anticipated GHG impacts from nine specific regional target projects were conducted. Two of those projects, 1) Belmont Circle/Route 25 Ramp Improvements and 2) Route 6 Exit 1C reconfiguration were included in the GHG analysis. The results of the anticipated GHG impacts from these two projects were documented as "quantified decrease in emissions from traffic operation improvement-to be verified by statewide modeling". Similarly, any increase or decreases in GHG emissions for the Build

[2] http://www.capecodcommission.org/resources/transportation/rtp/2016/FinalReport/Appendices/RTP%20Appendix%20N%20-%20Greenhouse%20Gas%20Analysis%20(Endorsed%207-20-15).pdf

Alternatives would need to be quantified in the final environmental document to account for VMT and vehicle speeds for the Build Alternatives compared to the No Build.



Appendix G:

Preliminary Noise Evaluation

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MEMORANDUM

To: Michael Paiewonsky, Stantec

From: Christopher Menge

Date: November 16, 2017

Subject: Cape Cod Canal Transportation Improvements Study
Preliminary Noise Evaluation

Reference: HMMH Project No. 308230

This memorandum summarizes the methods and findings of the preliminary noise evaluation conducted for the Cape Cod Canal Transportation Improvements Study. The noise evaluation was conducted with preliminary information about the potential location of future roadways and preliminary traffic forecasts. As such, the study did not include roadway modeling, prediction of noise levels with the Traffic Noise Model or noise impact assessment per the FHWA Noise Abatement Criteria. Instead, a more qualitative evaluation was conducted to assess the potential for increased noise levels in the noise-sensitive residential neighborhoods in the study areas.

A detailed noise study will be conducted during the preparation of the final environmental document for this project, once the number of alternatives has been narrowed, and the alternatives selected for study have been refined. This future detailed noise analysis will predict existing and future noise levels and impact associated with project roadways. Impact will be assessed with respect to the FHWA Noise Abatement Criteria, which are absolute sound levels above which noise impact is assessed and for which noise abatement must be considered. Impact will also be assessed with respect to relative criteria – identifying any areas with Substantial Increases in existing noise levels. In that study, where future Build case noise impact is identified noise abatement will be considered, and evaluated for feasibility and cost-reasonableness.

Preliminary Noise Evaluation Methodology

HMMH reviewed proposed roadway improvements in connection with four future Build scenarios under study, designated Cases 1, 2, 3 and 3a. Case 3a is considered to be the most complete long-term improvements scenario, and includes the replacement of both the Bourne and Sagamore Bridges. Case 2 represents mid-term improvements, including most of the improvements in Case 3a but without the replacement of the Canal bridges. Therefore, HMMH focused on evaluating these two cases to provide evaluations of worst-case potential increases in noise levels as well as a mid-term improvement scenario.

FHWA and MassDOT regulations and policies require noise assessments to evaluate future equivalent (L_{eq}) noise levels (in dBA) during the loudest hour of the day. To address these conditions, HMMH examined the traffic projections provided by Stantec for the non-summer weekday AM and PM peak hours and for the summer Saturday peak hour. The volumes were provided for the Existing year of 2014 and forecast to 2040 for the Build cases. For roads near noise-sensitive (mostly residential) areas, the Existing year peak-hour volumes were compared to the 2040 volumes for the same roadways in Cases 2 and 3a. Then, the sound level increase in decibels based on volumes alone was computed with the following equation:

$$Incr = 10 \times \log(\frac{V_{2040}}{V_{2014)}}), \qquad \text{where}$$

V_{2014} is the existing 2014 volume, and V_{2040} is the 2040 design-year Build case volume. This simple computation assumes three factors are not changing – speed, truck mix and distance to the nearest noise-sensitive properties. Those assumptions are reasonable for nearly all areas, but distances would be different in some areas where the roadways would be moved. That is particularly significant in Case 3a with Route 28 being relocated to the east, north and south of the Bourne Rotary. In those areas, the change in distance was accounted for with a customary sound propagation equation.

The increases in the hourly L_{eq} sound level from the 2014 Existing to 2040 Build conditions were computed for all three peak hours for Cases 2 and 3a. The range of increases and the peak hour with the highest increase are reported for the areas near residential land use. For reference, a sound level increase of 3 decibels (dB) or less is considered to be generally not noticeable under most circumstances. An increase of 5 dB is considered to be generally noticeable in a community setting. An increase of 10 dB is perceived by most people as about twice as loud. Also, MassDOT noise policy considers an increase of 10 dB or more above existing noise levels to be a "Substantial Increase." This is considered to be a relative noise impact that would require consideration of abatement in a final environmental document.

Results

Table 1 lists average or ranges of predicted L_{eq} sound level increases for the three peak hours from the Existing 2014 case traffic to the 2040 Build condition for Cases 2 and 3a. The average increase is shown where the range is small. Each row shows the information for one roadway that has some noise-sensitive land use adjacent to it. Most of that land use is single-family residential homes. The roadways in each project area are grouped together.

The predicted sound level increases are small for most roadways, generally less than 3 decibels, and would be expected to be generally not noticeable. However, due to expected changes in traffic patterns, the Head of the Bay road adjacent to Belmont Circle is predicted to experience up to four-fold increases in traffic volumes in both Cases 2 and 3a, which would result in increases up to six decibels. These are expected to be readily noticeable, but not approach a Substantial Increase per MassDOT policy.

The communities potentially most affected by proposed changes at the Bourne Rotary are west of Route 28, north and south of the rotary. Small increases of up to one decibel are predicted from Route 28 traffic in Case 2, which proposes minor improvements to the rotary. In Build Case 3a, however, the Bourne Bridge (carrying Rt. 28) would be replaced with a structure to the east, which would increase the distance from the bridge to the community to the west. The rotary itself would be replaced by a grade-separated (fly-over) interchange. The proposed re-alignment of Route 28 to the east of the existing roadway would also increase the distance to the homes and Bourne Middle School and fields to the west. These roadway shifts away from the communities would compensate for the predicted increases in traffic such that north of the rotary, a decrease of up to two decibels from Route 28 traffic noise is predicted, and south of the rotary, no change or a very small change in sound levels is expected.

The two far-right columns in Table 1 show the peak hour during which the highest sound level increase is predicted to occur. That part of the table clearly shows that the summer weekday PM peak hour is the period during which most of the highest increases are expected. There are a small

number of roadways where the Saturday peak hour would have a higher Build case increase over Existing.

While absolute noise levels were not computed in this preliminary evaluation, the potential for existing and future absolute noise impact from noise levels exceeding the FHWA Noise Abatement Criteria exists primarily in the yards of the first row of homes adjacent to project roadways. Absolute noise levels and associated impact will be addressed in the detailed noise study to be conducted for the final environmental document.

Table 1 Predicted Increases in Peak Hour Noise Levels from Project Roadways from Existing 2014 to Future 2040 Build Case Conditions

Project Area	Community Area (Residences unless otherwise indicated)	Increases over Existing L_{eq} among three peak hours (decibels)		Build Peak Hour with Highest Increase over the Existing L_{eq}	
		Case 2	Case 3a	Case 2	Case 3a
Rt 6 Additional EB lane	North and south of Route 6, east of Exit 2	0 to 1	0 to 1	PM	PM
	North of Route 6, west of Exit 2	1	1	PM	PM
	North of Route 6, west of Exit 1C	1	1	Sat	PM
Exit 1C Roundabout	Rt. 6A east of roundabout	1 to 3	1 to 3	PM/Sat	Sat
	Main St SE of roundabout	1	1	PM	PM
Bourne Rotary	West of the Bourne Bridge opposite Rt. 28, North of the Rotary	0 to 1	minus 1 to minus 2 (road shifts away)	PM	PM
	Homes and Bourne Middle School fields west of Rt. 28, south of the rotary	1/2 to 1	no change (road shifts away)	Sat	Sat
Belmont Circle	Nightingale Rd, east of Rt. 28	1 to 2	2	PM	PM
	Head of the Bay Road	4 to 6	4 to 6	PM	PM

Source: HMMH, 2017

Appendix H:
Traffic Analysis Reports

Short-Term Intersections

Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	375	10	525	425	5	295
Future Volume (vph)	375	10	525	425	5	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.996					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1855	0	1770	1863	1770	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1855	0	1770	1863	1770	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1449			900	376	
Travel Time (s)	32.9			20.5	8.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	408	11	571	462	5	321
Shared Lane Traffic (%)						
Lane Group Flow (vph)	419	0	571	462	5	321
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 62.8%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	375	10	525	425	5	295
Future Volume (Veh/h)	375	10	525	425	5	295
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	408	11	571	462	5	321
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			419		2018	414
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			419		2018	414
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			50		84	50
cM capacity (veh/h)			1140		32	639

Direction, Lane #	NB 1	SB 1	SB 2	NW 1	NW 2
Volume Total	419	571	462	5	321
Volume Left	0	571	0	5	0
Volume Right	11	0	0	0	321
cSH	1700	1140	1700	32	639
Volume to Capacity	0.25	0.50	0.27	0.16	0.50
Queue Length 95th (ft)	0	72	0	12	71
Control Delay (s)	0.0	11.3	0.0	137.1	16.2
Lane LOS		B		F	C
Approach Delay (s)	0.0	6.2		18.0	
Approach LOS				C	

Intersection Summary			
Average Delay	6.9		
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	7

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	375	10	525	425	5	295
Future Vol, veh/h	375	10	525	425	5	295
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	408	11	571	462	5	321

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	418	0	2016	413
Stage 1	-	-	-	-	413	-
Stage 2	-	-	-	-	1603	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1141	-	64	639
Stage 1	-	-	-	-	668	-
Stage 2	-	-	-	-	181	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1141	-	32	639
Mov Cap-2 Maneuver	-	-	-	-	32	-
Stage 1	-	-	-	-	668	-
Stage 2	-	-	-	-	90	-

Approach	NB	SB	NW
HCM Control Delay, s	0	6.2	18.3
HCM LOS			C

Minor Lane/Major Mvmt	NBT	NBR	NWLn1	NWLn2	SBL	SBT
Capacity (veh/h)	-	-	32	639	1141	-
HCM Lane V/C Ratio	-	-	0.17	0.502	0.5	-
HCM Control Delay (s)	-	-	139.2	16.2	11.3	-
HCM Lane LOS	-	-	F	C	B	-
HCM 95th %tile Q(veh)	-	-	0.5	2.8	2.9	-

Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	365	10	355	370	10	445
Future Volume (vph)	365	10	355	370	10	445
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.996					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1855	0	1770	1863	1770	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1855	0	1770	1863	1770	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1449			900	376	
Travel Time (s)	32.9			20.5	8.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	397	11	386	402	11	484
Shared Lane Traffic (%)						
Lane Group Flow (vph)	408	0	386	402	11	484
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 54.0%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	365	10	355	370	10	445
Future Volume (Veh/h)	365	10	355	370	10	445
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	397	11	386	402	11	484
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			408		1576	402
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			408		1576	402
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			66		86	25
cM capacity (veh/h)			1151		80	648

Direction, Lane #	NB 1	SB 1	SB 2	NW 1	NW 2
Volume Total	408	386	402	11	484
Volume Left	0	386	0	11	0
Volume Right	11	0	0	0	484
cSH	1700	1151	1700	80	648
Volume to Capacity	0.24	0.34	0.24	0.14	0.75
Queue Length 95th (ft)	0	37	0	11	167
Control Delay (s)	0.0	9.7	0.0	56.9	25.1
Lane LOS		A		F	D
Approach Delay (s)	0.0	4.8		25.8	
Approach LOS				D	

Intersection Summary			
Average Delay	9.8		
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	9.7

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	365	10	355	370	10	445
Future Vol, veh/h	365	10	355	370	10	445
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	397	11	386	402	11	484

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	408	0	1576	402
Stage 1	-	-	-	-	402	-
Stage 2	-	-	-	-	1174	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1151	-	121	648
Stage 1	-	-	-	-	676	-
Stage 2	-	-	-	-	294	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1151	-	80	648
Mov Cap-2 Maneuver	-	-	-	-	80	-
Stage 1	-	-	-	-	676	-
Stage 2	-	-	-	-	195	-

Approach	NB	SB	NW
HCM Control Delay, s	0	4.7	25.8
HCM LOS			D

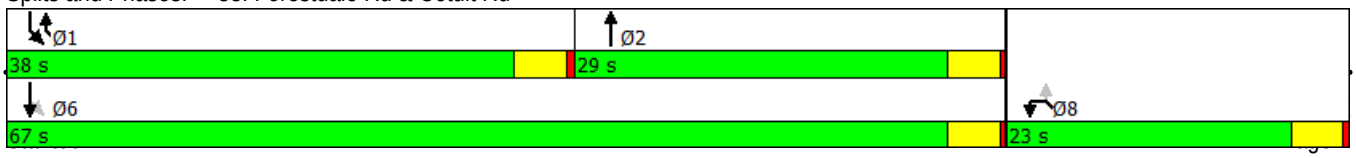
Minor Lane/Major Mvmt	NBT	NBR	NWLn1	NWLn2	SBL	SBT
Capacity (veh/h)	-	-	80	648	1151	-
HCM Lane V/C Ratio	-	-	0.136	0.746	0.335	-
HCM Control Delay (s)	-	-	57	25.1	9.7	-
HCM Lane LOS	-	-	F	D	A	-
HCM 95th %tile Q(veh)	-	-	0.4	6.7	1.5	-

Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	475	10	635	500	5	375
Future Volume (vph)	475	10	635	500	5	375
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.997					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1857	0	1770	1863	1770	1583
Flt Permitted			0.217		0.950	
Satd. Flow (perm)	1857	0	404	1863	1770	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					92
Link Speed (mph)	30			30	30	
Link Distance (ft)	1449			900	376	
Travel Time (s)	32.9			20.5	8.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	516	11	690	543	5	408
Shared Lane Traffic (%)						
Lane Group Flow (vph)	527	0	690	543	5	408
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	100		20	100	20	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	6		20	6	20	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases			6			8
Detector Phase	2		1	6	8	1
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0

Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Minimum Split (s)	20.0		8.0	20.0	20.0	8.0
Total Split (s)	29.0		38.0	67.0	23.0	38.0
Total Split (%)	32.2%		42.2%	74.4%	25.6%	42.2%
Maximum Green (s)	25.0		34.0	63.0	19.0	34.0
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	0.5		0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0		4.0	4.0	4.0	4.0
Lead/Lag	Lag		Lead			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		None	Min	None	None
Walk Time (s)	5.0			5.0	5.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	25.6		55.2	58.6	5.9	27.2
Actuated g/C Ratio	0.42		0.91	0.96	0.10	0.45
v/c Ratio	0.68		0.74	0.30	0.03	0.54
Control Delay	23.3		12.2	1.1	30.2	11.4
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	23.3		12.2	1.1	30.2	11.4
LOS	C		B	A	C	B
Approach Delay	23.3			7.3	11.7	
Approach LOS	C			A	B	
Queue Length 50th (ft)	146		79	0	2	75
Queue Length 95th (ft)	#418		299	70	12	135
Internal Link Dist (ft)	1369			820	296	
Turn Bay Length (ft)						
Base Capacity (vph)	779		1145	1791	564	983
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	0.68		0.60	0.30	0.01	0.42

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 60.9			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 12.0		Intersection LOS: B	
Intersection Capacity Utilization 74.1%		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.			

Splits and Phases: 33: Forestdale Rd & Cotuit Rd



Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	475	10	635	500	5	375
Future Volume (vph)	475	10	635	500	5	375
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1857		1770	1863	1770	1583
Flt Permitted	1.00		0.22	1.00	0.95	1.00
Satd. Flow (perm)	1857		404	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	516	11	690	543	5	408
RTOR Reduction (vph)	1	0	0	0	0	54
Lane Group Flow (vph)	526	0	690	543	5	354
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases			6			8
Actuated Green, G (s)	25.7		55.2	55.2	1.0	26.5
Effective Green, g (s)	25.7		55.2	55.2	1.0	26.5
Actuated g/C Ratio	0.40		0.86	0.86	0.02	0.41
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	743		889	1601	27	752
v/s Ratio Prot	0.28		c0.31	0.29	0.00	c0.19
v/s Ratio Perm			c0.36			0.04
v/c Ratio	0.71		0.78	0.34	0.19	0.47
Uniform Delay, d1	16.1		9.6	0.9	31.2	13.7
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1		4.3	0.1	3.3	0.5
Delay (s)	19.2		13.9	1.0	34.5	14.2
Level of Service	B		B	A	C	B
Approach Delay (s)	19.2			8.2	14.5	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	64.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	475	10	635	500	5	375
Future Volume (veh/h)	475	10	635	500	5	375
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1863
Adj Flow Rate, veh/h	516	11	690	543	5	408
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	560	12	740	1319	341	858
Arrive On Green	0.31	0.31	0.35	0.71	0.19	0.19
Sat Flow, veh/h	1817	39	1774	1863	1774	1583
Grp Volume(v), veh/h	0	527	690	543	5	408
Grp Sat Flow(s),veh/h/ln	0	1856	1774	1863	1774	1583
Q Serve(g_s), s	0.0	21.9	24.3	9.6	0.2	12.7
Cycle Q Clear(g_c), s	0.0	21.9	24.3	9.6	0.2	12.7
Prop In Lane		0.02	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	572	740	1319	341	858
V/C Ratio(X)	0.00	0.92	0.93	0.41	0.01	0.48
Avail Cap(c_a), veh/h	0	580	874	1468	422	930
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	26.7	18.2	4.8	26.2	11.3
Incr Delay (d2), s/veh	0.0	20.1	15.1	0.2	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	14.3	17.5	4.9	0.1	5.6
LnGrp Delay(d),s/veh	0.0	46.9	33.3	5.0	26.2	11.7
LnGrp LOS		D	C	A	C	B
Approach Vol, veh/h	527			1233	413	
Approach Delay, s/veh	46.9			20.9	11.9	
Approach LOS	D			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	32.0	28.6				60.6		19.4
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	34.0	25.0				63.0		19.0
Max Q Clear Time (g_c+I1), s	26.3	23.9				11.6		14.7
Green Ext Time (p_c), s	1.7	0.7				9.2		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	25.5
HCM 2010 LOS	C

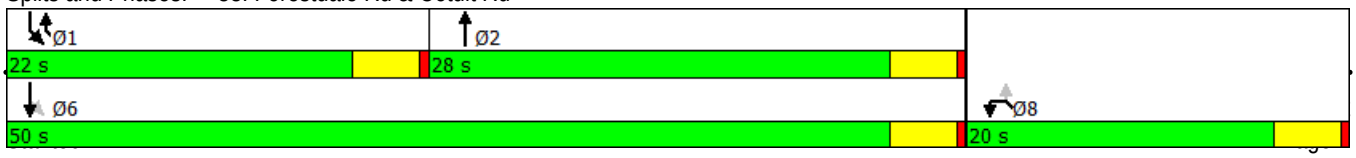
Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	485	10	445	400	10	525
Future Volume (vph)	485	10	445	400	10	525
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.997					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1857	0	1770	1863	1770	1583
Flt Permitted			0.212		0.950	
Satd. Flow (perm)	1857	0	395	1863	1770	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2					144
Link Speed (mph)	30			30	30	
Link Distance (ft)	1449			900	376	
Travel Time (s)	32.9			20.5	8.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	527	11	484	435	11	571
Shared Lane Traffic (%)						
Lane Group Flow (vph)	538	0	484	435	11	571
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	100		20	100	20	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	6		20	6	20	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases			6			8
Detector Phase	2		1	6	8	1
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0

Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Minimum Split (s)	20.0		8.0	20.0	20.0	8.0
Total Split (s)	28.0		22.0	50.0	20.0	22.0
Total Split (%)	40.0%		31.4%	71.4%	28.6%	31.4%
Maximum Green (s)	24.0		18.0	46.0	16.0	18.0
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	0.5		0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0		4.0	4.0	4.0	4.0
Lead/Lag	Lag		Lead			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		None	Min	None	None
Walk Time (s)	5.0			5.0	5.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	18.8		39.4	43.0	6.2	17.9
Actuated g/C Ratio	0.42		0.87	0.95	0.14	0.40
v/c Ratio	0.70		0.58	0.25	0.05	0.80
Control Delay	17.8		7.8	1.2	22.1	19.0
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	17.8		7.8	1.2	22.1	19.0
LOS	B		A	A	C	B
Approach Delay	17.8			4.6	19.0	
Approach LOS	B			A	B	
Queue Length 50th (ft)	105		14	0	3	92
Queue Length 95th (ft)	#279		161	58	16	219
Internal Link Dist (ft)	1369			820	296	
Turn Bay Length (ft)						
Base Capacity (vph)	1042		922	1753	661	800
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	0.52		0.52	0.25	0.02	0.71

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 45.2
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 12.2 Intersection LOS: B
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: 33: Forestdale Rd & Cotuit Rd



Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	485	10	445	400	10	525
Future Volume (vph)	485	10	445	400	10	525
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1858		1770	1863	1770	1583
Flt Permitted	1.00		0.21	1.00	0.95	1.00
Satd. Flow (perm)	1858		395	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	527	11	484	435	11	571
RTOR Reduction (vph)	1	0	0	0	0	92
Lane Group Flow (vph)	537	0	484	435	11	479
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases			6			8
Actuated Green, G (s)	19.0		39.3	39.3	1.0	17.3
Effective Green, g (s)	19.0		39.3	39.3	1.0	17.3
Actuated g/C Ratio	0.39		0.81	0.81	0.02	0.36
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	730		785	1515	36	698
v/s Ratio Prot	c0.29		0.21	0.23	0.01	c0.23
v/s Ratio Perm			0.29			0.07
v/c Ratio	0.74		0.62	0.29	0.31	0.69
Uniform Delay, d1	12.5		5.8	1.1	23.3	13.2
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	3.9		1.4	0.1	4.8	2.8
Delay (s)	16.4		7.2	1.2	28.1	16.0
Level of Service	B		A	A	C	B
Approach Delay (s)	16.4			4.4	16.2	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	48.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	485	10	445	400	10	525
Future Volume (veh/h)	485	10	445	400	10	525
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1863
Adj Flow Rate, veh/h	527	11	484	435	11	571
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	627	13	545	1143	457	731
Arrive On Green	0.34	0.34	0.20	0.61	0.26	0.26
Sat Flow, veh/h	1818	38	1774	1863	1774	1583
Grp Volume(v), veh/h	0	538	484	435	11	571
Grp Sat Flow(s),veh/h/ln	0	1856	1774	1863	1774	1583
Q Serve(g_s), s	0.0	16.6	9.8	7.3	0.3	16.0
Cycle Q Clear(g_c), s	0.0	16.6	9.8	7.3	0.3	16.0
Prop In Lane		0.02	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	640	545	1143	457	731
V/C Ratio(X)	0.00	0.84	0.89	0.38	0.02	0.78
Avail Cap(c_a), veh/h	0	717	697	1380	457	731
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	18.8	11.6	6.1	17.2	14.1
Incr Delay (d2), s/veh	0.0	8.1	11.2	0.2	0.0	5.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	9.8	6.3	3.8	0.1	9.3
LnGrp Delay(d),s/veh	0.0	26.8	22.7	6.3	17.2	19.5
LnGrp LOS		C	C	A	B	B
Approach Vol, veh/h	538			919	582	
Approach Delay, s/veh	26.8			14.9	19.5	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	16.7	25.4				42.1		20.0
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	18.0	24.0				46.0		16.0
Max Q Clear Time (g_c+I1), s	11.8	18.6				9.3		18.0
Green Ext Time (p_c), s	0.9	2.8				7.7		0.0

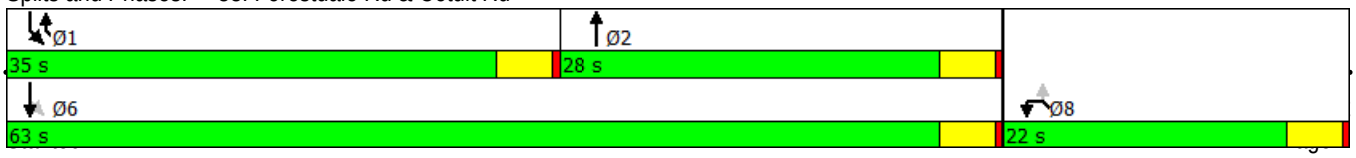
Intersection Summary	
HCM 2010 Ctrl Delay	19.4
HCM 2010 LOS	B

Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	480	10	620	495	5	385
Future Volume (vph)	480	10	620	495	5	385
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.997					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1857	0	1770	1863	1770	1583
Flt Permitted			0.214		0.950	
Satd. Flow (perm)	1857	0	399	1863	1770	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					94
Link Speed (mph)	30			30	30	
Link Distance (ft)	1449			900	376	
Travel Time (s)	32.9			20.5	8.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	522	11	674	538	5	418
Shared Lane Traffic (%)						
Lane Group Flow (vph)	533	0	674	538	5	418
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	100		20	100	20	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	6		20	6	20	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases			6			8
Detector Phase	2		1	6	8	1
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0

Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Minimum Split (s)	20.0		8.0	20.0	20.0	8.0
Total Split (s)	28.0		35.0	63.0	22.0	35.0
Total Split (%)	32.9%		41.2%	74.1%	25.9%	41.2%
Maximum Green (s)	24.0		31.0	59.0	18.0	31.0
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	0.5		0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0		4.0	4.0	4.0	4.0
Lead/Lag	Lag		Lead			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		None	Min	None	None
Walk Time (s)	5.0			5.0	5.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	24.6		52.4	55.8	5.9	25.3
Actuated g/C Ratio	0.42		0.90	0.96	0.10	0.44
v/c Ratio	0.68		0.73	0.30	0.03	0.56
Control Delay	22.6		12.2	1.1	28.6	11.7
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	22.6		12.2	1.1	28.6	11.7
LOS	C		B	A	C	B
Approach Delay	22.6			7.3	11.9	
Approach LOS	C			A	B	
Queue Length 50th (ft)	141		72	0	2	74
Queue Length 95th (ft)	#403		285	70	12	136
Internal Link Dist (ft)	1369			820	296	
Turn Bay Length (ft)						
Base Capacity (vph)	785		1108	1779	561	949
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	0.68		0.61	0.30	0.01	0.44

Intersection Summary			
Area Type:	Other		
Cycle Length: 85			
Actuated Cycle Length: 58.1			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 11.9		Intersection LOS: B	
Intersection Capacity Utilization 73.6%		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.			

Splits and Phases: 33: Forestdale Rd & Cotuit Rd



Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	480	10	620	495	5	385
Future Volume (vph)	480	10	620	495	5	385
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1858		1770	1863	1770	1583
Flt Permitted	1.00		0.21	1.00	0.95	1.00
Satd. Flow (perm)	1858		399	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	522	11	674	538	5	418
RTOR Reduction (vph)	1	0	0	0	0	56
Lane Group Flow (vph)	532	0	674	538	5	362
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases			6			8
Actuated Green, G (s)	24.6		52.3	52.3	1.0	24.7
Effective Green, g (s)	24.6		52.3	52.3	1.0	24.7
Actuated g/C Ratio	0.40		0.85	0.85	0.02	0.40
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	745		870	1589	28	741
v/s Ratio Prot	0.29		c0.30	0.29	0.00	c0.19
v/s Ratio Perm			c0.36			0.04
v/c Ratio	0.71		0.77	0.34	0.18	0.49
Uniform Delay, d1	15.4		9.4	0.9	29.7	13.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	3.3		4.4	0.1	3.0	0.5
Delay (s)	18.7		13.7	1.1	32.8	14.1
Level of Service	B		B	A	C	B
Approach Delay (s)	18.7			8.1	14.3	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	61.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	480	10	620	495	5	385
Future Volume (veh/h)	480	10	620	495	5	385
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1863
Adj Flow Rate, veh/h	522	11	674	538	5	418
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	558	12	722	1303	351	853
Arrive On Green	0.31	0.31	0.34	0.70	0.20	0.20
Sat Flow, veh/h	1818	38	1774	1863	1774	1583
Grp Volume(v), veh/h	0	533	674	538	5	418
Grp Sat Flow(s),veh/h/ln	0	1856	1774	1863	1774	1583
Q Serve(g_s), s	0.0	21.7	23.2	9.5	0.2	12.9
Cycle Q Clear(g_c), s	0.0	21.7	23.2	9.5	0.2	12.9
Prop In Lane		0.02	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	570	722	1303	351	853
V/C Ratio(X)	0.00	0.93	0.93	0.41	0.01	0.49
Avail Cap(c_a), veh/h	0	572	823	1412	410	906
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	26.2	18.1	4.9	25.1	11.3
Incr Delay (d2), s/veh	0.0	22.8	16.3	0.2	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	14.7	17.1	4.9	0.1	5.7
LnGrp Delay(d),s/veh	0.0	49.0	34.4	5.2	25.1	11.7
LnGrp LOS		D	C	A	C	B
Approach Vol, veh/h	533			1212	423	
Approach Delay, s/veh	49.0			21.4	11.9	
Approach LOS	D			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	30.5	27.9				58.4		19.4
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	31.0	24.0				59.0		18.0
Max Q Clear Time (g_c+I1), s	25.2	23.7				11.5		14.9
Green Ext Time (p_c), s	1.4	0.2				9.1		0.5

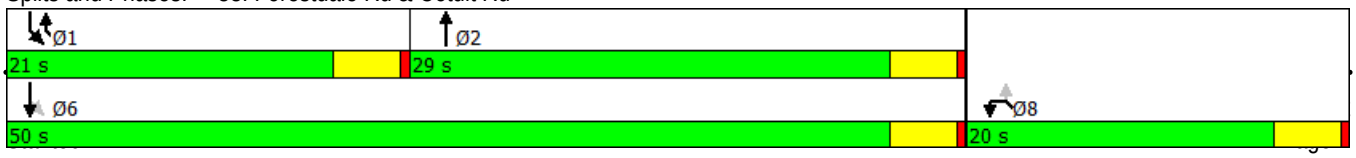
Intersection Summary	
HCM 2010 Ctrl Delay	26.3
HCM 2010 LOS	C

Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	505	10	440	385	10	525
Future Volume (vph)	505	10	440	385	10	525
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.997					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1857	0	1770	1863	1770	1583
Flt Permitted			0.207		0.950	
Satd. Flow (perm)	1857	0	386	1863	1770	1583
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2					144
Link Speed (mph)	30			30	30	
Link Distance (ft)	1449			900	376	
Travel Time (s)	32.9			20.5	8.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	549	11	478	418	11	571
Shared Lane Traffic (%)						
Lane Group Flow (vph)	560	0	478	418	11	571
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	100		20	100	20	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	6		20	6	20	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases			6			8
Detector Phase	2		1	6	8	1
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	4.0

Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Minimum Split (s)	20.0		8.0	20.0	20.0	8.0
Total Split (s)	29.0		21.0	50.0	20.0	21.0
Total Split (%)	41.4%		30.0%	71.4%	28.6%	30.0%
Maximum Green (s)	25.0		17.0	46.0	16.0	17.0
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	0.5		0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0		4.0	4.0	4.0	4.0
Lead/Lag	Lag		Lead			Lead
Lead-Lag Optimize?	Yes		Yes			Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		None	Min	None	None
Walk Time (s)	5.0			5.0	5.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	19.6		39.7	43.3	6.1	17.5
Actuated g/C Ratio	0.43		0.87	0.95	0.13	0.38
v/c Ratio	0.70		0.58	0.24	0.05	0.82
Control Delay	17.3		8.4	1.1	22.1	21.4
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	17.3		8.4	1.1	22.1	21.4
LOS	B		A	A	C	C
Approach Delay	17.3			5.0	21.4	
Approach LOS	B			A	C	
Queue Length 50th (ft)	106		15	0	3	93
Queue Length 95th (ft)	#281		#165	56	16	228
Internal Link Dist (ft)	1369			820	296	
Turn Bay Length (ft)						
Base Capacity (vph)	1074		880	1751	654	760
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	0.52		0.54	0.24	0.02	0.75

Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 45.5			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 13.1		Intersection LOS: B	
Intersection Capacity Utilization 66.4%		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: 33: Forestdale Rd & Cotuit Rd



Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	505	10	440	385	10	525
Future Volume (vph)	505	10	440	385	10	525
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1858		1770	1863	1770	1583
Flt Permitted	1.00		0.21	1.00	0.95	1.00
Satd. Flow (perm)	1858		386	1863	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	549	11	478	418	11	571
RTOR Reduction (vph)	1	0	0	0	0	94
Lane Group Flow (vph)	559	0	478	418	11	477
Turn Type	NA		pm+pt	NA	Prot	pm+ov
Protected Phases	2		1	6	8	1
Permitted Phases			6			8
Actuated Green, G (s)	19.9		39.7	39.7	1.0	16.8
Effective Green, g (s)	19.9		39.7	39.7	1.0	16.8
Actuated g/C Ratio	0.41		0.82	0.82	0.02	0.34
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	759		763	1518	36	676
v/s Ratio Prot	c0.30		0.20	0.22	0.01	c0.23
v/s Ratio Perm			0.31			0.07
v/c Ratio	0.74		0.63	0.28	0.31	0.71
Uniform Delay, d1	12.2		6.1	1.1	23.5	13.8
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	3.7		1.6	0.1	4.8	3.4
Delay (s)	15.9		7.7	1.2	28.3	17.2
Level of Service	B		A	A	C	B
Approach Delay (s)	15.9			4.7	17.4	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	48.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	505	10	440	385	10	525
Future Volume (veh/h)	505	10	440	385	10	525
Number	2	12	1	6	3	18
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1863
Adj Flow Rate, veh/h	549	11	478	418	11	571
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	647	13	535	1154	450	720
Arrive On Green	0.36	0.36	0.20	0.62	0.25	0.25
Sat Flow, veh/h	1820	36	1774	1863	1774	1583
Grp Volume(v), veh/h	0	560	478	418	11	571
Grp Sat Flow(s),veh/h/ln	0	1856	1774	1863	1774	1583
Q Serve(g_s), s	0.0	17.6	9.9	6.9	0.3	16.0
Cycle Q Clear(g_c), s	0.0	17.6	9.9	6.9	0.3	16.0
Prop In Lane		0.02	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	660	535	1154	450	720
V/C Ratio(X)	0.00	0.85	0.89	0.36	0.02	0.79
Avail Cap(c_a), veh/h	0	736	657	1358	450	720
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	18.8	12.2	5.9	17.7	14.7
Incr Delay (d2), s/veh	0.0	8.5	12.7	0.2	0.0	6.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	10.4	9.9	3.5	0.1	9.5
LnGrp Delay(d),s/veh	0.0	27.3	24.9	6.1	17.7	20.8
LnGrp LOS		C	C	A	B	C
Approach Vol, veh/h	560			896	582	
Approach Delay, s/veh	27.3			16.1	20.7	
Approach LOS	C			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	16.7	26.4				43.1		20.0
Change Period (Y+Rc), s	4.0	4.0				4.0		4.0
Max Green Setting (Gmax), s	17.0	25.0				46.0		16.0
Max Q Clear Time (g_c+I1), s	11.9	19.6				8.9		18.0
Green Ext Time (p_c), s	0.8	2.8				7.7		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	20.5
HCM 2010 LOS	C

Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	460	10	620	495	5	385
Future Volume (vph)	460	10	620	495	5	385
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.997					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1857	0	1770	1863	1770	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1857	0	1770	1863	1770	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1449			900	376	
Travel Time (s)	32.9			20.5	8.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	500	11	674	538	5	418
Shared Lane Traffic (%)						
Lane Group Flow (vph)	511	0	674	538	5	418
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 72.5%		ICU Level of Service C	
Analysis Period (min) 15			

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	460	10	620	495	5	385
Future Volume (Veh/h)	460	10	620	495	5	385
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	500	11	674	538	5	418
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			511		2392	506
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			511		2392	506
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			36		63	26
cM capacity (veh/h)			1054		13	567

Direction, Lane #	NB 1	SB 1	SB 2	NW 1	NW 2
Volume Total	511	674	538	5	418
Volume Left	0	674	0	5	0
Volume Right	11	0	0	0	418
cSH	1700	1054	1700	13	567
Volume to Capacity	0.30	0.64	0.32	0.37	0.74
Queue Length 95th (ft)	0	121	0	24	157
Control Delay (s)	0.0	14.3	0.0	386.9	27.1
Lane LOS		B		F	D
Approach Delay (s)	0.0	7.9		31.4	
Approach LOS				D	

Intersection Summary			
Average Delay	10.7		
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	10.8

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	460	10	620	495	5	385
Future Vol, veh/h	460	10	620	495	5	385
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	500	11	674	538	5	418

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	511	0	2391	505
Stage 1	-	-	-	-	505	-
Stage 2	-	-	-	-	1886	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1054	-	37	567
Stage 1	-	-	-	-	606	-
Stage 2	-	-	-	-	131	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1054	-	13	567
Mov Cap-2 Maneuver	-	-	-	-	13	-
Stage 1	-	-	-	-	606	-
Stage 2	-	-	-	-	47	-

Approach	NB	SB	NW
HCM Control Delay, s	0	7.9	32.1
HCM LOS			D

Minor Lane/Major Mvmt	NBT	NBR	NWLn1	NWLn2	SBL	SBT
Capacity (veh/h)	-	-	13	567	1054	-
HCM Lane V/C Ratio	-	-	0.418	0.738	0.639	-
HCM Control Delay (s)	-	-	$ 414.1	27.1	14.3	-
HCM Lane LOS	-	-	F	D	B	-
HCM 95th %tile Q(veh)	-	-	1	6.3	4.8	-

Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	505	10	440	385	10	525
Future Volume (vph)	505	10	440	385	10	525
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.997					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1857	0	1770	1863	1770	1583
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1857	0	1770	1863	1770	1583
Link Speed (mph)	30			30	30	
Link Distance (ft)	1449			900	376	
Travel Time (s)	32.9			20.5	8.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	549	11	478	418	11	571
Shared Lane Traffic (%)						
Lane Group Flow (vph)	560	0	478	418	11	571
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 66.4%		ICU Level of Service C	
Analysis Period (min) 15			

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	505	10	440	385	10	525
Future Volume (Veh/h)	505	10	440	385	10	525
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	549	11	478	418	11	571
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			560		1928	554
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			560		1928	554
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			53		71	0
cM capacity (veh/h)			1011		38	532

Direction, Lane #	NB 1	SB 1	SB 2	NW 1	NW 2
Volume Total	560	478	418	11	571
Volume Left	0	478	0	11	0
Volume Right	11	0	0	0	571
cSH	1700	1011	1700	38	532
Volume to Capacity	0.33	0.47	0.25	0.29	1.07
Queue Length 95th (ft)	0	65	0	24	432
Control Delay (s)	0.0	11.7	0.0	132.5	88.0
Lane LOS		B		F	F
Approach Delay (s)	0.0	6.2		88.9	
Approach LOS				F	

Intersection Summary			
Average Delay	28.1		
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	28

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	505	10	440	385	10	525
Future Vol, veh/h	505	10	440	385	10	525
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	0	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	549	11	478	418	11	571

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	560	0	1929	554
Stage 1	-	-	-	-	554	-
Stage 2	-	-	-	-	1375	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1011	-	73	~ 532
Stage 1	-	-	-	-	575	-
Stage 2	-	-	-	-	235	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1011	-	38	~ 532
Mov Cap-2 Maneuver	-	-	-	-	38	-
Stage 1	-	-	-	-	575	-
Stage 2	-	-	-	-	124	-

Approach	NB	SB	NW
HCM Control Delay, s	0	6.2	88.5
HCM LOS			F

Minor Lane/Major Mvmt	NBT	NBR	NWLn1	NWLn2	SBL	SBT
Capacity (veh/h)	-	-	38	532	1011	-
HCM Lane V/C Ratio	-	-	0.286	1.073	0.473	-
HCM Control Delay (s)	-	-	134	87.6	11.7	-
HCM Lane LOS	-	-	F	F	B	-
HCM 95th %tile Q(veh)	-	-	0.9	17.2	2.6	-

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

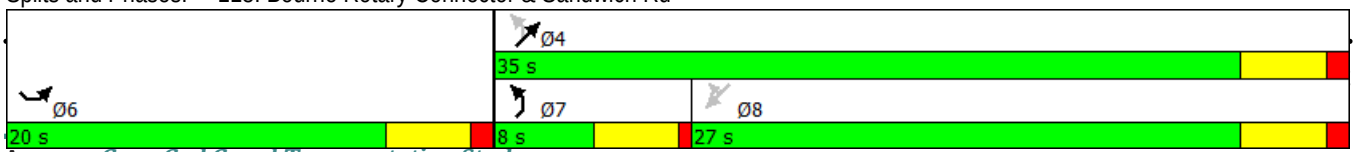
Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	145	325	10	905	420	555
Future Volume (vph)	145	325	10	905	420	555
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	1000	0	0			425
Storage Lanes	1	0	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.896					0.850
Flt Protected	0.985			0.999		
Satd. Flow (prot)	3098	0	0	3435	1810	1538
Flt Permitted	0.985			0.950		
Satd. Flow (perm)	3098	0	0	3266	1810	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	353					603
Link Speed (mph)	30			30	30	
Link Distance (ft)	1745			824	1013	
Travel Time (s)	39.7			18.7	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	353	11	984	457	603
Shared Lane Traffic (%)						
Lane Group Flow (vph)	511	0	0	995	457	603
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	24			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1		1	2	2	1
Detector Template	Left		Left	Thru	Thru	Right
Leading Detector (ft)	20		20	100	100	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		20	6	6	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Detector Phase	6		7	4	8	8
Switch Phase						
Minimum Initial (s)	5.0		4.0	5.0	5.0	5.0
Minimum Split (s)	20.0		8.0	20.0	22.5	22.5
Total Split (s)	20.0		8.0	35.0	27.0	27.0
Total Split (%)	36.4%		14.5%	63.6%	49.1%	49.1%
Maximum Green (s)	15.5		4.0	30.5	22.5	22.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		0.5	1.0	1.0	1.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	4.5			4.5	4.5	4.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		None	Min	Min	Min
Walk Time (s)					7.0	7.0
Flash Dont Walk (s)					11.0	11.0
Pedestrian Calls (#/hr)					0	0
Act Effct Green (s)	8.2			19.2	19.2	19.2
Actuated g/C Ratio	0.22			0.52	0.52	0.52
v/c Ratio	0.53			0.59	0.49	0.55
Control Delay	7.1			7.7	7.8	2.8
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	7.1			7.7	7.8	2.8
LOS	A			A	A	A
Approach Delay	7.1			7.7	4.9	
Approach LOS	A			A	A	
Queue Length 50th (ft)	12			55	45	0
Queue Length 95th (ft)	52			126	122	32
Internal Link Dist (ft)	1665			744	933	
Turn Bay Length (ft)	1000					425
Base Capacity (vph)	1577			2749	1227	1236
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	0.32			0.36	0.37	0.49

Intersection Summary

Area Type: Other
Cycle Length: 55
Actuated Cycle Length: 36.9
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 6.5 Intersection LOS: A
Intersection Capacity Utilization 67.2% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 118: Bourne Rotary Connector & Sandwich Rd



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	145	325	10	905	420	555
Future Volume (vph)	145	325	10	905	420	555
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	4.5
Lane Util. Factor	0.97			0.95	1.00	1.00
Frt	0.90			1.00	1.00	0.85
Flt Protected	0.98			1.00	1.00	1.00
Satd. Flow (prot)	3099			3436	1810	1538
Flt Permitted	0.98			0.95	1.00	1.00
Satd. Flow (perm)	3099			3265	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	353	11	984	457	603
RTOR Reduction (vph)	273	0	0	0	0	286
Lane Group Flow (vph)	238	0	0	995	457	317
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8
Actuated Green, G (s)	8.2			19.1	19.1	19.1
Effective Green, g (s)	8.2			19.1	19.1	19.1
Actuated g/C Ratio	0.23			0.53	0.53	0.53
Clearance Time (s)	4.5			4.5	4.5	4.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	700			1717	952	809
v/s Ratio Prot	c0.08					
v/s Ratio Perm				c0.30	0.25	0.21
v/c Ratio	0.34			0.58	0.48	0.39
Uniform Delay, d1	11.8			5.9	5.5	5.1
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.3			0.5	0.4	0.3
Delay (s)	12.1			6.3	5.8	5.4
Level of Service	B			A	A	A
Approach Delay (s)	12.1			6.3	5.6	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	36.3	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 edition methodology does not support a perm + prot left-turn type from a shared lane. Left-turn bay is needed for phases 7.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	970	670	215	130	270
Future Volume (vph)	0	970	670	215	130	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.967			0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1810	1750	0	1719	1538
Flt Permitted					0.950	
Satd. Flow (perm)	0	1810	1750	0	1719	1538
Link Speed (mph)		30	30		30	
Link Distance (ft)		912	966		164	
Travel Time (s)		20.7	22.0		3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1054	728	234	141	293
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1054	962	0	141	293
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 71.7%		ICU Level of Service C	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	970	670	215	130	270
Future Volume (Veh/h)	0	970	670	215	130	270
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1054	728	234	141	293
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	728				1899	845
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	728				1899	845
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				0	18
cM capacity (veh/h)	862				75	358

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	1054	962	141	293
Volume Left	0	0	141	0
Volume Right	0	234	0	293
cSH	862	1700	75	358
Volume to Capacity	0.00	0.57	1.89	0.82
Queue Length 95th (ft)	0	0	313	179
Control Delay (s)	0.0	0.0	536.6	47.4
Lane LOS			F	E
Approach Delay (s)	0.0	0.0	206.3	
Approach LOS			F	

Intersection Summary			
Average Delay	36.6		
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	29.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		↰	↱
Traffic Vol, veh/h	0	970	670	215	130	270
Future Vol, veh/h	0	970	670	215	130	270
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	0	1054	728	234	141	293

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	728	0	-	0	1782	728
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	1054	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	862	-	-	0	~ 88	418
Stage 1	-	-	-	0	473	-
Stage 2	-	-	-	0	331	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	862	-	-	-	~ 88	418
Mov Cap-2 Maneuver	-	-	-	-	~ 88	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	331	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	151.8
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	862	-	-	88	418
HCM Lane V/C Ratio	-	-	-	1.606	0.702
HCM Control Delay (s)	0	-	-	$ 401.6	31.5
HCM Lane LOS	A	-	-	F	D
HCM 95th %tile Q(veh)	0	-	-	11.3	5.3

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



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	990	670	415	190	325
Future Volume (vph)	0	990	670	415	190	325
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.948			0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1810	1715	0	1719	1538
Flt Permitted					0.950	
Satd. Flow (perm)	0	1810	1715	0	1719	1538
Link Speed (mph)		30	30		30	
Link Distance (ft)		912	966		164	
Travel Time (s)		20.7	22.0		3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1076	728	451	207	353
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1076	1179	0	207	353
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 87.4%		ICU Level of Service E	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	990	670	415	190	325
Future Volume (Veh/h)	0	990	670	415	190	325
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1076	728	451	207	353
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	728				2030	954
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	728				2030	954
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				0	0
cM capacity (veh/h)	862				62	310

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	1076	1179	207	353
Volume Left	0	0	207	0
Volume Right	0	451	0	353
cSH	862	1700	62	310
Volume to Capacity	0.00	0.69	3.35	1.14
Queue Length 95th (ft)	0	0	Err	363
Control Delay (s)	0.0	0.0	Err	131.1
Lane LOS			F	F
Approach Delay (s)	0.0	0.0	3778.7	
Approach LOS			F	

Intersection Summary			
Average Delay	751.7		
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	71.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		↰	↱
Traffic Vol, veh/h	0	990	670	415	190	325
Future Vol, veh/h	0	990	670	415	190	325
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	0	1076	728	451	207	353

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	728	0	-	0	1804	728
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	1076	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	862	-	-	0	~ 86	418
Stage 1	-	-	-	0	473	-
Stage 2	-	-	-	0	323	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	862	-	-	-	~ 86	418
Mov Cap-2 Maneuver	-	-	-	-	~ 86	-
Stage 1	-	-	-	-	473	-
Stage 2	-	-	-	-	323	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	$ 302.8
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	862	-	-	86	418
HCM Lane V/C Ratio	-	-	-	2.401	0.845
HCM Control Delay (s)	0	-	-	$ 742.5	45.8
HCM Lane LOS	A	-	-	F	E
HCM 95th %tile Q(veh)	0	-	-	19.1	8.2

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

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	990	670	415	190	325
Future Volume (vph)	0	990	670	415	190	325
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200			400	0	0
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected					0.950	
Satd. Flow (prot)	1810	1810	1810	1538	1719	1538
Flt Permitted					0.950	
Satd. Flow (perm)	1810	1810	1810	1538	1719	1538
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				451		114
Link Speed (mph)		30	30		30	
Link Distance (ft)		912	966		164	
Travel Time (s)		20.7	22.0		3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1076	728	451	207	353
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1076	728	451	207	353
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (ft)	20	100	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	5	Free!	6		4!	4 5
Permitted Phases				6		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	5		6	6	4	4 5
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	
Minimum Split (s)	20.0		20.0	20.0	20.0	
Total Split (s)	20.0		35.0	35.0	20.0	
Total Split (%)	26.7%		46.7%	46.7%	26.7%	
Maximum Green (s)	16.0		31.0	31.0	16.0	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	0.5		0.5	0.5	0.5	
Lost Time Adjust (s)	-1.0		-1.0	-1.0	-1.0	
Total Lost Time (s)	3.0		3.0	3.0	3.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Min	Min	None	
Walk Time (s)			5.0	5.0		
Flash Dont Walk (s)			11.0	11.0		
Pedestrian Calls (#/hr)			15	15		
Act Effct Green (s)		60.4	30.6	30.6	13.5	23.7
Actuated g/C Ratio		1.00	0.51	0.51	0.22	0.39
v/c Ratio		0.59	0.79	0.45	0.54	0.52
Control Delay		1.4	21.6	2.8	26.7	12.6
Queue Delay		0.0	0.0	0.0	0.0	0.0
Total Delay		1.4	21.6	2.8	26.7	12.6
LOS		A	C	A	C	B
Approach Delay		1.4	14.4		17.8	
Approach LOS		A	B		B	
Queue Length 50th (ft)		0	205	0	69	63
Queue Length 95th (ft)		0	#436	41	127	131
Internal Link Dist (ft)		832	886		84	
Turn Bay Length (ft)				400		
Base Capacity (vph)		1810	970	1033	489	897
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		0.59	0.75	0.44	0.42	0.39

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 60.4			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 10.1		Intersection LOS: B	
Intersection Capacity Utilization 69.3%		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.			
! Phase conflict between lane groups.			

Splits and Phases: 3: Bourne Rotary Connector/Sandwich Road & Old Sandwich Road





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	990	670	415	190	325
Future Volume (vph)	0	990	670	415	190	325
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0	3.0	3.0	3.0	3.0
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00
Frt		1.00	1.00	0.85	1.00	0.85
Flt Protected		1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1810	1810	1538	1719	1538
Flt Permitted		1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)		1810	1810	1538	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1076	728	451	207	353
RTOR Reduction (vph)	0	0	0	222	0	69
Lane Group Flow (vph)	0	1076	728	229	207	284
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	5	Free!	6		4!	4 5
Permitted Phases				6		
Actuated Green, G (s)		60.2	29.6	29.6	12.5	22.6
Effective Green, g (s)		60.2	30.6	30.6	13.5	23.6
Actuated g/C Ratio		1.00	0.51	0.51	0.22	0.39
Clearance Time (s)			4.0	4.0	4.0	
Vehicle Extension (s)			3.0	3.0	3.0	
Lane Grp Cap (vph)		1810	920	781	385	602
v/s Ratio Prot		0.59	c0.40		0.12	0.18
v/s Ratio Perm				0.15		
v/c Ratio		0.59	0.79	0.29	0.54	0.47
Uniform Delay, d1		0.0	12.2	8.6	20.6	13.6
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.4	4.7	0.2	1.4	0.6
Delay (s)		1.4	16.9	8.8	22.0	14.2
Level of Service		A	B	A	C	B
Approach Delay (s)		1.4	13.8		17.1	
Approach LOS		A	B		B	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	60.2	Sum of lost time (s)	9.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

HCM 2010 analysis cannot be performed with phasing conflicts.

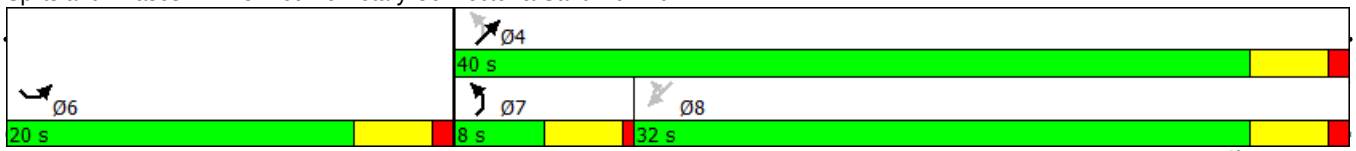
Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	200	125	25	1150	270	770
Future Volume (vph)	200	125	25	1150	270	770
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	1000	0	0			425
Storage Lanes	1	0	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.942					0.850
Flt Protected	0.970			0.999		
Satd. Flow (prot)	3208	0	0	3435	1810	1538
Flt Permitted	0.970			0.946		
Satd. Flow (perm)	3208	0	0	3252	1810	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	136					837
Link Speed (mph)	30			30	30	
Link Distance (ft)	1745			824	1013	
Travel Time (s)	39.7			18.7	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	136	27	1250	293	837
Shared Lane Traffic (%)						
Lane Group Flow (vph)	353	0	0	1277	293	837
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	24			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1		1	2	2	1
Detector Template	Left		Left	Thru	Thru	Right
Leading Detector (ft)	20		20	100	100	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		20	6	6	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Detector Phase	6		7	4	8	8
Switch Phase						
Minimum Initial (s)	5.0		4.0	5.0	5.0	5.0
Minimum Split (s)	20.0		8.0	20.0	22.5	22.5
Total Split (s)	20.0		8.0	40.0	32.0	32.0
Total Split (%)	33.3%		13.3%	66.7%	53.3%	53.3%
Maximum Green (s)	15.5		4.0	35.5	27.5	27.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		0.5	1.0	1.0	1.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	4.5			4.5	4.5	4.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		None	Min	Min	Min
Walk Time (s)					7.0	7.0
Flash Dont Walk (s)					11.0	11.0
Pedestrian Calls (#/hr)					0	0
Act Effct Green (s)	8.8			26.2	26.2	26.2
Actuated g/C Ratio	0.20			0.59	0.59	0.59
v/c Ratio	0.47			0.67	0.27	0.67
Control Delay	13.0			8.2	5.3	3.5
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	13.0			8.2	5.3	3.5
LOS	B			A	A	A
Approach Delay	13.0			8.2	4.0	
Approach LOS	B			A	A	
Queue Length 50th (ft)	24			90	29	0
Queue Length 95th (ft)	63			173	68	34
Internal Link Dist (ft)	1665			744	933	
Turn Bay Length (ft)	1000					425
Base Capacity (vph)	1258			2629	1258	1324
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	0.28			0.49	0.23	0.63

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 44.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 7.1 Intersection LOS: A
Intersection Capacity Utilization 87.7% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 118: Bourne Rotary Connector & Sandwich Rd



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	200	125	25	1150	270	770
Future Volume (vph)	200	125	25	1150	270	770
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	4.5
Lane Util. Factor	0.97			0.95	1.00	1.00
Frt	0.94			1.00	1.00	0.85
Flt Protected	0.97			1.00	1.00	1.00
Satd. Flow (prot)	3209			3434	1810	1538
Flt Permitted	0.97			0.95	1.00	1.00
Satd. Flow (perm)	3209			3252	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	136	27	1250	293	837
RTOR Reduction (vph)	109	0	0	0	0	339
Lane Group Flow (vph)	244	0	0	1277	293	498
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8
Actuated Green, G (s)	8.8			26.2	26.2	26.2
Effective Green, g (s)	8.8			26.2	26.2	26.2
Actuated g/C Ratio	0.20			0.60	0.60	0.60
Clearance Time (s)	4.5			4.5	4.5	4.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	641			1936	1077	915
v/s Ratio Prot	c0.08					
v/s Ratio Perm				c0.39	0.16	0.32
v/c Ratio	0.38			0.66	0.27	0.54
Uniform Delay, d1	15.2			5.9	4.3	5.3
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.4			0.8	0.1	0.7
Delay (s)	15.6			6.8	4.4	6.0
Level of Service	B			A	A	A
Approach Delay (s)	15.6			6.8	5.6	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	44.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 edition methodology does not support a perm + prot left-turn type from a shared lane. Left-turn bay is needed for phases 7.



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	1235	895	120	55	105
Future Volume (vph)	15	1235	895	120	55	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.984			0.850
Flt Protected		0.999			0.950	
Satd. Flow (prot)	0	1808	1781	0	1719	1538
Flt Permitted		0.999			0.950	
Satd. Flow (perm)	0	1808	1781	0	1719	1538
Link Speed (mph)		30	30		30	
Link Distance (ft)		912	966		164	
Travel Time (s)		20.7	22.0		3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	1342	973	130	60	114
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1358	1103	0	60	114
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 87.0%		ICU Level of Service E	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	1235	895	120	55	105
Future Volume (Veh/h)	15	1235	895	120	55	105
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	1342	973	130	60	114
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	973				2412	1038
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	973				2412	1038
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				0	59
cM capacity (veh/h)	697				35	277

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	1358	1103	60	114
Volume Left	16	0	60	0
Volume Right	0	130	0	114
cSH	697	1700	35	277
Volume to Capacity	0.02	0.65	1.74	0.41
Queue Length 95th (ft)	2	0	165	48
Control Delay (s)	1.2	0.0	606.2	26.8
Lane LOS	A		F	D
Approach Delay (s)	1.2	0.0	226.6	
Approach LOS			F	

Intersection Summary			
Average Delay	15.6		
Intersection Capacity Utilization	87.0%	ICU Level of Service	E
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	15.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		↰	↱
Traffic Vol, veh/h	15	1235	895	120	55	105
Future Vol, veh/h	15	1235	895	120	55	105
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	16	1342	973	130	60	114

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	973	0	-	0	2348	973
Stage 1	-	-	-	-	973	-
Stage 2	-	-	-	-	1375	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	697	-	-	0	~ 39	302
Stage 1	-	-	-	0	362	-
Stage 2	-	-	-	0	231	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	697	-	-	-	~ 35	302
Mov Cap-2 Maneuver	-	-	-	-	~ 35	-
Stage 1	-	-	-	-	362	-
Stage 2	-	-	-	-	210	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	218.7
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	697	-	-	35	302
HCM Lane V/C Ratio	0.023	-	-	1.708	0.378
HCM Control Delay (s)	10.3	0	-	$ 590.3	24
HCM Lane LOS	B	A	-	F	C
HCM 95th %tile Q(veh)	0.1	-	-	6.5	1.7

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



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	20	1150	890	165	215	125
Future Volume (vph)	20	1150	890	165	215	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.979			0.850
Flt Protected		0.999			0.950	
Satd. Flow (prot)	0	1808	1772	0	1719	1538
Flt Permitted		0.999			0.950	
Satd. Flow (perm)	0	1808	1772	0	1719	1538
Link Speed (mph)		30	30		30	
Link Distance (ft)		912	966		164	
Travel Time (s)		20.7	22.0		3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	1250	967	179	234	136
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1272	1146	0	234	136
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 95.1%		ICU Level of Service F	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	20	1150	890	165	215	125
Future Volume (Veh/h)	20	1150	890	165	215	125
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	1250	967	179	234	136
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	967				2350	1056
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	967				2350	1056
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				0	50
cM capacity (veh/h)	700				37	270

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	1272	1146	234	136
Volume Left	22	0	234	0
Volume Right	0	179	0	136
cSH	700	1700	37	270
Volume to Capacity	0.03	0.67	6.25	0.50
Queue Length 95th (ft)	2	0	Err	66
Control Delay (s)	1.4	0.0	Err	31.2
Lane LOS	A		F	D
Approach Delay (s)	1.4	0.0	6335.1	
Approach LOS			F	

Intersection Summary			
Average Delay	841.4		
Intersection Capacity Utilization	95.1%	ICU Level of Service	F
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	220.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↰	↱		↰	↱
Traffic Vol, veh/h	20	1150	890	165	215	125
Future Vol, veh/h	20	1150	890	165	215	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	22	1250	967	179	234	136

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	967	0	-	0	2260	967
Stage 1	-	-	-	-	967	-
Stage 2	-	-	-	-	1293	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	700	-	-	0	~ 44	304
Stage 1	-	-	-	0	364	-
Stage 2	-	-	-	0	254	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	700	-	-	-	~ 39	304
Mov Cap-2 Maneuver	-	-	-	-	~ 39	-
Stage 1	-	-	-	-	364	-
Stage 2	-	-	-	-	~ 228	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	$ 1558.6
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	700	-	-	39	304
HCM Lane V/C Ratio	0.031	-	-	5.992	0.447
HCM Control Delay (s)	10.3	0	$ 2449.6		26.1
HCM Lane LOS	B	A	-	F	D
HCM 95th %tile Q(veh)	0.1	-	-	27.5	2.2

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

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	20	1150	890	165	215	125
Future Volume (vph)	20	1150	890	165	215	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200			400	0	0
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1810	1810	1538	1719	1538
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1719	1810	1810	1538	1719	1538
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				179		93
Link Speed (mph)		30	30		30	
Link Distance (ft)		912	966		164	
Travel Time (s)		20.7	22.0		3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	1250	967	179	234	136
Shared Lane Traffic (%)						
Lane Group Flow (vph)	22	1250	967	179	234	136
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (ft)	20	100	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	5	Free!	6		4!	4 5
Permitted Phases				6		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	5		6	6	4	4 5
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	
Minimum Split (s)	20.0		20.0	20.0	20.0	
Total Split (s)	20.0		50.0	50.0	20.0	
Total Split (%)	22.2%		55.6%	55.6%	22.2%	
Maximum Green (s)	16.0		46.0	46.0	16.0	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	0.5		0.5	0.5	0.5	
Lost Time Adjust (s)	-1.0		-1.0	-1.0	-1.0	
Total Lost Time (s)	3.0		3.0	3.0	3.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Min	Min	None	
Walk Time (s)			5.0	5.0		
Flash Dont Walk (s)			11.0	11.0		
Pedestrian Calls (#/hr)			15	15		
Act Effct Green (s)	7.6	79.0	47.0	47.0	15.4	25.9
Actuated g/C Ratio	0.10	1.00	0.59	0.59	0.19	0.33
v/c Ratio	0.13	0.69	0.90	0.18	0.70	0.24
Control Delay	35.2	2.2	28.1	1.9	42.1	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.2	2.2	28.1	1.9	42.1	8.4
LOS	D	A	C	A	D	A
Approach Delay		2.8	24.0		29.7	
Approach LOS		A	C		C	
Queue Length 50th (ft)	10	0	396	0	108	14
Queue Length 95th (ft)	32	0	#715	25	#192	52
Internal Link Dist (ft)		832	886		84	
Turn Bay Length (ft)	200			400		
Base Capacity (vph)	370	1810	1077	988	370	737
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	0.06	0.69	0.90	0.18	0.63	0.18

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 79			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay: 15.1		Intersection LOS: B	
Intersection Capacity Utilization 79.1%		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.			
! Phase conflict between lane groups.			

Splits and Phases: 2: Bourne Rotary Connector/Sandwich Road & Old Sandwich Road



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	20	1150	890	165	215	125
Future Volume (vph)	20	1150	890	165	215	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1719	1810	1810	1538	1719	1538
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1719	1810	1810	1538	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	1250	967	179	234	136
RTOR Reduction (vph)	0	0	0	72	0	62
Lane Group Flow (vph)	22	1250	967	107	234	74
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	5	Free!	6		4!	4 5
Permitted Phases				6		
Actuated Green, G (s)	6.6	79.1	46.1	46.1	14.4	25.0
Effective Green, g (s)	7.6	79.1	47.1	47.1	15.4	26.0
Actuated g/C Ratio	0.10	1.00	0.60	0.60	0.19	0.33
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	165	1810	1077	915	334	505
v/s Ratio Prot	0.01	0.69	c0.53		0.14	0.05
v/s Ratio Perm				0.07		
v/c Ratio	0.13	0.69	0.90	0.12	0.70	0.15
Uniform Delay, d1	32.7	0.0	13.9	7.0	29.7	18.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	2.2	10.0	0.1	6.5	0.1
Delay (s)	33.1	2.2	23.9	7.0	36.2	18.9
Level of Service	C	A	C	A	D	B
Approach Delay (s)		2.7	21.2		29.8	
Approach LOS		A	C		C	

Intersection Summary			
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	79.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

HCM 2010 analysis cannot be performed with phasing conflicts.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	490	5	210	355	5	5	5	55	0	0	5
Future Volume (vph)	0	490	5	210	355	5	5	5	55	0	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	250		0	0		0	0		0
Storage Lanes	0		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.998				0.850		0.865	
Flt Protected				0.950				0.976				
Satd. Flow (prot)	0	1808	0	1719	1806	0	0	1766	1538	0	1565	0
Flt Permitted				0.950				0.976				
Satd. Flow (perm)	0	1808	0	1719	1806	0	0	1766	1538	0	1565	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		724			1081			130			454	
Travel Time (s)		16.5			24.6			3.0			10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	533	5	228	386	5	5	5	60	0	0	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	538	0	228	391	0	0	10	60	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 59.8%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	0	490	5	210	355	5	5	5	55	0	0	5
Future Volume (Veh/h)	0	490	5	210	355	5	5	5	55	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	533	5	228	386	5	5	5	60	0	0	5
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	391			538			1382	1382	536	1382	1382	388
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	391			538			1382	1382	536	1382	1382	388
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			78			95	95	89	100	100	99
cM capacity (veh/h)	1151			1015			98	110	539	85	110	653

Direction, Lane #	EB 1	WB 1	WB 2	NE 1	NE 2	SW 1
Volume Total	538	228	391	10	60	5
Volume Left	0	228	0	5	0	0
Volume Right	5	0	5	0	60	5
cSH	1151	1015	1700	104	539	653
Volume to Capacity	0.00	0.22	0.23	0.10	0.11	0.01
Queue Length 95th (ft)	0	22	0	8	9	1
Control Delay (s)	0.0	9.6	0.0	43.4	12.5	10.6
Lane LOS		A		E	B	B
Approach Delay (s)	0.0	3.5		16.9		10.6
Approach LOS				C		B

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	59.8%	ICU Level of Service		B
Analysis Period (min)	15			

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↰	↱			↰	↱		↕	
Traffic Vol, veh/h	0	490	5	210	355	5	5	5	55	0	0	5
Future Vol, veh/h	0	490	5	210	355	5	5	5	55	0	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	250	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	533	5	228	386	5	5	5	60	0	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	391	0	0	538	0	0	1383	1383	535	1383	1383	389
Stage 1	-	-	-	-	-	-	535	535	-	845	845	-
Stage 2	-	-	-	-	-	-	848	848	-	538	538	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1151	-	-	1015	-	-	119	142	540	119	142	653
Stage 1	-	-	-	-	-	-	524	519	-	353	375	-
Stage 2	-	-	-	-	-	-	352	373	-	522	517	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1151	-	-	1015	-	-	98	110	540	84	110	653
Mov Cap-2 Maneuver	-	-	-	-	-	-	98	110	-	84	110	-
Stage 1	-	-	-	-	-	-	524	519	-	353	291	-
Stage 2	-	-	-	-	-	-	271	289	-	459	517	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0	3.5	17.3	10.6
HCM LOS			C	B

Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	104	540	1151	-	-	1015	-	-	653
HCM Lane V/C Ratio	0.105	0.111	-	-	-	0.225	-	-	0.008
HCM Control Delay (s)	43.6	12.5	0	-	-	9.6	-	-	10.6
HCM Lane LOS	E	B	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.3	0.4	0	-	-	0.9	-	-	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	850	5	5	635	5	5	5	55	5	0	0
Future Volume (vph)	0	850	5	5	635	5	5	5	55	5	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	250		0	0		0	0		0
Storage Lanes	0		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.999				0.850			
Flt Protected				0.950				0.976			0.950	
Satd. Flow (prot)	0	1808	0	1719	1808	0	0	1766	1538	0	1719	0
Flt Permitted				0.950				0.976			0.950	
Satd. Flow (perm)	0	1808	0	1719	1808	0	0	1766	1538	0	1719	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		724			1081			130			454	
Travel Time (s)		16.5			24.6			3.0			10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	924	5	5	690	5	5	5	60	5	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	929	0	5	695	0	0	10	60	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 61.8%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	0	850	5	5	635	5	5	5	55	5	0	0
Future Volume (Veh/h)	0	850	5	5	635	5	5	5	55	5	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	924	5	5	690	5	5	5	60	5	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	695			929			1626	1632	926	1632	1632	692
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	695			929			1626	1632	926	1632	1632	692
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			94	95	81	92	100	100
cM capacity (veh/h)	887			724			80	99	321	62	99	439

Direction, Lane #	EB 1	WB 1	WB 2	NE 1	NE 2	SW 1
Volume Total	929	5	695	10	60	5
Volume Left	0	5	0	5	0	5
Volume Right	5	0	5	0	60	0
cSH	887	724	1700	89	321	62
Volume to Capacity	0.00	0.01	0.41	0.11	0.19	0.08
Queue Length 95th (ft)	0	1	0	9	17	6
Control Delay (s)	0.0	10.0	0.0	50.7	18.8	67.9
Lane LOS		B		F	C	F
Approach Delay (s)	0.0	0.1		23.3		67.9
Approach LOS				C		F

Intersection Summary				
Average Delay	1.2			
Intersection Capacity Utilization	61.8%	ICU Level of Service		B
Analysis Period (min)	15			

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↰	↱			↕	↱		↕	
Traffic Vol, veh/h	0	850	5	5	635	5	5	5	55	5	0	0
Future Vol, veh/h	0	850	5	5	635	5	5	5	55	5	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	250	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	924	5	5	690	5	5	5	60	5	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	696	0	0	929	0	0	1631	1634	927	1633	1633	693
Stage 1	-	-	-	-	-	-	927	927	-	704	704	-
Stage 2	-	-	-	-	-	-	704	707	-	929	929	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	886	-	-	724	-	-	80	99	321	80	100	438
Stage 1	-	-	-	-	-	-	318	343	-	423	435	-
Stage 2	-	-	-	-	-	-	423	434	-	317	342	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	886	-	-	724	-	-	80	98	321	62	99	438
Mov Cap-2 Maneuver	-	-	-	-	-	-	80	98	-	62	99	-
Stage 1	-	-	-	-	-	-	318	343	-	423	432	-
Stage 2	-	-	-	-	-	-	420	431	-	254	342	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0	0.1	23.8	68.6
HCM LOS			C	F

Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	88	321	886	-	-	724	-	-	62
HCM Lane V/C Ratio	0.124	0.186	-	-	-	0.008	-	-	0.088
HCM Control Delay (s)	51.6	18.8	0	-	-	10	-	-	68.6
HCM Lane LOS	F	C	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.4	0.7	0	-	-	0	-	-	0.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	430	5	175	310	5	5	5	45	5	0	0
Future Volume (vph)	0	430	5	175	310	5	5	5	45	5	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.999				0.850			
Flt Protected					0.982			0.976			0.950	
Satd. Flow (prot)	0	1808	0	0	1775	0	0	1766	1538	0	1719	0
Flt Permitted					0.982			0.976			0.950	
Satd. Flow (perm)	0	1808	0	0	1775	0	0	1766	1538	0	1719	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		724			1081			130			454	
Travel Time (s)		16.5			24.6			3.0			10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	467	5	190	337	5	5	5	49	5	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	472	0	0	532	0	0	10	49	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 63.4%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	0	430	5	175	310	5	5	5	45	5	0	0
Future Volume (Veh/h)	0	430	5	175	310	5	5	5	45	5	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	467	5	190	337	5	5	5	49	5	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	342			472			1189	1192	470	1192	1192	340
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	342			472			1189	1192	470	1192	1192	340
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			82			96	97	92	96	100	100
cM capacity (veh/h)	1200			1074			140	152	588	125	152	696

Direction, Lane #	EB 1	WB 1	NE 1	NE 2	SW 1
Volume Total	472	532	10	49	5
Volume Left	0	190	5	0	5
Volume Right	5	5	0	49	0
cSH	1200	1074	146	588	125
Volume to Capacity	0.00	0.18	0.07	0.08	0.04
Queue Length 95th (ft)	0	16	5	7	3
Control Delay (s)	0.0	4.5	31.5	11.7	35.0
Lane LOS		A	D	B	D
Approach Delay (s)	0.0	4.5	15.0		35.0
Approach LOS			C		D

Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	63.4%	ICU Level of Service	B	
Analysis Period (min)	15			

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	0	430	5	175	310	5	5	5	45	5	0	0
Future Vol, veh/h	0	430	5	175	310	5	5	5	45	5	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	467	5	190	337	5	5	5	49	5	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	342	0	0	473	0	0	1190	1193	470	1193	1193	340
Stage 1	-	-	-	-	-	-	470	470	-	720	720	-
Stage 2	-	-	-	-	-	-	720	723	-	473	473	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1200	-	-	1073	-	-	162	184	587	161	184	696
Stage 1	-	-	-	-	-	-	568	555	-	414	428	-
Stage 2	-	-	-	-	-	-	414	426	-	566	553	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1200	-	-	1073	-	-	135	144	587	119	144	696
Mov Cap-2 Maneuver	-	-	-	-	-	-	135	144	-	119	144	-
Stage 1	-	-	-	-	-	-	568	555	-	414	334	-
Stage 2	-	-	-	-	-	-	323	333	-	514	553	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0	3.2	15.6	36.7
HCM LOS			C	E

Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	139	587	1200	-	-	1073	-	-	119
HCM Lane V/C Ratio	0.078	0.083	-	-	-	0.177	-	-	0.046
HCM Control Delay (s)	33.1	11.7	0	-	-	9.1	-	-	36.7
HCM Lane LOS	D	B	A	-	-	A	-	-	E
HCM 95th %tile Q(veh)	0.3	0.3	0	-	-	0.6	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	490	5	210	355	5	5	5	55	5	0	0
Future Volume (vph)	0	490	5	210	355	5	5	5	55	5	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.999				0.850			
Flt Protected					0.982			0.976			0.950	
Satd. Flow (prot)	0	1808	0	0	1775	0	0	1766	1538	0	1719	0
Flt Permitted					0.982			0.976			0.950	
Satd. Flow (perm)	0	1808	0	0	1775	0	0	1766	1538	0	1719	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		724			1081			130			454	
Travel Time (s)		16.5			24.6			3.0			10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	533	5	228	386	5	5	5	60	5	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	538	0	0	619	0	0	10	60	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 70.9%		ICU Level of Service C	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	0	490	5	210	355	5	5	5	55	5	0	0
Future Volume (Veh/h)	0	490	5	210	355	5	5	5	55	5	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	533	5	228	386	5	5	5	60	5	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	391			538			1380	1382	536	1382	1382	388
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	391			538			1380	1382	536	1382	1382	388
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			78			95	95	89	94	100	100
cM capacity (veh/h)	1151			1015			99	110	539	85	110	653

Direction, Lane #	EB 1	WB 1	NE 1	NE 2	SW 1
Volume Total	538	619	10	60	5
Volume Left	0	228	5	0	5
Volume Right	5	5	0	60	0
cSH	1151	1015	104	539	85
Volume to Capacity	0.00	0.22	0.10	0.11	0.06
Queue Length 95th (ft)	0	22	8	9	5
Control Delay (s)	0.0	5.3	43.2	12.5	50.1
Lane LOS		A	E	B	F
Approach Delay (s)	0.0	5.3	16.9		50.1
Approach LOS			C		F

Intersection Summary				
Average Delay	3.8			
Intersection Capacity Utilization	70.9%	ICU Level of Service		C
Analysis Period (min)	15			

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	0	490	5	210	355	5	5	5	55	5	0	0
Future Vol, veh/h	0	490	5	210	355	5	5	5	55	5	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	0	533	5	228	386	5	5	5	60	5	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	391	0	0	538	0	0	1380	1383	535	1383	1383	389
Stage 1	-	-	-	-	-	-	535	535	-	845	845	-
Stage 2	-	-	-	-	-	-	845	848	-	538	538	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	1151	-	-	1015	-	-	120	142	540	119	142	653
Stage 1	-	-	-	-	-	-	524	519	-	353	375	-
Stage 2	-	-	-	-	-	-	353	373	-	522	517	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1151	-	-	1015	-	-	93	101	540	79	101	653
Mov Cap-2 Maneuver	-	-	-	-	-	-	93	101	-	79	101	-
Stage 1	-	-	-	-	-	-	524	519	-	353	267	-
Stage 2	-	-	-	-	-	-	252	266	-	459	517	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0	3.5	17.8	53.9
HCM LOS			C	F

Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	97	540	1151	-	-	1015	-	-	79
HCM Lane V/C Ratio	0.112	0.111	-	-	-	0.225	-	-	0.069
HCM Control Delay (s)	46.7	12.5	0	-	-	9.6	-	-	53.9
HCM Lane LOS	E	B	A	-	-	A	-	-	F
HCM 95th %tile Q(veh)	0.4	0.4	0	-	-	0.9	-	-	0.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	5	560	5	660	565	5	30	5	65	0	0	5
Future Volume (vph)	5	560	5	660	565	5	30	5	65	0	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	250		0	0		0	0		0
Storage Lanes	0		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.999				0.850		0.865	
Flt Protected				0.950				0.958				
Satd. Flow (prot)	0	1808	0	1719	1808	0	0	1734	1538	0	1565	0
Flt Permitted				0.950				0.958				
Satd. Flow (perm)	0	1808	0	1719	1808	0	0	1734	1538	0	1565	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		724			1081			130			454	
Travel Time (s)		16.5			24.6			3.0			10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	609	5	717	614	5	33	5	71	0	0	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	619	0	717	619	0	0	38	71	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 85.2%		ICU Level of Service E	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	5	560	5	660	565	5	30	5	65	0	0	5
Future Volume (Veh/h)	5	560	5	660	565	5	30	5	65	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	609	5	717	614	5	33	5	71	0	0	5
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	619			614			2674	2674	612	2674	2674	616
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	619			614			2674	2674	612	2674	2674	616
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			25			0	6	85	100	100	99
cM capacity (veh/h)	947			951			5	5	488	1	5	485

Direction, Lane #	EB 1	WB 1	WB 2	NE 1	NE 2	SW 1
Volume Total	619	717	619	38	71	5
Volume Left	5	717	0	33	0	0
Volume Right	5	0	5	0	71	5
cSH	947	951	1700	5	488	485
Volume to Capacity	0.01	0.75	0.36	7.11	0.15	0.01
Queue Length 95th (ft)	0	184	0	Err	13	1
Control Delay (s)	0.1	19.4	0.0	Err	13.6	12.5
Lane LOS	A	C		F	B	B
Approach Delay (s)	0.1	10.4		3494.8		12.5
Approach LOS				F		B

Intersection Summary				
Average Delay	190.9			
Intersection Capacity Utilization	85.2%	ICU Level of Service		E
Analysis Period (min)	15			

Intersection	
Int Delay, s/veh	87.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↰	↱			↰	↱		↕	
Traffic Vol, veh/h	5	560	5	660	565	5	30	5	65	0	0	5
Future Vol, veh/h	5	560	5	660	565	5	30	5	65	0	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	250	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	5	609	5	717	614	5	33	5	71	0	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	620	0	0	614	0	0	2676	2676	611	2677	2677	617
Stage 1	-	-	-	-	-	-	622	622	-	2052	2052	-
Stage 2	-	-	-	-	-	-	2054	2054	-	625	625	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	946	-	-	951	-	-	~ 14	22	488	14	22	484
Stage 1	-	-	-	-	-	-	469	474	-	71	96	-
Stage 2	-	-	-	-	-	-	71	96	-	468	473	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	946	-	-	951	-	-	~ 5	~ 5	488	-	5	484
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 5	~ 5	-	-	5	-
Stage 1	-	-	-	-	-	-	465	470	-	70	24	-
Stage 2	-	-	-	-	-	-	~ 17	24	-	392	469	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0.1	10.4	$ 1539.9	
HCM LOS			F	-

Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	5	488	946	-	-	951	-	-	-
HCM Lane V/C Ratio	7.609	0.145	0.006	-	-	0.754	-	-	-
HCM Control Delay (s)	$ 4374.4	13.6	8.8	0	-	19.4	-	-	-
HCM Lane LOS	F	B	A	A	-	C	-	-	-
HCM 95th %tile Q(veh)	6.4	0.5	0	-	-	7.4	-	-	-

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	5	1105	5	255	910	5	30	5	65	0	0	5
Future Volume (vph)	5	1105	5	255	910	5	30	5	65	0	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	250		0	0		0	0		0
Storage Lanes	0		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.999				0.850		0.865	
Flt Protected				0.950				0.958				
Satd. Flow (prot)	0	1808	0	1719	1808	0	0	1734	1538	0	1565	0
Flt Permitted				0.950				0.958				
Satd. Flow (perm)	0	1808	0	1719	1808	0	0	1734	1538	0	1565	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		724			1081			130			454	
Travel Time (s)		16.5			24.6			3.0			10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	1201	5	277	989	5	33	5	71	0	0	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1211	0	277	994	0	0	38	71	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 125.5%		ICU Level of Service H	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	5	1105	5	255	910	5	30	5	65	0	0	5
Future Volume (Veh/h)	5	1105	5	255	910	5	30	5	65	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	1201	5	277	989	5	33	5	71	0	0	5
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	994			1206			2762	2762	1204	2762	2762	992
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	994			1206			2762	2762	1204	2762	2762	992
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			51			0	48	68	100	100	98
cM capacity (veh/h)	684			568			7	10	221	3	10	295

Direction, Lane #	EB 1	WB 1	WB 2	NE 1	NE 2	SW 1
Volume Total	1211	277	994	38	71	5
Volume Left	5	277	0	33	0	0
Volume Right	5	0	5	0	71	5
cSH	684	568	1700	8	221	295
Volume to Capacity	0.01	0.49	0.58	4.98	0.32	0.02
Queue Length 95th (ft)	1	67	0	Err	33	1
Control Delay (s)	0.3	17.2	0.0	Err	28.8	17.4
Lane LOS	A	C		F	D	C
Approach Delay (s)	0.3	3.8		3504.6		17.4
Approach LOS				F		C

Intersection Summary				
Average Delay	149.2			
Intersection Capacity Utilization	125.5%	ICU Level of Service		H
Analysis Period (min)	15			

Intersection	
Int Delay, s/veh	46.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕		↰	↱			↕	↗		↕	
Traffic Vol, veh/h	5	1105	5	255	910	5	30	5	65	0	0	5
Future Vol, veh/h	5	1105	5	255	910	5	30	5	65	0	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	250	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	5	1201	5	277	989	5	33	5	71	0	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	995	0	0	1207	0	0	2764	2764	1204	2763	2763	992
Stage 1	-	-	-	-	-	-	1215	1215	-	1546	1546	-
Stage 2	-	-	-	-	-	-	1549	1549	-	1217	1217	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	683	-	-	568	-	-	~ 12	19	221	12	19	294
Stage 1	-	-	-	-	-	-	219	251	-	141	173	-
Stage 2	-	-	-	-	-	-	140	172	-	218	250	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	683	-	-	568	-	-	~ 7	10	221	3	10	294
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 7	10	-	3	10	-
Stage 1	-	-	-	-	-	-	214	245	-	138	89	-
Stage 2	-	-	-	-	-	-	70	88	-	142	245	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0	3.8	$ 1075.1	17.5
HCM LOS			F	C

Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	7	221	683	-	-	568	-	-	294
HCM Lane V/C Ratio	5.435	0.32	0.008	-	-	0.488	-	-	0.018
HCM Control Delay (s)	$ 3018.3	28.8	10.3	0	-	17.2	-	-	17.5
HCM Lane LOS	F	D	B	A	-	C	-	-	C
HCM 95th %tile Q(veh)	6.2	1.3	0	-	-	2.7	-	-	0.1

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	5	480	5	580	535	5	25	5	55	0	0	5
Future Volume (vph)	5	480	5	580	535	5	25	5	55	0	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.999				0.850		0.865	
Flt Protected					0.975			0.960				
Satd. Flow (prot)	0	1808	0	0	1763	0	0	1737	1538	0	1565	0
Flt Permitted					0.975			0.960				
Satd. Flow (perm)	0	1808	0	0	1763	0	0	1737	1538	0	1565	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		724			1081			130			454	
Travel Time (s)		16.5			24.6			3.0			10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	522	5	630	582	5	27	5	60	0	0	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	532	0	0	1217	0	0	32	60	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	104.7%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	5	480	5	580	535	5	25	5	55	0	0	5
Future Volume (Veh/h)	5	480	5	580	535	5	25	5	55	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	522	5	630	582	5	27	5	60	0	0	5
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	587			527			2384	2382	524	2382	2382	584
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	587			527			2384	2382	524	2382	2382	584
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			39			0	61	89	100	100	99
cM capacity (veh/h)	973			1025			12	13	547	8	13	506

Direction, Lane #	EB 1	WB 1	NE 1	NE 2	SW 1
Volume Total	532	1217	32	60	5
Volume Left	5	630	27	0	0
Volume Right	5	5	0	60	5
cSH	973	1025	12	547	506
Volume to Capacity	0.01	0.61	2.71	0.11	0.01
Queue Length 95th (ft)	0	110	124	9	1
Control Delay (s)	0.1	13.5	1415.7	12.4	12.2
Lane LOS	A	B	F	B	B
Approach Delay (s)	0.1	13.5	500.5		12.2
Approach LOS			F		B

Intersection Summary				
Average Delay	33.9			
Intersection Capacity Utilization	104.7%	ICU Level of Service	G	
Analysis Period (min)	15			

Intersection	
Int Delay, s/veh	73.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↳			↰	↱		↕	
Traffic Vol, veh/h	5	480	5	580	535	5	25	5	55	0	0	5
Future Vol, veh/h	5	480	5	580	535	5	25	5	55	0	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	5	522	5	630	582	5	27	5	60	0	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	587	0	0	527	0	0	2383	2383	524	2383	2383	584
Stage 1	-	-	-	-	-	-	535	535	-	1845	1845	-
Stage 2	-	-	-	-	-	-	1848	1848	-	538	538	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	973	-	-	1025	-	-	~ 23	34	547	23	34	506
Stage 1	-	-	-	-	-	-	524	519	-	94	123	-
Stage 2	-	-	-	-	-	-	94	122	-	522	517	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	973	-	-	1025	-	-	~ 5	~ 3	547	-	3	506
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 5	~ 3	-	-	3	-
Stage 1	-	-	-	-	-	-	520	515	-	93	11	-
Stage 2	-	-	-	-	-	-	~ 8	11	-	457	513	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0.1	7.2	$ 1377.3	
HCM LOS			F	-

Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	5	547	973	-	-	1025	-	-	-
HCM Lane V/C Ratio	6.522	0.109	0.006	-	-	0.615	-	-	-
HCM Control Delay (s)	$ 3879.6	12.4	8.7	0	-	14	-	-	-
HCM Lane LOS	F	B	A	A	-	B	-	-	-
HCM 95th %tile Q(veh)	5.6	0.4	0	-	-	4.4	-	-	-

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	5	560	5	660	565	5	30	5	65	0	0	5
Future Volume (vph)	5	560	5	660	565	5	30	5	65	0	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.999				0.850		0.865	
Flt Protected					0.974			0.958				
Satd. Flow (prot)	0	1808	0	0	1761	0	0	1734	1538	0	1565	0
Flt Permitted					0.974			0.958				
Satd. Flow (perm)	0	1808	0	0	1761	0	0	1734	1538	0	1565	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		724			1081			130			454	
Travel Time (s)		16.5			24.6			3.0			10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	609	5	717	614	5	33	5	71	0	0	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	619	0	0	1336	0	0	38	71	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	115.2%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	5	560	5	660	565	5	30	5	65	0	0	5
Future Volume (Veh/h)	5	560	5	660	565	5	30	5	65	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	609	5	717	614	5	33	5	71	0	0	5
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	619			614			2677	2674	612	2674	2674	616
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	619			614			2677	2674	612	2674	2674	616
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			25			0	6	85	100	100	99
cM capacity (veh/h)	947			951			5	5	488	1	5	485

Direction, Lane #	EB 1	WB 1	NE 1	NE 2	SW 1
Volume Total	619	1336	38	71	5
Volume Left	5	717	33	0	0
Volume Right	5	5	0	71	5
cSH	947	951	5	488	485
Volume to Capacity	0.01	0.75	7.13	0.15	0.01
Queue Length 95th (ft)	0	184	Err	13	1
Control Delay (s)	0.1	19.4	Err	13.6	12.5
Lane LOS	A	C	F	B	B
Approach Delay (s)	0.1	19.4	3494.8		12.5
Approach LOS			F		B

Intersection Summary				
Average Delay	196.7			
Intersection Capacity Utilization	115.2%	ICU Level of Service	H	
Analysis Period (min)	15			

Intersection	
Int Delay, s/veh	6.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Vol, veh/h	5	560	5	660	565	5	30	5	65	0	0	5
Future Vol, veh/h	5	560	5	660	565	5	30	5	65	0	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Yield	-	-	None
Storage Length	-	-	-	-	-	-	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Mvmt Flow	5	609	5	717	614	5	33	5	71	0	0	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	620	0	0	614	0	0	2676	2676	611	2677	2677	617
Stage 1	-	-	-	-	-	-	622	622	-	2052	2052	-
Stage 2	-	-	-	-	-	-	2054	2054	-	625	625	-
Critical Hdwy	4.15	-	-	4.15	-	-	7.15	6.55	6.25	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.55	-	6.15	5.55	-
Follow-up Hdwy	2.245	-	-	2.245	-	-	3.545	4.045	3.345	3.545	4.045	3.345
Pot Cap-1 Maneuver	946	-	-	951	-	-	~ 14	22	488	14	22	484
Stage 1	-	-	-	-	-	-	469	474	-	71	96	-
Stage 2	-	-	-	-	-	-	71	96	-	468	473	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	946	-	-	951	-	-	-	0	488	-	0	484
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	0	-	-	0	-
Stage 1	-	-	-	-	-	-	465	470	-	70	0	-
Stage 2	-	-	-	-	-	-	-	0	-	392	469	-

Approach	EB	WB	NE	SW
HCM Control Delay, s	0.1	10.4		
HCM LOS			-	-

Minor Lane/Major Mvmt	NELn1	NELn2	EBL	EBT	EBR	WBL	WBT	WBR	SWLn1
Capacity (veh/h)	-	488	946	-	-	951	-	-	-
HCM Lane V/C Ratio	-	0.145	0.006	-	-	0.754	-	-	-
HCM Control Delay (s)	-	13.6	8.8	0	-	19.4	-	-	-
HCM Lane LOS	-	B	A	A	-	C	-	-	-
HCM 95th %tile Q(veh)	-	0.5	0	-	-	7.4	-	-	-

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	860	345	210	20	200	145	175	115	30	35	30	150
Future Volume (vph)	860	345	210	20	200	145	175	115	30	35	30	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.937			0.969				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1745	0	1770	1805	0	1770	1863	1583
Flt Permitted	0.121			0.539			0.950			0.657		
Satd. Flow (perm)	225	1863	1583	1004	1745	0	1770	1805	0	1224	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			228		23			9				163
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		472			455			538			297	
Travel Time (s)		10.7			10.3			12.2			6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	935	375	228	22	217	158	190	125	33	38	33	163
Shared Lane Traffic (%)												
Lane Group Flow (vph)	935	375	228	22	375	0	190	158	0	38	33	163
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Perm	NA		Prot	NA		Perm	NA	Perm
Protected Phases	1	6			2		3	8			4	
Permitted Phases	6		6	2						4		4
Detector Phase	1	6	6	2	2		3	8		4	4	4
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		4.0	10.0		10.0	10.0	10.0

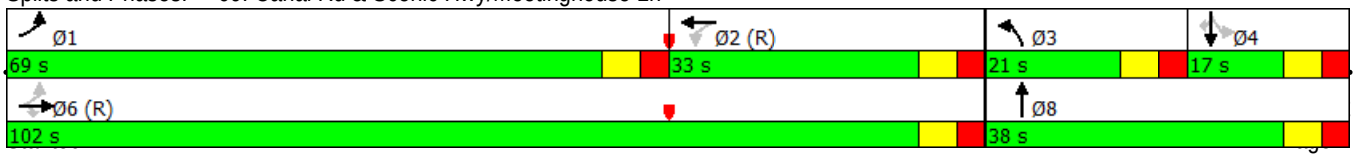
Lanes, Volumes, Timings
69: Canal Rd & Scenic Hwy/Meetinghouse Ln 02/14/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	17.0	17.0	17.0	17.0	17.0		11.0	17.0		17.0	17.0	17.0
Total Split (s)	69.0	102.0	102.0	33.0	33.0		21.0	38.0		17.0	17.0	17.0
Total Split (%)	49.3%	72.9%	72.9%	23.6%	23.6%		15.0%	27.1%		12.1%	12.1%	12.1%
Maximum Green (s)	62.0	95.0	95.0	26.0	26.0		14.0	31.0		10.0	10.0	10.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	None
Act Effct Green (s)	95.0	95.0	95.0	26.0	26.0		14.0	31.0		10.0	10.0	10.0
Actuated g/C Ratio	0.68	0.68	0.68	0.19	0.19		0.10	0.22		0.07	0.07	0.07
v/c Ratio	1.12	0.30	0.20	0.12	1.10		1.07	0.39		0.44	0.25	0.62
Control Delay	101.1	9.8	1.3	49.5	125.8		146.3	47.0		78.4	66.4	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	101.1	9.8	1.3	49.5	125.8		146.3	47.0		78.4	66.4	19.5
LOS	F	A	A	D	F		F	D		E	E	B
Approach Delay		64.0			121.5			101.2			35.7	
Approach LOS		E			F			F			D	
Queue Length 50th (ft)	~927	127	0	17	~367		~192	116		34	29	0
Queue Length 95th (ft)	#1188	177	26	44	#574		#352	187		74	66	72
Internal Link Dist (ft)		392			375			458			217	
Turn Bay Length (ft)												
Base Capacity (vph)	836	1264	1147	186	342		177	406		87	133	264
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	1.12	0.30	0.20	0.12	1.10		1.07	0.39		0.44	0.25	0.62

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.12
Intersection Signal Delay: 75.6 Intersection LOS: E
Intersection Capacity Utilization 108.4% 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.

Splits and Phases: 69: Canal Rd & Scenic Hwy/Meetinghouse Ln



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	860	345	210	20	200	145	175	115	30	35	30	150
Future Volume (vph)	860	345	210	20	200	145	175	115	30	35	30	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1745		1770	1804		1770	1863	1583
Flt Permitted	0.12	1.00	1.00	0.54	1.00		0.95	1.00		0.66	1.00	1.00
Satd. Flow (perm)	226	1863	1583	1003	1745		1770	1804		1223	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	935	375	228	22	217	158	190	125	33	38	33	163
RTOR Reduction (vph)	0	0	73	0	19	0	0	7	0	0	0	151
Lane Group Flow (vph)	935	375	155	22	356	0	190	151	0	38	33	12
Turn Type	pm+pt	NA	Perm	Perm	NA		Prot	NA		Perm	NA	Perm
Protected Phases	1	6			2		3	8			4	
Permitted Phases	6		6	2						4		4
Actuated Green, G (s)	95.0	95.0	95.0	26.0	26.0		14.0	31.0		10.0	10.0	10.0
Effective Green, g (s)	95.0	95.0	95.0	26.0	26.0		14.0	31.0		10.0	10.0	10.0
Actuated g/C Ratio	0.68	0.68	0.68	0.19	0.19		0.10	0.22		0.07	0.07	0.07
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	837	1264	1074	186	324		177	399		87	133	113
v/s Ratio Prot	c0.49	0.20			0.20		c0.11	c0.08			0.02	
v/s Ratio Perm	c0.26		0.10	0.02						0.03		0.01
v/c Ratio	1.12	0.30	0.14	0.12	1.10		1.07	0.38		0.44	0.25	0.10
Uniform Delay, d1	34.0	9.1	8.0	47.5	57.0		63.0	46.3		62.3	61.4	60.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	68.5	0.6	0.3	1.3	79.4		88.5	0.6		3.5	1.0	0.4
Delay (s)	102.5	9.7	8.3	48.8	136.4		151.5	46.9		65.8	62.4	61.2
Level of Service	F	A	A	D	F		F	D		E	E	E
Approach Delay (s)		65.9			131.6			104.0			62.1	
Approach LOS		E			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	81.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	108.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	860	345	210	20	200	145	175	115	30	35	30	150
Future Volume (veh/h)	860	345	210	20	200	145	175	115	30	35	30	150
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	935	375	228	22	217	158	190	125	0	38	33	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	837	1264	1074	202	186	136	177	412	0	141	133	113
Arrive On Green	0.44	0.68	0.68	0.19	0.19	0.19	0.10	0.22	0.00	0.07	0.07	0.00
Sat Flow, veh/h	1774	1863	1583	813	1003	731	1774	1863	0	1261	1863	1583
Grp Volume(v), veh/h	935	375	228	22	0	375	190	125	0	38	33	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	813	0	1734	1774	1863	0	1261	1863	1583
Q Serve(g_s), s	62.0	11.3	7.6	3.2	0.0	26.0	14.0	7.8	0.0	4.0	2.3	0.0
Cycle Q Clear(g_c), s	62.0	11.3	7.6	3.2	0.0	26.0	14.0	7.8	0.0	4.0	2.3	0.0
Prop In Lane	1.00		1.00	1.00		0.42	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	837	1264	1074	202	0	322	177	412	0	141	133	113
V/C Ratio(X)	1.12	0.30	0.21	0.11	0.00	1.16	1.07	0.30	0.00	0.27	0.25	0.00
Avail Cap(c_a), veh/h	837	1264	1074	202	0	322	177	412	0	141	133	113
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.0	9.1	8.4	47.7	0.0	57.0	63.0	45.5	0.0	62.2	61.5	0.0
Incr Delay (d2), s/veh	68.4	0.6	0.5	1.1	0.0	102.5	87.7	0.4	0.0	1.0	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	48.2	6.0	3.4	0.8	0.0	21.6	11.2	4.1	0.0	1.5	1.2	0.0
LnGrp Delay(d),s/veh	102.5	9.7	8.9	48.8	0.0	159.5	150.7	45.9	0.0	63.2	62.4	0.0
LnGrp LOS	F	A	A	D		F	F	D		E	E	
Approach Vol, veh/h		1538			397			315			71	
Approach Delay, s/veh		66.0			153.4			109.1			62.9	
Approach LOS		E			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4		6		8
Phs Duration (G+Y+Rc), s	69.0	33.0	21.0	17.0		102.0		38.0
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0		7.0		7.0
Max Green Setting (Gmax), s	62.0	26.0	14.0	10.0		95.0		31.0
Max Q Clear Time (g_c+I1), s	64.0	28.0	16.0	6.0		13.3		9.8
Green Ext Time (p_c), s	0.0	0.0	0.0	0.3		7.0		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	86.7
HCM 2010 LOS	F

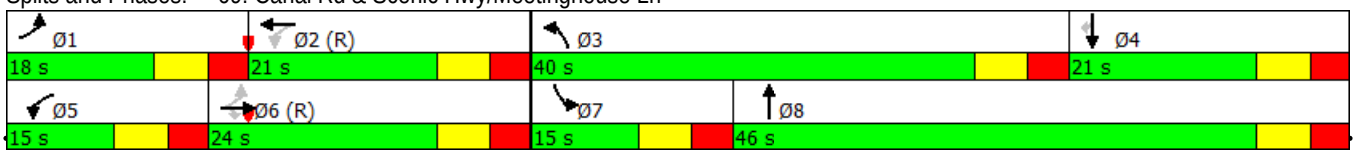
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	480	250	175	15	160	65	145	95	25	25	25	115
Future Volume (vph)	480	250	175	15	160	65	145	95	25	25	25	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.957			0.969				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1783	0	1770	1805	0	1770	1863	1583
Flt Permitted	0.220			0.592			0.950			0.950		
Satd. Flow (perm)	410	1863	1583	1103	1783	0	1770	1805	0	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			273		17			15				273
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		472			455			538			297	
Travel Time (s)		10.7			10.3			12.2			6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	522	272	190	16	174	71	158	103	27	27	27	125
Shared Lane Traffic (%)												
Lane Group Flow (vph)	522	272	190	16	245	0	158	130	0	27	27	125
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2								4
Detector Phase	1	6	6	5	2		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	4.0	10.0		4.0	10.0		4.0	10.0	10.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	17.0	17.0	17.0	11.0	17.0		11.0	17.0		11.0	17.0	17.0
Total Split (s)	18.0	24.0	24.0	15.0	21.0		40.0	46.0		15.0	21.0	21.0
Total Split (%)	18.0%	24.0%	24.0%	15.0%	21.0%		40.0%	46.0%		15.0%	21.0%	21.0%
Maximum Green (s)	11.0	17.0	17.0	8.0	14.0		33.0	39.0		8.0	14.0	14.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	None
Act Effct Green (s)	54.7	49.3	49.3	20.0	14.0		14.3	22.6		6.9	10.0	10.0
Actuated g/C Ratio	0.55	0.49	0.49	0.20	0.14		0.14	0.23		0.07	0.10	0.10
v/c Ratio	0.77	0.30	0.21	0.06	0.93		0.62	0.31		0.22	0.15	0.31
Control Delay	28.5	19.0	1.0	17.5	80.7		50.7	31.9		48.1	43.2	2.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	28.5	19.0	1.0	17.5	80.7		50.7	31.9		48.1	43.2	2.0
LOS	C	B	A	B	F		D	C		D	D	A
Approach Delay		20.6			76.8			42.2			15.2	
Approach LOS		C			E			D			B	
Queue Length 50th (ft)	225	87	0	4	146		96	65		17	16	0
Queue Length 95th (ft)	#450	202	8	16	#295		153	116		44	42	0
Internal Link Dist (ft)		392			375			458			217	
Turn Bay Length (ft)												
Base Capacity (vph)	682	918	918	296	264		584	713		141	260	456
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	0.30	0.21	0.05	0.93		0.27	0.18		0.19	0.10	0.27

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.93
Intersection Signal Delay: 32.2 Intersection LOS: C
Intersection Capacity Utilization 71.2% 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: 69: Canal Rd & Scenic Hwy/Meetinghouse Ln



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	480	250	175	15	160	65	145	95	25	25	25	115
Future Volume (vph)	480	250	175	15	160	65	145	95	25	25	25	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1782		1770	1805		1770	1863	1583
Flt Permitted	0.22	1.00	1.00	0.59	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	409	1863	1583	1103	1782		1770	1805		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	522	272	190	16	174	71	158	103	27	27	27	125
RTOR Reduction (vph)	0	0	110	0	15	0	0	12	0	0	0	109
Lane Group Flow (vph)	522	272	80	16	230	0	158	118	0	27	27	16
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2								4
Actuated Green, G (s)	51.9	42.3	42.3	13.8	11.2		14.3	22.6		4.5	12.8	12.8
Effective Green, g (s)	51.9	42.3	42.3	13.8	11.2		14.3	22.6		4.5	12.8	12.8
Actuated g/C Ratio	0.52	0.42	0.42	0.14	0.11		0.14	0.23		0.04	0.13	0.13
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	670	788	669	169	199		253	407		79	238	202
v/s Ratio Prot	c0.26	0.15		0.00	c0.13		c0.09	c0.07		0.02	0.01	
v/s Ratio Perm	0.14		0.05	0.01								0.01
v/c Ratio	0.78	0.35	0.12	0.09	1.16		0.62	0.29		0.34	0.11	0.08
Uniform Delay, d1	20.5	19.5	17.5	37.5	44.4		40.3	32.1		46.3	38.6	38.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.7	1.2	0.4	0.2	111.9		4.7	0.4		2.6	0.2	0.2
Delay (s)	26.2	20.7	17.9	37.7	156.3		45.1	32.5		48.9	38.8	38.6
Level of Service	C	C	B	D	F		D	C		D	D	D
Approach Delay (s)		23.1			149.0			39.4			40.2	
Approach LOS		C			F			D			D	

Intersection Summary			
HCM 2000 Control Delay	46.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	480	250	175	15	160	65	145	95	25	25	25	115
Future Volume (veh/h)	480	250	175	15	160	65	145	95	25	25	25	115
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	522	272	190	16	174	71	158	103	0	27	27	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	612	926	787	469	505	206	195	349	0	37	184	156
Arrive On Green	0.11	0.50	0.50	0.01	0.40	0.40	0.11	0.19	0.00	0.02	0.10	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1259	514	1774	1863	0	1774	1863	1583
Grp Volume(v), veh/h	522	272	190	16	0	245	158	103	0	27	27	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	0	1772	1774	1863	0	1774	1863	1583
Q Serve(g_s), s	11.0	8.6	6.9	0.5	0.0	9.6	8.7	4.8	0.0	1.5	1.3	0.0
Cycle Q Clear(g_c), s	11.0	8.6	6.9	0.5	0.0	9.6	8.7	4.8	0.0	1.5	1.3	0.0
Prop In Lane	1.00		1.00	1.00		0.29	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	612	926	787	469	0	712	195	349	0	37	184	156
V/C Ratio(X)	0.85	0.29	0.24	0.03	0.00	0.34	0.81	0.30	0.00	0.72	0.15	0.00
Avail Cap(c_a), veh/h	612	926	787	586	0	712	585	726	0	142	261	222
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	22.1	14.8	14.4	17.2	0.0	20.8	43.5	35.0	0.0	48.7	41.2	0.0
Incr Delay (d2), s/veh	11.2	0.8	0.7	0.0	0.0	1.3	7.9	0.5	0.0	22.7	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.4	4.6	3.1	0.3	0.0	5.0	4.7	2.5	0.0	1.0	0.7	0.0
LnGrp Delay(d),s/veh	33.3	15.6	15.1	17.2	0.0	22.1	51.4	35.4	0.0	71.4	41.6	0.0
LnGrp LOS	C	B	B	B		C	D	D		E	D	
Approach Vol, veh/h		984			261			261			54	
Approach Delay, s/veh		24.9			21.8			45.1			56.5	
Approach LOS		C			C			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.0	47.2	18.0	16.9	8.4	56.7	9.1	25.7
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Max Green Setting (Gmax), s	11.0	14.0	33.0	14.0	8.0	17.0	8.0	39.0
Max Q Clear Time (g_c+I1), s	13.0	11.6	10.7	3.3	2.5	10.6	3.5	6.8
Green Ext Time (p_c), s	0.0	0.9	0.4	0.4	0.0	2.1	0.0	0.7

Intersection Summary	
HCM 2010 Ctrl Delay	28.8
HCM 2010 LOS	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	765	345	210	20	200	145	175	115	30	35	30	150
Future Volume (vph)	765	345	210	20	200	145	175	115	30	35	30	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.937			0.969				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1745	0	1770	1805	0	1770	1863	1583
Flt Permitted	0.220			0.539			0.950			0.950		
Satd. Flow (perm)	410	1863	1583	1004	1745	0	1770	1805	0	1770	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			273		30			16				273
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		472			455			538			297	
Travel Time (s)		10.7			10.3			12.2			6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	832	375	228	22	217	158	190	125	33	38	33	163
Shared Lane Traffic (%)												
Lane Group Flow (vph)	832	375	228	22	375	0	190	158	0	38	33	163
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2								4
Detector Phase	1	6	6	5	2		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	4.0	10.0		4.0	10.0		4.0	10.0	10.0

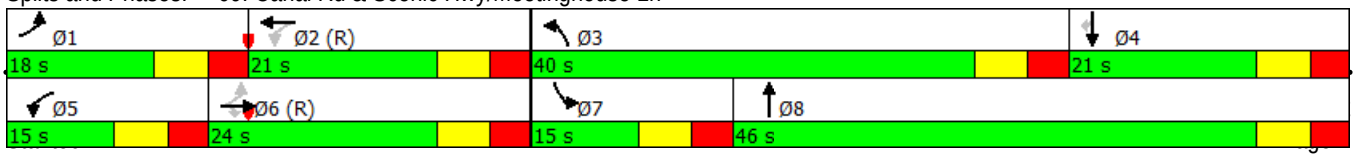
Lanes, Volumes, Timings
69: Canal Rd & Scenic Hwy/Meetinghouse Ln 02/14/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	17.0	17.0	17.0	11.0	17.0		11.0	17.0		11.0	17.0	17.0
Total Split (s)	18.0	24.0	24.0	15.0	21.0		40.0	46.0		15.0	21.0	21.0
Total Split (%)	18.0%	24.0%	24.0%	15.0%	21.0%		40.0%	46.0%		15.0%	21.0%	21.0%
Maximum Green (s)	11.0	17.0	17.0	8.0	14.0		33.0	39.0		8.0	14.0	14.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	None
Act Effct Green (s)	52.9	47.3	47.3	20.2	14.0		16.1	24.2		7.1	10.0	10.0
Actuated g/C Ratio	0.53	0.47	0.47	0.20	0.14		0.16	0.24		0.07	0.10	0.10
v/c Ratio	1.28	0.43	0.26	0.09	1.39		0.67	0.35		0.30	0.18	0.40
Control Delay	163.1	22.3	2.2	18.1	228.3		50.4	31.6		50.2	43.8	3.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	163.1	22.3	2.2	18.1	228.3		50.4	31.6		50.2	43.8	3.0
LOS	F	C	A	B	F		D	C		D	D	A
Approach Delay		100.8			216.7			41.8			16.4	
Approach LOS		F			F			D			B	
Queue Length 50th (ft)	~621	134	0	6	~305		115	81		23	20	0
Queue Length 95th (ft)	#930	298	29	21	#488		175	134		56	49	0
Internal Link Dist (ft)		392			375			458			217	
Turn Bay Length (ft)												
Base Capacity (vph)	650	882	893	282	270		584	713		141	260	456
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	1.28	0.43	0.26	0.08	1.39		0.33	0.22		0.27	0.13	0.36

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 140
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.39
Intersection Signal Delay: 103.2 Intersection LOS: F
Intersection Capacity Utilization 103.1% 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.

Splits and Phases: 69: Canal Rd & Scenic Hwy/Meetinghouse Ln



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	765	345	210	20	200	145	175	115	30	35	30	150
Future Volume (vph)	765	345	210	20	200	145	175	115	30	35	30	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1745		1770	1804		1770	1863	1583
Flt Permitted	0.22	1.00	1.00	0.54	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	409	1863	1583	1003	1745		1770	1804		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	832	375	228	22	217	158	190	125	33	38	33	163
RTOR Reduction (vph)	0	0	136	0	27	0	0	12	0	0	0	142
Lane Group Flow (vph)	832	375	92	22	348	0	190	146	0	38	33	21
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2								4
Actuated Green, G (s)	50.1	40.4	40.4	13.9	11.2		16.1	24.2		4.7	12.8	12.8
Effective Green, g (s)	50.1	40.4	40.4	13.9	11.2		16.1	24.2		4.7	12.8	12.8
Actuated g/C Ratio	0.50	0.40	0.40	0.14	0.11		0.16	0.24		0.05	0.13	0.13
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	639	752	639	160	195		284	436		83	238	202
v/s Ratio Prot	c0.42	0.20		0.00	c0.20		c0.11	c0.08		0.02	0.02	
v/s Ratio Perm	0.24		0.06	0.02								0.01
v/c Ratio	1.30	0.50	0.14	0.14	1.79		0.67	0.33		0.46	0.14	0.10
Uniform Delay, d1	26.1	22.2	18.9	37.5	44.4		39.4	31.3		46.4	38.7	38.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	147.1	2.4	0.5	0.4	373.8		5.9	0.5		4.0	0.3	0.2
Delay (s)	173.3	24.6	19.3	37.9	418.2		45.3	31.7		50.4	39.0	38.8
Level of Service	F	C	B	D	F		D	C		D	D	D
Approach Delay (s)		110.0			397.1			39.1			40.7	
Approach LOS		F			F			D			D	

Intersection Summary			
HCM 2000 Control Delay	140.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	103.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	765	345	210	20	200	145	175	115	30	35	30	150
Future Volume (veh/h)	765	345	210	20	200	145	175	115	30	35	30	150
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	832	375	228	22	217	158	190	125	0	38	33	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	479	882	749	381	383	279	228	375	0	48	185	158
Arrive On Green	0.11	0.47	0.47	0.02	0.38	0.38	0.13	0.20	0.00	0.03	0.10	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1003	731	1774	1863	0	1774	1863	1583
Grp Volume(v), veh/h	832	375	228	22	0	375	190	125	0	38	33	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	0	1734	1774	1863	0	1774	1863	1583
Q Serve(g_s), s	11.0	13.3	8.9	0.8	0.0	17.1	10.4	5.7	0.0	2.1	1.6	0.0
Cycle Q Clear(g_c), s	11.0	13.3	8.9	0.8	0.0	17.1	10.4	5.7	0.0	2.1	1.6	0.0
Prop In Lane	1.00		1.00	1.00		0.42	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	479	882	749	381	0	662	228	375	0	48	185	158
V/C Ratio(X)	1.74	0.43	0.30	0.06	0.00	0.57	0.83	0.33	0.00	0.79	0.18	0.00
Avail Cap(c_a), veh/h	479	882	749	491	0	662	585	726	0	142	261	222
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	26.7	17.4	16.2	18.3	0.0	24.4	42.5	34.2	0.0	48.4	41.3	0.0
Incr Delay (d2), s/veh	340.5	1.5	1.0	0.1	0.0	3.5	7.6	0.5	0.0	24.6	0.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	53.1	7.1	4.1	0.4	0.0	8.8	5.6	3.0	0.0	1.4	0.9	0.0
LnGrp Delay(d),s/veh	367.2	18.9	17.2	18.4	0.0	27.9	50.1	34.7	0.0	72.9	41.7	0.0
LnGrp LOS	F	B	B	B		C	D	C		E	D	
Approach Vol, veh/h		1435			397			315			71	
Approach Delay, s/veh		220.6			27.4			44.0			58.4	
Approach LOS		F			C			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.0	45.2	19.9	17.0	8.8	54.3	9.7	27.1
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Max Green Setting (Gmax), s	11.0	14.0	33.0	14.0	8.0	17.0	8.0	39.0
Max Q Clear Time (g_c+I1), s	13.0	19.1	12.4	3.6	2.8	15.3	4.1	7.7
Green Ext Time (p_c), s	0.0	0.0	0.5	0.5	0.0	1.0	0.0	0.9

Intersection Summary	
HCM 2010 Ctrl Delay	155.7
HCM 2010 LOS	F

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	765	345	210	20	200	145	175	115	30	35	30	150
Future Volume (vph)	765	345	210	20	200	145	175	115	30	35	30	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.937			0.969				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1745	0	1770	1805	0	1770	1863	1583
Flt Permitted	0.111			0.539			0.950			0.657		
Satd. Flow (perm)	207	1863	1583	1004	1745	0	1770	1805	0	1224	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			228		24			9				163
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		472			455			538			297	
Travel Time (s)		10.7			10.3			12.2			6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	832	375	228	22	217	158	190	125	33	38	33	163
Shared Lane Traffic (%)												
Lane Group Flow (vph)	832	375	228	22	375	0	190	158	0	38	33	163
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Perm	NA		Prot	NA		Perm	NA	Perm
Protected Phases	1	6			2		3	8			4	
Permitted Phases	6		6	2						4		4
Detector Phase	1	6	6	2	2		3	8		4	4	4
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0		4.0	10.0		10.0	10.0	10.0

Lanes, Volumes, Timings
69: Canal Rd & Scenic Hwy/Meetinghouse Ln

02/14/2018

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	17.0	17.0	17.0	17.0	17.0		11.0	17.0		17.0	17.0	17.0
Total Split (s)	65.0	101.0	101.0	36.0	36.0		22.0	39.0		17.0	17.0	17.0
Total Split (%)	46.4%	72.1%	72.1%	25.7%	25.7%		15.7%	27.9%		12.1%	12.1%	12.1%
Maximum Green (s)	58.0	94.0	94.0	29.0	29.0		15.0	32.0		10.0	10.0	10.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	None
Act Effct Green (s)	94.0	94.0	94.0	29.0	29.0		15.0	32.0		10.0	10.0	10.0
Actuated g/C Ratio	0.67	0.67	0.67	0.21	0.21		0.11	0.23		0.07	0.07	0.07
v/c Ratio	1.06	0.30	0.20	0.11	0.99		1.01	0.38		0.44	0.25	0.62
Control Delay	82.7	10.2	1.4	46.8	94.3		128.1	46.0		78.4	66.4	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	82.7	10.2	1.4	46.8	94.3		128.1	46.0		78.4	66.4	19.5
LOS	F	B	A	D	F		F	D		E	E	B
Approach Delay		50.8			91.7			90.8			35.7	
Approach LOS		D			F			F			D	
Queue Length 50th (ft)	~779	130	0	16	325		~176	115		34	29	0
Queue Length 95th (ft)	#1035	181	27	42	#538		#340	186		74	66	72
Internal Link Dist (ft)		392			375			458			217	
Turn Bay Length (ft)												
Base Capacity (vph)	786	1250	1137	207	380		189	419		87	133	264
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	1.06	0.30	0.20	0.11	0.99		1.01	0.38		0.44	0.25	0.62

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 61.9 — Intersection LOS: E

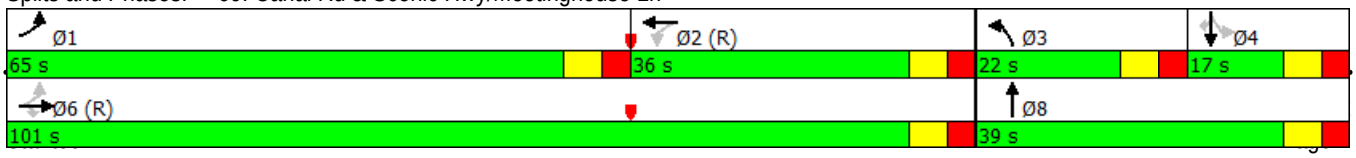
Intersection Capacity Utilization 103.1% — ICU Level of Service G

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.

Splits and Phases: 69: Canal Rd & Scenic Hwy/Meetinghouse Ln



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	765	345	210	20	200	145	175	115	30	35	30	150
Future Volume (vph)	765	345	210	20	200	145	175	115	30	35	30	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.94		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1745		1770	1804		1770	1863	1583
Flt Permitted	0.11	1.00	1.00	0.54	1.00		0.95	1.00		0.66	1.00	1.00
Satd. Flow (perm)	207	1863	1583	1003	1745		1770	1804		1223	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	832	375	228	22	217	158	190	125	33	38	33	163
RTOR Reduction (vph)	0	0	75	0	19	0	0	7	0	0	0	151
Lane Group Flow (vph)	832	375	153	22	356	0	190	151	0	38	33	12
Turn Type	pm+pt	NA	Perm	Perm	NA		Prot	NA		Perm	NA	Perm
Protected Phases	1	6			2		3	8			4	
Permitted Phases	6		6	2						4		4
Actuated Green, G (s)	94.0	94.0	94.0	29.0	29.0		15.0	32.0		10.0	10.0	10.0
Effective Green, g (s)	94.0	94.0	94.0	29.0	29.0		15.0	32.0		10.0	10.0	10.0
Actuated g/C Ratio	0.67	0.67	0.67	0.21	0.21		0.11	0.23		0.07	0.07	0.07
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	786	1250	1062	207	361		189	412		87	133	113
v/s Ratio Prot	c0.44	0.20			0.20		c0.11	c0.08			0.02	
v/s Ratio Perm	c0.27		0.10	0.02						0.03		0.01
v/c Ratio	1.06	0.30	0.14	0.11	0.99		1.01	0.37		0.44	0.25	0.10
Uniform Delay, d1	35.7	9.5	8.4	45.0	55.3		62.5	45.5		62.3	61.4	60.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	48.7	0.6	0.3	1.0	44.0		66.8	0.6		3.5	1.0	0.4
Delay (s)	84.4	10.1	8.7	46.0	99.3		129.3	46.0		65.8	62.4	61.2
Level of Service	F	B	A	D	F		F	D		E	E	E
Approach Delay (s)		52.9			96.4			91.5			62.1	
Approach LOS		D			F			F			E	

Intersection Summary			
HCM 2000 Control Delay	66.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	103.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	765	345	210	20	200	145	175	115	30	35	30	150
Future Volume (veh/h)	765	345	210	20	200	145	175	115	30	35	30	150
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	832	375	228	22	217	158	190	125	0	38	33	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	786	1251	1063	220	208	151	190	426	0	141	133	113
Arrive On Green	0.41	0.67	0.67	0.21	0.21	0.21	0.11	0.23	0.00	0.07	0.07	0.00
Sat Flow, veh/h	1774	1863	1583	813	1003	731	1774	1863	0	1261	1863	1583
Grp Volume(v), veh/h	832	375	228	22	0	375	190	125	0	38	33	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	813	0	1734	1774	1863	0	1261	1863	1583
Q Serve(g_s), s	58.0	11.6	7.7	3.1	0.0	29.0	15.0	7.8	0.0	4.0	2.3	0.0
Cycle Q Clear(g_c), s	58.0	11.6	7.7	3.1	0.0	29.0	15.0	7.8	0.0	4.0	2.3	0.0
Prop In Lane	1.00		1.00	1.00		0.42	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	786	1251	1063	220	0	359	190	426	0	141	133	113
V/C Ratio(X)	1.06	0.30	0.21	0.10	0.00	1.04	1.00	0.29	0.00	0.27	0.25	0.00
Avail Cap(c_a), veh/h	786	1251	1063	220	0	359	190	426	0	141	133	113
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	35.8	9.5	8.8	45.2	0.0	55.5	62.5	44.7	0.0	62.2	61.5	0.0
Incr Delay (d2), s/veh	48.5	0.6	0.5	0.9	0.0	59.4	65.2	0.4	0.0	1.0	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	41.0	6.2	3.5	0.8	0.0	19.8	10.8	4.0	0.0	1.5	1.2	0.0
LnGrp Delay(d),s/veh	84.3	10.1	9.3	46.1	0.0	114.9	127.7	45.0	0.0	63.2	62.4	0.0
LnGrp LOS	F	B	A	D		F	F	D		E	E	
Approach Vol, veh/h		1435			397			315			71	
Approach Delay, s/veh		53.0			111.1			94.9			62.9	
Approach LOS		D			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4		6		8
Phs Duration (G+Y+Rc), s	65.0	36.0	22.0	17.0		101.0		39.0
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0		7.0		7.0
Max Green Setting (Gmax), s	58.0	29.0	15.0	10.0		94.0		32.0
Max Q Clear Time (g_c+I1), s	60.0	31.0	17.0	6.0		13.6		9.8
Green Ext Time (p_c), s	0.0	0.0	0.0	0.3		7.0		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	69.7
HCM 2010 LOS	E

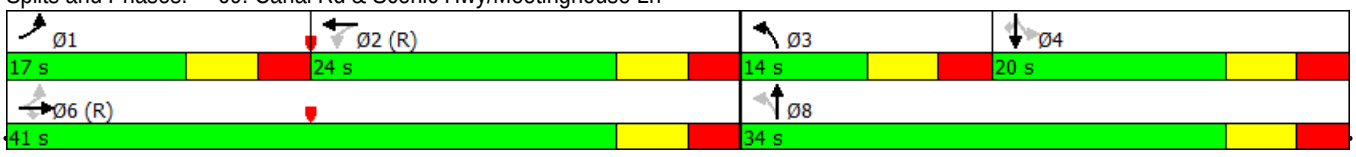
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	385	245	35	200	110	230	185	75	80	100	425
Future Volume (vph)	170	385	245	35	200	110	230	185	75	80	100	425
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.947			0.957				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1764	0	1770	1783	0	1770	1863	1583
Flt Permitted	0.281			0.518			0.420			0.586		
Satd. Flow (perm)	523	1863	1583	965	1764	0	782	1783	0	1092	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			266		34			31				462
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		472			455			538			297	
Travel Time (s)		10.7			10.3			12.2			6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	418	266	38	217	120	250	201	82	87	109	462
Shared Lane Traffic (%)												
Lane Group Flow (vph)	185	418	266	38	337	0	250	283	0	87	109	462
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6			2		3	8			4	
Permitted Phases	6		6	2			8			4		4
Detector Phase	1	6	6	2	2		3	8		4	4	4
Switch Phase												
Minimum Initial (s)	10.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	17.0	23.0	23.0	23.0	23.0		11.0	23.0		11.0	11.0	11.0
Total Split (s)	17.0	41.0	41.0	24.0	24.0		14.0	34.0		20.0	20.0	20.0
Total Split (%)	22.7%	54.7%	54.7%	32.0%	32.0%		18.7%	45.3%		26.7%	26.7%	26.7%
Maximum Green (s)	10.0	34.0	34.0	17.0	17.0		7.0	27.0		13.0	13.0	13.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	None
Act Effct Green (s)	36.0	36.0	36.0	19.0	19.0		25.0	25.0		11.0	11.0	11.0
Actuated g/C Ratio	0.48	0.48	0.48	0.25	0.25		0.33	0.33		0.15	0.15	0.15
v/c Ratio	0.44	0.47	0.30	0.16	0.71		0.71	0.46		0.54	0.40	0.74
Control Delay	15.7	15.9	2.7	25.3	34.2		31.9	19.6		42.0	32.7	11.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	15.7	15.9	2.7	25.3	34.2		31.9	19.6		42.0	32.7	11.1
LOS	B	B	A	C	C		C	B		D	C	B
Approach Delay		11.8			33.3			25.4			18.8	
Approach LOS		B			C			C			B	
Queue Length 50th (ft)	50	131	0	14	134		85	86		37	45	0
Queue Length 95th (ft)	90	208	38	39	#262		#152	151		81	90	81
Internal Link Dist (ft)		392			375			458			217	
Turn Bay Length (ft)												
Base Capacity (vph)	417	894	898	244	472		352	661		189	322	656
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	0.44	0.47	0.30	0.16	0.71		0.71	0.43		0.46	0.34	0.70

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 75
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 20.0 Intersection LOS: B
Intersection Capacity Utilization 73.8% 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.

Splits and Phases: 69: Canal Rd & Scenic Hwy/Meetinghouse Ln



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	385	245	35	200	110	230	185	75	80	100	425
Future Volume (vph)	170	385	245	35	200	110	230	185	75	80	100	425
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1763		1770	1782		1770	1863	1583
Flt Permitted	0.28	1.00	1.00	0.52	1.00		0.42	1.00		0.59	1.00	1.00
Satd. Flow (perm)	524	1863	1583	965	1763		782	1782		1092	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	418	266	38	217	120	250	201	82	87	109	462
RTOR Reduction (vph)	0	0	138	0	25	0	0	21	0	0	0	394
Lane Group Flow (vph)	185	418	128	38	312	0	250	262	0	87	109	68
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6			2		3	8			4	
Permitted Phases	6		6	2			8			4		4
Actuated Green, G (s)	36.0	36.0	36.0	19.0	19.0		25.0	25.0		11.0	11.0	11.0
Effective Green, g (s)	36.0	36.0	36.0	19.0	19.0		25.0	25.0		11.0	11.0	11.0
Actuated g/C Ratio	0.48	0.48	0.48	0.25	0.25		0.33	0.33		0.15	0.15	0.15
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	417	894	759	244	446		352	594		160	273	232
v/s Ratio Prot	0.06	c0.22			c0.18		c0.07	0.15			0.06	
v/s Ratio Perm	0.15		0.08	0.04			c0.17			0.08		0.04
v/c Ratio	0.44	0.47	0.17	0.16	0.70		0.71	0.44		0.54	0.40	0.29
Uniform Delay, d1	12.7	13.1	11.0	21.8	25.4		20.7	19.5		29.7	29.0	28.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8	1.8	0.5	1.4	8.8		6.6	0.5		3.7	1.0	0.7
Delay (s)	13.4	14.8	11.5	23.1	34.2		27.3	20.1		33.4	30.0	29.2
Level of Service	B	B	B	C	C		C	C		C	C	C
Approach Delay (s)		13.5			33.1			23.5			29.9	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	385	245	35	200	110	230	185	75	80	100	425
Future Volume (veh/h)	170	385	245	35	200	110	230	185	75	80	100	425
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	185	418	266	38	217	120	250	201	0	87	109	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	455	960	816	316	329	182	333	555	0	227	207	176
Arrive On Green	0.13	0.52	0.52	0.29	0.29	0.29	0.09	0.30	0.00	0.11	0.11	0.00
Sat Flow, veh/h	1774	1863	1583	754	1129	624	1774	1863	0	1177	1863	1583
Grp Volume(v), veh/h	185	418	266	38	0	337	250	201	0	87	109	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	754	0	1753	1774	1863	0	1177	1863	1583
Q Serve(g_s), s	4.8	10.5	7.3	2.8	0.0	12.6	7.0	6.4	0.0	5.3	4.1	0.0
Cycle Q Clear(g_c), s	4.8	10.5	7.3	2.8	0.0	12.6	7.0	6.4	0.0	5.3	4.1	0.0
Prop In Lane	1.00		1.00	1.00		0.36	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	455	960	816	316	0	511	333	555	0	227	207	176
V/C Ratio(X)	0.41	0.44	0.33	0.12	0.00	0.66	0.75	0.36	0.00	0.38	0.53	0.00
Avail Cap(c_a), veh/h	460	960	816	316	0	511	333	671	0	300	323	274
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	14.5	11.4	10.6	19.8	0.0	23.3	27.7	20.7	0.0	32.0	31.5	0.0
Incr Delay (d2), s/veh	0.6	1.4	1.1	0.8	0.0	6.5	9.1	0.4	0.0	1.1	2.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	5.7	3.4	0.6	0.0	7.0	5.2	3.3	0.0	1.8	2.2	0.0
LnGrp Delay(d),s/veh	15.0	12.8	11.6	20.6	0.0	29.8	36.9	21.1	0.0	33.0	33.5	0.0
LnGrp LOS	B	B	B	C		C	D	C		C	C	
Approach Vol, veh/h		869			375			451			196	
Approach Delay, s/veh		12.9			28.9			29.8			33.3	
Approach LOS		B			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4		6		8
Phs Duration (G+Y+Rc), s	16.8	28.9	14.0	15.3		45.7		29.3
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0		7.0		7.0
Max Green Setting (Gmax), s	10.0	17.0	7.0	13.0		34.0		27.0
Max Q Clear Time (g_c+I1), s	6.8	14.6	9.0	7.3		12.5		8.4
Green Ext Time (p_c), s	0.1	1.4	0.0	1.0		6.3		2.0

Intersection Summary	
HCM 2010 Ctrl Delay	22.2
HCM 2010 LOS	C

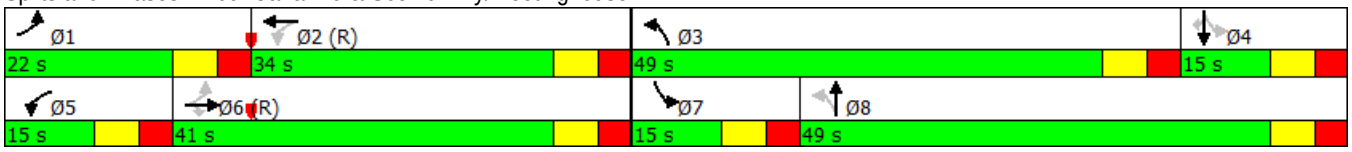
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	280	205	30	150	55	195	155	65	45	85	430
Future Volume (vph)	190	280	205	30	150	55	195	155	65	45	85	430
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.960			0.955				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1788	0	1770	1779	0	1770	1863	1583
Flt Permitted	0.499			0.575			0.481			0.610		
Satd. Flow (perm)	930	1863	1583	1071	1788	0	896	1779	0	1136	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			227		14			20				467
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		472			455			538			297	
Travel Time (s)		10.7			10.3			12.2			6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	304	223	33	163	60	212	168	71	49	92	467
Shared Lane Traffic (%)												
Lane Group Flow (vph)	207	304	223	33	223	0	212	239	0	49	92	467
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2			8			4		4
Detector Phase	1	6	6	5	2		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	10.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	17.0	23.0	23.0	11.0	23.0		11.0	23.0		11.0	11.0	11.0
Total Split (s)	22.0	41.0	41.0	15.0	34.0		49.0	49.0		15.0	15.0	15.0
Total Split (%)	18.3%	34.2%	34.2%	12.5%	28.3%		40.8%	40.8%		12.5%	12.5%	12.5%
Maximum Green (s)	15.0	34.0	34.0	8.0	27.0		42.0	42.0		8.0	8.0	8.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	None
Act Effct Green (s)	68.0	59.7	59.7	54.6	48.0		37.8	26.1		21.5	14.2	14.2
Actuated g/C Ratio	0.57	0.50	0.50	0.46	0.40		0.32	0.22		0.18	0.12	0.12
v/c Ratio	0.33	0.33	0.25	0.06	0.31		0.53	0.60		0.20	0.42	0.78
Control Delay	16.2	23.3	4.0	15.9	28.0		35.3	44.5		28.9	53.0	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	16.2	23.3	4.0	15.9	28.0		35.3	44.5		28.9	53.0	13.9
LOS	B	C	A	B	C		D	D		C	D	B
Approach Delay		15.4			26.4			40.2			21.0	
Approach LOS		B			C			D			C	
Queue Length 50th (ft)	73	147	0	11	106		129	161		27	68	0
Queue Length 95th (ft)	149	274	52	33	220		165	214		47	110	99
Internal Link Dist (ft)		392			375			458			217	
Turn Bay Length (ft)												
Base Capacity (vph)	639	926	901	546	722		632	635		252	221	599
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	0.32	0.33	0.25	0.06	0.31		0.34	0.38		0.19	0.42	0.78

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 23.9 Intersection LOS: C
Intersection Capacity Utilization 66.2% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 69: Canal Rd & Scenic Hwy/Meetinghouse Ln



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	280	205	30	150	55	195	155	65	45	85	430
Future Volume (vph)	190	280	205	30	150	55	195	155	65	45	85	430
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1788		1770	1780		1770	1863	1583
Flt Permitted	0.50	1.00	1.00	0.57	1.00		0.48	1.00		0.61	1.00	1.00
Satd. Flow (perm)	930	1863	1583	1071	1788		897	1780		1136	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	207	304	223	33	163	60	212	168	71	49	92	467
RTOR Reduction (vph)	0	0	120	0	9	0	0	16	0	0	0	406
Lane Group Flow (vph)	207	304	103	33	214	0	212	223	0	49	92	61
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2			8			4		4
Actuated Green, G (s)	66.8	55.5	55.5	50.9	46.6		39.2	26.1		21.7	15.6	15.6
Effective Green, g (s)	66.8	55.5	55.5	50.9	46.6		39.2	26.1		21.7	15.6	15.6
Actuated g/C Ratio	0.56	0.46	0.46	0.42	0.39		0.33	0.22		0.18	0.13	0.13
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	610	861	732	479	694		413	387		237	242	205
v/s Ratio Prot	c0.04	c0.16		0.00	0.12		c0.07	c0.13		0.01	0.05	
v/s Ratio Perm	0.15		0.07	0.03			0.10			0.03		0.04
v/c Ratio	0.34	0.35	0.14	0.07	0.31		0.51	0.58		0.21	0.38	0.30
Uniform Delay, d1	13.9	20.7	18.5	20.3	25.5		31.1	42.0		41.4	47.8	47.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.3	1.1	0.4	0.1	1.2		1.1	2.1		0.4	1.0	0.8
Delay (s)	14.2	21.9	18.9	20.3	26.7		32.2	44.1		41.8	48.8	48.0
Level of Service	B	C	B	C	C		C	D		D	D	D
Approach Delay (s)		18.8			25.8			38.5			47.7	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	32.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	190	280	205	30	150	55	195	155	65	45	85	430
Future Volume (veh/h)	190	280	205	30	150	55	195	155	65	45	85	430
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	207	304	223	33	163	60	212	168	0	49	92	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	687	1025	871	503	636	234	310	298	0	200	122	104
Arrive On Green	0.08	0.55	0.55	0.02	0.49	0.49	0.13	0.16	0.00	0.03	0.07	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1300	478	1774	1863	0	1774	1863	1583
Grp Volume(v), veh/h	207	304	223	33	0	223	212	168	0	49	92	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	0	1778	1774	1863	0	1774	1863	1583
Q Serve(g_s), s	6.5	10.5	8.8	1.1	0.0	8.8	12.9	10.0	0.0	3.1	5.8	0.0
Cycle Q Clear(g_c), s	6.5	10.5	8.8	1.1	0.0	8.8	12.9	10.0	0.0	3.1	5.8	0.0
Prop In Lane	1.00		1.00	1.00		0.27	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	687	1025	871	503	0	870	310	298	0	200	122	104
V/C Ratio(X)	0.30	0.30	0.26	0.07	0.00	0.26	0.68	0.56	0.00	0.25	0.75	0.00
Avail Cap(c_a), veh/h	762	1025	871	582	0	870	703	652	0	258	124	106
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.1	14.5	14.1	14.6	0.0	17.9	42.7	46.5	0.0	50.0	55.1	0.0
Incr Delay (d2), s/veh	0.2	0.7	0.7	0.1	0.0	0.7	2.7	1.7	0.0	0.6	22.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	5.6	4.0	0.5	0.0	4.4	6.5	5.3	0.0	1.5	3.7	0.0
LnGrp Delay(d),s/veh	12.3	15.2	14.8	14.7	0.0	18.6	45.4	48.2	0.0	50.7	77.6	0.0
LnGrp LOS	B	B	B	B		B	D	D		D	E	
Approach Vol, veh/h		734			256			380			141	
Approach Delay, s/veh		14.3			18.1			46.6			68.2	
Approach LOS		B			B			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.0	65.7	22.4	14.9	9.7	73.0	11.1	26.2
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Max Green Setting (Gmax), s	15.0	27.0	42.0	8.0	8.0	34.0	8.0	42.0
Max Q Clear Time (g_c+I1), s	8.5	10.8	14.9	7.8	3.1	12.5	5.1	12.0
Green Ext Time (p_c), s	0.3	3.7	0.6	0.0	0.0	4.0	0.0	1.5

Intersection Summary	
HCM 2010 Ctrl Delay	28.1
HCM 2010 LOS	C

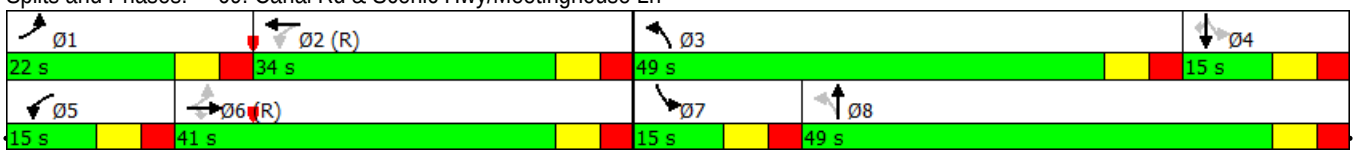
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	375	245	35	200	110	230	185	75	80	100	385
Future Volume (vph)	195	375	245	35	200	110	230	185	75	80	100	385
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.947			0.957				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1764	0	1770	1783	0	1770	1863	1583
Flt Permitted	0.372			0.486			0.466			0.586		
Satd. Flow (perm)	693	1863	1583	905	1764	0	868	1783	0	1092	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			266		21			19				418
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		472			455			538			297	
Travel Time (s)		10.7			10.3			12.2			6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	408	266	38	217	120	250	201	82	87	109	418
Shared Lane Traffic (%)												
Lane Group Flow (vph)	212	408	266	38	337	0	250	283	0	87	109	418
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2			8			4		4
Detector Phase	1	6	6	5	2		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	10.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	17.0	23.0	23.0	11.0	23.0		11.0	23.0		11.0	11.0	11.0
Total Split (s)	22.0	41.0	41.0	15.0	34.0		49.0	49.0		15.0	15.0	15.0
Total Split (%)	18.3%	34.2%	34.2%	12.5%	28.3%		40.8%	40.8%		12.5%	12.5%	12.5%
Maximum Green (s)	15.0	34.0	34.0	8.0	27.0		42.0	42.0		8.0	8.0	8.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	None
Act Effct Green (s)	65.4	56.9	56.9	51.7	44.9		40.3	25.7		22.5	14.8	14.8
Actuated g/C Ratio	0.54	0.47	0.47	0.43	0.37		0.34	0.21		0.19	0.12	0.12
v/c Ratio	0.42	0.46	0.30	0.09	0.50		0.58	0.71		0.35	0.47	0.75
Control Delay	18.5	27.2	4.2	16.9	33.3		35.2	50.1		31.3	54.8	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	18.5	27.2	4.2	16.9	33.3		35.2	50.1		31.3	54.8	13.2
LOS	B	C	A	B	C		D	D		C	D	B
Approach Delay		18.2			31.6			43.1			23.2	
Approach LOS		B			C			D			C	
Queue Length 50th (ft)	81	226	0	13	185		148	191		47	80	0
Queue Length 95th (ft)	154	386	59	37	#368		192	257		74	131	95
Internal Link Dist (ft)		392			375			458			217	
Turn Bay Length (ft)												
Base Capacity (vph)	521	883	890	458	673		635	636		252	230	561
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	0.41	0.46	0.30	0.08	0.50		0.39	0.44		0.35	0.47	0.75

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 27.1 Intersection LOS: C
Intersection Capacity Utilization 71.3% 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: 69: Canal Rd & Scenic Hwy/Meetinghouse Ln



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	375	245	35	200	110	230	185	75	80	100	385
Future Volume (vph)	195	375	245	35	200	110	230	185	75	80	100	385
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1763		1770	1782		1770	1863	1583
Flt Permitted	0.37	1.00	1.00	0.49	1.00		0.47	1.00		0.59	1.00	1.00
Satd. Flow (perm)	693	1863	1583	906	1763		868	1782		1092	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	408	266	38	217	120	250	201	82	87	109	418
RTOR Reduction (vph)	0	0	146	0	13	0	0	15	0	0	0	366
Lane Group Flow (vph)	212	408	120	38	324	0	250	268	0	87	109	52
Turn Type	pm+pt	NA	Perm	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2			8			4		4
Actuated Green, G (s)	65.6	54.1	54.1	49.4	44.9		40.4	25.7		22.5	14.8	14.8
Effective Green, g (s)	65.6	54.1	54.1	49.4	44.9		40.4	25.7		22.5	14.8	14.8
Actuated g/C Ratio	0.55	0.45	0.45	0.41	0.37		0.34	0.21		0.19	0.12	0.12
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	501	839	713	405	659		432	381		248	229	195
v/s Ratio Prot	c0.05	c0.22		0.00	0.18		c0.09	c0.15		0.02	0.06	
v/s Ratio Perm	0.18		0.08	0.04			0.11			0.04		0.03
v/c Ratio	0.42	0.49	0.17	0.09	0.49		0.58	0.70		0.35	0.48	0.26
Uniform Delay, d1	15.6	23.2	19.6	21.3	28.8		31.0	43.6		41.7	49.0	47.7
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.6	2.0	0.5	0.1	2.6		1.9	5.8		0.9	1.6	0.7
Delay (s)	16.2	25.2	20.1	21.4	31.4		32.9	49.4		42.5	50.5	48.4
Level of Service	B	C	C	C	C		C	D		D	D	D
Approach Delay (s)		21.5			30.4			41.7			47.9	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	34.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	195	375	245	35	200	110	230	185	75	80	100	385
Future Volume (veh/h)	195	375	245	35	200	110	230	185	75	80	100	385
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	212	408	266	38	217	120	250	201	0	87	109	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	563	982	835	403	528	292	335	292	0	228	124	106
Arrive On Green	0.08	0.53	0.53	0.02	0.47	0.47	0.15	0.16	0.00	0.06	0.07	0.00
Sat Flow, veh/h	1774	1863	1583	1774	1129	624	1774	1863	0	1774	1863	1583
Grp Volume(v), veh/h	212	408	266	38	0	337	250	201	0	87	109	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	0	1753	1774	1863	0	1774	1863	1583
Q Serve(g_s), s	7.0	15.9	11.5	1.3	0.0	15.2	15.1	12.2	0.0	5.4	7.0	0.0
Cycle Q Clear(g_c), s	7.0	15.9	11.5	1.3	0.0	15.2	15.1	12.2	0.0	5.4	7.0	0.0
Prop In Lane	1.00		1.00	1.00		0.36	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	563	982	835	403	0	820	335	292	0	228	124	106
V/C Ratio(X)	0.38	0.42	0.32	0.09	0.00	0.41	0.75	0.69	0.00	0.38	0.88	0.00
Avail Cap(c_a), veh/h	637	982	835	479	0	820	692	652	0	243	124	106
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	14.3	17.2	16.1	16.2	0.0	21.0	41.6	47.8	0.0	48.3	55.5	0.0
Incr Delay (d2), s/veh	0.4	1.3	1.0	0.1	0.0	1.5	3.3	2.9	0.0	1.0	45.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	8.5	5.2	0.7	0.0	7.6	7.7	6.5	0.0	2.7	5.2	0.0
LnGrp Delay(d),s/veh	14.7	18.5	17.1	16.3	0.0	22.5	44.9	50.7	0.0	49.3	101.4	0.0
LnGrp LOS	B	B	B	B		C	D	D		D	F	
Approach Vol, veh/h		886			375			451			196	
Approach Delay, s/veh		17.1			21.9			47.5			78.3	
Approach LOS		B			C			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.0	63.2	24.8	15.0	9.9	70.3	14.0	25.8
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Max Green Setting (Gmax), s	15.0	27.0	42.0	8.0	8.0	34.0	8.0	42.0
Max Q Clear Time (g_c+I1), s	9.0	17.2	17.1	9.0	3.3	17.9	7.4	14.2
Green Ext Time (p_c), s	0.3	4.0	0.7	0.0	0.0	5.3	0.0	1.8

Intersection Summary	
HCM 2010 Ctrl Delay	31.5
HCM 2010 LOS	C

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	375	245	35	200	110	230	185	75	80	100	385
Future Volume (vph)	195	375	245	35	200	110	230	185	75	80	100	385
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.947			0.957				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1863	1583	1770	1764	0	1770	1783	0	1770	1863	1583
Flt Permitted	0.293			0.523			0.407			0.586		
Satd. Flow (perm)	546	1863	1583	974	1764	0	758	1783	0	1092	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			266		35			30				418
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		472			455			538			297	
Travel Time (s)		10.7			10.3			12.2			6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	408	266	38	217	120	250	201	82	87	109	418
Shared Lane Traffic (%)												
Lane Group Flow (vph)	212	408	266	38	337	0	250	283	0	87	109	418
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6			2		3	8			4	
Permitted Phases	6		6	2			8			4		4
Detector Phase	1	6	6	2	2		3	8		4	4	4
Switch Phase												
Minimum Initial (s)	10.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	17.0	23.0	23.0	23.0	23.0		11.0	23.0		11.0	11.0	11.0
Total Split (s)	17.0	42.0	42.0	25.0	25.0		14.0	33.0		19.0	19.0	19.0
Total Split (%)	22.7%	56.0%	56.0%	33.3%	33.3%		18.7%	44.0%		25.3%	25.3%	25.3%
Maximum Green (s)	10.0	35.0	35.0	18.0	18.0		7.0	26.0		12.0	12.0	12.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	C-Max	C-Max		None	None		None	None	None
Act Effct Green (s)	36.8	36.8	36.8	19.8	19.8		24.2	24.2		10.2	10.2	10.2
Actuated g/C Ratio	0.49	0.49	0.49	0.26	0.26		0.32	0.32		0.14	0.14	0.14
v/c Ratio	0.49	0.45	0.29	0.15	0.69		0.74	0.48		0.59	0.43	0.73
Control Delay	15.9	15.0	2.6	24.3	31.9		35.0	20.6		46.2	34.5	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	15.9	15.0	2.6	24.3	31.9		35.0	20.6		46.2	34.5	11.5
LOS	B	B	A	C	C		C	C		D	C	B
Approach Delay		11.5			31.1			27.3			20.5	
Approach LOS		B			C			C			C	
Queue Length 50th (ft)	57	123	0	14	130		87	88		37	46	0
Queue Length 95th (ft)	100	196	37	38	#250		#165	155		82	91	78
Internal Link Dist (ft)		392			375			458			217	
Turn Bay Length (ft)												
Base Capacity (vph)	431	913	911	256	490		339	637		174	298	604
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	0.49	0.45	0.29	0.15	0.69		0.74	0.44		0.50	0.37	0.69

Intersection Summary

Area Type: Other
Cycle Length: 75
Actuated Cycle Length: 75
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 20.4 Intersection LOS: C
Intersection Capacity Utilization 71.3% 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: 69: Canal Rd & Scenic Hwy/Meetinghouse Ln



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	375	245	35	200	110	230	185	75	80	100	385
Future Volume (vph)	195	375	245	35	200	110	230	185	75	80	100	385
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1763		1770	1782		1770	1863	1583
Flt Permitted	0.29	1.00	1.00	0.52	1.00		0.41	1.00		0.59	1.00	1.00
Satd. Flow (perm)	546	1863	1583	974	1763		759	1782		1092	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	408	266	38	217	120	250	201	82	87	109	418
RTOR Reduction (vph)	0	0	135	0	26	0	0	20	0	0	0	361
Lane Group Flow (vph)	212	408	131	38	311	0	250	263	0	87	109	57
Turn Type	pm+pt	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6			2		3	8			4	
Permitted Phases	6		6	2			8			4		4
Actuated Green, G (s)	36.8	36.8	36.8	19.8	19.8		24.2	24.2		10.2	10.2	10.2
Effective Green, g (s)	36.8	36.8	36.8	19.8	19.8		24.2	24.2		10.2	10.2	10.2
Actuated g/C Ratio	0.49	0.49	0.49	0.26	0.26		0.32	0.32		0.14	0.14	0.14
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	431	914	776	257	465		339	574		148	253	215
v/s Ratio Prot	0.07	c0.22			c0.18		c0.07	0.15			0.06	
v/s Ratio Perm	0.18		0.08	0.04			c0.17			0.08		0.04
v/c Ratio	0.49	0.45	0.17	0.15	0.67		0.74	0.46		0.59	0.43	0.26
Uniform Delay, d1	12.4	12.5	10.6	21.1	24.7		21.4	20.2		30.4	29.7	29.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.9	1.6	0.5	1.2	7.5		8.1	0.6		5.9	1.2	0.7
Delay (s)	13.3	14.0	11.1	22.4	32.1		29.6	20.8		36.3	30.9	29.7
Level of Service	B	B	B	C	C		C	C		D	C	C
Approach Delay (s)		13.0			31.1			24.9			30.8	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	28.0
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	195	375	245	35	200	110	230	185	75	80	100	385
Future Volume (veh/h)	195	375	245	35	200	110	230	185	75	80	100	385
Number	1	6	16	5	2	12	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	212	408	266	38	217	120	250	201	0	87	109	0
Adj No. of Lanes	1	1	1	1	1	0	1	1	0	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	458	963	819	318	330	182	331	552	0	225	204	173
Arrive On Green	0.13	0.52	0.52	0.29	0.29	0.29	0.09	0.30	0.00	0.11	0.11	0.00
Sat Flow, veh/h	1774	1863	1583	761	1129	624	1774	1863	0	1177	1863	1583
Grp Volume(v), veh/h	212	408	266	38	0	337	250	201	0	87	109	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	761	0	1753	1774	1863	0	1177	1863	1583
Q Serve(g_s), s	5.6	10.2	7.3	2.8	0.0	12.6	7.0	6.4	0.0	5.3	4.2	0.0
Cycle Q Clear(g_c), s	5.6	10.2	7.3	2.8	0.0	12.6	7.0	6.4	0.0	5.3	4.2	0.0
Prop In Lane	1.00		1.00	1.00		0.36	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	458	963	819	318	0	512	331	552	0	225	204	173
V/C Ratio(X)	0.46	0.42	0.32	0.12	0.00	0.66	0.76	0.36	0.00	0.39	0.53	0.00
Avail Cap(c_a), veh/h	461	963	819	318	0	512	331	646	0	284	298	253
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	14.7	11.2	10.5	19.8	0.0	23.3	27.9	20.8	0.0	32.1	31.6	0.0
Incr Delay (d2), s/veh	0.7	1.4	1.1	0.8	0.0	6.5	9.5	0.4	0.0	1.1	2.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	5.6	3.4	0.6	0.0	7.0	5.3	3.4	0.0	1.8	2.2	0.0
LnGrp Delay(d),s/veh	15.4	12.6	11.6	20.5	0.0	29.8	37.4	21.2	0.0	33.2	33.8	0.0
LnGrp LOS	B	B	B	C		C	D	C		C	C	
Approach Vol, veh/h		886			375			451			196	
Approach Delay, s/veh		12.9			28.8			30.2			33.5	
Approach LOS		B			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4		6		8
Phs Duration (G+Y+Rc), s	16.9	28.9	14.0	15.2		45.8		29.2
Change Period (Y+Rc), s	7.0	7.0	7.0	7.0		7.0		7.0
Max Green Setting (Gmax), s	10.0	18.0	7.0	12.0		35.0		26.0
Max Q Clear Time (g_c+I1), s	7.6	14.6	9.0	7.3		12.2		8.4
Green Ext Time (p_c), s	0.1	1.9	0.0	0.9		6.3		1.9

Intersection Summary	
HCM 2010 Ctrl Delay	22.3
HCM 2010 LOS	C

Lane Group	EBL	EBT	EBR	WBT	WBR	WBR2	NBL2	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	1255	25	325	1305	60	45	0	35	40	0	70
Future Volume (vph)	95	1255	25	325	1305	60	45	0	35	40	0	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997		0.879				0.850				0.850
Flt Protected		0.997					0.950				0.950	
Satd. Flow (prot)	0	3417	0	3022	0	0	1719	1538	0	0	1719	1538
Flt Permitted		0.566					0.729				0.732	
Satd. Flow (perm)	0	1940	0	3022	0	0	1319	1538	0	0	1325	1538
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)		5		7				115				
Link Speed (mph)		30		30				30			30	
Link Distance (ft)		386		584				567			306	
Travel Time (s)		8.8		13.3				12.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	1364	27	353	1418	65	49	0	38	43	0	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1494	0	1836	0	0	49	38	0	0	43	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0		0				12			12	
Link Offset(ft)		0		0				0			0	
Crosswalk Width(ft)		16		16				16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9		9	9	15		9	15		9
Number of Detectors	1	2		2			1	2		1	2	1
Detector Template	Left	Thru		Thru			Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		100			20	100		20	100	20
Trailing Detector (ft)	0	0		0			0	0		0	0	0
Detector 1 Position(ft)	0	0		0			0	0		0	0	0
Detector 1 Size(ft)	20	6		6			20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0			0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0			0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0			0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94		94				94			94	
Detector 2 Size(ft)		6		6				6			6	
Detector 2 Type		Cl+Ex		Cl+Ex				Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0		0.0				0.0			0.0	
Turn Type	pm+pt	NA		NA			Perm	NA		Perm	NA	Perm
Protected Phases	7	4		8				2			6	
Permitted Phases	4						2			6		6
Detector Phase	7	4		8			2	2		6	6	6
Switch Phase												
Minimum Initial (s)	4.0	40.0		40.0			10.0	10.0		10.0	10.0	10.0

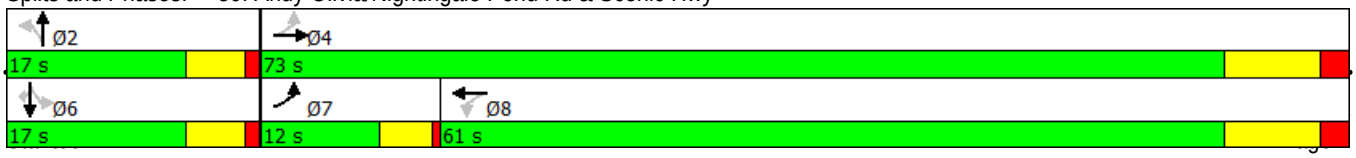
Lanes, Volumes, Timings
59: Andy Olivia/Nightingale Pond Rd & Scenic Hwy 02/14/2018

Lane Group	EBL	EBT	EBR	WBT	WBR	WBR2	NBL2	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	8.0	48.5		48.5			15.0	15.0		15.0	15.0	15.0
Total Split (s)	12.0	73.0		61.0			17.0	17.0		17.0	17.0	17.0
Total Split (%)	13.3%	81.1%		67.8%			18.9%	18.9%		18.9%	18.9%	18.9%
Maximum Green (s)	8.0	64.5		52.5			12.0	12.0		12.0	12.0	12.0
Yellow Time (s)	3.5	6.5		6.5			4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	0.5	2.0		2.0			1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0		0.0			0.0	0.0			0.0	0.0
Total Lost Time (s)		8.5		8.5			5.0	5.0			5.0	5.0
Lead/Lag	Lead			Lag								
Lead-Lag Optimize?	Yes			Yes								
Vehicle Extension (s)	3.0	3.0		3.0			3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		Min			None	None		None	None	None
Act Effct Green (s)		69.3		69.3			10.7	10.7			10.7	10.7
Actuated g/C Ratio		0.78		0.78			0.12	0.12			0.12	0.12
v/c Ratio		0.99		1.21dr			0.31	0.13			0.27	0.41
Control Delay		34.5		10.7			41.3	1.0			40.1	43.4
Queue Delay		0.0		0.0			0.0	0.0			0.0	0.0
Total Delay		34.5		10.7			41.3	1.0			40.1	43.4
LOS		C		B			D	A			D	D
Approach Delay		34.5		10.7				23.7			42.2	
Approach LOS		C		B				C			D	
Queue Length 50th (ft)		~481		298			25	0			22	40
Queue Length 95th (ft)		#639		456			60	0			54	83
Internal Link Dist (ft)		306		504				487			226	
Turn Bay Length (ft)												
Base Capacity (vph)		1516		2361			178	307			179	208
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		0.99		0.78			0.28	0.12			0.24	0.37

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 88.7
Natural Cycle: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 22.1 Intersection LOS: C
Intersection Capacity Utilization 118.9% ICU Level of Service H
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.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.

Splits and Phases: 59: Andy Olivia/Nightingale Pond Rd & Scenic Hwy



Movement	EBL	EBT	EBR	WBT	WBR	WBR2	NBL2	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	1255	25	325	1305	60	45	0	35	40	0	70
Future Volume (vph)	95	1255	25	325	1305	60	45	0	35	40	0	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.5		8.5			5.0	5.0			5.0	5.0
Lane Util. Factor		0.95		0.95			1.00	1.00			1.00	1.00
Frt		1.00		0.88			1.00	0.85			1.00	0.85
Flt Protected		1.00		1.00			0.95	1.00			0.95	1.00
Satd. Flow (prot)		3417		3022			1719	1538			1719	1538
Flt Permitted		0.57		1.00			0.73	1.00			0.73	1.00
Satd. Flow (perm)		1940		3022			1319	1538			1325	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	1364	27	353	1418	65	49	0	38	43	0	76
RTOR Reduction (vph)	0	1	0	2	0	0	0	34	0	0	0	0
Lane Group Flow (vph)	0	1493	0	1834	0	0	49	4	0	0	43	76
Turn Type	pm+pt	NA		NA			Perm	NA		Perm	NA	Perm
Protected Phases	7	4		8				2			6	
Permitted Phases	4						2			6		6
Actuated Green, G (s)		67.5		67.5			8.6	8.6			8.6	8.6
Effective Green, g (s)		67.5		67.5			8.6	8.6			8.6	8.6
Actuated g/C Ratio		0.75		0.75			0.10	0.10			0.10	0.10
Clearance Time (s)		8.5		8.5			5.0	5.0			5.0	5.0
Vehicle Extension (s)		3.0		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1461		2276			126	147			127	147
v/s Ratio Prot				0.61				0.00				
v/s Ratio Perm		c0.77					0.04				0.03	c0.05
v/c Ratio		1.02		1.21dr			0.39	0.02			0.34	0.52
Uniform Delay, d1		11.0		6.9			38.0	36.7			37.8	38.5
Progression Factor		1.00		1.00			1.00	1.00			1.00	1.00
Incremental Delay, d2		29.2		2.2			2.0	0.1			1.6	3.1
Delay (s)		40.2		9.1			40.0	36.8			39.4	41.6
Level of Service		D		A			D	D			D	D
Approach Delay (s)		40.2		9.1				38.6			40.8	
Approach LOS		D		A				D			D	

Intersection Summary			
HCM 2000 Control Delay	24.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	89.6	Sum of lost time (s)	17.5
Intersection Capacity Utilization	118.9%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

HCM 2010 methodology does not support more than 4 approaches.

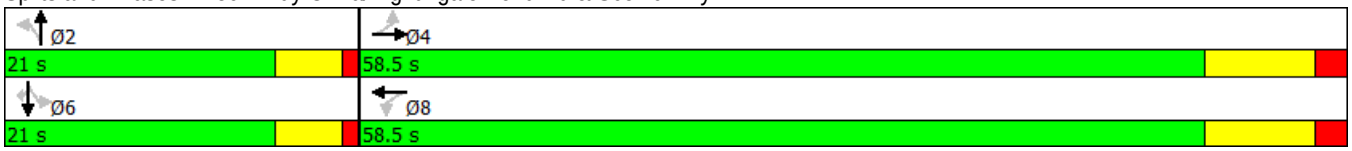
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	875	20	0	1200	25	15	0	0	10	0	35
Future Volume (vph)	55	875	20	0	1200	25	15	0	0	10	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.997							0.850
Flt Protected		0.997					0.950				0.950	
Satd. Flow (prot)	0	3518	0	0	3529	0	1770	1863	0	0	1770	1583
Flt Permitted		0.773					0.750				0.757	
Satd. Flow (perm)	0	2728	0	0	3529	0	1397	1863	0	0	1410	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			5							75
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		386			584			567			306	
Travel Time (s)		8.8			13.3			12.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	951	22	0	1304	27	16	0	0	11	0	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1033	0	0	1331	0	16	0	0	0	11	38
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA			NA		Perm			Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	40.0	40.0		40.0	40.0		10.0	10.0		10.0	10.0	10.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	48.5	48.5		48.5	48.5		15.0	15.0		15.0	15.0	15.0
Total Split (s)	58.5	58.5		58.5	58.5		21.0	21.0		21.0	21.0	21.0
Total Split (%)	73.6%	73.6%		73.6%	73.6%		26.4%	26.4%		26.4%	26.4%	26.4%
Maximum Green (s)	50.0	50.0		50.0	50.0		16.0	16.0		16.0	16.0	16.0
Yellow Time (s)	6.5	6.5		6.5	6.5		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	Min		Min	Min		None	None		None	None	None
Act Effct Green (s)		50.1			50.1		10.0				10.0	10.0
Actuated g/C Ratio		0.78			0.78		0.16				0.16	0.16
v/c Ratio		0.48			0.48		0.07				0.05	0.12
Control Delay		6.0			5.6		24.7				24.3	3.3
Queue Delay		0.0			0.0		0.0				0.0	0.0
Total Delay		6.0			5.6		24.7				24.3	3.3
LOS		A			A		C				C	A
Approach Delay		6.0			5.6			24.7			8.0	
Approach LOS		A			A			C			A	
Queue Length 50th (ft)		105			135		5				4	0
Queue Length 95th (ft)		153			185		21				17	10
Internal Link Dist (ft)		306			504			487			226	
Turn Bay Length (ft)												
Base Capacity (vph)		2361			3053		349				352	451
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		0.44			0.44		0.05				0.03	0.08

Intersection Summary

Area Type: Other
Cycle Length: 79.5
Actuated Cycle Length: 64.1
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.48
Intersection Signal Delay: 5.9 Intersection LOS: A
Intersection Capacity Utilization 85.8% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 59: Andy Olivia/Nightingale Pond Rd & Scenic Hwy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	875	20	0	1200	25	15	0	0	10	0	35
Future Volume (vph)	55	875	20	0	1200	25	15	0	0	10	0	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.5			8.5		5.0				5.0	5.0
Lane Util. Factor		0.95			0.95		1.00				1.00	1.00
Frt		1.00			1.00		1.00				1.00	0.85
Flt Protected		1.00			1.00		0.95				0.95	1.00
Satd. Flow (prot)		3518			3528		1770				1770	1583
Flt Permitted		0.77			1.00		0.75				0.76	1.00
Satd. Flow (perm)		2728			3528		1398				1410	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	951	22	0	1304	27	16	0	0	11	0	38
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	0	0	0	35
Lane Group Flow (vph)	0	1032	0	0	1330	0	16	0	0	0	11	3
Turn Type	Perm	NA			NA		Perm			Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		46.7			46.7		6.0				6.0	6.0
Effective Green, g (s)		46.7			46.7		6.0				6.0	6.0
Actuated g/C Ratio		0.71			0.71		0.09				0.09	0.09
Clearance Time (s)		8.5			8.5		5.0				5.0	5.0
Vehicle Extension (s)		3.0			3.0		3.0				3.0	3.0
Lane Grp Cap (vph)		1924			2488		126				127	143
v/s Ratio Prot					0.38							
v/s Ratio Perm		c0.38					c0.01				0.01	0.00
v/c Ratio		0.54			0.53		0.13				0.09	0.02
Uniform Delay, d1		4.6			4.6		27.7				27.6	27.4
Progression Factor		1.00			1.00		1.00				1.00	1.00
Incremental Delay, d2		0.3			0.2		0.5				0.3	0.1
Delay (s)		4.9			4.8		28.1				27.9	27.5
Level of Service		A			A		C				C	C
Approach Delay (s)		4.9			4.8			28.1			27.6	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	5.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	66.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 analysis supports yellow change in the range of 3 and 6 seconds

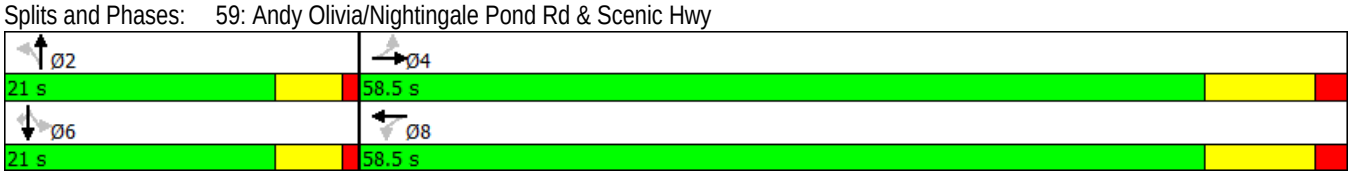
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	1145	25	0	1440	60	45	0	35	40	0	70
Future Volume (vph)	95	1145	25	0	1440	60	45	0	35	40	0	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.994			0.850				0.850
Flt Protected		0.996					0.950				0.950	
Satd. Flow (prot)	0	3514	0	0	3518	0	1770	1583	0	0	1770	1583
Flt Permitted		0.599					0.729				0.732	
Satd. Flow (perm)	0	2114	0	0	3518	0	1358	1583	0	0	1364	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			10			78				75
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		386			584			567			306	
Travel Time (s)		8.8			13.3			12.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	1245	27	0	1565	65	49	0	38	43	0	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1375	0	0	1630	0	49	38	0	0	43	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	40.0	40.0		40.0	40.0		10.0	10.0		10.0	10.0	10.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	48.5	48.5		48.5	48.5		15.0	15.0		15.0	15.0	15.0
Total Split (s)	58.5	58.5		58.5	58.5		21.0	21.0		21.0	21.0	21.0
Total Split (%)	73.6%	73.6%		73.6%	73.6%		26.4%	26.4%		26.4%	26.4%	26.4%
Maximum Green (s)	50.0	50.0		50.0	50.0		16.0	16.0		16.0	16.0	16.0
Yellow Time (s)	6.5	6.5		6.5	6.5		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	Min		Min	Min		None	None		None	None	None
Act Effct Green (s)		54.7			54.7		10.2	10.2			10.2	10.2
Actuated g/C Ratio		0.74			0.74		0.14	0.14			0.14	0.14
v/c Ratio		0.88			0.62		0.26	0.13			0.23	0.27
Control Delay		19.1			7.6		32.3	2.9			31.6	10.7
Queue Delay		0.0			0.0		0.0	0.0			0.0	0.0
Total Delay		19.1			7.6		32.3	2.9			31.6	10.7
LOS		B			A		C	A			C	B
Approach Delay		19.1			7.6			19.5			18.2	
Approach LOS		B			A			B			B	
Queue Length 50th (ft)		250			193		20	0			18	0
Queue Length 95th (ft)		#473			275		51	8			46	35
Internal Link Dist (ft)		306			504			487			226	
Turn Bay Length (ft)												
Base Capacity (vph)		1569			2613		294	404			295	402
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		0.88			0.62		0.17	0.09			0.15	0.19

Intersection Summary

Area Type: Other
Cycle Length: 79.5
Actuated Cycle Length: 73.7
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 13.2 Intersection LOS: B
Intersection Capacity Utilization 104.4% 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.

Splits and Phases: 59: Andy Olivia/Nightingale Pond Rd & Scenic Hwy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	1145	25	0	1440	60	45	0	35	40	0	70
Future Volume (vph)	95	1145	25	0	1440	60	45	0	35	40	0	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Lane Util. Factor		0.95			0.95		1.00	1.00			1.00	1.00
Frt		1.00			0.99		1.00	0.85			1.00	0.85
Flt Protected		1.00			1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)		3516			3518		1770	1583			1770	1583
Flt Permitted		0.60			1.00		0.73	1.00			0.73	1.00
Satd. Flow (perm)		2115			3518		1358	1583			1364	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	1245	27	0	1565	65	49	0	38	43	0	76
RTOR Reduction (vph)	0	1	0	0	3	0	0	34	0	0	0	67
Lane Group Flow (vph)	0	1374	0	0	1627	0	49	4	0	0	43	9
Turn Type	Perm	NA			NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		53.0			53.0		8.2	8.2			8.2	8.2
Effective Green, g (s)		53.0			53.0		8.2	8.2			8.2	8.2
Actuated g/C Ratio		0.71			0.71		0.11	0.11			0.11	0.11
Clearance Time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1500			2496		149	173			149	173
v/s Ratio Prot					0.46			0.00				
v/s Ratio Perm		c0.65					c0.04				0.03	0.01
v/c Ratio		0.92			0.65		0.33	0.02			0.29	0.05
Uniform Delay, d1		9.0			5.9		30.7	29.7			30.6	29.8
Progression Factor		1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		9.0			0.6		1.3	0.1			1.1	0.1
Delay (s)		18.0			6.5		32.0	29.7			31.6	29.9
Level of Service		B			A		C	C			C	C
Approach Delay (s)		18.0			6.5			31.0			30.5	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	74.7	Sum of lost time (s)	13.5
Intersection Capacity Utilization	104.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 analysis supports yellow change in the range of 3 and 6 seconds

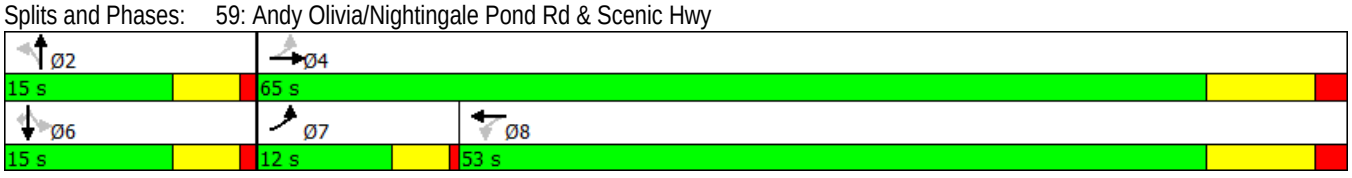
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	1145	25	0	1440	60	45	0	35	40	0	70
Future Volume (vph)	95	1145	25	0	1440	60	45	0	35	40	0	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.994			0.850				0.850
Flt Protected		0.996					0.950				0.950	
Satd. Flow (prot)	0	3514	0	0	3518	0	1770	1583	0	0	1770	1583
Flt Permitted		0.602					0.729				0.732	
Satd. Flow (perm)	0	2124	0	0	3518	0	1358	1583	0	0	1364	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			8			130				130
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		386			584			567			306	
Travel Time (s)		8.8			13.3			12.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	1245	27	0	1565	65	49	0	38	43	0	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1375	0	0	1630	0	49	38	0	0	43	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA			NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	4.0	40.0		40.0	40.0		10.0	10.0		10.0	10.0	10.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	8.0	48.5		48.5	48.5		15.0	15.0		15.0	15.0	15.0
Total Split (s)	12.0	65.0		53.0	53.0		15.0	15.0		15.0	15.0	15.0
Total Split (%)	15.0%	81.3%		66.3%	66.3%		18.8%	18.8%		18.8%	18.8%	18.8%
Maximum Green (s)	8.0	56.5		44.5	44.5		10.0	10.0		10.0	10.0	10.0
Yellow Time (s)	3.5	6.5		6.5	6.5		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	0.5	2.0		2.0	2.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		Min	Min		None	None		None	None	None
Act Effct Green (s)		58.7			58.7		10.1	10.1			10.1	10.1
Actuated g/C Ratio		0.77			0.77		0.13	0.13			0.13	0.13
v/c Ratio		0.85			0.61		0.28	0.12			0.24	0.24
Control Delay		15.9			6.8		36.3	0.7			35.5	3.5
Queue Delay		0.0			0.0		0.0	0.0			0.0	0.0
Total Delay		15.9			6.8		36.3	0.7			35.5	3.5
LOS		B			A		D	A			D	A
Approach Delay		15.9			6.8			20.8			15.0	
Approach LOS		B			A			C			B	
Queue Length 50th (ft)		248			193		23	0			20	0
Queue Length 95th (ft)		#476			253		55	0			50	11
Internal Link Dist (ft)		306			504			487			226	
Turn Bay Length (ft)												
Base Capacity (vph)		1579			2692		178	320			179	320
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		0.87			0.61		0.28	0.12			0.24	0.24

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 76.7
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 11.4 Intersection LOS: B
Intersection Capacity Utilization 104.4% 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.

Splits and Phases: 59: Andy Olivia/Nightingale Pond Rd & Scenic Hwy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	1145	25	0	1440	60	45	0	35	40	0	70
Future Volume (vph)	95	1145	25	0	1440	60	45	0	35	40	0	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Lane Util. Factor		0.95			0.95		1.00	1.00			1.00	1.00
Frt		1.00			0.99		1.00	0.85			1.00	0.85
Flt Protected		1.00			1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)		3516			3518		1770	1583			1770	1583
Flt Permitted		0.60			1.00		0.73	1.00			0.73	1.00
Satd. Flow (perm)		2126			3518		1358	1583			1364	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	1245	27	0	1565	65	49	0	38	43	0	76
RTOR Reduction (vph)	0	2	0	0	2	0	0	34	0	0	0	68
Lane Group Flow (vph)	0	1373	0	0	1628	0	49	4	0	0	43	8
Turn Type	pm+pt	NA			NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		56.6			56.6		7.7	7.7			7.7	7.7
Effective Green, g (s)		56.6			56.6		7.7	7.7			7.7	7.7
Actuated g/C Ratio		0.73			0.73		0.10	0.10			0.10	0.10
Clearance Time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1546			2559		134	156			134	156
v/s Ratio Prot					0.46			0.00				
v/s Ratio Perm		c0.65					c0.04				0.03	0.00
v/c Ratio		0.89			0.64		0.37	0.02			0.32	0.05
Uniform Delay, d1		8.2			5.4		32.8	31.7			32.6	31.7
Progression Factor		1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		6.6			0.5		1.7	0.1			1.4	0.1
Delay (s)		14.8			5.9		34.5	31.7			34.0	31.9
Level of Service		B			A		C	C			C	C
Approach Delay (s)		14.8			5.9			33.3			32.6	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	77.8	Sum of lost time (s)	17.5
Intersection Capacity Utilization	104.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 edition methodology does not support a perm + prot left-turn type from a shared lane. Left-turn bay is needed for phases 7.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL2	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	100	1290	85	5	935	755	25	85	5	80	5	0
Future Volume (vph)	100	1290	85	5	935	755	25	85	5	80	5	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00
Frt		0.991			0.932				0.858			
Flt Protected		0.997						0.950				0.950
Satd. Flow (prot)	0	3397	0	0	3204	0	0	1719	1553	0	0	1719
Flt Permitted		0.543			0.949			0.754				0.697
Satd. Flow (perm)	0	1850	0	0	3041	0	0	1364	1553	0	0	1261
Right Turn on Red			Yes				Yes			Yes		
Satd. Flow (RTOR)		18			3				83			
Link Speed (mph)		30			30				30			30
Link Distance (ft)		636			584				567			306
Travel Time (s)		14.5			13.3				12.9			7.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	1402	92	5	1016	821	27	92	5	87	5	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1603	0	0	1869	0	0	92	92	0	0	5
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Right	Left	Left	Right	Left	Left
Median Width(ft)		0			0				12			12
Link Offset(ft)		0			0				0			0
Crosswalk Width(ft)		16			16				16			16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	9	15		9	15	
Number of Detectors	1	2		1	2			1	2		1	2
Detector Template	Left	Thru		Left	Thru			Left	Thru		Left	Thru
Leading Detector (ft)	20	100		20	100			20	100		20	100
Trailing Detector (ft)	0	0		0	0			0	0		0	0
Detector 1 Position(ft)	0	0		0	0			0	0		0	0
Detector 1 Size(ft)	20	6		20	6			20	6		20	6
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Detector 2 Position(ft)		94			94				94			94
Detector 2 Size(ft)		6			6				6			6
Detector 2 Type		Cl+Ex			Cl+Ex				Cl+Ex			Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0				0.0			0.0
Turn Type	pm+pt	NA		Perm	NA			Perm	NA		Perm	NA
Protected Phases	7	4			8				2			6
Permitted Phases	4			8				2			6	
Detector Phase	7	4		8	8			2	2		6	6
Switch Phase												
Minimum Initial (s)	4.0	40.0		40.0	40.0			10.0	10.0		10.0	10.0

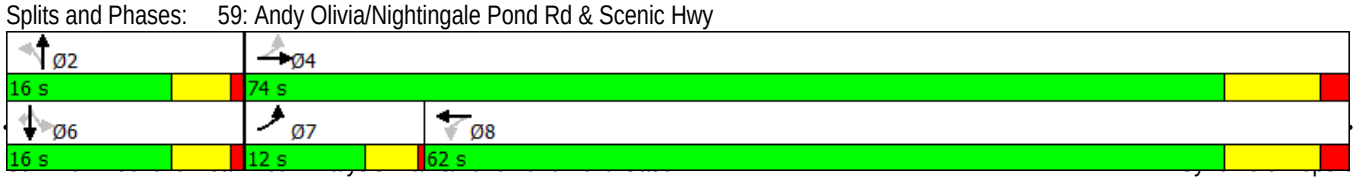
Lane Group	SBR
Lane Configurations	
Traffic Volume (vph)	120
Future Volume (vph)	120
Ideal Flow (vphpl)	1900
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1538
Flt Permitted	
Satd. Flow (perm)	1538
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Adj. Flow (vph)	130
Shared Lane Traffic (%)	
Lane Group Flow (vph)	130
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Number of Detectors	1
Detector Template	Right
Leading Detector (ft)	20
Trailing Detector (ft)	0
Detector 1 Position(ft)	0
Detector 1 Size(ft)	20
Detector 1 Type	Cl+Ex
Detector 1 Channel	
Detector 1 Extend (s)	0.0
Detector 1 Queue (s)	0.0
Detector 1 Delay (s)	0.0
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Detector Phase	6
Switch Phase	
Minimum Initial (s)	10.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL2	NBT	NBR	SBL	SBT
Minimum Split (s)	8.0	48.5		48.5	48.5			15.0	15.0		15.0	15.0
Total Split (s)	12.0	74.0		62.0	62.0			16.0	16.0		16.0	16.0
Total Split (%)	13.3%	82.2%		68.9%	68.9%			17.8%	17.8%		17.8%	17.8%
Maximum Green (s)	8.0	65.5		53.5	53.5			11.0	11.0		11.0	11.0
Yellow Time (s)	3.5	6.5		6.5	6.5			4.0	4.0		4.0	4.0
All-Red Time (s)	0.5	2.0		2.0	2.0			1.0	1.0		1.0	1.0
Lost Time Adjust (s)		0.0			0.0			0.0	0.0			0.0
Total Lost Time (s)		8.5			8.5			5.0	5.0			5.0
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	3.0
Recall Mode	None	Min		Min	Min			None	None		None	None
Act Effct Green (s)		65.5			65.5			10.8	10.8			10.8
Actuated g/C Ratio		0.73			0.73			0.12	0.12			0.12
v/c Ratio		1.18			0.84			0.56	0.36			0.03
Control Delay		107.2			13.3			51.6	14.6			35.6
Queue Delay		0.0			0.0			0.0	0.0			0.0
Total Delay		107.2			13.3			51.6	14.6			35.6
LOS		F			B			D	B			D
Approach Delay		107.2			13.3				33.1			59.0
Approach LOS		F			B				C			E
Queue Length 50th (ft)		~585			327			50	5			3
Queue Length 95th (ft)		#723			450			#107	48			13
Internal Link Dist (ft)		556			504				487			226
Turn Bay Length (ft)												
Base Capacity (vph)		1354			2218			166	262			154
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		1.18			0.84			0.55	0.35			0.03

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 89.8
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.18
Intersection Signal Delay: 55.6 Intersection LOS: E
Intersection Capacity Utilization 122.0% ICU Level of Service H
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: 59: Andy Olivia/Nightingale Pond Rd & Scenic Hwy





Lane Group	SBR
Minimum Split (s)	15.0
Total Split (s)	16.0
Total Split (%)	17.8%
Maximum Green (s)	11.0
Yellow Time (s)	4.0
All-Red Time (s)	1.0
Lost Time Adjust (s)	0.0
Total Lost Time (s)	5.0
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Act Effct Green (s)	10.8
Actuated g/C Ratio	0.12
v/c Ratio	0.71
Control Delay	59.9
Queue Delay	0.0
Total Delay	59.9
LOS	E
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	72
Queue Length 95th (ft)	#155
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	188
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.69

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL2	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	100	1290	85	5	935	755	25	85	5	80	5	0
Future Volume (vph)	100	1290	85	5	935	755	25	85	5	80	5	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.5			8.5			5.0	5.0			5.0
Lane Util. Factor		0.95			0.95			1.00	1.00			1.00
Frt		0.99			0.93			1.00	0.86			1.00
Flt Protected		1.00			1.00			0.95	1.00			0.95
Satd. Flow (prot)		3397			3204			1719	1553			1719
Flt Permitted		0.54			0.95			0.75	1.00			0.70
Satd. Flow (perm)		1849			3042			1365	1553			1262
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	1402	92	5	1016	821	27	92	5	87	5	0
RTOR Reduction (vph)	0	5	0	0	1	0	0	0	73	0	0	0
Lane Group Flow (vph)	0	1598	0	0	1868	0	0	92	19	0	0	5
Turn Type	pm+pt	NA		Perm	NA			Perm	NA		Perm	NA
Protected Phases	7	4			8				2			6
Permitted Phases	4			8				2			6	
Actuated Green, G (s)		65.5			65.5			10.8	10.8			10.8
Effective Green, g (s)		65.5			65.5			10.8	10.8			10.8
Actuated g/C Ratio		0.73			0.73			0.12	0.12			0.12
Clearance Time (s)		8.5			8.5			5.0	5.0			5.0
Vehicle Extension (s)		3.0			3.0			3.0	3.0			3.0
Lane Grp Cap (vph)		1348			2218			164	186			151
v/s Ratio Prot									0.01			
v/s Ratio Perm		c0.86			0.61			0.07				0.00
v/c Ratio		1.19			0.84			0.56	0.10			0.03
Uniform Delay, d1		12.1			8.5			37.3	35.2			34.9
Progression Factor		1.00			1.00			1.00	1.00			1.00
Incremental Delay, d2		91.3			3.1			4.3	0.2			0.1
Delay (s)		103.5			11.6			41.6	35.4			35.0
Level of Service		F			B			D	D			C
Approach Delay (s)		103.5			11.6				38.5			49.1
Approach LOS		F			B				D			D

Intersection Summary			
HCM 2000 Control Delay	53.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	89.8	Sum of lost time (s)	17.5
Intersection Capacity Utilization	122.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Movement	SBR
Lane Configurations	
Traffic Volume (vph)	120
Future Volume (vph)	120
Ideal Flow (vphpl)	1900
Total Lost time (s)	5.0
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1538
Flt Permitted	1.00
Satd. Flow (perm)	1538
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	130
RTOR Reduction (vph)	0
Lane Group Flow (vph)	130
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	10.8
Effective Green, g (s)	10.8
Actuated g/C Ratio	0.12
Clearance Time (s)	5.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	184
v/s Ratio Prot	
v/s Ratio Perm	c0.08
v/c Ratio	0.71
Uniform Delay, d1	38.0
Progression Factor	1.00
Incremental Delay, d2	11.7
Delay (s)	49.7
Level of Service	D
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM 2010 methodology does not support more than 4 approaches.

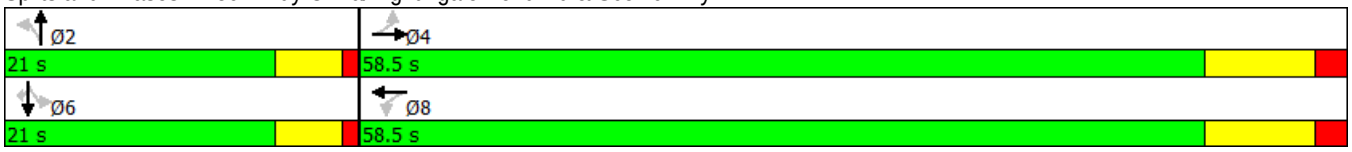
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	1075	70	5	1550	0	100	5	10	5	0	50
Future Volume (vph)	55	1075	70	5	1550	0	100	5	10	5	0	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991						0.897				0.850
Flt Protected		0.998					0.950				0.950	
Satd. Flow (prot)	0	3500	0	0	3539	0	1770	1671	0	0	1770	1583
Flt Permitted		0.716			0.950		0.754				0.747	
Satd. Flow (perm)	0	2511	0	0	3362	0	1405	1671	0	0	1391	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15						11				75
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		386			584			567			306	
Travel Time (s)		8.8			13.3			12.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	1168	76	5	1685	0	109	5	11	5	0	54
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1304	0	0	1690	0	109	16	0	0	5	54
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	40.0	40.0		40.0	40.0		10.0	10.0		10.0	10.0	10.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	48.5	48.5		48.5	48.5		15.0	15.0		15.0	15.0	15.0
Total Split (s)	58.5	58.5		58.5	58.5		21.0	21.0		21.0	21.0	21.0
Total Split (%)	73.6%	73.6%		73.6%	73.6%		26.4%	26.4%		26.4%	26.4%	26.4%
Maximum Green (s)	50.0	50.0		50.0	50.0		16.0	16.0		16.0	16.0	16.0
Yellow Time (s)	6.5	6.5		6.5	6.5		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	Min		Min	Min		None	None		None	None	None
Act Effct Green (s)		51.3			51.3		11.9	11.9			11.9	11.9
Actuated g/C Ratio		0.72			0.72		0.17	0.17			0.17	0.17
v/c Ratio		0.72			0.70		0.47	0.06			0.02	0.17
Control Delay		11.8			10.4		35.1	17.7			26.4	5.5
Queue Delay		0.0			0.0		0.0	0.0			0.0	0.0
Total Delay		11.8			10.4		35.1	17.7			26.4	5.5
LOS		B			B		D	B			C	A
Approach Delay		11.8			10.4			32.9			7.3	
Approach LOS		B			B			C			A	
Queue Length 50th (ft)		181			230		47	2			2	0
Queue Length 95th (ft)		335			390		95	18			11	19
Internal Link Dist (ft)		306			504			487			226	
Turn Bay Length (ft)												
Base Capacity (vph)		1879			2511		316	385			313	414
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		0.69			0.67		0.34	0.04			0.02	0.13

Intersection Summary

Area Type: Other
Cycle Length: 79.5
Actuated Cycle Length: 71.6
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 11.8 Intersection LOS: B
Intersection Capacity Utilization 96.4% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 59: Andy Olivia/Nightingale Pond Rd & Scenic Hwy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	1075	70	5	1550	0	100	5	10	5	0	50
Future Volume (vph)	55	1075	70	5	1550	0	100	5	10	5	0	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Lane Util. Factor		0.95			0.95		1.00	1.00			1.00	1.00
Frt		0.99			1.00		1.00	0.90			1.00	0.85
Flt Protected		1.00			1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)		3500			3539		1770	1671			1770	1583
Flt Permitted		0.72			0.95		0.75	1.00			0.75	1.00
Satd. Flow (perm)		2512			3364		1405	1671			1392	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	1168	76	5	1685	0	109	5	11	5	0	54
RTOR Reduction (vph)	0	5	0	0	0	0	0	10	0	0	0	47
Lane Group Flow (vph)	0	1299	0	0	1690	0	109	6	0	0	5	7
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		49.4			49.4		9.7	9.7			9.7	9.7
Effective Green, g (s)		49.4			49.4		9.7	9.7			9.7	9.7
Actuated g/C Ratio		0.68			0.68		0.13	0.13			0.13	0.13
Clearance Time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1709			2289		187	223			185	211
v/s Ratio Prot								0.00				
v/s Ratio Perm		c0.52			0.50		c0.08				0.00	0.00
v/c Ratio		0.76			0.74		0.58	0.03			0.03	0.03
Uniform Delay, d1		7.7			7.4		29.5	27.4			27.3	27.4
Progression Factor		1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		2.0			1.3		4.6	0.1			0.1	0.1
Delay (s)		9.7			8.7		34.1	27.4			27.4	27.4
Level of Service		A			A		C	C			C	C
Approach Delay (s)		9.7			8.7			33.3			27.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	72.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 analysis supports yellow change in the range of 3 and 6 seconds

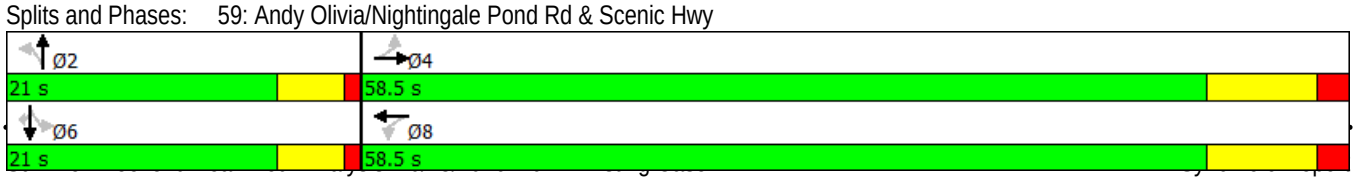
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	1120	85	5	1625	25	110	5	55	15	0	95
Future Volume (vph)	100	1120	85	5	1625	25	110	5	55	15	0	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.998			0.862				0.850
Flt Protected		0.996					0.950				0.950	
Satd. Flow (prot)	0	3490	0	0	3532	0	1770	1606	0	0	1770	1583
Flt Permitted		0.546			0.950		0.747				0.715	
Satd. Flow (perm)	0	1913	0	0	3356	0	1391	1606	0	0	1332	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			4			60				75
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		386			584			567			306	
Travel Time (s)		8.8			13.3			12.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	1217	92	5	1766	27	120	5	60	16	0	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1418	0	0	1798	0	120	65	0	0	16	103
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	4	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	40.0	40.0		40.0	40.0		10.0	10.0		10.0	10.0	10.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	48.5	48.5		48.5	48.5		15.0	15.0		15.0	15.0	15.0
Total Split (s)	58.5	58.5		58.5	58.5		21.0	21.0		21.0	21.0	21.0
Total Split (%)	73.6%	73.6%		73.6%	73.6%		26.4%	26.4%		26.4%	26.4%	26.4%
Maximum Green (s)	50.0	50.0		50.0	50.0		16.0	16.0		16.0	16.0	16.0
Yellow Time (s)	6.5	6.5		6.5	6.5		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	2.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	Min		Min	Min		None	None		None	None	None
Act Effct Green (s)		54.9			54.9		12.3	12.3			12.3	12.3
Actuated g/C Ratio		0.72			0.72		0.16	0.16			0.16	0.16
v/c Ratio		1.02			0.74		0.53	0.21			0.07	0.32
Control Delay		46.7			11.6		38.3	10.8			27.2	13.8
Queue Delay		0.0			0.0		0.0	0.0			0.0	0.0
Total Delay		46.7			11.6		38.3	10.8			27.2	13.8
LOS		D			B		D	B			C	B
Approach Delay		46.7			11.6			28.6			15.6	
Approach LOS		D			B			C			B	
Queue Length 50th (ft)		~406			271		52	2			7	11
Queue Length 95th (ft)		#583			446		103	33			22	51
Internal Link Dist (ft)		306			504			487			226	
Turn Bay Length (ft)												
Base Capacity (vph)		1389			2430		293	386			281	393
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		1.02			0.74		0.41	0.17			0.06	0.26

Intersection Summary

Area Type: Other
Cycle Length: 79.5
Actuated Cycle Length: 75.8
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.02
Intersection Signal Delay: 26.7 Intersection LOS: C
Intersection Capacity Utilization 113.5% ICU Level of Service H
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: 59: Andy Olivia/Nightingale Pond Rd & Scenic Hwy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	1120	85	5	1625	25	110	5	55	15	0	95
Future Volume (vph)	100	1120	85	5	1625	25	110	5	55	15	0	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Lane Util. Factor		0.95			0.95		1.00	1.00			1.00	1.00
Frt		0.99			1.00		1.00	0.86			1.00	0.85
Flt Protected		1.00			1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)		3491			3531		1770	1605			1770	1583
Flt Permitted		0.55			0.95		0.75	1.00			0.71	1.00
Satd. Flow (perm)		1915			3355		1392	1605			1331	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	1217	92	5	1766	27	120	5	60	16	0	103
RTOR Reduction (vph)	0	5	0	0	1	0	0	52	0	0	0	65
Lane Group Flow (vph)	0	1413	0	0	1797	0	120	13	0	0	16	38
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		53.1			53.1		10.2	10.2			10.2	10.2
Effective Green, g (s)		53.1			53.1		10.2	10.2			10.2	10.2
Actuated g/C Ratio		0.69			0.69		0.13	0.13			0.13	0.13
Clearance Time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1324			2319		184	213			176	210
v/s Ratio Prot								0.01				
v/s Ratio Perm		c0.74			0.54		c0.09				0.01	0.02
v/c Ratio		1.07			0.77		0.65	0.06			0.09	0.18
Uniform Delay, d1		11.8			7.9		31.6	29.1			29.2	29.6
Progression Factor		1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		44.8			1.7		8.0	0.1			0.2	0.4
Delay (s)		56.6			9.6		39.6	29.2			29.5	30.0
Level of Service		E			A		D	C			C	C
Approach Delay (s)		56.6			9.6			36.0			29.9	
Approach LOS		E			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	30.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	76.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	113.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 analysis supports yellow change in the range of 3 and 6 seconds

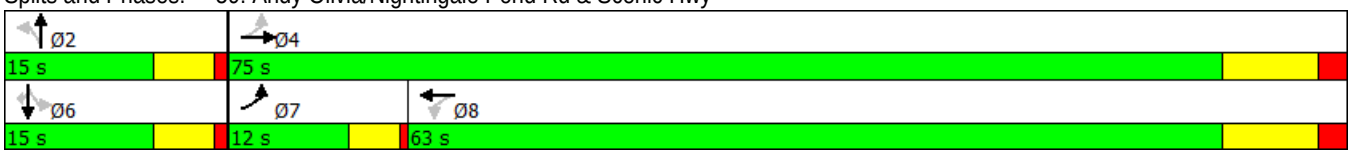
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	1120	85	5	1625	25	110	5	55	15	0	95
Future Volume (vph)	100	1120	85	5	1625	25	110	5	55	15	0	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.998			0.862				0.850
Flt Protected		0.996					0.950				0.950	
Satd. Flow (prot)	0	3490	0	0	3532	0	1770	1606	0	0	1770	1583
Flt Permitted		0.550			0.950		0.747				0.715	
Satd. Flow (perm)	0	1927	0	0	3356	0	1391	1606	0	0	1332	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		22			3			60				115
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		386			584			567			306	
Travel Time (s)		8.8			13.3			12.9			7.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	1217	92	5	1766	27	120	5	60	16	0	103
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1418	0	0	1798	0	120	65	0	0	16	103
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phase	7	4		8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	4.0	40.0		40.0	40.0		10.0	10.0		10.0	10.0	10.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	8.0	48.5		48.5	48.5		15.0	15.0		15.0	15.0	15.0
Total Split (s)	12.0	75.0		63.0	63.0		15.0	15.0		15.0	15.0	15.0
Total Split (%)	13.3%	83.3%		70.0%	70.0%		16.7%	16.7%		16.7%	16.7%	16.7%
Maximum Green (s)	8.0	66.5		54.5	54.5		10.0	10.0		10.0	10.0	10.0
Yellow Time (s)	3.5	6.5		6.5	6.5		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	0.5	2.0		2.0	2.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?	Yes			Yes	Yes							
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min		Min	Min		None	None		None	None	None
Act Effct Green (s)		66.9			66.9		10.0	10.0			10.0	10.0
Actuated g/C Ratio		0.74			0.74		0.11	0.11			0.11	0.11
v/c Ratio		0.99			0.72		0.78	0.28			0.11	0.37
Control Delay		34.8			8.7		73.2	15.2			38.0	10.4
Queue Delay		0.0			0.0		0.0	0.0			0.0	0.0
Total Delay		34.8			8.7		73.2	15.2			38.0	10.4
LOS		C			A		E	B			D	B
Approach Delay		34.8			8.7			52.8			14.1	
Approach LOS		C			A			D			B	
Queue Length 50th (ft)		337			247		68	3			8	0
Queue Length 95th (ft)		#576			322		#160	40			28	39
Internal Link Dist (ft)		306			504			487			226	
Turn Bay Length (ft)												
Base Capacity (vph)		1431			2484		153	230			147	277
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		0.99			0.72		0.78	0.28			0.11	0.37

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90.4
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 21.7 Intersection LOS: C
Intersection Capacity Utilization 113.5% ICU Level of Service H
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 59: Andy Olivia/Nightingale Pond Rd & Scenic Hwy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	1120	85	5	1625	25	110	5	55	15	0	95
Future Volume (vph)	100	1120	85	5	1625	25	110	5	55	15	0	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Lane Util. Factor		0.95			0.95		1.00	1.00			1.00	1.00
Frt		0.99			1.00		1.00	0.86			1.00	0.85
Flt Protected		1.00			1.00		0.95	1.00			0.95	1.00
Satd. Flow (prot)		3491			3531		1770	1605			1770	1583
Flt Permitted		0.55			0.95		0.75	1.00			0.71	1.00
Satd. Flow (perm)		1926			3356		1392	1605			1331	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	1217	92	5	1766	27	120	5	60	16	0	103
RTOR Reduction (vph)	0	6	0	0	1	0	0	53	0	0	0	92
Lane Group Flow (vph)	0	1412	0	0	1797	0	120	12	0	0	16	11
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		66.9			66.9		10.0	10.0			10.0	10.0
Effective Green, g (s)		66.9			66.9		10.0	10.0			10.0	10.0
Actuated g/C Ratio		0.74			0.74		0.11	0.11			0.11	0.11
Clearance Time (s)		8.5			8.5		5.0	5.0			5.0	5.0
Vehicle Extension (s)		3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1425			2483		153	177			147	175
v/s Ratio Prot								0.01				
v/s Ratio Perm		c0.73			0.54		c0.09				0.01	0.01
v/c Ratio		0.99			0.72		0.78	0.07			0.11	0.07
Uniform Delay, d1		11.5			6.6		39.1	36.0			36.2	36.0
Progression Factor		1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		21.6			1.1		22.6	0.2			0.3	0.2
Delay (s)		33.1			7.6		61.8	36.2			36.5	36.2
Level of Service		C			A		E	D			D	D
Approach Delay (s)		33.1			7.6			52.8			36.2	
Approach LOS		C			A			D			D	

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	17.5
Intersection Capacity Utilization	113.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 edition methodology does not support a perm + prot left-turn type from a shared lane. Left-turn bay is needed for phases 7.

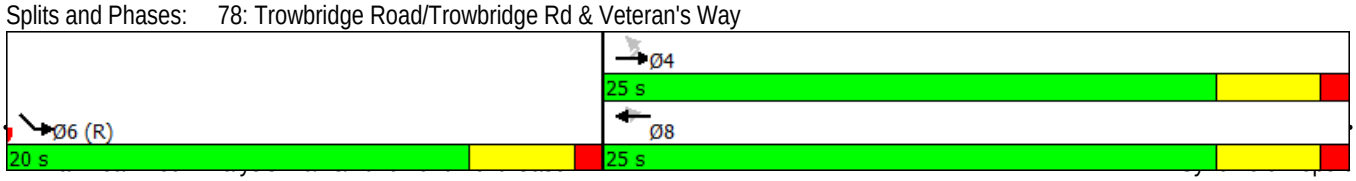
Mid-Term Improvements

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	15	505	250	20	160	90
Future Volume (vph)	15	505	250	20	160	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	250
Storage Lanes	0			1	2	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	0.95
Frt				0.850	0.946	
Flt Protected		0.999			0.969	
Satd. Flow (prot)	0	1808	1810	1538	3218	0
Flt Permitted		0.989			0.969	
Satd. Flow (perm)	0	1790	1810	1538	3218	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				22	98	
Link Speed (mph)		30	30		30	
Link Distance (ft)		742	276		701	
Travel Time (s)		16.9	6.3		15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	549	272	22	174	98
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	565	272	22	272	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		24	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (ft)	20	100	100	20	20	
Trailing Detector (ft)	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	
Detector 1 Size(ft)	20	6	6	20	20	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Detector Phase	4	4	8	8	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (s)	25.0	25.0	25.0	25.0	20.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	44.4%	
Maximum Green (s)	20.5	20.5	20.5	20.5	15.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.5	4.5	4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	Min	Min	Min	Min	C-Min	
Act Effct Green (s)		19.4	19.4	19.4	16.6	
Actuated g/C Ratio		0.43	0.43	0.43	0.37	
v/c Ratio		0.73	0.35	0.03	0.22	
Control Delay		16.1	8.8	2.6	8.3	
Queue Delay		0.0	0.0	0.0	0.0	
Total Delay		16.1	8.8	2.6	8.3	
LOS		B	A	A	A	
Approach Delay		16.1	8.4		8.3	
Approach LOS		B	A		A	
Queue Length 50th (ft)		110	43	0	14	
Queue Length 95th (ft)		143	58	6	42	
Internal Link Dist (ft)		662	196		621	
Turn Bay Length (ft)						
Base Capacity (vph)		867	876	756	1341	
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		0.65	0.31	0.03	0.20	

Intersection Summary			
Area Type:	Other		
Cycle Length: 45			
Actuated Cycle Length: 45			
Offset: 0 (0%), Referenced to phase 2: and 6:SEL, Start of Green			
Natural Cycle: 45			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 12.2		Intersection LOS: B	
Intersection Capacity Utilization 53.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 78: Trowbridge Road/Trowbridge Rd & Veteran's Way



Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	15	505	250	20	160	90
Future Volume (vph)	15	505	250	20	160	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	1.00	0.97	
Frt		1.00	1.00	0.85	0.95	
Flt Protected		1.00	1.00	1.00	0.97	
Satd. Flow (prot)		1807	1810	1538	3218	
Flt Permitted		0.99	1.00	1.00	0.97	
Satd. Flow (perm)		1789	1810	1538	3218	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	549	272	22	174	98
RTOR Reduction (vph)	0	0	0	13	62	0
Lane Group Flow (vph)	0	565	272	9	210	0
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)		19.4	19.4	19.4	16.6	
Effective Green, g (s)		19.4	19.4	19.4	16.6	
Actuated g/C Ratio		0.43	0.43	0.43	0.37	
Clearance Time (s)		4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		771	780	663	1187	
v/s Ratio Prot			0.15		c0.07	
v/s Ratio Perm		c0.32		0.01		
v/c Ratio		0.73	0.35	0.01	0.18	
Uniform Delay, d1		10.6	8.6	7.3	9.6	
Progression Factor		1.00	1.00	1.00	1.00	
Incremental Delay, d2		3.6	0.3	0.0	0.3	
Delay (s)		14.3	8.8	7.3	9.9	
Level of Service		B	A	A	A	
Approach Delay (s)		14.3	8.7		9.9	
Approach LOS		B	A		A	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

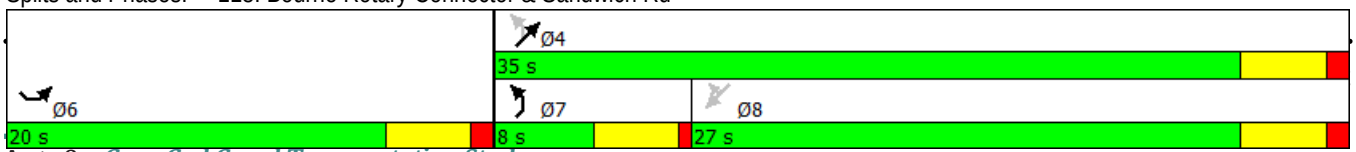
Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	145	325	10	905	420	555
Future Volume (vph)	145	325	10	905	420	555
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	1000	0	0			425
Storage Lanes	1	0	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.896					0.850
Flt Protected	0.985			0.999		
Satd. Flow (prot)	3098	0	0	3435	1810	1538
Flt Permitted	0.985			0.950		
Satd. Flow (perm)	3098	0	0	3266	1810	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	353					603
Link Speed (mph)	30			30	30	
Link Distance (ft)	1745			824	1013	
Travel Time (s)	39.7			18.7	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	353	11	984	457	603
Shared Lane Traffic (%)						
Lane Group Flow (vph)	511	0	0	995	457	603
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	24			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1		1	2	2	1
Detector Template	Left		Left	Thru	Thru	Right
Leading Detector (ft)	20		20	100	100	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		20	6	6	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8

Lanes, Volumes, Timings
118: Bourne Rotary Connector & Sandwich Rd 02/16/2018

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Detector Phase	6		7	4	8	8
Switch Phase						
Minimum Initial (s)	5.0		4.0	5.0	5.0	5.0
Minimum Split (s)	20.0		8.0	20.0	22.5	22.5
Total Split (s)	20.0		8.0	35.0	27.0	27.0
Total Split (%)	36.4%		14.5%	63.6%	49.1%	49.1%
Maximum Green (s)	15.5		4.0	30.5	22.5	22.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		0.5	1.0	1.0	1.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	4.5			4.5	4.5	4.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		None	Min	Min	Min
Walk Time (s)					7.0	7.0
Flash Dont Walk (s)					11.0	11.0
Pedestrian Calls (#/hr)					0	0
Act Effct Green (s)	8.2			19.2	19.2	19.2
Actuated g/C Ratio	0.22			0.52	0.52	0.52
v/c Ratio	0.53			0.59	0.49	0.55
Control Delay	7.1			7.7	7.8	2.8
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	7.1			7.7	7.8	2.8
LOS	A			A	A	A
Approach Delay	7.1			7.7	4.9	
Approach LOS	A			A	A	
Queue Length 50th (ft)	12			55	45	0
Queue Length 95th (ft)	52			126	122	32
Internal Link Dist (ft)	1665			744	933	
Turn Bay Length (ft)	1000					425
Base Capacity (vph)	1577			2749	1227	1236
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	0.32			0.36	0.37	0.49

Intersection Summary			
Area Type:	Other		
Cycle Length: 55			
Actuated Cycle Length: 36.9			
Natural Cycle: 55			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 6.5		Intersection LOS: A	
Intersection Capacity Utilization 67.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 118: Bourne Rotary Connector & Sandwich Rd



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	145	325	10	905	420	555
Future Volume (vph)	145	325	10	905	420	555
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	4.5
Lane Util. Factor	0.97			0.95	1.00	1.00
Frt	0.90			1.00	1.00	0.85
Flt Protected	0.98			1.00	1.00	1.00
Satd. Flow (prot)	3099			3436	1810	1538
Flt Permitted	0.98			0.95	1.00	1.00
Satd. Flow (perm)	3099			3265	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	353	11	984	457	603
RTOR Reduction (vph)	273	0	0	0	0	286
Lane Group Flow (vph)	238	0	0	995	457	317
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8
Actuated Green, G (s)	8.2			19.1	19.1	19.1
Effective Green, g (s)	8.2			19.1	19.1	19.1
Actuated g/C Ratio	0.23			0.53	0.53	0.53
Clearance Time (s)	4.5			4.5	4.5	4.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	700			1717	952	809
v/s Ratio Prot	c0.08					
v/s Ratio Perm				c0.30	0.25	0.21
v/c Ratio	0.34			0.58	0.48	0.39
Uniform Delay, d1	11.8			5.9	5.5	5.1
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.3			0.5	0.4	0.3
Delay (s)	12.1			6.3	5.8	5.4
Level of Service	B			A	A	A
Approach Delay (s)	12.1			6.3	5.6	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	36.3	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

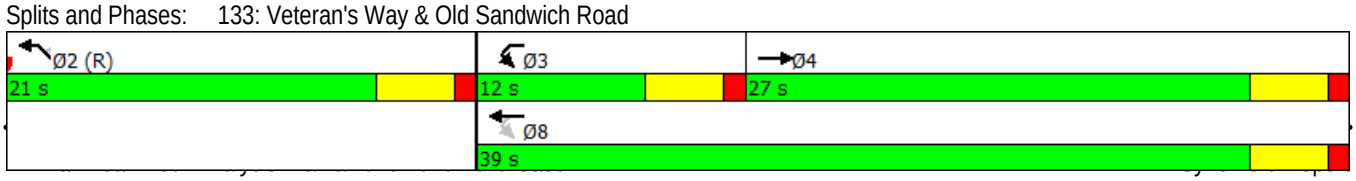
HCM 2010 edition methodology does not support a perm + prot left-turn type from a shared lane. Left-turn bay is needed for phases 7.

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	455	65	185	380	20	15
Future Volume (vph)	455	65	185	380	20	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	500		0	0
Storage Lanes		0	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.983					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1779	0	1719	1810	1719	1538
Flt Permitted			0.188		0.950	
Satd. Flow (perm)	1779	0	340	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	14					16
Link Speed (mph)	30			30	30	
Link Distance (ft)	612			1745	701	
Travel Time (s)	13.9			39.7	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	495	71	201	413	22	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	566	0	201	413	22	16
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	100		20	100	20	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	6		20	6	20	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	20.0		9.5	20.0	20.0	20.0
Total Split (s)	27.0		12.0	39.0	21.0	21.0
Total Split (%)	45.0%		20.0%	65.0%	35.0%	35.0%
Maximum Green (s)	22.5		7.5	34.5	16.5	16.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		Min	Min	C-Min	C-Min
Act Effct Green (s)	23.9		36.7	36.7	14.3	14.3
Actuated g/C Ratio	0.40		0.61	0.61	0.24	0.24
v/c Ratio	0.79		0.50	0.37	0.05	0.04
Control Delay	23.9		8.9	6.2	21.8	12.3
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	23.9		8.9	6.2	21.8	12.3
LOS	C		A	A	C	B
Approach Delay	23.9			7.1	17.8	
Approach LOS	C			A	B	
Queue Length 50th (ft)	164		26	61	6	0
Queue Length 95th (ft)	245		33	68	25	15
Internal Link Dist (ft)	532			1665	621	
Turn Bay Length (ft)			500			
Base Capacity (vph)	748		403	1143	507	465
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	0.76		0.50	0.36	0.04	0.03

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NWL and 6:, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 15.2		Intersection LOS: B	
Intersection Capacity Utilization 53.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 133: Veteran's Way & Old Sandwich Road



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	455	65	185	380	20	15
Future Volume (vph)	455	65	185	380	20	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	4.5	4.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1779		1719	1810	1719	1538
Flt Permitted	1.00		0.19	1.00	0.95	1.00
Satd. Flow (perm)	1779		341	1810	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	495	71	201	413	22	16
RTOR Reduction (vph)	8	0	0	0	0	12
Lane Group Flow (vph)	558	0	201	413	22	4
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Actuated Green, G (s)	23.9		36.7	36.7	14.3	14.3
Effective Green, g (s)	23.9		36.7	36.7	14.3	14.3
Actuated g/C Ratio	0.40		0.61	0.61	0.24	0.24
Clearance Time (s)	4.5		4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	708		399	1107	409	366
v/s Ratio Prot	c0.31		c0.07	0.23	c0.01	
v/s Ratio Perm			0.24			0.00
v/c Ratio	0.79		0.50	0.37	0.05	0.01
Uniform Delay, d1	15.8		8.2	5.9	17.6	17.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	5.8		1.0	0.2	0.3	0.1
Delay (s)	21.6		9.2	6.1	17.9	17.5
Level of Service	C		A	A	B	B
Approach Delay (s)	21.6			7.1	17.7	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	455	65	185	380	20	15
Future Volume (veh/h)	455	65	185	380	20	15
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1900	1810	1810	1810	1810
Adj Flow Rate, veh/h	495	71	201	413	22	0
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	555	80	342	968	543	484
Arrive On Green	0.36	0.36	0.10	0.54	0.31	0.00
Sat Flow, veh/h	1548	222	1723	1810	1723	1538
Grp Volume(v), veh/h	0	566	201	413	22	0
Grp Sat Flow(s),veh/h/ln	0	1770	1723	1810	1723	1538
Q Serve(g_s), s	0.0	18.1	4.0	8.2	0.5	0.0
Cycle Q Clear(g_c), s	0.0	18.1	4.0	8.2	0.5	0.0
Prop In Lane		0.13	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	635	342	968	543	484
V/C Ratio(X)	0.00	0.89	0.59	0.43	0.04	0.00
Avail Cap(c_a), veh/h	0	664	382	1040	543	484
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.81	0.81	1.00	0.00
Uniform Delay (d), s/veh	0.0	18.1	12.9	8.4	14.3	0.0
Incr Delay (d2), s/veh	0.0	13.9	1.6	0.2	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	11.3	2.0	4.1	0.3	0.0
LnGrp Delay(d),s/veh	0.0	32.1	14.5	8.6	14.4	0.0
LnGrp LOS		C	B	A	B	
Approach Vol, veh/h	566			614	22	
Approach Delay, s/veh	32.1			10.6	14.4	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		23.4	10.6	26.0				36.6
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5
Max Green Setting (Gmax), s		16.5	7.5	22.5				34.5
Max Q Clear Time (g_c+I1), s		2.5	6.0	20.1				10.2
Green Ext Time (p_c), s		0.0	0.1	1.4				7.1

Intersection Summary	
HCM 2010 Ctrl Delay	20.8
HCM 2010 LOS	C

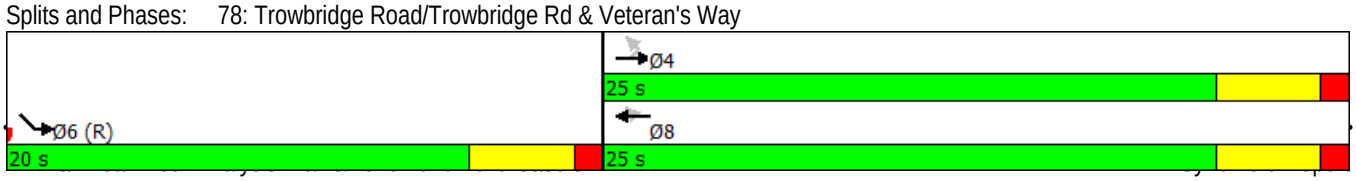
Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	15	510	255	20	160	90
Future Volume (vph)	15	510	255	20	160	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	250
Storage Lanes	0			1	2	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	0.95
Frt				0.850	0.946	
Flt Protected		0.999			0.969	
Satd. Flow (prot)	0	1808	1810	1538	3218	0
Flt Permitted		0.989			0.969	
Satd. Flow (perm)	0	1790	1810	1538	3218	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				22	98	
Link Speed (mph)		30	30		30	
Link Distance (ft)		742	276		701	
Travel Time (s)		16.9	6.3		15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	554	277	22	174	98
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	570	277	22	272	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		24	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (ft)	20	100	100	20	20	
Trailing Detector (ft)	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	
Detector 1 Size(ft)	20	6	6	20	20	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Detector Phase	4	4	8	8	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (s)	25.0	25.0	25.0	25.0	20.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	44.4%	
Maximum Green (s)	20.5	20.5	20.5	20.5	15.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.5	4.5	4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	Min	Min	Min	Min	C-Min	
Act Effct Green (s)		19.5	19.5	19.5	16.5	
Actuated g/C Ratio		0.43	0.43	0.43	0.37	
v/c Ratio		0.74	0.35	0.03	0.22	
Control Delay		16.2	8.8	2.6	8.4	
Queue Delay		0.0	0.0	0.0	0.0	
Total Delay		16.2	8.8	2.6	8.4	
LOS		B	A	A	A	
Approach Delay		16.2	8.4		8.4	
Approach LOS		B	A		A	
Queue Length 50th (ft)		111	43	0	14	
Queue Length 95th (ft)		144	59	6	42	
Internal Link Dist (ft)		662	196		621	
Turn Bay Length (ft)						
Base Capacity (vph)		868	877	757	1336	
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		0.66	0.32	0.03	0.20	

Intersection Summary

Area Type: Other
Cycle Length: 45
Actuated Cycle Length: 45
Offset: 0 (0%), Referenced to phase 2: and 6:SEL, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 12.3 Intersection LOS: B
Intersection Capacity Utilization 53.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 78: Trowbridge Road/Trowbridge Rd & Veteran's Way



Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	15	510	255	20	160	90
Future Volume (vph)	15	510	255	20	160	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	1.00	0.97	
Frt		1.00	1.00	0.85	0.95	
Flt Protected		1.00	1.00	1.00	0.97	
Satd. Flow (prot)		1807	1810	1538	3218	
Flt Permitted		0.99	1.00	1.00	0.97	
Satd. Flow (perm)		1789	1810	1538	3218	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	554	277	22	174	98
RTOR Reduction (vph)	0	0	0	12	62	0
Lane Group Flow (vph)	0	570	277	10	210	0
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)		19.5	19.5	19.5	16.5	
Effective Green, g (s)		19.5	19.5	19.5	16.5	
Actuated g/C Ratio		0.43	0.43	0.43	0.37	
Clearance Time (s)		4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		775	784	666	1179	
v/s Ratio Prot			0.15		c0.07	
v/s Ratio Perm		c0.32		0.01		
v/c Ratio		0.74	0.35	0.01	0.18	
Uniform Delay, d1		10.6	8.5	7.3	9.7	
Progression Factor		1.00	1.00	1.00	1.00	
Incremental Delay, d2		3.6	0.3	0.0	0.3	
Delay (s)		14.3	8.8	7.3	10.0	
Level of Service		B	A	A	A	
Approach Delay (s)		14.3	8.7		10.0	
Approach LOS		B	A		A	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

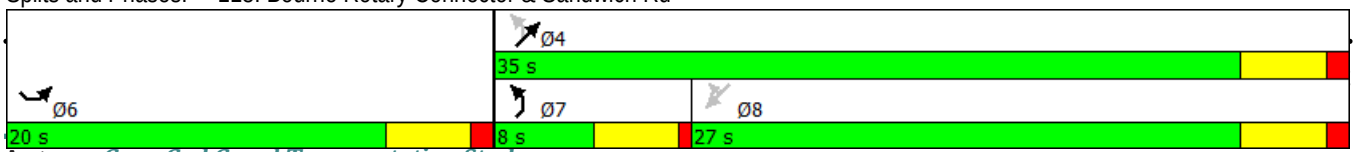
Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	170	325	10	950	385	560
Future Volume (vph)	170	325	10	950	385	560
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	1000	0	0			425
Storage Lanes	1	0	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.902					0.850
Flt Protected	0.983			0.999		
Satd. Flow (prot)	3113	0	0	3435	1810	1538
Flt Permitted	0.983			0.950		
Satd. Flow (perm)	3113	0	0	3266	1810	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	353					609
Link Speed (mph)	30			30	30	
Link Distance (ft)	1745			824	1013	
Travel Time (s)	39.7			18.7	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	353	11	1033	418	609
Shared Lane Traffic (%)						
Lane Group Flow (vph)	538	0	0	1044	418	609
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	24			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1		1	2	2	1
Detector Template	Left		Left	Thru	Thru	Right
Leading Detector (ft)	20		20	100	100	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		20	6	6	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Detector Phase	6		7	4	8	8
Switch Phase						
Minimum Initial (s)	5.0		4.0	5.0	5.0	5.0
Minimum Split (s)	20.0		8.0	20.0	22.5	22.5
Total Split (s)	20.0		8.0	35.0	27.0	27.0
Total Split (%)	36.4%		14.5%	63.6%	49.1%	49.1%
Maximum Green (s)	15.5		4.0	30.5	22.5	22.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		0.5	1.0	1.0	1.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	4.5			4.5	4.5	4.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		None	Min	Min	Min
Walk Time (s)					7.0	7.0
Flash Dont Walk (s)					11.0	11.0
Pedestrian Calls (#/hr)					0	0
Act Effct Green (s)	8.6			20.4	20.4	20.4
Actuated g/C Ratio	0.22			0.53	0.53	0.53
v/c Ratio	0.56			0.60	0.44	0.55
Control Delay	7.8			8.0	7.3	2.8
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	7.8			8.0	7.3	2.8
LOS	A			A	A	A
Approach Delay	7.8			8.0	4.6	
Approach LOS	A			A	A	
Queue Length 50th (ft)	15			61	41	0
Queue Length 95th (ft)	57			141	114	34
Internal Link Dist (ft)	1665			744	933	
Turn Bay Length (ft)	1000					425
Base Capacity (vph)	1529			2646	1192	1221
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	0.35			0.39	0.35	0.50

Intersection Summary

Area Type: Other
Cycle Length: 55
Actuated Cycle Length: 38.5
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.60
Intersection Signal Delay: 6.7 Intersection LOS: A
Intersection Capacity Utilization 68.7% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 118: Bourne Rotary Connector & Sandwich Rd



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	170	325	10	950	385	560
Future Volume (vph)	170	325	10	950	385	560
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	4.5
Lane Util. Factor	0.97			0.95	1.00	1.00
Frt	0.90			1.00	1.00	0.85
Flt Protected	0.98			1.00	1.00	1.00
Satd. Flow (prot)	3111			3436	1810	1538
Flt Permitted	0.98			0.95	1.00	1.00
Satd. Flow (perm)	3111			3268	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	353	11	1033	418	609
RTOR Reduction (vph)	273	0	0	0	0	282
Lane Group Flow (vph)	265	0	0	1044	418	327
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8
Actuated Green, G (s)	8.6			20.4	20.4	20.4
Effective Green, g (s)	8.6			20.4	20.4	20.4
Actuated g/C Ratio	0.23			0.54	0.54	0.54
Clearance Time (s)	4.5			4.5	4.5	4.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	704			1754	971	825
v/s Ratio Prot	c0.09					
v/s Ratio Perm				c0.32	0.23	0.21
v/c Ratio	0.38			0.60	0.43	0.40
Uniform Delay, d1	12.4			6.0	5.3	5.2
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.3			0.5	0.3	0.3
Delay (s)	12.8			6.5	5.6	5.5
Level of Service	B			A	A	A
Approach Delay (s)	12.8			6.5	5.5	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	38.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	68.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

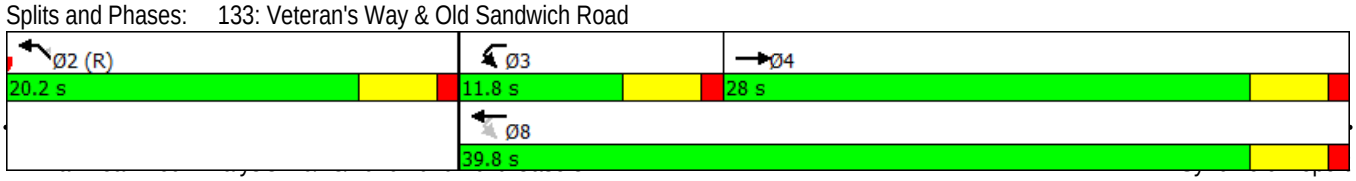
HCM 2010 edition methodology does not support a perm + prot left-turn type from a shared lane. Left-turn bay is needed for phases 7.

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	475	65	185	385	20	20
Future Volume (vph)	475	65	185	385	20	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	500		0	0
Storage Lanes		0	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.984					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1781	0	1719	1810	1719	1538
Flt Permitted			0.179		0.950	
Satd. Flow (perm)	1781	0	324	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	14					22
Link Speed (mph)	30			30	30	
Link Distance (ft)	612			1745	701	
Travel Time (s)	13.9			39.7	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	516	71	201	418	22	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	587	0	201	418	22	22
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	100		20	100	20	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	6		20	6	20	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	20.0		9.5	20.0	20.0	20.0
Total Split (s)	28.0		11.8	39.8	20.2	20.2
Total Split (%)	46.7%		19.7%	66.3%	33.7%	33.7%
Maximum Green (s)	23.5		7.3	35.3	15.7	15.7
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		Min	Min	C-Min	C-Min
Act Effct Green (s)	24.3		37.2	37.2	13.8	13.8
Actuated g/C Ratio	0.40		0.62	0.62	0.23	0.23
v/c Ratio	0.80		0.51	0.37	0.06	0.06
Control Delay	24.2		9.2	6.0	22.1	11.4
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	24.2		9.2	6.0	22.1	11.4
LOS	C		A	A	C	B
Approach Delay	24.2			7.1	16.8	
Approach LOS	C			A	B	
Queue Length 50th (ft)	170		25	61	6	0
Queue Length 95th (ft)	260		38	69	25	17
Internal Link Dist (ft)	532			1665	621	
Turn Bay Length (ft)			500			
Base Capacity (vph)	769		397	1161	487	451
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	0.76		0.51	0.36	0.05	0.05

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NWL and 6:, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 15.5		Intersection LOS: B	
Intersection Capacity Utilization 54.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 133: Veteran's Way & Old Sandwich Road



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	475	65	185	385	20	20
Future Volume (vph)	475	65	185	385	20	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	4.5	4.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1780		1719	1810	1719	1538
Flt Permitted	1.00		0.18	1.00	0.95	1.00
Satd. Flow (perm)	1780		324	1810	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	516	71	201	418	22	22
RTOR Reduction (vph)	8	0	0	0	0	17
Lane Group Flow (vph)	579	0	201	418	22	5
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Actuated Green, G (s)	24.4		37.2	37.2	13.8	13.8
Effective Green, g (s)	24.4		37.2	37.2	13.8	13.8
Actuated g/C Ratio	0.41		0.62	0.62	0.23	0.23
Clearance Time (s)	4.5		4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	723		393	1122	395	353
v/s Ratio Prot	c0.33		c0.07	0.23	c0.01	
v/s Ratio Perm			0.25			0.00
v/c Ratio	0.80		0.51	0.37	0.06	0.01
Uniform Delay, d1	15.7		8.2	5.6	18.0	17.8
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	6.3		1.1	0.2	0.3	0.1
Delay (s)	22.0		9.3	5.8	18.3	17.9
Level of Service	C		A	A	B	B
Approach Delay (s)	22.0			7.0	18.1	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	475	65	185	385	20	20
Future Volume (veh/h)	475	65	185	385	20	20
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1900	1810	1810	1810	1810
Adj Flow Rate, veh/h	516	71	201	418	22	0
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	580	80	342	991	521	465
Arrive On Green	0.37	0.37	0.10	0.55	0.30	0.00
Sat Flow, veh/h	1557	214	1723	1810	1723	1538
Grp Volume(v), veh/h	0	587	201	418	22	0
Grp Sat Flow(s),veh/h/ln	0	1772	1723	1810	1723	1538
Q Serve(g_s), s	0.0	18.7	3.9	8.2	0.5	0.0
Cycle Q Clear(g_c), s	0.0	18.7	3.9	8.2	0.5	0.0
Prop In Lane		0.12	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	660	342	991	521	465
V/C Ratio(X)	0.00	0.89	0.59	0.42	0.04	0.00
Avail Cap(c_a), veh/h	0	694	379	1065	521	465
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.81	0.81	1.00	0.00
Uniform Delay (d), s/veh	0.0	17.7	12.8	8.0	14.8	0.0
Incr Delay (d2), s/veh	0.0	13.2	1.6	0.2	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	11.4	1.9	4.1	0.3	0.0
LnGrp Delay(d),s/veh	0.0	30.8	14.4	8.2	14.9	0.0
LnGrp LOS		C	B	A	B	
Approach Vol, veh/h	587			619	22	
Approach Delay, s/veh	30.8			10.2	14.9	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		22.7	10.5	26.8				37.3
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5
Max Green Setting (Gmax), s		15.7	7.3	23.5				35.3
Max Q Clear Time (g_c+I1), s		2.5	5.9	20.7				10.2
Green Ext Time (p_c), s		0.0	0.1	1.7				7.4

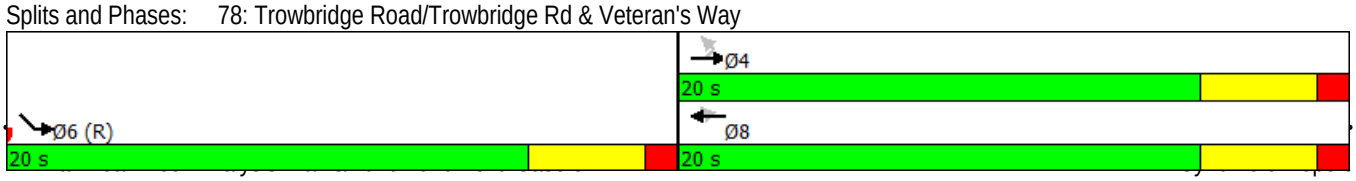
Intersection Summary	
HCM 2010 Ctrl Delay	20.2
HCM 2010 LOS	C

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	15	185	120	20	515	80
Future Volume (vph)	15	185	120	20	515	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	250
Storage Lanes	0			1	2	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	0.95
Frt				0.850	0.980	
Flt Protected		0.996			0.959	
Satd. Flow (prot)	0	1802	1810	1538	3299	0
Flt Permitted		0.971			0.959	
Satd. Flow (perm)	0	1757	1810	1538	3299	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				22	52	
Link Speed (mph)		30	30		30	
Link Distance (ft)		742	276		701	
Travel Time (s)		16.9	6.3		15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	201	130	22	560	87
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	217	130	22	647	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		24	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (ft)	20	100	100	20	20	
Trailing Detector (ft)	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	
Detector 1 Size(ft)	20	6	6	20	20	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Detector Phase	4	4	8	8	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	
Maximum Green (s)	15.5	15.5	15.5	15.5	15.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.5	4.5	4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	Min	Min	Min	Min	C-Min	
Act Effct Green (s)		10.1	10.1	10.1	20.9	
Actuated g/C Ratio		0.25	0.25	0.25	0.52	
v/c Ratio		0.49	0.28	0.05	0.37	
Control Delay		15.9	12.6	5.3	6.6	
Queue Delay		0.0	0.0	0.0	0.0	
Total Delay		15.9	12.6	5.3	6.6	
LOS		B	B	A	A	
Approach Delay		15.9	11.5		6.6	
Approach LOS		B	B		A	
Queue Length 50th (ft)		41	23	0	34	
Queue Length 95th (ft)		73	46	9	73	
Internal Link Dist (ft)		662	196		621	
Turn Bay Length (ft)						
Base Capacity (vph)		680	701	609	1748	
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		0.32	0.19	0.04	0.37	

Intersection Summary			
Area Type:	Other		
Cycle Length: 40			
Actuated Cycle Length: 40			
Offset: 0 (0%), Referenced to phase 2: and 6:SEL, Start of Green			
Natural Cycle: 40			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.49			
Intersection Signal Delay: 9.3		Intersection LOS: A	
Intersection Capacity Utilization 41.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 78: Trowbridge Road/Trowbridge Rd & Veteran's Way



Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	15	185	120	20	515	80
Future Volume (vph)	15	185	120	20	515	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	1.00	0.97	
Frt		1.00	1.00	0.85	0.98	
Flt Protected		1.00	1.00	1.00	0.96	
Satd. Flow (prot)		1803	1810	1538	3297	
Flt Permitted		0.97	1.00	1.00	0.96	
Satd. Flow (perm)		1758	1810	1538	3297	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	201	130	22	560	87
RTOR Reduction (vph)	0	0	0	16	25	0
Lane Group Flow (vph)	0	217	130	6	622	0
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)		10.1	10.1	10.1	20.9	
Effective Green, g (s)		10.1	10.1	10.1	20.9	
Actuated g/C Ratio		0.25	0.25	0.25	0.52	
Clearance Time (s)		4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		443	457	388	1722	
v/s Ratio Prot			0.07		c0.19	
v/s Ratio Perm		c0.12		0.00		
v/c Ratio		0.49	0.28	0.01	0.36	
Uniform Delay, d1		12.8	12.0	11.2	5.6	
Progression Factor		1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.9	0.3	0.0	0.6	
Delay (s)		13.6	12.4	11.2	6.2	
Level of Service		B	B	B	A	
Approach Delay (s)		13.6	12.2		6.2	
Approach LOS		B	B		A	

Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	195	600	0	960	25	910
Future Volume (vph)	195	600	0	960	25	910
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	1000	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.887				0.869	
Flt Protected	0.988					
Satd. Flow (prot)	3076	0	0	3438	1572	0
Flt Permitted	0.988					
Satd. Flow (perm)	3076	0	0	3438	1572	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	652				989	
Link Speed (mph)	30			30	30	
Link Distance (ft)	1745			824	1013	
Travel Time (s)	39.7			18.7	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	652	0	1043	27	989
Shared Lane Traffic (%)						
Lane Group Flow (vph)	864	0	0	1043	1016	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	24			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (ft)	20		20	100	100	
Trailing Detector (ft)	0		0	0	0	
Detector 1 Position(ft)	0		0	0	0	
Detector 1 Size(ft)	20		20	6	6	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot			NA	NA	
Protected Phases	6		7	4		
Permitted Phases			4		8	

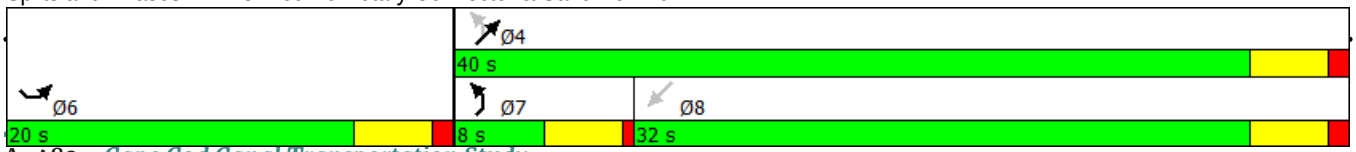
Lanes, Volumes, Timings
118: Bourne Rotary Connector & Sandwich Rd 02/19/2018

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Detector Phase	6		7	4	8	
Switch Phase						
Minimum Initial (s)	5.0		4.0	5.0	5.0	
Minimum Split (s)	20.0		8.0	20.0	22.5	
Total Split (s)	20.0		8.0	40.0	32.0	
Total Split (%)	33.3%		13.3%	66.7%	53.3%	
Maximum Green (s)	15.5		4.0	35.5	27.5	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		0.5	1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	4.5			4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Min		None	Min	Min	
Walk Time (s)					7.0	
Flash Dont Walk (s)					11.0	
Pedestrian Calls (#/hr)					0	
Act Effct Green (s)	10.1			21.0	21.0	
Actuated g/C Ratio	0.25			0.51	0.51	
v/c Ratio	0.69			0.59	0.79	
Control Delay	7.4			8.5	6.3	
Queue Delay	0.0			0.0	0.0	
Total Delay	7.4			8.5	6.3	
LOS	A			A	A	
Approach Delay	7.4			8.5	6.3	
Approach LOS	A			A	A	
Queue Length 50th (ft)	19			69	2	
Queue Length 95th (ft)	71			144	48	
Internal Link Dist (ft)	1665			744	933	
Turn Bay Length (ft)	1000					
Base Capacity (vph)	1641			2934	1416	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.53			0.36	0.72	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 40.8
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 7.4 Intersection LOS: A
Intersection Capacity Utilization 89.7% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 118: Bourne Rotary Connector & Sandwich Rd



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	195	600	0	960	25	910
Future Volume (vph)	195	600	0	960	25	910
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	0.97			0.95	1.00	
Frt	0.89			1.00	0.87	
Flt Protected	0.99			1.00	1.00	
Satd. Flow (prot)	3075			3438	1572	
Flt Permitted	0.99			1.00	1.00	
Satd. Flow (perm)	3075			3438	1572	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	652	0	1043	27	989
RTOR Reduction (vph)	488	0	0	0	471	0
Lane Group Flow (vph)	376	0	0	1043	545	0
Turn Type	Prot			NA	NA	
Protected Phases	6		7	4		
Permitted Phases			4		8	
Actuated Green, G (s)	10.1			21.0	21.0	
Effective Green, g (s)	10.1			21.0	21.0	
Actuated g/C Ratio	0.25			0.52	0.52	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	774			1800	823	
v/s Ratio Prot	c0.12			0.30		
v/s Ratio Perm					c0.35	
v/c Ratio	0.49			0.58	0.66	
Uniform Delay, d1	12.8			6.5	7.0	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.5			0.5	2.0	
Delay (s)	13.3			7.0	9.0	
Level of Service	B			A	A	
Approach Delay (s)	13.3			7.0	9.0	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	40.1	Sum of lost time (s)	13.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 Research does not support Non-NEMA phasing.

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	780	65	530	380	20	15
Future Volume (vph)	780	65	530	380	20	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	500		0	0
Storage Lanes		0	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.990					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1791	0	1719	1810	1719	1538
Flt Permitted			0.111		0.950	
Satd. Flow (perm)	1791	0	201	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	8					16
Link Speed (mph)	30			30	30	
Link Distance (ft)	612			1745	701	
Travel Time (s)	13.9			39.7	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	848	71	576	413	22	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	919	0	576	413	22	16
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	100		20	100	20	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	6		20	6	20	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	20.0		9.5	20.0	20.0	20.0
Total Split (s)	26.0		13.0	39.0	21.0	21.0
Total Split (%)	43.3%		21.7%	65.0%	35.0%	35.0%
Maximum Green (s)	21.5		8.5	34.5	16.5	16.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		Min	Min	C-Min	C-Min
Act Effct Green (s)	31.6		44.6	44.6	6.4	6.4
Actuated g/C Ratio	0.53		0.74	0.74	0.11	0.11
v/c Ratio	0.97		1.58	0.31	0.12	0.09
Control Delay	40.0		296.0	3.4	25.3	13.7
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	40.0		296.0	3.4	25.3	13.7
LOS	D		F	A	C	B
Approach Delay	40.0			173.8	20.4	
Approach LOS	D			F	C	
Queue Length 50th (ft)	289		~261	34	7	0
Queue Length 95th (ft)	#568		#442	68	25	15
Internal Link Dist (ft)	532			1665	621	
Turn Bay Length (ft)			500			
Base Capacity (vph)	948		364	1346	472	434
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	0.97		1.58	0.31	0.05	0.04

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 0 (0%), Referenced to phase 2:NWL and 6:, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.58			
Intersection Signal Delay: 107.6		Intersection LOS: F	
Intersection Capacity Utilization 89.8%		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: 133: Veteran's Way & Old Sandwich Road



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	780	65	530	380	20	15
Future Volume (vph)	780	65	530	380	20	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	4.5	4.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1791		1719	1810	1719	1538
Flt Permitted	1.00		0.11	1.00	0.95	1.00
Satd. Flow (perm)	1791		201	1810	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	848	71	576	413	22	16
RTOR Reduction (vph)	4	0	0	0	0	14
Lane Group Flow (vph)	915	0	576	413	22	2
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Actuated Green, G (s)	31.6		44.6	44.6	6.4	6.4
Effective Green, g (s)	31.6		44.6	44.6	6.4	6.4
Actuated g/C Ratio	0.53		0.74	0.74	0.11	0.11
Clearance Time (s)	4.5		4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	943		364	1345	183	164
v/s Ratio Prot	0.51		c0.22	0.23	c0.01	
v/s Ratio Perm			c0.95			0.00
v/c Ratio	0.97		1.58	0.31	0.12	0.01
Uniform Delay, d1	13.7		19.7	2.6	24.3	24.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	22.3		274.9	0.1	1.3	0.1
Delay (s)	36.1		294.6	2.7	25.6	24.1
Level of Service	D		F	A	C	C
Approach Delay (s)	36.1			172.7	25.0	
Approach LOS	D			F	C	

Intersection Summary			
HCM 2000 Control Delay	105.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.46		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	780	65	530	380	20	15
Future Volume (veh/h)	780	65	530	380	20	15
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1900	1810	1810	1810	1810
Adj Flow Rate, veh/h	848	71	576	413	22	0
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	590	49	364	1040	474	423
Arrive On Green	0.36	0.36	0.14	0.57	0.28	0.00
Sat Flow, veh/h	1647	138	1723	1810	1723	1538
Grp Volume(v), veh/h	0	919	576	413	22	0
Grp Sat Flow(s),veh/h/ln	0	1785	1723	1810	1723	1538
Q Serve(g_s), s	0.0	21.5	8.5	7.5	0.6	0.0
Cycle Q Clear(g_c), s	0.0	21.5	8.5	7.5	0.6	0.0
Prop In Lane		0.08	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	640	364	1040	474	423
V/C Ratio(X)	0.00	1.44	1.58	0.40	0.05	0.00
Avail Cap(c_a), veh/h	0	640	364	1040	474	423
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	19.3	24.3	7.0	16.0	0.0
Incr Delay (d2), s/veh	0.0	205.3	274.6	0.2	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	47.0	33.7	3.7	0.3	0.0
LnGrp Delay(d),s/veh	0.0	224.6	299.0	7.3	16.2	0.0
LnGrp LOS		F	F	A	B	
Approach Vol, veh/h	919			989	22	
Approach Delay, s/veh	224.6			177.2	16.2	
Approach LOS	F			F	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		21.0	13.0	26.0				39.0
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5
Max Green Setting (Gmax), s		16.5	8.5	21.5				34.5
Max Q Clear Time (g_c+I1), s		2.6	10.5	23.5				9.5
Green Ext Time (p_c), s		0.0	0.0	0.0				4.9

Intersection Summary	
HCM 2010 Ctrl Delay	197.9
HCM 2010 LOS	F

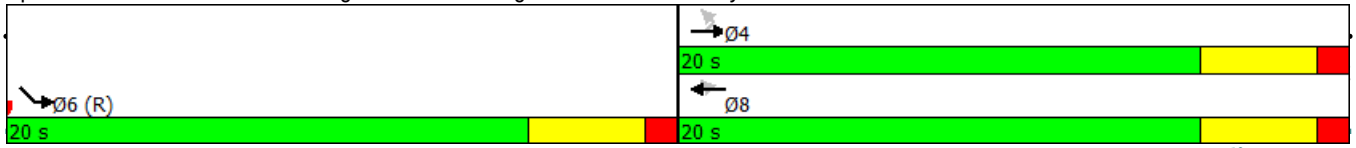
Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	5	465	290	25	545	55
Future Volume (vph)	5	465	290	25	545	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	250
Storage Lanes	0			1	2	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	0.95
Frt				0.850	0.986	
Flt Protected					0.957	
Satd. Flow (prot)	0	1810	1810	1538	3312	0
Flt Permitted		0.996			0.957	
Satd. Flow (perm)	0	1802	1810	1538	3312	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				27	32	
Link Speed (mph)		30	30		30	
Link Distance (ft)		742	276		701	
Travel Time (s)		16.9	6.3		15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	505	315	27	592	60
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	510	315	27	652	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		24	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (ft)	20	100	100	20	20	
Trailing Detector (ft)	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	
Detector 1 Size(ft)	20	6	6	20	20	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Detector Phase	4	4	8	8	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	
Maximum Green (s)	15.5	15.5	15.5	15.5	15.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.5	4.5	4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	Min	Min	Min	Min	C-Min	
Act Effct Green (s)		14.8	14.8	14.8	16.2	
Actuated g/C Ratio		0.37	0.37	0.37	0.40	
v/c Ratio		0.77	0.47	0.05	0.48	
Control Delay		20.9	11.9	4.1	10.2	
Queue Delay		0.0	0.0	0.0	0.0	
Total Delay		20.9	11.9	4.1	10.2	
LOS		C	B	A	B	
Approach Delay		20.9	11.3		10.2	
Approach LOS		C	B		B	
Queue Length 50th (ft)		85	45	0	54	
Queue Length 95th (ft)		#214	97	9	84	
Internal Link Dist (ft)		662	196		621	
Turn Bay Length (ft)						
Base Capacity (vph)		718	721	629	1400	
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		0.71	0.44	0.04	0.47	

Intersection Summary

Area Type: Other
Cycle Length: 40
Actuated Cycle Length: 40
Offset: 0 (0%), Referenced to phase 2: and 6:SEL, Start of Green
Natural Cycle: 40
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 14.1 Intersection LOS: B
Intersection Capacity Utilization 53.2% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 78: Trowbridge Road/Trowbridge Rd & Veteran's Way



Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	5	465	290	25	545	55
Future Volume (vph)	5	465	290	25	545	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	1.00	0.97	
Frt		1.00	1.00	0.85	0.99	
Flt Protected		1.00	1.00	1.00	0.96	
Satd. Flow (prot)		1809	1810	1538	3312	
Flt Permitted		1.00	1.00	1.00	0.96	
Satd. Flow (perm)		1803	1810	1538	3312	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	505	315	27	592	60
RTOR Reduction (vph)	0	0	0	17	19	0
Lane Group Flow (vph)	0	510	315	10	633	0
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)		14.8	14.8	14.8	16.2	
Effective Green, g (s)		14.8	14.8	14.8	16.2	
Actuated g/C Ratio		0.37	0.37	0.37	0.40	
Clearance Time (s)		4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		667	669	569	1341	
v/s Ratio Prot			0.17		c0.19	
v/s Ratio Perm		c0.28		0.01		
v/c Ratio		0.76	0.47	0.02	0.47	
Uniform Delay, d1		11.1	9.6	8.0	8.8	
Progression Factor		1.00	1.00	1.00	1.00	
Incremental Delay, d2		5.2	0.5	0.0	1.2	
Delay (s)		16.3	10.1	8.0	9.9	
Level of Service		B	B	A	A	
Approach Delay (s)		16.3	10.0		9.9	
Approach LOS		B	A		A	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

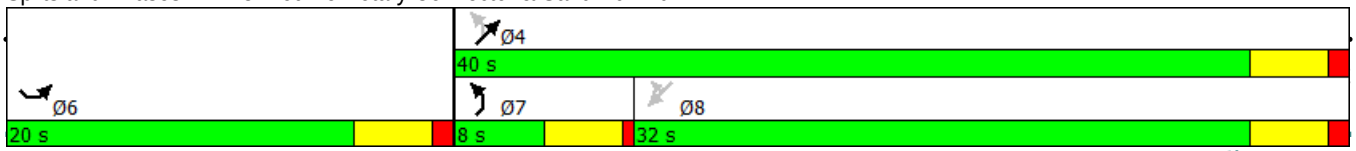
HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	200	125	25	1150	270	770
Future Volume (vph)	200	125	25	1150	270	770
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	1000	0	0			425
Storage Lanes	1	0	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.942					0.850
Flt Protected	0.970			0.999		
Satd. Flow (prot)	3208	0	0	3435	1810	1538
Flt Permitted	0.970			0.946		
Satd. Flow (perm)	3208	0	0	3252	1810	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	136					837
Link Speed (mph)	30			30	30	
Link Distance (ft)	1745			824	1013	
Travel Time (s)	39.7			18.7	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	136	27	1250	293	837
Shared Lane Traffic (%)						
Lane Group Flow (vph)	353	0	0	1277	293	837
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	24			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1		1	2	2	1
Detector Template	Left		Left	Thru	Thru	Right
Leading Detector (ft)	20		20	100	100	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		20	6	6	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Detector Phase	6		7	4	8	8
Switch Phase						
Minimum Initial (s)	5.0		4.0	5.0	5.0	5.0
Minimum Split (s)	20.0		8.0	20.0	22.5	22.5
Total Split (s)	20.0		8.0	40.0	32.0	32.0
Total Split (%)	33.3%		13.3%	66.7%	53.3%	53.3%
Maximum Green (s)	15.5		4.0	35.5	27.5	27.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		0.5	1.0	1.0	1.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	4.5			4.5	4.5	4.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		None	Min	Min	Min
Walk Time (s)					7.0	7.0
Flash Dont Walk (s)					11.0	11.0
Pedestrian Calls (#/hr)					0	0
Act Effct Green (s)	8.8			26.2	26.2	26.2
Actuated g/C Ratio	0.20			0.59	0.59	0.59
v/c Ratio	0.47			0.67	0.27	0.67
Control Delay	13.0			8.2	5.3	3.5
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	13.0			8.2	5.3	3.5
LOS	B			A	A	A
Approach Delay	13.0			8.2	4.0	
Approach LOS	B			A	A	
Queue Length 50th (ft)	24			90	29	0
Queue Length 95th (ft)	63			173	68	34
Internal Link Dist (ft)	1665			744	933	
Turn Bay Length (ft)	1000					425
Base Capacity (vph)	1258			2629	1258	1324
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	0.28			0.49	0.23	0.63

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 44.5			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 7.1		Intersection LOS: A	
Intersection Capacity Utilization 87.7%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 118: Bourne Rotary Connector & Sandwich Rd



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	200	125	25	1150	270	770
Future Volume (vph)	200	125	25	1150	270	770
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	4.5
Lane Util. Factor	0.97			0.95	1.00	1.00
Frt	0.94			1.00	1.00	0.85
Flt Protected	0.97			1.00	1.00	1.00
Satd. Flow (prot)	3209			3434	1810	1538
Flt Permitted	0.97			0.95	1.00	1.00
Satd. Flow (perm)	3209			3252	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	136	27	1250	293	837
RTOR Reduction (vph)	109	0	0	0	0	339
Lane Group Flow (vph)	244	0	0	1277	293	498
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8
Actuated Green, G (s)	8.8			26.2	26.2	26.2
Effective Green, g (s)	8.8			26.2	26.2	26.2
Actuated g/C Ratio	0.20			0.60	0.60	0.60
Clearance Time (s)	4.5			4.5	4.5	4.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	641			1936	1077	915
v/s Ratio Prot	c0.08					
v/s Ratio Perm				c0.39	0.16	0.32
v/c Ratio	0.38			0.66	0.27	0.54
Uniform Delay, d1	15.2			5.9	4.3	5.3
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.4			0.8	0.1	0.7
Delay (s)	15.6			6.8	4.4	6.0
Level of Service	B			A	A	A
Approach Delay (s)	15.6			6.8	5.6	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	44.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

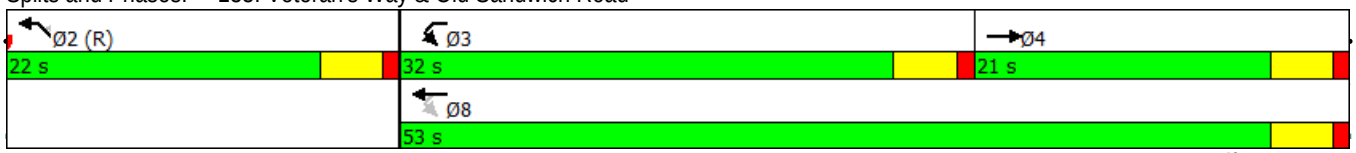
HCM 2010 edition methodology does not support a perm + prot left-turn type from a shared lane. Left-turn bay is needed for phases 7.

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	315	10	590	205	25	10
Future Volume (vph)	315	10	590	205	25	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	500		0	0
Storage Lanes		0	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.996					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1802	0	1719	1810	1719	1538
Flt Permitted			0.226		0.950	
Satd. Flow (perm)	1802	0	409	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2					11
Link Speed (mph)	30			30	30	
Link Distance (ft)	612			1745	701	
Travel Time (s)	13.9			39.7	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	342	11	641	223	27	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	353	0	641	223	27	11
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	100		20	100	20	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	6		20	6	20	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	20.0		9.5	20.0	20.0	20.0
Total Split (s)	21.0		32.0	53.0	22.0	22.0
Total Split (%)	28.0%		42.7%	70.7%	29.3%	29.3%
Maximum Green (s)	16.5		27.5	48.5	17.5	17.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		Min	Min	C-Min	C-Min
Act Effct Green (s)	18.8		52.6	52.6	13.4	13.4
Actuated g/C Ratio	0.25		0.70	0.70	0.18	0.18
v/c Ratio	0.78		0.80	0.18	0.09	0.04
Control Delay	40.6		18.9	3.6	30.6	17.0
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	40.6		18.9	3.6	30.6	17.0
LOS	D		B	A	C	B
Approach Delay	40.6			14.9	26.6	
Approach LOS	D			B	C	
Queue Length 50th (ft)	145		167	25	11	0
Queue Length 95th (ft)	#309		252	35	34	14
Internal Link Dist (ft)	532			1665	621	
Turn Bay Length (ft)			500			
Base Capacity (vph)	460		819	1301	431	394
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	0.77		0.78	0.17	0.06	0.03

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 0 (0%), Referenced to phase 2:NWL and 6:, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 22.5		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: 133: Veteran's Way & Old Sandwich Road



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	315	10	590	205	25	10
Future Volume (vph)	315	10	590	205	25	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	4.5	4.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1802		1719	1810	1719	1538
Flt Permitted	1.00		0.23	1.00	0.95	1.00
Satd. Flow (perm)	1802		409	1810	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	342	11	641	223	27	11
RTOR Reduction (vph)	1	0	0	0	0	9
Lane Group Flow (vph)	352	0	641	223	27	2
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Actuated Green, G (s)	18.8		52.7	52.7	13.3	13.3
Effective Green, g (s)	18.8		52.7	52.7	13.3	13.3
Actuated g/C Ratio	0.25		0.70	0.70	0.18	0.18
Clearance Time (s)	4.5		4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	451		800	1271	304	272
v/s Ratio Prot	0.20		c0.31	0.12	c0.02	
v/s Ratio Perm			c0.25			0.00
v/c Ratio	0.78		0.80	0.18	0.09	0.01
Uniform Delay, d1	26.2		12.2	3.8	25.8	25.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	8.3		5.8	0.1	0.6	0.0
Delay (s)	34.5		18.0	3.8	26.4	25.5
Level of Service	C		B	A	C	C
Approach Delay (s)	34.5			14.4	26.1	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	315	10	590	205	25	10
Future Volume (veh/h)	315	10	590	205	25	10
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1900	1810	1810	1810	1810
Adj Flow Rate, veh/h	342	11	641	223	27	0
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	381	12	684	1093	476	425
Arrive On Green	0.22	0.22	0.33	0.60	0.28	0.00
Sat Flow, veh/h	1744	56	1723	1810	1723	1538
Grp Volume(v), veh/h	0	353	641	223	27	0
Grp Sat Flow(s),veh/h/ln	0	1800	1723	1810	1723	1538
Q Serve(g_s), s	0.0	14.3	21.4	4.2	0.9	0.0
Cycle Q Clear(g_c), s	0.0	14.3	21.4	4.2	0.9	0.0
Prop In Lane		0.03	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	393	684	1093	476	425
V/C Ratio(X)	0.00	0.90	0.94	0.20	0.06	0.00
Avail Cap(c_a), veh/h	0	396	755	1170	476	425
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.69	0.69	1.00	0.00
Uniform Delay (d), s/veh	0.0	28.5	16.0	6.7	20.0	0.0
Incr Delay (d2), s/veh	0.0	22.5	13.8	0.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	9.5	15.3	2.1	0.4	0.0
LnGrp Delay(d),s/veh	0.0	51.0	29.7	6.8	20.2	0.0
LnGrp LOS		D	C	A	C	
Approach Vol, veh/h	353			864	27	
Approach Delay, s/veh	51.0			23.8	20.2	
Approach LOS	D			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		25.2	28.9	20.9				49.8
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5
Max Green Setting (Gmax), s		17.5	27.5	16.5				48.5
Max Q Clear Time (g_c+I1), s		2.9	23.4	16.3				6.2
Green Ext Time (p_c), s		0.0	1.0	0.1				4.0

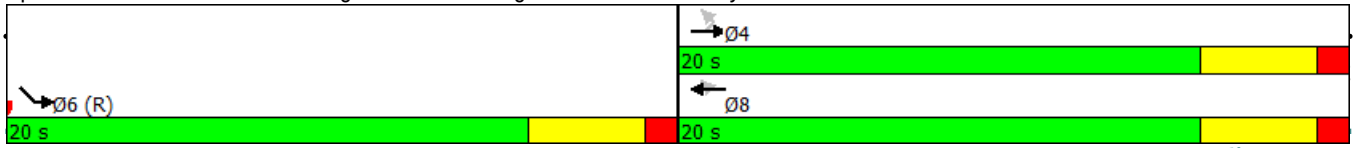
Intersection Summary	
HCM 2010 Ctrl Delay	31.4
HCM 2010 LOS	C

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	25	440	310	30	480	50
Future Volume (vph)	25	440	310	30	480	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	250
Storage Lanes	0			1	2	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	0.95
Frt				0.850	0.986	
Flt Protected		0.997			0.957	
Satd. Flow (prot)	0	1804	1810	1538	3312	0
Flt Permitted		0.970			0.957	
Satd. Flow (perm)	0	1755	1810	1538	3312	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				33	33	
Link Speed (mph)		30	30		30	
Link Distance (ft)		742	276		701	
Travel Time (s)		16.9	6.3		15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	478	337	33	522	54
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	505	337	33	576	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		24	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (ft)	20	100	100	20	20	
Trailing Detector (ft)	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	
Detector 1 Size(ft)	20	6	6	20	20	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Detector Phase	4	4	8	8	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	
Maximum Green (s)	15.5	15.5	15.5	15.5	15.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.5	4.5	4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	Min	Min	Min	Min	C-Min	
Act Effct Green (s)		15.2	15.2	15.2	15.8	
Actuated g/C Ratio		0.38	0.38	0.38	0.40	
v/c Ratio		0.76	0.49	0.05	0.43	
Control Delay		20.4	11.9	3.8	10.1	
Queue Delay		0.0	0.0	0.0	0.0	
Total Delay		20.4	11.9	3.8	10.1	
LOS		C	B	A	B	
Approach Delay		20.4	11.2		10.1	
Approach LOS		C	B		B	
Queue Length 50th (ft)		83	49	0	46	
Queue Length 95th (ft)		#215	105	11	72	
Internal Link Dist (ft)		662	196		621	
Turn Bay Length (ft)						
Base Capacity (vph)		715	737	646	1395	
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		0.71	0.46	0.05	0.41	

Intersection Summary			
Area Type:	Other		
Cycle Length: 40			
Actuated Cycle Length: 40			
Offset: 0 (0%), Referenced to phase 2: and 6:SEL, Start of Green			
Natural Cycle: 40			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.76			
Intersection Signal Delay: 14.0		Intersection LOS: B	
Intersection Capacity Utilization 66.3%		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: 78: Trowbridge Road/Trowbridge Rd & Veteran's Way



Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	25	440	310	30	480	50
Future Volume (vph)	25	440	310	30	480	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	1.00	0.97	
Frt		1.00	1.00	0.85	0.99	
Flt Protected		1.00	1.00	1.00	0.96	
Satd. Flow (prot)		1805	1810	1538	3311	
Flt Permitted		0.97	1.00	1.00	0.96	
Satd. Flow (perm)		1754	1810	1538	3311	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	478	337	33	522	54
RTOR Reduction (vph)	0	0	0	20	20	0
Lane Group Flow (vph)	0	505	337	13	556	0
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)		15.2	15.2	15.2	15.8	
Effective Green, g (s)		15.2	15.2	15.2	15.8	
Actuated g/C Ratio		0.38	0.38	0.38	0.40	
Clearance Time (s)		4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		666	687	584	1307	
v/s Ratio Prot			0.19		c0.17	
v/s Ratio Perm		c0.29		0.01		
v/c Ratio		0.76	0.49	0.02	0.43	
Uniform Delay, d1		10.8	9.4	7.8	8.8	
Progression Factor		1.00	1.00	1.00	1.00	
Incremental Delay, d2		4.9	0.6	0.0	1.0	
Delay (s)		15.7	10.0	7.8	9.8	
Level of Service		B	B	A	A	
Approach Delay (s)		15.7	9.8		9.8	
Approach LOS		B	A		A	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

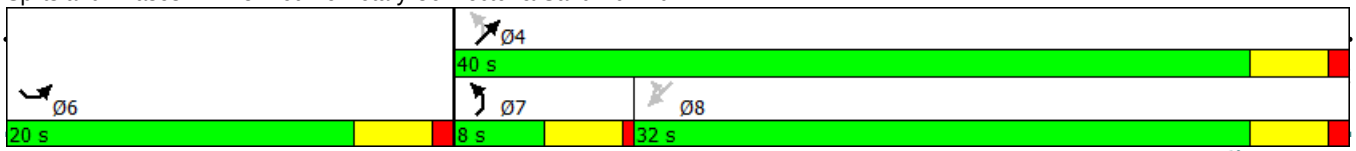
HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	195	125	25	1260	350	695
Future Volume (vph)	195	125	25	1260	350	695
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	1000	0	0			425
Storage Lanes	1	0	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.941					0.850
Flt Protected	0.970			0.999		
Satd. Flow (prot)	3204	0	0	3435	1810	1538
Flt Permitted	0.970			0.945		
Satd. Flow (perm)	3204	0	0	3249	1810	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	136					755
Link Speed (mph)	30			30	30	
Link Distance (ft)	1745			824	1013	
Travel Time (s)	39.7			18.7	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	136	27	1370	380	755
Shared Lane Traffic (%)						
Lane Group Flow (vph)	348	0	0	1397	380	755
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	24			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1		1	2	2	1
Detector Template	Left		Left	Thru	Thru	Right
Leading Detector (ft)	20		20	100	100	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		20	6	6	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Detector Phase	6		7	4	8	8
Switch Phase						
Minimum Initial (s)	5.0		4.0	5.0	5.0	5.0
Minimum Split (s)	20.0		8.0	20.0	22.5	22.5
Total Split (s)	20.0		8.0	40.0	32.0	32.0
Total Split (%)	33.3%		13.3%	66.7%	53.3%	53.3%
Maximum Green (s)	15.5		4.0	35.5	27.5	27.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		0.5	1.0	1.0	1.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	4.5			4.5	4.5	4.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		None	Min	Min	Min
Walk Time (s)					7.0	7.0
Flash Dont Walk (s)					11.0	11.0
Pedestrian Calls (#/hr)					0	0
Act Effct Green (s)	8.9			28.9	28.9	28.9
Actuated g/C Ratio	0.19			0.61	0.61	0.61
v/c Ratio	0.49			0.70	0.34	0.61
Control Delay	13.8			8.6	5.5	2.9
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	13.8			8.6	5.5	2.9
LOS	B			A	A	A
Approach Delay	13.8			8.6	3.8	
Approach LOS	B			A	A	
Queue Length 50th (ft)	27			106	40	0
Queue Length 95th (ft)	62			200	90	32
Internal Link Dist (ft)	1665			744	933	
Turn Bay Length (ft)	1000					425
Base Capacity (vph)	1185			2503	1226	1285
Starvation Cap Reductn	0			0	0	0
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.29			0.56	0.31	0.59

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 47.1			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 7.3		Intersection LOS: A	
Intersection Capacity Utilization 86.1%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 118: Bourne Rotary Connector & Sandwich Rd



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	195	125	25	1260	350	695
Future Volume (vph)	195	125	25	1260	350	695
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	4.5
Lane Util. Factor	0.97			0.95	1.00	1.00
Frt	0.94			1.00	1.00	0.85
Flt Protected	0.97			1.00	1.00	1.00
Satd. Flow (prot)	3207			3435	1810	1538
Flt Permitted	0.97			0.94	1.00	1.00
Satd. Flow (perm)	3207			3249	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	136	27	1370	380	755
RTOR Reduction (vph)	110	0	0	0	0	289
Lane Group Flow (vph)	238	0	0	1397	380	466
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8
Actuated Green, G (s)	8.9			28.9	28.9	28.9
Effective Green, g (s)	8.9			28.9	28.9	28.9
Actuated g/C Ratio	0.19			0.62	0.62	0.62
Clearance Time (s)	4.5			4.5	4.5	4.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	609			2006	1117	949
v/s Ratio Prot	c0.07					
v/s Ratio Perm				c0.43	0.21	0.30
v/c Ratio	0.39			0.70	0.34	0.49
Uniform Delay, d1	16.6			6.0	4.3	4.9
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.4			1.1	0.2	0.4
Delay (s)	17.0			7.1	4.5	5.3
Level of Service	B			A	A	A
Approach Delay (s)	17.0			7.1	5.0	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	46.8	Sum of lost time (s)	13.0
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

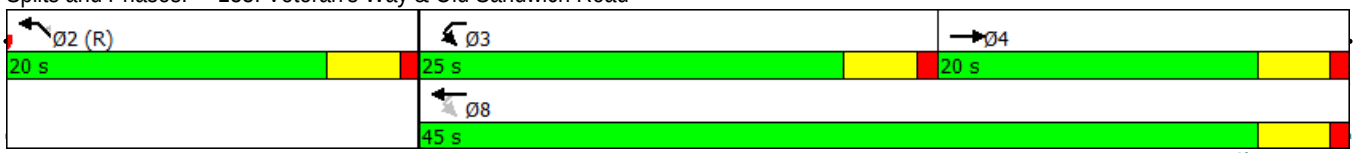
HCM 2010 edition methodology does not support a perm + prot left-turn type from a shared lane. Left-turn bay is needed for phases 7.

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	285	10	520	200	25	35
Future Volume (vph)	285	10	520	200	25	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	500		0	0
Storage Lanes		0	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.995					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1800	0	1719	1810	1719	1538
Flt Permitted			0.262		0.950	
Satd. Flow (perm)	1800	0	474	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	3					38
Link Speed (mph)	30			30	30	
Link Distance (ft)	612			1745	701	
Travel Time (s)	13.9			39.7	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	310	11	565	217	27	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	321	0	565	217	27	38
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	100		20	100	20	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	6		20	6	20	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	20.0		9.5	20.0	20.0	20.0
Total Split (s)	20.0		25.0	45.0	20.0	20.0
Total Split (%)	30.8%		38.5%	69.2%	30.8%	30.8%
Maximum Green (s)	15.5		20.5	40.5	15.5	15.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		Min	Min	C-Min	C-Min
Act Effct Green (s)	15.4		41.6	41.6	14.4	14.4
Actuated g/C Ratio	0.24		0.64	0.64	0.22	0.22
v/c Ratio	0.75		0.79	0.19	0.07	0.10
Control Delay	35.2		17.4	4.4	24.6	10.5
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	35.2		17.4	4.4	24.6	10.5
LOS	D		B	A	C	B
Approach Delay	35.2			13.8	16.4	
Approach LOS	D			B	B	
Queue Length 50th (ft)	113		113	27	9	0
Queue Length 95th (ft)	#230		183	35	30	24
Internal Link Dist (ft)	532			1665	621	
Turn Bay Length (ft)			500			
Base Capacity (vph)	459		737	1215	464	443
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	0.70		0.77	0.18	0.06	0.09

Intersection Summary			
Area Type:	Other		
Cycle Length: 65			
Actuated Cycle Length: 65			
Offset: 0 (0%), Referenced to phase 2:NWL and 6:, Start of Green			
Natural Cycle: 65			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 19.8		Intersection LOS: B	
Intersection Capacity Utilization 59.8%		ICU Level of Service B	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 133: Veteran's Way & Old Sandwich Road



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	285	10	520	200	25	35
Future Volume (vph)	285	10	520	200	25	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	4.5	4.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1801		1719	1810	1719	1538
Flt Permitted	1.00		0.26	1.00	0.95	1.00
Satd. Flow (perm)	1801		474	1810	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	310	11	565	217	27	38
RTOR Reduction (vph)	2	0	0	0	0	30
Lane Group Flow (vph)	319	0	565	217	27	8
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Actuated Green, G (s)	15.5		41.6	41.6	14.4	14.4
Effective Green, g (s)	15.5		41.6	41.6	14.4	14.4
Actuated g/C Ratio	0.24		0.64	0.64	0.22	0.22
Clearance Time (s)	4.5		4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	429		717	1158	380	340
v/s Ratio Prot	0.18		c0.26	0.12	c0.02	
v/s Ratio Perm			c0.24			0.01
v/c Ratio	0.74		0.79	0.19	0.07	0.02
Uniform Delay, d1	22.9		9.9	4.8	20.0	19.8
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	6.8		5.7	0.1	0.4	0.1
Delay (s)	29.7		15.7	4.9	20.4	19.9
Level of Service	C		B	A	C	B
Approach Delay (s)	29.7			12.7	20.1	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	59.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	285	10	520	200	25	35
Future Volume (veh/h)	285	10	520	200	25	35
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1900	1810	1810	1810	1810
Adj Flow Rate, veh/h	310	11	565	217	27	0
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	371	13	630	1011	522	466
Arrive On Green	0.21	0.21	0.28	0.56	0.30	0.00
Sat Flow, veh/h	1737	62	1723	1810	1723	1538
Grp Volume(v), veh/h	0	321	565	217	27	0
Grp Sat Flow(s),veh/h/ln	0	1799	1723	1810	1723	1538
Q Serve(g_s), s	0.0	11.1	15.2	3.9	0.7	0.0
Cycle Q Clear(g_c), s	0.0	11.1	15.2	3.9	0.7	0.0
Prop In Lane		0.03	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	384	630	1011	522	466
V/C Ratio(X)	0.00	0.84	0.90	0.21	0.05	0.00
Avail Cap(c_a), veh/h	0	429	698	1127	522	466
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	0.76	0.76	1.00	0.00
Uniform Delay (d), s/veh	0.0	24.5	13.0	7.2	16.0	0.0
Incr Delay (d2), s/veh	0.0	12.4	10.7	0.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	6.8	8.9	2.0	0.4	0.0
LnGrp Delay(d),s/veh	0.0	36.8	23.7	7.3	16.2	0.0
LnGrp LOS		D	C	A	B	
Approach Vol, veh/h	321			782	27	
Approach Delay, s/veh	36.8			19.1	16.2	
Approach LOS	D			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		24.2	22.4	18.4				40.8
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5
Max Green Setting (Gmax), s		15.5	20.5	15.5				40.5
Max Q Clear Time (g_c+I1), s		2.7	17.2	13.1				5.9
Green Ext Time (p_c), s		0.0	0.7	0.8				3.6

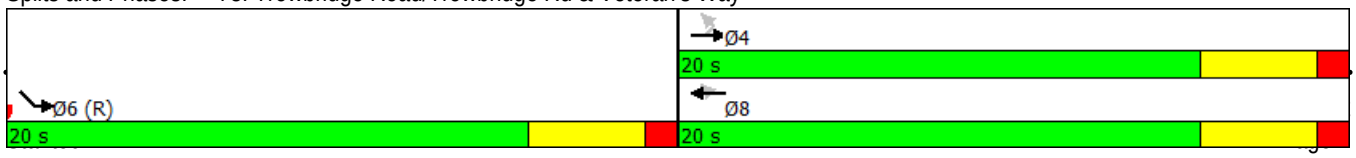
Intersection Summary	
HCM 2010 Ctrl Delay	24.1
HCM 2010 LOS	C

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	65	80	225	30	685	45
Future Volume (vph)	65	80	225	30	685	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	250
Storage Lanes	0			1	2	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	0.95
Frt				0.850	0.991	
Flt Protected		0.978			0.955	
Satd. Flow (prot)	0	1770	1810	1538	3322	0
Flt Permitted		0.755			0.955	
Satd. Flow (perm)	0	1366	1810	1538	3322	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				33	20	
Link Speed (mph)		30	30		30	
Link Distance (ft)		742	276		701	
Travel Time (s)		16.9	6.3		15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	87	245	33	745	49
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	158	245	33	794	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		24	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (ft)	20	100	100	20	20	
Trailing Detector (ft)	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	
Detector 1 Size(ft)	20	6	6	20	20	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Detector Phase	4	4	8	8	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	
Maximum Green (s)	15.5	15.5	15.5	15.5	15.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.5	4.5	4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	Min	Min	Min	Min	C-Min	
Act Effct Green (s)		10.7	10.7	10.7	20.3	
Actuated g/C Ratio		0.27	0.27	0.27	0.51	
v/c Ratio		0.43	0.51	0.08	0.47	
Control Delay		14.9	15.4	4.5	6.0	
Queue Delay		0.0	0.0	0.0	0.0	
Total Delay		14.9	15.4	4.5	6.0	
LOS		B	B	A	A	
Approach Delay		14.9	14.1		6.0	
Approach LOS		B	B		A	
Queue Length 50th (ft)		29	46	0	68	
Queue Length 95th (ft)		54	76	11	m85	
Internal Link Dist (ft)		662	196		621	
Turn Bay Length (ft)						
Base Capacity (vph)		529	701	616	1695	
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		0.30	0.35	0.05	0.47	

Intersection Summary			
Area Type:	Other		
Cycle Length: 40			
Actuated Cycle Length: 40			
Offset: 0 (0%), Referenced to phase 2: and 6:SEL, Start of Green			
Natural Cycle: 40			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay: 9.0		Intersection LOS: A	
Intersection Capacity Utilization 51.9%		ICU Level of Service A	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 78: Trowbridge Road/Trowbridge Rd & Veteran's Way



Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	65	80	225	30	685	45
Future Volume (vph)	65	80	225	30	685	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	1.00	0.97	
Frt		1.00	1.00	0.85	0.99	
Flt Protected		0.98	1.00	1.00	0.96	
Satd. Flow (prot)		1770	1810	1538	3322	
Flt Permitted		0.76	1.00	1.00	0.96	
Satd. Flow (perm)		1367	1810	1538	3322	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	87	245	33	745	49
RTOR Reduction (vph)	0	0	0	24	10	0
Lane Group Flow (vph)	0	158	245	9	784	0
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)		10.7	10.7	10.7	20.3	
Effective Green, g (s)		10.7	10.7	10.7	20.3	
Actuated g/C Ratio		0.27	0.27	0.27	0.51	
Clearance Time (s)		4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		365	484	411	1685	
v/s Ratio Prot			c0.14		c0.24	
v/s Ratio Perm		0.12		0.01		
v/c Ratio		0.43	0.51	0.02	0.47	
Uniform Delay, d1		12.1	12.4	10.8	6.4	
Progression Factor		1.00	1.00	1.00	0.81	
Incremental Delay, d2		0.8	0.8	0.0	0.3	
Delay (s)		13.0	13.2	10.8	5.5	
Level of Service		B	B	B	A	
Approach Delay (s)		13.0	13.0		5.5	
Approach LOS		B	B		A	

Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

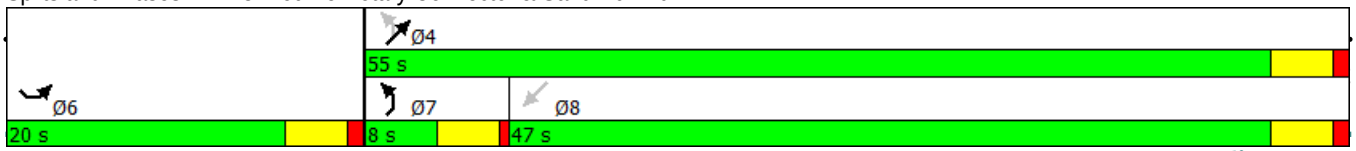
HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	195	495	20	1255	120	905
Future Volume (vph)	195	495	20	1255	120	905
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	1000	0	0			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.892				0.881	
Flt Protected	0.986			0.999		
Satd. Flow (prot)	3088	0	0	3435	1594	0
Flt Permitted	0.986			0.861		
Satd. Flow (perm)	3088	0	0	2960	1594	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	538				838	
Link Speed (mph)	30			30	30	
Link Distance (ft)	1745			824	1013	
Travel Time (s)	39.7			18.7	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	538	22	1364	130	984
Shared Lane Traffic (%)						
Lane Group Flow (vph)	750	0	0	1386	1114	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	24			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1		1	2	2	
Detector Template	Left		Left	Thru	Thru	
Leading Detector (ft)	20		20	100	100	
Trailing Detector (ft)	0		0	0	0	
Detector 1 Position(ft)	0		0	0	0	
Detector 1 Size(ft)	20		20	6	6	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	6		7	4		
Permitted Phases			4		8	

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Detector Phase	6		7	4	8	
Switch Phase						
Minimum Initial (s)	5.0		4.0	5.0	5.0	
Minimum Split (s)	20.0		8.0	20.0	22.5	
Total Split (s)	20.0		8.0	55.0	47.0	
Total Split (%)	26.7%		10.7%	73.3%	62.7%	
Maximum Green (s)	15.5		4.0	50.5	42.5	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	1.0		0.5	1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	4.5			4.5	4.5	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	Min		None	Min	Min	
Walk Time (s)					7.0	
Flash Dont Walk (s)					11.0	
Pedestrian Calls (#/hr)					0	
Act Effct Green (s)	10.8			39.8	39.8	
Actuated g/C Ratio	0.18			0.66	0.66	
v/c Ratio	0.75			0.71	0.83	
Control Delay	13.0			9.2	9.0	
Queue Delay	0.0			0.0	0.0	
Total Delay	13.0			9.2	9.0	
LOS	B			A	A	
Approach Delay	13.0			9.2	9.0	
Approach LOS	B			A	A	
Queue Length 50th (ft)	38			142	35	
Queue Length 95th (ft)	99			245	197	
Internal Link Dist (ft)	1665			744	933	
Turn Bay Length (ft)	1000					
Base Capacity (vph)	1243			2443	1425	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.60			0.57	0.78	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 60.3			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 10.0		Intersection LOS: A	
Intersection Capacity Utilization 90.9%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 118: Bourne Rotary Connector & Sandwich Rd



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	195	495	20	1255	120	905
Future Volume (vph)	195	495	20	1255	120	905
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	
Lane Util. Factor	0.97			0.95	1.00	
Frt	0.89			1.00	0.88	
Flt Protected	0.99			1.00	1.00	
Satd. Flow (prot)	3089			3435	1594	
Flt Permitted	0.99			0.86	1.00	
Satd. Flow (perm)	3089			2959	1594	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	538	22	1364	130	984
RTOR Reduction (vph)	441	0	0	0	278	0
Lane Group Flow (vph)	309	0	0	1386	836	0
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	6		7	4		
Permitted Phases			4		8	
Actuated Green, G (s)	10.8			39.8	39.8	
Effective Green, g (s)	10.8			39.8	39.8	
Actuated g/C Ratio	0.18			0.67	0.67	
Clearance Time (s)	4.5			4.5	4.5	
Vehicle Extension (s)	3.0			3.0	3.0	
Lane Grp Cap (vph)	559			1975	1064	
v/s Ratio Prot	c0.10					
v/s Ratio Perm				0.47	c0.52	
v/c Ratio	0.55			0.70	0.79	
Uniform Delay, d1	22.2			6.2	6.9	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	1.2			1.1	3.9	
Delay (s)	23.4			7.3	10.8	
Level of Service	C			A	B	
Approach Delay (s)	23.4			7.3	10.8	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	59.6	Sum of lost time (s)	13.0
Intersection Capacity Utilization	90.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 edition methodology does not support a perm + prot left-turn type from a shared lane. Left-turn bay is needed for phases 7.

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	610	10	720	205	25	80
Future Volume (vph)	610	10	720	205	25	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	500		0	0
Storage Lanes		0	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.998					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1806	0	1719	1810	1719	1538
Flt Permitted			0.138		0.950	
Satd. Flow (perm)	1806	0	250	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					87
Link Speed (mph)	30			30	30	
Link Distance (ft)	612			1745	701	
Travel Time (s)	13.9			39.7	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	663	11	783	223	27	87
Shared Lane Traffic (%)						
Lane Group Flow (vph)	674	0	783	223	27	87
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	100		20	100	20	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	6		20	6	20	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	20.0		9.5	20.0	20.0	20.0
Total Split (s)	29.0		30.0	59.0	21.0	21.0
Total Split (%)	36.3%		37.5%	73.8%	26.3%	26.3%
Maximum Green (s)	24.5		25.5	54.5	16.5	16.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		Min	Min	C-Min	C-Min
Act Effct Green (s)	24.5		63.9	63.9	7.1	7.1
Actuated g/C Ratio	0.31		0.80	0.80	0.09	0.09
v/c Ratio	1.22		0.93	0.15	0.18	0.40
Control Delay	142.1		36.7	2.3	31.0	17.3
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	142.1		36.7	2.3	31.0	17.3
LOS	F		D	A	C	B
Approach Delay	142.1			29.1	20.5	
Approach LOS	F			C	C	
Queue Length 50th (ft)	~422		295	17	14	11
Queue Length 95th (ft)	#628		#579	38	34	51
Internal Link Dist (ft)	532			1665	621	
Turn Bay Length (ft)			500			
Base Capacity (vph)	553		841	1446	354	386
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	1.22		0.93	0.15	0.08	0.23

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 4 (5%), Referenced to phase 2:NWL and 6:, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.22			
Intersection Signal Delay: 71.0		Intersection LOS: E	
Intersection Capacity Utilization 88.0%		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: 133: Veteran's Way & Old Sandwich Road



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	610	10	720	205	25	80
Future Volume (vph)	610	10	720	205	25	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	4.5	4.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1806		1719	1810	1719	1538
Flt Permitted	1.00		0.14	1.00	0.95	1.00
Satd. Flow (perm)	1806		250	1810	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	663	11	783	223	27	87
RTOR Reduction (vph)	1	0	0	0	0	79
Lane Group Flow (vph)	673	0	783	223	27	8
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Actuated Green, G (s)	24.5		63.9	63.9	7.1	7.1
Effective Green, g (s)	24.5		63.9	63.9	7.1	7.1
Actuated g/C Ratio	0.31		0.80	0.80	0.09	0.09
Clearance Time (s)	4.5		4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	553		840	1445	152	136
v/s Ratio Prot	c0.37		c0.41	0.12	c0.02	
v/s Ratio Perm			0.34			0.01
v/c Ratio	1.22		0.93	0.15	0.18	0.06
Uniform Delay, d1	27.8		17.3	1.8	33.7	33.4
Progression Factor	1.00		1.00	1.00	0.86	1.37
Incremental Delay, d2	113.6		16.8	0.1	2.5	0.8
Delay (s)	141.3		34.2	1.9	31.5	46.6
Level of Service	F		C	A	C	D
Approach Delay (s)	141.3			27.0	43.0	
Approach LOS	F			C	D	

Intersection Summary			
HCM 2000 Control Delay	71.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	610	10	720	205	25	80
Future Volume (veh/h)	610	10	720	205	25	80
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1900	1810	1810	1810	1810
Adj Flow Rate, veh/h	663	11	783	223	27	0
Adj No. of Lanes	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	544	9	639	1233	355	317
Arrive On Green	0.31	0.31	0.32	0.68	0.21	0.00
Sat Flow, veh/h	1775	29	1723	1810	1723	1538
Grp Volume(v), veh/h	0	674	783	223	27	0
Grp Sat Flow(s),veh/h/ln	0	1804	1723	1810	1723	1538
Q Serve(g_s), s	0.0	24.5	25.5	3.6	1.0	0.0
Cycle Q Clear(g_c), s	0.0	24.5	25.5	3.6	1.0	0.0
Prop In Lane		0.02	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	0	553	639	1233	355	317
V/C Ratio(X)	0.00	1.22	1.22	0.18	0.08	0.00
Avail Cap(c_a), veh/h	0	553	639	1233	355	317
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	0.0	27.8	21.5	4.6	25.6	0.0
Incr Delay (d2), s/veh	0.0	114.5	114.7	0.1	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	29.7	34.4	1.8	0.5	0.0
LnGrp Delay(d),s/veh	0.0	142.3	136.2	4.7	26.0	0.0
LnGrp LOS		F	F	A	C	
Approach Vol, veh/h	674			1006	27	
Approach Delay, s/veh	142.3			107.0	26.0	
Approach LOS	F			F	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		21.0	30.0	29.0				59.0
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5
Max Green Setting (Gmax), s		16.5	25.5	24.5				54.5
Max Q Clear Time (g_c+I1), s		3.0	27.5	26.5				5.6
Green Ext Time (p_c), s		0.0	0.0	0.0				7.5

Intersection Summary	
HCM 2010 Ctrl Delay	119.7
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (veh/h)	115	5	10	0	0	120	75	275	0	5	260	5
Future Volume (Veh/h)	115	5	10	0	0	120	75	275	0	5	260	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	125	5	11	0	0	130	82	299	0	5	283	5
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	758	756	299	761	758	286	283			299		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	758	756	299	761	758	286	283			299		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	51	98	99	100	100	83	94			100		
cM capacity (veh/h)	254	314	741	297	313	754	1279			1262		

Direction, Lane #	EB 1	WB 1	SE 1	NW 1
Volume Total	141	130	381	293
Volume Left	125	0	82	5
Volume Right	11	130	0	5
cSH	269	754	1279	1262
Volume to Capacity	0.52	0.17	0.06	0.00
Queue Length 95th (ft)	70	16	5	0
Control Delay (s)	32.2	10.8	2.2	0.2
Lane LOS	D	B	A	A
Approach Delay (s)	32.2	10.8	2.2	0.2
Approach LOS	D	B		

Intersection Summary				
Average Delay	7.2			
Intersection Capacity Utilization	56.8%	ICU Level of Service	B	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	140	5	10	0	0	130	85	325	0	5	335	5
Future Volume (vph)	140	5	10	0	0	130	85	325	0	5	335	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991			0.865						0.998	
Flt Protected		0.957						0.990			0.999	
Satd. Flow (prot)	0	1767	0	0	1611	0	0	1844	0	0	1857	0
Flt Permitted		0.957						0.990			0.999	
Satd. Flow (perm)	0	1767	0	0	1611	0	0	1844	0	0	1857	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		220			345			326			645	
Travel Time (s)		5.0			7.8			7.4			14.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	5	11	0	0	141	92	353	0	5	364	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	168	0	0	141	0	0	445	0	0	374	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 70.0%		ICU Level of Service C	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	140	5	10	0	0	130	85	325	0	5	335	5
Future Volume (Veh/h)	140	5	10	0	0	130	85	325	0	5	335	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	152	5	11	0	0	141	92	353	0	5	364	5
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	914	911	353	916	914	366	364			353		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	914	911	353	916	914	366	364			353		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	19	98	98	100	100	79	92			100		
cM capacity (veh/h)	189	252	691	230	251	679	1195			1206		

Direction, Lane #	EB 1	WB 1	SE 1	NW 1
Volume Total	168	141	445	374
Volume Left	152	0	92	5
Volume Right	11	141	0	5
cSH	200	679	1195	1206
Volume to Capacity	0.84	0.21	0.08	0.00
Queue Length 95th (ft)	155	19	6	0
Control Delay (s)	77.2	11.7	2.3	0.1
Lane LOS	F	B	A	A
Approach Delay (s)	77.2	11.7	2.3	0.1
Approach LOS	F	B		

Intersection Summary				
Average Delay	13.9			
Intersection Capacity Utilization	70.0%	ICU Level of Service	C	
Analysis Period (min)	15			

Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	140	5	10	0	0	130	85	325	0	5	335	5
Future Vol, veh/h	140	5	10	0	0	130	85	325	0	5	335	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Free	-	-	Free	-	-	Free	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	152	5	11	0	0	141	92	353	0	5	364	5

Major/Minor	Minor1			Minor2			Major1			Major2		
Conflicting Flow All	913	913	-	916	913	-	364	0	-	353	0	0
Stage 1	538	538	-	375	375	-	-	-	-	-	-	-
Stage 2	375	375	-	541	538	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	-	7.12	6.52	-	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	-	3.518	4.018	-	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	254	273	0	253	273	0	1195	-	0	1206	-	0
Stage 1	527	522	0	646	617	0	-	-	0	-	-	0
Stage 2	646	617	0	525	522	0	-	-	0	-	-	0
Platoon blocked, %								-			-	
Mov Cap-1 Maneuver	234	246	-	230	246	-	1195	-	-	1206	-	-
Mov Cap-2 Maneuver	234	246	-	230	246	-	-	-	-	-	-	-
Stage 1	476	472	-	584	614	-	-	-	-	-	-	-
Stage 2	643	614	-	469	472	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s		0	1.7	0.1
HCM LOS	-	A		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	WBLn1	SEL	SET
Capacity (veh/h)	1206	-	-	-	1195	-
HCM Lane V/C Ratio	0.005	-	-	-	0.077	-
HCM Control Delay (s)	8	0	-	0	8.3	0
HCM Lane LOS	A	A	-	A	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.3	-

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	280	10	30	5	5	265	95	290	0	5	600	15
Future Volume (Veh/h)	280	10	30	5	5	265	95	290	0	5	600	15
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	304	11	33	5	5	288	103	315	0	5	652	16
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	1194	1183	315	1196	1191	660	652			315		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1194	1183	315	1196	1191	660	652			315		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	93	95	96	97	38	89			100		
cM capacity (veh/h)	55	168	725	135	166	463	935			1245		

Direction, Lane #	EB 1	WB 1	SE 1	NW 1
Volume Total	348	298	418	673
Volume Left	304	5	103	5
Volume Right	33	288	0	16
cSH	62	432	935	1245
Volume to Capacity	5.62	0.69	0.11	0.00
Queue Length 95th (ft)	Err	128	9	0
Control Delay (s)	Err	29.8	3.2	0.1
Lane LOS	F	D	A	A
Approach Delay (s)	Err	29.8	3.2	0.1
Approach LOS	F	D		

Intersection Summary			
Average Delay	2009.2		
Intersection Capacity Utilization	101.4%	ICU Level of Service	G
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	330	10	35	5	5	300	120	345	0	5	680	20
Future Volume (vph)	330	10	35	5	5	300	120	345	0	5	680	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.987			0.869						0.996	
Flt Protected		0.958			0.999			0.987				
Satd. Flow (prot)	0	1761	0	0	1617	0	0	1839	0	0	1855	0
Flt Permitted		0.958			0.999			0.987				
Satd. Flow (perm)	0	1761	0	0	1617	0	0	1839	0	0	1855	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		220			315			326			645	
Travel Time (s)		5.0			7.2			7.4			14.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	359	11	38	5	5	326	130	375	0	5	739	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	408	0	0	336	0	0	505	0	0	766	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 115.4%		ICU Level of Service H	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	330	10	35	5	5	300	120	345	0	5	680	20
Future Volume (Veh/h)	330	10	35	5	5	300	120	345	0	5	680	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	359	11	38	5	5	326	130	375	0	5	739	22
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	1398	1384	375	1400	1395	750	739			375		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1398	1384	375	1400	1395	750	739			375		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	91	94	95	96	21	85			100		
cM capacity (veh/h)	21	121	671	91	120	411	867			1183		

Direction, Lane #	EB 1	WB 1	SE 1	NW 1
Volume Total	408	336	505	766
Volume Left	359	5	130	5
Volume Right	38	326	0	22
cSH	24	378	867	1183
Volume to Capacity	17.27	0.89	0.15	0.00
Queue Length 95th (ft)	Err	223	13	0
Control Delay (s)	Err	56.2	4.0	0.1
Lane LOS	F	F	A	A
Approach Delay (s)	Err	56.2	4.0	0.1
Approach LOS	F	F		

Intersection Summary				
Average Delay	2035.0			
Intersection Capacity Utilization	115.4%	ICU Level of Service	H	
Analysis Period (min)	15			

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	330	10	35	5	5	300	120	345	0	5	680	20
Future Vol, veh/h	330	10	35	5	5	300	120	345	0	5	680	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Free	-	-	Free	-	-	Free	-	-	Free
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	359	11	38	5	5	326	130	375	0	5	739	22

Major/Minor	Minor1			Minor2			Major1			Major2		
Conflicting Flow All	1389	1386	-	1391	1386	-	739	0	-	375	0	0
Stage 1	636	636	-	750	750	-	-	-	-	-	-	-
Stage 2	753	750	-	641	636	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	-	7.12	6.52	-	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	-	3.518	4.018	-	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	~ 120	143	0	120	143	0	867	-	0	1183	-	0
Stage 1	466	472	0	403	419	0	-	-	0	-	-	0
Stage 2	402	419	0	463	472	0	-	-	0	-	-	0
Platoon blocked, %								-			-	
Mov Cap-1 Maneuver	~ 98	115	-	95	115	-	867	-	-	1183	-	-
Mov Cap-2 Maneuver	~ 98	115	-	95	115	-	-	-	-	-	-	-
Stage 1	378	383	-	327	416	-	-	-	-	-	-	-
Stage 2	394	416	-	365	383	-	-	-	-	-	-	-

Approach	EB	WB	SE	NW
HCM Control Delay, s			2.6	0.1
HCM LOS	-	-		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	WBLn1	SEL	SET
Capacity (veh/h)	1183	-	-	-	867	-
HCM Lane V/C Ratio	0.005	-	-	-	0.15	-
HCM Control Delay (s)	8.1	0	-	-	9.9	0
HCM Lane LOS	A	A	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	-	0.5	-

Notes

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

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	970	10	340	10	10	10	400	30	10	10	1025	305
Future Volume (vph)	970	10	340	10	10	10	400	30	10	10	1025	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		150	0		0	0		0	0		100
Storage Lanes	1		0	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.920			0.955			0.962				0.850
Flt Protected	0.950	0.978			0.984		0.950					
Satd. Flow (prot)	1633	1547	0	0	1700	0	1719	1741	0	0	3438	1538
Flt Permitted	0.683	0.808			0.651		0.123				0.953	
Satd. Flow (perm)	1174	1278	0	0	1125	0	223	1741	0	0	3277	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		77			11			11				235
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		333			284			282			370	
Travel Time (s)		7.6			6.5			6.4			8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1054	11	370	11	11	11	435	33	11	11	1114	332
Shared Lane Traffic (%)	30%											
Lane Group Flow (vph)	738	697	0	0	33	0	435	44	0	0	1125	332
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6

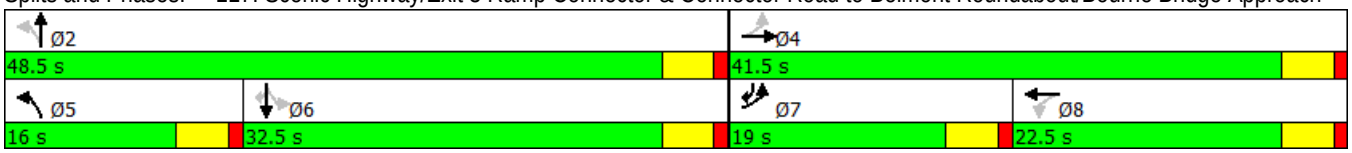
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4		8	8		5	2		6	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	9.5
Total Split (s)	19.0	41.5		22.5	22.5		16.0	48.5		32.5	32.5	19.0
Total Split (%)	21.1%	46.1%		25.0%	25.0%		17.8%	53.9%		36.1%	36.1%	21.1%
Maximum Green (s)	14.5	37.0		18.0	18.0		11.5	44.0		28.0	28.0	14.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	None		None	None		Min	Min		Min	Min	Min
Walk Time (s)		7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	37.0	37.0			13.0		44.0	44.0			28.0	56.0
Actuated g/C Ratio	0.41	0.41			0.14		0.49	0.49			0.31	0.62
v/c Ratio	1.23	1.09			0.19		1.45	0.05			1.10	0.32
Control Delay	142.8	87.1			25.4		243.3	10.0			92.2	4.5
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Delay	142.8	87.1			25.4		243.3	10.0			92.2	4.5
LOS	F	F			C		F	A			F	A
Approach Delay		115.7			25.4			221.8			72.2	
Approach LOS		F			C			F			E	
Queue Length 50th (ft)	~577	~463			10		~294	9			~386	27
Queue Length 95th (ft)	#806	#692			36		#480	27			#514	73
Internal Link Dist (ft)		253			204			202			290	
Turn Bay Length (ft)												100
Base Capacity (vph)	602	641			233		300	856			1019	1045
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	1.23	1.09			0.14		1.45	0.05			1.10	0.32

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.45
Intersection Signal Delay: 111.1 Intersection LOS: F
Intersection Capacity Utilization 106.2% 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.

Splits and Phases: 117: Scenic Highway/Exit 3 Ramp Connector & Connector Road to Belmont Roundabout/Bourne Bridge Approach



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	970	10	340	10	10	10	400	30	10	10	1025	305
Future Volume (vph)	970	10	340	10	10	10	400	30	10	10	1025	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Lane Util. Factor	0.95	0.95			1.00		1.00	1.00			0.95	1.00
Frt	1.00	0.92			0.95		1.00	0.96			1.00	0.85
Flt Protected	0.95	0.98			0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1633	1547			1700		1719	1742			3436	1538
Flt Permitted	0.68	0.81			0.65		0.12	1.00			0.95	1.00
Satd. Flow (perm)	1174	1279			1125		223	1742			3277	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1054	11	370	11	11	11	435	33	11	11	1114	332
RTOR Reduction (vph)	0	44	0	0	10	0	0	6	0	0	0	103
Lane Group Flow (vph)	738	653	0	0	23	0	435	38	0	0	1125	229
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	38.8	38.8			10.8		44.0	44.0			28.0	51.5
Effective Green, g (s)	38.8	38.8			10.8		44.0	44.0			28.0	51.5
Actuated g/C Ratio	0.42	0.42			0.12		0.48	0.48			0.31	0.56
Clearance Time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	613	609			132		294	834			999	938
v/s Ratio Prot	c0.31	0.27					c0.19	0.02				0.06
v/s Ratio Perm	c0.20	0.18			0.02		c0.52				0.34	0.09
v/c Ratio	1.20	1.07			0.18		1.48	0.05			1.13	0.24
Uniform Delay, d1	25.7	26.5			36.5		25.2	12.7			31.9	10.2
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	106.7	57.1			0.6		233.3	0.0			69.8	0.1
Delay (s)	132.4	83.6			37.1		258.5	12.7			101.7	10.4
Level of Service	F	F			D		F	B			F	B
Approach Delay (s)		108.7			37.1			236.0			80.9	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	114.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	91.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	106.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	295	355	225	395	70
Future Volume (vph)	5	295	355	225	395	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.948		0.980	
Flt Protected		0.999			0.959	
Satd. Flow (prot)	0	1808	1715	0	1701	0
Flt Permitted		0.999			0.959	
Satd. Flow (perm)	0	1808	1715	0	1701	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		510	234		330	
Travel Time (s)		11.6	5.3		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	321	386	245	429	76
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	326	631	0	505	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 65.2%		ICU Level of Service C	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	295	355	225	395	70
Future Volume (Veh/h)	5	295	355	225	395	70
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	321	386	245	429	76
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	631				840	508
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	631				840	508
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				0	86
cM capacity (veh/h)	937				330	559

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	326	631	505
Volume Left	5	0	429
Volume Right	0	245	76
cSH	937	1700	352
Volume to Capacity	0.01	0.37	1.44
Queue Length 95th (ft)	0	0	659
Control Delay (s)	0.2	0.0	241.0
Lane LOS	A		F
Approach Delay (s)	0.2	0.0	241.0
Approach LOS			F

Intersection Summary			
Average Delay	83.3		
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	0	0	1015	0	0	520
Future Volume (vph)	0	0	1015	0	0	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1810	1810	0	0	1810
Flt Permitted						
Satd. Flow (perm)	0	1810	1810	0	0	1810
Link Speed (mph)	30		30			30
Link Distance (ft)	474		550			219
Travel Time (s)	10.8		12.5			5.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1103	0	0	565
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1103	0	0	565
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	0		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 56.8%		ICU Level of Service B	
Analysis Period (min) 15			

Intersection Sign configuration not allowed in HCM analysis.

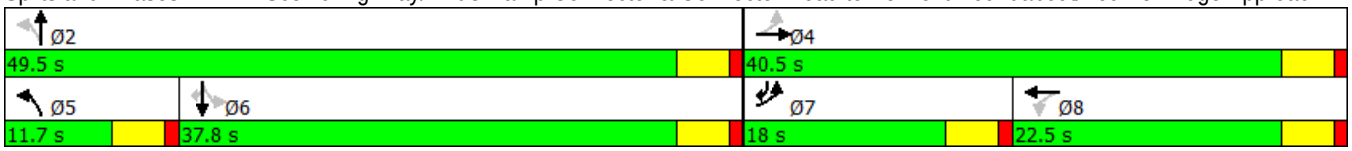
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	970	10	340	10	10	10	400	30	10	10	995	310
Future Volume (vph)	970	10	340	10	10	10	400	30	10	10	995	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		150	0		0	0		0	0		100
Storage Lanes	1		0	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt		0.920			0.955			0.993				0.850
Flt Protected	0.950	0.978			0.984		0.950	0.960			0.999	
Satd. Flow (prot)	1633	1547	0	0	1700	0	1633	1639	0	0	3435	1538
Flt Permitted	0.683	0.808			0.555		0.106	0.096			0.951	
Satd. Flow (perm)	1174	1278	0	0	959	0	182	164	0	0	3270	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		75			11			4				273
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		333			284			282			370	
Travel Time (s)		7.6			6.5			6.4			8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1054	11	370	11	11	11	435	33	11	11	1082	337
Shared Lane Traffic (%)	30%						47%					
Lane Group Flow (vph)	738	697	0	0	33	0	231	248	0	0	1093	337
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4		8	8		5	2		6	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	9.5
Total Split (s)	18.0	40.5		22.5	22.5		11.7	49.5		37.8	37.8	18.0
Total Split (%)	20.0%	45.0%		25.0%	25.0%		13.0%	55.0%		42.0%	42.0%	20.0%
Maximum Green (s)	13.5	36.0		18.0	18.0		7.2	45.0		33.3	33.3	13.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	None		None	None		Min	Min		Min	Min	Min
Walk Time (s)		7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	36.0	36.0			13.0		45.0	45.0			33.3	60.3
Actuated g/C Ratio	0.40	0.40			0.14		0.50	0.50			0.37	0.67
v/c Ratio	1.26	1.12			0.22		1.12	1.23			0.90	0.30
Control Delay	158.9	99.0			26.6		119.2	161.0			38.9	3.0
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Delay	158.9	99.0			26.6		119.2	161.0			38.9	3.0
LOS	F	F			C		F	F			D	A
Approach Delay		129.8			26.6			140.9			30.4	
Approach LOS		F			C			F			C	
Queue Length 50th (ft)	~589	~474			10		~110	~140			304	15
Queue Length 95th (ft)	#817	#704			36		#264	#297			#432	53
Internal Link Dist (ft)		253			204			202			290	
Turn Bay Length (ft)												100
Base Capacity (vph)	584	623			200		207	202			1209	1120
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	1.26	1.12			0.17		1.12	1.23			0.90	0.30

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.26			
Intersection Signal Delay: 88.3		Intersection LOS: F	
Intersection Capacity Utilization 95.4%		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: 117: Scenic Highway/Exit 3 Ramp Connector & Connector Road to Belmont Roundabout/Bourne Bridge Approach



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	970	10	340	10	10	10	400	30	10	10	995	310
Future Volume (vph)	970	10	340	10	10	10	400	30	10	10	995	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Lane Util. Factor	0.95	0.95			1.00		0.95	0.95			0.95	1.00
Frt	1.00	0.92			0.95		1.00	0.99			1.00	0.85
Flt Protected	0.95	0.98			0.98		0.95	0.96			1.00	1.00
Satd. Flow (prot)	1633	1547			1700		1633	1640			3436	1538
Flt Permitted	0.68	0.81			0.55		0.11	0.10			0.95	1.00
Satd. Flow (perm)	1174	1279			959		182	165			3271	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1054	11	370	11	11	11	435	33	11	11	1082	337
RTOR Reduction (vph)	0	44	0	0	10	0	0	2	0	0	0	107
Lane Group Flow (vph)	738	653	0	0	23	0	231	246	0	0	1093	230
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	37.8	37.8			10.8		45.0	45.0			33.3	55.8
Effective Green, g (s)	37.8	37.8			10.8		45.0	45.0			33.3	55.8
Actuated g/C Ratio	0.41	0.41			0.12		0.49	0.49			0.36	0.61
Clearance Time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	595	592			112		203	196			1186	1010
v/s Ratio Prot	c0.30	0.27					0.09	c0.10				0.06
v/s Ratio Perm	c0.21	0.18			0.02		0.47	c0.52			0.33	0.09
v/c Ratio	1.24	1.10			0.21		1.14	1.25			0.92	0.23
Uniform Delay, d1	26.3	27.0			36.6		21.8	23.4			28.0	8.2
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	122.0	68.4			0.9		105.2	149.4			11.7	0.1
Delay (s)	148.3	95.4			37.6		127.0	172.8			39.7	8.3
Level of Service	F	F			D		F	F			D	A
Approach Delay (s)		122.6			37.6			150.7			32.3	
Approach LOS		F			D			F			C	

Intersection Summary			
HCM 2000 Control Delay	87.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.36		
Actuated Cycle Length (s)	91.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	95.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	300	355	225	395	70
Future Volume (vph)	5	300	355	225	395	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.948		0.980	
Flt Protected		0.999			0.959	
Satd. Flow (prot)	0	1808	1715	0	1701	0
Flt Permitted		0.999			0.959	
Satd. Flow (perm)	0	1808	1715	0	1701	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		510	234		330	
Travel Time (s)		11.6	5.3		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	326	386	245	429	76
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	331	631	0	505	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 65.2%		ICU Level of Service C	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	300	355	225	395	70
Future Volume (Veh/h)	5	300	355	225	395	70
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	326	386	245	429	76
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	631				844	508
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	631				844	508
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				0	86
cM capacity (veh/h)	937				328	559

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	331	631	505
Volume Left	5	0	429
Volume Right	0	245	76
cSH	937	1700	349
Volume to Capacity	0.01	0.37	1.45
Queue Length 95th (ft)	0	0	664
Control Delay (s)	0.2	0.0	244.9
Lane LOS	A		F
Approach Delay (s)	0.2	0.0	244.9
Approach LOS			F

Intersection Summary			
Average Delay	84.4		
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	0	0	1005	0	0	530
Future Volume (vph)	0	0	1005	0	0	530
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1810	1810	0	0	1810
Flt Permitted						
Satd. Flow (perm)	0	1810	1810	0	0	1810
Link Speed (mph)	30		30			30
Link Distance (ft)	474		550			219
Travel Time (s)	10.8		12.5			5.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1092	0	0	576
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1092	0	0	576
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	0		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 56.2%		ICU Level of Service B	
Analysis Period (min) 15			

Intersection Sign configuration not allowed in HCM analysis.

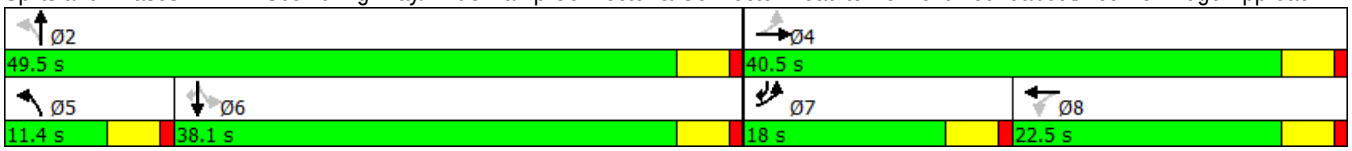
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	965	10	330	10	10	10	370	30	10	10	980	310
Future Volume (vph)	965	10	330	10	10	10	370	30	10	10	980	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		150	0		0	0		0	0		100
Storage Lanes	1		0	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt		0.921			0.955			0.993				0.850
Flt Protected	0.950	0.978			0.984		0.950	0.961			0.999	
Satd. Flow (prot)	1633	1548	0	0	1700	0	1633	1640	0	0	3435	1538
Flt Permitted	0.683	0.806			0.618		0.105	0.095			0.951	
Satd. Flow (perm)	1174	1276	0	0	1068	0	180	162	0	0	3270	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		73			11			4				279
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		333			284			282			370	
Travel Time (s)		7.6			6.5			6.4			8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1049	11	359	11	11	11	402	33	11	11	1065	337
Shared Lane Traffic (%)	30%						47%					
Lane Group Flow (vph)	734	685	0	0	33	0	213	233	0	0	1076	337
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4		8	8		5	2		6	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	9.5
Total Split (s)	18.0	40.5		22.5	22.5		11.4	49.5		38.1	38.1	18.0
Total Split (%)	20.0%	45.0%		25.0%	25.0%		12.7%	55.0%		42.3%	42.3%	20.0%
Maximum Green (s)	13.5	36.0		18.0	18.0		6.9	45.0		33.6	33.6	13.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	None		None	None		Min	Min		Min	Min	Min
Walk Time (s)		7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	36.0	36.0			13.0		45.0	45.0			33.6	60.6
Actuated g/C Ratio	0.40	0.40			0.14		0.50	0.50			0.37	0.67
v/c Ratio	1.26	1.10			0.20		1.06	1.19			0.88	0.30
Control Delay	156.1	92.6			25.8		102.2	147.3			36.5	2.8
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Delay	156.1	92.6			25.8		102.2	147.3			36.5	2.8
LOS	F	F			C		F	F			D	A
Approach Delay		125.4			25.8			125.8			28.5	
Approach LOS		F			C			F			C	
Queue Length 50th (ft)	~584	~461			10		~91	~124			295	14
Queue Length 95th (ft)	#811	#687			36		#241	#278			#417	51
Internal Link Dist (ft)		253			204			202			290	
Turn Bay Length (ft)												100
Base Capacity (vph)	584	622			222		201	196			1220	1126
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	1.26	1.10			0.15		1.06	1.19			0.88	0.30

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Natural Cycle: 140			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.26			
Intersection Signal Delay: 83.1		Intersection LOS: F	
Intersection Capacity Utilization 93.7%		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: 117: Scenic Highway/Exit 3 Ramp Connector & Connector Road to Belmont Roundabout/Bourne Bridge Approach



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	965	10	330	10	10	10	370	30	10	10	980	310
Future Volume (vph)	965	10	330	10	10	10	370	30	10	10	980	310
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Lane Util. Factor	0.95	0.95			1.00		0.95	0.95			0.95	1.00
Frt	1.00	0.92			0.95		1.00	0.99			1.00	0.85
Flt Protected	0.95	0.98			0.98		0.95	0.96			1.00	1.00
Satd. Flow (prot)	1633	1548			1700		1633	1640			3436	1538
Flt Permitted	0.68	0.81			0.62		0.10	0.10			0.95	1.00
Satd. Flow (perm)	1174	1277			1068		180	162			3271	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1049	11	359	11	11	11	402	33	11	11	1065	337
RTOR Reduction (vph)	0	43	0	0	10	0	0	2	0	0	0	109
Lane Group Flow (vph)	734	642	0	0	23	0	213	231	0	0	1076	229
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	37.8	37.8			10.8		45.0	45.0			33.6	56.1
Effective Green, g (s)	37.8	37.8			10.8		45.0	45.0			33.6	56.1
Actuated g/C Ratio	0.41	0.41			0.12		0.49	0.49			0.37	0.61
Clearance Time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	595	592			125		197	190			1197	1015
v/s Ratio Prot	c0.30	0.27					0.08	c0.09				0.06
v/s Ratio Perm	c0.21	0.18			0.02		0.45	c0.50			0.33	0.09
v/c Ratio	1.23	1.08			0.19		1.08	1.22			0.90	0.23
Uniform Delay, d1	26.3	27.0			36.5		21.2	23.4			27.5	8.0
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	119.2	62.0			0.7		87.4	135.3			9.2	0.1
Delay (s)	145.5	89.0			37.3		108.6	158.7			36.7	8.2
Level of Service	F	F			D		F	F			D	A
Approach Delay (s)		118.2			37.3			134.8			29.9	
Approach LOS		F			D			F			C	

Intersection Summary			
HCM 2000 Control Delay	81.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	91.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	93.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	5	290	350	205	395	70
Future Volume (vph)	5	290	350	205	395	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.950		0.980	
Flt Protected		0.999			0.959	
Satd. Flow (prot)	0	1808	1719	0	1701	0
Flt Permitted		0.999			0.959	
Satd. Flow (perm)	0	1808	1719	0	1701	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		510	234		330	
Travel Time (s)		11.6	5.3		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	315	380	223	429	76
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	320	603	0	505	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 63.7%		ICU Level of Service B	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	290	350	205	395	70
Future Volume (Veh/h)	5	290	350	205	395	70
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	315	380	223	429	76
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	603				816	492
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	603				816	492
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				0	87
cM capacity (veh/h)	960				340	571

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	320	603	505
Volume Left	5	0	429
Volume Right	0	223	76
cSH	960	1700	362
Volume to Capacity	0.01	0.35	1.39
Queue Length 95th (ft)	0	0	633
Control Delay (s)	0.2	0.0	221.9
Lane LOS	A		F
Approach Delay (s)	0.2	0.0	221.9
Approach LOS			F

Intersection Summary			
Average Delay	78.5		
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	0	0	1015	0	0	530
Future Volume (vph)	0	0	1015	0	0	530
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1810	1810	0	0	1810
Flt Permitted						
Satd. Flow (perm)	0	1810	1810	0	0	1810
Link Speed (mph)	30		30			30
Link Distance (ft)	474		550			219
Travel Time (s)	10.8		12.5			5.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1103	0	0	576
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1103	0	0	576
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	0		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 56.8%		ICU Level of Service B	
Analysis Period (min) 15			

Intersection Sign configuration not allowed in HCM analysis.

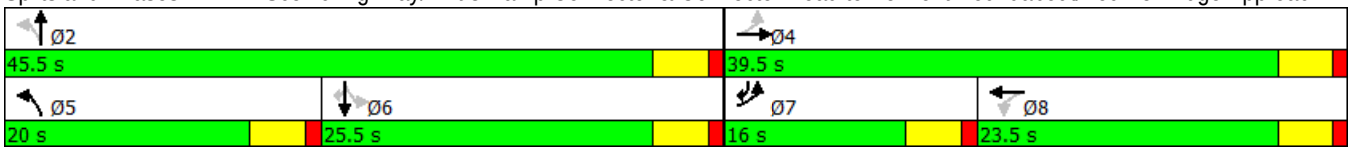
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1655	5	590	5	5	5	1080	55	5	5	880	435
Future Volume (vph)	1655	5	590	5	5	5	1080	55	5	5	880	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		150	0		0	0		0	0		100
Storage Lanes	1		0	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00
Frt		0.919			0.955			0.988				0.850
Flt Protected	0.950	0.978			0.984		0.950					
Satd. Flow (prot)	1633	1545	0	0	1700	0	1719	1788	0	0	3438	1538
Flt Permitted	0.644	0.786			0.702		0.157				0.954	
Satd. Flow (perm)	1107	1242	0	0	1213	0	284	1788	0	0	3280	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		85			5			5				351
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		333			284			282			370	
Travel Time (s)		7.6			6.5			6.4			8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1799	5	641	5	5	5	1174	60	5	5	957	473
Shared Lane Traffic (%)	30%											
Lane Group Flow (vph)	1259	1186	0	0	15	0	1174	65	0	0	962	473
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4		8	8		5	2		6	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	9.5
Total Split (s)	16.0	39.5		23.5	23.5		20.0	45.5		25.5	25.5	16.0
Total Split (%)	18.8%	46.5%		27.6%	27.6%		23.5%	53.5%		30.0%	30.0%	18.8%
Maximum Green (s)	11.5	35.0		19.0	19.0		15.5	41.0		21.0	21.0	11.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	None		None	None		Min	Min		Min	Min	Min
Walk Time (s)		7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	35.0	35.0			8.7		41.0	41.0			21.0	55.8
Actuated g/C Ratio	0.41	0.41			0.10		0.48	0.48			0.25	0.66
v/c Ratio	1.96	1.77			0.12		2.95	0.08			1.19	0.42
Control Delay	458.5	375.2			26.9		900.0	11.4			127.7	4.1
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Delay	458.5	375.2			26.9		900.0	11.4			127.7	4.1
LOS	F	F			C		F	B			F	A
Approach Delay		418.1			26.9			853.4			87.0	
Approach LOS		F			C			F			F	
Queue Length 50th (ft)	~1093	~982			5		~1068	16			~330	17
Queue Length 95th (ft)	#1435	#1293			20		#1314	37			#450	117
Internal Link Dist (ft)		253			204			202			290	
Turn Bay Length (ft)												100
Base Capacity (vph)	643	669			275		398	865			810	1129
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	1.96	1.77			0.05		2.95	0.08			1.19	0.42

Intersection Summary			
Area Type:	Other		
Cycle Length: 85			
Actuated Cycle Length: 85			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 2.95			
Intersection Signal Delay: 429.5		Intersection LOS: F	
Intersection Capacity Utilization 166.2%		ICU Level of Service H	
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: 117: Scenic Highway/Exit 3 Ramp Connector & Connector Road to Belmont Roundabout/Bourne Bridge Approach



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1655	5	590	5	5	5	1080	55	5	5	880	435
Future Volume (vph)	1655	5	590	5	5	5	1080	55	5	5	880	435
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Lane Util. Factor	0.95	0.95			1.00		1.00	1.00			0.95	1.00
Frt	1.00	0.92			0.95		1.00	0.99			1.00	0.85
Flt Protected	0.95	0.98			0.98		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1633	1545			1700		1719	1789			3437	1538
Flt Permitted	0.64	0.79			0.70		0.16	1.00			0.95	1.00
Satd. Flow (perm)	1108	1241			1213		284	1789			3280	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1799	5	641	5	5	5	1174	60	5	5	957	473
RTOR Reduction (vph)	0	48	0	0	5	0	0	3	0	0	0	148
Lane Group Flow (vph)	1259	1138	0	0	10	0	1174	62	0	0	962	325
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	38.6	38.6			3.8		41.0	41.0			21.0	51.3
Effective Green, g (s)	38.6	38.6			3.8		41.0	41.0			21.0	51.3
Actuated g/C Ratio	0.44	0.44			0.04		0.46	0.46			0.24	0.58
Clearance Time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	662	644			52		382	827			777	968
v/s Ratio Prot	c0.65	0.60					c0.54	0.03				0.11
v/s Ratio Perm	c0.18	0.17			0.01		c0.88				0.29	0.10
v/c Ratio	1.90	1.77			0.20		3.07	0.08			1.24	0.34
Uniform Delay, d1	24.2	25.0			40.9		24.3	13.2			33.8	9.7
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	411.5	351.5			1.9		939.9	0.0			118.1	0.2
Delay (s)	435.7	376.5			42.8		964.2	13.3			151.9	10.0
Level of Service	F	F			D		F	B			F	A
Approach Delay (s)		407.0			42.8			914.3			105.1	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	444.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.73		
Actuated Cycle Length (s)	88.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	166.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	65	440	260	85	500	15
Future Volume (vph)	65	440	260	85	500	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.967		0.996	
Flt Protected		0.994			0.954	
Satd. Flow (prot)	0	1799	1750	0	1719	0
Flt Permitted		0.994			0.954	
Satd. Flow (perm)	0	1799	1750	0	1719	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		510	234		330	
Travel Time (s)		11.6	5.3		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	478	283	92	543	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	549	375	0	559	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 84.2%		ICU Level of Service E	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	65	440	260	85	500	15
Future Volume (Veh/h)	65	440	260	85	500	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	71	478	283	92	543	16
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	375				949	329
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	375				949	329
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				0	98
cM capacity (veh/h)	1167				268	706

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	549	375	559
Volume Left	71	0	543
Volume Right	0	92	16
cSH	1167	1700	273
Volume to Capacity	0.06	0.22	2.05
Queue Length 95th (ft)	5	0	1022
Control Delay (s)	1.7	0.0	514.4
Lane LOS	A		F
Approach Delay (s)	1.7	0.0	514.4
Approach LOS			F

Intersection Summary			
Average Delay	194.5		
Intersection Capacity Utilization	84.2%	ICU Level of Service	E
Analysis Period (min)	15		

Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	0	0	1520	0	0	1385
Future Volume (vph)	0	0	1520	0	0	1385
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1810	1810	0	0	1810
Flt Permitted						
Satd. Flow (perm)	0	1810	1810	0	0	1810
Link Speed (mph)	30		30			30
Link Distance (ft)	474		550			219
Travel Time (s)	10.8		12.5			5.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1652	0	0	1505
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1652	0	0	1505
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	0		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 83.3%		ICU Level of Service E	
Analysis Period (min) 15			

Intersection Sign configuration not allowed in HCM analysis.



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	510	260	50	700
Future Volume (vph)	0	0	510	260	50	700
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850		
Flt Protected						0.997
Satd. Flow (prot)	0	0	1810	1538	0	1804
Flt Permitted						0.997
Satd. Flow (perm)	0	0	1810	1538	0	1804
Link Speed (mph)	30		30			30
Link Distance (ft)	815		173			967
Travel Time (s)	18.5		3.9			22.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	554	283	54	761
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	554	283	0	815
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	0		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 73.1%		ICU Level of Service D	
Analysis Period (min) 15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	510	260	50	700
Future Volume (Veh/h)	0	0	510	260	50	700
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	554	283	54	761
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	1423	554			554	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1423	554			554	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			95	
cM capacity (veh/h)	140	526			1001	

Direction, Lane #	NB 1	NB 2	SB 1
Volume Total	554	283	815
Volume Left	0	0	54
Volume Right	0	283	0
cSH	1700	1700	1001
Volume to Capacity	0.33	0.17	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.0	0.0	1.4
Lane LOS			A
Approach Delay (s)	0.0		1.4
Approach LOS			

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	55	215	0	510	535	0
Future Volume (vph)	55	215	0	510	535	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.893					
Flt Protected	0.990					
Satd. Flow (prot)	1600	0	0	1810	1810	0
Flt Permitted	0.990					
Satd. Flow (perm)	1600	0	0	1810	1810	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	269			967	341	
Travel Time (s)	6.1			22.0	7.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	234	0	554	582	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	294	0	0	554	582	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	55	215	0	510	535	0
Future Volume (Veh/h)	55	215	0	510	535	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	234	0	554	582	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	1136	582	582			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1136	582	582			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	73	54	100			
cM capacity (veh/h)	220	507	978			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	294	554	582
Volume Left	60	0	0
Volume Right	234	0	0
cSH	401	1700	1700
Volume to Capacity	0.73	0.33	0.34
Queue Length 95th (ft)	144	0	0
Control Delay (s)	35.0	0.0	0.0
Lane LOS	E		
Approach Delay (s)	35.0	0.0	0.0
Approach LOS	E		

Intersection Summary			
Average Delay	7.2		
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	0	1080	35	0	5	1730
Future Volume (vph)	0	1080	35	0	5	1730
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.865	
Flt Protected						
Satd. Flow (prot)	0	1810	1810	0	1565	0
Flt Permitted						
Satd. Flow (perm)	0	1810	1810	0	1565	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		429	887		645	
Travel Time (s)		9.8	20.2		14.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1174	38	0	5	1880
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1174	38	0	1885	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 170.9%		ICU Level of Service H	
Analysis Period (min) 15			

Movement	NBL	NBT	SBT	SBR	SEL	SER
Lane Configurations						
Traffic Volume (veh/h)	0	1080	35	0	5	1730
Future Volume (Veh/h)	0	1080	35	0	5	1730
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1174	38	0	5	1880
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	38				1212	38
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	38				1212	38
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	0
cM capacity (veh/h)	1553				198	1025

Direction, Lane #	NB 1	SB 1	SE 1
Volume Total	1174	38	1885
Volume Left	0	0	5
Volume Right	0	0	1880
cSH	1700	1700	1014
Volume to Capacity	0.69	0.02	1.86
Queue Length 95th (ft)	0	0	2875
Control Delay (s)	0.0	0.0	402.5
Lane LOS			F
Approach Delay (s)	0.0	0.0	402.5
Approach LOS			F

Intersection Summary			
Average Delay	245.0		
Intersection Capacity Utilization	170.9%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	0	0	50	1035	25	35
Future Volume (vph)	0	0	50	1035	25	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850		
Flt Protected						0.980
Satd. Flow (prot)	0	0	1810	1538	0	1773
Flt Permitted						0.980
Satd. Flow (perm)	0	0	1810	1538	0	1773
Link Speed (mph)	30		30			30
Link Distance (ft)	263		139			83
Travel Time (s)	6.0		3.2			1.9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	54	1125	27	38
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	54	1125	0	65
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	0		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 74.1%		ICU Level of Service D	
Analysis Period (min) 15			

Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (veh/h)	0	0	50	1035	25	35
Future Volume (Veh/h)	0	0	50	1035	25	35
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	54	1125	27	38
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	146	54			54	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	146	54			54	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			98	
cM capacity (veh/h)	825	1005			1532	

Direction, Lane #	NE 1	NE 2	SW 1
Volume Total	54	1125	65
Volume Left	0	0	27
Volume Right	0	1125	0
cSH	1700	1700	1532
Volume to Capacity	0.03	0.66	0.02
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.0	3.1
Lane LOS			A
Approach Delay (s)	0.0		3.1
Approach LOS			

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	1450	5	0	1030	5	5
Future Volume (vph)	1450	5	0	1030	5	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.932	
Flt Protected					0.976	
Satd. Flow (prot)	1810	0	0	1810	1646	0
Flt Permitted					0.976	
Satd. Flow (perm)	1810	0	0	1810	1646	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	915			3519	548	
Travel Time (s)	20.8			80.0	12.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1576	5	0	1120	5	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1581	0	0	1120	10	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 86.6%		ICU Level of Service E	
Analysis Period (min) 15			

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	1450	5	0	1030	5	5
Future Volume (Veh/h)	1450	5	0	1030	5	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1576	5	0	1120	5	5
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			1581		2698	1578
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1581		2698	1578
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		78	96
cM capacity (veh/h)			408		23	132

Direction, Lane #	NB 1	SB 1	NW 1
Volume Total	1581	1120	10
Volume Left	0	0	5
Volume Right	5	0	5
cSH	1700	408	39
Volume to Capacity	0.93	0.00	0.25
Queue Length 95th (ft)	0	0	21
Control Delay (s)	0.0	0.0	125.4
Lane LOS			F
Approach Delay (s)	0.0	0.0	125.4
Approach LOS			F

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	86.6%	ICU Level of Service	E
Analysis Period (min)	15		

Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	0	0	1450	5	5	1020
Future Volume (vph)	0	0	1450	5	5	1020
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	1810	0	1810	0	0	1810
Flt Permitted						
Satd. Flow (perm)	1810	0	1810	0	0	1810
Link Speed (mph)	30		30			30
Link Distance (ft)	350		636			590
Travel Time (s)	8.0		14.5			13.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1576	5	5	1109
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1581	0	0	1114
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 80.0%		ICU Level of Service D	
Analysis Period (min) 15			

Movement	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (veh/h)	0	0	1450	5	5	1020
Future Volume (Veh/h)	0	0	1450	5	5	1020
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1576	5	5	1109
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	2698	1578			1581	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2698	1578			1581	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			99	
cM capacity (veh/h)	23	132			408	

Direction, Lane #	WB 1	NE 1	SW 1
Volume Total	0	1581	1114
Volume Left	0	0	5
Volume Right	0	5	0
cSH	1700	1700	408
Volume to Capacity	0.00	0.93	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.0	0.0	0.6
Lane LOS	A		A
Approach Delay (s)	0.0	0.0	0.6
Approach LOS	A		

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	55	625	60	1120	225	90
Future Volume (vph)	55	625	60	1120	225	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1719	1538	1719	1810	1810	1538
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1719	1538	1719	1810	1810	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		639				98
Link Speed (mph)	30			30	30	
Link Distance (ft)	181			443	226	
Travel Time (s)	4.1			10.1	5.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	679	65	1217	245	98
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	679	65	1217	245	98
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (ft)	20	20	20	100	100	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	20	20	6	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	3		1	6	2	
Permitted Phases		3				2
Detector Phase	3	3	1	6	2	2
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	10.0	10.0	10.0

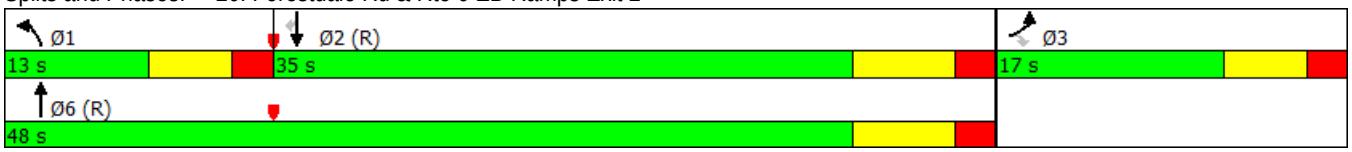
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Split (s)	11.0	11.0	11.0	17.0	17.0	17.0
Total Split (s)	17.0	17.0	13.0	48.0	35.0	35.0
Total Split (%)	26.2%	26.2%	20.0%	73.8%	53.8%	53.8%
Maximum Green (s)	11.0	11.0	7.0	41.0	28.0	28.0
Yellow Time (s)	4.0	4.0	4.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	7.0	7.0	7.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Act Effct Green (s)	9.3	9.3	6.3	42.7	34.9	34.9
Actuated g/C Ratio	0.14	0.14	0.10	0.66	0.54	0.54
v/c Ratio	0.24	0.89	0.39	1.02	0.25	0.11
Control Delay	26.5	19.2	34.5	47.7	3.0	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	19.2	34.5	47.7	3.0	0.5
LOS	C	B	C	D	A	A
Approach Delay	19.8			47.0	2.3	
Approach LOS	B			D	A	
90th %ile Green (s)	11.0	11.0	7.0	41.0	28.0	28.0
90th %ile Term Code	Max	Max	Max	Coord	Coord	Coord
70th %ile Green (s)	11.0	11.0	7.0	41.0	28.0	28.0
70th %ile Term Code	Max	Max	Max	Coord	Coord	Coord
50th %ile Green (s)	10.3	10.3	6.8	41.7	28.9	28.9
50th %ile Term Code	Gap	Gap	Gap	Coord	Coord	Coord
30th %ile Green (s)	7.3	7.3	0.0	44.7	44.7	44.7
30th %ile Term Code	Gap	Gap	Skip	Coord	Coord	Coord
10th %ile Green (s)	6.9	6.9	0.0	45.1	45.1	45.1
10th %ile Term Code	Gap	Gap	Skip	Coord	Coord	Coord
Stops (vph)	49	81	55	798	23	1
Fuel Used(gal)	1	5	5	88	1	0
CO Emissions (g/hr)	53	351	325	6180	103	35
NOx Emissions (g/hr)	10	68	63	1202	20	7
VOC Emissions (g/hr)	12	81	75	1432	24	8
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (ft)	21	14	25	~540	10	0
Queue Length 95th (ft)	51	#189	58	#771	26	0
Internal Link Dist (ft)	101			363	146	
Turn Bay Length (ft)						
Base Capacity (vph)	290	791	185	1188	972	872
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	0.21	0.86	0.35	1.02	0.25	0.11

Intersection Summary	
Area Type:	Other
Cycle Length: 65	

Actuated Cycle Length: 65	
Offset: 0 (0%), Referenced to phase 2:SBT and 6:NBT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.02	
Intersection Signal Delay: 32.0	Intersection LOS: C
Intersection Capacity Utilization 73.9%	ICU Level of Service D
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: 20: Forestdale Rd & Rte 6 EB Ramps Exit 2





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	55	625	60	1120	225	90
Future Volume (vph)	55	625	60	1120	225	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1719	1538	1719	1810	1810	1538
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1719	1538	1719	1810	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	679	65	1217	245	98
RTOR Reduction (vph)	0	548	0	0	0	49
Lane Group Flow (vph)	60	131	65	1217	245	49
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	3		1	6	2	
Permitted Phases		3				2
Actuated Green, G (s)	9.3	9.3	4.2	42.7	32.5	32.5
Effective Green, g (s)	9.3	9.3	4.2	42.7	32.5	32.5
Actuated g/C Ratio	0.14	0.14	0.06	0.66	0.50	0.50
Clearance Time (s)	6.0	6.0	6.0	7.0	7.0	7.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	245	220	111	1189	905	769
v/s Ratio Prot	0.03		0.04	c0.67	0.14	
v/s Ratio Perm		c0.09				0.03
v/c Ratio	0.24	0.60	0.59	1.02	0.27	0.06
Uniform Delay, d1	24.7	26.1	29.6	11.1	9.4	8.4
Progression Factor	1.00	1.00	1.00	1.00	0.23	0.07
Incremental Delay, d2	0.2	2.9	5.0	32.2	0.7	0.2
Delay (s)	24.9	29.0	34.6	43.4	2.9	0.8
Level of Service	C	C	C	D	A	A
Approach Delay (s)	28.7			42.9	2.3	
Approach LOS	C			D	A	

Intersection Summary			
HCM 2000 Control Delay	32.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

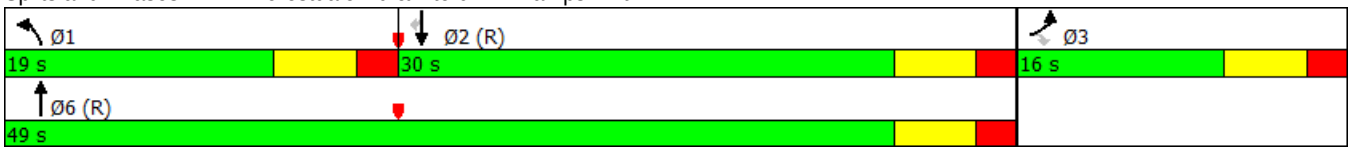
c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	205	60	530	645	255	30
Future Volume (vph)	205	60	530	645	255	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	300			0
Storage Lanes	1	1	2			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	0.97	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1719	1538	3335	1810	1810	1538
Flt Permitted	0.950		0.950			
Satd. Flow (perm)	1719	1538	3335	1810	1810	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		65				33
Link Speed (mph)	30			30	30	
Link Distance (ft)	441			372	296	
Travel Time (s)	10.0			8.5	6.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	65	576	701	277	33
Shared Lane Traffic (%)						
Lane Group Flow (vph)	223	65	576	701	277	33
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			24	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (ft)	20	20	20	100	100	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	20	20	6	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	3		1	6	2	
Permitted Phases		3				2

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Detector Phase	3	3	1	6	2	2
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	10.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	16.0	16.0	16.0
Total Split (s)	16.0	16.0	19.0	49.0	30.0	30.0
Total Split (%)	24.6%	24.6%	29.2%	75.4%	46.2%	46.2%
Maximum Green (s)	10.0	10.0	13.0	43.0	24.0	24.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Recall Mode	None	None	None	C-Min	C-Min	C-Min
Act Effct Green (s)	12.7	12.7	14.0	40.3	20.3	20.3
Actuated g/C Ratio	0.20	0.20	0.22	0.62	0.31	0.31
v/c Ratio	0.67	0.19	0.80	0.62	0.49	0.07
Control Delay	35.0	8.0	20.8	16.5	22.5	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.0	8.0	20.8	16.5	22.5	6.9
LOS	C	A	C	B	C	A
Approach Delay	28.9			18.4	20.8	
Approach LOS	C			B	C	
90th %ile Green (s)	12.9	12.9	13.0	40.1	21.1	21.1
90th %ile Term Code	Max	Max	Max	Coord	Coord	Coord
70th %ile Green (s)	15.5	15.5	14.7	37.5	16.8	16.8
70th %ile Term Code	Gap	Gap	Max	Coord	Coord	Coord
50th %ile Green (s)	14.0	14.0	16.1	39.0	16.9	16.9
50th %ile Term Code	Gap	Gap	Gap	Coord	Coord	Coord
30th %ile Green (s)	12.0	12.0	14.4	41.0	20.6	20.6
30th %ile Term Code	Gap	Gap	Gap	Coord	Coord	Coord
10th %ile Green (s)	8.9	8.9	11.9	44.1	26.2	26.2
10th %ile Term Code	Gap	Gap	Gap	Coord	Coord	Coord
Stops (vph)	178	16	448	573	204	9
Fuel Used(gal)	3	0	8	9	12	1
CO Emissions (g/hr)	220	27	530	615	824	85
NOx Emissions (g/hr)	43	5	103	120	160	16
VOC Emissions (g/hr)	51	6	123	143	191	20
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (ft)	80	0	89	302	96	0
Queue Length 95th (ft)	#165	28	m110	m260	150	16
Internal Link Dist (ft)	361			292	216	
Turn Bay Length (ft)			300			
Base Capacity (vph)	340	356	730	1203	680	598
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	0.66	0.18	0.79	0.58	0.41	0.06

Intersection Summary		
Area Type:	Other	
Cycle Length: 65		
Actuated Cycle Length: 65		
Offset: 52 (80%), Referenced to phase 2:SBT and 6:NBT, Start of Green		
Natural Cycle: 55		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.80		
Intersection Signal Delay: 20.4		Intersection LOS: C
Intersection Capacity Utilization 55.3%		ICU Level of Service B
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: Forestdale Rd & Rte 6 WB Ramps Exit 2





Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	205	60	530	645	255	30
Future Volume (vph)	205	60	530	645	255	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	0.97	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1719	1538	3335	1810	1810	1538
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1719	1538	3335	1810	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	65	576	701	277	33
RTOR Reduction (vph)	0	52	0	0	0	23
Lane Group Flow (vph)	223	13	576	701	277	10
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	3		1	6	2	
Permitted Phases		3				2
Actuated Green, G (s)	12.7	12.7	14.0	40.3	20.3	20.3
Effective Green, g (s)	12.7	12.7	14.0	40.3	20.3	20.3
Actuated g/C Ratio	0.20	0.20	0.22	0.62	0.31	0.31
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lane Grp Cap (vph)	335	300	718	1122	565	480
v/s Ratio Prot	c0.13		c0.17	c0.39	0.15	
v/s Ratio Perm		0.01				0.01
v/c Ratio	0.67	0.04	0.80	0.62	0.49	0.02
Uniform Delay, d1	24.2	21.2	24.2	7.7	18.1	15.5
Progression Factor	1.00	1.00	0.68	1.85	1.00	1.00
Incremental Delay, d2	3.8	0.0	1.6	0.7	3.0	0.1
Delay (s)	28.0	21.2	18.0	14.9	21.2	15.6
Level of Service	C	C	B	B	C	B
Approach Delay (s)	26.5			16.3	20.6	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	545	10	435	345	10	525
Future Volume (vph)	545	10	435	345	10	525
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.998					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1806	0	1719	1810	1719	1538
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1806	0	1719	1810	1719	1538
Link Speed (mph)	30			30	30	
Link Distance (ft)	1449			900	376	
Travel Time (s)	32.9			20.5	8.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	592	11	473	375	11	571
Shared Lane Traffic (%)						
Lane Group Flow (vph)	603	0	473	375	11	571
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 68.5%		ICU Level of Service C	
Analysis Period (min) 15			

Movement	NBT	NBR	SBL	SBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	545	10	435	345	10	525
Future Volume (Veh/h)	545	10	435	345	10	525
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	592	11	473	375	11	571
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			603		1918	598
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			603		1918	598
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			51		70	0
cM capacity (veh/h)			960		37	497

Direction, Lane #	NB 1	SB 1	SB 2	NW 1	NW 2
Volume Total	603	473	375	11	571
Volume Left	0	473	0	11	0
Volume Right	11	0	0	0	571
cSH	1700	960	1700	37	497
Volume to Capacity	0.35	0.49	0.22	0.30	1.15
Queue Length 95th (ft)	0	70	0	24	499
Control Delay (s)	0.0	12.3	0.0	139.8	115.5
Lane LOS		B		F	F
Approach Delay (s)	0.0	6.9		115.9	
Approach LOS				F	

Intersection Summary			
Average Delay	36.1		
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	760	95	20	485	85	10
Future Volume (vph)	760	95	20	485	85	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.985				0.986	
Flt Protected				0.998	0.957	
Satd. Flow (prot)	1782	0	0	1806	1707	0
Flt Permitted				0.998	0.957	
Satd. Flow (perm)	1782	0	0	1806	1707	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	2701			935	1588	
Travel Time (s)	61.4			21.3	36.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	826	103	22	527	92	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	929	0	0	549	103	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 57.7%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	760	95	20	485	85	10
Future Volume (Veh/h)	760	95	20	485	85	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	826	103	22	527	92	11
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			929		1448	878
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			929		1448	878
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		33	97
cM capacity (veh/h)			724		138	343

Direction, Lane #	NB 1	SB 1	SW 1
Volume Total	929	549	103
Volume Left	0	22	92
Volume Right	103	0	11
cSH	1700	724	147
Volume to Capacity	0.55	0.03	0.70
Queue Length 95th (ft)	0	2	101
Control Delay (s)	0.0	0.8	72.5
Lane LOS		A	F
Approach Delay (s)	0.0	0.8	72.5
Approach LOS			F

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	355	115	75	630	470	105	240	75	250	175	20
Future Volume (vph)	20	355	115	75	630	470	105	240	75	250	175	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00	1.00	0.95	0.95	0.95
Frt		0.965			0.940			0.976			0.993	
Flt Protected		0.998			0.997			0.988			0.973	
Satd. Flow (prot)	0	3311	0	0	3222	0	0	1745	0	0	3322	0
Flt Permitted		0.722			0.831			0.988			0.973	
Satd. Flow (perm)	0	2395	0	0	2686	0	0	1745	0	0	3322	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		51			201			11			5	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		199			602			623			129	
Travel Time (s)		4.5			13.7			14.2			2.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	386	125	82	685	511	114	261	82	272	190	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	533	0	0	1278	0	0	457	0	0	484	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100		20	100	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Detector Phase	2	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	14.0	14.0		14.0	14.0		10.0	10.0		10.0	10.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	20.5	20.5		20.5	20.5		15.0	15.0		15.0	15.0	
Total Split (s)	40.0	40.0		40.0	40.0		25.0	25.0		25.0	25.0	
Total Split (%)	44.4%	44.4%		44.4%	44.4%		27.8%	27.8%		27.8%	27.8%	
Maximum Green (s)	33.5	33.5		33.5	33.5		20.0	20.0		20.0	20.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.0	3.0		3.0	3.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		6.5			6.5			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Act Effct Green (s)		33.5			33.5			20.0			17.3	
Actuated g/C Ratio		0.38			0.38			0.23			0.20	
v/c Ratio		0.56			1.11			1.12			0.73	
Control Delay		22.2			85.3			114.9			39.5	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		22.2			85.3			114.9			39.5	
LOS		C			F			F			D	
Approach Delay		22.2			85.3			114.9			39.5	
Approach LOS		C			F			F			D	
90th %ile Green (s)	33.5	33.5		33.5	33.5		20.0	20.0		20.0	20.0	
90th %ile Term Code	Hold	Hold		Max	Max		Max	Max		Max	Max	
70th %ile Green (s)	33.5	33.5		33.5	33.5		20.0	20.0		20.0	20.0	
70th %ile Term Code	Hold	Hold		Max	Max		Max	Max		Max	Max	
50th %ile Green (s)	33.5	33.5		33.5	33.5		20.0	20.0		18.7	18.7	
50th %ile Term Code	Hold	Hold		Max	Max		Max	Max		Gap	Gap	
30th %ile Green (s)	33.5	33.5		33.5	33.5		20.0	20.0		15.6	15.6	
30th %ile Term Code	Hold	Hold		Max	Max		Max	Max		Gap	Gap	
10th %ile Green (s)	33.5	33.5		33.5	33.5		20.0	20.0		12.7	12.7	
10th %ile Term Code	Hold	Hold		Max	Max		Max	Max		Gap	Gap	
Stops (vph)		340			856			329			397	
Fuel Used(gal)		7			31			14			8	
CO Emissions (g/hr)		493			2144			957			544	
NOx Emissions (g/hr)		96			417			186			106	
VOC Emissions (g/hr)		114			497			222			126	
Dilemma Vehicles (#)		0			0			0			0	
Queue Length 50th (ft)		110			~400			~298			131	
Queue Length 95th (ft)		166			#543			#494			184	
Internal Link Dist (ft)		119			522			543			49	
Turn Bay Length (ft)												
Base Capacity (vph)		950			1154			408			765	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.56			1.11			1.12			0.63	

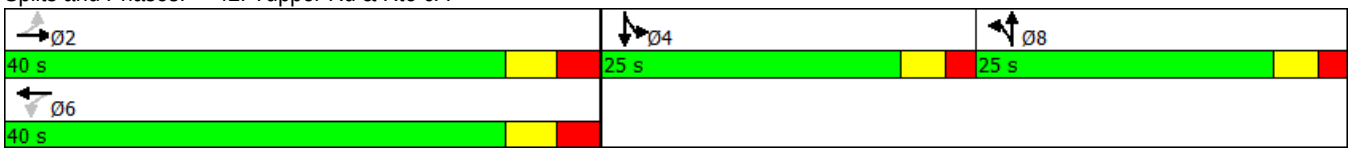
Intersection Summary	
Area Type:	Other
Cycle Length: 90	

Actuated Cycle Length: 87.4	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.12	
Intersection Signal Delay: 69.9	Intersection LOS: E
Intersection Capacity Utilization 104.8%	ICU Level of Service G
Analysis Period (min) 15	
90th %ile Actuated Cycle: 90	
70th %ile Actuated Cycle: 90	
50th %ile Actuated Cycle: 88.7	
30th %ile Actuated Cycle: 85.6	
10th %ile Actuated Cycle: 82.7	

~ 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: 42: Tupper Rd & Rte 6A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	355	115	75	630	470	105	240	75	250	175	20
Future Volume (vph)	20	355	115	75	630	470	105	240	75	250	175	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.5			6.5			5.0			5.0	
Lane Util. Factor		0.95			0.95			1.00			0.95	
Frt		0.96			0.94			0.98			0.99	
Flt Protected		1.00			1.00			0.99			0.97	
Satd. Flow (prot)		3310			3222			1744			3321	
Flt Permitted		0.72			0.83			0.99			0.97	
Satd. Flow (perm)		2396			2685			1744			3321	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	386	125	82	685	511	114	261	82	272	190	22
RTOR Reduction (vph)	0	31	0	0	124	0	0	8	0	0	4	0
Lane Group Flow (vph)	0	502	0	0	1154	0	0	449	0	0	480	0
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		2			6		8	8		4	4	
Permitted Phases	2			6								
Actuated Green, G (s)		33.5			33.5			20.0			17.3	
Effective Green, g (s)		33.5			33.5			20.0			17.3	
Actuated g/C Ratio		0.38			0.38			0.23			0.20	
Clearance Time (s)		6.5			6.5			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		919			1030			399			658	
v/s Ratio Prot								c0.26			c0.14	
v/s Ratio Perm		0.21			c0.43							
v/c Ratio		0.55			1.12			1.12			0.73	
Uniform Delay, d1		21.0			26.9			33.6			32.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.7			67.3			83.3			4.1	
Delay (s)		21.6			94.2			116.9			36.9	
Level of Service		C			F			F			D	
Approach Delay (s)		21.6			94.2			116.9			36.9	
Approach LOS		C			F			F			D	

Intersection Summary			
HCM 2000 Control Delay	73.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	16.5
Intersection Capacity Utilization	104.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	5	785	5	245	1005	5	30	5	65	0	0	5
Future Volume (vph)	5	785	5	245	1005	5	30	5	65	0	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999							0.850		0.865	
Flt Protected					0.990			0.958				
Satd. Flow (prot)	0	1808	0	0	1791	0	0	1734	1538	0	1565	0
Flt Permitted					0.990			0.958				
Satd. Flow (perm)	0	1808	0	0	1791	0	0	1734	1538	0	1565	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		724			1081			130			454	
Travel Time (s)		16.5			24.6			3.0			10.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	853	5	266	1092	5	33	5	71	0	0	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	863	0	0	1363	0	0	38	71	0	5	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 127.2%		ICU Level of Service H	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (veh/h)	5	785	5	245	1005	5	30	5	65	0	0	5
Future Volume (Veh/h)	5	785	5	245	1005	5	30	5	65	0	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	853	5	266	1092	5	33	5	71	0	0	5
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	1097			858			2497	2494	856	2494	2494	1094
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1097			858			2497	2494	856	2494	2494	1094
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			65			0	73	80	100	100	98
cM capacity (veh/h)	625			770			14	18	353	9	18	256

Direction, Lane #	EB 1	WB 1	NE 1	NE 2	SW 1
Volume Total	863	1363	38	71	5
Volume Left	5	266	33	0	0
Volume Right	5	5	0	71	5
cSH	625	770	14	353	256
Volume to Capacity	0.01	0.35	2.69	0.20	0.02
Queue Length 95th (ft)	1	39	139	18	1
Control Delay (s)	0.2	11.9	1310.2	17.7	19.3
Lane LOS	A	B	F	C	C
Approach Delay (s)	0.2	11.9	468.3		19.3
Approach LOS			F		C

Intersection Summary				
Average Delay	28.9			
Intersection Capacity Utilization	127.2%	ICU Level of Service		H
Analysis Period (min)	15			

Lane Group	EBL	EBR	EBR2	NWL2	NWL	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt												
Flt Protected												
Satd. Flow (prot)	1810	0	1810	1810	0	1810	1810	3438	1810	1810	3438	0
Flt Permitted												
Satd. Flow (perm)	1810	0	1810	1810	0	1810	1810	3438	1810	1810	3438	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)												
Link Speed (mph)	30				30			30			30	
Link Distance (ft)	633				167			285			418	
Travel Time (s)	14.4				3.8			6.5			9.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12				12			12			12	
Link Offset(ft)	0				0			0			0	
Crosswalk Width(ft)	16				16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	9	15	15	9	15		9	15		9
Number of Detectors	1		1	1		1	1	2	1	1	2	
Detector Template	Left		Right	Left		Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20		20	20		20	20	100	20	20	100	
Trailing Detector (ft)	0		0	0		0	0	0	0	0	0	
Detector 1 Position(ft)	0		0	0		0	0	0	0	0	0	
Detector 1 Size(ft)	20		20	20		20	20	6	20	20	6	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type	Prot		Perm	Perm		Perm	Perm		Perm	Perm		
Protected Phases	4							2			6	
Permitted Phases			4	8		8	2		2	6		
Detector Phase	4		4	8		8	2	2	2	6	6	
Switch Phase												
Minimum Initial (s)	10.0		10.0	10.0		10.0	40.0	40.0	40.0	40.0	40.0	

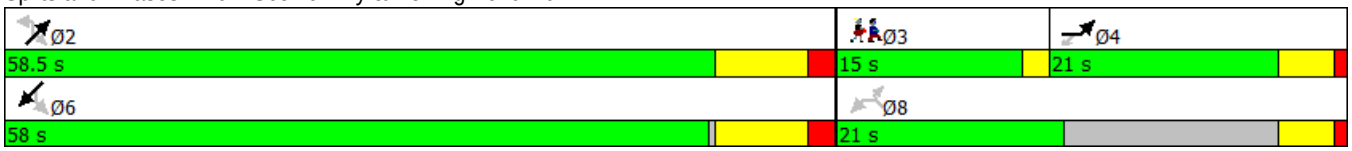
Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Detector 2 Position(ft)	
Detector 2 Size(ft)	
Detector 2 Type	
Detector 2 Channel	
Detector 2 Extend (s)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0

Lane Group	EBL	EBR	EBR2	NWL2	NWL	NWR	NEL	NET	NER	SWL	SWT	SWR
Minimum Split (s)	21.0		21.0	21.0		21.0	48.5	48.5	48.5	48.5	48.5	
Total Split (s)	21.0		21.0	21.0		21.0	58.5	58.5	58.5	58.0	58.0	
Total Split (%)	22.2%		22.2%	22.2%		22.2%	61.9%	61.9%	61.9%	61.4%	61.4%	
Maximum Green (s)	16.0		16.0	16.0		16.0	50.0	50.0	50.0	49.5	49.5	
Yellow Time (s)	4.0		4.0	4.0		4.0	6.5	6.5	6.5	6.5	6.5	
All-Red Time (s)	1.0		1.0	1.0		1.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0		5.0	5.0		5.0	8.5	8.5	8.5	8.5	8.5	
Lead/Lag	Lag		Lag									
Lead-Lag Optimize?	Yes		Yes									
Vehicle Extension (s)	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None		None	None		None	Max	Max	Max	Max	Max	
Walk Time (s)	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	
Flash Dont Walk (s)	11.0		11.0	11.0		11.0	11.0	11.0	11.0	11.0	11.0	
Pedestrian Calls (#/hr)	0		0	0		0	0	0	0	0	0	
Act Effct Green (s)												
Actuated g/C Ratio												
v/c Ratio												
Control Delay												
Queue Delay												
Total Delay												
LOS												
Approach Delay												
Approach LOS												
90th %ile Green (s)	0.0		0.0	0.0		0.0	65.0	65.0	65.0	65.0	65.0	
90th %ile Term Code	Skip		Skip	Skip		Skip	Dwell	Dwell	Dwell	Dwell	Dwell	
70th %ile Green (s)	0.0		0.0	0.0		0.0	65.0	65.0	65.0	65.0	65.0	
70th %ile Term Code	Skip		Skip	Skip		Skip	Dwell	Dwell	Dwell	Dwell	Dwell	
50th %ile Green (s)	0.0		0.0	0.0		0.0	65.0	65.0	65.0	65.0	65.0	
50th %ile Term Code	Skip		Skip	Skip		Skip	Dwell	Dwell	Dwell	Dwell	Dwell	
30th %ile Green (s)	0.0		0.0	0.0		0.0	65.0	65.0	65.0	65.0	65.0	
30th %ile Term Code	Skip		Skip	Skip		Skip	Dwell	Dwell	Dwell	Dwell	Dwell	
10th %ile Green (s)	0.0		0.0	0.0		0.0	65.0	65.0	65.0	65.0	65.0	
10th %ile Term Code	Skip		Skip	Skip		Skip	Dwell	Dwell	Dwell	Dwell	Dwell	
Stops (vph)												
Fuel Used(gal)												
CO Emissions (g/hr)												
NOx Emissions (g/hr)												
VOC Emissions (g/hr)												
Dilemma Vehicles (#)												
Queue Length 50th (ft)												
Queue Length 95th (ft)												
Internal Link Dist (ft)	553				87			205			338	
Turn Bay Length (ft)												
Base Capacity (vph)												
Starvation Cap Reductn												
Spillback Cap Reductn												
Storage Cap Reductn												
Reduced v/c Ratio												

Lane Group	Ø3
Minimum Split (s)	15.0
Total Split (s)	15.0
Total Split (%)	16%
Maximum Green (s)	13.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	
Flash Dont Walk (s)	
Pedestrian Calls (#/hr)	
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	0.0
90th %ile Term Code	Skip
70th %ile Green (s)	0.0
70th %ile Term Code	Skip
50th %ile Green (s)	0.0
50th %ile Term Code	Skip
30th %ile Green (s)	0.0
30th %ile Term Code	Skip
10th %ile Green (s)	0.0
10th %ile Term Code	Skip
Stops (vph)	
Fuel Used(gal)	
CO Emissions (g/hr)	
NOx Emissions (g/hr)	
VOC Emissions (g/hr)	
Dilemma Vehicles (#)	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary		
Area Type:	Other	
Cycle Length: 94.5		
Actuated Cycle Length: 73.5		
Natural Cycle: 85		
Control Type: Semi Act-Uncoord		
Maximum v/c Ratio: 0.00		
Intersection Signal Delay: 0.0		Intersection LOS: A
Intersection Capacity Utilization 0.0%		ICU Level of Service A
Analysis Period (min) 15		
90th %ile Actuated Cycle: 73.5		
70th %ile Actuated Cycle: 73.5		
50th %ile Actuated Cycle: 73.5		
30th %ile Actuated Cycle: 73.5		
10th %ile Actuated Cycle: 73.5		

Splits and Phases: 64: Scenic Hwy & Herring Pond Rd



Movement	EBL	EBR	EBR2	NWL2	NWL	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)												
Lane Util. Factor												
Frt												
Flt Protected												
Satd. Flow (prot)												
Flt Permitted												
Satd. Flow (perm)												
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Turn Type	Prot		Perm	Perm		Perm	Perm		Perm	Perm		
Protected Phases	4							2			6	
Permitted Phases			4	8		8	2		2	6		
Actuated Green, G (s)												
Effective Green, g (s)												
Actuated g/C Ratio												
Clearance Time (s)												
Vehicle Extension (s)												
Lane Grp Cap (vph)												
v/s Ratio Prot												
v/s Ratio Perm												
v/c Ratio												
Uniform Delay, d1												
Progression Factor												
Incremental Delay, d2												
Delay (s)												
Level of Service												
Approach Delay (s)	0.0				0.0			0.0			0.0	
Approach LOS	A				A			A			A	

Intersection Summary			
HCM 2000 Control Delay	0.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.00		
Actuated Cycle Length (s)	73.5	Sum of lost time (s)	15.5
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

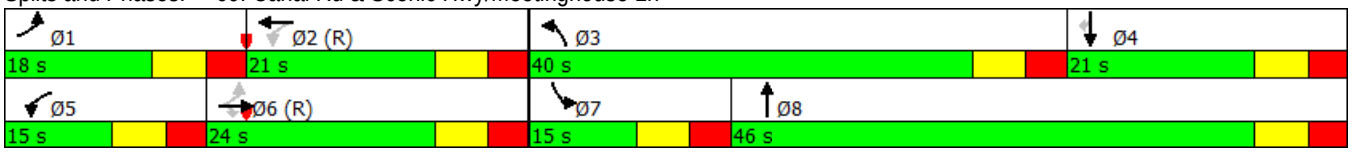
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	395	240	35	220	105	230	185	75	80	100	490
Future Volume (vph)	195	395	240	35	220	105	230	185	75	80	100	490
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.952			0.957				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1810	1538	1719	1723	0	1719	1732	0	1719	1810	1538
Flt Permitted	0.180			0.326			0.950			0.950		
Satd. Flow (perm)	326	1810	1538	590	1723	0	1719	1732	0	1719	1810	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			273		20			24				437
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		472			455			538			297	
Travel Time (s)		10.7			10.3			12.2			6.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	429	261	38	239	114	250	201	82	87	109	533
Shared Lane Traffic (%)												
Lane Group Flow (vph)	212	429	261	38	353	0	250	283	0	87	109	533
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2								4
Detector Phase	1	6	6	5	2		3	8		7	4	4
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	4.0	10.0		4.0	10.0		4.0	10.0	10.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	17.0	17.0	17.0	11.0	17.0		11.0	17.0		11.0	17.0	17.0
Total Split (s)	18.0	24.0	24.0	15.0	21.0		40.0	46.0		15.0	21.0	21.0
Total Split (%)	18.0%	24.0%	24.0%	15.0%	21.0%		40.0%	46.0%		15.0%	21.0%	21.0%
Maximum Green (s)	11.0	17.0	17.0	8.0	14.0		33.0	39.0		8.0	14.0	14.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	None
Act Effct Green (s)	40.2	33.1	33.1	29.7	22.9		19.9	32.2		7.7	17.3	17.3
Actuated g/C Ratio	0.40	0.33	0.33	0.30	0.23		0.20	0.32		0.08	0.17	0.17
v/c Ratio	0.72	0.72	0.38	0.15	0.86		0.73	0.49		0.66	0.35	0.85
Control Delay	39.2	43.5	5.9	24.1	60.5		49.6	27.2		68.7	38.2	21.9
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	39.2	43.5	5.9	24.1	60.5		49.6	27.2		68.7	38.2	21.9
LOS	D	D	A	C	E		D	C		E	D	C
Approach Delay		31.6			56.9			37.7			29.9	
Approach LOS		C			E			D			C	
90th %ile Green (s)	11.0	17.0	17.0	8.0	14.0		27.0	39.0		8.0	20.0	20.0
90th %ile Term Code	Max	Coord	Coord	Max	Coord		Gap	Hold		Max	Max	Max
70th %ile Green (s)	11.0	17.2	17.2	7.8	14.0		22.9	39.0		8.0	24.1	24.1
70th %ile Term Code	Max	Coord	Coord	Gap	Coord		Gap	Hold		Max	Max	Max
50th %ile Green (s)	15.3	25.5	25.5	6.8	17.0		19.9	31.7		8.0	19.8	19.8
50th %ile Term Code	Gap	Coord	Coord	Gap	Coord		Gap	Hold		Max	Gap	Gap
30th %ile Green (s)	12.1	49.5	49.5	0.0	30.4		17.0	21.5		8.0	12.5	12.5
30th %ile Term Code	Gap	Coord	Coord	Skip	Coord		Gap	Hold		Max	Gap	Gap
10th %ile Green (s)	10.0	56.2	56.2	0.0	39.2		12.8	29.8		0.0	10.0	10.0
10th %ile Term Code	Min	Coord	Coord	Skip	Coord		Gap	Hold		Skip	Min	Min
Stops (vph)	120	249	27	27	204		208	183		74	83	108
Fuel Used(gal)	3	6	1	0	6		4	4		2	2	6
CO Emissions (g/hr)	205	442	92	31	439		310	248		145	135	431
NOx Emissions (g/hr)	40	86	18	6	85		60	48		28	26	84
VOC Emissions (g/hr)	48	103	21	7	102		72	57		34	31	100
Dilemma Vehicles (#)	0	0	0	0	0		0	0		0	0	0
Queue Length 50th (ft)	92	268	0	15	~254		151	133		55	60	53
Queue Length 95th (ft)	#224	#555	60	40	#468		216	188		#123	110	#233
Internal Link Dist (ft)		392			375			458			217	
Turn Bay Length (ft)												
Base Capacity (vph)	299	598	691	272	410		567	690		137	332	639
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	0.71	0.72	0.38	0.14	0.86		0.44	0.41		0.64	0.33	0.83

Intersection Summary	
Area Type:	Other
Cycle Length: 100	

Actuated Cycle Length: 100
Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 36.3 Intersection LOS: D
Intersection Capacity Utilization 78.6% ICU Level of Service D
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: 69: Canal Rd & Scenic Hwy/Meetinghouse Ln



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	395	240	35	220	105	230	185	75	80	100	490
Future Volume (vph)	195	395	240	35	220	105	230	185	75	80	100	490
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1719	1810	1538	1719	1722		1719	1731		1719	1810	1538
Flt Permitted	0.18	1.00	1.00	0.33	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	326	1810	1538	589	1722		1719	1731		1719	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	212	429	261	38	239	114	250	201	82	87	109	533
RTOR Reduction (vph)	0	0	186	0	16	0	0	16	0	0	0	355
Lane Group Flow (vph)	212	429	75	38	337	0	250	267	0	87	109	178
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA		Prot	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases	6		6	2								4
Actuated Green, G (s)	40.4	28.9	28.9	26.0	21.5		19.9	32.2		6.4	18.7	18.7
Effective Green, g (s)	40.4	28.9	28.9	26.0	21.5		19.9	32.2		6.4	18.7	18.7
Actuated g/C Ratio	0.40	0.29	0.29	0.26	0.22		0.20	0.32		0.06	0.19	0.19
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		7.0	7.0		7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	297	523	444	203	370		342	557		110	338	287
v/s Ratio Prot	c0.08	c0.24		0.01	0.20		c0.15	0.15		0.05	0.06	
v/s Ratio Perm	0.20		0.05	0.04								c0.12
v/c Ratio	0.71	0.82	0.17	0.19	0.91		0.73	0.48		0.79	0.32	0.62
Uniform Delay, d1	22.6	33.1	26.6	28.3	38.3		37.5	27.2		46.1	35.2	37.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	7.9	13.5	0.8	0.4	29.0		7.8	0.7		31.0	0.6	3.9
Delay (s)	30.5	46.6	27.4	28.8	67.3		45.4	27.8		77.1	35.7	41.3
Level of Service	C	D	C	C	E		D	C		E	D	D
Approach Delay (s)		37.3			63.6			36.1			44.8	
Approach LOS		D			E			D			D	

Intersection Summary					
HCM 2000 Control Delay	43.2	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.78				
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	28.0		
Intersection Capacity Utilization	78.6%	ICU Level of Service	D		
Analysis Period (min)	15				

c Critical Lane Group

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	340	115	660	10
Future Volume (vph)	0	0	340	115	660	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.998	
Flt Protected			0.950			
Satd. Flow (prot)	0	0	1719	1810	1806	0
Flt Permitted			0.950			
Satd. Flow (perm)	0	0	1719	1810	1806	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	326			356	559	
Travel Time (s)	7.4			8.1	12.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	370	125	717	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	370	125	728	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 60.8%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	340	115	660	10
Future Volume (Veh/h)	0	0	340	115	660	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	370	125	717	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				886		
pX, platoon unblocked						
vC, conflicting volume	1588	722	728			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1588	722	728			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	57			
cM capacity (veh/h)	67	422	862			

Direction, Lane #	NB 1	NB 2	SB 1
Volume Total	370	125	728
Volume Left	370	0	0
Volume Right	0	0	11
cSH	862	1700	1700
Volume to Capacity	0.43	0.07	0.43
Queue Length 95th (ft)	54	0	0
Control Delay (s)	12.3	0.0	0.0
Lane LOS	B		
Approach Delay (s)	9.2		0.0
Approach LOS			

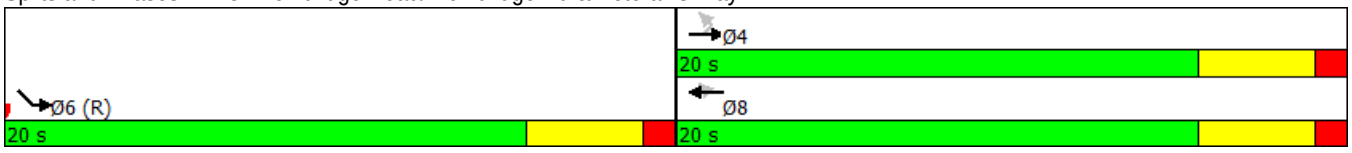
Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	20	425	285	30	560	50
Future Volume (vph)	20	425	285	30	560	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	250
Storage Lanes	0			1	2	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	0.95
Frt				0.850	0.988	
Flt Protected		0.998			0.956	
Satd. Flow (prot)	0	1806	1810	1538	3316	0
Flt Permitted		0.976			0.956	
Satd. Flow (perm)	0	1766	1810	1538	3316	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				33	28	
Link Speed (mph)		30	30		30	
Link Distance (ft)		742	276		701	
Travel Time (s)		16.9	6.3		15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	462	310	33	609	54
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	484	310	33	663	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		24	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	
Detector Template	Left	Thru	Thru	Right	Left	
Leading Detector (ft)	20	100	100	20	20	
Trailing Detector (ft)	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	
Detector 1 Size(ft)	20	6	6	20	20	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Detector Phase	4	4	8	8	6	
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (s)	20.0	20.0	20.0	20.0	20.0	
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	
Maximum Green (s)	15.5	15.5	15.5	15.5	15.5	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	
Total Lost Time (s)		4.5	4.5	4.5	4.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	Min	Min	Min	Min	C-Min	
Act Effct Green (s)		14.5	14.5	14.5	16.5	
Actuated g/C Ratio		0.36	0.36	0.36	0.41	
v/c Ratio		0.76	0.47	0.06	0.48	
Control Delay		20.7	12.1	4.0	10.2	
Queue Delay		0.0	0.0	0.0	0.0	
Total Delay		20.7	12.1	4.0	10.2	
LOS		C	B	A	B	
Approach Delay		20.7	11.3		10.2	
Approach LOS		C	B		B	
90th %ile Green (s)	15.5	15.5	15.5	15.5	15.5	
90th %ile Term Code	Max	Max	Max	Max	Coord	
70th %ile Green (s)	16.1	16.1	16.1	16.1	14.9	
70th %ile Term Code	Max	Max	Hold	Hold	Coord	
50th %ile Green (s)	16.5	16.5	16.5	16.5	14.5	
50th %ile Term Code	Gap	Gap	Hold	Hold	Coord	
30th %ile Green (s)	13.8	13.8	13.8	13.8	17.2	
30th %ile Term Code	Gap	Gap	Hold	Hold	Coord	
10th %ile Green (s)	10.5	10.5	10.5	10.5	20.5	
10th %ile Term Code	Gap	Gap	Hold	Hold	Coord	
Stops (vph)		346	197	10	400	
Fuel Used(gal)		6	2	0	7	
CO Emissions (g/hr)		444	168	10	476	
NOx Emissions (g/hr)		86	33	2	93	
VOC Emissions (g/hr)		103	39	2	110	
Dilemma Vehicles (#)		0	0	0	0	
Queue Length 50th (ft)		81	46	0	55	
Queue Length 95th (ft)		#201	96	11	86	
Internal Link Dist (ft)		662	196		621	
Turn Bay Length (ft)						
Base Capacity (vph)		698	715	628	1412	
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		0.69	0.43	0.05	0.47	

Intersection Summary		
Area Type:	Other	
Cycle Length: 40		
Actuated Cycle Length: 40		
Offset: 0 (0%), Referenced to phase 2: and 6:SEL, Start of Green		
Natural Cycle: 40		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.76		
Intersection Signal Delay: 13.8		Intersection LOS: B
Intersection Capacity Utilization 63.7%		ICU Level of Service B
Analysis Period (min) 15		
# 95th percentile volume exceeds capacity, queue may be longer.		
Queue shown is maximum after two cycles.		

Splits and Phases: 78: Trowbridge Road/Trowbridge Rd & Veteran's Way



Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	20	425	285	30	560	50
Future Volume (vph)	20	425	285	30	560	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	1.00	0.97	
Frt		1.00	1.00	0.85	0.99	
Flt Protected		1.00	1.00	1.00	0.96	
Satd. Flow (prot)		1805	1810	1538	3315	
Flt Permitted		0.98	1.00	1.00	0.96	
Satd. Flow (perm)		1766	1810	1538	3315	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	462	310	33	609	54
RTOR Reduction (vph)	0	0	0	21	16	0
Lane Group Flow (vph)	0	484	310	12	647	0
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)		14.5	14.5	14.5	16.5	
Effective Green, g (s)		14.5	14.5	14.5	16.5	
Actuated g/C Ratio		0.36	0.36	0.36	0.41	
Clearance Time (s)		4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		640	656	557	1367	
v/s Ratio Prot			0.17		c0.20	
v/s Ratio Perm		c0.27		0.01		
v/c Ratio		0.76	0.47	0.02	0.47	
Uniform Delay, d1		11.2	9.8	8.2	8.6	
Progression Factor		1.00	1.00	1.00	1.00	
Incremental Delay, d2		5.1	0.5	0.0	1.2	
Delay (s)		16.3	10.3	8.2	9.8	
Level of Service		B	B	A	A	
Approach Delay (s)		16.3	10.1		9.8	
Approach LOS		B	B		A	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	1450	5	5	1030	5	5
Future Volume (vph)	1450	5	5	1030	5	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.932	
Flt Protected			0.950		0.976	
Satd. Flow (prot)	1810	1538	1719	1810	1646	0
Flt Permitted			0.950		0.976	
Satd. Flow (perm)	1810	1538	1719	1810	1646	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1013			317	951	
Travel Time (s)	23.0			7.2	21.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1576	5	5	1120	5	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1576	5	5	1120	10	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 86.3%		ICU Level of Service E	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	1450	5	5	1030	5	5
Future Volume (Veh/h)	1450	5	5	1030	5	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1576	5	5	1120	5	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	1013					
pX, platoon unblocked			0.39		0.39	0.39
vC, conflicting volume			1581		2706	1576
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1710		4628	1697
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		0	88
cM capacity (veh/h)			140		0	43

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NW 1
Volume Total	1576	5	5	1120	10
Volume Left	0	0	5	0	5
Volume Right	0	5	0	0	5
cSH	1700	1700	140	1700	1
Volume to Capacity	0.93	0.00	0.04	0.66	11.59
Queue Length 95th (ft)	0	0	3	0	Err
Control Delay (s)	0.0	0.0	31.7	0.0	Err
Lane LOS			D		F
Approach Delay (s)	0.0		0.1		Err
Approach LOS					F

Intersection Summary			
Average Delay	36.9		
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		

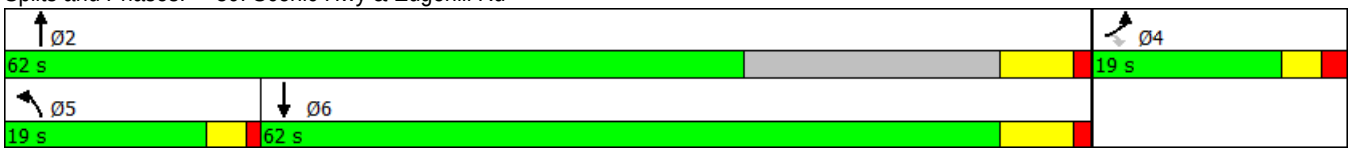
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	0.95
Frt						
Flt Protected						
Satd. Flow (prot)	1810	1810	1810	3438	3438	0
Flt Permitted						
Satd. Flow (perm)	1810	1810	1810	3438	3438	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)						
Link Speed (mph)	30			30	30	
Link Distance (ft)	393			1366	1052	
Travel Time (s)	8.9			31.0	23.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1	1	1	2	2	
Detector Template	Left	Right	Left	Thru	Thru	
Leading Detector (ft)	20	20	20	100	100	
Trailing Detector (ft)	0	0	0	0	0	
Detector 1 Position(ft)	0	0	0	0	0	
Detector 1 Size(ft)	20	20	20	6	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot	Perm	Prot			
Protected Phases	4		5	2	6	
Permitted Phases		4				
Detector Phase	4	4	5	2	6	
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	15.0	15.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Minimum Split (s)	12.0	12.0	12.0	23.0	23.0	
Total Split (s)	19.0	19.0	19.0	62.0	62.0	
Total Split (%)	19.0%	19.0%	19.0%	62.0%	62.0%	
Maximum Green (s)	14.0	14.0	15.0	55.0	55.0	
Yellow Time (s)	3.0	3.0	3.0	5.5	5.5	
All-Red Time (s)	2.0	2.0	1.0	1.5	1.5	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0	4.0	7.0	7.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?			Yes		Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None	None	Max	Max	
Act Effct Green (s)						
Actuated g/C Ratio						
v/c Ratio						
Control Delay						
Queue Delay						
Total Delay						
LOS						
Approach Delay						
Approach LOS						
90th %ile Green (s)	0.0	0.0	0.0	70.0	70.0	
90th %ile Term Code	Skip	Skip	Skip	Dwell	Dwell	
70th %ile Green (s)	0.0	0.0	0.0	70.0	70.0	
70th %ile Term Code	Skip	Skip	Skip	Dwell	Dwell	
50th %ile Green (s)	0.0	0.0	0.0	70.0	70.0	
50th %ile Term Code	Skip	Skip	Skip	Dwell	Dwell	
30th %ile Green (s)	0.0	0.0	0.0	70.0	70.0	
30th %ile Term Code	Skip	Skip	Skip	Dwell	Dwell	
10th %ile Green (s)	0.0	0.0	0.0	70.0	70.0	
10th %ile Term Code	Skip	Skip	Skip	Dwell	Dwell	
Stops (vph)						
Fuel Used(gal)						
CO Emissions (g/hr)						
NOx Emissions (g/hr)						
VOC Emissions (g/hr)						
Dilemma Vehicles (#)						
Queue Length 50th (ft)						
Queue Length 95th (ft)						
Internal Link Dist (ft)	313			1286	972	
Turn Bay Length (ft)						
Base Capacity (vph)						
Starvation Cap Reductn						
Spillback Cap Reductn						
Storage Cap Reductn						
Reduced v/c Ratio						

Intersection Summary	
Area Type:	Other
Cycle Length: 100	

Actuated Cycle Length: 77	
Natural Cycle: 50	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.00	
Intersection Signal Delay: 0.0	Intersection LOS: A
Intersection Capacity Utilization 0.0%	ICU Level of Service A
Analysis Period (min) 15	
90th %ile Actuated Cycle: 77	
70th %ile Actuated Cycle: 77	
50th %ile Actuated Cycle: 77	
30th %ile Actuated Cycle: 77	
10th %ile Actuated Cycle: 77	

Splits and Phases: 89: Scenic Hwy & Edgehill Rd



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)						
Lane Util. Factor						
Frt						
Flt Protected						
Satd. Flow (prot)						
Flt Permitted						
Satd. Flow (perm)						
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	0
Turn Type	Prot	Perm	Prot			
Protected Phases	4		5	2	6	
Permitted Phases		4				
Actuated Green, G (s)						
Effective Green, g (s)						
Actuated g/C Ratio						
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)						
v/s Ratio Prot						
v/s Ratio Perm						
v/c Ratio						
Uniform Delay, d1						
Progression Factor						
Incremental Delay, d2						
Delay (s)						
Level of Service						
Approach Delay (s)	0.0			0.0	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	0.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.00		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

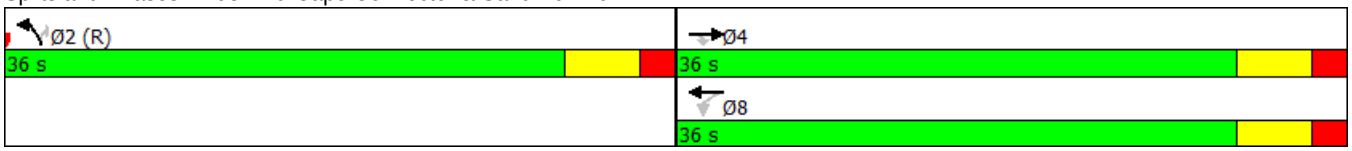
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	240	1270	65	715	230	370
Future Volume (vph)	240	1270	65	715	230	370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1810	1538	1719	1810	1719	1538
Flt Permitted			0.576		0.950	
Satd. Flow (perm)	1810	1538	1042	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		1091				402
Link Speed (mph)	30			30	30	
Link Distance (ft)	282			234	445	
Travel Time (s)	6.4			5.3	10.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	261	1380	71	777	250	402
Shared Lane Traffic (%)						
Lane Group Flow (vph)	261	1380	71	777	250	402
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Minimum Split (s)	36.0	36.0	36.0	36.0	36.0	36.0
Total Split (s)	36.0	36.0	36.0	36.0	36.0	36.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Maximum Green (s)	30.0	30.0	30.0	30.0	30.0	30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	30.0	30.0	30.0	30.0	30.0	30.0
Actuated g/C Ratio	0.42	0.42	0.42	0.42	0.42	0.42
v/c Ratio	0.35	1.08	0.16	1.03	0.35	0.46
Control Delay	16.0	58.3	14.5	64.6	16.1	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.0	58.3	14.5	64.6	16.1	3.5

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
LOS	B	E	B	E	B	A
Approach Delay	51.5			60.4	8.4	
Approach LOS	D			E	A	
Stops (vph)	156	289	40	588	150	33
Fuel Used(gal)	3	26	1	18	3	3
CO Emissions (g/hr)	236	1804	62	1247	220	207
NOx Emissions (g/hr)	46	351	12	243	43	40
VOC Emissions (g/hr)	55	418	14	289	51	48
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (ft)	76	~385	19	~378	73	0
Queue Length 95th (ft)	130	#629	45	#580	127	48
Internal Link Dist (ft)	202			154	365	
Turn Bay Length (ft)						
Base Capacity (vph)	754	1277	434	754	716	875
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	0.35	1.08	0.16	1.03	0.35	0.46

Intersection Summary			
Area Type:	Other		
Cycle Length: 72			
Actuated Cycle Length: 72			
Offset: 0 (0%), Referenced to phase 2:NBL and 6:, Start of Green			
Natural Cycle: 100			
Control Type: Pretimed			
Maximum v/c Ratio: 1.08			
Intersection Signal Delay: 45.0		Intersection LOS: D	
Intersection Capacity Utilization 113.6%		ICU Level of Service H	
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: 93: Mid-Cape Connector & Sandwich Rd



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	240	1270	65	715	230	370
Future Volume (vph)	240	1270	65	715	230	370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1810	1538	1719	1810	1719	1538
Flt Permitted	1.00	1.00	0.58	1.00	0.95	1.00
Satd. Flow (perm)	1810	1538	1042	1810	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	261	1380	71	777	250	402
RTOR Reduction (vph)	0	636	0	0	0	235
Lane Group Flow (vph)	261	744	71	777	250	168
Turn Type	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Actuated Green, G (s)	30.0	30.0	30.0	30.0	30.0	30.0
Effective Green, g (s)	30.0	30.0	30.0	30.0	30.0	30.0
Actuated g/C Ratio	0.42	0.42	0.42	0.42	0.42	0.42
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lane Grp Cap (vph)	754	640	434	754	716	640
v/s Ratio Prot	0.14			0.43	c0.15	
v/s Ratio Perm		c0.48	0.07			0.11
v/c Ratio	0.35	1.16	0.16	1.03	0.35	0.26
Uniform Delay, d1	14.3	21.0	13.1	21.0	14.3	13.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	89.3	0.8	40.8	1.3	1.0
Delay (s)	15.6	110.3	14.0	61.8	15.7	14.7
Level of Service	B	F	B	E	B	B
Approach Delay (s)	95.2			57.8	15.1	
Approach LOS	F			E	B	

Intersection Summary			
HCM 2000 Control Delay	68.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	72.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	113.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

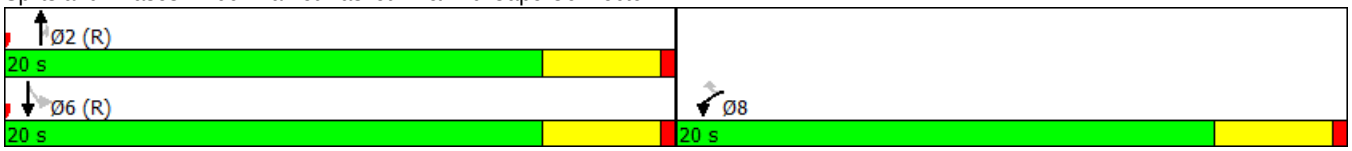
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	60	55	545	55	60	1275
Future Volume (vph)	60	55	545	55	60	1275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	0.95
Ped Bike Factor	0.99					
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	3335	1538	1810	1538	1719	3438
Flt Permitted	0.950				0.250	
Satd. Flow (perm)	3314	1538	1810	1538	452	3438
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		60		60		
Link Speed (mph)	30		30			30
Link Distance (ft)	572		399			426
Travel Time (s)	13.0		9.1			9.7
Confl. Peds. (#/hr)	5					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	60	592	60	65	1386
Shared Lane Traffic (%)						
Lane Group Flow (vph)	65	60	592	60	65	1386
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	24		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Maximum Green (s)	16.0	16.0	16.0	16.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effct Green (s)	16.0	16.0	16.0	16.0	16.0	16.0
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40	0.40
v/c Ratio	0.05	0.09	0.82	0.09	0.36	1.01
Control Delay	7.5	3.3	23.6	3.3	15.5	42.3

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.5	3.3	23.6	3.3	15.5	42.3
LOS	A	A	C	A	B	D
Approach Delay	5.5		21.7			41.1
Approach LOS	A		C			D
Stops (vph)	36	14	420	14	48	1009
Fuel Used(gal)	1	0	7	0	1	25
CO Emissions (g/hr)	39	25	464	20	60	1762
NOx Emissions (g/hr)	8	5	90	4	12	343
VOC Emissions (g/hr)	9	6	107	5	14	408
Dilemma Vehicles (#)	0	0	0	0	0	0
Queue Length 50th (ft)	4	0	110	0	10	~155
Queue Length 95th (ft)	11	14	#257	14	35	#285
Internal Link Dist (ft)	492		319			346
Turn Bay Length (ft)						
Base Capacity (vph)	1334	651	724	651	180	1375
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	0.09	0.82	0.09	0.36	1.01

Intersection Summary

Area Type: Other
Cycle Length: 40
Actuated Cycle Length: 40
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 50
Control Type: Pretimed
Maximum v/c Ratio: 1.01
Intersection Signal Delay: 33.4 Intersection LOS: C
Intersection Capacity Utilization 45.4% ICU Level of Service A
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: 99: Market Basket Dr & Mid-Cape Connector



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	60	55	545	55	60	1275
Future Volume (vph)	60	55	545	55	60	1275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	0.95
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3335	1538	1810	1538	1719	3438
Flt Permitted	0.95	1.00	1.00	1.00	0.25	1.00
Satd. Flow (perm)	3335	1538	1810	1538	452	3438
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	60	592	60	65	1386
RTOR Reduction (vph)	0	36	0	36	0	0
Lane Group Flow (vph)	65	24	592	24	65	1386
Confl. Peds. (#/hr)	5					
Turn Type	Prot	Perm	NA	Perm	Perm	NA
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	16.0	16.0	16.0	16.0	16.0	16.0
Effective Green, g (s)	16.0	16.0	16.0	16.0	16.0	16.0
Actuated g/C Ratio	0.40	0.40	0.40	0.40	0.40	0.40
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Grp Cap (vph)	1334	615	724	615	180	1375
v/s Ratio Prot	c0.02		0.33			c0.40
v/s Ratio Perm		0.02		0.02	0.14	
v/c Ratio	0.05	0.04	0.82	0.04	0.36	1.01
Uniform Delay, d1	7.3	7.3	10.7	7.3	8.4	12.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	9.9	0.1	5.5	26.2
Delay (s)	7.4	7.4	20.6	7.4	14.0	38.2
Level of Service	A	A	C	A	B	D
Approach Delay (s)	7.4		19.4			37.1
Approach LOS	A		B			D

Intersection Summary			
HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	280	665	645	0	120	355
Future Volume (vph)	280	665	645	0	120	355
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				
Flt Protected	0.950					0.988
Satd. Flow (prot)	1719	1538	1810	1810	0	1788
Flt Permitted	0.950					0.988
Satd. Flow (perm)	1719	1538	1810	1810	0	1788
Link Speed (mph)	30		30			30
Link Distance (ft)	263		109			1820
Travel Time (s)	6.0		2.5			41.4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	723	701	0	130	386
Shared Lane Traffic (%)						
Lane Group Flow (vph)	304	723	701	0	0	516
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 84.8%		ICU Level of Service E	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	280	665	645	0	120	355
Future Volume (Veh/h)	280	665	645	0	120	355
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	304	723	701	0	130	386
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	1347	701			701	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1347	701			701	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	0			85	
cM capacity (veh/h)	140	434			882	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	304	723	701	0	516
Volume Left	304	0	0	0	130
Volume Right	0	723	0	0	0
cSH	140	434	1700	1700	882
Volume to Capacity	2.17	1.67	0.41	0.00	0.15
Queue Length 95th (ft)	626	1064	0	0	13
Control Delay (s)	602.2	333.0	0.0	0.0	3.9
Lane LOS	F	F			A
Approach Delay (s)	412.7		0.0		3.9
Approach LOS	F				

Intersection Summary			
Average Delay	189.8		
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	90	90	435	875	385	360
Future Volume (vph)	90	90	435	875	385	360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950			0.984		
Satd. Flow (prot)	1719	1538	0	1781	1810	1538
Flt Permitted	0.950			0.984		
Satd. Flow (perm)	1719	1538	0	1781	1810	1538
Link Speed (mph)	30			30	30	
Link Distance (ft)	482			1820	155	
Travel Time (s)	11.0			41.4	3.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	98	473	951	418	391
Shared Lane Traffic (%)						
Lane Group Flow (vph)	98	98	0	1424	418	391
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 105.4%		ICU Level of Service G	
Analysis Period (min) 15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	90	90	435	875	385	360
Future Volume (Veh/h)	90	90	435	875	385	360
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	98	473	951	418	391
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	2315	418	418			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2315	418	418			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	84	58			
cM capacity (veh/h)	24	629	1125			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2
Volume Total	98	98	1424	418	391
Volume Left	98	0	473	0	0
Volume Right	0	98	0	0	391
cSH	24	629	1125	1700	1700
Volume to Capacity	4.15	0.16	0.42	0.25	0.23
Queue Length 95th (ft)	Err	14	53	0	0
Control Delay (s)	Err	11.8	10.2	0.0	0.0
Lane LOS	F	B	B		
Approach Delay (s)	5005.4		10.2	0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	409.9		
Intersection Capacity Utilization	105.4%	ICU Level of Service	G
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	1810	0	0	1810	0	0	1810	0	0	1810	0
Flt Permitted												
Satd. Flow (perm)	0	1810	0	0	1810	0	0	1810	0	0	1810	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		622			556			536			177	
Travel Time (s)		14.1			12.6			12.2			4.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 0.0%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	0	0	0	0	0	0	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0	0	0	0	0	0	0			0		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0	0	0	0	0	0	0			0		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	100	100	100	100			100		
cM capacity (veh/h)	1016	890	1076	1016	890	1076	1604			1604		

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

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

Lane Group	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (vph)	175	305	420	570	470	495
Future Volume (vph)	175	305	420	570	470	495
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.922		0.931	
Flt Protected		0.982			0.976	
Satd. Flow (prot)	0	1777	1668	0	1644	0
Flt Permitted		0.982			0.976	
Satd. Flow (perm)	0	1777	1668	0	1644	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		876	439		613	
Travel Time (s)		19.9	10.0		13.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	190	332	457	620	511	538
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	522	1077	0	1049	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 149.2%		ICU Level of Service H	
Analysis Period (min) 15			

Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	175	305	420	570	470	495
Future Volume (Veh/h)	175	305	420	570	470	495
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	190	332	457	620	511	538
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	457				1479	767
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	457				1479	767
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				0	0
cM capacity (veh/h)	1088				112	397

Direction, Lane #	NB 1	SB 1	NE 1
Volume Total	522	1077	1049
Volume Left	190	0	511
Volume Right	0	620	538
cSH	1088	1700	178
Volume to Capacity	0.17	0.63	5.90
Queue Length 95th (ft)	16	0	Err
Control Delay (s)	4.5	0.0	Err
Lane LOS	A		F
Approach Delay (s)	4.5	0.0	Err
Approach LOS			F

Intersection Summary			
Average Delay	3962.0		
Intersection Capacity Utilization	149.2%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	50	5	5	155	0	5	0	15	10	0	5
Future Volume (vph)	0	50	5	5	155	0	5	0	15	10	0	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.987						0.897			0.958	
Flt Protected					0.999			0.988			0.967	
Satd. Flow (prot)	0	3393	0	0	3435	0	0	1604	0	0	1676	0
Flt Permitted					0.999			0.988			0.967	
Satd. Flow (perm)	0	3393	0	0	3435	0	0	1604	0	0	1676	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		366			498			307			1083	
Travel Time (s)		8.3			11.3			7.0			24.6	
Confl. Peds. (#/hr)	300											
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	54	5	5	168	0	5	0	16	11	0	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	59	0	0	173	0	0	21	0	0	16	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 17.8%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	50	5	5	155	0	5	0	15	10	0	5
Future Volume (Veh/h)	0	50	5	5	155	0	5	0	15	10	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	54	5	5	168	0	5	0	16	11	0	5
Pedestrians											300	
Lane Width (ft)											12.0	
Walking Speed (ft/s)											4.0	
Percent Blockage											25	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	468			59			156	534	30	521	537	384
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	468			59			156	534	30	521	537	384
tC, single (s)	4.2			4.2			7.6	6.6	7.0	7.6	6.6	7.0
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	98	96	100	99
cM capacity (veh/h)	802			1521			627	332	1029	257	331	454

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	36	23	61	112	21	16
Volume Left	0	0	5	0	5	11
Volume Right	0	5	0	0	16	5
cSH	1700	1700	1521	1700	893	297
Volume to Capacity	0.02	0.01	0.00	0.07	0.02	0.05
Queue Length 95th (ft)	0	0	0	0	2	4
Control Delay (s)	0.0	0.0	0.6	0.0	9.1	17.8
Lane LOS			A		A	C
Approach Delay (s)	0.0		0.2		9.1	17.8
Approach LOS					A	C

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	17.8%	ICU Level of Service		A
Analysis Period (min)	15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	510	5	20	915	0	0
Future Volume (vph)	510	5	20	915	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.999					
Flt Protected				0.999		
Satd. Flow (prot)	1808	0	0	1808	0	0
Flt Permitted				0.999		
Satd. Flow (perm)	1808	0	0	1808	0	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	493			456	1083	
Travel Time (s)	11.2			10.4	24.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	554	5	22	995	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	559	0	0	1017	0	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 67.5%		ICU Level of Service C	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	510	5	20	915	0	0
Future Volume (Veh/h)	510	5	20	915	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	554	5	22	995	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			559		1596	556
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			559		1596	556
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		100	100
cM capacity (veh/h)			997		113	525

Direction, Lane #	EB 1	WB 1
Volume Total	559	1017
Volume Left	0	22
Volume Right	5	0
cSH	1700	997
Volume to Capacity	0.33	0.02
Queue Length 95th (ft)	0	2
Control Delay (s)	0.0	0.6
Lane LOS		A
Approach Delay (s)	0.0	0.6
Approach LOS		

Intersection Summary				
Average Delay		0.4		
Intersection Capacity Utilization		67.5%	ICU Level of Service	C
Analysis Period (min)		15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1800	5	625	5	5	5	1110	85	5	5	755	450
Future Volume (vph)	1800	5	625	5	5	5	1110	85	5	5	755	450
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		150	0		0	0		0	0		100
Storage Lanes	1		0	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt		0.921			0.955			0.999				0.850
Flt Protected	0.950	0.977			0.984		0.950	0.959				
Satd. Flow (prot)	1633	1547	0	0	1700	0	1633	1647	0	0	3438	1538
Flt Permitted	0.650	0.784			0.620		0.154	0.143			0.951	
Satd. Flow (perm)	1117	1241	0	0	1071	0	265	246	0	0	3270	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		82			5			1				417
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		333			284			282			370	
Travel Time (s)		7.6			6.5			6.4			8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1957	5	679	5	5	5	1207	92	5	5	821	489
Shared Lane Traffic (%)	31%						48%					
Lane Group Flow (vph)	1350	1291	0	0	15	0	628	676	0	0	826	489
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4		8	8		5	2		6	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	9.5
Total Split (s)	20.0	46.0		26.0	26.0		18.0	44.0		26.0	26.0	20.0
Total Split (%)	22.2%	51.1%		28.9%	28.9%		20.0%	48.9%		28.9%	28.9%	22.2%
Maximum Green (s)	15.5	41.5		21.5	21.5		13.5	39.5		21.5	21.5	15.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	None		None	None		Min	Min		Min	Min	Min
Walk Time (s)		7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	41.5	41.5			9.3		39.5	39.5			21.5	62.3
Actuated g/C Ratio	0.46	0.46			0.10		0.44	0.44			0.24	0.69
v/c Ratio	1.87	1.75			0.13		1.96	2.13			1.06	0.41
Control Delay	418.2	363.0			28.6		462.2	537.0			83.2	3.1
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Delay	418.2	363.0			28.6		462.2	537.0			83.2	3.1
LOS	F	F			C		F	F			F	A
Approach Delay		391.2			28.6			501.0			53.4	
Approach LOS		F			C			F			D	
90th %ile Green (s)	15.5	41.5		21.5	21.5		13.5	39.5		21.5	21.5	15.5
90th %ile Term Code	Max	Max		Hold	Hold		Max	Max		Max	Max	Max
70th %ile Green (s)	41.5	41.5		0.0	0.0		13.5	39.5		21.5	21.5	41.5
70th %ile Term Code	Hold	Max		Skip	Skip		Max	Max		Max	Max	Hold
50th %ile Green (s)	41.5	41.5		0.0	0.0		13.5	39.5		21.5	21.5	41.5
50th %ile Term Code	Hold	Max		Skip	Skip		Max	Max		Max	Max	Hold
30th %ile Green (s)	41.5	41.5		0.0	0.0		13.5	39.5		21.5	21.5	41.5
30th %ile Term Code	Hold	Max		Skip	Skip		Max	Max		Max	Max	Hold
10th %ile Green (s)	41.5	41.5		0.0	0.0		13.5	39.5		21.5	21.5	41.5
10th %ile Term Code	Hold	Max		Skip	Skip		Max	Max		Max	Max	Hold
Stops (vph)	861	792			11		343	379			656	47
Fuel Used(gal)	114	95			0		63	77			19	2
CO Emissions (g/hr)	7950	6658			12		4413	5415			1306	128
NOx Emissions (g/hr)	1547	1295			2		859	1054			254	25
VOC Emissions (g/hr)	1842	1543			3		1023	1255			303	30
Dilemma Vehicles (#)	0	0			0		0	0			0	0
Queue Length 50th (ft)	~1224	~1133			5		~546	~613			~273	9
Queue Length 95th (ft)	#1581	#1460			20		#767	#840			#391	88
Internal Link Dist (ft)		253			204			202			290	
Turn Bay Length (ft)												100
Base Capacity (vph)	722	739			259		321	318			781	1192
Starvation Cap Reductn	0	0			0		0	0			0	0

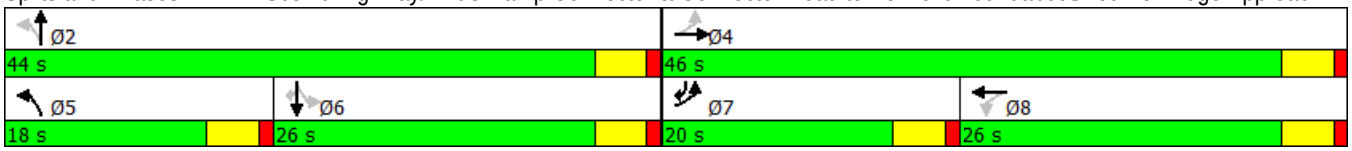
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Spillback Cap Reductn	0	0			0		0	0			0	0
Storage Cap Reductn	0	0			0		0	0			0	0
Reduced v/c Ratio	1.87	1.75			0.06		1.96	2.13			1.06	0.41

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Natural Cycle: 120			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 2.13			
Intersection Signal Delay: 333.1		Intersection LOS: F	
Intersection Capacity Utilization 141.1%		ICU Level of Service H	
Analysis Period (min) 15			
90th %ile Actuated Cycle: 90			
70th %ile Actuated Cycle: 90			
50th %ile Actuated Cycle: 90			
30th %ile Actuated Cycle: 90			
10th %ile Actuated Cycle: 90			

~ 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: 117: Scenic Highway/Exit 3 Ramp Connector & Connector Road to Belmont Roundabout/Bourne Bridge Approach



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1800	5	625	5	5	5	1110	85	5	5	755	450
Future Volume (vph)	1800	5	625	5	5	5	1110	85	5	5	755	450
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Lane Util. Factor	0.95	0.95			1.00		0.95	0.95			0.95	1.00
Frt	1.00	0.92			0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.98			0.98		0.95	0.96			1.00	1.00
Satd. Flow (prot)	1633	1547			1700		1633	1647			3437	1538
Flt Permitted	0.65	0.78			0.62		0.15	0.14			0.95	1.00
Satd. Flow (perm)	1118	1241			1072		264	245			3268	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1957	5	679	5	5	5	1207	92	5	5	821	489
RTOR Reduction (vph)	0	42	0	0	5	0	0	1	0	0	0	159
Lane Group Flow (vph)	1350	1249	0	0	10	0	628	675	0	0	826	330
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	45.1	45.1			4.3		39.5	39.5			21.5	57.8
Effective Green, g (s)	45.1	45.1			4.3		39.5	39.5			21.5	57.8
Actuated g/C Ratio	0.48	0.48			0.05		0.42	0.42			0.23	0.62
Clearance Time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	738	716			49		308	305			750	1023
v/s Ratio Prot	c0.71	0.68					0.29	c0.32				0.12
v/s Ratio Perm	c0.17	0.16			0.01		0.56	c0.61			0.25	0.09
v/c Ratio	1.83	1.74			0.21		2.04	2.21			1.10	0.32
Uniform Delay, d1	23.4	24.2			43.0		25.0	27.0			36.0	8.5
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	378.5	340.5			2.1		478.7	557.1			64.1	0.2
Delay (s)	401.8	364.7			45.1		503.8	584.1			100.2	8.7
Level of Service	F	F			D		F	F			F	A
Approach Delay (s)		383.7			45.1			545.4			66.2	
Approach LOS		F			D			F			E	

Intersection Summary			
HCM 2000 Control Delay	343.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.18		
Actuated Cycle Length (s)	93.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	141.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

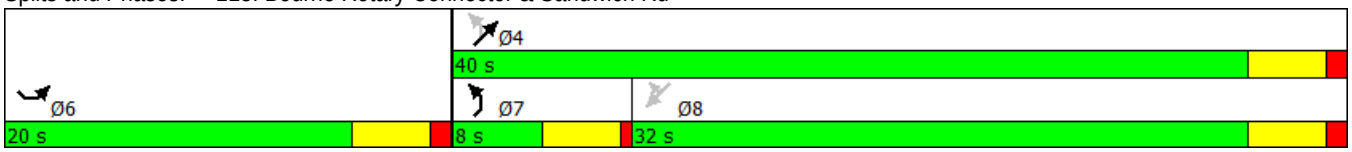
Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	220	125	25	1235	320	715
Future Volume (vph)	220	125	25	1235	320	715
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	1000	0	0			425
Storage Lanes	1	0	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	0.97	0.95	0.95	0.95	1.00	1.00
Frt	0.946					0.850
Flt Protected	0.969			0.999		
Satd. Flow (prot)	3218	0	0	3435	1810	1538
Flt Permitted	0.969			0.945		
Satd. Flow (perm)	3218	0	0	3249	1810	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	136					777
Link Speed (mph)	30			30	30	
Link Distance (ft)	1745			824	1013	
Travel Time (s)	39.7			18.7	23.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	136	27	1342	348	777
Shared Lane Traffic (%)						
Lane Group Flow (vph)	375	0	0	1369	348	777
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	24			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Number of Detectors	1		1	2	2	1
Detector Template	Left		Left	Thru	Thru	Right
Leading Detector (ft)	20		20	100	100	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	20		20	6	6	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)				94	94	
Detector 2 Size(ft)				6	6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Detector Phase	6		7	4	8	8
Switch Phase						
Minimum Initial (s)	5.0		4.0	5.0	5.0	5.0
Minimum Split (s)	20.0		8.0	20.0	22.5	22.5
Total Split (s)	20.0		8.0	40.0	32.0	32.0
Total Split (%)	33.3%		13.3%	66.7%	53.3%	53.3%
Maximum Green (s)	15.5		4.0	35.5	27.5	27.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		0.5	1.0	1.0	1.0
Lost Time Adjust (s)	0.0			0.0	0.0	0.0
Total Lost Time (s)	4.5			4.5	4.5	4.5
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		None	Min	Min	Min
Walk Time (s)					7.0	7.0
Flash Dont Walk (s)					11.0	11.0
Pedestrian Calls (#/hr)					0	0
Act Effct Green (s)	9.3			28.5	28.5	28.5
Actuated g/C Ratio	0.20			0.60	0.60	0.60
v/c Ratio	0.51			0.70	0.32	0.63
Control Delay	14.2			8.8	5.6	3.1
Queue Delay	0.0			0.0	0.0	0.0
Total Delay	14.2			8.8	5.6	3.1
LOS	B			A	A	A
Approach Delay	14.2			8.8	3.8	
Approach LOS	B			A	A	
90th %ile Green (s)	13.1		0.0	35.5	35.5	35.5
90th %ile Term Code	Gap		Skip	Max	Hold	Hold
70th %ile Green (s)	10.9		0.0	35.5	35.5	35.5
70th %ile Term Code	Gap		Skip	Max	Hold	Hold
50th %ile Green (s)	9.4		0.0	30.6	30.6	30.6
50th %ile Term Code	Gap		Skip	Gap	Hold	Hold
30th %ile Green (s)	7.6		0.0	24.1	24.1	24.1
30th %ile Term Code	Gap		Skip	Gap	Hold	Hold
10th %ile Green (s)	6.0		0.0	18.3	18.3	18.3
10th %ile Term Code	Gap		Skip	Gap	Hold	Hold
Stops (vph)	177			735	130	48
Fuel Used(gal)	7			14	4	6
CO Emissions (g/hr)	466			1006	252	444
NOx Emissions (g/hr)	91			196	49	86
VOC Emissions (g/hr)	108			233	58	103
Dilemma Vehicles (#)	0			0	0	0
Queue Length 50th (ft)	30			107	37	0
Queue Length 95th (ft)	68			201	84	33
Internal Link Dist (ft)	1665			744	933	
Turn Bay Length (ft)	1000					425
Base Capacity (vph)	1190			2504	1224	1292
Starvation Cap Reductn	0			0	0	0

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Spillback Cap Reductn	0			0	0	0
Storage Cap Reductn	0			0	0	0
Reduced v/c Ratio	0.32			0.55	0.28	0.60

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 47.2			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 7.5		Intersection LOS: A	
Intersection Capacity Utilization 86.6%		ICU Level of Service E	
Analysis Period (min) 15			
90th %ile Actuated Cycle: 57.6			
70th %ile Actuated Cycle: 55.4			
50th %ile Actuated Cycle: 49			
30th %ile Actuated Cycle: 40.7			
10th %ile Actuated Cycle: 33.3			

Splits and Phases: 118: Bourne Rotary Connector & Sandwich Rd



Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	220	125	25	1235	320	715
Future Volume (vph)	220	125	25	1235	320	715
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5			4.5	4.5	4.5
Lane Util. Factor	0.97			0.95	1.00	1.00
Frt	0.95			1.00	1.00	0.85
Flt Protected	0.97			1.00	1.00	1.00
Satd. Flow (prot)	3217			3435	1810	1538
Flt Permitted	0.97			0.95	1.00	1.00
Satd. Flow (perm)	3217			3250	1810	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	136	27	1342	348	777
RTOR Reduction (vph)	109	0	0	0	0	304
Lane Group Flow (vph)	266	0	0	1369	348	473
Turn Type	Prot		pm+pt	NA	NA	custom
Protected Phases	6		7	4		
Permitted Phases			4		8	8
Actuated Green, G (s)	9.3			28.5	28.5	28.5
Effective Green, g (s)	9.3			28.5	28.5	28.5
Actuated g/C Ratio	0.20			0.61	0.61	0.61
Clearance Time (s)	4.5			4.5	4.5	4.5
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	639			1979	1102	936
v/s Ratio Prot	c0.08					
v/s Ratio Perm				c0.42	0.19	0.31
v/c Ratio	0.42			0.69	0.32	0.51
Uniform Delay, d1	16.4			6.2	4.4	5.2
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	0.4			1.1	0.2	0.4
Delay (s)	16.8			7.2	4.6	5.6
Level of Service	B			A	A	A
Approach Delay (s)	16.8			7.2	5.3	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	46.8	Sum of lost time (s)	13.0
Intersection Capacity Utilization	86.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	10	65	1390	65	5	1020
Future Volume (vph)	10	65	1390	65	5	1020
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.883		0.994			
Flt Protected	0.993					
Satd. Flow (prot)	1587	0	1799	0	0	1810
Flt Permitted	0.993					
Satd. Flow (perm)	1587	0	1799	0	0	1810
Link Speed (mph)	30		30			30
Link Distance (ft)	607		3519			1081
Travel Time (s)	13.8		80.0			24.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	71	1511	71	5	1109
Shared Lane Traffic (%)						
Lane Group Flow (vph)	82	0	1582	0	0	1114
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 88.3%		ICU Level of Service E	
Analysis Period (min) 15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	10	65	1390	65	5	1020
Future Volume (Veh/h)	10	65	1390	65	5	1020
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	71	1511	71	5	1109
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	2666	1546			1582	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2666	1546			1582	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	54	49			99	
cM capacity (veh/h)	24	138			407	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	82	1582	1114
Volume Left	11	0	5
Volume Right	71	71	0
cSH	84	1700	407
Volume to Capacity	0.97	0.93	0.01
Queue Length 95th (ft)	135	0	1
Control Delay (s)	178.4	0.0	0.6
Lane LOS	F		A
Approach Delay (s)	178.4	0.0	0.6
Approach LOS	F		

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	88.3%	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												
Traffic Volume (vph)	125	175	20	60	200	55	20	105	240	35	60	100
Future Volume (vph)	125	175	20	60	200	55	20	105	240	35	60	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.991			0.976			0.911			0.931	
Flt Protected		0.981			0.991			0.997			0.991	
Satd. Flow (prot)	0	1759	0	0	1750	0	0	1644	0	0	1670	0
Flt Permitted		0.981			0.991			0.997			0.991	
Satd. Flow (perm)	0	1759	0	0	1750	0	0	1644	0	0	1670	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		649			646			758			537	
Travel Time (s)		14.8			14.7			17.2			12.2	
Confl. Peds. (#/hr)										55		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	190	22	65	217	60	22	114	261	38	65	109
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	348	0	0	342	0	0	397	0	0	212	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 62.3%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	175	20	60	200	55	20	105	240	35	60	100
Future Volume (Veh/h)	125	175	20	60	200	55	20	105	240	35	60	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	136	190	22	65	217	60	22	114	261	38	65	109
Pedestrians					55							
Lane Width (ft)					12.0							
Walking Speed (ft/s)					4.0							
Percent Blockage					5							
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	277			212			992	880	256	1223	861	247
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	277			212			992	880	256	1223	861	247
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	89			95			84	53	65	29	74	86
cM capacity (veh/h)	1269			1341			135	240	740	53	246	784

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	348	342	397	212
Volume Left	136	65	22	38
Volume Right	22	60	261	109
cSH	1269	1341	401	190
Volume to Capacity	0.11	0.05	0.99	1.11
Queue Length 95th (ft)	9	4	299	260
Control Delay (s)	3.8	1.9	75.0	150.6
Lane LOS	A	A	F	F
Approach Delay (s)	3.8	1.9	75.0	150.6
Approach LOS			F	F

Intersection Summary				
Average Delay	49.0			
Intersection Capacity Utilization	62.3%	ICU Level of Service	B	
Analysis Period (min)	15			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	335	0	740	1730	45	0	0	0	45	60	20
Future Volume (vph)	40	335	0	740	1730	45	0	0	0	45	60	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.996						0.978	
Flt Protected	0.950			0.950							0.982	
Satd. Flow (prot)	1719	3438	0	1719	3424	0	0	0	0	0	1738	0
Flt Permitted	0.950			0.950							0.982	
Satd. Flow (perm)	1719	3438	0	1719	3424	0	0	0	0	0	1738	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					5						8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		702			714			283			411	
Travel Time (s)		16.0			16.2			6.4			9.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	364	0	804	1880	49	0	0	0	49	65	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	43	364	0	804	1929	0	0	0	0	0	136	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2					1	2	
Detector Template	Left	Thru		Left	Thru					Left	Thru	
Leading Detector (ft)	20	100		20	100					20	100	
Trailing Detector (ft)	0	0		0	0					0	0	
Detector 1 Position(ft)	0	0		0	0					0	0	
Detector 1 Size(ft)	20	6		20	6					20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex					Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0					0.0	0.0	
Detector 2 Position(ft)		94			94						94	
Detector 2 Size(ft)		6			6						6	
Detector 2 Type		Cl+Ex			Cl+Ex						Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0						0.0	
Turn Type	Prot	NA		Prot	NA					Perm	NA	
Protected Phases	1	6		5	2						4	
Permitted Phases										4		
Detector Phase	1	6		5	2					4	4	
Switch Phase												
Minimum Initial (s)	4.0	10.0		10.0	10.0					10.0	10.0	

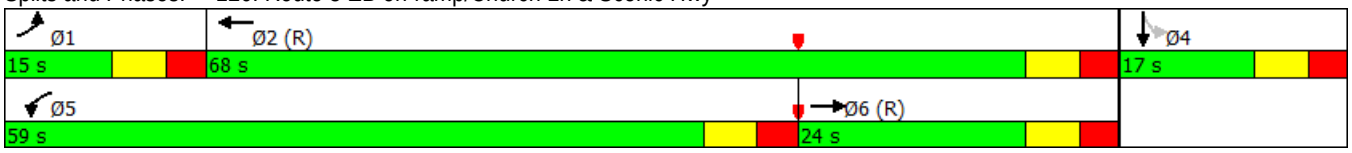
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	11.0	17.0		17.0	17.0					17.0	17.0	
Total Split (s)	15.0	24.0		59.0	68.0					17.0	17.0	
Total Split (%)	15.0%	24.0%		59.0%	68.0%					17.0%	17.0%	
Maximum Green (s)	8.0	17.0		52.0	61.0					10.0	10.0	
Yellow Time (s)	4.0	4.0		4.0	4.0					4.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0					3.0	3.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0						0.0	
Total Lost Time (s)	7.0	7.0		7.0	7.0						7.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	2.0	2.0		2.0	2.0					2.0	2.0	
Recall Mode	None	C-Max		None	C-Max					None	None	
Act Effct Green (s)	6.6	19.1		49.9	67.2						10.0	
Actuated g/C Ratio	0.07	0.19		0.50	0.67						0.10	
v/c Ratio	0.38	0.55		0.94	0.84						0.75	
Control Delay	53.9	41.1		43.3	18.5						67.2	
Queue Delay	0.0	0.0		0.0	0.0						0.0	
Total Delay	53.9	41.1		43.3	18.5						67.2	
LOS	D	D		D	B						E	
Approach Delay		42.4			25.8						67.2	
Approach LOS		D			C						E	
90th %ile Green (s)	8.0	17.0		52.0	61.0					10.0	10.0	
90th %ile Term Code	Max	Coord		Max	Coord					Max	Max	
70th %ile Green (s)	8.0	17.0		52.0	61.0					10.0	10.0	
70th %ile Term Code	Max	Coord		Max	Coord					Max	Max	
50th %ile Green (s)	6.9	17.0		52.0	62.1					10.0	10.0	
50th %ile Term Code	Gap	Coord		Max	Coord					Max	Max	
30th %ile Green (s)	0.0	19.1		49.9	76.0					10.0	10.0	
30th %ile Term Code	Skip	Coord		Gap	Coord					Max	Max	
10th %ile Green (s)	0.0	25.5		43.5	76.0					10.0	10.0	
10th %ile Term Code	Skip	Coord		Gap	Coord					Max	Max	
Stops (vph)	39	298		634	1248						107	
Fuel Used(gal)	1	6		14	23						3	
CO Emissions (g/hr)	61	439		988	1640						189	
NOx Emissions (g/hr)	12	85		192	319						37	
VOC Emissions (g/hr)	14	102		229	380						44	
Dilemma Vehicles (#)	0	0		0	0						0	
Queue Length 50th (ft)	27	114		441	514						81	
Queue Length 95th (ft)	61	163		#706	#710						#177	
Internal Link Dist (ft)		622			634			203			331	
Turn Bay Length (ft)												
Base Capacity (vph)	137	657		893	2303						181	
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	0.31	0.55		0.90	0.84						0.75	

Intersection Summary	
Area Type:	Other
Cycle Length: 100	

Actuated Cycle Length: 100	
Offset: 75 (75%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 29.6	Intersection LOS: C
Intersection Capacity Utilization 78.4%	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.

Splits and Phases: 126: Route 3 EB on-ramp/Church Ln & Scenic Hwy



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	335	0	740	1730	45	0	0	0	45	60	20
Future Volume (vph)	40	335	0	740	1730	45	0	0	0	45	60	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0						7.0	
Lane Util. Factor	1.00	0.95		1.00	0.95						1.00	
Frt	1.00	1.00		1.00	1.00						0.98	
Flt Protected	0.95	1.00		0.95	1.00						0.98	
Satd. Flow (prot)	1719	3438		1719	3425						1739	
Flt Permitted	0.95	1.00		0.95	1.00						0.98	
Satd. Flow (perm)	1719	3438		1719	3425						1739	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	364	0	804	1880	49	0	0	0	49	65	22
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	0	0	7	0
Lane Group Flow (vph)	43	364	0	804	1927	0	0	0	0	0	129	0
Turn Type	Prot	NA		Prot	NA					Perm	NA	
Protected Phases	1	6		5	2						4	
Permitted Phases										4		
Actuated Green, G (s)	4.6	19.1		49.9	64.4						10.0	
Effective Green, g (s)	4.6	19.1		49.9	64.4						10.0	
Actuated g/C Ratio	0.05	0.19		0.50	0.64						0.10	
Clearance Time (s)	7.0	7.0		7.0	7.0						7.0	
Vehicle Extension (s)	2.0	2.0		2.0	2.0						2.0	
Lane Grp Cap (vph)	79	656		857	2205						173	
v/s Ratio Prot	0.03	0.11		c0.47	c0.56							
v/s Ratio Perm											0.07	
v/c Ratio	0.54	0.55		0.94	0.87						0.74	
Uniform Delay, d1	46.7	36.6		23.6	14.5						43.8	
Progression Factor	1.00	1.00		1.00	1.00						1.00	
Incremental Delay, d2	4.1	3.4		17.2	5.2						14.0	
Delay (s)	50.7	40.0		40.8	19.7						57.8	
Level of Service	D	D		D	B						E	
Approach Delay (s)		41.1			25.9			0.0			57.8	
Approach LOS		D			C			A			E	

Intersection Summary			
HCM 2000 Control Delay	29.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		

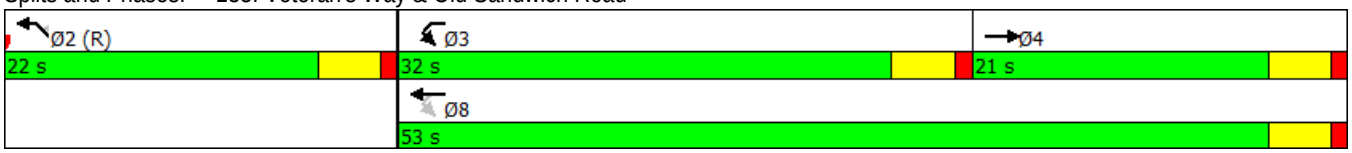
c Critical Lane Group

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	320	10	600	140	25	25
Future Volume (vph)	320	10	600	140	25	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	500		0	0
Storage Lanes		0	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.996					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1802	0	1719	1810	1719	1538
Flt Permitted			0.222		0.950	
Satd. Flow (perm)	1802	0	402	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	2					27
Link Speed (mph)	30			30	30	
Link Distance (ft)	612			1745	701	
Travel Time (s)	13.9			39.7	15.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	348	11	652	152	27	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	359	0	652	152	27	27
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	100		20	100	20	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	6		20	6	20	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	20.0		9.5	20.0	20.0	20.0
Total Split (s)	21.0		32.0	53.0	22.0	22.0
Total Split (%)	28.0%		42.7%	70.7%	29.3%	29.3%
Maximum Green (s)	16.5		27.5	48.5	17.5	17.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		Min	Min	C-Min	C-Min
Act Effct Green (s)	19.0		53.2	53.2	12.8	12.8
Actuated g/C Ratio	0.25		0.71	0.71	0.17	0.17
v/c Ratio	0.79		0.81	0.12	0.09	0.10
Control Delay	40.8		19.3	3.0	30.8	13.6
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	40.8		19.3	3.0	30.8	13.6
LOS	D		B	A	C	B
Approach Delay	40.8			16.2	22.2	
Approach LOS	D			B	C	
90th %ile Green (s)	16.5		36.5	57.5	8.5	8.5
90th %ile Term Code	Max		Max	Hold	Coord	Coord
70th %ile Green (s)	21.8		32.3	58.6	7.4	7.4
70th %ile Term Code	Max		Gap	Hold	Coord	Coord
50th %ile Green (s)	21.6		29.4	55.5	10.5	10.5
50th %ile Term Code	Gap		Gap	Hold	Coord	Coord
30th %ile Green (s)	19.4		27.5	51.4	14.6	14.6
30th %ile Term Code	Gap		Gap	Hold	Coord	Coord
10th %ile Green (s)	15.5		23.1	43.1	22.9	22.9
10th %ile Term Code	Gap		Gap	Hold	Coord	Coord
Stops (vph)	270		367	33	25	10
Fuel Used(gal)	6		13	2	0	0
CO Emissions (g/hr)	406		877	152	30	18
NOx Emissions (g/hr)	79		171	30	6	4
VOC Emissions (g/hr)	94		203	35	7	4
Dilemma Vehicles (#)	0		0	0	0	0
Queue Length 50th (ft)	147		172	16	11	0
Queue Length 95th (ft)	#317		263	25	34	22
Internal Link Dist (ft)	532			1665	621	
Turn Bay Length (ft)			500			
Base Capacity (vph)	462		823	1310	426	401
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	0.78		0.79	0.12	0.06	0.07

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 75			
Offset: 0 (0%), Referenced to phase 2:NWL and 6:, Start of Green			
Natural Cycle: 75			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 23.7		Intersection LOS: C	
Intersection Capacity Utilization 66.1%		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: 133: Veteran's Way & Old Sandwich Road



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	320	10	600	140	25	25
Future Volume (vph)	320	10	600	140	25	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	4.5	4.5
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	1802		1719	1810	1719	1538
Flt Permitted	1.00		0.22	1.00	0.95	1.00
Satd. Flow (perm)	1802		402	1810	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	348	11	652	152	27	27
RTOR Reduction (vph)	1	0	0	0	0	22
Lane Group Flow (vph)	358	0	652	152	27	5
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Actuated Green, G (s)	19.0		53.3	53.3	12.7	12.7
Effective Green, g (s)	19.0		53.3	53.3	12.7	12.7
Actuated g/C Ratio	0.25		0.71	0.71	0.17	0.17
Clearance Time (s)	4.5		4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	456		808	1286	291	260
v/s Ratio Prot	0.20		c0.32	0.08	c0.02	
v/s Ratio Perm			c0.25			0.00
v/c Ratio	0.78		0.81	0.12	0.09	0.02
Uniform Delay, d1	26.1		12.3	3.4	26.3	26.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	8.6		5.9	0.0	0.6	0.1
Delay (s)	34.7		18.3	3.5	26.9	26.1
Level of Service	C		B	A	C	C
Approach Delay (s)	34.7			15.5	26.5	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	130	380	830	20	5	305
Future Volume (vph)	130	380	830	20	5	305
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt			0.996		0.867	
Flt Protected		0.987			0.999	
Satd. Flow (prot)	0	3393	3424	0	1567	0
Flt Permitted		0.987			0.999	
Satd. Flow (perm)	0	3393	3424	0	1567	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		163	645		352	
Travel Time (s)		3.7	14.7		8.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	413	902	22	5	332
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	554	924	0	337	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 67.0%		ICU Level of Service C	
Analysis Period (min) 15			

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (veh/h)	130	380	830	20	5	305
Future Volume (Veh/h)	130	380	830	20	5	305
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	141	413	902	22	5	332
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	924				1402	462
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	924				1402	462
tC, single (s)	4.2				6.9	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	80				95	38
cM capacity (veh/h)	717				102	538

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	279	275	601	323	337
Volume Left	141	0	0	0	5
Volume Right	0	0	0	22	332
cSH	717	1700	1700	1700	506
Volume to Capacity	0.20	0.16	0.35	0.19	0.67
Queue Length 95th (ft)	18	0	0	0	121
Control Delay (s)	6.9	0.0	0.0	0.0	25.1
Lane LOS	A				D
Approach Delay (s)	3.5		0.0		25.1
Approach LOS					D

Intersection Summary			
Average Delay	5.7		
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

Lane Group	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (vph)	85	30	65	130	35	75
Future Volume (vph)	85	30	65	130	35	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.964				0.908	
Flt Protected				0.984	0.984	
Satd. Flow (prot)	1744	0	0	1781	1617	0
Flt Permitted				0.984	0.984	
Satd. Flow (perm)	1744	0	0	1781	1617	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1094			1029	1588	
Travel Time (s)	24.9			23.4	36.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	33	71	141	38	82
Shared Lane Traffic (%)						
Lane Group Flow (vph)	125	0	0	212	120	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 30.3%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	85	30	65	130	35	75
Future Volume (Veh/h)	85	30	65	130	35	75
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	92	33	71	141	38	82
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			125		392	108
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			125		392	108
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		93	91
cM capacity (veh/h)			1443		577	937

Direction, Lane #	EB 1	WB 1	NE 1
Volume Total	125	212	120
Volume Left	0	71	38
Volume Right	33	0	82
cSH	1700	1443	782
Volume to Capacity	0.07	0.05	0.15
Queue Length 95th (ft)	0	4	13
Control Delay (s)	0.0	2.8	10.4
Lane LOS		A	B
Approach Delay (s)	0.0	2.8	10.4
Approach LOS			B

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	25	0	135	0	5	10	0	565	45	140	1070	0
Future Volume (vph)	25	0	135	0	5	10	0	565	45	140	1070	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.886			0.907			0.990				
Flt Protected		0.992									0.994	
Satd. Flow (prot)	0	1590	0	0	1641	0	0	1791	0	0	1799	0
Flt Permitted		0.992									0.994	
Satd. Flow (perm)	0	1590	0	0	1641	0	0	1791	0	0	1799	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1029			573			1000			878	
Travel Time (s)		23.4			13.0			22.7			20.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	0	147	0	5	11	0	614	49	152	1163	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	174	0	0	16	0	0	663	0	0	1315	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Stop			Stop			Free			Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	122.9%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (veh/h)	25	0	135	0	5	10	0	565	45	140	1070	0
Future Volume (Veh/h)	25	0	135	0	5	10	0	565	45	140	1070	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	0	147	0	5	11	0	614	49	152	1163	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	2119	2106	638	2106	2081	1163	1163			614		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2119	2106	638	2106	2081	1163	1163			614		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	2	100	69	100	89	95	100			84		
cM capacity (veh/h)	28	42	471	22	44	234	590			951		

Direction, Lane #	EB 1	WB 1	SE 1	NW 1
Volume Total	174	16	663	1315
Volume Left	27	0	0	152
Volume Right	147	11	49	0
cSH	135	99	590	951
Volume to Capacity	1.29	0.16	0.00	0.16
Queue Length 95th (ft)	273	14	0	14
Control Delay (s)	239.0	48.0	0.0	5.4
Lane LOS	F	E		A
Approach Delay (s)	239.0	48.0	0.0	5.4
Approach LOS	F	E		

Intersection Summary				
Average Delay	22.8			
Intersection Capacity Utilization	122.9%	ICU Level of Service	H	
Analysis Period (min)	15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	25	430	220	70	590	15
Future Volume (vph)	25	430	220	70	590	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.967		0.997	
Flt Protected		0.997			0.953	
Satd. Flow (prot)	0	1804	1750	0	1719	0
Flt Permitted		0.997			0.953	
Satd. Flow (perm)	0	1804	1750	0	1719	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		510	234		330	
Travel Time (s)		11.6	5.3		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	467	239	76	641	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	494	315	0	657	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 83.3%		ICU Level of Service E	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	430	220	70	590	15
Future Volume (Veh/h)	25	430	220	70	590	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	467	239	76	641	16
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	315				798	277
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	315				798	277
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				0	98
cM capacity (veh/h)	1228				343	755

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	494	315	657
Volume Left	27	0	641
Volume Right	0	76	16
cSH	1228	1700	348
Volume to Capacity	0.02	0.19	1.89
Queue Length 95th (ft)	2	0	1105
Control Delay (s)	0.7	0.0	436.1
Lane LOS	A		F
Approach Delay (s)	0.7	0.0	436.1
Approach LOS			F

Intersection Summary			
Average Delay	195.7		
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	0	0	1520	0	0	1385
Future Volume (vph)	0	0	1520	0	0	1385
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1810	1810	0	0	1810
Flt Permitted						
Satd. Flow (perm)	0	1810	1810	0	0	1810
Link Speed (mph)	30		30			30
Link Distance (ft)	474		550			219
Travel Time (s)	10.8		12.5			5.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1652	0	0	1505
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1652	0	0	1505
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	0		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 83.3%		ICU Level of Service E	
Analysis Period (min) 15			

Intersection Sign configuration not allowed in HCM analysis.

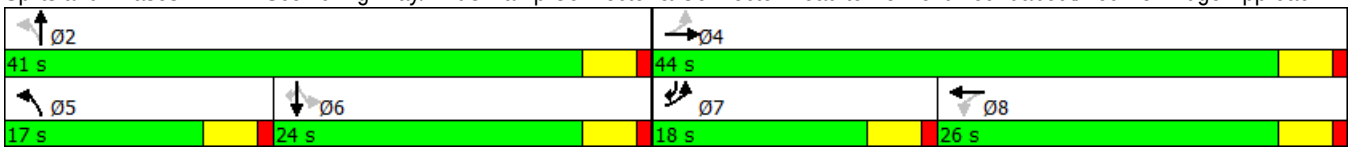
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1805	5	585	5	5	5	1015	100	5	5	775	450
Future Volume (vph)	1805	5	585	5	5	5	1015	100	5	5	775	450
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		150	0		0	0		0	0		100
Storage Lanes	1		0	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00
Frt		0.925			0.955			0.999				0.850
Flt Protected	0.950	0.976			0.984		0.950	0.961				
Satd. Flow (prot)	1633	1552	0	0	1700	0	1633	1650	0	0	3438	1538
Flt Permitted	0.650	0.775			0.620		0.167	0.152			0.951	
Satd. Flow (perm)	1117	1232	0	0	1071	0	287	261	0	0	3270	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		79			5			1				415
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		333			284			282			370	
Travel Time (s)		7.6			6.5			6.4			8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1962	5	636	5	5	5	1103	109	5	5	842	489
Shared Lane Traffic (%)	32%						47%					
Lane Group Flow (vph)	1334	1269	0	0	15	0	585	632	0	0	847	489
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4		8	8		5	2		6	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	9.5
Total Split (s)	18.0	44.0		26.0	26.0		17.0	41.0		24.0	24.0	18.0
Total Split (%)	21.2%	51.8%		30.6%	30.6%		20.0%	48.2%		28.2%	28.2%	21.2%
Maximum Green (s)	13.5	39.5		21.5	21.5		12.5	36.5		19.5	19.5	13.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Lost Time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	None		None	None		Min	Min		Min	Min	Min
Walk Time (s)		7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	39.5	39.5			9.2		36.5	36.5			19.5	58.3
Actuated g/C Ratio	0.46	0.46			0.11		0.43	0.43			0.23	0.69
v/c Ratio	1.83	1.71			0.12		1.82	2.00			1.13	0.41
Control Delay	403.1	345.4			26.5		402.8	481.3			106.9	3.2
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	0.0
Total Delay	403.1	345.4			26.5		402.8	481.3			106.9	3.2
LOS	F	F			C		F	F			F	A
Approach Delay		374.9			26.5			443.6			68.9	
Approach LOS		F			C			F			E	
Queue Length 50th (ft)	~1131	~1040			5		~460	~524			~279	8
Queue Length 95th (ft)	#1484	#1363			19		#672	#741			#395	90
Internal Link Dist (ft)		253			204			202			290	
Turn Bay Length (ft)												100
Base Capacity (vph)	727	743			274		321	316			750	1184
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	1.83	1.71			0.05		1.82	2.00			1.13	0.41

Intersection Summary			
Area Type:	Other		
Cycle Length: 85			
Actuated Cycle Length: 85			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 2.00			
Intersection Signal Delay: 311.0		Intersection LOS: F	
Intersection Capacity Utilization 138.4%		ICU Level of Service H	
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: 117: Scenic Highway/Exit 3 Ramp Connector & Connector Road to Belmont Roundabout/Bourne Bridge Approach



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1805	5	585	5	5	5	1015	100	5	5	775	450
Future Volume (vph)	1805	5	585	5	5	5	1015	100	5	5	775	450
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Lane Util. Factor	0.95	0.95			1.00		0.95	0.95			0.95	1.00
Frt	1.00	0.92			0.95		1.00	1.00			1.00	0.85
Flt Protected	0.95	0.98			0.98		0.95	0.96			1.00	1.00
Satd. Flow (prot)	1633	1551			1700		1633	1649			3437	1538
Flt Permitted	0.65	0.78			0.62		0.17	0.15			0.95	1.00
Satd. Flow (perm)	1118	1233			1072		287	260			3269	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1962	5	636	5	5	5	1103	109	5	5	842	489
RTOR Reduction (vph)	0	41	0	0	5	0	0	1	0	0	0	163
Lane Group Flow (vph)	1334	1228	0	0	10	0	585	631	0	0	847	326
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	43.1	43.1			4.3		36.5	36.5			19.5	53.8
Effective Green, g (s)	43.1	43.1			4.3		36.5	36.5			19.5	53.8
Actuated g/C Ratio	0.49	0.49			0.05		0.41	0.41			0.22	0.61
Clearance Time (s)	4.5	4.5			4.5		4.5	4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	743	722			52		308	303			719	1012
v/s Ratio Prot	c0.69	0.66					0.27	c0.29				0.12
v/s Ratio Perm	c0.18	0.17			0.01		0.52	c0.56			0.26	0.09
v/c Ratio	1.80	1.70			0.20		1.90	2.08			1.18	0.32
Uniform Delay, d1	21.9	22.7			40.5		22.8	26.0			34.5	8.5
Progression Factor	1.00	1.00			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2	363.3	321.6			1.9		416.7	498.9			94.2	0.2
Delay (s)	385.2	344.3			42.3		439.5	525.0			128.7	8.7
Level of Service	F	F			D		F	F			F	A
Approach Delay (s)		365.3			42.3			483.9			84.8	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	319.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.11		
Actuated Cycle Length (s)	88.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	138.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	45	410	190	80	650	15
Future Volume (vph)	45	410	190	80	650	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.960		0.997	
Flt Protected		0.995			0.953	
Satd. Flow (prot)	0	1800	1737	0	1719	0
Flt Permitted		0.995			0.953	
Satd. Flow (perm)	0	1800	1737	0	1719	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		510	234		330	
Travel Time (s)		11.6	5.3		7.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	446	207	87	707	16
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	495	294	0	723	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 85.9%		ICU Level of Service E	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	45	410	190	80	650	15
Future Volume (Veh/h)	45	410	190	80	650	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	49	446	207	87	707	16
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	294				794	250
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	294				794	250
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				0	98
cM capacity (veh/h)	1251				339	781

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	495	294	723
Volume Left	49	0	707
Volume Right	0	87	16
cSH	1251	1700	343
Volume to Capacity	0.04	0.17	2.11
Queue Length 95th (ft)	3	0	1316
Control Delay (s)	1.2	0.0	532.9
Lane LOS	A		F
Approach Delay (s)	1.2	0.0	532.9
Approach LOS			F

Intersection Summary			
Average Delay	255.2		
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		

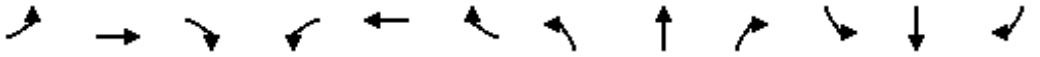
Lane Group	WBL	WBR	NET	NER	SWL	SWT
Lane Configurations						
Traffic Volume (vph)	0	0	1520	0	0	1385
Future Volume (vph)	0	0	1520	0	0	1385
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	1810	1810	0	0	1810
Flt Permitted						
Satd. Flow (perm)	0	1810	1810	0	0	1810
Link Speed (mph)	30		30			30
Link Distance (ft)	474		550			219
Travel Time (s)	10.8		12.5			5.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	1652	0	0	1505
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	1652	0	0	1505
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	0		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 83.3%		ICU Level of Service E	
Analysis Period (min) 15			

Intersection Sign configuration not allowed in HCM analysis.

Previous Screening Analysis

Belmont Circle

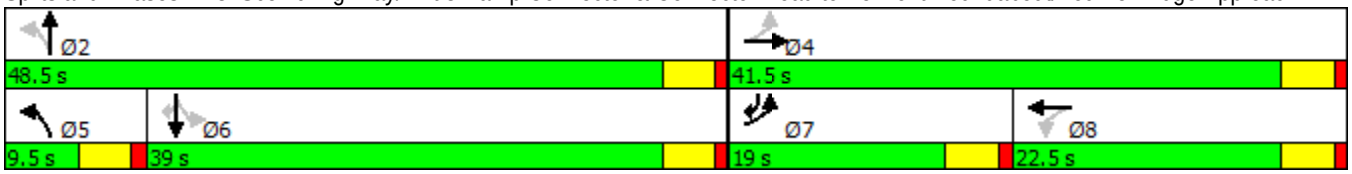


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	10	605	10	10	10	210	710	10	10	400	615
Future Volume (vph)	475	10	605	10	10	10	210	710	10	10	400	615
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	1		0	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	1.00
Frt		0.852			0.955			0.998				0.850
Flt Protected	0.950				0.984			0.989			0.999	
Satd. Flow (prot)	1719	1542	0	0	1700	0	0	3393	0	0	3435	1538
Flt Permitted	0.669				0.645			0.663			0.925	
Satd. Flow (perm)	1211	1542	0	0	1115	0	0	2275	0	0	3180	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		355			11			2				668
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		466			399			232			313	
Travel Time (s)		10.6			9.1			5.3			7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	516	11	658	11	11	11	228	772	11	11	435	668
Shared Lane Traffic (%)												
Lane Group Flow (vph)	516	669	0	0	33	0	0	1011	0	0	446	668
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4		8	8		5	2		6	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	9.5
Total Split (s)	19.0	41.5		22.5	22.5		9.5	48.5		39.0	39.0	19.0
Total Split (%)	21.1%	46.1%		25.0%	25.0%		10.6%	53.9%		43.3%	43.3%	21.1%
Maximum Green (s)	14.5	37.0		18.0	18.0		5.0	44.0		34.5	34.5	14.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	0.0
Total Lost Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	None		None	None		Min	Min		Min	Min	Min
Walk Time (s)		7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	26.8	26.8			10.7			37.0			26.8	48.6
Actuated g/C Ratio	0.36	0.36			0.15			0.50			0.36	0.66
v/c Ratio	0.92	0.85			0.19			0.82			0.38	0.54
Control Delay	47.9	22.1			25.7			22.9			18.8	2.5
Queue Delay	0.0	0.0			0.0			0.0			0.0	0.0
Total Delay	47.9	22.1			25.7			22.9			18.8	2.5
LOS	D	C			C			C			B	A
Approach Delay		33.3			25.7			22.9			9.0	
Approach LOS		C			C			C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 73.5			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 22.0		Intersection LOS: C	
Intersection Capacity Utilization 86.6%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: Scenic Highway/Exit 3 Ramp Connector & Connector Road to Belmont Roundabout/Bourne Bridge Approach



Lane Group	EBL	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	516	669	33	1011	446	668
v/c Ratio	0.92	0.85	0.19	0.82	0.38	0.54
Control Delay	47.9	22.1	25.7	22.9	18.8	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.9	22.1	25.7	22.9	18.8	2.5
Queue Length 50th (ft)	~242	155	10	165	77	0
Queue Length 95th (ft)	#463	#322	36	#290	133	42
Internal Link Dist (ft)		386	319	152	233	
Turn Bay Length (ft)						100
Base Capacity (vph)	558	996	301	1544	1602	1243
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	0.92	0.67	0.11	0.65	0.28	0.54

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	10	605	10	10	10	210	710	10	10	400	615
Future Volume (vph)	475	10	605	10	10	10	210	710	10	10	400	615
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	1.00
Frt	1.00	0.85			0.95			1.00			1.00	0.85
Flt Protected	0.95	1.00			0.98			0.99			1.00	1.00
Satd. Flow (prot)	1719	1543			1700			3394			3434	1538
Flt Permitted	0.67	1.00			0.65			0.66			0.93	1.00
Satd. Flow (perm)	1210	1543			1115			2277			3181	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	516	11	658	11	11	11	228	772	11	11	435	668
RTOR Reduction (vph)	0	218	0	0	10	0	0	1	0	0	0	275
Lane Group Flow (vph)	516	451	0	0	23	0	0	1010	0	0	446	393
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	29.0	29.0			7.5			37.0			27.1	44.1
Effective Green, g (s)	29.0	29.0			7.5			37.0			27.1	44.1
Actuated g/C Ratio	0.39	0.39			0.10			0.49			0.36	0.59
Clearance Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	583	596			111			1203			1149	996
v/s Ratio Prot	c0.20	0.29						c0.06				0.09
v/s Ratio Perm	c0.14				0.02			c0.35			0.14	0.17
v/c Ratio	0.89	0.76			0.21			0.84			0.39	0.39
Uniform Delay, d1	20.8	19.9			31.0			16.4			17.8	8.3
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	14.9	5.5			0.9			5.3			0.2	0.3
Delay (s)	35.8	25.4			32.0			21.7			18.0	8.5
Level of Service	D	C			C			C			B	A
Approach Delay (s)		29.9			32.0			21.7			12.3	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	86.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	475	10	605	10	10	10	210	710	10	10	400	615
Future Volume (veh/h)	475	10	605	10	10	10	210	710	10	10	400	615
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1900	1900	1810	1900	1900	1810	1900	1900	1810	1810
Adj Flow Rate, veh/h	516	11	0	11	11	11	228	772	11	11	435	668
Adj No. of Lanes	1	1	0	0	1	0	0	2	0	0	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	537	531	0	84	22	21	84	967	15	68	1930	1200
Arrive On Green	0.19	0.29	0.00	0.04	0.04	0.04	0.59	0.59	0.59	0.59	0.59	0.59
Sat Flow, veh/h	1723	1810	0	492	544	518	3	1649	26	31	3290	1538
Grp Volume(v), veh/h	516	11	0	33	0	0	315	0	696	236	210	668
Grp Sat Flow(s),veh/h/ln	1723	1810	0	1554	0	0	35	0	1642	1757	1564	1538
Q Serve(g_s), s	14.5	0.3	0.0	1.4	0.0	0.0	73.3	0.0	22.8	0.0	4.8	12.7
Cycle Q Clear(g_c), s	14.5	0.3	0.0	1.6	0.0	0.0	73.3	0.0	22.8	4.7	4.8	12.7
Prop In Lane	1.00		0.00	0.33		0.33	0.72		0.02	0.05		1.00
Lane Grp Cap(c), veh/h	537	531	0	126	0	0	0	0	964	1081	918	1200
V/C Ratio(X)	0.96	0.02	0.00	0.26	0.00	0.00	0.00	0.00	0.72	0.22	0.23	0.56
Avail Cap(c_a), veh/h	537	893	0	436	0	0	0	0	964	1081	918	1200
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.0	18.8	0.0	35.3	0.0	0.0	0.0	0.0	11.1	7.4	7.4	3.2
Incr Delay (d2), s/veh	29.2	0.0	0.0	1.1	0.0	0.0	0.0	0.0	2.7	0.1	0.1	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	0.2	0.0	0.7	0.0	0.0	0.0	0.0	11.0	2.3	2.1	5.3
LnGrp Delay(d),s/veh	58.3	18.9	0.0	36.4	0.0	0.0	0.0	0.0	13.8	7.5	7.5	3.8
LnGrp LOS	E	B		D					B	A	A	A
Approach Vol, veh/h		527			33			1011			1114	
Approach Delay, s/veh		57.4			36.4			9.5			5.3	
Approach LOS		E			D			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6	7	8
Phs Duration (G+Y+Rc), s		48.5		26.5		48.5	19.0	7.5
Change Period (Y+Rc), s		4.5		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		44.0		37.0		34.5	14.5	18.0
Max Q Clear Time (g_c+I1), s		75.3		2.3		14.7	16.5	3.6
Green Ext Time (p_c), s		0.0		0.2		14.2	0.0	0.1

Intersection Summary	
HCM 2010 Ctrl Delay	17.5
HCM 2010 LOS	B

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	440	110	420	415	235	650
Future Volume (vph)	440	110	420	415	235	650
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1810	1538	1719	1810	1719	1538
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1810	1538	1719	1810	1719	1538
Link Speed (mph)	30			30	30	
Link Distance (ft)	236			466	240	
Travel Time (s)	5.4			10.6	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	478	120	457	451	255	707
Shared Lane Traffic (%)						
Lane Group Flow (vph)	478	120	457	451	255	707
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 70.1%		ICU Level of Service C	
Analysis Period (min) 15			



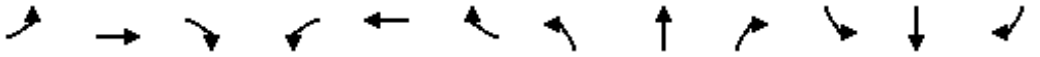
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Right Turn Channelized						
Traffic Volume (veh/h)	440	110	420	415	235	650
Future Volume (veh/h)	440	110	420	415	235	650
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	478	120	457	451	255	707
Approach Volume (veh/h)	598			908	962	
Crossing Volume (veh/h)	457			255	478	
High Capacity (veh/h)	966			1134	950	
High v/c (veh/h)	0.62			0.80	1.01	
Low Capacity (veh/h)	783			934	769	
Low v/c (veh/h)	0.76			0.97	1.25	

Intersection Summary			
Maximum v/c High	1.01		
Maximum v/c Low	1.25		
Intersection Capacity Utilization	70.1%	ICU Level of Service	C

Intersection	
Intersection Delay, s/veh	20.2
Intersection LOS	C

Approach	EB	WB	NB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	598	908	962
Demand Flow Rate, veh/h	628	954	1010
Vehicles Circulating, veh/h	480	268	502
Vehicles Exiting, veh/h	742	1244	606
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	14.1	10.8	32.9
Approach LOS	B	B	D

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	L	TR	L	TR
Assumed Moves	LT	R	L	TR	L	TR
RT Channelized						
Lane Util	0.799	0.201	0.503	0.497	0.265	0.735
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	502	126	480	474	268	742
Cap Entry Lane, veh/h	788	807	924	937	775	795
Entry HV Adj Factor	0.952	0.952	0.952	0.952	0.951	0.953
Flow Entry, veh/h	478	120	457	451	255	707
Cap Entry, veh/h	751	769	880	892	738	758
V/C Ratio	0.637	0.156	0.519	0.506	0.346	0.933
Control Delay, s/veh	16.0	6.3	11.0	10.6	9.2	41.5
LOS	C	A	B	B	A	E
95th %tile Queue, veh	5	1	3	3	2	13

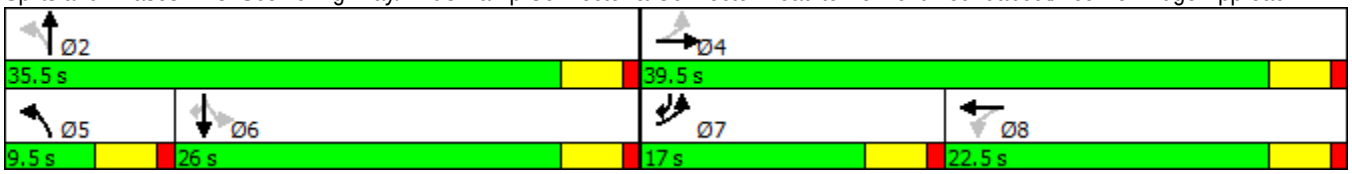


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	10	605	10	10	10	210	710	10	10	0	615
Future Volume (vph)	475	10	605	10	10	10	210	710	10	10	0	615
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	1		0	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	1.00
Frt		0.852			0.955			0.998				0.850
Flt Protected	0.950				0.984			0.989			0.950	
Satd. Flow (prot)	1719	1542	0	0	1700	0	0	3393	0	0	3266	1538
Flt Permitted	0.622							0.778			0.283	
Satd. Flow (perm)	1126	1542	0	0	1728	0	0	2669	0	0	973	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		658			11			2				668
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		466			399			232			313	
Travel Time (s)		10.6			9.1			5.3			7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	516	11	658	11	11	11	228	772	11	11	0	668
Shared Lane Traffic (%)												
Lane Group Flow (vph)	516	669	0	0	33	0	0	1011	0	0	11	668
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4		8	8		5	2		6	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	9.5
Total Split (s)	17.0	39.5		22.5	22.5		9.5	35.5		26.0	26.0	17.0
Total Split (%)	22.7%	52.7%		30.0%	30.0%		12.7%	47.3%		34.7%	34.7%	22.7%
Maximum Green (s)	12.5	35.0		18.0	18.0		5.0	31.0		21.5	21.5	12.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	0.0
Total Lost Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	None		None	None		Min	Min		Min	Min	Min
Walk Time (s)		7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	17.1	17.1			6.7			25.5			15.5	33.3
Actuated g/C Ratio	0.33	0.33			0.13			0.49			0.30	0.64
v/c Ratio	0.99	0.71			0.14			0.73			0.04	0.55
Control Delay	60.1	6.3			20.6			14.8			14.8	2.5
Queue Delay	0.0	0.0			0.0			0.0			0.0	0.0
Total Delay	60.1	6.3			20.6			14.8			14.8	2.5
LOS	E	A			C			B			B	A
Approach Delay		29.7			20.6			14.8			2.7	
Approach LOS		C			C			B			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 52			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.99			
Intersection Signal Delay: 18.1		Intersection LOS: B	
Intersection Capacity Utilization 79.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Scenic Highway/Exit 3 Ramp Connector & Connector Road to Belmont Roundabout/Bourne Bridge Approach

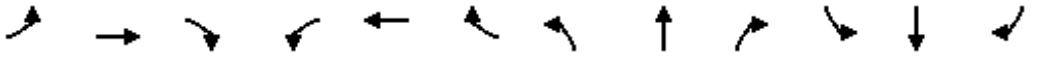


Lane Group	EBL	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	516	669	33	1011	11	668
v/c Ratio	0.99	0.71	0.14	0.73	0.04	0.55
Control Delay	60.1	6.3	20.6	14.8	14.8	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.1	6.3	20.6	14.8	14.8	2.5
Queue Length 50th (ft)	~173	2	5	81	1	0
Queue Length 95th (ft)	#374	63	31	210	6	37
Internal Link Dist (ft)		386	319	152	233	
Turn Bay Length (ft)						100
Base Capacity (vph)	519	1280	632	1738	420	1225
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	0.99	0.52	0.05	0.58	0.03	0.55

Intersection Summary

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

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	10	605	10	10	10	210	710	10	10	0	615
Future Volume (vph)	475	10	605	10	10	10	210	710	10	10	0	615
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	1.00
Frt	1.00	0.85			0.95			1.00			1.00	0.85
Flt Protected	0.95	1.00			0.98			0.99			0.95	1.00
Satd. Flow (prot)	1719	1543			1700			3394			3266	1538
Flt Permitted	0.62	1.00			1.00			0.78			0.28	1.00
Satd. Flow (perm)	1126	1543			1728			2672			975	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	516	11	658	11	11	11	228	772	11	11	0	668
RTOR Reduction (vph)	0	415	0	0	10	0	0	1	0	0	0	315
Lane Group Flow (vph)	516	254	0	0	23	0	0	1010	0	0	11	353
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	20.2	20.2			2.6			25.5			15.8	28.9
Effective Green, g (s)	20.2	20.2			2.6			25.5			15.8	28.9
Actuated g/C Ratio	0.37	0.37			0.05			0.47			0.29	0.53
Clearance Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	557	569			82			1314			281	939
v/s Ratio Prot	c0.22	0.16						c0.07				0.09
v/s Ratio Perm	c0.12				0.01			c0.29			0.01	0.14
v/c Ratio	0.93	0.45			0.27			0.77			0.04	0.38
Uniform Delay, d1	16.0	13.0			25.1			12.1			14.0	7.6
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	21.5	0.6			1.8			2.8			0.1	0.3
Delay (s)	37.5	13.6			27.0			14.9			14.0	7.8
Level of Service	D	B			C			B			B	A
Approach Delay (s)		24.0			27.0			14.9			7.9	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	54.7	Sum of lost time (s)	18.0
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	475	10	605	10	10	10	210	710	10	10	0	615
Future Volume (veh/h)	475	10	605	10	10	10	210	710	10	10	0	615
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1900	1900	1810	1900	1900	1810	1900	1900	1810	1810
Adj Flow Rate, veh/h	516	11	0	11	11	11	228	772	11	11	0	668
Adj No. of Lanes	1	1	0	0	1	0	0	2	0	0	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	606	595	0	103	22	22	95	875	16	286	814	1123
Arrive On Green	0.21	0.33	0.00	0.04	0.04	0.04	0.52	0.52	0.52	0.52	0.00	0.52
Sat Flow, veh/h	1723	1810	0	516	516	516	3	1681	30	317	1564	1538
Grp Volume(v), veh/h	516	11	0	33	0	0	415	0	596	11	0	668
Grp Sat Flow(s),veh/h/ln	1723	1810	0	1547	0	0	73	0	1642	317	1564	1538
Q Serve(g_s), s	12.5	0.2	0.0	1.2	0.0	0.0	37.5	0.0	16.3	0.8	0.0	12.3
Cycle Q Clear(g_c), s	12.5	0.2	0.0	1.2	0.0	0.0	37.5	0.0	16.3	17.1	0.0	12.3
Prop In Lane	1.00		0.00	0.33		0.33	0.55		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	606	595	0	148	0	0	0	0	854	286	814	1123
V/C Ratio(X)	0.85	0.02	0.00	0.22	0.00	0.00	0.00	0.00	0.70	0.04	0.00	0.59
Avail Cap(c_a), veh/h	606	1063	0	548	0	0	0	0	854	286	814	1123
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.6	13.5	0.0	27.9	0.0	0.0	0.0	0.0	10.8	17.2	0.0	3.8
Incr Delay (d2), s/veh	11.1	0.0	0.0	0.8	0.0	0.0	0.0	0.0	2.5	0.1	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.1	0.0	0.6	0.0	0.0	0.0	0.0	7.9	0.1	0.0	5.3
LnGrp Delay(d),s/veh	32.7	13.5	0.0	28.6	0.0	0.0	0.0	0.0	13.3	17.2	0.0	4.7
LnGrp LOS	C	B		C					B	B		A
Approach Vol, veh/h		527			33			1011			679	
Approach Delay, s/veh		32.3			28.6			7.8			4.9	
Approach LOS		C			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6	7	8
Phs Duration (G+Y+Rc), s		35.5		24.1		35.5	17.0	7.1
Change Period (Y+Rc), s		4.5		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		31.0		35.0		21.5	12.5	18.0
Max Q Clear Time (g_c+I1), s		39.5		2.2		19.1	14.5	3.2
Green Ext Time (p_c), s		0.0		0.2		2.0	0.0	0.1

Intersection Summary	
HCM 2010 Ctrl Delay	13.0
HCM 2010 LOS	B

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	440	110	420	415	235	650
Future Volume (vph)	440	110	420	415	235	650
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1810	1538	1719	1810	1719	1538
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1810	1538	1719	1810	1719	1538
Link Speed (mph)	30			30	30	
Link Distance (ft)	236			466	240	
Travel Time (s)	5.4			10.6	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	478	120	457	451	255	707
Shared Lane Traffic (%)						
Lane Group Flow (vph)	478	120	457	451	255	707
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 70.1%		ICU Level of Service C	
Analysis Period (min) 15			



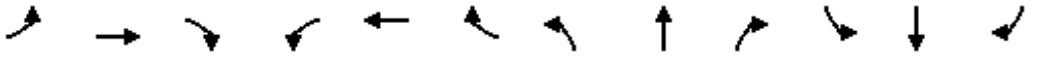
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Right Turn Channelized						
Traffic Volume (veh/h)	440	110	420	415	235	650
Future Volume (veh/h)	440	110	420	415	235	650
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	478	120	457	451	255	707
Approach Volume (veh/h)	598			908	962	
Crossing Volume (veh/h)	457			255	478	
High Capacity (veh/h)	966			1134	950	
High v/c (veh/h)	0.62			0.80	1.01	
Low Capacity (veh/h)	783			934	769	
Low v/c (veh/h)	0.76			0.97	1.25	

Intersection Summary			
Maximum v/c High	1.01		
Maximum v/c Low	1.25		
Intersection Capacity Utilization	70.1%	ICU Level of Service	C

Intersection	
Intersection Delay, s/veh	20.2
Intersection LOS	C

Approach	EB	WB	NB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	598	908	962
Demand Flow Rate, veh/h	628	954	1010
Vehicles Circulating, veh/h	480	268	502
Vehicles Exiting, veh/h	742	1244	606
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	14.1	10.8	32.9
Approach LOS	B	B	D

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	L	TR	L	TR
Assumed Moves	LT	R	L	TR	L	TR
RT Channelized						
Lane Util	0.799	0.201	0.503	0.497	0.265	0.735
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	502	126	480	474	268	742
Cap Entry Lane, veh/h	788	807	924	937	775	795
Entry HV Adj Factor	0.952	0.952	0.952	0.952	0.951	0.953
Flow Entry, veh/h	478	120	457	451	255	707
Cap Entry, veh/h	751	769	880	892	738	758
V/C Ratio	0.637	0.156	0.519	0.506	0.346	0.933
Control Delay, s/veh	16.0	6.3	11.0	10.6	9.2	41.5
LOS	C	A	B	B	A	E
95th %tile Queue, veh	5	1	3	3	2	13

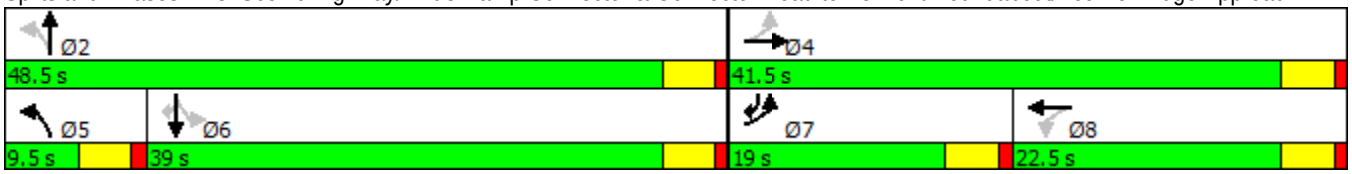


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	10	605	10	10	10	210	710	10	10	400	615
Future Volume (vph)	475	10	605	10	10	10	210	710	10	10	400	615
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	1		0	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	1.00
Frt		0.852			0.955			0.998				0.850
Flt Protected	0.950				0.984			0.989			0.999	
Satd. Flow (prot)	1719	1542	0	0	1700	0	0	3393	0	0	3435	1538
Flt Permitted	0.669				0.645			0.663			0.925	
Satd. Flow (perm)	1211	1542	0	0	1115	0	0	2275	0	0	3180	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		355			11			2				668
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		466			399			232			313	
Travel Time (s)		10.6			9.1			5.3			7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	516	11	658	11	11	11	228	772	11	11	435	668
Shared Lane Traffic (%)												
Lane Group Flow (vph)	516	669	0	0	33	0	0	1011	0	0	446	668
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4		8	8		5	2		6	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	9.5
Total Split (s)	19.0	41.5		22.5	22.5		9.5	48.5		39.0	39.0	19.0
Total Split (%)	21.1%	46.1%		25.0%	25.0%		10.6%	53.9%		43.3%	43.3%	21.1%
Maximum Green (s)	14.5	37.0		18.0	18.0		5.0	44.0		34.5	34.5	14.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	0.0
Total Lost Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	None		None	None		Min	Min		Min	Min	Min
Walk Time (s)		7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	26.8	26.8			10.7			37.0			26.8	48.6
Actuated g/C Ratio	0.36	0.36			0.15			0.50			0.36	0.66
v/c Ratio	0.92	0.85			0.19			0.82			0.38	0.54
Control Delay	47.9	22.1			25.7			22.9			18.8	2.5
Queue Delay	0.0	0.0			0.0			0.0			0.0	0.0
Total Delay	47.9	22.1			25.7			22.9			18.8	2.5
LOS	D	C			C			C			B	A
Approach Delay		33.3			25.7			22.9			9.0	
Approach LOS		C			C			C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 73.5			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 22.0		Intersection LOS: C	
Intersection Capacity Utilization 86.6%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: Scenic Highway/Exit 3 Ramp Connector & Connector Road to Belmont Roundabout/Bourne Bridge Approach

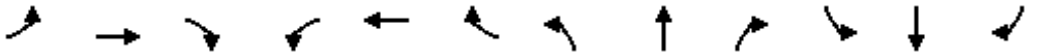


Lane Group	EBL	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	516	669	33	1011	446	668
v/c Ratio	0.92	0.85	0.19	0.82	0.38	0.54
Control Delay	47.9	22.1	25.7	22.9	18.8	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.9	22.1	25.7	22.9	18.8	2.5
Queue Length 50th (ft)	~242	155	10	165	77	0
Queue Length 95th (ft)	#463	#322	36	#290	133	42
Internal Link Dist (ft)		386	319	152	233	
Turn Bay Length (ft)						100
Base Capacity (vph)	558	996	301	1544	1602	1243
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	0.92	0.67	0.11	0.65	0.28	0.54

Intersection Summary

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

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



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	10	605	10	10	10	210	710	10	10	400	615
Future Volume (vph)	475	10	605	10	10	10	210	710	10	10	400	615
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	1.00
Frt	1.00	0.85			0.95			1.00			1.00	0.85
Flt Protected	0.95	1.00			0.98			0.99			1.00	1.00
Satd. Flow (prot)	1719	1543			1700			3394			3434	1538
Flt Permitted	0.67	1.00			0.65			0.66			0.93	1.00
Satd. Flow (perm)	1210	1543			1115			2277			3181	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	516	11	658	11	11	11	228	772	11	11	435	668
RTOR Reduction (vph)	0	218	0	0	10	0	0	1	0	0	0	275
Lane Group Flow (vph)	516	451	0	0	23	0	0	1010	0	0	446	393
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	29.0	29.0			7.5			37.0			27.1	44.1
Effective Green, g (s)	29.0	29.0			7.5			37.0			27.1	44.1
Actuated g/C Ratio	0.39	0.39			0.10			0.49			0.36	0.59
Clearance Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	583	596			111			1203			1149	996
v/s Ratio Prot	c0.20	0.29						c0.06				0.09
v/s Ratio Perm	c0.14				0.02			c0.35			0.14	0.17
v/c Ratio	0.89	0.76			0.21			0.84			0.39	0.39
Uniform Delay, d1	20.8	19.9			31.0			16.4			17.8	8.3
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	14.9	5.5			0.9			5.3			0.2	0.3
Delay (s)	35.8	25.4			32.0			21.7			18.0	8.5
Level of Service	D	C			C			C			B	A
Approach Delay (s)		29.9			32.0			21.7			12.3	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	86.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	475	10	605	10	10	10	210	710	10	10	400	615
Future Volume (veh/h)	475	10	605	10	10	10	210	710	10	10	400	615
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1900	1900	1810	1900	1900	1810	1900	1900	1810	1810
Adj Flow Rate, veh/h	516	11	0	11	11	11	228	772	11	11	435	668
Adj No. of Lanes	1	1	0	0	1	0	0	2	0	0	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	537	531	0	84	22	21	84	967	15	68	1930	1200
Arrive On Green	0.19	0.29	0.00	0.04	0.04	0.04	0.59	0.59	0.59	0.59	0.59	0.59
Sat Flow, veh/h	1723	1810	0	492	544	518	3	1649	26	31	3290	1538
Grp Volume(v), veh/h	516	11	0	33	0	0	315	0	696	236	210	668
Grp Sat Flow(s),veh/h/ln	1723	1810	0	1554	0	0	35	0	1642	1757	1564	1538
Q Serve(g_s), s	14.5	0.3	0.0	1.4	0.0	0.0	73.3	0.0	22.8	0.0	4.8	12.7
Cycle Q Clear(g_c), s	14.5	0.3	0.0	1.6	0.0	0.0	73.3	0.0	22.8	4.7	4.8	12.7
Prop In Lane	1.00		0.00	0.33		0.33	0.72		0.02	0.05		1.00
Lane Grp Cap(c), veh/h	537	531	0	126	0	0	0	0	964	1081	918	1200
V/C Ratio(X)	0.96	0.02	0.00	0.26	0.00	0.00	0.00	0.00	0.72	0.22	0.23	0.56
Avail Cap(c_a), veh/h	537	893	0	436	0	0	0	0	964	1081	918	1200
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.0	18.8	0.0	35.3	0.0	0.0	0.0	0.0	11.1	7.4	7.4	3.2
Incr Delay (d2), s/veh	29.2	0.0	0.0	1.1	0.0	0.0	0.0	0.0	2.7	0.1	0.1	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	0.2	0.0	0.7	0.0	0.0	0.0	0.0	11.0	2.3	2.1	5.3
LnGrp Delay(d),s/veh	58.3	18.9	0.0	36.4	0.0	0.0	0.0	0.0	13.8	7.5	7.5	3.8
LnGrp LOS	E	B		D					B	A	A	A
Approach Vol, veh/h		527			33			1011			1114	
Approach Delay, s/veh		57.4			36.4			9.5			5.3	
Approach LOS		E			D			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6	7	8
Phs Duration (G+Y+Rc), s		48.5		26.5		48.5	19.0	7.5
Change Period (Y+Rc), s		4.5		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		44.0		37.0		34.5	14.5	18.0
Max Q Clear Time (g_c+I1), s		75.3		2.3		14.7	16.5	3.6
Green Ext Time (p_c), s		0.0		0.2		14.2	0.0	0.1

Intersection Summary	
HCM 2010 Ctrl Delay	17.5
HCM 2010 LOS	B



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	440	110	420	415	235	650
Future Volume (vph)	440	110	420	415	235	650
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1810	1538	1719	1810	1719	1538
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1810	1538	1719	1810	1719	1538
Link Speed (mph)	30			30	30	
Link Distance (ft)	236			466	240	
Travel Time (s)	5.4			10.6	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	478	120	457	451	255	707
Shared Lane Traffic (%)						
Lane Group Flow (vph)	478	120	457	451	255	707
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 70.1%		ICU Level of Service C	
Analysis Period (min) 15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Right Turn Channelized						
Traffic Volume (veh/h)	440	110	420	415	235	650
Future Volume (veh/h)	440	110	420	415	235	650
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	478	120	457	451	255	707
Approach Volume (veh/h)	598			908	962	
Crossing Volume (veh/h)	457			255	478	
High Capacity (veh/h)	966			1134	950	
High v/c (veh/h)	0.62			0.80	1.01	
Low Capacity (veh/h)	783			934	769	
Low v/c (veh/h)	0.76			0.97	1.25	

Intersection Summary			
Maximum v/c High	1.01		
Maximum v/c Low	1.25		
Intersection Capacity Utilization	70.1%	ICU Level of Service	C

Intersection	
Intersection Delay, s/veh	20.2
Intersection LOS	C

Approach	EB	WB	NB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	598	908	962
Demand Flow Rate, veh/h	628	954	1010
Vehicles Circulating, veh/h	480	268	502
Vehicles Exiting, veh/h	742	1244	606
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	14.1	10.8	32.9
Approach LOS	B	B	D

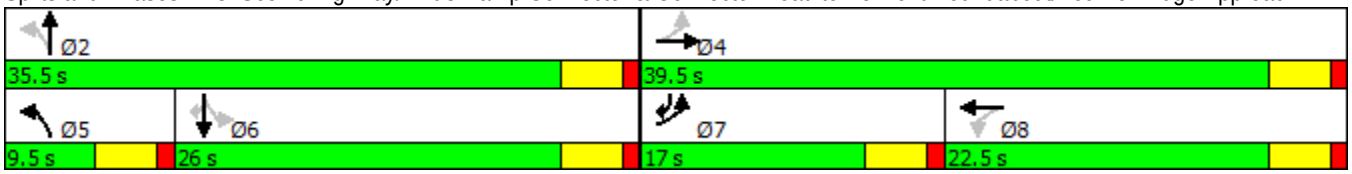
Lane	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	L	TR	L	TR
Assumed Moves	LT	R	L	TR	L	TR
RT Channelized						
Lane Util	0.799	0.201	0.503	0.497	0.265	0.735
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	502	126	480	474	268	742
Cap Entry Lane, veh/h	788	807	924	937	775	795
Entry HV Adj Factor	0.952	0.952	0.952	0.952	0.951	0.953
Flow Entry, veh/h	478	120	457	451	255	707
Cap Entry, veh/h	751	769	880	892	738	758
V/C Ratio	0.637	0.156	0.519	0.506	0.346	0.933
Control Delay, s/veh	16.0	6.3	11.0	10.6	9.2	41.5
LOS	C	A	B	B	A	E
95th %tile Queue, veh	5	1	3	3	2	13

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	10	605	10	10	10	210	710	10	10	0	615
Future Volume (vph)	475	10	605	10	10	10	210	710	10	10	0	615
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	1		0	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	1.00
Frt		0.852			0.955			0.998				0.850
Flt Protected	0.950				0.984			0.989			0.950	
Satd. Flow (prot)	1719	1542	0	0	1700	0	0	3393	0	0	3266	1538
Flt Permitted	0.622							0.778			0.283	
Satd. Flow (perm)	1126	1542	0	0	1728	0	0	2669	0	0	973	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		658			11			2				668
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		466			399			232			313	
Travel Time (s)		10.6			9.1			5.3			7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	516	11	658	11	11	11	228	772	11	11	0	668
Shared Lane Traffic (%)												
Lane Group Flow (vph)	516	669	0	0	33	0	0	1011	0	0	11	668
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4		8	8		5	2		6	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	9.5
Total Split (s)	17.0	39.5		22.5	22.5		9.5	35.5		26.0	26.0	17.0
Total Split (%)	22.7%	52.7%		30.0%	30.0%		12.7%	47.3%		34.7%	34.7%	22.7%
Maximum Green (s)	12.5	35.0		18.0	18.0		5.0	31.0		21.5	21.5	12.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	0.0
Total Lost Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	None		None	None		Min	Min		Min	Min	Min
Walk Time (s)		7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	17.1	17.1			6.7			25.5			15.5	33.3
Actuated g/C Ratio	0.33	0.33			0.13			0.49			0.30	0.64
v/c Ratio	0.99	0.71			0.14			0.73			0.04	0.55
Control Delay	60.1	6.3			20.6			14.8			14.8	2.5
Queue Delay	0.0	0.0			0.0			0.0			0.0	0.0
Total Delay	60.1	6.3			20.6			14.8			14.8	2.5
LOS	E	A			C			B			B	A
Approach Delay		29.7			20.6			14.8			2.7	
Approach LOS		C			C			B			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 52			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.99			
Intersection Signal Delay: 18.1		Intersection LOS: B	
Intersection Capacity Utilization 79.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: Scenic Highway/Exit 3 Ramp Connector & Connector Road to Belmont Roundabout/Bourne Bridge Approach



Lane Group	EBL	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	516	669	33	1011	11	668
v/c Ratio	0.99	0.71	0.14	0.73	0.04	0.55
Control Delay	60.1	6.3	20.6	14.8	14.8	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	60.1	6.3	20.6	14.8	14.8	2.5
Queue Length 50th (ft)	~173	2	5	81	1	0
Queue Length 95th (ft)	#374	63	31	210	6	37
Internal Link Dist (ft)		386	319	152	233	
Turn Bay Length (ft)						100
Base Capacity (vph)	519	1280	632	1738	420	1225
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	0.99	0.52	0.05	0.58	0.03	0.55

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	10	605	10	10	10	210	710	10	10	0	615
Future Volume (vph)	475	10	605	10	10	10	210	710	10	10	0	615
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	1.00
Frt	1.00	0.85			0.95			1.00			1.00	0.85
Flt Protected	0.95	1.00			0.98			0.99			0.95	1.00
Satd. Flow (prot)	1719	1543			1700			3394			3266	1538
Flt Permitted	0.62	1.00			1.00			0.78			0.28	1.00
Satd. Flow (perm)	1126	1543			1728			2672			975	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	516	11	658	11	11	11	228	772	11	11	0	668
RTOR Reduction (vph)	0	415	0	0	10	0	0	1	0	0	0	315
Lane Group Flow (vph)	516	254	0	0	23	0	0	1010	0	0	11	353
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	20.2	20.2			2.6			25.5			15.8	28.9
Effective Green, g (s)	20.2	20.2			2.6			25.5			15.8	28.9
Actuated g/C Ratio	0.37	0.37			0.05			0.47			0.29	0.53
Clearance Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	557	569			82			1314			281	939
v/s Ratio Prot	c0.22	0.16						c0.07				0.09
v/s Ratio Perm	c0.12				0.01			c0.29			0.01	0.14
v/c Ratio	0.93	0.45			0.27			0.77			0.04	0.38
Uniform Delay, d1	16.0	13.0			25.1			12.1			14.0	7.6
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	21.5	0.6			1.8			2.8			0.1	0.3
Delay (s)	37.5	13.6			27.0			14.9			14.0	7.8
Level of Service	D	B			C			B			B	A
Approach Delay (s)		24.0			27.0			14.9			7.9	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	54.7	Sum of lost time (s)	18.0
Intersection Capacity Utilization	79.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	475	10	605	10	10	10	210	710	10	10	0	615
Future Volume (veh/h)	475	10	605	10	10	10	210	710	10	10	0	615
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1900	1900	1810	1900	1900	1810	1900	1900	1810	1810
Adj Flow Rate, veh/h	516	11	0	11	11	11	228	772	11	11	0	668
Adj No. of Lanes	1	1	0	0	1	0	0	2	0	0	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	606	595	0	103	22	22	95	875	16	286	814	1123
Arrive On Green	0.21	0.33	0.00	0.04	0.04	0.04	0.52	0.52	0.52	0.52	0.00	0.52
Sat Flow, veh/h	1723	1810	0	516	516	516	3	1681	30	317	1564	1538
Grp Volume(v), veh/h	516	11	0	33	0	0	415	0	596	11	0	668
Grp Sat Flow(s),veh/h/ln	1723	1810	0	1547	0	0	73	0	1642	317	1564	1538
Q Serve(g_s), s	12.5	0.2	0.0	1.2	0.0	0.0	37.5	0.0	16.3	0.8	0.0	12.3
Cycle Q Clear(g_c), s	12.5	0.2	0.0	1.2	0.0	0.0	37.5	0.0	16.3	17.1	0.0	12.3
Prop In Lane	1.00		0.00	0.33		0.33	0.55		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	606	595	0	148	0	0	0	0	854	286	814	1123
V/C Ratio(X)	0.85	0.02	0.00	0.22	0.00	0.00	0.00	0.00	0.70	0.04	0.00	0.59
Avail Cap(c_a), veh/h	606	1063	0	548	0	0	0	0	854	286	814	1123
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.6	13.5	0.0	27.9	0.0	0.0	0.0	0.0	10.8	17.2	0.0	3.8
Incr Delay (d2), s/veh	11.1	0.0	0.0	0.8	0.0	0.0	0.0	0.0	2.5	0.1	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.1	0.0	0.6	0.0	0.0	0.0	0.0	7.9	0.1	0.0	5.3
LnGrp Delay(d),s/veh	32.7	13.5	0.0	28.6	0.0	0.0	0.0	0.0	13.3	17.2	0.0	4.7
LnGrp LOS	C	B		C					B	B		A
Approach Vol, veh/h		527			33			1011			679	
Approach Delay, s/veh		32.3			28.6			7.8			4.9	
Approach LOS		C			C			A			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6	7	8
Phs Duration (G+Y+Rc), s		35.5		24.1		35.5	17.0	7.1
Change Period (Y+Rc), s		4.5		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		31.0		35.0		21.5	12.5	18.0
Max Q Clear Time (g_c+I1), s		39.5		2.2		19.1	14.5	3.2
Green Ext Time (p_c), s		0.0		0.2		2.0	0.0	0.1

Intersection Summary	
HCM 2010 Ctrl Delay	13.0
HCM 2010 LOS	B

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	440	110	420	415	235	650
Future Volume (vph)	440	110	420	415	235	650
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1810	1538	1719	1810	1719	1538
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1810	1538	1719	1810	1719	1538
Link Speed (mph)	30			30	30	
Link Distance (ft)	236			466	240	
Travel Time (s)	5.4			10.6	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	478	120	457	451	255	707
Shared Lane Traffic (%)						
Lane Group Flow (vph)	478	120	457	451	255	707
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 70.1%		ICU Level of Service C	
Analysis Period (min) 15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Right Turn Channelized						
Traffic Volume (veh/h)	440	110	420	415	235	650
Future Volume (veh/h)	440	110	420	415	235	650
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	478	120	457	451	255	707
Approach Volume (veh/h)	598			908	962	
Crossing Volume (veh/h)	457			255	478	
High Capacity (veh/h)	966			1134	950	
High v/c (veh/h)	0.62			0.80	1.01	
Low Capacity (veh/h)	783			934	769	
Low v/c (veh/h)	0.76			0.97	1.25	

Intersection Summary			
Maximum v/c High	1.01		
Maximum v/c Low	1.25		
Intersection Capacity Utilization	70.1%	ICU Level of Service	C

Intersection	
Intersection Delay, s/veh	20.2
Intersection LOS	C

Approach	EB	WB	NB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	598	908	962
Demand Flow Rate, veh/h	628	954	1010
Vehicles Circulating, veh/h	480	268	502
Vehicles Exiting, veh/h	742	1244	606
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	14.1	10.8	32.9
Approach LOS	B	B	D

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	L	TR	L	TR
Assumed Moves	LT	R	L	TR	L	TR
RT Channelized						
Lane Util	0.799	0.201	0.503	0.497	0.265	0.735
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	502	126	480	474	268	742
Cap Entry Lane, veh/h	788	807	924	937	775	795
Entry HV Adj Factor	0.952	0.952	0.952	0.952	0.951	0.953
Flow Entry, veh/h	478	120	457	451	255	707
Cap Entry, veh/h	751	769	880	892	738	758
V/C Ratio	0.637	0.156	0.519	0.506	0.346	0.933
Control Delay, s/veh	16.0	6.3	11.0	10.6	9.2	41.5
LOS	C	A	B	B	A	E
95th %tile Queue, veh	5	1	3	3	2	13

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	175	260	110	70	140	0	235	300	0	400	345	270
Future Volume (vph)	175	260	110	70	140	0	235	300	0	400	345	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.973									0.934	
Flt Protected		0.984			0.984			0.979		0.950		
Satd. Flow (prot)	0	1783	0	0	1833	0	0	1824	0	1770	1740	0
Flt Permitted		0.984			0.984			0.979		0.950		
Satd. Flow (perm)	0	1783	0	0	1833	0	0	1824	0	1770	1740	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		342			237			185			480	
Travel Time (s)		7.8			5.4			4.2			10.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	190	283	120	76	152	0	255	326	0	435	375	293
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	593	0	0	228	0	0	581	0	435	668	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 112.4%		ICU Level of Service H	
Analysis Period (min) 15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Right Turn Channelized			MOYes									MOYes
Traffic Volume (veh/h)	175	260	110	70	140	0	235	300	0	400	345	270
Future Volume (veh/h)	175	260	110	70	140	0	235	300	0	400	345	270
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	190	283	120	76	152	0	255	326	0	435	375	293
Approach Volume (veh/h)		473			228			581			810	
Crossing Volume (veh/h)		886			771			908			483	
High Capacity (veh/h)		683			750			671			946	
High v/c (veh/h)		0.69			0.30			0.87			0.86	
Low Capacity (veh/h)		535			593			525			766	
Low v/c (veh/h)		0.88			0.38			1.11			1.06	

Intersection Summary					
Maximum v/c High	0.87				
Maximum v/c Low	1.11				
Intersection Capacity Utilization	112.4%	ICU Level of Service		H	

Intersection	
Intersection Delay, s/veh	68.5
Intersection LOS	F

Approach	EB	WB	NE	SW
Entry Lanes	1	1	1	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	593	228	581	1103
Demand Flow Rate, veh/h	605	233	593	1125
Vehicles Circulating, veh/h	904	787	927	493
Vehicles Exiting, veh/h	415	733	460	527
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	72.1	15.2	188.0	14.6
Approach LOS	F	C	F	B

Lane	Left	Bypass	Left	Left	Left	Right	Bypass
Designated Moves	LT	R	LT	LTR	L	TR	R
Assumed Moves	LT	R	LT	LTR	L	TR	R
RT Channelized		Yield					Yield
Lane Util	1.000		1.000	1.000	0.538	0.462	
Critical Headway, s	5.193		5.193	5.193	5.193	5.193	
Entry Flow, veh/h	483	122	233	593	444	382	299
Cap Entry Lane, veh/h	458	713	514	447	690	690	746
Entry HV Adj Factor	0.980	0.980	0.978	0.981	0.980	0.980	0.980
Flow Entry, veh/h	473	120	228	581	435	375	293
Cap Entry, veh/h	448	699	503	438	676	677	732
V/C Ratio	1.056	0.172	0.453	1.326	0.643	0.553	0.401
Control Delay, s/veh	88.5	7.1	15.2	188.0	17.6	14.5	10.2
LOS	F	A	C	F	C	B	B
95th %tile Queue, veh	15	1	2	26	5	3	2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	655	10	850	10	10	10	460	760	10	10	550	835
Future Volume (vph)	655	10	850	10	10	10	460	760	10	10	550	835
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	1		0	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	1.00
Frt		0.852			0.955			0.999				0.850
Flt Protected	0.950				0.984			0.982			0.999	
Satd. Flow (prot)	1719	1542	0	0	1700	0	0	3373	0	0	3435	1538
Flt Permitted	0.667				0.301			0.573			0.917	
Satd. Flow (perm)	1207	1542	0	0	520	0	0	1968	0	0	3153	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		283			11			1				812
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		466			399			232			313	
Travel Time (s)		10.6			9.1			5.3			7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	712	11	924	11	11	11	500	826	11	11	598	908
Shared Lane Traffic (%)												
Lane Group Flow (vph)	712	935	0	0	33	0	0	1337	0	0	609	908
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6

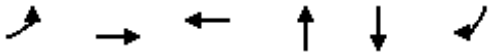
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4		8	8		5	2		6	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	9.5
Total Split (s)	37.0	61.0		24.0	24.0		9.5	89.0		79.5	79.5	37.0
Total Split (%)	24.7%	40.7%		16.0%	16.0%		6.3%	59.3%		53.0%	53.0%	24.7%
Maximum Green (s)	32.5	56.5		19.5	19.5		5.0	84.5		75.0	75.0	32.5
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	0.0
Total Lost Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	None		None	None		Min	Min		Min	Min	Min
Walk Time (s)		7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	56.5	56.5			16.7			84.5			75.0	116.8
Actuated g/C Ratio	0.38	0.38			0.11			0.56			0.50	0.78
v/c Ratio	1.23	1.24			0.49			1.33dl			0.39	0.66
Control Delay	154.5	145.5			69.0			111.1			24.2	3.4
Queue Delay	0.0	0.0			0.0			0.0			0.0	0.0
Total Delay	154.5	145.5			69.0			111.1			24.2	3.4
LOS	F	F			E			F			C	A
Approach Delay		149.4			69.0			111.1			11.7	
Approach LOS		F			E			F			B	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.24			
Intersection Signal Delay: 91.5		Intersection LOS: F	
Intersection Capacity Utilization 114.6%		ICU Level of Service H	
Analysis Period (min) 15			

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 3: Scenic Highway/Exit 3 Ramp Connector & Connector Road to Belmont Roundabout/Bourne Bridge Approach





Lane Group	EBL	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	712	935	33	1337	609	908
v/c Ratio	1.23	1.24	0.49	1.33dl	0.39	0.66
Control Delay	154.5	145.5	69.0	111.1	24.2	3.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	154.5	145.5	69.0	111.1	24.2	3.4
Queue Length 50th (ft)	~871	~950	20	~646	190	23
Queue Length 95th (ft)	#1118	#1213	60	#869	238	58
Internal Link Dist (ft)		386	319	152	233	
Turn Bay Length (ft)						100
Base Capacity (vph)	581	757	77	1155	1576	1377
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	1.23	1.24	0.43	1.16	0.39	0.66

Intersection Summary

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

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

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	655	10	850	10	10	10	460	760	10	10	550	835
Future Volume (vph)	655	10	850	10	10	10	460	760	10	10	550	835
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	1.00
Frt	1.00	0.85			0.95			1.00			1.00	0.85
Flt Protected	0.95	1.00			0.98			0.98			1.00	1.00
Satd. Flow (prot)	1719	1541			1700			3371			3435	1538
Flt Permitted	0.67	1.00			0.30			0.57			0.92	1.00
Satd. Flow (perm)	1206	1541			520			1969			3152	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	712	11	924	11	11	11	500	826	11	11	598	908
RTOR Reduction (vph)	0	175	0	0	10	0	0	0	0	0	0	208
Lane Group Flow (vph)	712	760	0	0	23	0	0	1337	0	0	609	700
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	57.4	57.4			15.6			84.5			75.0	112.3
Effective Green, g (s)	57.4	57.4			15.6			84.5			75.0	112.3
Actuated g/C Ratio	0.38	0.38			0.10			0.56			0.50	0.74
Clearance Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	585	586			53			1149			1566	1190
v/s Ratio Prot	0.30	c0.49						c0.04				0.15
v/s Ratio Perm	0.16				0.04			c0.61			0.19	0.31
v/c Ratio	1.22	1.30			0.44			1.33dl			0.39	0.59
Uniform Delay, d1	45.3	46.8			63.5			33.2			23.7	8.8
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	112.7	145.7			5.7			83.3			0.2	0.7
Delay (s)	158.0	192.4			69.2			116.5			23.8	9.5
Level of Service	F	F			E			F			C	A
Approach Delay (s)		177.5			69.2			116.5			15.3	
Approach LOS		F			E			F			B	

Intersection Summary			
HCM 2000 Control Delay	104.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	150.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	114.6%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	655	10	850	10	10	10	460	760	10	10	550	835
Future Volume (veh/h)	655	10	850	10	10	10	460	760	10	10	550	835
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1900	1900	1810	1900	1900	1810	1900	1900	1810	1810
Adj Flow Rate, veh/h	712	11	0	11	11	11	500	826	11	11	598	908
Adj No. of Lanes	1	1	0	0	1	0	0	2	0	0	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	534	552	0	49	18	16	55	1018	14	43	1945	1338
Arrive On Green	0.24	0.31	0.00	0.03	0.03	0.03	0.63	0.63	0.63	0.63	0.63	0.63
Sat Flow, veh/h	1723	1810	0	456	588	522	2	1621	22	24	3097	1538
Grp Volume(v), veh/h	712	11	0	33	0	0	500	0	837	305	304	908
Grp Sat Flow(s),veh/h/ln	1723	1810	0	1566	0	0	2	0	1643	1556	1564	1538
Q Serve(g_s), s	32.5	0.6	0.0	2.3	0.0	0.0	150.0	0.0	52.0	2.2	12.1	25.3
Cycle Q Clear(g_c), s	32.5	0.6	0.0	2.8	0.0	0.0	150.0	0.0	52.0	54.1	12.1	25.3
Prop In Lane	1.00		0.00	0.33		0.33	1.00		0.01	0.04		1.00
Lane Grp Cap(c), veh/h	534	552	0	83	0	0	0	0	1032	1005	983	1338
V/C Ratio(X)	1.33	0.02	0.00	0.40	0.00	0.00	0.00	0.00	0.81	0.30	0.31	0.68
Avail Cap(c_a), veh/h	534	760	0	260	0	0	0	0	1032	1005	983	1338
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	49.5	32.7	0.0	64.6	0.0	0.0	0.0	0.0	19.0	11.6	11.5	2.8
Incr Delay (d2), s/veh	162.7	0.0	0.0	3.1	0.0	0.0	0.0	0.0	5.0	0.2	0.2	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	28.5	0.3	0.0	1.3	0.0	0.0	0.0	0.0	24.9	5.1	5.2	10.7
LnGrp Delay(d),s/veh	212.2	32.7	0.0	67.7	0.0	0.0	0.0	0.0	23.9	11.8	11.7	4.2
LnGrp LOS	F	C		E					C	B	B	A
Approach Vol, veh/h		723			33			1337			1517	
Approach Delay, s/veh		209.5			67.7			15.0			7.2	
Approach LOS		F			E			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6	7	8
Phs Duration (G+Y+Rc), s		89.0		45.5		89.0	37.0	8.5
Change Period (Y+Rc), s		4.5		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		84.5		56.5		75.0	32.5	19.5
Max Q Clear Time (g_c+I1), s		152.0		2.6		56.1	34.5	4.8
Green Ext Time (p_c), s		0.0		0.2		17.9	0.0	0.1

Intersection Summary	
HCM 2010 Ctrl Delay	51.2
HCM 2010 LOS	D

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	280	395	995	310	165	1235
Future Volume (vph)	280	395	995	310	165	1235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1810	1538	1719	1810	1719	1538
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1810	1538	1719	1810	1719	1538
Link Speed (mph)	30			30	30	
Link Distance (ft)	236			466	240	
Travel Time (s)	5.4			10.6	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	429	1082	337	179	1342
Shared Lane Traffic (%)						
Lane Group Flow (vph)	304	429	1082	337	179	1342
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 97.9%		ICU Level of Service F	
Analysis Period (min) 15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Right Turn Channelized						
Traffic Volume (veh/h)	280	395	995	310	165	1235
Future Volume (veh/h)	280	395	995	310	165	1235
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	304	429	1082	337	179	1342
Approach Volume (veh/h)	733			1419	1521	
Crossing Volume (veh/h)	1082			179	304	
High Capacity (veh/h)	582			1204	1091	
High v/c (veh/h)	1.26			1.18	1.39	
Low Capacity (veh/h)	448			997	895	
Low v/c (veh/h)	1.64			1.42	1.70	

Intersection Summary			
Maximum v/c High	1.39		
Maximum v/c Low	1.70		
Intersection Capacity Utilization	97.9%	ICU Level of Service	F

Intersection	
Intersection Delay, s/veh	137.7
Intersection LOS	F

Approach	EB	WB	NB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	733	1419	1521
Demand Flow Rate, veh/h	769	1490	1597
Vehicles Circulating, veh/h	1136	188	319
Vehicles Exiting, veh/h	542	1728	1586
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	37.2	79.2	240.6
Approach LOS	E	F	F

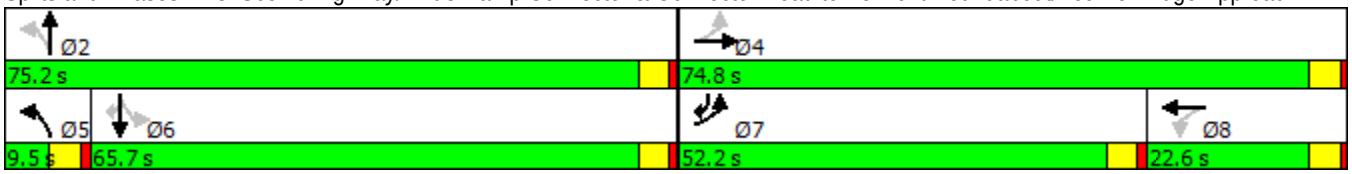
Lane	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	L	TR	L	TR
Assumed Moves	LT	R	L	TR	L	TR
RT Channelized						
Lane Util	0.415	0.585	0.762	0.238	0.118	0.882
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	319	450	1136	354	188	1409
Cap Entry Lane, veh/h	482	510	981	991	890	904
Entry HV Adj Factor	0.952	0.953	0.952	0.952	0.952	0.952
Flow Entry, veh/h	304	429	1082	337	179	1342
Cap Entry, veh/h	459	486	935	943	847	861
V/C Ratio	0.662	0.882	1.158	0.357	0.211	1.559
Control Delay, s/veh	25.2	45.6	101.4	7.7	6.4	271.9
LOS	D	E	F	A	A	F
95th %tile Queue, veh	5	10	31	2	1	68

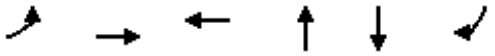
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	655	10	850	10	10	10	460	760	10	10	0	835
Future Volume (vph)	655	10	850	10	10	10	460	760	10	10	0	835
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	1		0	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	0.95	0.95	0.95	1.00
Frt		0.852			0.955			0.999				0.850
Flt Protected	0.950				0.984			0.982			0.950	
Satd. Flow (prot)	1719	1542	0	0	1700	0	0	3373	0	0	3266	1538
Flt Permitted	0.627				0.325			0.801			0.102	
Satd. Flow (perm)	1135	1542	0	0	562	0	0	2751	0	0	351	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		924			11			1				805
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		466			399			232			313	
Travel Time (s)		10.6			9.1			5.3			7.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	712	11	924	11	11	11	500	826	11	11	0	908
Shared Lane Traffic (%)												
Lane Group Flow (vph)	712	935	0	0	33	0	0	1337	0	0	11	908
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	7	4		8	8		5	2		6	6	7
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	9.5	22.5		22.5	22.5		9.5	22.5		22.5	22.5	9.5
Total Split (s)	52.2	74.8		22.6	22.6		9.5	75.2		65.7	65.7	52.2
Total Split (%)	34.8%	49.9%		15.1%	15.1%		6.3%	50.1%		43.8%	43.8%	34.8%
Maximum Green (s)	47.7	70.3		18.1	18.1		5.0	70.7		61.2	61.2	47.7
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0			0.0			0.0			0.0	0.0
Total Lost Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lead/Lag	Lead			Lag	Lag		Lead			Lag	Lag	Lead
Lead-Lag Optimize?	Yes			Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	None		None	None		Min	Min		Min	Min	Min
Walk Time (s)		7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)		11.0		11.0	11.0			11.0		11.0	11.0	
Pedestrian Calls (#/hr)		0		0	0			0		0	0	
Act Effct Green (s)	58.7	58.7			10.9			71.1			61.5	114.0
Actuated g/C Ratio	0.42	0.42			0.08			0.51			0.44	0.82
v/c Ratio	1.05	0.79			0.61			0.93			0.07	0.65
Control Delay	84.4	7.3			89.7			45.1			27.8	3.1
Queue Delay	0.0	0.0			0.0			0.0			0.0	0.0
Total Delay	84.4	7.3			89.7			45.1			27.8	3.1
LOS	F	A			F			D			C	A
Approach Delay		40.6			89.7			45.1			3.4	
Approach LOS		D			F			D			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 138.8			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.05			
Intersection Signal Delay: 33.9		Intersection LOS: C	
Intersection Capacity Utilization 101.8%		ICU Level of Service G	
Analysis Period (min) 15			

Splits and Phases: 3: Scenic Highway/Exit 3 Ramp Connector & Connector Road to Belmont Roundabout/Bourne Bridge Approach





Lane Group	EBL	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	712	935	33	1337	11	908
v/c Ratio	1.05	0.79	0.61	0.93	0.07	0.65
Control Delay	84.4	7.3	89.7	45.1	27.8	3.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.4	7.3	89.7	45.1	27.8	3.1
Queue Length 50th (ft)	~647	6	20	533	3	18
Queue Length 95th (ft)	#787	107	60	#844	11	58
Internal Link Dist (ft)		386	319	152	233	
Turn Bay Length (ft)						100
Base Capacity (vph)	681	1238	83	1431	155	1406
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	1.05	0.76	0.40	0.93	0.07	0.65

Intersection Summary

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

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

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	655	10	850	10	10	10	460	760	10	10	0	835
Future Volume (vph)	655	10	850	10	10	10	460	760	10	10	0	835
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Lane Util. Factor	1.00	1.00			1.00			0.95			0.95	1.00
Frt	1.00	0.85			0.95			1.00			1.00	0.85
Flt Protected	0.95	1.00			0.98			0.98			0.95	1.00
Satd. Flow (prot)	1719	1541			1700			3371			3266	1538
Flt Permitted	0.63	1.00			0.33			0.80			0.10	1.00
Satd. Flow (perm)	1134	1541			562			2750			352	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	712	11	924	11	11	11	500	826	11	11	0	908
RTOR Reduction (vph)	0	526	0	0	10	0	0	0	0	0	0	179
Lane Group Flow (vph)	712	409	0	0	23	0	0	1337	0	0	11	729
Turn Type	pm+pt	NA		Perm	NA		pm+pt	NA		Perm	NA	pm+ov
Protected Phases	7	4			8		5	2			6	7
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	60.6	60.6			8.2			71.0			61.5	109.4
Effective Green, g (s)	60.6	60.6			8.2			71.0			61.5	109.4
Actuated g/C Ratio	0.43	0.43			0.06			0.50			0.44	0.78
Clearance Time (s)	4.5	4.5			4.5			4.5			4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	688	664			32			1410			153	1245
v/s Ratio Prot	c0.35	0.27						c0.03				0.20
v/s Ratio Perm	c0.09				0.04			c0.44			0.03	0.27
v/c Ratio	1.03	0.62			0.71			0.95			0.07	0.59
Uniform Delay, d1	38.6	31.0			65.0			33.0			23.0	6.4
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	43.6	1.7			52.5			13.4			0.2	0.7
Delay (s)	82.2	32.7			117.5			46.4			23.2	7.1
Level of Service	F	C			F			D			C	A
Approach Delay (s)		54.1			117.5			46.4			7.3	
Approach LOS		D			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	41.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	140.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	101.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	655	10	850	10	10	10	460	760	10	10	0	835
Future Volume (veh/h)	655	10	850	10	10	10	460	760	10	10	0	835
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1900	1900	1810	1900	1900	1810	1900	1900	1810	1810
Adj Flow Rate, veh/h	712	11	0	11	11	11	500	826	11	11	0	908
Adj No. of Lanes	1	1	0	0	1	0	0	2	0	0	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5	5	5	5	5	5	5
Cap, veh/h	721	749	0	49	18	16	54	843	11	67	814	1340
Arrive On Green	0.35	0.41	0.00	0.03	0.03	0.03	0.52	0.52	0.52	0.52	0.00	0.52
Sat Flow, veh/h	1723	1810	0	456	588	522	2	1621	22	26	1564	1538
Grp Volume(v), veh/h	712	11	0	33	0	0	500	0	837	11	0	908
Grp Sat Flow(s),veh/h/ln	1723	1810	0	1566	0	0	2	0	1643	26	1564	1538
Q Serve(g_s), s	47.7	0.5	0.0	2.4	0.0	0.0	150.0	0.0	67.8	2.3	0.0	25.3
Cycle Q Clear(g_c), s	47.7	0.5	0.0	2.8	0.0	0.0	150.0	0.0	67.8	70.1	0.0	25.3
Prop In Lane	1.00		0.00	0.33		0.33	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	721	749	0	82	0	0	0	0	854	67	814	1340
V/C Ratio(X)	0.99	0.01	0.00	0.40	0.00	0.00	0.00	0.00	0.98	0.16	0.00	0.68
Avail Cap(c_a), veh/h	721	936	0	242	0	0	0	0	854	67	814	1340
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	42.3	23.5	0.0	65.3	0.0	0.0	0.0	0.0	31.9	66.2	0.0	2.8
Incr Delay (d2), s/veh	30.4	0.0	0.0	3.2	0.0	0.0	0.0	0.0	25.7	1.1	0.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.1	0.2	0.0	1.3	0.0	0.0	0.0	0.0	36.8	0.4	0.0	10.7
LnGrp Delay(d),s/veh	72.7	23.5	0.0	68.5	0.0	0.0	0.0	0.0	57.6	67.4	0.0	4.2
LnGrp LOS	E	C		E					E	E		A
Approach Vol, veh/h		723			33			1337			919	
Approach Delay, s/veh		71.9			68.5			36.1			4.9	
Approach LOS		E			E			D			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6	7	8
Phs Duration (G+Y+Rc), s		75.2		60.8		75.2	52.2	8.6
Change Period (Y+Rc), s		4.5		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		70.7		70.3		61.2	47.7	18.1
Max Q Clear Time (g_c+I1), s		152.0		2.5		72.1	49.7	4.8
Green Ext Time (p_c), s		0.0		0.3		0.0	0.0	0.1

Intersection Summary	
HCM 2010 Ctrl Delay	35.5
HCM 2010 LOS	D

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	280	395	995	310	165	1235
Future Volume (vph)	280	395	995	310	165	1235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1810	1538	1719	1810	1719	1538
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1810	1538	1719	1810	1719	1538
Link Speed (mph)	30			30	30	
Link Distance (ft)	236			466	240	
Travel Time (s)	5.4			10.6	5.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	304	429	1082	337	179	1342
Shared Lane Traffic (%)						
Lane Group Flow (vph)	304	429	1082	337	179	1342
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Yield			Yield	Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 97.9%		ICU Level of Service F	
Analysis Period (min) 15			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Right Turn Channelized						
Traffic Volume (veh/h)	280	395	995	310	165	1235
Future Volume (veh/h)	280	395	995	310	165	1235
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	304	429	1082	337	179	1342
Approach Volume (veh/h)	733			1419	1521	
Crossing Volume (veh/h)	1082			179	304	
High Capacity (veh/h)	582			1204	1091	
High v/c (veh/h)	1.26			1.18	1.39	
Low Capacity (veh/h)	448			997	895	
Low v/c (veh/h)	1.64			1.42	1.70	

Intersection Summary			
Maximum v/c High	1.39		
Maximum v/c Low	1.70		
Intersection Capacity Utilization	97.9%	ICU Level of Service	F

Intersection	
Intersection Delay, s/veh	137.7
Intersection LOS	F

Approach	EB	WB	NB
Entry Lanes	2	2	2
Conflicting Circle Lanes	2	2	2
Adj Approach Flow, veh/h	733	1419	1521
Demand Flow Rate, veh/h	769	1490	1597
Vehicles Circulating, veh/h	1136	188	319
Vehicles Exiting, veh/h	542	1728	1586
Follow-Up Headway, s	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	37.2	79.2	240.6
Approach LOS	E	F	F

Lane	Left	Right	Left	Right	Left	Right
Designated Moves	LT	R	L	TR	L	TR
Assumed Moves	LT	R	L	TR	L	TR
RT Channelized						
Lane Util	0.415	0.585	0.762	0.238	0.118	0.882
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	319	450	1136	354	188	1409
Cap Entry Lane, veh/h	482	510	981	991	890	904
Entry HV Adj Factor	0.952	0.953	0.952	0.952	0.952	0.952
Flow Entry, veh/h	304	429	1082	337	179	1342
Cap Entry, veh/h	459	486	935	943	847	861
V/C Ratio	0.662	0.882	1.158	0.357	0.211	1.559
Control Delay, s/veh	25.2	45.6	101.4	7.7	6.4	271.9
LOS	D	E	F	A	A	F
95th %tile Queue, veh	5	10	31	2	1	68

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	125	150	395	285	175	0	165	530	0	550	705	130
Future Volume (vph)	125	150	395	285	175	0	165	530	0	550	705	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.920									0.977	
Flt Protected		0.991			0.970			0.988		0.950		
Satd. Flow (prot)	0	1698	0	0	1807	0	0	1840	0	1770	1820	0
Flt Permitted		0.991			0.970			0.988		0.950		
Satd. Flow (perm)	0	1698	0	0	1807	0	0	1840	0	1770	1820	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		342			237			185			480	
Travel Time (s)		7.8			5.4			4.2			10.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	136	163	429	310	190	0	179	576	0	598	766	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	728	0	0	500	0	0	755	0	598	907	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Roundabout			
Intersection Capacity Utilization 158.2%		ICU Level of Service H	
Analysis Period (min) 15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Right Turn Channelized			MOYes									MOYes
Traffic Volume (veh/h)	125	150	395	285	175	0	165	530	0	550	705	130
Future Volume (veh/h)	125	150	395	285	175	0	165	530	0	550	705	130
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	136	163	429	310	190	0	179	576	0	598	766	141
Approach Volume (veh/h)		299			500			755			1364	
Crossing Volume (veh/h)		1674#			891			897			679	
High Capacity (veh/h)		355			681			677			808	
High v/c (veh/h)		0.84			0.73			1.11			1.69	
Low Capacity (veh/h)		258			533			530			644	
Low v/c (veh/h)		1.16			0.94			1.42			2.12	

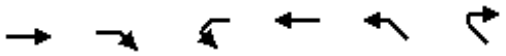
Intersection Summary					
Maximum v/c High	1.69				
Maximum v/c Low	2.12				
Intersection Capacity Utilization	158.2%	ICU Level of Service		H	
# Crossing flow exceeds 1200, method is not applicable					

Intersection	
Intersection Delay, s/veh	192.2
Intersection LOS	F

Approach	EB	WB	NE	SW
Entry Lanes	1	1	1	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	728	500	755	1505
Demand Flow Rate, veh/h	743	510	771	1535
Vehicles Circulating, veh/h	1707	910	915	693
Vehicles Exiting, veh/h	377	776	1097	727
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	195.1	109.8	348.3	139.8
Approach LOS	F	F	F	F

Lane	Left	Bypass	Left	Left	Left	Right	Bypass
Designated Moves	LT	R	LT	LTR	L	TR	R
Assumed Moves	LT	R	LT	LTR	L	TR	R
RT Channelized		Yield					Yield
Lane Util	1.000		1.000	1.000	0.439	0.561	
Critical Headway, s	5.193		5.193	5.193	5.193	5.193	
Entry Flow, veh/h	305	438	510	771	610	781	144
Cap Entry Lane, veh/h	205	377	455	453	565	565	775
Entry HV Adj Factor	0.979	0.980	0.981	0.980	0.980	0.980	0.980
Flow Entry, veh/h	299	429	500	755	598	766	141
Cap Entry, veh/h	201	370	446	443	554	554	760
V/C Ratio	1.488	1.160	1.121	1.704	1.080	1.382	0.186
Control Delay, s/veh	287.8	130.6	109.8	348.3	88.4	204.4	6.7
LOS	F	F	F	F	F	F	A
95th %tile Queue, veh	18	17	17	45	18	35	1

Bourne Rotary



Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	340	30	50	95	25	20
Future Volume (vph)	340	30	50	95	25	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.989				0.939	
Flt Protected				0.983	0.973	
Satd. Flow (prot)	1790	0	0	1779	1653	0
Flt Permitted				0.983	0.973	
Satd. Flow (perm)	1790	0	0	1779	1653	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1661			1631	761	
Travel Time (s)	37.8			37.1	17.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	370	33	54	103	27	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	403	0	0	157	49	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 40.8%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	340	30	50	95	25	20
Future Volume (Veh/h)	340	30	50	95	25	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	370	33	54	103	27	22
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			403		598	386
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			403		598	386
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		94	97
cM capacity (veh/h)			1140		439	655

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	403	157	49
Volume Left	0	54	27
Volume Right	33	0	22
cSH	1700	1140	515
Volume to Capacity	0.24	0.05	0.10
Queue Length 95th (ft)	0	4	8
Control Delay (s)	0.0	3.1	12.7
Lane LOS		A	B
Approach Delay (s)	0.0	3.1	12.7
Approach LOS			B

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

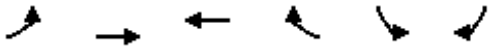
Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	340	30	50	95	25	20
Future Vol, veh/h	340	30	50	95	25	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	370	33	54	103	27	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	402	0	598	386
Stage 1	-	-	-	-	386	-
Stage 2	-	-	-	-	212	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1141	-	460	655
Stage 1	-	-	-	-	681	-
Stage 2	-	-	-	-	816	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1141	-	437	655
Mov Cap-2 Maneuver	-	-	-	-	437	-
Stage 1	-	-	-	-	681	-
Stage 2	-	-	-	-	775	-

Approach	EB	WB	NW
HCM Control Delay, s	0	2.9	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NWLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	513	-	-	1141	-
HCM Lane V/C Ratio	0.095	-	-	0.048	-
HCM Control Delay (s)	12.8	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	1125	970	135	195	165
Future Volume (vph)	10	1125	970	135	195	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200			400	0	0
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1810	1810	1538	1719	1538
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1719	1810	1810	1538	1719	1538
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				147		94
Link Speed (mph)		30	30		30	
Link Distance (ft)		912	966		164	
Travel Time (s)		20.7	22.0		3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	1223	1054	147	212	179
Shared Lane Traffic (%)						
Lane Group Flow (vph)	11	1223	1054	147	212	179
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (ft)	20	100	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	5	Free!	6		4!	4 5
Permitted Phases				6		

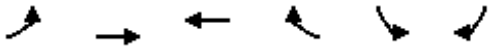
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	5		6	6	4	4 5
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	
Minimum Split (s)	20.0		20.0	20.0	20.0	
Total Split (s)	20.0		60.0	60.0	20.0	
Total Split (%)	20.0%		60.0%	60.0%	20.0%	
Maximum Green (s)	16.0		56.0	56.0	16.0	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	0.5		0.5	0.5	0.5	
Lost Time Adjust (s)	-1.0		-1.0	-1.0	-1.0	
Total Lost Time (s)	3.0		3.0	3.0	3.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Min	Min	None	
Walk Time (s)			5.0	5.0		
Flash Dont Walk (s)			11.0	11.0		
Pedestrian Calls (#/hr)			15	15		
Act Effct Green (s)	7.2	88.7	57.0	57.0	15.5	25.7
Actuated g/C Ratio	0.08	1.00	0.64	0.64	0.17	0.29
v/c Ratio	0.08	0.68	0.91	0.14	0.71	0.35
Control Delay	39.6	2.0	27.4	1.6	48.4	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.6	2.0	27.4	1.6	48.4	14.1
LOS	D	A	C	A	D	B
Approach Delay		2.4	24.3		32.7	
Approach LOS		A	C		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 100			
Actuated Cycle Length: 88.7			
Natural Cycle: 100			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 15.9		Intersection LOS: B	
Intersection Capacity Utilization 76.7%		ICU Level of Service D	
Analysis Period (min) 15			

! Phase conflict between lane groups.

Splits and Phases: 3: Bourne Rotary Connector/Sandwich Road & Old Sandwich Road

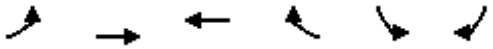




Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	11	1223	1054	147	212	179
v/c Ratio	0.08	0.68	0.91	0.14	0.71	0.35
Control Delay	39.6	2.0	27.4	1.6	48.4	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.6	2.0	27.4	1.6	48.4	14.1
Queue Length 50th (ft)	6	0	474	0	113	36
Queue Length 95th (ft)	23	0	#833	21	#196	88
Internal Link Dist (ft)		832	886		84	
Turn Bay Length (ft)	200			400		
Base Capacity (vph)	329	1810	1163	1041	329	668
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	0.68	0.91	0.14	0.64	0.27

Intersection Summary

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

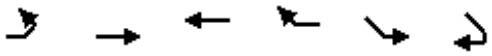


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	1125	970	135	195	165
Future Volume (vph)	10	1125	970	135	195	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1719	1810	1810	1538	1719	1538
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1719	1810	1810	1538	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	1223	1054	147	212	179
RTOR Reduction (vph)	0	0	0	52	0	67
Lane Group Flow (vph)	11	1223	1054	95	212	112
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	5	Free!	6		4!	4 5
Permitted Phases				6		
Actuated Green, G (s)	6.2	88.8	56.1	56.1	14.5	24.7
Effective Green, g (s)	7.2	88.8	57.1	57.1	15.5	25.7
Actuated g/C Ratio	0.08	1.00	0.64	0.64	0.17	0.29
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	139	1810	1163	988	300	445
v/s Ratio Prot	0.01	0.68	c0.58		0.12	0.07
v/s Ratio Perm				0.06		
v/c Ratio	0.08	0.68	0.91	0.10	0.71	0.25
Uniform Delay, d1	37.7	0.0	13.6	6.0	34.5	24.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	2.0	10.1	0.0	7.4	0.3
Delay (s)	38.0	2.0	23.7	6.1	41.9	24.5
Level of Service	D	A	C	A	D	C
Approach Delay (s)		2.4	21.5		33.9	
Approach LOS		A	C		C	

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

HCM 2010 analysis cannot be performed with phasing conflicts.



Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	20	535	380	25	55	25
Future Volume (vph)	20	535	380	25	55	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.992		0.958	
Flt Protected		0.998			0.967	
Satd. Flow (prot)	0	1806	1795	0	1676	0
Flt Permitted		0.998			0.967	
Satd. Flow (perm)	0	1806	1795	0	1676	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		1220	221		761	
Travel Time (s)		27.7	5.0		17.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	582	413	27	60	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	604	440	0	87	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 55.6%		ICU Level of Service B	
Analysis Period (min) 15			

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (veh/h)	20	535	380	25	55	25
Future Volume (Veh/h)	20	535	380	25	55	25
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	582	413	27	60	27
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	440				1052	426
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	440				1052	426
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				75	96
cM capacity (veh/h)	1104				243	622

Direction, Lane #	EB 1	WB 1	SE 1
Volume Total	604	440	87
Volume Left	22	0	60
Volume Right	0	27	27
cSH	1104	1700	299
Volume to Capacity	0.02	0.26	0.29
Queue Length 95th (ft)	2	0	29
Control Delay (s)	0.5	0.0	21.9
Lane LOS	A		C
Approach Delay (s)	0.5	0.0	21.9
Approach LOS			C

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

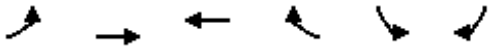
Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Vol, veh/h	20	535	380	25	55	25
Future Vol, veh/h	20	535	380	25	55	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	22	582	413	27	60	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	440	0	-	0	1052	427
Stage 1	-	-	-	-	427	-
Stage 2	-	-	-	-	625	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1104	-	-	-	248	621
Stage 1	-	-	-	-	652	-
Stage 2	-	-	-	-	528	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1104	-	-	-	241	621
Mov Cap-2 Maneuver	-	-	-	-	241	-
Stage 1	-	-	-	-	652	-
Stage 2	-	-	-	-	513	-

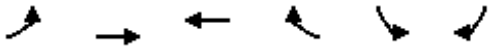
Approach	EB	WB	SE
HCM Control Delay, s	0.3	0	22
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1104	-	-	-	298
HCM Lane V/C Ratio	0.02	-	-	-	0.292
HCM Control Delay (s)	8.3	-	-	-	22
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1.2



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	425	970	135	0	165
Future Volume (vph)	10	425	970	135	0	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.983			0.865
Flt Protected		0.999				
Satd. Flow (prot)	0	1808	1779	0	0	1565
Flt Permitted		0.999				
Satd. Flow (perm)	0	1808	1779	0	0	1565
Link Speed (mph)		30	30		30	
Link Distance (ft)		912	966		164	
Travel Time (s)		20.7	22.0		3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	462	1054	147	0	179
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	473	1201	0	0	179
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 76.1%		ICU Level of Service D	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	425	970	135	0	165
Future Volume (Veh/h)	10	425	970	135	0	165
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	462	1054	147	0	179
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	1054				1612	1128
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1054				1612	1128
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				100	27
cM capacity (veh/h)	649				111	245

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	473	1201	179
Volume Left	11	0	0
Volume Right	0	147	179
cSH	649	1700	245
Volume to Capacity	0.02	0.71	0.73
Queue Length 95th (ft)	1	0	126
Control Delay (s)	0.5	0.0	51.2
Lane LOS	A		F
Approach Delay (s)	0.5	0.0	51.2
Approach LOS			F

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

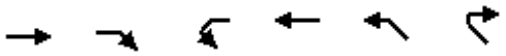
Intersection	
Int Delay, s/veh	4.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	425	970	135	0	165
Future Vol, veh/h	10	425	970	135	0	165
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	11	462	1054	147	0	179

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1054	0	-	0	-	1054
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.15	-	-	-	-	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.245	-	-	-	-	3.345
Pot Cap-1 Maneuver	649	-	-	0	0	271
Stage 1	-	-	-	0	0	-
Stage 2	-	-	-	0	0	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	649	-	-	-	-	271
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	40.9
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	649	-	-	271
HCM Lane V/C Ratio	0.017	-	-	0.662
HCM Control Delay (s)	10.6	0	-	40.9
HCM Lane LOS	B	A	-	E
HCM 95th %tile Q(veh)	0.1	-	-	4.3



Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	340	55	25	120	25	20
Future Volume (vph)	340	55	25	120	25	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.981				0.939	
Flt Protected				0.991	0.973	
Satd. Flow (prot)	1775	0	0	1793	1653	0
Flt Permitted				0.991	0.973	
Satd. Flow (perm)	1775	0	0	1793	1653	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1661			1631	761	
Travel Time (s)	37.8			37.1	17.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	370	60	27	130	27	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	430	0	0	157	49	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.7%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	340	55	25	120	25	20
Future Volume (Veh/h)	340	55	25	120	25	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	370	60	27	130	27	22
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			430		584	400
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			430		584	400
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		94	97
cM capacity (veh/h)			1114		458	643

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	430	157	49
Volume Left	0	27	27
Volume Right	60	0	22
cSH	1700	1114	526
Volume to Capacity	0.25	0.02	0.09
Queue Length 95th (ft)	0	2	8
Control Delay (s)	0.0	1.6	12.5
Lane LOS		A	B
Approach Delay (s)	0.0	1.6	12.5
Approach LOS			B

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	37.7%	ICU Level of Service	A
Analysis Period (min)	15		

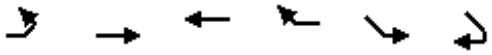
Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	340	55	25	120	25	20
Future Vol, veh/h	340	55	25	120	25	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	370	60	27	130	27	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	429	0	584	399
Stage 1	-	-	-	-	399	-
Stage 2	-	-	-	-	185	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1115	-	469	644
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	839	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1115	-	457	644
Mov Cap-2 Maneuver	-	-	-	-	457	-
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	817	-

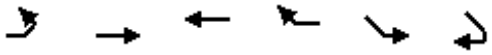
Approach	EB	WB	NW
HCM Control Delay, s	0	1.4	12.6
HCM LOS			B

Minor Lane/Major Mvmt	NWLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	525	-	-	1115	-
HCM Lane V/C Ratio	0.093	-	-	0.024	-
HCM Control Delay (s)	12.6	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0.1	-



Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	20	535	380	25	55	25
Future Volume (vph)	20	535	380	25	55	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.992		0.958	
Flt Protected		0.998			0.967	
Satd. Flow (prot)	0	1806	1795	0	1676	0
Flt Permitted		0.998			0.967	
Satd. Flow (perm)	0	1806	1795	0	1676	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		1220	221		761	
Travel Time (s)		27.7	5.0		17.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	582	413	27	60	27
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	604	440	0	87	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 55.6%		ICU Level of Service B	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (veh/h)	20	535	380	25	55	25
Future Volume (Veh/h)	20	535	380	25	55	25
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	582	413	27	60	27
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	440				1052	426
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	440				1052	426
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				75	96
cM capacity (veh/h)	1104				243	622

Direction, Lane #	EB 1	WB 1	SE 1
Volume Total	604	440	87
Volume Left	22	0	60
Volume Right	0	27	27
cSH	1104	1700	299
Volume to Capacity	0.02	0.26	0.29
Queue Length 95th (ft)	2	0	29
Control Delay (s)	0.5	0.0	21.9
Lane LOS	A		C
Approach Delay (s)	0.5	0.0	21.9
Approach LOS			C

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

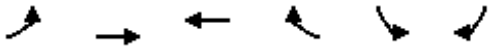
Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Vol, veh/h	20	535	380	25	55	25
Future Vol, veh/h	20	535	380	25	55	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	22	582	413	27	60	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	440	0	-	0	1052	427
Stage 1	-	-	-	-	427	-
Stage 2	-	-	-	-	625	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1104	-	-	-	248	621
Stage 1	-	-	-	-	652	-
Stage 2	-	-	-	-	528	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1104	-	-	-	241	621
Mov Cap-2 Maneuver	-	-	-	-	241	-
Stage 1	-	-	-	-	652	-
Stage 2	-	-	-	-	513	-

Approach	EB	WB	SE
HCM Control Delay, s	0.3	0	22
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1104	-	-	-	298
HCM Lane V/C Ratio	0.02	-	-	-	0.292
HCM Control Delay (s)	8.3	-	-	-	22
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1.2

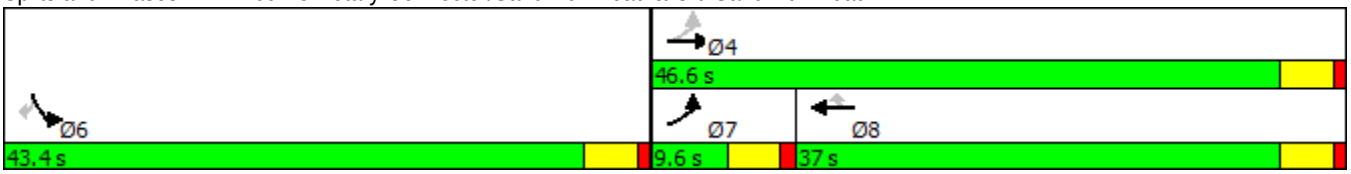


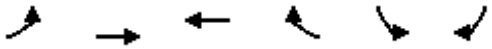
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	80	425	565	540	895	690
Future Volume (vph)	80	425	565	540	895	690
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400			425	300	0
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1810	1810	1538	3335	1538
Flt Permitted	0.110				0.950	
Satd. Flow (perm)	199	1810	1810	1538	3335	1538
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				587		247
Link Speed (mph)		30	30		30	
Link Distance (ft)		912	966		1791	
Travel Time (s)		20.7	22.0		40.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	462	614	587	973	750
Shared Lane Traffic (%)						
Lane Group Flow (vph)	87	462	614	587	973	750
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		24	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (ft)	20	100	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	7	4	8	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	20.0	22.5	22.5	22.5	22.5
Total Split (s)	9.6	46.6	37.0	37.0	43.4	43.4
Total Split (%)	10.7%	51.8%	41.1%	41.1%	48.2%	48.2%
Maximum Green (s)	5.1	42.1	32.5	32.5	38.9	38.9
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Min	Min	Min	Min	None	None
Walk Time (s)			7.0	7.0	7.0	7.0
Flash Dont Walk (s)			11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)			0	0	0	0
Act Effct Green (s)	41.5	41.5	31.8	31.8	37.0	37.0
Actuated g/C Ratio	0.47	0.47	0.36	0.36	0.42	0.42
v/c Ratio	0.48	0.54	0.93	0.63	0.69	0.95
Control Delay	22.3	19.6	51.1	5.3	23.6	39.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.3	19.6	51.1	5.3	23.6	39.1
LOS	C	B	D	A	C	D
Approach Delay		20.0	28.7		30.4	
Approach LOS		C	C		C	

Intersection Summary	
Area Type:	Other
Cycle Length: 90	
Actuated Cycle Length: 87.5	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.95	
Intersection Signal Delay: 28.2	Intersection LOS: C
Intersection Capacity Utilization 80.0%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 2: Bourne Rotary Connector/Sandwich Road & Old Sandwich Road

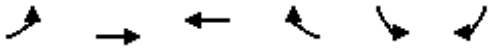




Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	87	462	614	587	973	750
v/c Ratio	0.48	0.54	0.93	0.63	0.69	0.95
Control Delay	22.3	19.6	51.1	5.3	23.6	39.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.3	19.6	51.1	5.3	23.6	39.1
Queue Length 50th (ft)	27	181	333	0	221	288
Queue Length 95th (ft)	54	272	#548	71	290	#549
Internal Link Dist (ft)		832	886		1711	
Turn Bay Length (ft)	400			425	300	
Base Capacity (vph)	183	874	674	941	1488	822
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	0.48	0.53	0.91	0.62	0.65	0.91

Intersection Summary

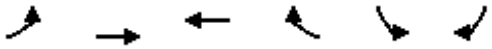
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	80	425	565	540	895	690
Future Volume (vph)	80	425	565	540	895	690
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1719	1810	1810	1538	3335	1538
Flt Permitted	0.11	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	199	1810	1810	1538	3335	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	462	614	587	973	750
RTOR Reduction (vph)	0	0	0	373	0	142
Lane Group Flow (vph)	87	462	614	214	973	608
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	41.4	41.4	31.8	31.8	37.0	37.0
Effective Green, g (s)	41.4	41.4	31.8	31.8	37.0	37.0
Actuated g/C Ratio	0.47	0.47	0.36	0.36	0.42	0.42
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	182	857	658	559	1411	651
v/s Ratio Prot	0.03	c0.26	c0.34		0.29	
v/s Ratio Perm	0.20			0.14		c0.40
v/c Ratio	0.48	0.54	0.93	0.38	0.69	0.93
Uniform Delay, d1	18.0	16.3	26.8	20.5	20.5	24.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.7	20.3	0.4	1.4	20.4
Delay (s)	19.9	16.9	47.0	21.0	21.9	44.5
Level of Service	B	B	D	C	C	D
Approach Delay (s)		17.4	34.3		31.7	
Approach LOS		B	C		C	

Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	87.4	Sum of lost time (s)	13.5
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	80	425	565	540	895	690
Future Volume (veh/h)	80	425	565	540	895	690
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810	1810	1810	1810
Adj Flow Rate, veh/h	87	462	614	0	973	750
Adj No. of Lanes	1	1	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	200	842	650	552	1452	668
Arrive On Green	0.06	0.47	0.36	0.00	0.43	0.43
Sat Flow, veh/h	1723	1810	1810	1538	3343	1538
Grp Volume(v), veh/h	87	462	614	0	973	750
Grp Sat Flow(s),veh/h/ln	1723	1810	1810	1538	1672	1538
Q Serve(g_s), s	2.7	16.4	29.5	0.0	20.8	38.9
Cycle Q Clear(g_c), s	2.7	16.4	29.5	0.0	20.8	38.9
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	200	842	650	552	1452	668
V/C Ratio(X)	0.43	0.55	0.94	0.00	0.67	1.12
Avail Cap(c_a), veh/h	202	851	657	558	1452	668
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	21.1	17.2	27.8	0.0	20.2	25.3
Incr Delay (d2), s/veh	1.5	0.7	22.4	0.0	1.2	73.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	8.3	18.7	0.0	9.8	39.6
LnGrp Delay(d),s/veh	22.6	17.9	50.3	0.0	21.4	99.0
LnGrp LOS	C	B	D		C	F
Approach Vol, veh/h		549	614		1723	
Approach Delay, s/veh		18.7	50.3		55.2	
Approach LOS		B	D		E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				46.2		43.4	9.5	36.7
Change Period (Y+Rc), s				4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s				42.1		38.9	5.1	32.5
Max Q Clear Time (g_c+I1), s				18.4		40.9	4.7	31.5
Green Ext Time (p_c), s				7.9		0.0	0.0	0.7

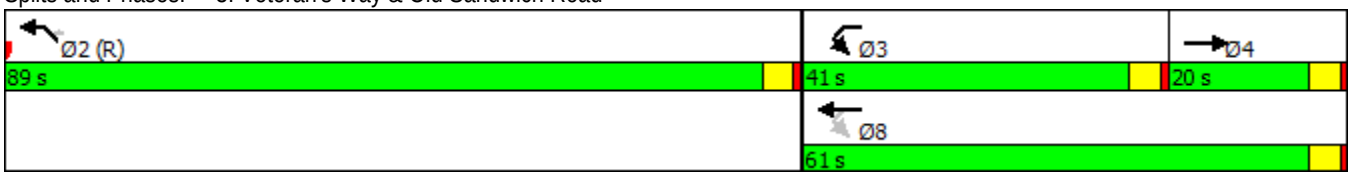
Intersection Summary	
HCM 2010 Ctrl Delay	47.2
HCM 2010 LOS	D

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	370	10	500	120	25	1230
Future Volume (vph)	370	10	500	120	25	1230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	500		0	0
Storage Lanes		0	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt	0.996					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3424	0	1719	1810	1719	1538
Flt Permitted			0.200		0.950	
Satd. Flow (perm)	3424	0	362	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	1					767
Link Speed (mph)	30			30	30	
Link Distance (ft)	1661			1791	761	
Travel Time (s)	37.8			40.7	17.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	402	11	543	130	27	1337
Shared Lane Traffic (%)						
Lane Group Flow (vph)	413	0	543	130	27	1337
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	100		20	100	20	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	6		20	6	20	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	20.0		9.5	20.0	20.0	20.0
Total Split (s)	20.0		41.0	61.0	89.0	89.0
Total Split (%)	13.3%		27.3%	40.7%	59.3%	59.3%
Maximum Green (s)	15.5		36.5	56.5	84.5	84.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		Min	Min	C-Min	C-Min
Act Effct Green (s)	15.5		56.5	56.5	84.5	84.5
Actuated g/C Ratio	0.10		0.38	0.38	0.56	0.56
v/c Ratio	1.17		1.17	0.19	0.03	1.11
Control Delay	157.5		135.1	32.4	14.7	77.9
Queue Delay	0.0		0.0	0.0	0.0	0.1
Total Delay	157.5		135.1	32.4	14.7	78.0
LOS	F		F	C	B	E
Approach Delay	157.5			115.3	76.7	
Approach LOS	F			F	E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:NWL and 6:, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.17			
Intersection Signal Delay: 100.9		Intersection LOS: F	
Intersection Capacity Utilization 94.2%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 3: Veteran's Way & Old Sandwich Road





Lane Group	EBT	WBL	WBT	NWL	NWR
Lane Group Flow (vph)	413	543	130	27	1337
v/c Ratio	1.17	1.17	0.19	0.03	1.11
Control Delay	157.5	135.1	32.4	14.7	77.9
Queue Delay	0.0	0.0	0.0	0.0	0.1
Total Delay	157.5	135.1	32.4	14.7	78.0
Queue Length 50th (ft)	~252	~580	85	11	~1148
Queue Length 95th (ft)	#366	#817	137	27	#1420
Internal Link Dist (ft)	1581		1711	681	
Turn Bay Length (ft)		500			
Base Capacity (vph)	354	466	681	968	1201
Starvation Cap Reductn	0	0	0	0	19
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.17	1.17	0.19	0.03	1.13

Intersection Summary

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

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

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	370	10	500	120	25	1230
Future Volume (vph)	370	10	500	120	25	1230
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	4.5	4.5
Lane Util. Factor	0.95		1.00	1.00	1.00	1.00
Frt	1.00		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3424		1719	1810	1719	1538
Flt Permitted	1.00		0.20	1.00	0.95	1.00
Satd. Flow (perm)	3424		362	1810	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	402	11	543	130	27	1337
RTOR Reduction (vph)	1	0	0	0	0	335
Lane Group Flow (vph)	412	0	543	130	27	1002
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Actuated Green, G (s)	15.5		56.5	56.5	84.5	84.5
Effective Green, g (s)	15.5		56.5	56.5	84.5	84.5
Actuated g/C Ratio	0.10		0.38	0.38	0.56	0.56
Clearance Time (s)	4.5		4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	353		466	681	968	866
v/s Ratio Prot	0.12		c0.28	0.07	0.02	
v/s Ratio Perm			c0.16			c0.65
v/c Ratio	1.17		1.17	0.19	0.03	1.16
Uniform Delay, d1	67.2		44.9	31.4	14.5	32.8
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	101.7		95.6	0.1	0.1	83.6
Delay (s)	168.9		140.5	31.5	14.6	116.4
Level of Service	F		F	C	B	F
Approach Delay (s)	168.9			119.5	114.4	
Approach LOS	F			F	F	

Intersection Summary			
HCM 2000 Control Delay	125.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	94.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	370	10	500	120	25	1230
Future Volume (veh/h)	370	10	500	120	25	1230
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1900	1810	1810	1810	1810
Adj Flow Rate, veh/h	402	11	543	130	27	0
Adj No. of Lanes	2	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	353	10	467	682	971	866
Arrive On Green	0.10	0.10	0.24	0.38	0.56	0.00
Sat Flow, veh/h	3509	93	1723	1810	1723	1538
Grp Volume(v), veh/h	202	211	543	130	27	0
Grp Sat Flow(s),veh/h/ln	1719	1793	1723	1810	1723	1538
Q Serve(g_s), s	15.5	15.5	36.5	7.2	1.0	0.0
Cycle Q Clear(g_c), s	15.5	15.5	36.5	7.2	1.0	0.0
Prop In Lane		0.05	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	178	185	467	682	971	866
V/C Ratio(X)	1.14	1.14	1.16	0.19	0.03	0.00
Avail Cap(c_a), veh/h	178	185	467	682	971	866
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.76	0.76	0.71	0.00
Uniform Delay (d), s/veh	67.3	67.3	45.0	31.4	14.5	0.0
Incr Delay (d2), s/veh	108.9	108.7	89.8	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.7	13.3	31.0	3.6	0.5	0.0
LnGrp Delay(d),s/veh	176.1	175.9	134.9	31.5	14.6	0.0
LnGrp LOS	F	F	F	C	B	
Approach Vol, veh/h	413			673	27	
Approach Delay, s/veh	176.0			114.9	14.6	
Approach LOS	F			F	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		89.0	41.0	20.0				61.0
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5
Max Green Setting (Gmax), s		84.5	36.5	15.5				56.5
Max Q Clear Time (g_c+I1), s		3.0	38.5	17.5				9.2
Green Ext Time (p_c), s		0.1	0.0	0.0				3.6

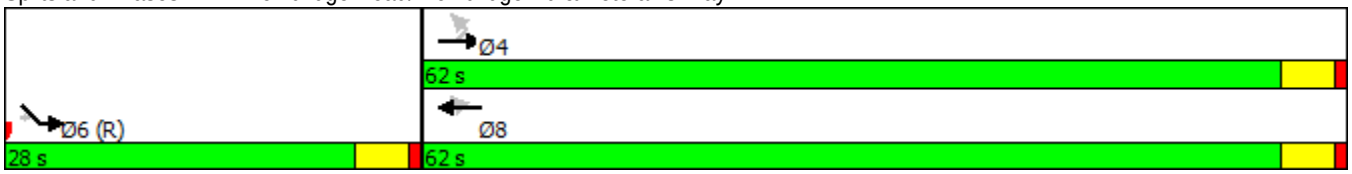
Intersection Summary	
HCM 2010 Ctrl Delay	135.1
HCM 2010 LOS	F

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	485	70	260	770	365	145
Future Volume (vph)	485	70	260	770	365	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	250
Storage Lanes	0			1	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected		0.958			0.950	
Satd. Flow (prot)	0	1734	1810	1538	1719	1538
Flt Permitted		0.556			0.950	
Satd. Flow (perm)	0	1006	1810	1538	1719	1538
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				837		158
Link Speed (mph)		30	30		30	
Link Distance (ft)		1220	221		761	
Travel Time (s)		27.7	5.0		17.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	527	76	283	837	397	158
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	603	283	837	397	158
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (ft)	20	100	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Detector Phase	4	4	8	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	62.0	62.0	62.0	62.0	28.0	28.0
Total Split (%)	68.9%	68.9%	68.9%	68.9%	31.1%	31.1%
Maximum Green (s)	57.5	57.5	57.5	57.5	23.5	23.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		4.5	4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Min	Min	Min	Min	C-Min	C-Min
Act Effct Green (s)		56.4	56.4	56.4	24.6	24.6
Actuated g/C Ratio		0.63	0.63	0.63	0.27	0.27
v/c Ratio		0.96	0.25	0.66	0.84	0.30
Control Delay		44.7	7.9	3.3	49.9	6.2
Queue Delay		0.0	0.0	0.0	0.0	0.0
Total Delay		44.7	7.9	3.3	49.9	6.2
LOS		D	A	A	D	A
Approach Delay		44.7	4.5		37.5	
Approach LOS		D	A		D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:SEL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 23.2		Intersection LOS: C	
Intersection Capacity Utilization 85.7%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 7: Trowbridge Road/Trowbridge Rd & Veteran's Way

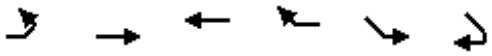




Lane Group	EBT	WBT	WBR	SEL	SER
Lane Group Flow (vph)	603	283	837	397	158
v/c Ratio	0.96	0.25	0.66	0.84	0.30
Control Delay	44.7	7.9	3.3	49.9	6.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	44.7	7.9	3.3	49.9	6.2
Queue Length 50th (ft)	278	62	0	217	0
Queue Length 95th (ft)	#539	98	39	#382	46
Internal Link Dist (ft)	1140	141		681	
Turn Bay Length (ft)					250
Base Capacity (vph)	642	1156	1284	470	535
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	0.94	0.24	0.65	0.84	0.30

Intersection Summary

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



Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	485	70	260	770	365	145
Future Volume (vph)	485	70	260	770	365	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00
Frt		1.00	1.00	0.85	1.00	0.85
Flt Protected		0.96	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1734	1810	1538	1719	1538
Flt Permitted		0.56	1.00	1.00	0.95	1.00
Satd. Flow (perm)		1006	1810	1538	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	527	76	283	837	397	158
RTOR Reduction (vph)	0	0	0	312	0	115
Lane Group Flow (vph)	0	603	283	525	397	43
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)		56.4	56.4	56.4	24.6	24.6
Effective Green, g (s)		56.4	56.4	56.4	24.6	24.6
Actuated g/C Ratio		0.63	0.63	0.63	0.27	0.27
Clearance Time (s)		4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		630	1134	963	469	420
v/s Ratio Prot			0.16		c0.23	
v/s Ratio Perm		c0.60		0.34		0.03
v/c Ratio		0.96	0.25	0.54	0.85	0.10
Uniform Delay, d1		15.7	7.4	9.5	30.9	24.4
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		25.4	0.1	0.6	17.0	0.5
Delay (s)		41.0	7.6	10.2	47.9	24.9
Level of Service		D	A	B	D	C
Approach Delay (s)		41.0	9.5		41.4	
Approach LOS		D	A		D	

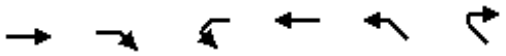
Intersection Summary			
HCM 2000 Control Delay	25.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (veh/h)	485	70	260	770	365	145
Future Volume (veh/h)	485	70	260	770	365	145
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1810	1810	1810	1810	1810
Adj Flow Rate, veh/h	527	76	283	0	397	0
Adj No. of Lanes	0	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	620	79	1134	964	471	421
Arrive On Green	0.63	0.63	0.63	0.00	0.27	0.00
Sat Flow, veh/h	870	125	1810	1538	1723	1538
Grp Volume(v), veh/h	603	0	283	0	397	0
Grp Sat Flow(s),veh/h/ln	995	0	1810	1538	1723	1538
Q Serve(g_s), s	46.6	0.0	6.2	0.0	19.6	0.0
Cycle Q Clear(g_c), s	52.8	0.0	6.2	0.0	19.6	0.0
Prop In Lane	0.87			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	698	0	1134	964	471	421
V/C Ratio(X)	0.86	0.00	0.25	0.00	0.84	0.00
Avail Cap(c_a), veh/h	712	0	1156	983	471	421
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.09	0.00
Uniform Delay (d), s/veh	19.1	0.0	7.4	0.0	30.9	0.0
Incr Delay (d2), s/veh	10.5	0.0	0.1	0.0	1.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.3	0.0	3.1	0.0	9.5	0.0
LnGrp Delay(d),s/veh	29.7	0.0	7.6	0.0	32.7	0.0
LnGrp LOS	C		A		C	
Approach Vol, veh/h		603	283		397	
Approach Delay, s/veh		29.7	7.6		32.7	
Approach LOS		C	A		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				60.9		29.1		60.9
Change Period (Y+Rc), s				4.5		4.5		4.5
Max Green Setting (Gmax), s				57.5		23.5		57.5
Max Q Clear Time (g_c+I1), s				54.8		21.6		8.2
Green Ext Time (p_c), s				1.6		0.3		8.8

Intersection Summary	
HCM 2010 Ctrl Delay	25.7
HCM 2010 LOS	C



Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	175	25	25	140	15	20
Future Volume (vph)	175	25	25	140	15	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.983				0.922	
Flt Protected				0.993	0.979	
Satd. Flow (prot)	1779	0	0	1797	1633	0
Flt Permitted				0.993	0.979	
Satd. Flow (perm)	1779	0	0	1797	1633	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1661			1631	761	
Travel Time (s)	37.8			37.1	17.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	190	27	27	152	16	22
Shared Lane Traffic (%)						
Lane Group Flow (vph)	217	0	0	179	38	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 32.8%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	175	25	25	140	15	20
Future Volume (Veh/h)	175	25	25	140	15	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	190	27	27	152	16	22
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			217		410	204
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			217		410	204
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		97	97
cM capacity (veh/h)			1335		580	830

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	217	179	38
Volume Left	0	27	16
Volume Right	27	0	22
cSH	1700	1335	703
Volume to Capacity	0.13	0.02	0.05
Queue Length 95th (ft)	0	2	4
Control Delay (s)	0.0	1.3	10.4
Lane LOS		A	B
Approach Delay (s)	0.0	1.3	10.4
Approach LOS			B

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	32.8%	ICU Level of Service	A
Analysis Period (min)	15		

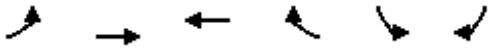
Intersection	
Int Delay, s/veh	1.4

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	175	25	25	140	15	20
Future Vol, veh/h	175	25	25	140	15	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	190	27	27	152	16	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	217	0	411	204
Stage 1	-	-	-	-	204	-
Stage 2	-	-	-	-	207	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1335	-	591	829
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	821	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1335	-	578	829
Mov Cap-2 Maneuver	-	-	-	-	578	-
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	803	-

Approach	EB	WB	NW
HCM Control Delay, s	0	1.2	10.4
HCM LOS			B

Minor Lane/Major Mvmt	NWLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	699	-	-	1335	-
HCM Lane V/C Ratio	0.054	-	-	0.02	-
HCM Control Delay (s)	10.4	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.1	-



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	1560	1295	150	70	125
Future Volume (vph)	15	1560	1295	150	70	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200			400	0	0
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1810	1810	1538	1719	1538
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1719	1810	1810	1538	1719	1538
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				163		79
Link Speed (mph)		30	30		30	
Link Distance (ft)		912	966		164	
Travel Time (s)		20.7	22.0		3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	1696	1408	163	76	136
Shared Lane Traffic (%)						
Lane Group Flow (vph)	16	1696	1408	163	76	136
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (ft)	20	100	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	5	Free!	6		4!	4 5
Permitted Phases				6		

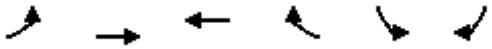
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	5		6	6	4	4 5
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	
Minimum Split (s)	20.0		20.0	20.0	20.0	
Total Split (s)	20.0		110.0	110.0	20.0	
Total Split (%)	13.3%		73.3%	73.3%	13.3%	
Maximum Green (s)	16.0		106.0	106.0	16.0	
Yellow Time (s)	3.5		3.5	3.5	3.5	
All-Red Time (s)	0.5		0.5	0.5	0.5	
Lost Time Adjust (s)	-1.0		-1.0	-1.0	-1.0	
Total Lost Time (s)	3.0		3.0	3.0	3.0	
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	None		Min	Min	None	
Walk Time (s)			5.0	5.0		
Flash Dont Walk (s)			11.0	11.0		
Pedestrian Calls (#/hr)			15	15		
Act Effct Green (s)	7.9	136.3	107.1	107.1	12.3	23.2
Actuated g/C Ratio	0.06	1.00	0.79	0.79	0.09	0.17
v/c Ratio	0.16	0.94	0.99	0.13	0.49	0.42
Control Delay	65.9	11.8	37.2	0.9	70.0	25.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.9	11.8	37.2	0.9	70.0	25.8
LOS	E	B	D	A	E	C
Approach Delay		12.3	33.4		41.6	
Approach LOS		B	C		D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 136.3			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.99			
Intersection Signal Delay: 23.6		Intersection LOS: C	
Intersection Capacity Utilization 92.7%		ICU Level of Service F	
Analysis Period (min) 15			

! Phase conflict between lane groups.

Splits and Phases: 3: Bourne Rotary Connector/Sandwich Road & Old Sandwich Road

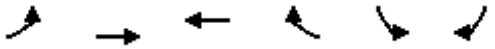




Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	16	1696	1408	163	76	136
v/c Ratio	0.16	0.94	0.99	0.13	0.49	0.42
Control Delay	65.9	11.8	37.2	0.9	70.0	25.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.9	11.8	37.2	0.9	70.0	25.8
Queue Length 50th (ft)	14	0	1014	0	65	44
Queue Length 95th (ft)	40	#42	#1674	17	120	108
Internal Link Dist (ft)		832	886		84	
Turn Bay Length (ft)	200			400		
Base Capacity (vph)	214	1810	1422	1243	214	424
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	0.94	0.99	0.13	0.36	0.32

Intersection Summary

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

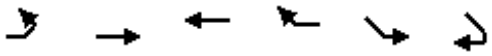


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	1560	1295	150	70	125
Future Volume (vph)	15	1560	1295	150	70	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1719	1810	1810	1538	1719	1538
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1719	1810	1810	1538	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	1696	1408	163	76	136
RTOR Reduction (vph)	0	0	0	35	0	66
Lane Group Flow (vph)	16	1696	1408	128	76	70
Turn Type	Prot	NA	NA	Perm	Prot	pt+ov
Protected Phases	5	Free!	6		4!	4 5
Permitted Phases				6		
Actuated Green, G (s)	6.9	136.3	106.1	106.1	11.3	22.2
Effective Green, g (s)	7.9	136.3	107.1	107.1	12.3	23.2
Actuated g/C Ratio	0.06	1.00	0.79	0.79	0.09	0.17
Clearance Time (s)	4.0		4.0	4.0	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	99	1810	1422	1208	155	261
v/s Ratio Prot	0.01	0.94	c0.78		0.04	0.05
v/s Ratio Perm				0.08		
v/c Ratio	0.16	0.94	0.99	0.11	0.49	0.27
Uniform Delay, d1	61.1	0.0	14.1	3.4	59.0	49.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	10.7	21.4	0.0	2.4	0.6
Delay (s)	61.8	10.7	35.5	3.5	61.4	49.7
Level of Service	E	B	D	A	E	D
Approach Delay (s)		11.2	32.2		53.9	
Approach LOS		B	C		D	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	136.3	Sum of lost time (s)	9.0
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		

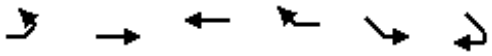
! Phase conflict between lane groups.
c Critical Lane Group

HCM 2010 analysis cannot be performed with phasing conflicts.



Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	10	555	350	25	40	10
Future Volume (vph)	10	555	350	25	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.991		0.972	
Flt Protected		0.999			0.962	
Satd. Flow (prot)	0	1808	1793	0	1692	0
Flt Permitted		0.999			0.962	
Satd. Flow (perm)	0	1808	1793	0	1692	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		1220	221		761	
Travel Time (s)		27.7	5.0		17.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	603	380	27	43	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	614	407	0	54	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 47.2%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (veh/h)	10	555	350	25	40	10
Future Volume (Veh/h)	10	555	350	25	40	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	603	380	27	43	11
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	407				1018	394
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	407				1018	394
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				83	98
cM capacity (veh/h)	1136				257	649

Direction, Lane #	EB 1	WB 1	SE 1
Volume Total	614	407	54
Volume Left	11	0	43
Volume Right	0	27	11
cSH	1136	1700	293
Volume to Capacity	0.01	0.24	0.18
Queue Length 95th (ft)	1	0	17
Control Delay (s)	0.3	0.0	20.0
Lane LOS	A		C
Approach Delay (s)	0.3	0.0	20.0
Approach LOS			C

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

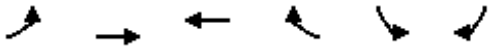
Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations		↑	↱		⋔	
Traffic Vol, veh/h	10	555	350	25	40	10
Future Vol, veh/h	10	555	350	25	40	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	11	603	380	27	43	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	408	0	-	0	1019	394
Stage 1	-	-	-	-	394	-
Stage 2	-	-	-	-	625	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1135	-	-	-	259	649
Stage 1	-	-	-	-	675	-
Stage 2	-	-	-	-	528	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1135	-	-	-	255	649
Mov Cap-2 Maneuver	-	-	-	-	255	-
Stage 1	-	-	-	-	675	-
Stage 2	-	-	-	-	520	-

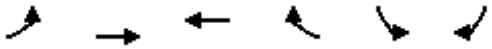
Approach	EB	WB	SE
HCM Control Delay, s	0.1	0	20.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1135	-	-	-	290
HCM Lane V/C Ratio	0.01	-	-	-	0.187
HCM Control Delay (s)	8.2	-	-	-	20.3
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.7



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	15	710	1295	150	0	125
Future Volume (vph)	15	710	1295	150	0	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.986			0.865
Flt Protected		0.999				
Satd. Flow (prot)	0	1808	1784	0	0	1565
Flt Permitted		0.999				
Satd. Flow (perm)	0	1808	1784	0	0	1565
Link Speed (mph)		30	30		30	
Link Distance (ft)		912	966		164	
Travel Time (s)		20.7	22.0		3.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	772	1408	163	0	136
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	788	1571	0	0	136
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		0	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 91.7%		ICU Level of Service F	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	15	710	1295	150	0	125
Future Volume (Veh/h)	15	710	1295	150	0	125
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	772	1408	163	0	136
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	1408				2294	1490
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1408				2294	1490
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	9
cM capacity (veh/h)	475				41	150

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	788	1571	136
Volume Left	16	0	0
Volume Right	0	163	136
cSH	475	1700	150
Volume to Capacity	0.03	0.92	0.91
Queue Length 95th (ft)	3	0	158
Control Delay (s)	1.0	0.0	109.7
Lane LOS	A		F
Approach Delay (s)	1.0	0.0	109.7
Approach LOS			F

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	4.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	710	1295	150	0	125
Future Vol, veh/h	15	710	1295	150	0	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	16	772	1408	163	0	136

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1408	0	-	0	-	1408
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	4.15	-	-	-	-	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.245	-	-	-	-	3.345
Pot Cap-1 Maneuver	475	-	-	0	0	167
Stage 1	-	-	-	0	0	-
Stage 2	-	-	-	0	0	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	475	-	-	-	-	167
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	82.9
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1
Capacity (veh/h)	475	-	-	167
HCM Lane V/C Ratio	0.034	-	-	0.814
HCM Control Delay (s)	12.8	0	-	82.9
HCM Lane LOS	B	A	-	F
HCM 95th %tile Q(veh)	0.1	-	-	5.5

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	185	40	10	155	25	10
Future Volume (vph)	185	40	10	155	25	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.976				0.961	
Flt Protected				0.997	0.966	
Satd. Flow (prot)	1766	0	0	1804	1680	0
Flt Permitted				0.997	0.966	
Satd. Flow (perm)	1766	0	0	1804	1680	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1661			1631	761	
Travel Time (s)	37.8			37.1	17.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	201	43	11	168	27	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	244	0	0	179	38	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 26.4%		ICU Level of Service A	
Analysis Period (min) 15			

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	185	40	10	155	25	10
Future Volume (Veh/h)	185	40	10	155	25	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	201	43	11	168	27	11
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			244		412	222
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			244		412	222
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		95	99
cM capacity (veh/h)			1305		585	810

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	244	179	38
Volume Left	0	11	27
Volume Right	43	0	11
cSH	1700	1305	636
Volume to Capacity	0.14	0.01	0.06
Queue Length 95th (ft)	0	1	5
Control Delay (s)	0.0	0.5	11.0
Lane LOS		A	B
Approach Delay (s)	0.0	0.5	11.0
Approach LOS			B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	26.4%	ICU Level of Service	A
Analysis Period (min)	15		

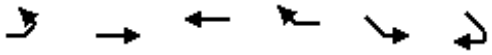
Intersection	
Int Delay, s/veh	1.1

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Vol, veh/h	185	40	10	155	25	10
Future Vol, veh/h	185	40	10	155	25	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	201	43	11	168	27	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	245	0	413	223
Stage 1	-	-	-	-	223	-
Stage 2	-	-	-	-	190	-
Critical Hdwy	-	-	4.15	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.245	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1304	-	590	809
Stage 1	-	-	-	-	807	-
Stage 2	-	-	-	-	835	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1304	-	585	809
Mov Cap-2 Maneuver	-	-	-	-	585	-
Stage 1	-	-	-	-	807	-
Stage 2	-	-	-	-	827	-

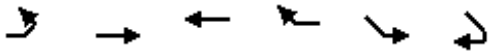
Approach	EB	WB	NW
HCM Control Delay, s	0	0.5	11
HCM LOS			B

Minor Lane/Major Mvmt	NWLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	635	-	-	1304	-
HCM Lane V/C Ratio	0.06	-	-	0.008	-
HCM Control Delay (s)	11	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-



Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	10	555	350	25	40	10
Future Volume (vph)	10	555	350	25	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.991		0.972	
Flt Protected		0.999			0.962	
Satd. Flow (prot)	0	1808	1793	0	1692	0
Flt Permitted		0.999			0.962	
Satd. Flow (perm)	0	1808	1793	0	1692	0
Link Speed (mph)		30	30		30	
Link Distance (ft)		1220	221		761	
Travel Time (s)		27.7	5.0		17.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	603	380	27	43	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	614	407	0	54	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 47.2%		ICU Level of Service A	
Analysis Period (min) 15			



Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (veh/h)	10	555	350	25	40	10
Future Volume (Veh/h)	10	555	350	25	40	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	603	380	27	43	11
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	407				1018	394
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	407				1018	394
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				83	98
cM capacity (veh/h)	1136				257	649

Direction, Lane #	EB 1	WB 1	SE 1
Volume Total	614	407	54
Volume Left	11	0	43
Volume Right	0	27	11
cSH	1136	1700	293
Volume to Capacity	0.01	0.24	0.18
Queue Length 95th (ft)	1	0	17
Control Delay (s)	0.3	0.0	20.0
Lane LOS	A		C
Approach Delay (s)	0.3	0.0	20.0
Approach LOS			C

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

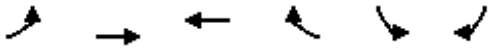
Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations		↑	↱		⋔	
Traffic Vol, veh/h	10	555	350	25	40	10
Future Vol, veh/h	10	555	350	25	40	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	11	603	380	27	43	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	408	0	-	0	1019	394
Stage 1	-	-	-	-	394	-
Stage 2	-	-	-	-	625	-
Critical Hdwy	4.15	-	-	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	2.245	-	-	-	3.545	3.345
Pot Cap-1 Maneuver	1135	-	-	-	259	649
Stage 1	-	-	-	-	675	-
Stage 2	-	-	-	-	528	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1135	-	-	-	255	649
Mov Cap-2 Maneuver	-	-	-	-	255	-
Stage 1	-	-	-	-	675	-
Stage 2	-	-	-	-	520	-

Approach	EB	WB	SE
HCM Control Delay, s	0.1	0	20.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SELn1
Capacity (veh/h)	1135	-	-	-	290
HCM Lane V/C Ratio	0.01	-	-	-	0.187
HCM Control Delay (s)	8.2	-	-	-	20.3
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.7

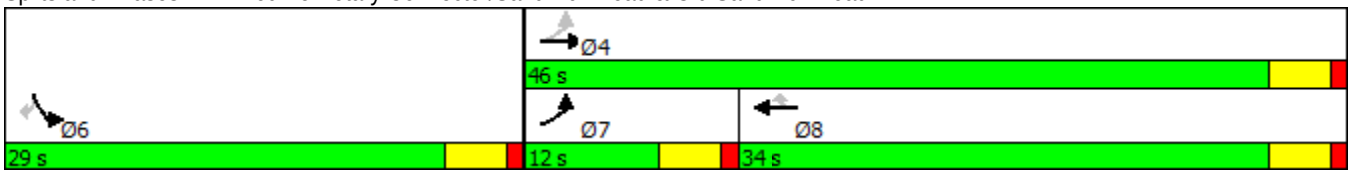


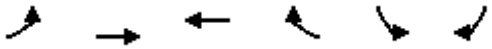
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	215	710	605	810	875	475
Future Volume (vph)	215	710	605	810	875	475
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	400			425	300	0
Storage Lanes	1			1	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1810	1810	1538	3335	1538
Flt Permitted	0.118				0.950	
Satd. Flow (perm)	214	1810	1810	1538	3335	1538
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				871		316
Link Speed (mph)		30	30		30	
Link Distance (ft)		912	966		1791	
Travel Time (s)		20.7	22.0		40.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	234	772	658	880	951	516
Shared Lane Traffic (%)						
Lane Group Flow (vph)	234	772	658	880	951	516
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		12	12		24	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (ft)	20	100	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Detector Phase	7	4	8	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	20.0	22.5	22.5	22.5	22.5
Total Split (s)	12.0	46.0	34.0	34.0	29.0	29.0
Total Split (%)	16.0%	61.3%	45.3%	45.3%	38.7%	38.7%
Maximum Green (s)	7.5	41.5	29.5	29.5	24.5	24.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?	Yes		Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Min	Min	Min	Min	None	None
Walk Time (s)			7.0	7.0	7.0	7.0
Flash Dont Walk (s)			11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)			0	0	0	0
Act Effct Green (s)	41.4	41.4	29.4	29.4	24.0	24.0
Actuated g/C Ratio	0.56	0.56	0.40	0.40	0.32	0.32
v/c Ratio	0.87	0.77	0.92	0.78	0.88	0.73
Control Delay	46.0	19.4	42.8	7.2	35.6	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.0	19.4	42.8	7.2	35.6	15.3
LOS	D	B	D	A	D	B
Approach Delay		25.6	22.4		28.4	
Approach LOS		C	C		C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 75			
Actuated Cycle Length: 74.4			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.92			
Intersection Signal Delay: 25.4		Intersection LOS: C	
Intersection Capacity Utilization 80.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 2: Bourne Rotary Connector/Sandwich Road & Old Sandwich Road

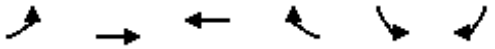




Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	234	772	658	880	951	516
v/c Ratio	0.87	0.77	0.92	0.78	0.88	0.73
Control Delay	46.0	19.4	42.8	7.2	35.6	15.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.0	19.4	42.8	7.2	35.6	15.3
Queue Length 50th (ft)	57	258	284	3	211	73
Queue Length 95th (ft)	#182	409	#492	90	#319	192
Internal Link Dist (ft)		832	886		1711	
Turn Bay Length (ft)	400			425	300	
Base Capacity (vph)	270	1009	717	1135	1098	718
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	0.87	0.77	0.92	0.78	0.87	0.72

Intersection Summary

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



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	215	710	605	810	875	475
Future Volume (vph)	215	710	605	810	875	475
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	1.00	1.00	1.00	0.97	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1719	1810	1810	1538	3335	1538
Flt Permitted	0.12	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	214	1810	1810	1538	3335	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	234	772	658	880	951	516
RTOR Reduction (vph)	0	0	0	527	0	214
Lane Group Flow (vph)	234	772	658	353	951	302
Turn Type	pm+pt	NA	NA	Perm	Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)	41.4	41.4	29.4	29.4	24.0	24.0
Effective Green, g (s)	41.4	41.4	29.4	29.4	24.0	24.0
Actuated g/C Ratio	0.56	0.56	0.40	0.40	0.32	0.32
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	270	1007	715	607	1075	496
v/s Ratio Prot	0.09	c0.43	0.36		c0.29	
v/s Ratio Perm	c0.39			0.23		0.20
v/c Ratio	0.87	0.77	0.92	0.58	0.88	0.61
Uniform Delay, d1	16.1	12.8	21.4	17.7	23.9	21.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	24.0	3.5	17.1	1.4	8.9	2.1
Delay (s)	40.1	16.3	38.5	19.1	32.8	23.4
Level of Service	D	B	D	B	C	C
Approach Delay (s)		21.8	27.4		29.4	
Approach LOS		C	C		C	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	74.4	Sum of lost time (s)	13.5
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	215	710	605	810	875	475
Future Volume (veh/h)	215	710	605	810	875	475
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810	1810	1810	1810
Adj Flow Rate, veh/h	234	772	658	0	951	516
Adj No. of Lanes	1	1	1	1	2	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	302	998	707	601	1097	504
Arrive On Green	0.10	0.55	0.39	0.00	0.33	0.33
Sat Flow, veh/h	1723	1810	1810	1538	3343	1538
Grp Volume(v), veh/h	234	772	658	0	951	516
Grp Sat Flow(s),veh/h/ln	1723	1810	1810	1538	1672	1538
Q Serve(g_s), s	5.7	24.9	26.0	0.0	20.0	24.5
Cycle Q Clear(g_c), s	5.7	24.9	26.0	0.0	20.0	24.5
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	302	998	707	601	1097	504
V/C Ratio(X)	0.78	0.77	0.93	0.00	0.87	1.02
Avail Cap(c_a), veh/h	302	1005	715	607	1097	504
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	16.3	13.1	21.8	0.0	23.6	25.1
Incr Delay (d2), s/veh	12.0	3.8	18.7	0.0	7.5	46.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	13.3	16.5	0.0	10.3	23.8
LnGrp Delay(d),s/veh	28.3	16.9	40.4	0.0	31.1	71.1
LnGrp LOS	C	B	D		C	F
Approach Vol, veh/h		1006	658		1467	
Approach Delay, s/veh		19.5	40.4		45.2	
Approach LOS		B	D		D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6	7	8
Phs Duration (G+Y+Rc), s				45.7		29.0	12.0	33.7
Change Period (Y+Rc), s				4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s				41.5		24.5	7.5	29.5
Max Q Clear Time (g_c+I1), s				26.9		26.5	7.7	28.0
Green Ext Time (p_c), s				8.6		0.0	0.0	1.2

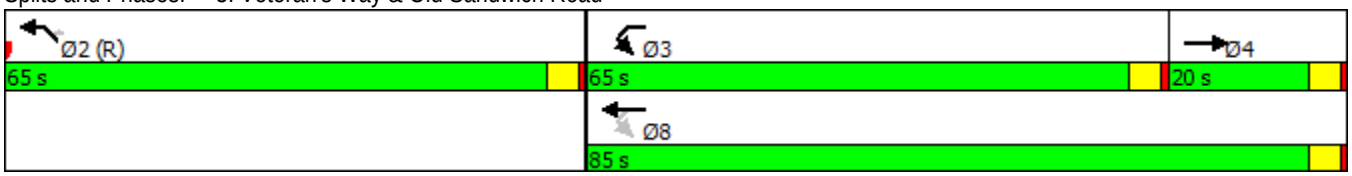
Intersection Summary	
HCM 2010 Ctrl Delay	35.9
HCM 2010 LOS	D

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	210	15	870	155	45	1175
Future Volume (vph)	210	15	870	155	45	1175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	500		0	0
Storage Lanes		0	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	0.95	1.00	1.00	1.00	1.00
Frt	0.990					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3404	0	1719	1810	1719	1538
Flt Permitted			0.269		0.950	
Satd. Flow (perm)	3404	0	487	1810	1719	1538
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	4					880
Link Speed (mph)	30			30	30	
Link Distance (ft)	1661			1791	761	
Travel Time (s)	37.8			40.7	17.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	16	946	168	49	1277
Shared Lane Traffic (%)						
Lane Group Flow (vph)	244	0	946	168	49	1277
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Number of Detectors	2		1	2	1	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	100		20	100	20	20
Trailing Detector (ft)	0		0	0	0	0
Detector 1 Position(ft)	0		0	0	0	0
Detector 1 Size(ft)	6		20	6	20	20
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2

Lane Group	EBT	EBR	WBL	WBT	NWL	NWR
Detector Phase	4		3	8	2	2
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	20.0		9.5	20.0	20.0	20.0
Total Split (s)	20.0		65.0	85.0	65.0	65.0
Total Split (%)	13.3%		43.3%	56.7%	43.3%	43.3%
Maximum Green (s)	15.5		60.5	80.5	60.5	60.5
Yellow Time (s)	3.5		3.5	3.5	3.5	3.5
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5		4.5	4.5	4.5	4.5
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Recall Mode	Min		Min	Min	C-Min	C-Min
Act Effct Green (s)	14.4		79.4	79.4	61.6	61.6
Actuated g/C Ratio	0.10		0.53	0.53	0.41	0.41
v/c Ratio	0.74		1.25	0.18	0.07	1.11
Control Delay	78.6		157.5	18.7	27.8	76.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	78.6		157.5	18.7	27.8	76.2
LOS	E		F	B	C	E
Approach Delay	78.6			136.5	74.4	
Approach LOS	E			F	E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:NWL and 6:, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.25			
Intersection Signal Delay: 100.6		Intersection LOS: F	
Intersection Capacity Utilization 86.5%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 3: Veteran's Way & Old Sandwich Road





Lane Group	EBT	WBL	WBT	NWL	NWR
Lane Group Flow (vph)	244	946	168	49	1277
v/c Ratio	0.74	1.25	0.18	0.07	1.11
Control Delay	78.6	157.5	18.7	27.8	76.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	78.6	157.5	18.7	27.8	76.2
Queue Length 50th (ft)	121	~1087	82	29	~885
Queue Length 95th (ft)	171	#1353	125	58	#1157
Internal Link Dist (ft)	1581		1711	681	
Turn Bay Length (ft)		500			
Base Capacity (vph)	355	754	971	705	1150
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	0.69	1.25	0.17	0.07	1.11

Intersection Summary

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

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

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (vph)	210	15	870	155	45	1175
Future Volume (vph)	210	15	870	155	45	1175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	4.5	4.5
Lane Util. Factor	0.95		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3404		1719	1810	1719	1538
Flt Permitted	1.00		0.27	1.00	0.95	1.00
Satd. Flow (perm)	3404		487	1810	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	228	16	946	168	49	1277
RTOR Reduction (vph)	4	0	0	0	0	519
Lane Group Flow (vph)	240	0	946	168	49	758
Turn Type	NA		pm+pt	NA	Prot	Perm
Protected Phases	4		3	8	2	
Permitted Phases			8			2
Actuated Green, G (s)	14.4		79.4	79.4	61.6	61.6
Effective Green, g (s)	14.4		79.4	79.4	61.6	61.6
Actuated g/C Ratio	0.10		0.53	0.53	0.41	0.41
Clearance Time (s)	4.5		4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	326		754	958	705	631
v/s Ratio Prot	0.07		c0.51	0.09	0.03	
v/s Ratio Perm			c0.16			c0.49
v/c Ratio	0.74		1.25	0.18	0.07	1.20
Uniform Delay, d1	66.0		36.2	18.3	26.8	44.2
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	8.4		125.3	0.1	0.2	105.5
Delay (s)	74.4		161.5	18.4	27.0	149.7
Level of Service	E		F	B	C	F
Approach Delay (s)	74.4			139.9	145.1	
Approach LOS	E			F	F	

Intersection Summary			
HCM 2000 Control Delay	136.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	210	15	870	155	45	1175
Future Volume (veh/h)	210	15	870	155	45	1175
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1900	1810	1810	1810	1810
Adj Flow Rate, veh/h	228	16	946	168	49	0
Adj No. of Lanes	2	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	284	20	763	942	723	645
Arrive On Green	0.09	0.09	0.40	0.52	0.42	0.00
Sat Flow, veh/h	3352	227	1723	1810	1723	1538
Grp Volume(v), veh/h	119	125	946	168	49	0
Grp Sat Flow(s),veh/h/ln	1719	1769	1723	1810	1723	1538
Q Serve(g_s), s	10.2	10.4	60.5	7.4	2.5	0.0
Cycle Q Clear(g_c), s	10.2	10.4	60.5	7.4	2.5	0.0
Prop In Lane		0.13	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	150	154	763	942	723	645
V/C Ratio(X)	0.80	0.81	1.24	0.18	0.07	0.00
Avail Cap(c_a), veh/h	178	183	763	971	723	645
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.51	0.51	0.53	0.00
Uniform Delay (d), s/veh	67.2	67.2	35.4	19.0	26.0	0.0
Incr Delay (d2), s/veh	19.0	19.9	113.8	0.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	5.9	55.7	3.7	1.2	0.0
LnGrp Delay(d),s/veh	86.2	87.1	149.2	19.1	26.1	0.0
LnGrp LOS	F	F	F	B	C	
Approach Vol, veh/h	244			1114	49	
Approach Delay, s/veh	86.7			129.6	26.1	
Approach LOS	F			F	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		67.4	65.0	17.6				82.6
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5
Max Green Setting (Gmax), s		60.5	60.5	15.5				80.5
Max Q Clear Time (g_c+I1), s		4.5	62.5	12.4				9.4
Green Ext Time (p_c), s		0.1	0.0	0.7				2.7

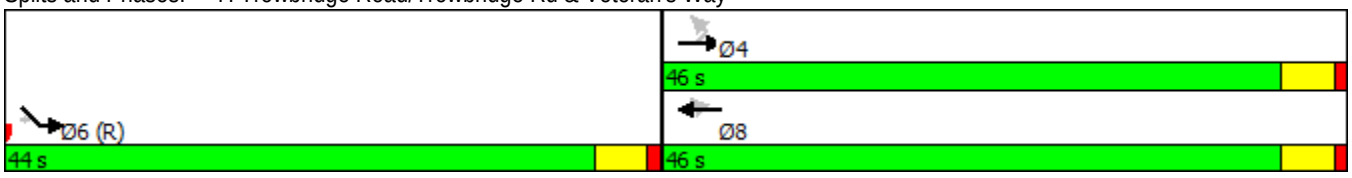
Intersection Summary	
HCM 2010 Ctrl Delay	118.6
HCM 2010 LOS	F

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	335	230	165	885	690	195
Future Volume (vph)	335	230	165	885	690	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	250
Storage Lanes	0			1	1	1
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850		0.850
Flt Protected		0.971			0.950	
Satd. Flow (prot)	0	1757	1810	1538	1719	1538
Flt Permitted		0.703			0.950	
Satd. Flow (perm)	0	1272	1810	1538	1719	1538
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				962		212
Link Speed (mph)		30	30		30	
Link Distance (ft)		1220	221		761	
Travel Time (s)		27.7	5.0		17.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	364	250	179	962	750	212
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	614	179	962	750	212
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(ft)		0	0		12	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	2	2	1	1	1
Detector Template	Left	Thru	Thru	Right	Left	Right
Leading Detector (ft)	20	100	100	20	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	6	20	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94	94			
Detector 2 Size(ft)		6	6			
Detector 2 Type		Cl+Ex	Cl+Ex			
Detector 2 Channel						
Detector 2 Extend (s)		0.0	0.0			
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6

Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Detector Phase	4	4	8	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	46.0	46.0	46.0	46.0	44.0	44.0
Total Split (%)	51.1%	51.1%	51.1%	51.1%	48.9%	48.9%
Maximum Green (s)	41.5	41.5	41.5	41.5	39.5	39.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		4.5	4.5	4.5	4.5	4.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	Min	Min	Min	Min	C-Min	C-Min
Act Effct Green (s)		41.5	41.5	41.5	39.5	39.5
Actuated g/C Ratio		0.46	0.46	0.46	0.44	0.44
v/c Ratio		1.05	0.21	0.78	0.99	0.27
Control Delay		76.6	15.4	6.6	58.5	3.2
Queue Delay		0.0	0.0	0.0	0.0	0.0
Total Delay		76.6	15.4	6.6	58.5	3.2
LOS		E	B	A	E	A
Approach Delay		76.6	8.0		46.3	
Approach LOS		E	A		D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 0 (0%), Referenced to phase 2: and 6:SEL, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.05			
Intersection Signal Delay: 37.1		Intersection LOS: D	
Intersection Capacity Utilization 92.9%		ICU Level of Service F	
Analysis Period (min) 15			

Splits and Phases: 7: Trowbridge Road/Trowbridge Rd & Veteran's Way



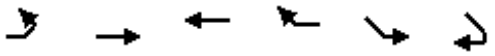


Lane Group	EBT	WBT	WBR	SEL	SER
Lane Group Flow (vph)	614	179	962	750	212
v/c Ratio	1.05	0.21	0.78	0.99	0.27
Control Delay	76.6	15.4	6.6	58.5	3.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	76.6	15.4	6.6	58.5	3.2
Queue Length 50th (ft)	~383	59	0	411	0
Queue Length 95th (ft)	#588	100	73	#663	38
Internal Link Dist (ft)	1140	141		681	
Turn Bay Length (ft)					250
Base Capacity (vph)	586	834	1227	754	793
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.05	0.21	0.78	0.99	0.27

Intersection Summary

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

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



Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (vph)	335	230	165	885	690	195
Future Volume (vph)	335	230	165	885	690	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00
Frt		1.00	1.00	0.85	1.00	0.85
Flt Protected		0.97	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1757	1810	1538	1719	1538
Flt Permitted		0.70	1.00	1.00	0.95	1.00
Satd. Flow (perm)		1273	1810	1538	1719	1538
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	364	250	179	962	750	212
RTOR Reduction (vph)	0	0	0	518	0	119
Lane Group Flow (vph)	0	614	179	444	750	93
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Actuated Green, G (s)		41.5	41.5	41.5	39.5	39.5
Effective Green, g (s)		41.5	41.5	41.5	39.5	39.5
Actuated g/C Ratio		0.46	0.46	0.46	0.44	0.44
Clearance Time (s)		4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		586	834	709	754	675
v/s Ratio Prot			0.10		c0.44	
v/s Ratio Perm		c0.48		0.29		0.06
v/c Ratio		1.05	0.21	0.63	0.99	0.14
Uniform Delay, d1		24.2	14.5	18.4	25.1	15.1
Progression Factor		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		50.3	0.1	1.7	31.5	0.4
Delay (s)		74.5	14.6	20.1	56.7	15.5
Level of Service		E	B	C	E	B
Approach Delay (s)		74.5	19.2		47.6	
Approach LOS		E	B		D	

Intersection Summary			
HCM 2000 Control Delay	41.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations						
Traffic Volume (veh/h)	335	230	165	885	690	195
Future Volume (veh/h)	335	230	165	885	690	195
Number	7	4	8	18	1	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1810	1810	1810	1810	1810
Adj Flow Rate, veh/h	364	250	179	0	750	0
Adj No. of Lanes	0	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	5	5	5
Cap, veh/h	389	223	834	709	756	675
Arrive On Green	0.46	0.46	0.46	0.00	0.44	0.00
Sat Flow, veh/h	705	484	1810	1538	1723	1538
Grp Volume(v), veh/h	614	0	179	0	750	0
Grp Sat Flow(s),veh/h/ln	1189	0	1810	1538	1723	1538
Q Serve(g_s), s	36.2	0.0	5.3	0.0	38.9	0.0
Cycle Q Clear(g_c), s	41.5	0.0	5.3	0.0	38.9	0.0
Prop In Lane	0.59			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	612	0	834	709	756	675
V/C Ratio(X)	1.00	0.00	0.21	0.00	0.99	0.00
Avail Cap(c_a), veh/h	612	0	834	709	756	675
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.09	0.00
Uniform Delay (d), s/veh	28.8	0.0	14.5	0.0	25.1	0.0
Incr Delay (d2), s/veh	37.3	0.0	0.1	0.0	8.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	21.5	0.0	2.7	0.0	20.0	0.0
LnGrp Delay(d),s/veh	66.1	0.0	14.6	0.0	33.2	0.0
LnGrp LOS	F		B		C	
Approach Vol, veh/h		614	179		750	
Approach Delay, s/veh		66.1	14.6		33.2	
Approach LOS		E	B		C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		8
Phs Duration (G+Y+Rc), s				46.0		44.0		46.0
Change Period (Y+Rc), s				4.5		4.5		4.5
Max Green Setting (Gmax), s				41.5		39.5		41.5
Max Q Clear Time (g_c+I1), s				43.5		40.9		7.3
Green Ext Time (p_c), s				0.0		0.0		6.6

Intersection Summary	
HCM 2010 Ctrl Delay	44.1
HCM 2010 LOS	D

Relocated Exit 1C

Intersection	
Intersection Delay, s/veh	16.0
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1028	510	162	799
Demand Flow Rate, veh/h	1048	520	165	816
Vehicles Circulating, veh/h	365	875	1170	420
Vehicles Exiting, veh/h	870	460	243	975
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	21.2	14.3	12.5	11.2
Approach LOS	C	B	B	B

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	L	TR	LT	R	LT	R	LT	R
Assumed Moves	L	TR	LT	R	LT	R	LT	R
RT Channelized								
Lane Util	0.693	0.307	0.627	0.373	0.903	0.097	0.442	0.558
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	726	322	326	194	149	16	361	455
Cap Entry Lane, veh/h	859	875	586	612	470	498	825	842
Entry HV Adj Factor	0.981	0.981	0.981	0.979	0.979	1.000	0.979	0.980
Flow Entry, veh/h	712	316	320	190	146	16	353	446
Cap Entry, veh/h	843	858	575	600	460	498	807	825
V/C Ratio	0.845	0.368	0.556	0.317	0.317	0.032	0.438	0.540
Control Delay, s/veh	26.9	8.5	16.6	10.3	13.0	7.6	10.1	12.1
LOS	D	A	C	B	B	A	B	B
95th %tile Queue, veh	10	2	3	1	1	0	2	3



Lane Group	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	0	0	325	410	0	880
Future Volume (vph)	0	0	325	410	0	880
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	0	0		0	0	
Taper Length (ft)	25				25	
Link Speed (mph)	30		30			30
Link Distance (ft)	241		270			223
Travel Time (s)	5.5		6.1			5.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	799	0	0	957

Intersection Summary	
Area Type:	Other

Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	0	945	375	0	0	410
Future Volume (vph)	0	945	375	0	0	410
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			0	0	1
Taper Length (ft)	25				25	
Link Speed (mph)		30	30		30	
Link Distance (ft)		347	241		241	
Travel Time (s)		7.9	5.5		5.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1027	408	0	0	446

Intersection Summary	
Area Type:	Other

Lane Group	EBL	EBT	EBR	EBR2	WBT	WBR	NBL2	NBL	NBR	NBR2	SEL	SET
Lane Configurations												
Traffic Volume (vph)	655	40	150	100	80	50	85	50	5	10	45	165
Future Volume (vph)	655	40	150	100	80	50	85	50	5	10	45	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%				0%
Storage Length (ft)	0		0			0		0	0		0	
Storage Lanes	1		0			0		1	1		0	
Taper Length (ft)	25							25			25	
Link Speed (mph)		30			30			30				30
Link Distance (ft)		241			708			406				223
Travel Time (s)		5.5			16.1			9.2				5.1
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%				0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	712	315	0	0	141	0	0	146	16	0	0	228

Intersection Summary	
Area Type:	Other

Lane Group	SER	NWL2	NWL	NWT	NWR
Lane Configurations					
Traffic Volume (vph)	115	5	210	125	5
Future Volume (vph)	115	5	210	125	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12
Grade (%)				0%	
Storage Length (ft)	0		0		0
Storage Lanes	1		1		0
Taper Length (ft)			25		
Link Speed (mph)				30	
Link Distance (ft)				398	
Travel Time (s)				9.0	
Confl. Peds. (#/hr)					
Confl. Bikes (#/hr)					
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0
Parking (#/hr)					
Mid-Block Traffic (%)				0%	
Shared Lane Traffic (%)					
Lane Group Flow (vph)	125	0	233	141	0

Intersection Summary

Intersection	
Intersection Delay, s/veh	15.9
Intersection LOS	C

Approach	EB	WB	NB	SE
Entry Lanes	2	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	1027	141	162	353
Demand Flow Rate, veh/h	1047	144	165	361
Vehicles Circulating, veh/h	365	1252	1169	421
Vehicles Exiting, veh/h	416	104	243	975
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	21.2	12.7	12.4	7.0
Approach LOS	C	B	B	A

Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	L	TR	LTR	L	TR	LT	R
Assumed Moves	L	TR	LTR	L	TR	LT	R
RT Channelized							
Lane Util	0.693	0.307	1.000	0.903	0.097	0.645	0.355
Critical Headway, s	4.293	4.113	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	726	321	144	149	16	233	128
Cap Entry Lane, veh/h	859	875	470	470	499	824	842
Entry HV Adj Factor	0.981	0.982	0.981	0.981	1.000	0.980	0.977
Flow Entry, veh/h	712	315	141	146	16	228	125
Cap Entry, veh/h	843	859	461	461	499	808	822
V/C Ratio	0.845	0.367	0.306	0.317	0.032	0.283	0.152
Control Delay, s/veh	26.9	8.4	12.7	13.0	7.6	7.6	5.9
LOS	D	A	B	B	A	A	A
95th %tile Queue, veh	10	2	1	1	0	1	1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Approach	NW
Entry Lanes	2
Conflicting Circle Lanes	2
Adj Approach Flow, veh/h	374
Demand Flow Rate, veh/h	382
Vehicles Circulating, veh/h	974
Vehicles Exiting, veh/h	360
Follow-Up Headway, s	3.186
Ped Vol Crossing Leg, #/h	0
Ped Cap Adj	1.000
Approach Delay, s/veh	12.5
Approach LOS	B

Lane	Left	Right
Designated Moves	L	TR
Assumed Moves	L	TR
RT Channelized		
Lane Util	0.623	0.377
Critical Headway, s	4.293	4.113
Entry Flow, veh/h	238	144
Cap Entry Lane, veh/h	544	571
Entry HV Adj Factor	0.979	0.981
Flow Entry, veh/h	233	141
Cap Entry, veh/h	533	561
V/C Ratio	0.437	0.252
Control Delay, s/veh	14.1	9.8
LOS	B	A
95th %tile Queue, veh	2	1

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	45	165	0	215	125	5	705	45	160	0	80	50
Future Volume (vph)	45	165	0	215	125	5	705	45	160	0	80	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		306			430			137			707	
Travel Time (s)		7.0			9.8			3.1			16.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)							34%					
Lane Group Flow (vph)	49	179	0	234	141	0	506	483	0	0	141	0
Turn Type	Perm	NA		Perm	NA		Split	NA			NA	
Protected Phases		6			2		4	4		3	3	
Permitted Phases	6			2						8		
Detector Phase	6	6		2	2		4	4		3	3	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	23.5	23.5		23.5	23.5		23.5	23.5		10.5	10.5	
Total Split (s)	30.0	30.0		30.0	30.0		29.0	29.0		11.0	11.0	
Total Split (%)	42.9%	42.9%		42.9%	42.9%		41.4%	41.4%		15.7%	15.7%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5			5.5	
Lead/Lag							Lag	Lag		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	Min	Min		None	None		Min	Min		None	None	
v/c Ratio	0.14	0.35		0.71	0.28		0.80	0.76			0.76	
Control Delay	17.3	19.7		32.9	18.3		15.3	11.3			51.6	
Queue Delay	0.0	0.0		72.3	0.0		0.5	0.6			15.1	
Total Delay	17.3	19.7		105.2	18.3		15.8	11.9			66.7	
Queue Length 50th (ft)	14	54		80	41		22	10			41	
Queue Length 95th (ft)	36	99		149	79		m#323	m#65			#140	
Internal Link Dist (ft)		226			350			57			627	
Turn Bay Length (ft)												
Base Capacity (vph)	485	727		468	725		629	638			186	
Starvation Cap Reductn	0	0		0	0		14	25			0	

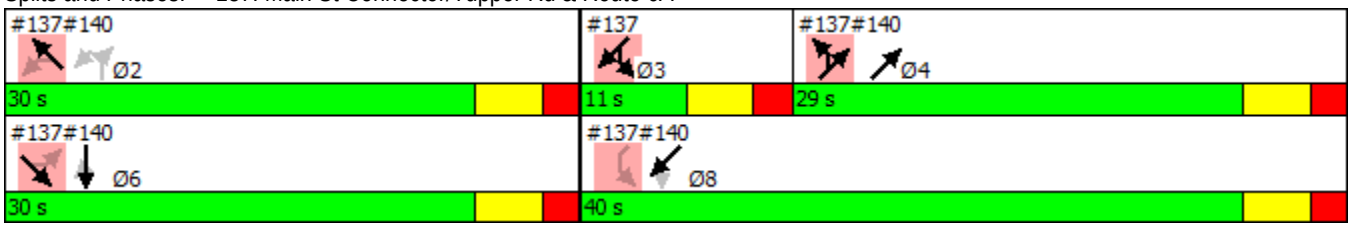
Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	23.5
Total Split (s)	40.0
Total Split (%)	57%
Yellow Time (s)	3.5
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Spillback Cap Reductn	0	0		340	0		0	0			32	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.10	0.25		1.83	0.19		0.82	0.79			0.92	

Intersection Summary	
Area Type:	Other
Cycle Length: 70	
Actuated Cycle Length: 63.2	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	

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: 137: Main St Connector/Tupper Rd & Route 6A



Lane Group	Ø8
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWT
Lane Group Flow (vph)	49	179	234	141	506	483	141
v/c Ratio	0.14	0.35	0.71	0.28	0.80	0.76	0.76
Control Delay	17.3	19.7	32.9	18.3	15.3	11.3	51.6
Queue Delay	0.0	0.0	72.3	0.0	0.5	0.6	15.1
Total Delay	17.3	19.7	105.2	18.3	15.8	11.9	66.7
Queue Length 50th (ft)	14	54	80	41	22	10	41
Queue Length 95th (ft)	36	99	149	79	m#323	m#65	#140
Internal Link Dist (ft)		226		350		57	627
Turn Bay Length (ft)							
Base Capacity (vph)	485	727	468	725	629	638	186
Starvation Cap Reductn	0	0	0	0	14	25	0
Spillback Cap Reductn	0	0	340	0	0	0	32
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.25	1.83	0.19	0.82	0.79	0.92

Intersection Summary

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

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	45	165	0	215	125	5	705	45	160	0	80	50
Future Volume (vph)	45	165	0	215	125	5	705	45	160	0	80	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5		5.5	5.5			5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		0.95	0.95			1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.95			0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.97			1.00	
Satd. Flow (prot)	1770	1863		1770	1853		1681	1630			1766	
Flt Permitted	0.67	1.00		0.64	1.00		0.95	0.97			1.00	
Satd. Flow (perm)	1243	1863		1200	1853		1681	1630			1766	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	179	0	234	136	5	766	49	174	0	87	54
RTOR Reduction (vph)	0	0	0	0	2	0	0	27	0	0	32	0
Lane Group Flow (vph)	49	179	0	234	139	0	506	456	0	0	109	0
Turn Type	Perm	NA		Perm	NA		Split	NA			NA	
Protected Phases		6			2		4	4		3	3	
Permitted Phases	6			2						8		
Actuated Green, G (s)	17.4	17.4		17.4	17.4		23.8	23.8			5.5	
Effective Green, g (s)	17.4	17.4		17.4	17.4		23.8	23.8			5.5	
Actuated g/C Ratio	0.28	0.28		0.28	0.28		0.38	0.38			0.09	
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	5.5			5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	342	512		330	510		633	613			153	
v/s Ratio Prot		0.10			0.07		c0.30	0.28			c0.06	
v/s Ratio Perm	0.04			c0.19								
v/c Ratio	0.14	0.35		0.71	0.27		0.80	0.74			0.71	
Uniform Delay, d1	17.3	18.4		20.6	17.9		17.6	17.1			28.1	
Progression Factor	1.00	1.00		1.00	1.00		0.24	0.19			1.00	
Incremental Delay, d2	0.2	0.4		6.8	0.3		4.7	3.2			14.5	
Delay (s)	17.5	18.8		27.4	18.2		9.0	6.5			42.6	
Level of Service	B	B		C	B		A	A			D	
Approach Delay (s)		18.5			24.0			7.7			42.6	
Approach LOS		B			C			A			D	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	63.2	Sum of lost time (s)	16.5
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 methodology does not support clustered intersections.

Lane Group	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	0	0	210	525	0	880
Future Volume (vph)	0	0	210	525	0	880
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	0	0		0	0	
Taper Length (ft)	25				25	
Link Speed (mph)	30		30			30
Link Distance (ft)	301		380			306
Travel Time (s)	6.8		8.6			7.0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	799	0	0	957
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	85	0	65	0	115	410	0	845	100	5	290	0
Future Volume (vph)	85	0	65	0	115	410	0	845	100	5	290	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		0	0		0
Storage Lanes	1		1	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		388			301			786			137	
Travel Time (s)		8.8			6.8			17.9			3.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	92	0	71	0	125	446	0	1027	0	0	320	0
Turn Type	Perm		Perm		NA	Perm		NA		Perm	NA	
Protected Phases					6			4			8	
Permitted Phases	2		2			6				8		
Detector Phase	2		2		6	6		4		8	8	
Switch Phase												
Minimum Initial (s)	5.0		5.0		5.0	5.0		5.0		5.0	5.0	
Minimum Split (s)	23.5		23.5		23.5	23.5		23.5		23.5	23.5	
Total Split (s)	30.0		30.0		30.0	30.0		29.0		40.0	40.0	
Total Split (%)	42.9%		42.9%		42.9%	42.9%		41.4%		57.1%	57.1%	
Yellow Time (s)	3.5		3.5		3.5	3.5		3.5		3.5	3.5	
All-Red Time (s)	2.0		2.0		2.0	2.0		2.0		2.0	2.0	
Lost Time Adjust (s)	0.0		0.0		0.0	0.0		0.0			0.0	
Total Lost Time (s)	5.5		5.5		5.5	5.5		5.5			5.5	
Lead/Lag								Lag				
Lead-Lag Optimize?								Yes				
Recall Mode	None		None		Min	Min		Min		None	None	
v/c Ratio	0.27		0.14		0.24	0.59		0.78			0.32	
Control Delay	19.2		1.5		18.3	5.5		23.9			17.0	
Queue Delay	0.0		0.0		0.0	0.0		0.1			62.7	
Total Delay	19.2		1.5		18.3	5.5		24.0			79.7	
Queue Length 50th (ft)	27		0		37	0		177			108	
Queue Length 95th (ft)	60		8		72	56		#323			m221	
Internal Link Dist (ft)		308			221			706			57	
Turn Bay Length (ft)						150						
Base Capacity (vph)	492		694		727	889		1317			1009	
Starvation Cap Reductn	0		0		0	0		0			773	

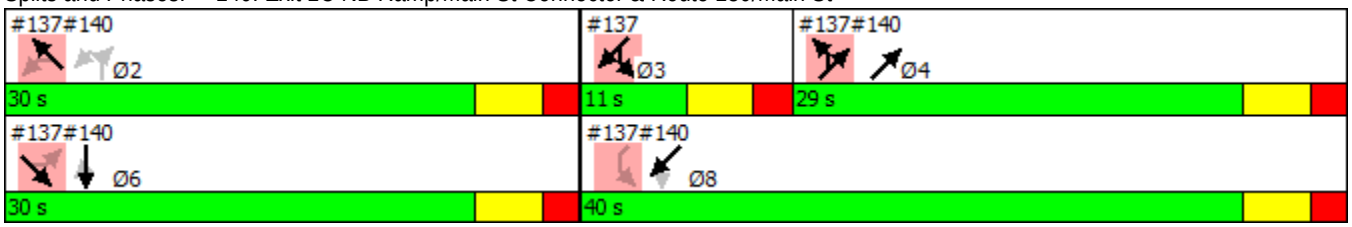
Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	10.5
Total Split (s)	11.0
Total Split (%)	16%
Yellow Time (s)	3.5
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Spillback Cap Reductn	0		75		0	0		11			0	
Storage Cap Reductn	0		0		0	0		0			0	
Reduced v/c Ratio	0.19		0.11		0.17	0.50		0.79			1.36	

Intersection Summary	
Area Type:	Other
Cycle Length: 70	
Actuated Cycle Length: 63.2	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	

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: 140: Exit 1C NB Ramp/Main St Connector & Route 130/Main St



Lane Group	Ø3
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	NBL	NBR	SBT	SBR	NET	SWT
Lane Group Flow (vph)	92	71	125	446	1027	320
v/c Ratio	0.27	0.14	0.24	0.59	0.78	0.32
Control Delay	19.2	1.5	18.3	5.5	23.9	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.1	62.7
Total Delay	19.2	1.5	18.3	5.5	24.0	79.7
Queue Length 50th (ft)	27	0	37	0	177	108
Queue Length 95th (ft)	60	8	72	56	#323	m221
Internal Link Dist (ft)			221		706	57
Turn Bay Length (ft)				150		
Base Capacity (vph)	492	694	727	889	1317	1009
Starvation Cap Reductn	0	0	0	0	0	773
Spillback Cap Reductn	0	75	0	0	11	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.11	0.17	0.50	0.79	1.36

Intersection Summary

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

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	85	0	65	0	115	410	0	845	100	5	290	0
Future Volume (vph)	85	0	65	0	115	410	0	845	100	5	290	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5		5.5		5.5	5.5		5.5			5.5	
Lane Util. Factor	1.00		1.00		1.00	1.00		0.95			1.00	
Frt	1.00		0.85		1.00	0.85		0.98			1.00	
Flt Protected	0.95		1.00		1.00	1.00		1.00			1.00	
Satd. Flow (prot)	1770		1583		1863	1583		3483			1861	
Flt Permitted	0.68		1.00		1.00	1.00		1.00			0.99	
Satd. Flow (perm)	1261		1583		1863	1583		3483			1835	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	0	71	0	125	446	0	918	109	5	315	0
RTOR Reduction (vph)	0	0	51	0	0	323	0	12	0	0	0	0
Lane Group Flow (vph)	92	0	20	0	125	123	0	1015	0	0	320	0
Turn Type	Perm		Perm		NA	Perm		NA		Perm	NA	
Protected Phases					6			4			8	
Permitted Phases	2		2			6				8		
Actuated Green, G (s)	17.4		17.4		17.4	17.4		23.8			34.8	
Effective Green, g (s)	17.4		17.4		17.4	17.4		23.8			34.8	
Actuated g/C Ratio	0.28		0.28		0.28	0.28		0.38			0.55	
Clearance Time (s)	5.5		5.5		5.5	5.5		5.5			5.5	
Vehicle Extension (s)	3.0		3.0		3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	347		435		512	435		1311			1010	
v/s Ratio Prot					0.07			c0.29				
v/s Ratio Perm	0.07		0.01			c0.08					c0.17	
v/c Ratio	0.27		0.04		0.24	0.28		0.77			0.32	
Uniform Delay, d1	17.9		16.8		17.8	18.0		17.3			7.7	
Progression Factor	1.00		1.00		1.00	1.00		1.00			1.75	
Incremental Delay, d2	0.4		0.0		0.2	0.4		2.9			0.2	
Delay (s)	18.3		16.8		18.0	18.4		20.2			13.7	
Level of Service	B		B		B	B		C			B	
Approach Delay (s)		17.7			18.3			20.2			13.7	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	63.2	Sum of lost time (s)	16.5
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 methodology does not support clustered intersections.

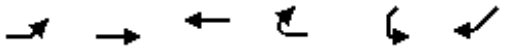
Intersection	
Intersection Delay, s/veh	90.1
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	897	1223	429	918
Demand Flow Rate, veh/h	915	1248	438	936
Vehicles Circulating, veh/h	637	1075	1242	948
Vehicles Exiting, veh/h	1247	605	310	1375
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	42.8	152.1	43.2	75.6
Approach LOS	E	F	E	F

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	L	TR	LT	R	LT	R	LT	R
Assumed Moves	L	TR	LT	R	LT	R	LT	R
RT Channelized								
Lane Util	0.751	0.249	0.564	0.436	0.886	0.114	0.669	0.331
Critical Headway, s	4.293	4.113	4.293	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	687	228	704	544	388	50	626	310
Cap Entry Lane, veh/h	701	723	505	532	445	474	555	582
Entry HV Adj Factor	0.981	0.978	0.981	0.980	0.980	0.980	0.980	0.981
Flow Entry, veh/h	674	223	690	533	380	49	614	304
Cap Entry, veh/h	688	708	495	522	436	464	544	571
V/C Ratio	0.980	0.315	1.395	1.022	0.872	0.106	1.128	0.533
Control Delay, s/veh	54.0	9.0	212.9	73.3	47.5	9.2	105.1	15.9
LOS	F	A	F	F	E	A	F	C
95th %tile Queue, veh	15	1	32	15	9	0	20	3

Lane Group	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	0	0	565	280	0	1240
Future Volume (vph)	0	0	565	280	0	1240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	0	0		0	0	
Taper Length (ft)	25				25	
Link Speed (mph)	30		30			30
Link Distance (ft)	241		270			223
Travel Time (s)	5.5		6.1			5.1
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	918	0	0	1348

Intersection Summary	
Area Type:	Other



Lane Group	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	0	825	845	0	0	280
Future Volume (vph)	0	825	845	0	0	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)		0%	0%		0%	
Storage Length (ft)	0			0	0	0
Storage Lanes	0			0	0	1
Taper Length (ft)	25				25	
Link Speed (mph)		30	30		30	
Link Distance (ft)		347	241		241	
Travel Time (s)		7.9	5.5		5.5	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	897	918	0	0	304

Intersection Summary	
Area Type:	Other

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	620	35	100	70	5	5	170	135	220	130	10	35
Future Volume (vph)	620	35	100	70	5	5	170	135	220	130	10	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%					0%			0%		
Storage Length (ft)	0		0			0		0		0	0	
Storage Lanes	1		0			0		0		1	1	
Taper Length (ft)	25					25				25		
Link Speed (mph)		30					30			30		
Link Distance (ft)		241					708			406		
Travel Time (s)		5.5					16.1			9.2		
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%					0%			0%		
Shared Lane Traffic (%)												
Lane Group Flow (vph)	674	223	0	0	0	0	342	0	0	380	49	0

Intersection Summary	
Area Type:	Other

Lane Group	SEL	SET	SER	NWL2	NWL	NWT	NWR
Lane Configurations							
Traffic Volume (vph)	85	280	200	5	455	355	20
Future Volume (vph)	85	280	200	5	455	355	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12
Grade (%)		0%				0%	
Storage Length (ft)	0		0		0		0
Storage Lanes	0		1		1		0
Taper Length (ft)	25				25		
Link Speed (mph)		30				30	
Link Distance (ft)		223				398	
Travel Time (s)		5.1				9.0	
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0
Parking (#/hr)							
Mid-Block Traffic (%)		0%				0%	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	396	217	0	500	408	0

Intersection Summary

Intersection	
Intersection Delay, s/veh	63.5
Intersection LOS	F

Approach	EB	WB	NB	SE
Entry Lanes	2	1	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	897	342	429	613
Demand Flow Rate, veh/h	915	349	438	625
Vehicles Circulating, veh/h	640	1979	1246	953
Vehicles Exiting, veh/h	938	166	309	1375
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	43.2	170.6	43.6	21.2
Approach LOS	E	F	E	C

Lane	Left	Right	Left	Left	Right	Left	Right
Designated Moves	L	TR	LTR	L	TR	LT	R
Assumed Moves	L	TR	LTR	L	TR	LT	R
RT Channelized							
Lane Util	0.751	0.249	1.000	0.886	0.114	0.646	0.354
Critical Headway, s	4.293	4.113	4.113	4.293	4.113	4.293	4.113
Entry Flow, veh/h	687	228	349	388	50	404	221
Cap Entry Lane, veh/h	699	722	283	444	472	553	580
Entry HV Adj Factor	0.981	0.979	0.981	0.980	0.980	0.980	0.982
Flow Entry, veh/h	674	223	342	380	49	396	217
Cap Entry, veh/h	686	707	277	435	463	542	569
V/C Ratio	0.983	0.316	1.234	0.874	0.106	0.731	0.381
Control Delay, s/veh	54.6	9.0	170.6	48.0	9.2	26.2	12.1
LOS	F	A	F	E	A	D	B
95th %tile Queue, veh	15	1	16	9	0	6	2

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Approach	NW
Entry Lanes	2
Conflicting Circle Lanes	2
Adj Approach Flow, veh/h	908
Demand Flow Rate, veh/h	926
Vehicles Circulating, veh/h	1219
Vehicles Exiting, veh/h	465
Follow-Up Headway, s	3.186
Ped Vol Crossing Leg, #/h	0
Ped Cap Adj	1.000
Approach Delay, s/veh	81.1
Approach LOS	F

Lane	Left	Right
Designated Moves	L	TR
Assumed Moves	L	TR
RT Channelized		
Lane Util	0.551	0.449
Critical Headway, s	4.293	4.113
Entry Flow, veh/h	510	416
Cap Entry Lane, veh/h	453	481
Entry HV Adj Factor	0.980	0.981
Flow Entry, veh/h	500	408
Cap Entry, veh/h	444	472
V/C Ratio	1.126	0.864
Control Delay, s/veh	111.6	43.8
LOS	F	E
95th %tile Queue, veh	18	9

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	85	280	80	460	355	20	750	45	135	5	175	135
Future Volume (vph)	85	280	80	460	355	20	750	45	135	5	175	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	1		0	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		306			430			137			707	
Travel Time (s)		7.0			9.8			3.1			16.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)							37%					
Lane Group Flow (vph)	92	391	0	500	408	0	513	498	0	0	342	0
Turn Type	Perm	NA		Perm	NA		Split	NA		custom	NA	
Protected Phases		6			2		4	4		3	3	
Permitted Phases	6			2						8		
Detector Phase	6	6		2	2		4	4		3	3	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	23.5	23.5		23.5	23.5		23.5	23.5		10.5	10.5	
Total Split (s)	51.0	51.0		51.0	51.0		50.0	50.0		19.0	19.0	
Total Split (%)	42.5%	42.5%		42.5%	42.5%		41.7%	41.7%		15.8%	15.8%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	5.5	5.5		5.5	5.5		5.5	5.5			5.5	
Lead/Lag							Lag	Lag		Lead	Lead	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	Min	Min		None	None		Min	Min		None	None	
v/c Ratio	0.39	0.57		2.01	0.58		0.82	0.80			1.56	
Control Delay	33.3	32.2		491.8	33.5		20.2	17.2			307.0	
Queue Delay	0.0	89.9		75.3	0.0		0.1	0.1			15.8	
Total Delay	33.3	122.1		567.1	33.5		20.2	17.4			322.8	
Queue Length 50th (ft)	51	229		~605	247		64	51			~359	
Queue Length 95th (ft)	102	330		#816	352		#567	#88			#550	
Internal Link Dist (ft)		226			350			57			627	
Turn Bay Length (ft)												
Base Capacity (vph)	236	691		249	702		623	621			219	
Starvation Cap Reductn	0	0		0	0		2	4			0	

Lane Group	Ø8
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	8
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	23.5
Total Split (s)	69.0
Total Split (%)	58%
Yellow Time (s)	3.5
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	

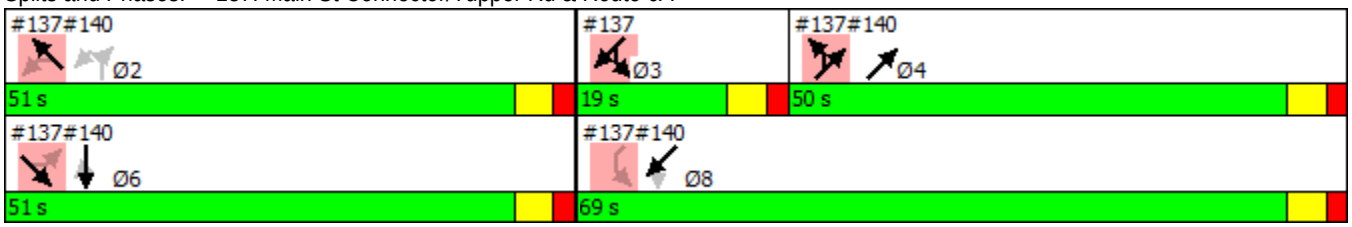
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Spillback Cap Reductn	0	627		228	0		0	0			123	
Storage Cap Reductn	0	0		0	0		0	0			0	
Reduced v/c Ratio	0.39	6.11		23.81	0.58		0.83	0.81			3.56	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	

~ 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: 137: Main St Connector/Tupper Rd & Route 6A



Lane Group	Ø8
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	SEL	SET	NWL	NWT	NEL	NET	SWT
Lane Group Flow (vph)	92	391	500	408	513	498	342
v/c Ratio	0.39	0.57	2.01	0.58	0.82	0.80	1.56
Control Delay	33.3	32.2	491.8	33.5	20.2	17.2	307.0
Queue Delay	0.0	89.9	75.3	0.0	0.1	0.1	15.8
Total Delay	33.3	122.1	567.1	33.5	20.2	17.4	322.8
Queue Length 50th (ft)	51	229	~605	247	64	51	~359
Queue Length 95th (ft)	102	330	#816	352	#567	#88	#550
Internal Link Dist (ft)		226		350		57	627
Turn Bay Length (ft)							
Base Capacity (vph)	236	691	249	702	623	621	219
Starvation Cap Reductn	0	0	0	0	2	4	0
Spillback Cap Reductn	0	627	228	0	0	0	123
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	6.11	23.81	0.58	0.83	0.81	3.56

Intersection Summary

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

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

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	85	280	80	460	355	20	750	45	135	5	175	135
Future Volume (vph)	85	280	80	460	355	20	750	45	135	5	175	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5		5.5	5.5		5.5	5.5			5.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		0.95	0.95			1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.96			0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.97			1.00	
Satd. Flow (prot)	1770	1801		1770	1848		1681	1641			1753	
Flt Permitted	0.33	1.00		0.35	1.00		0.95	0.97			1.00	
Satd. Flow (perm)	624	1801		659	1848		1681	1641			1753	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	304	87	500	386	22	815	49	147	5	190	147
RTOR Reduction (vph)	0	9	0	0	2	0	0	13	0	0	22	0
Lane Group Flow (vph)	92	382	0	500	406	0	513	485	0	0	320	0
Turn Type	Perm	NA		Perm	NA		Split	NA		custom	NA	
Protected Phases		6			2		4	4		3	3	
Permitted Phases	6			2						8		
Actuated Green, G (s)	45.5	45.5		45.5	45.5		44.5	44.5			13.5	
Effective Green, g (s)	45.5	45.5		45.5	45.5		44.5	44.5			13.5	
Actuated g/C Ratio	0.38	0.38		0.38	0.38		0.37	0.37			0.11	
Clearance Time (s)	5.5	5.5		5.5	5.5		5.5	5.5			5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	236	682		249	700		623	608			197	
v/s Ratio Prot		0.21			0.22		c0.31	0.30			c0.18	
v/s Ratio Perm	0.15			c0.76								
v/c Ratio	0.39	0.56		2.01	0.58		0.82	0.80			1.62	
Uniform Delay, d1	27.1	29.4		37.2	29.6		34.2	33.7			53.2	
Progression Factor	1.00	1.00		1.00	1.00		0.28	0.24			1.00	
Incremental Delay, d2	1.1	1.1		467.6	1.2		7.0	5.8			302.6	
Delay (s)	28.2	30.4		504.8	30.9		16.5	14.1			355.8	
Level of Service	C	C		F	C		B	B			F	
Approach Delay (s)		30.0			291.9			15.3			355.8	
Approach LOS		C			F			B			F	

Intersection Summary			
HCM 2000 Control Delay	151.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.45		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	107.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 methodology does not support clustered intersections.

Lane Group	NBL	NBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Volume (vph)	0	0	445	400	0	1240
Future Volume (vph)	0	0	445	400	0	1240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12
Grade (%)	0%		0%			0%
Storage Length (ft)	0	0		0	0	
Storage Lanes	0	0		0	0	
Taper Length (ft)	25				25	
Link Speed (mph)	30		30			30
Link Distance (ft)	301		380			306
Travel Time (s)	6.8		8.6			7.0
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	0	919	0	0	1348
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	220	0	175	0	120	280	0	755	70	90	625	0
Future Volume (vph)	220	0	175	0	120	280	0	755	70	90	625	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		150	0		0	0		0
Storage Lanes	1		1	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		388			301			786			137	
Travel Time (s)		8.8			6.8			17.9			3.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	239	0	190	0	130	304	0	897	0	0	777	0
Turn Type	Perm		Perm		NA	Perm		NA		Perm	NA	
Protected Phases					6			4			8	
Permitted Phases	2		2			6				8		
Detector Phase	2		2		6	6		4		8	8	
Switch Phase												
Minimum Initial (s)	5.0		5.0		5.0	5.0		5.0		5.0	5.0	
Minimum Split (s)	23.5		23.5		23.5	23.5		23.5		23.5	23.5	
Total Split (s)	51.0		51.0		51.0	51.0		50.0		69.0	69.0	
Total Split (%)	42.5%		42.5%		42.5%	42.5%		41.7%		57.5%	57.5%	
Yellow Time (s)	3.5		3.5		3.5	3.5		3.5		3.5	3.5	
All-Red Time (s)	2.0		2.0		2.0	2.0		2.0		2.0	2.0	
Lost Time Adjust (s)	0.0		0.0		0.0	0.0		0.0			0.0	
Total Lost Time (s)	5.5		5.5		5.5	5.5		5.5			5.5	
Lead/Lag								Lag				
Lead-Lag Optimize?								Yes				
Recall Mode	None		None		Min	Min		Min		None	None	
v/c Ratio	0.51		0.26		0.18	0.42		0.69			2.23	
Control Delay	33.3		4.4		25.8	10.9		34.9			580.3	
Queue Delay	0.0		0.1		0.0	0.0		0.1			21.4	
Total Delay	33.3		4.5		25.8	10.9		35.0			601.7	
Queue Length 50th (ft)	141		0		67	51		303			~1008	
Queue Length 95th (ft)	223		47		113	125		377			m#504	
Internal Link Dist (ft)		308			221			706			57	
Turn Bay Length (ft)						150						
Base Capacity (vph)	472		718		706	726		1300			348	
Starvation Cap Reductn	0		0		0	0		0			251	

Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	
Confl. Bikes (#/hr)	
Peak Hour Factor	
Growth Factor	
Heavy Vehicles (%)	
Bus Blockages (#/hr)	
Parking (#/hr)	
Mid-Block Traffic (%)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	10.5
Total Split (s)	19.0
Total Split (%)	16%
Yellow Time (s)	3.5
All-Red Time (s)	2.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Recall Mode	None
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Spillback Cap Reductn	0		90		0	0		18			0	
Storage Cap Reductn	0		0		0	0		0			0	
Reduced v/c Ratio	0.51		0.30		0.18	0.42		0.70			8.01	

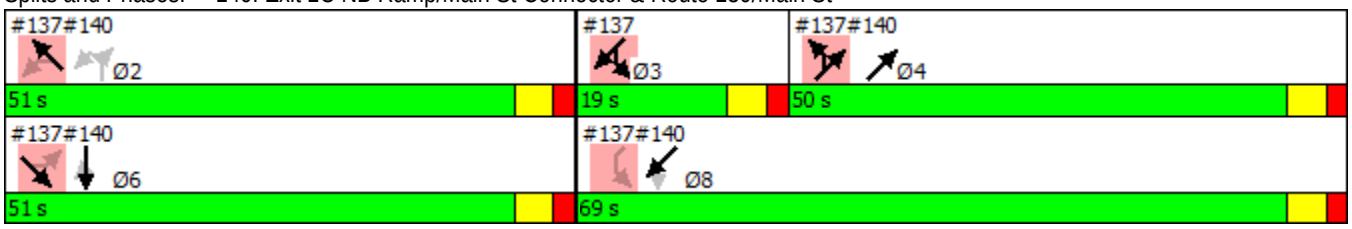
Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	

~ 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: 140: Exit 1C NB Ramp/Main St Connector & Route 130/Main St



Lane Group	Ø3
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	NBL	NBR	SBT	SBR	NET	SWT
Lane Group Flow (vph)	239	190	130	304	897	777
v/c Ratio	0.51	0.26	0.18	0.42	0.69	2.23
Control Delay	33.3	4.4	25.8	10.9	34.9	580.3
Queue Delay	0.0	0.1	0.0	0.0	0.1	21.4
Total Delay	33.3	4.5	25.8	10.9	35.0	601.7
Queue Length 50th (ft)	141	0	67	51	303	~1008
Queue Length 95th (ft)	223	47	113	125	377	m#504
Internal Link Dist (ft)			221		706	57
Turn Bay Length (ft)				150		
Base Capacity (vph)	472	718	706	726	1300	348
Starvation Cap Reductn	0	0	0	0	0	251
Spillback Cap Reductn	0	90	0	0	18	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.30	0.18	0.42	0.70	8.01

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

Movement	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	220	0	175	0	120	280	0	755	70	90	625	0
Future Volume (vph)	220	0	175	0	120	280	0	755	70	90	625	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5		5.5		5.5	5.5		5.5			5.5	
Lane Util. Factor	1.00		1.00		1.00	1.00		0.95			1.00	
Frt	1.00		0.85		1.00	0.85		0.99			1.00	
Flt Protected	0.95		1.00		1.00	1.00		1.00			0.99	
Satd. Flow (prot)	1770		1583		1863	1583		3494			1851	
Flt Permitted	0.67		1.00		1.00	1.00		1.00			0.35	
Satd. Flow (perm)	1247		1583		1863	1583		3494			658	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	0	190	0	130	304	0	821	76	98	679	0
RTOR Reduction (vph)	0	0	118	0	0	126	0	6	0	0	0	0
Lane Group Flow (vph)	239	0	72	0	130	178	0	891	0	0	777	0
Turn Type	Perm		Perm		NA	Perm		NA		Perm	NA	
Protected Phases					6			4			8	
Permitted Phases	2		2			6				8		
Actuated Green, G (s)	45.5		45.5		45.5	45.5		44.5			63.5	
Effective Green, g (s)	45.5		45.5		45.5	45.5		44.5			63.5	
Actuated g/C Ratio	0.38		0.38		0.38	0.38		0.37			0.53	
Clearance Time (s)	5.5		5.5		5.5	5.5		5.5			5.5	
Vehicle Extension (s)	3.0		3.0		3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)	472		600		706	600		1295			348	
v/s Ratio Prot					0.07			0.26				
v/s Ratio Perm	c0.19		0.05			0.11					c1.18	
v/c Ratio	0.51		0.12		0.18	0.30		0.69			2.23	
Uniform Delay, d1	28.6		24.2		24.9	26.1		31.9			28.2	
Progression Factor	1.00		1.00		1.00	1.00		1.00			1.75	
Incremental Delay, d2	0.9		0.1		0.1	0.3		1.5			555.6	
Delay (s)	29.5		24.3		25.0	26.3		33.4			604.9	
Level of Service	C		C		C	C		C			F	
Approach Delay (s)		27.2			25.9			33.4			604.9	
Approach LOS		C			C			C			F	

Intersection Summary			
HCM 2000 Control Delay	206.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.59		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	92.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM 2010 methodology does not support clustered intersections.