

## Appendices

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## Appendix A: Public Involvement Plan

# Public Involvement Plan

## 1 STUDY OVERVIEW AND GOALS

### 1.1 I-90 INTERCHANGE STUDY OVERVIEW

The Massachusetts Department of Transportation (MassDOT) is conducting a conceptual planning study examining the feasibility of a new interchange on Interstate 90 (I-90, also known as the Massachusetts Turnpike) between the existing interchanges located in the City of Westfield and the Town of Lee. The study was established by state legislation and requires MassDOT to examine and evaluate the costs and economic opportunities related to the interchange, including projected capital and operating costs; use levels; environmental and community impacts; potential funding sources; and economic, social and cultural benefits that could accrue to the surrounding communities and the Commonwealth.

The Study Area includes the corridor of I-90 from Exit 2 in Lee to Exit 3 in Westfield. The goals of the study are to improve regional access to and from I-90 for the regional study area and to mitigate I-90-bound traffic to and from Lee and Westfield.

Led by the Office of Transportation Planning (OTP), the study team will work with the community Working Group representatives, elected officials, and the public to review and discuss the goals and objectives for the project. The study team will present evaluation criteria by which alternatives can be assessed.

The study will examine and evaluate the alternatives to the extent possible in the context of vehicular, bicycle and pedestrian use, transit use, land use, and cost, as well as resulting economic, social and cultural impacts. The alternatives will be evaluated relative to criteria that relate to the study goals and objectives. The study will produce a final report that includes the study's analytical findings; preliminary cost estimates; recommendations; and other relevant details.

### 1.2 GOALS OF THE PUBLIC INVOLVEMENT PLAN

The consultant team, led by AECOM, with support from Regina Villa Associates (RVA), will assist MassDOT with public involvement and outreach efforts, consistent with MassDOT's Public Participation Plan. This Public Involvement Plan describes the methods, strategies and activities to seek input from the Working Group and general public.

The goals of the public involvement plan are to:

- Reach out early and frequently to invite the public to participate in the study process.
- Distribute timely and accurate information to ensure transparency.
- Provide meaningful opportunities for public involvement and respond promptly to inquiries.
- Develop and maintain positive relationships with community officials, Working Group members, community leaders, business owners, residents and other stakeholders.
- Communicate information and announcements across several platforms in easy-to-understand and accessible formats. Provide translations if appropriate and develop specific communication strategies to engage all affected communities (including minority, low-income, and limited-English proficiency populations).

These goals are established to welcome input and garner public support for the study recommendations.

## 2 OUTREACH ELEMENTS

The consultant team and MassDOT will use a variety of communication strategies and tools to engage the public throughout the course of the study.

### 2.1 ELECTRONIC DATABASE

An electronic database will be developed using available data, Working Group members, and those who sign up for information on the study website. Where possible, the database will include abutting property and business owners from community electronic databases, as available along the corridor. The consultant team will supplement this list with relevant agency departments, community and neighborhood organizations, chambers of commerce, cultural and religious organizations, schools, bicycle and pedestrian advocacy groups, social services, and local publications. The database will be updated consistently throughout the study, after Working Group and public meetings, and through the website email sign-up.

### 2.2 INTERNET COMMUNICATIONS

The consultant team will communicate updates, announcements and other study-related information electronically via the study website, e-blasts and social media.

#### 2.2.1 Website

MassDOT is hosting a study website. The consultant team will draft website content and updates. MassDOT's website will allow users to translate the content into Spanish and other languages. Visitors will be able to click a link on the website to sign up to receive email updates from the study team. The website will include:

- Project Overview
- Meeting Announcements
- Project Documents
- Public Involvement
- Project Team
- Contact information and signup for database



Meeting announcements and materials, study updates, and documents and graphics, including task deliverables, will be regularly posted to the study website. All posted files will be compliant with MassDOT's web accessibility requirements.

### **2.2.2 E-blasts**

The consultant team will draft email blasts, with MassDOT approval, to keep stakeholders apprised of study meetings and activities, documents recently posted on the website, and other information. The consultant team will act as an administrator on the project's GovDelivery account (MassDOT's email marketing program), allowing the ability to format and send e-blasts and import database updates as needed.

### **2.2.3 Social Media**

The consultant team will provide MassDOT with content and images to be posted on the MassDOT blog, Facebook, Twitter, YouTube, and Flickr accounts (by MassDOT) based on the materials prepared for the Working Group and Public Meetings.

## **2.3 PRINT MATERIALS**

MassDOT may distribute print materials at meetings and will coordinate posting them on the website. Meeting notices and an online survey announcement will be distributed primarily electronically with a limited print distribution as the budget permits. The consultant team will support the development of meeting presentations and materials.

## **2.4 PUBLIC MEETINGS**

Public meetings will be scheduled according to major study milestones. Public meetings will serve as an opportunity for the public to provide feedback on the study analysis and alternatives. Alternatively, the team will host an open house or workshop, where there are more opportunities for one-on-one conversation.

Public meetings will begin with a presentation from the study team recapping the work that has been done to date. A Question and Answer session will follow the presentation. Attendees will have an opportunity to review study materials, speak one-on-one with members of the study team, and provide written comments.

Tasks will include:

- Identify and secure location(s); coordinate logistics and any special accommodations.
- Prepare meeting notices and announcements for MassDOT distribution via e-blast, website, social media, and ads in local newspaper.
- Assist with display materials and presentation preparation (including audio/visual needs).
- Staff public meetings and prepare related documents: sign in sheet, handouts, agenda, etc.
- Provide prompt responses to questions, website updates, and prepare summaries after the meetings.
- Coordinate with vendors for interpretation services.
- Ensure meetings are held in accessible locations and within ¼ mile of public transportation, when possible.

## **2.5 PUBLIC COMMENT PROCESSING & RESPONSES**

Public comments and questions will be welcomed electronically (through the website or email), via mail, or at public or Working Group meetings throughout the course of the study. All comments will be documented and become part of the study record. The study team will review all comments received and will respond in consultation with MassDOT staff.

## **2.6 WORKING GROUP MEETINGS**

The Working Group will consist of MassDOT representatives, community representatives, regional planning agencies, and elected officials. The Working Group will advise on local issues and concerns, represent and report back to their respective organizations, and provide regular feedback on MassDOT's materials at key milestones and overall study process.

While Working Group meetings are intended primarily for communication between the members, MassDOT and the study team, the public is welcome to observe. There will be time set aside at the end of each meeting for questions and comments from the public.

The consultant team will assist MassDOT with coordinating and preparing for Working Group meetings, including the following tasks:

- Identify and secure location(s); coordinate logistics and any special accommodations.
- Prepare meeting notification e-blasts for Working Group members.
- Assist with materials, including presentation and handout preparation.
- Staff Working Group meetings and prepare summary and other related documents: sign-in sheet, handouts, agenda, etc.

## **2.7 PRESS OUTREACH**

All media outreach and inquiries will be handled by MassDOT's Press Office, with the exception that any media representatives on the database (to be determined by MassDOT) will receive general study communication. Any press inquiries made to consultant staff will be directed to MassDOT. Press representatives included on the database will receive general information via GovDelivery. Media contacts will be provided to MassDOT's Press Office for inclusion on its media list.

The study team will provide draft media and press releases to MassDOT public affairs for distribution to broadcast, online and print media outlets. Content, materials and background information will be packaged for MassDOT's Press Office as needed to respond to press inquiries.

## Appendix B: Public Correspondence Record

File



Town of Blandford  
1 Russell Stage Road  
Blandford, MA 01008  
January 19, 2016

To: Massachusetts DOT Highway Division  
Ten Park Plaza  
Suite 4160  
Boston, MA 02116

Dear Ladies and Gentlemen;

We want to take this opportunity to make you aware of a substantial and growing interest by the town of Blandford in having the state provide access to the Massachusetts Turnpike between the current exits of Westfield (Exit 3) and Lee (Exit 2). Last year, the town circulated a petition requesting this access with overwhelming support. This year, a survey was conducted with respondents in favor of an entrance/exit by more than a 3 to 1 margin.

With the encouragement of our state representative, Smitty Pignatelli, we are formally requesting that a study be conducted to determine the best method and location for providing this much needed avenue of travel. As you may be aware, the general populations of the Western Massachusetts towns and the limitations of business opportunities in our communities is constricted, to some degree by the lack of easy access to wider areas of our portion of the state. As a result, the communities of Blandford, Chester, Huntington, Middlefield, Montgomery and Russell have formed a Task Force whose mission included the revitalization of our towns. We feel that this turnpike access will create substantial opportunities to reverse the demographics we have experienced over the last decade and beyond.

In addition, this much needed access will allow our community to provide more timely emergency services to the travelers on the turnpike within this under serviced, and difficult-to-access section.

We anticipate that this request is timely, in light of the other changes that are being prepared for implementation on the Turnpike in the coming year. Please give this request your serious consideration, responding to our office at your earliest convenience. For further discussion and clarifications, please contact Andy Montanaro (413-454-4962) as a point of contact for Blandford.

Thank you for your assistance in this very important matter.

Board of Selectmen  
Town of Blandford  
1 Russell Stage Road,  
Blandford, MA 01008

DRAFT

ARCHITECT  
J E F F R E Y S C O T T P E N N  
77 Worthington Road, Huntington, MA 01050  
tel. 413-667-5230 fax. 413-667-3082  
[jpsed@verizon.net](mailto:jpsed@verizon.net)

30 April 2018

## **Opposition to the Proposed Turnpike Exit in Blandford, MA**

The Character of Western Massachusetts is frozen in time. The pressures of modern development have not been felt or seen here as in other parts of New England. Our region has more resemblance to Southern Vermont than Eastern Mass. This is due in large part to planning of the Massachusetts Turnpike without an exit in the region. The bypassing of Jacob's Ladder Trail and the Mohawk Trail has left them mostly unsullied by vast floodlit parking lots or shopping centers. Our ridgelines are not yet filled with houses; the sense of vast wilderness reigns. Our rivers are clean; our forests full of wildlife. This lack of concentrated development is a treasure and is wholly in our stewardship. We live here in paradise for the peace.

### **Possible positive effects of a new Exit in Blandford (and negative consequences)**

One-Time jump in property values (probably increased taxes for everyone)  
Lots of work and value for Real Estate Brokers and property investors (only a few will profit)  
Jump in housing development (pressure on infrastructure – roads, schools = net loss of taxes)  
Slight ease of long-distance travel for several hundred people (no net change in travel time or distance for most hilltown residents; huge investment required to improve access to Blandford along the degraded Stage and Chester Roads)

### **Probable negative effects of a new Exit in Blandford**

Light Pollution (dark skies are diminishing; in the night satellite photograph of the Northeast at night, we are the black dagger in the glow of Megalopolis)  
Overdevelopment (look at every other Turnpike Exit to see the degraded landscape). Blandford requires extremely specific and detailed protections which are not in place yet.

### **More effective and permanent solutions than an additional Exit**

Northampton and Westfield need comprehensive traffic planning to facilitate passage around them without creating gridlock. The solution of one-way traffic system circuits around downtowns has been perfected in Europe and will work well here. For example Westfield, Silver St. East, Meadow St. West; Northampton, South/Conz St. East, State St. West?  
Again, learning from successes elsewhere such as Europe and New York State, intown speed limits should be 25mph or 35mph with resume speed to 55mph out of town. Currently, there is a schizophrenic micro-managing of speed limits which “nanny” every corner and junction with a speed adjustment instead of trusting licensed adults to drive responsibly.

Rethink Massachusetts Turnpike exit  
From Neil Toomey 37 Mitchell Rd Becket MA  
413-623-6682

Dear Editor, Much discussion about an exit from the Mass. Turnpike seems to be centered around fixing a problem with truck traffic in Westfield. The issue of congestion need to be solved in Westfield and not foisted on the hill towns. An exit from the pike on Route 20, four to five miles west of downtown Westfield would solve the problem and give access to the pike for residents on the west side of town as well as people living in the hill towns. This would be a far more cost effective way to spend tax dollars. The road and bridge infrastructure in the hill towns cannot support additional truck traffic. The budgets of these small towns are already strapped, and the state has shown little inclination to help repair the roads and bridges that are now crumbling.

The planners from the state could serve those of us in the Berkshires by making rail travel available, promoting our natural resource venues and working with local residents and businesses in a sustainable and more durable manner. We have hiking, skiing, canoeing, camping, as well as theater, music and restaurants all set out in a beautiful landscape. An exit with its incumbent liabilities will destroy the very things that make our rural towns a destination point for many, and a home for those of us who live here.

Besides building yet another highway, let's think about working with what and who we have here in the Berkshires and a more common sense approach to spending our tax dollars. Sincerely, Neil F Toomey

*Neil F. Toomey*

Stephen W. Hamlin  
2 Laurel Rd., PO Box 414  
Huntington MA 01050

September 24, 2018

Cassandra Gascon, Project Manager  
10 Park Plaza, Suite 4150  
Boston, MA 02116

Re: Proposed I-90 Interchange in the Hilltowns

Dear Ms. Gascon:

I'm writing on behalf of the Jacob's Ladder Trail Scenic Byway Advisory Committee to express our concern about the impact an interchange from I-90 into any of the hilltowns between Lee and Westfield would have on the rural character of the region.

Jacob's Ladder Trail (US Rt. 20 through the towns of Lee, Becket, Chester, Huntington and Russell) was the main transportation artery through this region until the Mass Turnpike opened sixty years ago. With that opening, Rt. 20 was transformed overnight from bustling corridor to backwater.

Over the next 40 years, the towns served by Jacob's Ladder Trail (JLT) suffered a nearly complete drain of industry and jobs, due in part to the isolation that resulted from the opening of the Pike. Coincidentally, the region was spared the explosion of development that has happened in virtually every other part of Massachusetts. As a result, the JLT area and the larger hilltown region that it's part of remains a rural oasis – the largest mostly-intact remnant in the state of the vast woodland that once characterized all of Massachusetts.

Most of us who have chosen this region as our home have done so because of the rural character and lifestyle it offers, and in spite of the difficulties presented by the isolation that preserves that character.

Jacob's Ladder Trail Scenic Byway was established more than 25 years ago, partly to celebrate the heritage of the road – the first road in the world built for automobile travel to cross a mountain range – and partly to act as stewards - to raise awareness and work to preserve the rural and natural features of the area.

The majority of the members of the JLT advisory board oppose any change to the access to I-90 between Westfield and Lee. We object to the direct impact any such access point would have on the secondary road it would empty onto, but mostly we fear the unknowable, but undoubtedly far-reaching tentacles of downstream changes that would be unleashed. Rural character is a fragile thing and difficult or impossible to restore, once damaged.



Thank you for considering our comments. We look forward to participating in the public process and continuing to offer input to you, the I-90 Interchange Study Working Group, and our fellow citizens as the study continues.

Sincerely,

Stephen Hamlin  
Charter member and past president

DRAFT

# No New Turnpike Interchange

[bit.ly/TurnpikePetition](http://bit.ly/TurnpikePetition)

[Signatures](#)

## Target:

[Gov. Baker, Ms. Pollack, Mr. Gulliver, Ms. Gascon, Mr. Pignatelli, Mr. Hinds](#)

## BACKGROUND INFORMATION

The Massachusetts Department of Transportation is currently studying the possibility of constructing a new turnpike interchange in western MA between the interchanges of Westfield and Lee. The towns along this section of the turnpike are Blandford, Becket and Otis. Surrounding towns that would also be affected are Chester, Huntington, Russell and Granville.

An additional turnpike interchange would completely change the character of our rural communities. There would be more cars and trucks, with ensuing noise and engine exhaust and serious safety concerns. Our two-lane roads are narrow, with steep grades. Steep grades plus the snow and ice that are common in western Massachusetts would be a dangerous combination for the proposed additional traffic. And the local towns are poorly equipped to perform the supplemental maintenance that would be required of them to maintain safe conditions.

Moreover, the existing bridges and culverts are not capable of supporting the additional weight from commercial vehicles.

Most important, we choose to live in western Massachusetts for its natural

beauty, quiet and small-town nature. As residents, property owners and taxpayers, we want to maintain that rural character. We think the addition of a turnpike interchange would be detrimental to the residents, to the economies of the towns and to the wildlife.

As residents and taxpayers, we INSIST - No New Interchange in Western Massachusetts.

This petition will be sent to the people list below who are involved with the decision making. Their emails are included. You are encouraged to write to them individually as well as signing the petition. The more they hear from us, the more they will realize our level of commitment and concern.

Governor Charlie Baker, [constituent.services@state.ma.us](mailto:constituent.services@state.ma.us)

Stephanie Pollack, Secretary and Chief Executive Officer, MA Dept. of Transportation (MassDOT) - email is sent to her assistant - [cheryl.a.dustin@dot.state.ma.us](mailto:cheryl.a.dustin@dot.state.ma.us)

Jonathan Gulliver, Highway Administrator, MassDOT, [jonathan.gulliver@dot.state.ma.us](mailto:jonathan.gulliver@dot.state.ma.us)

Cassandra Gascon, project manager for MassDOT [cassandra.gascon@dot.state.ma.us](mailto:cassandra.gascon@dot.state.ma.us)

William "Smitty" Pignatelli is the MA House Representative for the area.

[smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov),

Adam Hinds is the MA Senator for the involved area.

[adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov)

## **PETITION**

We, the undersigned, are opposed to any new interchange between Exit 2 in Lee and Exit 3 in Westfield.

We are residents and taxpayers of Massachusetts. We feel an interchange would be extremely detrimental to our local communities, to both people and wildlife.

We request that you immediately stop any further consideration of an interchange, including engineering studies.

#	Title	Name	Town/City	S/C/P	Comment	Date
1		Lynne Hertzog	Becket	MA		5-Oct-18
2			Becket	Massachusetts		5-Oct-18
3		Meredyth Babcock	Becket	Ma	<a href="#">View</a>	5-Oct-18
4		Jerome Toomey	Chester	74 Blandford Rd		5-Oct-18
5		DAVID PACKARD	GOSHEN	MA		5-Oct-18
6	Mr	Jonathon Nix	Becket	Massachusetts	<a href="#">View</a>	5-Oct-18
7		Amanda Madru	Becket	Massachusetts		5-Oct-18
8		Maria Cal	Vigo	fóra dos EUA		5-Oct-18
9	Ms		Huntington	MA.		5-Oct-18
10			Becket	MA		5-Oct-18
11	Mrs	Laura Madru	Becket	Ma		5-Oct-18
12	Ms	Carol Waag	Middlefield	MA	<a href="#">View</a>	6-Oct-18
13	ms		St.John's	N.L		6-Oct-18
14	Ms.	Alice Cozzolino	Cummington	MA		8-Oct-18
15	Ms.	Amy Pulley	Cummington	MA		8-Oct-18
16	Ms	Eileen FitzGerald	Chester	Massachusetts		10-Oct-18
17	Mr	Henry Frey	Chester	Massachusetts		10-Oct-18
18	Ms	Kathleen Williams	Blandford	Ma		19-Oct-18
19		Stan Wolkoff	Becket	MA		20-Oct-18
20	Mr	John Carino	Becket	Mass	<a href="#">View</a>	20-Oct-18
21	Mr	Lawrence Abrams	MA	Becket	<a href="#">View</a>	20-Oct-18
22	Ms.	Ellen Offner	Newton	MA		20-Oct-18
23	Mr		Becket	MA		20-Oct-18
24			Becket	MA		20-Oct-18
25			Becket	Massachusetts	<a href="#">View</a>	20-Oct-18
26	Mr	Timothy Ogilvie	Becket	MA		20-Oct-18
27	Mrs	Robin wolkoff	Becket	Massachusetts	<a href="#">View</a>	20-Oct-18

28 Dr.	Michele Cohen	Becket	MA		20-Oct-18
29 Mr	Leonard Levine	Becket	MA	<a href="#">View</a>	20-Oct-18
30 Mr.	David Giannini	Becket	MA	<a href="#">View</a>	20-Oct-18
31 Mr	STEVEN PEQUIGNOT	Becket	Massachusetts		20-Oct-18
32 Mrs.	Eleanor Metrick	New Rochelle	New York		20-Oct-18
33 Dr.	Susan Rose	Becket	Massachusetts		20-Oct-18
34 Mr.	Allan Metrick	New Rochelle	New York		20-Oct-18
35 Dr.	Frank Gelbwasser	Becket	MA		20-Oct-18
36 Mrs.	Rhonda Gelbwasser	Becket	MA		20-Oct-18
37 Dr.	Ted Greenwood	Becket	MA		20-Oct-18
38 Mr.	Harold Ware	Becket	MA		20-Oct-18
39 Dr	Jeremy Lichtman	Becket	Mass	<a href="#">View</a>	21-Oct-18
40 Mrs	Jeanette Katz	Becket	Mass	<a href="#">View</a>	21-Oct-18
41 Ms.		Becket	MA	<a href="#">View</a>	21-Oct-18
42 mr	stuart london	east setauket	NY		21-Oct-18
43	Cynthia Trenholm	Becket	Massachusetts	<a href="#">View</a>	21-Oct-18
44 Mrs.		Becket	Massachusetts		21-Oct-18
45 Mr. and MS.	Harvey Ableman	East Otis	Ma.	<a href="#">View</a>	21-Oct-18
46	Paul Aube	Becket	Ma	<a href="#">View</a>	22-Oct-18
47 Mr.		Becket	Mass.		22-Oct-18
48 Ms		Becket	Mass.		22-Oct-18
49 Dr.	jeffrey rosen	Becket	MA		22-Oct-18
50 Mr.	WAYNE CROUCH	AMHERST	MA	<a href="#">View</a>	24-Oct-18
51 Professor	Carl Goodman	Becket	Massachusetts	<a href="#">View</a>	24-Oct-18
52 Dr		Becket	Massachusetts	<a href="#">View</a>	25-Oct-18
53 Mr	Thomas Markovits	Becket	MA		25-Oct-18
54	OFFER SHARABY	Hollis Hills	New York	<a href="#">View</a>	25-Oct-18
55 Dr	David Kroll	Becket	Massachusetts		25-Oct-18
56	Frayda Sharaby	Becket	Massachusetts		25-Oct-18
57 Mr	Patrick Grumley	Becket	MA		25-Oct-18

58 Ms.	Pam Bachrach	Becket	Massachusetts		25-Oct-18
59 Mr	Theodore Ginsburg	Becket	MA		25-Oct-18
60 Ms	June Feigenblatt	Boynton each	FI		25-Oct-18
61 Mrs.	Leila Strassler	Becket	Massachusetts	<a href="#">View</a>	25-Oct-18
62	Judy Pillinger	Becket	MA	<a href="#">View</a>	25-Oct-18
63		Becket	MA	<a href="#">View</a>	25-Oct-18
64 Dr.	Michael Pillinger	Becket	MA	<a href="#">View</a>	25-Oct-18
65 Mr	Robert Boonin	Becket	MA	<a href="#">View</a>	25-Oct-18
66 Mr		Becket	Massachusetts		25-Oct-18
67 Ms	Frances Boonin	Becket	MA	<a href="#">View</a>	25-Oct-18
68 Mr and Mrs.	Frederick Braun	Becket	Massachusetts		25-Oct-18
69 Ms.	Shelli Dicioccio	Becket	Ma		25-Oct-18
70	Susan OBrien	Becket	Massachusetts		25-Oct-18
71 Mrs	catherine scher	Becket	MA		25-Oct-18
72 mr.	Richard Carino	Milford	Ct		25-Oct-18
73	Louis Bernstein	Becket	MA		25-Oct-18
74 Dr.	Barbara Weinstein	Becket	MA		25-Oct-18
75 Ms.	Joan Rosenberg	Becket	MA	<a href="#">View</a>	25-Oct-18
76	Kimberly Scher	Becket	891 Moberg road		25-Oct-18
77	Glenn Wellington	Becket	MA		25-Oct-18
78 Ms	DEBRA COHEN	BECKET	MA		26-Oct-18
79 Mr.	Arnold Offner	Newton	MA		26-Oct-18
80 Mr.	William Naylor	East Otis	MA	<a href="#">View</a>	28-Oct-18
81 Mr.	Frederick Mandler	Becket	Massachusetts		28-Oct-18
82	Paula Katz	Becket	MA		29-Oct-18
83 Mrs.	Elisabeth Naylor	East Otis	MA	<a href="#">View</a>	29-Oct-18
84 Elliot family		Lenox	MA		30-Oct-18
85 Mr	Matt Barron	Chesterfield	MA	<a href="#">View</a>	30-Oct-18
86 Dr	Robert Cherdack	Ashfield	Mssachusetts	<a href="#">View</a>	30-Oct-18
87 Ms.	Susan Purdy	DALTON	MA	<a href="#">View</a>	30-Oct-18

88 Mr	Michael Kay	Becket	MA		30-Oct-18
89 Ms.	Francine Germaine	Dalton	Mass	<a href="#">View</a>	30-Oct-18
90 Ms		Becket	MA	<a href="#">View</a>	31-Oct-18
91	Kate Albright-Hanna	Huntington	MA		1-Nov-18
92 Mr. and Mrs. Howard A. Po	Harriet/Howard Pollack	Merrick	NY		1-Nov-18
93 Mr		Becket	MA		2-Nov-18
94	2018	BECKET	MA	<a href="#">View</a>	2-Nov-18
95	Mark Proshan	Blandford ma	128 north Blandford road		3-Nov-18
96	Michael Kuntz	East Otis	MA		3-Nov-18
97	Kimberly Kuntz	East Otis	MA		3-Nov-18
98 Mrs.	Faith Rubin	Becket	Massachusetts	<a href="#">View</a>	3-Nov-18
99 Dr.	Glenna Rubin	Roslyn	NY	<a href="#">View</a>	3-Nov-18
100 Mrs.	Melissa Stadlen	Syosset,	New York		3-Nov-18
101 Ms.	Judy Keshner	Becket	MA		5-Nov-18
102 Ms		Worthington	MA		5-Nov-18
103 Mr.	John Gill	Worthington	Massachusetts	<a href="#">View</a>	6-Nov-18
104 Mrs		Philadelphia	PA	<a href="#">View</a>	6-Nov-18
105		Becket	MA		9-Nov-18
106		Becket	MA		9-Nov-18
107 Mr	Douglas Fraser	Chesterfield	MA	<a href="#">View</a>	9-Nov-18
108	1939 alan daly	washington	MA		10-Nov-18
109		Washington	MA		10-Nov-18
110		Becket	Massachusetts	<a href="#">View</a>	11-Nov-18
111	Laurel Adams	East Otis	Massachusetts		13-Nov-18
112		Middlefield	MA	<a href="#">View</a>	18-Nov-18
113	Morgan Cummings	Middlefield	MA		18-Nov-18
114 Mr	Irving Krawet	Becket	MA	<a href="#">View</a>	21-Nov-18

115 Mr	Thomas Garvey	Otis	MA		11-Dec-18
116 Mrs	Evelyn Garvey	Otis	MA	<a href="#">View</a>	12-Dec-18
117		Otis	Massachusetts		12-Dec-18
118	Susan Brofman	Otis	MA		12-Dec-18
119 Mr.		Otis	MA		12-Dec-18
120 Mr.	Arthur Alpert	Becket	Berkshire		12-Dec-18
121	Sherry Remillard	Otis	MA		12-Dec-18
122	Jim Remillard	Otis	MA		12-Dec-18
123 Mr.	Paul Cripps	Becket	MA		12-Dec-18
124 Ms	Amy Alpert	Becket	MA		12-Dec-18
125	Art Feltman	Becket	Massachusetts		13-Dec-18
126 Ms.	Robin Schoen	Otis	MA		15-Dec-18
127 Mr	Thomas Riley	Otis	Massachusetts	<a href="#">View</a>	16-Dec-18
128 Mrs	Cheryl Riley	Otis	massachusetts	<a href="#">View</a>	16-Dec-18
129 Mr		Otis	MA	<a href="#">View</a>	16-Dec-18
130		Blandford	MA	<a href="#">View</a>	21-Dec-18
131 Mrs		Blandford	32 Brookman Drive	<a href="#">View</a>	26-Dec-18
132 Mr.	David Sarnacki	East Otis	MA	<a href="#">View</a>	31-Dec-18
133	Henry Czeremcha	Westfield	MA	<a href="#">View</a>	31-Dec-18
134 Ms.	Roberta Sarnacki	East Otis	MA	<a href="#">View</a>	1-Jan-19
135 Mr.	Timothy Hickey	Becket	MA	<a href="#">View</a>	3-Jan-19
136 Mrs.		Becket	MA	<a href="#">View</a>	16-Jan-19
137	Maryann Carroll	Portland	ME	<a href="#">View</a>	16-Jan-19
138 Mrs	Kathleen Rodhouse	Becket	MA Berkshire		16-Jan-19
139	Jared Smith	Otis	MA		21-Jan-19
140 Mr.	Edward Marchbanks	Chester	Massachusetts		29-Jan-19
141	Richard Gallup	East Otis	Massachusetts		29-Jan-19
142 Mr.	Frerderick Ryon	East Otis	Berkshire County, MA	<a href="#">View</a>	30-Jan-19



143 Mr.	George Townsend	East Otis	MA		30-Jan-19
144 Ms	Kathleen Duffy	Moraga	CA		31-Jan-19
145	Jamie Mitchell	West Springfield	MA	<a href="#">View</a>	31-Jan-19
146 Mrs.	Christine Lawlor	Otis	MA		31-Jan-19
147 Dr.	Katherine Pichard	Great	MA	<a href="#">View</a>	31-Jan-19
148	John Cox	NORTH HAVEN	Connecticut		31-Jan-19
149	Laurie Gloster	East Otis	Massachusetts		31-Jan-19
150 Dr.	Mary Jane Pederzani-Dinneen	Westhampton	MA	<a href="#">View</a>	31-Jan-19
151 Mr	Bret Calder	Otis	Ma	<a href="#">View</a>	31-Jan-19
152 Ms	Patricia Racine	East Otis	MA		31-Jan-19
153 Mr.	John Cuzzone	Westfield	Massachusetts	<a href="#">View</a>	31-Jan-19
154 Mrs	Debra Case	Otis	MA	<a href="#">View</a>	1-Feb-19
155		Otis	MA		1-Feb-19
156 Mr.		Otis	MA. Berkshire County	<a href="#">View</a>	1-Feb-19
157 Mr	kenneth taylor	longmeadow	MA		1-Feb-19
158 Ms	Patricia Morey	Goshen	MA	<a href="#">View</a>	1-Feb-19
159 Mr	Timothy Nardi	Otis	MA	<a href="#">View</a>	2-Feb-19
160 Ms.	Lee Meyer	Dallas	Texas	<a href="#">View</a>	2-Feb-19
161 Mr and Mrs Ginsburg	Theodore Ginsburg	Becket	MA	<a href="#">View</a>	10-Feb-19
162 Mrs		East Otis	Mass		11-Feb-19
163 Ms.		Becket	Berkshire		11-Feb-19
164		Marlborough	Massachusetts		12-Feb-19
165 Dr.	Steven Heise	Marlborough	MA		12-Feb-19
166 Mrs.		Becket	MA		13-Feb-19
167 Mr	Aurelio Menuzzo	Otis	MA		17-Feb-19
168	james mcgee	becket	ma	<a href="#">View</a>	6-Mar-19
169 MS	Carrie Gleason	Sedalia	CO		8-Apr-19

170 Mr.	THEODORE Kahn	Becket	MA	<a href="#">View</a>	9-Aug-19
171		Becket	MA		8-Sep-19
172 Dr.		Marlboro	MA		11-Sep-19
173 Ms.	Elizabeth Brennan	new York	New York	<a href="#">View</a>	11-Sep-19
174 Mr		Becket	Berkshire Cty, MA	<a href="#">View</a>	11-Sep-19
175	Barbara DROSNIN	East Otis	MA		13-Sep-19
176 Mr and mrs	Fred Schornstein	East otis	Ma	<a href="#">View</a>	13-Sep-19
177	Chafik Behidj	Blandford	Massachusetts	<a href="#">View</a>	13-Sep-19
178 Dr.	Mark Elliot	Lenox	MA		13-Sep-19
179 Mr.	Howard Komisar	Otis	MA		13-Sep-19
180	1953 Luke Garvey	Otis	MA		13-Sep-19
181 Mr	John Carino	Becket	Ma	<a href="#">View</a>	13-Sep-19
182 Mr.	Manu S-M	Hamilton	ON		14-Sep-19
183 Mr.		Becket	MA	<a href="#">View</a>	23-Sep-19
184 Ms.	Barbara Peel	Otis	Massachusetts	<a href="#">View</a>	25-Sep-19
185 mr	cory liptak	otis	ma		26-Sep-19
186	Marc Schechter	Otis	Massachusetts	<a href="#">View</a>	29-Sep-19
187 Mr	Daniel Penny	Becket	MA	<a href="#">View</a>	7-Oct-19
188 Mr.	George Townsend	East Otis	MA		7-Oct-19
189 Mrs	THERESA SMITH	East Otis	MA		7-Oct-19
190 Mr	Michael Failla	East Otis	Ma	<a href="#">View</a>	7-Oct-19
191 Dr,	Daniel Wollman	Otis	Massachusetts		7-Oct-19
192		Otis	MA		7-Oct-19
193 Ms	Liz Queler	Blandford	MA	<a href="#">View</a>	8-Oct-19
194	Caroline Wollman	Otis	MA		8-Oct-19
195		Blandford	MA		9-Oct-19
196 mr	jeffrey penn	huntington	MA	<a href="#">View</a>	10-Oct-19
197 Mr.	Richard Hamel	Blandford	MA	<a href="#">View</a>	10-Oct-19
198 Mrs.	Jerelyn Hamel	Blandford	MA	<a href="#">View</a>	10-Oct-19
199 Mr.	Peter Barton	Becket	Mass.	<a href="#">View</a>	10-Oct-19

200	David Chaffee	Blandford	Ma	<a href="#">View</a>	11-Oct-19
201		Blandford	Ma		11-Oct-19
202 Mr.	Tim Robinson	Becket	Massachusetts	<a href="#">View</a>	14-Oct-19

DRAFT

**From:** [james adams](#)  
**To:** [Gascon, Cassandra \(DOT\)](#)  
**Subject:** next meeting I-90 Interchange group  
**Date:** Friday, January 11, 2019 12:45:24 PM  
**Attachments:** [No Exit Otis letter.docx](#)

Hello Ms. Gascon:

You are quoted in a recent newspaper article (Springfield Republican Jan. 3) as saying the next meeting of your group will be held in late January or February, but your website does not give a time or place. Could you notify me when and where this meeting will be held, since several officers of the Big Pond Association and other interested parties would like to attend.

After looking through your material, I hope that your future studies of the Algeria Road alternative will take into account the impact on the entire length of Algeria Road, including the Girl Scout camp Bonnie Brae. As the oldest operating Girl Scout camp in the United States, celebrating its centenary this year, Bonnie Brae is a national institution with a considerable constituency.

As a courtesy, I am attaching a letter to the editor I recently sent to the Republican.

With best regards,

James Ring Adams, Ph.D.  
Algeria Road  
East Otis, MA 01029  
413-269-0293

# No Exit

$\infty$

DRAFT

Springfield Republican

[letters@repub.com](mailto:letters@repub.com)

[jkinney@repub.com](mailto:jkinney@repub.com)

To the editor:

State Rep. William "Smitty" Pignatelli (D.- Lennox) was quoted recently in your paper as saying he found more support than opposition to a new on-off ramp for the Mass Turnpike in East Otis. He must not be speaking to the residents of Algeria Road, site of the proposed exit, other than the local quarry owners. The people who live here can give him at least three reasons why this exit is a very bad and destructive idea.

1. The one local road connecting the possible exit to Route 23 in the south and route 20 to the north is flanked for its entire length by a wetlands system (with the exception of the granite out-cropping mined by three quarries). This system, which runs at times right by the side of Algeria Road, includes at least five lakes and ponds to the south and three to the north of the proposed Turnpike exit, connected by continuous streams and marshes. It harbors a rich array of wildlife, including at time, moose, nesting bald eagles and mountain lions. A Turnpike exchange would require the rebuilding of Algeria Road, with devastating impact on these wetlands, not to mention the air, noise, soil and water pollution from the vastly increased traffic.
2. The ponds and lakes in this system, such as Big Pond, White Lily Pond, Watson Pond, Excalibur Pond and Robin Hood Lake, support a significant number of residents, seasonal and year-round, who are here for some relief from a constant flow of traffic.
3. One of the most significant addresses on Algeria Road is the Bonnie Brae Girl Scout camp, now celebrating its centenary as the oldest

continuously operating girl scout camp in the United States. Its campers often hike along Algeria Road and cross it many times daily to the camp's archery range and volleyball court. A large increase in traffic would threaten the safety of the campers and perhaps put the viability of the camp itself in question.

The politicians involved in this project, State Reps. Pignatelli, and John C. Velis and State Senators Adam Hinds and Donald Humason, should listen to a few more local taxpayers and voters, or at least look at a map, before they continue supporting this very bad and environmentally catastrophic idea.

Sincerely yours,

James R. Adams

Algerie Road

East Otis, Massachusetts

**From:** Alan Koss  
**To:** Gascon, Cassandra (DOT)  
**Subject:** I-90 Interchange Study  
**Date:** Monday, January 21, 2019 3:37:43 PM

As a property owner and tax payer in Otis, MA I am writing to you to express my strong concern with the manner in which the subject study data is being conducted and is to be evaluated. It is apparent that virtually all the evaluation issues are focused on the design, feasibility and costs to construct an interchange. There seems to be scant interest in determining why an interchange between Lee and Westfield, MA is needed at all. Earlier in the process the point was made that the stretch between Exits 2 and 3 is the longest over the entire Mass Turnpike; but this in itself is of no consequence absent any demonstrated significant needs for another interchange. To date, it seems that the most pressing concern is the occasional slow down of traffic exiting the interchanges at Exits 2 and 3. That occurs very infrequently, is mostly seasonal, and by itself no justification to build another interchange 15 miles away. The number of vehicular accidents noted at Exits 2 and 3 would seem to be far more due to the surrounding streets layout, road markings and traffic light controls, none of which would be improved by the construction of a new interchange 15 miles away. And all of which could be corrected at much lower cost than building a new interchange. There is passing mention of transit time saved for the approximate 15 miles that, given a new interchange midway between Exits 2 and 3 would be saved over transiting that distance on I-90 rather than either Routes 20 or 23. The amount of car and truck usage of those roads, particularly in other than July and August, is so low that the time/convenience/cost benefits of transiting those 15 miles at 60 MPH on I-90 versus at 45 to 50 MPH on Routes 20 or 23 is insignificant. Certainly not nearly enough to significantly contribute to a cost/benefit assessment of building a new interchange.

The I-90 Interchange Study to date is overwhelmingly focused on the engineering and construction issues of building a new interchange. It is critically lacking in developing meaningful data that would support why a new interchange needs to be constructed at all. It is at heart an engineering "how to" study; it is grossly lacking as a cost/benefit study, perhaps because there are so few benefits to be had for building it at all. As the study has progressed to date, and as it seems to stand now, the study group participants are derelict in their duty to produce a comprehensive report that provides not just where an interchange can be built, and its cost, but why an interchange should be built, and the cost benefits that justify its construction expense.

Alan R. Koss  
Alan Koss  
[alanrkoss@gregkoss.com](mailto:alanrkoss@gregkoss.com)



**From:** james adams  
**To:** Gascon, Cassandra (DOT)  
**Subject:** Algeria Road alternative  
**Date:** Thursday, January 24, 2019 5:23:38 PM

P.O. Box390

28 McClean Beach Road

(Off Algeria Road)

East Otis, MA 01029

January 24, 2019

**Cassandra Gascon, Project Manager**

I-90 Interchange Study Working Group

10 Park Plaza, Suite 4150

Boston, MA 02116

Dear Ms. Gascon:

I am writing to inform you of the vehement opposition of a great majority of your constituents in Otis and Becket to the Massachusetts Turnpike exit on Algeria Road in East Otis.

The citizens you represent DO NOT WANT an ecosystem-destroying, wetlands-annihilating environmental apocalypse on Algeria Road, home to an interconnecting system of five lakes and ponds to the south of the proposed interchange site and three lakes and ponds to the north.

Although Algeria Road and its environs may appear somewhat uninhabited; behind the grasslands, blueberry bushes, meadows and forests are many of your constituents who have CHOSEN to build and invest in this area BECAUSE of the clean air, clean water, non-toxic soil and freedom from noise pollution provided by the protected wetlands along Algeria Road.

The area bordering Algeria Road and within approximately a two minute drive of the proposed interchange site includes bordering vegetated wetlands (BVWs) and floodplains which are necessarily highly regulated as dictated by The Massachusetts Wetlands Protection Act(General Laws Chapter 131, Sec.40; the Act).

Are you aware that the I-90 Interchange Study of September 6, 2018 totally misrepresented the East Otis, Algeria Road site as it did NOT include the number of primary and secondary residences within a two minute drive from the site (approximately 180 households); it did NOT mention the 330 acre lake ringed by primary and secondary homes and a hub for boating, swimming, fishing, water skiing, camping and water-related recreation (known as Big Pond) within a two minute drive from the site; and it DID NOT mention Camp Bonnie Brae, the oldest continuously functioning Girl Scout camp in the United States which sits on Algeria Road and the above-mentioned lake (Big Pond),also within a two minute drive to the proposed site! (Numbers of residences affected with attendant well and septic system reliance on the water tables and wetland protections as well as bordering camps were included in discussions of the other proposed location sites.)

Are you aware that Big Pond, stocked by the Massachusetts Division of Fisheries and Wildlife, is environmentally one of the most pristine lakes in the State? It is actively protected from pollution and invasive species invasion by The Big Pond Association, a group of approximately 500 residents committed to the preservation of Big Pond and the associated interconnected waterways and their safekeeping from air, noise, water and soil defilement. Certainly the 24 hour a day, 7 day a week (24/7) operation of an I-90 Interchange within a two-minute drive, with its incessant

diesel truck and gasoline-fueled auto traffic and drastically widened roadways passing right next to the lake and the Girl Scout camp will threaten the very existence of Big Pond and the pollution-free vacation/recreational community surrounding it.

Are you aware that Camp Bonnie Brae, the oldest functioning Girl Scout camp in the United States, about to celebrate its 100<sup>th</sup> anniversary, sits RIGHT ON Algeria Road, a two- minute drive from the proposed interchange site? It also borders Big Pond which offers kayaking, sailing, water skiing, swimming, hiking, and camping opportunities to the Scouts and the many organizations that rent this quiet, serene pollution-free site from the Girl Scouts.

Do you really think parents will continue to send their daughters to hike and camp and swim and fish and boat at this camp where the 24 hour a day, 7 day a week din of passing diesel trucks and unending automobiles has obliterated the sounds of birds chirping, winds blowing through the trees and waves splashing onto the sandy beaches; and where the overwhelming odors are gasoline and exhaust fumes from vehicles on their way to the uncomfortably close I-90 interchange?

Do you think parents will send their daughters to hike and bicycle down Algeria Road to the camp's archery field and volleyball field and gather blueberries in the camp's meadows AS THEY DO NOW and have done for one hundred years, when the roadway they are hiking along is the major thoroughfare for trucks, buses and autos to access and exit I-90?

A thruway interchange within a two -minute drive will DESTROY Camp Bonnie Brae by polluting the air, the water, the soil, the SAFETY, and the serenity that the Camp and Big Pond provide to so many grateful city dwellers.

Do you think families from Springfield, Hartford, Boston and New York City will want to buy homes around Big Pond or rent cottages in the area and spend their vacation dollars to be minutes from the din and pollution of a highway interchange?

Do you think the families who have invested in primary and secondary homes around this pristine great pond of Massachusetts will continue to buy property, renovate property, and maintain property (providing employment for local businesses and independent contractors) will continue to do so when their kayaking, sailing, water skiing, fishing and swimming enjoyment is overwhelmed by the sounds and smells of diesel engines and car exhausts?

The citizens and voters who live and work and visit East Otis, Big Pond, Algeria Road and Camp Bonnie Brae DEPEND on this area economically, environmentally and aesthetically as a SANCTUARY from the concrete jungles and the pollution of thruways and city-borne industry and commerce. They are willing to not only INVEST in this area but to travel a few more minutes to reach it and thereby protect the environmental haven this wetland magnificence represents.

To destroy this Algeria Road wetlands sanctuary and the economic value of so many Big Pond residents' properties as well as the excellence of the camping experience offered by Camp Bonnie Brae to so many would be a crime.

Faster is not always better!

Access to the thruway exists already in Lee and Westfield. Most people seek the chance to slow down and have a vacation where the air smells sweet, the wind blowing through the trees is musical and one can paddle a kayak or ride a bike on a safe country road. They are willing to travel a few minutes longer in order to preserve the existence of that which they seek: the serenity and beauty of the Big Pond/Algeria Road wetlands; free from noise, air pollution, acid rain- tainted water and soil contamination.

There are many two and four lane highways leading to thruway interchanges with diesel fumes, car exhausts, and safety issues. There is ONLY ONE pristine Big Pond and ONLY ONE 100- year old Girl Scout camp and ONLY ONE interconnected lake and pond wetlands area that gives so much to so many. DO NOT DESTROY them by placing the I-90 interchange in their midst.

Sincerely,

Attorney Laurel Adams

DRAFT

**From:** [Lawrence Abrams](#)  
**To:** [Constituent Services \(GOV\)](#)  
**Cc:** [Dustin, Cheryl A. \(DOT\)](#); [Gulliver, Jonathan L. \(DOT\)](#); [Gascon, Cassandra \(DOT\)](#); [smitty.pignatelli@mahouse.gov](#); [adam.hinds@masenate.gov](#)  
**Subject:** Opposition to the site selection for a new Mass Pike Interchange  
**Date:** Monday, February 11, 2019 5:18:11 PM

Dear Governor Charlie Baker,

I have decided to write to you as well as others who are or will become involved in the MASS DOT's Working Group to situate a new highway interchange in either Blandford or Otis.

I have lived in Becket for over 30 years and love the gentle, rural environment which surrounds me and my neighbors in the Hill Towns. I read with great interest Larry Parnass's illuminating coverage in The Berkshire Eagle entitled "Neighbors worry new Mass Turnpike exit would take a toll on neighborhood." Indeed we do.

Apparently, a MASS DOT Working Group is in the process of recommending the feasibility of a new interchange between exits 2 and 3 on the Mass Pike to relieve truck and traffic congestion in Westfield. Civil Servants in the DOT guided by very strict measurements decided the new exit must be located either in Blandford or Otis.

If this recommendation comes to pass, the lovely rural environment we all cherish dearly would be in jeopardy from an increase of over 5000 commercial and passenger vehicles per year. Local roads are not safe to withstand this influx of traffic. Local communities would have to increase taxes to maintain these new pathways and the DOT estimates reportedly are "nowhere near accurate." Their figures do not include the land the government must take to build the interchange nor the environmental impact of infringing on our wetlands.

One solution is for the MASS DOT to recognize that sometimes the best distance between two points is not a straight line. There are other possibilities east of Blandford which directly align with Route 20 and west of Becket which directly align with Route 8 six miles or so from the Lee exit. If the study group used either or both of these sites, no country back roads would be sacrificed to the misguided plan to improve our way of life. Town budgets would not have to feel the burden of improving and maintaining backroads transforming them to handle "modern day" traffic. People could walk or bike on these pristine roads without the fear of a Semi Tractor Trailer bearing down on them. We need a more thoughtful solution than the straight line thinking the MASS DOT is currently advocating.

Respectfully,

Larry Abrams  
162 Bonny Rigg Hill Road  
Becket, MA 01223

Cell: 917-763-5645

**From:** [dntoomey@juno.com](mailto:dntoomey@juno.com)  
**To:** [Gascon, Cassandra \(DOT\)](#); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov)  
**Cc:** [efitzma@gmail.com](mailto:efitzma@gmail.com); [meredythbabcock@outlook.com](mailto:meredythbabcock@outlook.com); [dntoomey@juno.com](mailto:dntoomey@juno.com); [nft.1@outlook.com](mailto:nft.1@outlook.com); [erbshepard1@gmail.com](mailto:erbshepard1@gmail.com); [wmal1@verizon.net](mailto:wmal1@verizon.net); [tammymerenda@gmail.com](mailto:tammymerenda@gmail.com); [peterbarton@earthlink.net](mailto:peterbarton@earthlink.net)  
**Subject:** Turnpike Exit Blandford  
**Date:** Monday, February 25, 2019 1:28:55 PM  
**Attachments:** [Bridge Damage.zip](#)

Hi Cassandra, Adam and Smitty,

As you know we have been involved in the Turnpike Exit issue proposed in our area.

We have previously brought to your attention the inadequate road conditions in the area of Blandford Road. The Study Committee only looks at the connecting roads for a mile or two beyond the exit. However, in this situation, getting off the Turnpike in Blandford brings you no where, you have to go either to Route 23 or Route 20. Both of these intersections will need substantial rebuilding to accommodate any kind of traffic.

We have told you about tractor trailers getting stuck on the bridge at the intersection of Blandford Road and Route 20. We have personally witnessed 4 of such incidents. Attached is the most recent, causing quite a bit of damage to the signage, guardrails and possibly the bridge, which is not rated for truck traffic at all.

We ask that you please inform the Study Committee of these issues as it will raise the cost of the project beyond any benefits it may have.

Thank you for your input in this important project

Deborah and Neil Toomey

*Deborah A. Toomey, EA, ATP*  
*P. O. Box 276*  
*Chester, MA 01011*  
*(413) 623-6682*

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**From:** Laurie Thomas  
**To:** Gascon, Cassandra (DOT)  
**Subject:** Indian Lake Association Against MA Pike Algeria Rd Exit  
**Date:** Friday, May 3, 2019 10:46:29 AM

**Indian Lake Association  
P.O. Box 567  
Becket, MA 01223**

May 3, 2019

Cassandra Gascon  
Massachusetts Department of Transportation

Dear Project Manager Gascon:

I am writing to you today as the president of the Indian Lake Association, Becket, MA. We are a community of homeowners who cherish the quiet rural life that our community was founded upon in 1982. That way of life is potentially threatened by the outcome of a feasibility study currently being undertaken by the DOT. I speak specifically of the study which considers the addition of a Turnpike interchange between exits 2 and 3.

The site which concerns our community, neighboring communities, camps, campgrounds is the Algeria Road, Otis location. We stand against the selection of this site. Here are several important reasons:

- It is predicted that traffic (cars and trucks) on Algeria Road to Bonny Rigg Hill Road would increase substantially, some estimate hundreds per day. These roads are simple, two-lane roads which pass mainly residential and recreational acreage. Imagine the safety implications of this amount of traffic on rural roads that border homes and camps inhabited by families and summer campers.
- Our community sits on both sides of Bonny Rigg Hill Road. Our residents, including many elderly and young children, must cross that road to access our community 's pond which is situated on the west side of Bonny Rigg Hill Road. The image of a steady stream of trucks and cars traveling at 50+ mph is terrifying. The possibility of accidents, or worse, fatalities looms large.
- The current noise level is noticeable, barely tolerable and is mainly the result of trucks serving the working quarries in the area. Adding hundreds of cars and trucks to that would quickly make noise levels intolerable and damaging to the land, wildlife and homeowners. It is important to note that construction on Algeria Road would impinge upon wetlands potentially devastating native flora and fauna.
- Every person who lives and/or works in the area moved here with knowledge and appreciation of the distance between exits 2 and 3. That is one of the selling points of the area. Destroying peace, tranquility, wetlands and a way of life so trucks can simply pass through our communities spewing pollutants and endangering our families has to be called 'infeasible.' We hope you will agree; no interchange on Algeria Road, Otis!

Respectfully submitted,

Laurie Thomas  
President, Indian Lake Association

DRAFT



**From:** [dntoomey@juno.com](mailto:dntoomey@juno.com)  
**To:** [Gascon, Cassandra \(DOT\)](#); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [efitzma@gmail.com](mailto:efitzma@gmail.com); [meredythbabcock@outlook.com](mailto:meredythbabcock@outlook.com); [dntoomey@juno.com](mailto:dntoomey@juno.com); [nft.1@outlook.com](mailto:nft.1@outlook.com); [erbshepard1@gmail.com](mailto:erbshepard1@gmail.com); [wmal1@verizon.net](mailto:wmal1@verizon.net); [tammymerenda@gmail.com](mailto:tammymerenda@gmail.com); [peterbarton@earthlink.net](mailto:peterbarton@earthlink.net)  
**Subject:** Mass Turnpike Exit  
**Date:** Monday, May 13, 2019 9:46:08 AM

Cassandra, Adam, Smitty and ReThink Group,

Monday May 13, 2019 My neighbors just informed me, yet again, that a tractor trailer was "stuck" on the bridge at the intersection of Route 20 and Blandford Road (one of the proposed roads for the Mass Pike exit). As you all know, this has been an on going problem for the past year or more. This continued misuse of the bridge is going to cause major damage. As this is a Chester road, we all know there is no funds for repairs if this were to happen.

Is there was a way to inform the truckers that Blandford Road in not suitable for their use? If the bridge is damaged, there is no detour to Route 20, as we would be cut off from the area you are trying to promote. I urge you to please discuss this matter, so we can come up with a solution.

Thank you all for your input and concerns.

Deb & Neil Toomey

*Deborah A. Toomey, EA, ATP*  
*P. O. Box 276*  
*Chester, MA 01011*  
*(413) 623-6682*

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**From:** Meredyth Babcock  
**To:** [dntoomey@juno.com](mailto:dntoomey@juno.com); Gascon, Cassandra (DOT); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov); [Rep.Smitty@mahouse.gov](mailto:Rep.Smitty@mahouse.gov); [efitzma@gmail.com](mailto:efitzma@gmail.com); [nft.1@outlook.com](mailto:nft.1@outlook.com); [erbshepard1@gmail.com](mailto:erbshepard1@gmail.com); [wma11@verizon.net](mailto:wma11@verizon.net); [tammymerenda@gmail.com](mailto:tammymerenda@gmail.com); [peterbarton@earthlink.net](mailto:peterbarton@earthlink.net)  
**Subject:** Re: Mass Turnpike Exit  
**Date:** Thursday, June 6, 2019 12:58:33 PM

Dear Cassandra, Adam Hinds, Smitty Pignatelli and members of the ReThink Group,  
In regards to your ongoing work to assist and support the economy of the beautiful small towns in Western Mass. I would like to offer my humble opinion. We do not need another turnpike exit we need a more creative solution.

The unique enclave of towns you are working to connect are not "cut off" but delightfully "Off the Beaten Track", which is part of their charm and draw. These could be elegantly connected via commuter rail.

Let's be creative and think long range, in a changing climate lets look for solutions that reduce single car transportation and support public transportation. Why not offer something different and unique in these rugged small communities in keeping with their colorful past. Help develop without degrading, create something that allows more access without adding infrastructure or costs to road maintenance and transportation. This area not only has Massachusetts first designated Wild & Scenic River, the Westfield, it hosts enormous tracks of wilderness worth safeguarding.

In addition to an existing rail line I believe there is room for a third track from Pittsfield to Albany. Perhaps someday a bike path will share the direct route through the hills as well as a commuter train to bring visitors and new home owners to these preserved and historic small towns.

Thank you for your work and thoughtful long range planning.

Yours Truly,  
Meredyth Babcock  
56 Benton Hill Rd  
Becket MA. 01223  
413 623-2070

**From:** [historicalcommission@townofblandford.com](mailto:historicalcommission@townofblandford.com)  
**To:** [Gascon, Cassandra \(DOT\)](#)  
**Cc:** [cletendre@townofblandford.com](mailto:cletendre@townofblandford.com); [selectboardadmin@townofblandford.com](mailto:selectboardadmin@townofblandford.com); [administrator@townofblandford.com](mailto:administrator@townofblandford.com)  
**Subject:** MASS DOT I-90 Interstate exchange study  
**Date:** Thursday, June 6, 2019 2:43:33 PM  
**Attachments:** [2019 BHC MASS DOT Interchange Study.pdf](#)

Dear Ms Gascon,

Please review attached letter from the Town of Blandford Historical Commission in reference to the MASS DOT I-90 Interstate exchange study.

Thank you,

Town of Blandford Historical Commission

DRAFT



**Blandford Historical Commission  
1 Russell Stage Road, Suite 5  
Blandford, Massachusetts 01008**

Cassandra Gascon  
MASS DOT  
Project Manager I-90 Interchange Study

Dear Ms Gascon:

In keeping with our duty, under Massachusetts General Law, to preserve and protect historical resources which are significant to our town, the Historical Commission of the Town of Blandford, Massachusetts wishes to make a matter of record its judgement that the addition of an access/exit point on the Massachusetts I-90 Turnpike which would direct traffic onto the town of Blandford would irreparably alter the small-town atmosphere as well as the peace and quiet of the town's rural setting. Further, and more importantly, it would cause an unacceptable risk of significant harm to historical buildings and archeological sites. There is a very limited number of options available to exiting traffic each of which we find problematic.

The historical character of the Town is of great value to the Commission and the citizenry. We are not aware of any definitive plans and we respectfully ask that you factor these risks into your process as you develop such plans.

Our town has a long and unhappy experience with the MASS Turnpike. In the absence of an Historical Commission, many assets were lost which might have been saved when the MASS Turnpike was first laid out and constructed.

The historical assets which we seek to protect include homes (some of which date from the 1700's), cemeteries (one of which is already four feet below Rout 23 grade, to which it is contiguous) and the site of a colonial fort. Also included are, a church, pictured above in our Blandford Town Seal, built in 1822, which is listed in the National Register of Historic Places and a former school which now houses the Blandford Historical Society's museum of historically valuable town documents and items. These two buildings sit on the Blandford Town Common. They are on opposite sides of the road which directly connects the MASS Turnpike to the Blandford rest area and Route 23. We suspect that this road might be high on your list of potentially useful parts of a new traffic pattern. Please know that the road, at its nearest point to these buildings, is not wide enough for two vehicles to pass each other safely in much of the winter due to rock ledge at its sides and the inevitable buildup of snow. We have no doubt that to meet traffic standards the ledge would have to be blasted. These historical buildings are about twenty feet from the road. The risk of damage is significant and unacceptable.

Respectfully submitted,  
The Blandford Historical Commission,  
Michael J. Brennan  
1 Russell Stage Rd Ste. 5  
Blandford, MA 01008

CC:  
Blandford Board of Selectman  
Blandford Town Administrator Joshua Garcia

**TOWN OF BECKET**  
**HIGHWAY DEPARTMENT**  
47 LYMAN STREET • BECKET, MA 01223  
TEL. 413-623-8988 • FAX 413-623-2007

HIGHWAY@TOWNOFBECKET.ORG

05/20/2019

Cassandra Gascon  
MA DOT  
I-90 Interchange Study

[Cassandra.Gascon@dot.state.ma.us](mailto:Cassandra.Gascon@dot.state.ma.us)

Cassandra,

I am writing to you about the proposed new turnpike exchange in the locations of Blandford or Otis as they will directly impact the roads, users and residents of such in the Town Becket. This will be the first new exit on the western end of the turnpike in 60 years. As we know that there will be positive and negative effects anytime such an infrastructure project is proposed and under taken and I would like to make sure that if this new exit does happen that we look at everything we can to reduce the negative effects it has on the Town of Becket. I also believe this will be the first exit that exits directly onto City or Town maintained roads, and if not it will be the only one that does so on a small rural Town maintained roads.

MA DOT needs to draw a 5 mile and 10 mile circle around the exit and look at all the Town roads that will see the traffic levels increase by 30%-40% or more. They need to be designed and reconstruct them from the base up as state roads are constructed today and incorporate the complete streets design methods so that all users can safely use them. I believe that the budget figures that have been proposed are severely underestimated as I think that costs proposed are only to construct the exit and resurface some of the directly impacted roads. My cost estimates would be in the range of \$300-\$500 million for a project of this size with all of the roads, bridges and culverts that will need to be addressed to accommodate this exit as our roads were not designed or constructed to handle this kind of traffic increase. This will be the only true way to get an accurate cost figure on this proposed project.

We need to do our due diligence and look at all of the possible affected roads from the traffic studies up front instead of after the fact. As we will need to maintain them going forward with limited Town funds, level funded Chapter 90 funds on a year to year basis that are not keeping pace with the economy and not a timely release and also very competitive grants. The fact that

we do not provide the same level or varying levels of snow and ice removal as MA DOT as we go home for a period of time at night to rest for safety reasons, this could become a costly burden on our Town in the future that we did not ask for.

In Closing if the feasibility study warrants moving this project forward I hope that each Town affected will get two seats at the table to make sure that all of our concerns and needs will be fully addressed before moving this project forward. If this project does come to fruition I hope that it is a requirement of MA DOT to fully fund all aspects of this project and not to try and piece the project together in stages as our roads need to be improved before the first vehicle enters or exits the new exchange and so that it will reduce the impact it has on our community.

I know that you fully understand the challenges of small communities and feel assured that you will have our resident's best interests and concerns on your mind with this proposed project.

Respectfully,

*Christopher J. Bouchard*

Highway Superintendent

**From:** Leonard Margulies  
**To:** Gascon, Cassandra (DOT)  
**Subject:** Mass Pike Becket/Blandford Exit  
**Date:** Sunday, June 16, 2019 11:42:14 AM

Ms Gascon,

One of the attractions for me to purchase a home in Becket was the serenity of the community. As a resident of the Indian Lake Association off of Bonny Rigg Hill Road, I would be particularly affected by the increased traffic and noise that an exit would generate. I urge you to help the Town of Becket retain it's character and work against establishing an exit that would burden our roads and impact our environment.

Very truly yours,  
Len Margulies  
386 Moberg Road  
Becket, MA 01223

DRAFT

**From:** dntoomey@juno.com  
**To:** efitzma@gmail.com; meredythbabcock@outlook.com; dntoomey@juno.com; nft.1@outlook.com; erbshepard1@gmail.com; wmal1@verizon.net; tammymerenda@gmail.com; peterbarton@earthlink.net; eapinsley@aol.com; adam.hinds@masenate.gov; Gascon, Cassandra (DOT); Gascon, Cassandra (DOT); smitty.pignatelli@mahouse.gov  
**Subject:** Proposed Mass Turnpike Exit  
**Date:** Friday, June 21, 2019 10:11:30 AM

Hello all,

A couple of weeks ago I sent you a photo of a truck stuck on the bridge at the intersection of Route 20 and Blandford Road. As this is only 1/2 mile from our house, that is what we are seeing on a regular basis, without access to the Turnpike.

Yesterday, we were heading home from Blandford and came across this situation in the center of town. (See photo Rte 23). Seems the same issues are happening at the intersection of Route 23 and North Street. Where the tractor trailers are unable to make the turns.

As this is the only road that would get traffic to and from the 2 proposed sites in Blandford, we feel the Turnpike Study Committee should take a further look at the surrounding area before moving forward. We feel the current roads are totally inadequate for accommodating a turnpike exit in the area. Building some sort of access road is a waste of taxpayer dollars for the benefit of a few who wish to travel via the pike.

Again, we invite the committee to travel the roads further out than the study requires and speak to the local (underfunded) highway departments, and local residents who would be impacted by such a project.

Thanks again for your attention,

Deb and Neil Toomey

*Deborah A. Toomey, EA, ATP*  
*P. O. Box 276*  
*Chester, MA 01011*  
*(413) 623-6682*

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**From:** Meredyth Babcock  
**To:** dntoomey@juno.com; efitzma@gmail.com; nft.1@outlook.com; erbshepard1@gmail.com; wmal1@verizon.net; tammymmerenda@gmail.com; peterbarton@earthlink.net; eapinsley@aol.com; adam.hinds@masenate.gov; Gascon, Cassandra (DOT); Gascon, Cassandra (DOT); rep.smitty@mahouse.gov  
**Subject:** Re: Proposed Mass Turnpike Exit  
**Date:** Friday, June 21, 2019 10:18:47 AM

Please bring the right kind of connection and transportation to our small towns. While issues with bridges, road and exits are daunting the rail line has just been upgraded and has ample space for parking and stops in Becket, Chester and Huntington MA.

Meredyth Babcock

**From:** dntoomey@juno.com <dntoomey@juno.com>  
**Sent:** Friday, June 21, 2019 10:09 AM  
**To:** efitzma@gmail.com; meredythbabcock@outlook.com; dntoomey@juno.com; nft.1@outlook.com; erbshepard1@gmail.com; wmal1@verizon.net; tammymmerenda@gmail.com; peterbarton@earthlink.net; eapinsley@aol.com; adam.hinds@masenate.gov; Cassandra.Gascon@dot.state.ma.us; cassandra.gascon@state.ma.us; rep.smitty@mahouse.gov  
**Subject:** Proposed Mass Turnpike Exit

Hello all,

A couple of weeks ago I sent you a photo of a truck stuck on the bridge at the intersection of Route 20 and Blandford Road. As this is only 1/2 mile from our house, that is what we are seeing on a regular basis, without access to the Turnpike.

Yesterday, we were heading home from Blandford and came across this situation in the center of town. (See photo Rte 23). Seems the same issues are happening at the intersection of Route 23 and North Street. Where the tractor trailers are unable to make the turns.

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Again, we invite the committee to travel the roads further out than the study requires and speak to the local (underfunded) highway departments, and local residents who would be impacted by such a project.

Thanks again for your attention,

Deb and Neil Toomey

*Deborah A. Toomey, EA, ATP*

*P. O. Box 276  
Chester, MA 01011  
(413) 623-6682*

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DRAFT



The Commonwealth of Massachusetts  
HOUSE OF REPRESENTATIVES  
STATE HOUSE, BOSTON 02133-1054

SMITTY PIGNATELLI  
REPRESENTATIVE  
4<sup>TH</sup> BERKSHIRE DISTRICT  
P.O. BOX 2228  
LENOX, MA 01240  
TEL (413) 637-0631

VICE CHAIR  
Post Audit and Oversight

Committees on:  
Education  
State Administration  
Consumer Protection and  
Professional Licensure

STATE HOUSE, ROOM 146  
TEL (617) 722-2575

August 10, 2019

Ms. Stephanie Pollack, Secretary  
Massachusetts Department of Transportation  
10 Park Plaza, Suite 4160  
Boston, MA 02116  
Attn: Ms. Jennifer Slesinger

*Re: Exits 2 and 3 Interchanges*

Dear Secretary Pollack:

I write today in regards to the recommend interchanges between Exits 2 and 3 on the Massachusetts Turnpike, specifically to request that a report on any final recommendations be made available to the public before the end of the year, in time for local public hearings and public input.

It is my understanding that the Department of Transportation has received a draft report of the recommended interchanges between exits 2 and 3. As such, I hope the Department will see fit to release these draft reports as soon as possible to allow affected towns between the two exits an opportunity to notify their constituencies and host public meetings before the 2019 holiday season.

I have heard from several constituents and organizations in my district hoping that a timely released report will make it possible for them to collect more localized and robust public input before any other steps of the process begin to unfold. I hope this matter will be given all due consideration. Please feel free to contact my office with any further questions or concerns.

Sincerely,

Representative Smitty Pignatelli  
Fourth Berkshire District

CC: Mr. Jonathan L. Gulliver  
Highway Administrator, MassDOT

2019-08018045

**From:** [Lawrence Abrams](#)  
**To:** [Pollack, Stephanie \(DOT\)](#)  
**Cc:** [Constituent Services \(GOV\)](#); [Dustin, Cheryl A. \(DOT\)](#); [Gulliver, Jonathan L. \(DOT\)](#); [Bligh, Cassandra \(DOT\)](#); [smitty.pignatelli@mahouse.gov](#); [adam.hinds@masenate.gov](#); [Otis Town Manager](#); [AdminAsst@townofbecket.org](#); [lla](#)  
**Subject:** Revised Pollack Letter with Graphics Opposing I-90 Algeria Interchange  
**Date:** Sunday, August 11, 2019 7:25:56 AM  
**Attachments:** [pastedGraphic.png](#)  
[pastedGraphic\\_1.png](#)  
[pastedGraphic\\_2.png](#)

---

Larry Abrams  
P.O. Box 801  
162 Bonny Rigg Hill Road  
Becket, MA 01223  
email: [labrams00@gmail.com](mailto:labrams00@gmail.com)  
cell 917-763-5645

August 7, 2019  
(Revised August 12, 2019)

Ms. Stephanie Pollack,  
Secretary of Transportation and  
C.E.O. of MassDOT  
[email: stephanie.pollack@dot.state.ma.us](mailto:stephanie.pollack@dot.state.ma.us)

Dear Ms. Pollack,

I am writing to you on behalf of the Indian Lake community of over 300 people in Becket and beyond to seek your intervention with DOT's Working Group Study on a possible interchange on the Mass Pike between exits 2 and 3. As I do so, I find myself hearing Joni Mitchell's lyrics: "They paved paradise to put up a parking lot" echoing in my head. Of course, I know the DOT is studying how best to "develop" the hill towns over the long term rather than planning a parking lot. Unfortunately, the process has gone awry and we are looking to you to correct it. I discuss the problems with the process in section 1; the reasons why an exit should not be built on Algeria road in section 2; and our plan to bring more attention to the issues in section 3.

### 1. Problems with the Study Process

On August 5th four leaders of our group who have concerns about DOT's communication with the public met with Representative Pignatelli to express the following concerns with the DOT's process:

- a. The Study Group has not yet given the public the chance to see the "draft" report. This should be done in advance of the public meeting, so we can make intelligent comments at a public hearing.
- b. We noted that the June public meeting promised by the DOT never materialized; and although a DOT representative stated there would be one or two Study Group meetings prior to the report's release, a Berkshire Eagle story by Larry Parnass reported that the draft report will be submitted directly to you and would not be available until a public meeting. We wrote to the group's project manager about the inconsistency only to receive a dismissive response that she knew the number of meetings scheduled and no further meetings, to date, had been scheduled.
- c. In the Parnass story, another DOT manager was quoted that an informational meeting on the draft report would probably be held around Thanksgiving. **I hope you will schedule an information meeting early October, not late November.** Note that a July 29<sup>th</sup> Berkshire Eagle editorial demanded that the DOT release the draft report in August or early September. Doing so would make the informational meeting more productive.

I am enclosing articles, letters to the editor, and editorial positions of the Eagle to be included in the draft report since we did not have the opportunity in June to present such documents to the Study Group or have them included in "The Draft Report."

In response to the above concerns, Representative Pignatelli suggested the reasons for what we refer to as "slow-playing" the

public were not intentional. He gave us a greater understanding of the policy issues.

It is my understanding that Representative Pignatelli will reach out to you directly to request that the report be available to the public in September in advance of the public meeting, which should be held in October.

## **2. An Algeria Road Exit Would Irrevocably Harm the Community and Cost Too Much**

When we met with Representative Pignatelli, we voiced our strong opposition to siting a Turnpike Exit on Algeria Road because doing so will increase commercial and passenger traffic on Bonny Rigg Hill Road (BRHR). More specifically, BRHR:

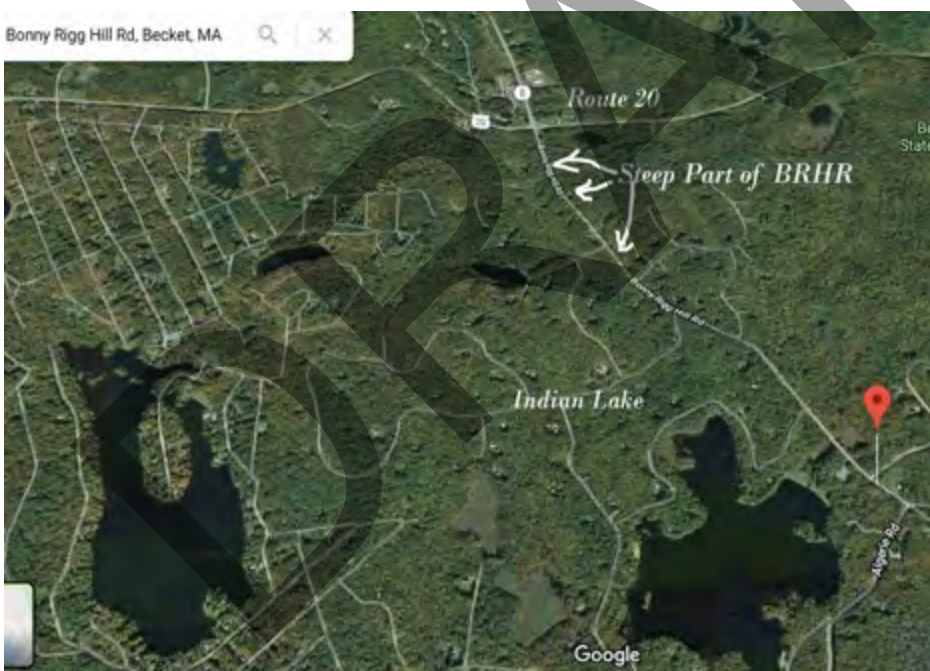
- a. Is a steep, narrow country road that is totally unsuited to such additional traffic.
- b. Bifurcates the Indian Lake Community where many walkers, hikers and bikers are present thus creating real danger to life and property. It cannot safely support two 18 wheelers barreling down BRHR in opposite directions. (See Exhibit 1 below.)
- c. Has a **steep** incline that is difficult for 18 wheelers to ascend and (more distressingly) to descend safely.
- d. Does not have a “run-away truck ramp” to prevent loss of air brakes thereby having trucks careen through route 20. The descent for trucks is even more perilous in winter/ice season. (See Exhibit 2 below.)
- e. Would increase the noise pollution on a rural road of trucks downshifting and pumping breaks when descending.
- f. Would increase the probability of blowing out the Walker Brook Culvert near Route 20 which has been blown out twice in the last 10 years. The cost of repairing local bridges which collapse on back country roads falls on the local community, not the Commonwealth of Massachusetts, as does the traffic disruption. (See Exhibit 3 below.)
- g. Has “old growth” maple trees on both sides, which our community wants to preserve so widening the road for safety’ reasons would change the very rural nature of our environment, and remove a buffer that mutes traffic sounds.
- h. Road maintenance costs—borne by local Becket taxpayers—would be greatly increased.
- i. Would subject landholders to an ugly eminent domain process.

**Exhibit 1: Bonny Rigg Hill Road is too steep and narrow for more traffic. Eighteen wheelers would be even more of a hazard than the large trucks already using BRHR!**





**Exhibit 2: A runaway truck would cross a major state road Route 20, if it could not stop after the steep part of BRHR**



**Exhibit 3: The impact of the last time the culvert on Bonny Rigg Hill Road was “blown out.”**





**If our specific objections are not cited in the current draft report because the June meeting did not materialize as promised, please incorporate them in the report now. In addition, please include this letter in your report, to be discussed at the next public meeting to support our argument that an Algeria site is not suitable for a turnpike exit.**

We cannot merely hope that the Algeria Interchange will not be selected simply because it the most expensive option. (Algeria is \$37.8 million, Blandford Maintenance is \$29 million and the Blandford Service Area is \$34 million.) These figures exclude costs for eminent domain to both the state and land owners and the significant costs to towns to upgrade roads, culverts and bridges.

At the last public meeting, Chris Bouchard of The Becket Highway Department warned the DOT that placing an interchange on Algeria Road would demand a substantial increase in the road maintenance and repair budget. Otis faces similar issues; thus, both Otis and Becket are likely to unite to oppose the Algeria interchange to avoid an increased tax burden. Indeed, people from both Becket and Otis spoke against the Algeria site at the last Study Group meeting because it would create danger to local camps, wetlands, and our rural way of life.

It is very likely, if the interchange is sited on Algeria, the citizens of Becket will seek to change its zoning laws to ban commercial traffic on Bonny Rigg Hill Road, except for local truck traffic. Such a zoning change would mean the pass-through commercial traffic would be directed on Algeria Road onto Route 23 passing through Otis and East Otis. Again this would motivate the Becket and Otis communities to work together to stop the Algeria interchange. Accordingly, we are pursuing such an effort now.

Finally, the Study Group, which some say was funded around \$270,000, simply narrowed down their selections to the three midway sites; two in Blandford and one on Algeria (Otis) all of which use back country roads to link to the main State routes. Since you really don't have the funding in the current 51% Federal/49% State formula it would make more sense to look to more direct routes that would not destroy communities.

For example, eight months ago, we suggested two exits, one in Russell and one in Becket, near Jacob's Pillow, where the Mass Pike intersects with Routes 20 and 8 respectively. These selections would give commuters access to two exits which empty directly onto State Routes so local towns and communities will not have to bear the burden of increased local taxes implicit in the DOT's master development plan.

### **3. Community Outreach**

It is imperative that people from the affected communities voice their opinions pro or con at the next DOT session, date to be determined. To prepare intelligent comments the report should be distributed to all interested parties weeks before the informational meeting.

**As the current plan was explained the conclusions of the report will be presented to the public and then “planners” will get immediate public reaction. This plan is unacceptable and it takes the “planners” off the hook for their two-year study and passes it on to the State Legislature.**

All people in the hill towns need to stay vigilant and alert. We need to go on record giving feedback to the DOT. We should never be dismissed by a process which accepts superficial public comments.

We need to have an in-depth discussion about the quality of the development plan and if its choices are truly the best for those of us who reside in the hill towns.

The Indian Lake Association and The No New Turnpike Petition people will alert as many people as we can when DOT sets the date for their next public meeting. We plan to attend en mass and make our voices heard. **Once the DOT meeting date is announced** we will urge our communities to consider the following:

- a. Share this email with their neighbors and encourage them to do so as well.
- b. Speak with their friends and neighbors about the issue and ask for their support.
- c. Write a letter expressing their opinion to any or all of the people listed below
- d. Talk to local politicians informally or at Public Town Hall meetings, etc.

We also will contact various media outlets to get the word of the DOT meeting out to the public. Right now you can go to [mass.gov/i-90-interchange-study](http://mass.gov/i-90-interchange-study) and sign up for alerts of the next very important public meetings and examine DOT documents and plans. You can go to [bit.ly/TurnpikePetition](http://bit.ly/TurnpikePetition) if you want to oppose all of the 3 planned sites for the new interchange.

We are a community who took the initiative to purchase a quarry and donated the land to The Becket Land Trust for public walking and hiking trails because we were opposed to the increased traffic a new operating quarry would bring to our neighborhood. DOT's development plan categorically ignores our history and our environment unlike Trip Advisor which gives a 4 star rating to the tourist activities our quarry offers.

We will continue to expand our numbers of people who oppose the Algeria Interchange. We will respectfully ask DOT's Working Group on siting the Algeria interchange, including all decision-makers and local politicians, to address the negative impact of the proposed development plan on our community.

Sincerely,

Lawrence Abrams

A list of email addresses is as follows:

Governor Charlie Baker, [constituent.services@state.ma.us](mailto:constituent.services@state.ma.us)

Stephanie Pollack, Secretary and Chief Executive Officer, MA Dept. of Transportation (MassDOT) - email is sent to her assistant - [cheryl.a.dustin@dot.state.ma.us](mailto:cheryl.a.dustin@dot.state.ma.us)

Jonathan Gulliver, Highway Administrator, MassDOT, [jonathan.gulliver@dot.state.ma.us](mailto:jonathan.gulliver@dot.state.ma.us)

Cassandra Gascon, project manager for MassDOT [cassandra.gascon@dot.state.ma.us](mailto:cassandra.gascon@dot.state.ma.us)

William "Smitty" Pignatelli is the MA House Representative for the area. [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov)

Adam Hinds is the MA Senator for the involved area.  
[adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov)

[townadministrator.otis@gmail.com](mailto:townadministrator.otis@gmail.com) ((Rebecca Stone, town administrator who will forward letters to Selectmen.))

[AdminAsst@townofbecket.org](mailto:AdminAsst@townofbecket.org) (Beverly Gilbert, administrative assistant who will forward letters to Selectmen)

[letters@berkshireeagle.com](mailto:letters@berkshireeagle.com) (Berkshire Eagle letter to the editor)

[berkrec@bcn.net](mailto:berkrec@bcn.net) (Berkshire Record letter to the editor)

cc:

Gov. Baker

Lt. Gov. Polito

Mr. Gulliver

Ms. Gascon

Mr. Pignatelli

Mr. Hinds

Larry Parnass, Investigative Reporter, Berkshire Eagle

William Everhart, Editorial Page Editor, Berkshire Eagle

Robert Gross

Chris Bouchard, Becket Highway Department

Rebecca Stone, Otis Town Administrator

Lynne Hertzog

Laurie Thomas

DRAFT

**From:** [Kathy Dickinson](#)  
**To:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov)  
**Cc:** [Constituent Services \(GOV\)](#); [Dustin, Cheryl A. \(DOT\)](#); [Gulliver, Jonathan L. \(DOT\)](#); [Bligh, Cassandra \(DOT\)](#); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov); [selectmen.otis@gmail.com](mailto:selectmen.otis@gmail.com); [AdminAsst@townofbecket.org](mailto:AdminAsst@townofbecket.org)  
**Subject:** Opposition to Turnpike Exit in Otis  
**Date:** Friday, August 16, 2019 9:22:34 AM

---

Dear Representative Pignatelli,

As we noted in our letter to the Editor of the Berkshire Eagle, we are writing to register our opposition to locating a Mass Pike interchange on Algeria Road in Otis.

We are new residents to this region, having down-sized from a much larger, busier town commutable to offices in Boston and Providence. Since relocating to Becket just eight months ago, we have enjoyed discovering the quiet, friendly, slower-paced life that perhaps other folks in this region may be taking for granted. We live very near Bonnie Rigg Hill Road, where deer, bear, and even moose have been seen crossing as they follow Walker Brook. As you likely already know, our rural roads pass through fairly environmentally sensitive woods and wetlands, including National Heritage Endangered Species Program certified vernal pools. Conservatively, doubling or tripling the volume of cars and trucks, and associated speeds of “through traffic”, will absolutely disrupt the calm and sylvan nature of our neighborhood, to say the least.

The very health of our woods and wetlands is threatened by placing access to the interstate highway here in the remote woods of our neighboring town of Otis.

Here in Becket, there are no malls or shopping centers. That is precisely why we – and, we presume, other folks - settle here: for the quiet, rural nature this region affords. We don’t need to commute, but our woods, lakes, and wildlife need to be preserved; once they are disrupted by development, the damage can not be reversed.

Please, please consider this before deciding where to locate a Mass Pike Interchange.

Sincere best regards,

Dave and Kathy Dickinson  
PO Box 41  
107 Chippewa Drive  
Becket, MA 01223-0041

cc:  
Gov. Baker  
Ms. Pollack  
Mr. Gulliver  
Ms. Gascon  
Senator Hinds  
Otis Board of Selectmen  
Becket Board of Selectmen

**From:** [Lawrence Abrams](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [Pollack, Stephanie \(DOT\)](#); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov)  
**Subject:** Upcoming Mass DOT Meetings on Algeria Interchange  
**Date:** Sunday, September 8, 2019 4:35:17 PM

---

Dear Ms. Gascon,

I know the people I represent are adamantly opposed to the Algeria interchange. I know to I am passionate in my advocacy for the DOT to consider better options for development other than the ones under consideration.

I know you know the decision and if Algeria Road is not on the list, there is no need to ask your agency to provide the information requested in the piece below. If Algeria is still a viable option then we need to insure a fair process whereby DOT provides the Study/Working Group and the public answers to the cost issues we raise below. Likewise if Algeria is an option, we need to make sure that the steering group, which controls the Study/Working Group's agenda, does not bury our supporting documents in the appendices. A fair and open process would allow the Study/Working Group to engage a free discussion and decision-making role on our issues.

If you lived in our rural community, which is a far cry from Boston, you would have 5,771 daily reasons to oppose the interchange because that number represents the trucks and cars you predict will be invading our community daily.

Please acknowledge asap that this letter and the "Mass DOT Study Must Not Squander Taxpayer Money" has been received.

Also when you read this email, blink once if Algeria has been eliminated.

Sincerely,

Larry Abrams  
Coordinator of Opposition to the Algeria Interchange.

### Mass DOT Study Must Not Squander Taxpayer Money

The Mass DOT has scheduled meetings for Oct 2nd (Study/Working Group with public comments at the end) and October 10th (Public Meeting) where the DOT will roll out the results of the "Interchange Sweepstakes."

All interested parties should save the dates and hold the planners accountable if they make recommendations without presenting more complete estimates of the cost of the Algeria Interchange.

The engineers doing the study must determine the true cost of the Algeria option to the taxpayer and present these figures to the upcoming two meetings. Doing so could reveal that two interchanges are cheaper than one.

Initial DOT cost projections for the Algeria interchange come to \$37.8 million—\$26.3 million plus an additional \$11.5 to improve and widen the routes from Algeria to Route 23 and Bonny Rigg to Route 8. DOT projects traffic would increase by 5,771 trips per day down our back-country roads, but they have not calculated the true costs of this ill-conceived plan.

Specifically, other likely costs to taxpayers, which the DOT appears to have omitted, include the costs for:

1. Added yearly road maintenance in Becket and Otis, which the State might (or might not) subsidize.
2. Building a run-away truck ramp, at the base of Bonny Rigg Hill Road before it intersects routes 8 and 20.
3. Building sidewalks and a bike lane to protect our residents from large vehicles, e.g., 18-wheelers. The population of the Indian Lake community through which Bonny Rigg Hill Road runs swells to 400 people in the summer. (Note the DOT states there are 7 residences within a quarter mile of the interchange, but ignores the 130 Indian Lake homes one mile away. Thus, their road construction costs were likely based on a few homes on Algeria and account only for minimal costs of widening the road for trucks without considering all of the residences on/near Bonny Rigg Hill or the people who walk, hike and bike on the proposed route.)
4. Building new sewers since the culverts along Bonnie Rigg Hill often get washed out.
5. The legal and financial expenses to secure easements on the approximately 20 or so properties directly on Bonny Rigg.
6. Tree work to cut down and remove the old-growth maple trees lining Bonny Rigg.
7. Landscaping and driveway repair for the affected homes.
8. Replacing the overpass at the Algeria Interchange because semis cannot pass through it. This would be a waste because the overpass was just reinforced such that one workman said should last 100 years.
9. Additional police enforcement and other emergency costs associated with routing more traffic including more heaving trucks and passenger vehicles through Becket and Otis. (The DOT data imply 320 added daytime trips per hour and 161 added nighttime trips per hour, assuming 2/3 of the 5771 added trips per day are between 8 am and 8 pm and rest are from 8 pm to 7:59 am.)

If, as we suspect, the above costs are not included in the study's \$11.5 million local upgrade cost, the true costs would be much higher.

It is conceivable that the true cost of an Algeria interchange could be as high as \$60

million—\$26.3 million for the interchange itself plus \$11.5 million included in the study for the local road upgrade, plus perhaps as much as \$22 million more for the additional items listed above.

If this “guesstimated” figure is in the correct ball park, two interchanges onto State Routes, say one in Russell and one near Jacob's Pillow, might well be cheaper than Algeria because costs listed above would be avoided. By going directly over state routes DOT could avoid the \$11.5 million to upgrade back roads, and it could avoid or substantially reduce the costs for the contingencies enumerated above. This approach would provide an intelligent development plan for our region.

The DOT estimates that average cost to build an interchange in Blandford is approximately \$20 million (just for the interchange.) Assuming the same costs for each of the two interchanges on the State Routes, the total would be about \$40 million. Thus, this option appears to be less costly than the Algeria road option once the costs for the above factors are fully considered. Note, even if the added costs for these factors is much less than the \$22 million estimate above, the two-exchange option would be less costly. Factoring in the disruption during and after the construction to residents along and near the routes needed for the Algeria road option, we believe it is clear that it is in the public interest to avoid back roads. Mass DOT should not develop plans which will squander taxpayer money and destroy the quality of life for those who would be affected by the Algeria option.

Larry Abrams and Harold Ware  
162 Bonny Rigg Hill Road  
Becket, MA 01223  
cell: 917-763-5645  
[labrams00@gmail.com](mailto:labrams00@gmail.com)



**From:** [Lawrence Abrams](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Re: Upcoming Mass DOT Meetings on Algeria Interchange  
**Date:** Monday, September 9, 2019 9:34:27 PM

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Dear Ms. Bligh (Gascon),

I very much appreciate your efforts to reach out to us. Your letter is most clear and I appreciate your efforts to resolve the conflict. I think they are genuine. So much so I am going to share an email with a reporter so you can understand our approach and what you can do to get DOT to address our needs. I already included our piece on The DOT Study Is Squandering Taxpayer Money shortly. We are asking the DOT to let the Study/Working Group know if the true costs of the Algeria Interchange have been considered in DOT's estimate of close to \$38 million. We also will argue 2 interchanges on State Routes may be considerably less expensive than Algeria. Please carefully read the contingencies I will send the packet directly too the working group since you have no way of assuring me it will be discussed at the October meeting. If your experts can refute our guesstimates, that would be helpful to understand this situation.

excerpt from my email to a reporter.

"By the way I did receive a nice letter from Cassandra Gascon. She did clarify her process and I am appreciative. As a result I am going to engage her. If this type of communication would have happened in the Spring when we wanted to be heard, it would have done much to alleviate our community's angst. I am happy it is happening now.

When I lead groups I always feel it is best to be transparent. Now Ms Gascon has engaged us in a meaningful way she needs the information to offer resolutions to this conflict. I intend to give her our arguments up front so she will not be blind sided.

The conflict is there is no way to guarantee our information will reach the working group, because the DOT planning committee composed of her supervisor, Ethan Britland,, Ms Gascon and engineers from Aecom control the information the Working/Study Group receives. Ms. Gascon is not allowed to reveal the recommendations in the draft until the Study/Working Group meeting. They could not be passing the information on because Algeria has been eliminated but they must stay mute.

I intend to share a second packet to her as well as email to the Working Study Group directly with a note that if Algeria is not selected to move onto the State Legislature, then there is no need to discuss a moot point.

If, on the other hand ,Algeria is selected, we would like members of the Study/Working group to question deeply why the DOT did not have the time to provide the Study Group with ballpark estimates of the additional costs to the taxpayer. The Opposition to Algeria Road Interchange has asked DOT to verify our guesstimates by the October 2nd meeting and present their findings to the Study/Working Group. If they do not do so the Study/Working Group has the power to table their endorsement until experts verify the true costs.

When you are playing the house you have to cover all your bets."

Anyway, Ms. Gascon, I'll send you 2nd half of the opposition packet as soon as it is ready and



hope for the best.

Some questions:

Is the October 2nd Study/Working Group open to the public? I ask this because In the 3rd paragraph you say, "For this reason we do not finalize or distribute draft study findings publicly before presenting them to the Working Group for discussion and feedback."

Will the public who attends the October 2nd meeting be allowed to comment at the end of the session?

If not, will the public who attends gain full knowledge of the draft report, its recommendations and methodology?

Thanks for all your efforts and remember when we finally do meet, blink once off it is Algeria and twice if it is in Blandford. Let's keep in touch

Best,

Larry

On Sep 9, 2019, at 12:55 PM, Bligh, Cassandra (DOT)  
<[Cassandra.Gascon@dot.state.ma.us](mailto:Cassandra.Gascon@dot.state.ma.us)> wrote:

Mr. Abrams,

Thank you for your second email on September 8, 2019, containing a letter regarding the I-90 Interchange Study. I would like to confirm receipt of that letter, and also respond to your email from Friday September 6, 2019. MassDOT appreciates your continued efforts to communicate not only with the study team but with interested local residents. I would like to again assure you that your letters will be included in the final report.

Regarding your questions in your email from Friday, I would be happy to provide you with clarification. The 'study team' refers to MassDOT's staff that is assigned to conduct this study which includes myself as the project manager for this effort, Ethan Britland as my direct manager, and the engineers and planners at AECOM as our hired consultant. The study's Working Group consists of representatives from MassDOT, community representatives, regional planning agencies, and elected officials. The Working Group serves to advise the study team on local issues and concerns, represent and report back to their respective organizations, and provide feedback at key milestones.

Public opposition to the Algeria Road alternative will certainly be discussed at the Working Group meeting in October, as well as at the Public Meeting. As noted, public opposition to this alternative has had a large role in the alternatives analysis and will also be reflected in the study's findings. The Working Group is encouraged to share any position they may hold regarding the study or its draft findings, and MassDOT relies on the Working Group to provide this type of feedback for the study process. For this reason we do not finalize or distribute draft study findings publicly before presenting them to the Working Group for discussion and feedback.

I hope this answers your questions and I look forward to discussing the topic further in October.

Thank you,  
Cassandra

---

**From:** Lawrence Abrams <[labrams00@gmail.com](mailto:labrams00@gmail.com)>  
**Sent:** Sunday, September 8, 2019 4:35 PM  
**To:** Bligh, Cassandra (DOT) <[Cassandra.Gascon@dot.state.ma.us](mailto:Cassandra.Gascon@dot.state.ma.us)>  
**Cc:** Pollack, Stephanie (DOT) <[Stephanie.Pollack@dot.state.ma.us](mailto:Stephanie.Pollack@dot.state.ma.us)>;  
[adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov)  
**Subject:** Upcoming Mass DOT Meetings on Algeria Interchange

Dear Ms. Gascon,

I know the people I represent are adamantly opposed to the Algeria interchange. I know to I am passionate in my advocacy for the DOT to consider better options for development other than the ones under consideration.

I know you know the decision and if Algeria Road is not on the list, there is no need to ask your agency to provide the information requested in the piece below. If Algeria is still a viable option then we need to insure a fair process whereby DOT provides the Study/Working Group and the public answers to the cost issues we raise below. Likewise if Algeria is an option, we need to make sure that the steering group, which controls the Study/Working Group's agenda, does not bury our supporting documents in the appendices. A fair and open process would allow the Study/Working Group to engage a free discussion and decision-making role on our issues.

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9. Additional police enforcement and other emergency costs associated with routing more traffic including more heaving trucks and passenger vehicles through Becket and Otis. (The DOT data imply 320 added daytime trips per hour and 161 added nighttime trips per hour, assuming 2/3 of the 5771 added trips per day are between 8 am and 8 pm and rest are from 8 pm to 7:59 am.)

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residents along and near the routes needed for the Algeria road option, we believe it is clear that it is in the public interest to avoid back roads. Mass DOT should not develop plans which will squander taxpayer money and destroy the quality of life for those who would be affected by the Algeria option.

Larry Abrams and Harold Ware  
162 Bonny Rigg Hill Road  
Becket, MA 01223  
cell: 917-763-5645  
[labrams00@gmail.com](mailto:labrams00@gmail.com)

DRAFT

**From:** [Lawrence Abrams](#)  
**To:** [Bligh, Cassandra \(DOT\)](#); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov)  
**Subject:** Loose Ends  
**Date:** Monday, September 16, 2019 6:44:36 PM

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Hi Cassandra,

As we previously agreed, I emailed you and the Study Working Group, the second packet of opposition to The Algeria Interchange . Please copy people in the DOT planning committee as well since I don't have all of their emails. Since that package is dense, I suggest you focus on the comparative analysis chart of the three alternatives below. I had an economist desegregate the AECOM data. They should check the analysis and if valid they may want to use it as a slide in their power point presentation to the Working Group on October 2nd.

All the best,

Larry

**Comparison of Costs and Impacts of Algeria and Blanford Exits**  
**Harold Ware, PhD**

In the table below, I compare several quantitative measures of the costs and impacts of the three options contained in the I-90 Interexchange Study Working Group, Meeting #4, February 7, 2019 presentation by the Mass DOT and AECOM. Data in that presentation show that:

- The Algeria option costs the most;
- Algeria diverts fewest trips from Exits 2, and 3 (Lee and Westfield);
- Blanford Service Plaza reduces vehicle miles the most;
- The Blanford Exits reduce vehicle hours much more than the Algeria option;
- The cost per mile reduced is highest for Algeria than either of the other interchanges;
- The cost per vehicle hour saved is over 60 percent higher for Algeria than either of the other options.

Thus, the data imply that Algeria is the least effective, most costly of the 3 options studied.

This does not necessarily imply that either of the Blanford options should be approved. Other investments, e.g., broadband infrastructure, could do more to promote Hilltown development.

Summary of Interchange Costs and Impacts			
	Algerie	Blanford Maintenance	Blanford Service Plaza
Algerie costs the most.			
	-----Cost, Millions-----		
Interchange	\$ 26.3	\$ 19.4	\$ 20.4
Local	11.5	10.1	13.6
Total	\$ 37.8	\$29.5	\$34.0
Algerie diverts fewest trips from Exits 2 and 3.			
Diversion from Ex 2 Lee	64	346	134
Diversion from Ex 3 Westfield	597	1044	1433
Total Trip Reductions	661	1,390	1,567
Blanford Service Plaza reduces vehicle miles the most.			
Vehicle Mile Reductions per day	15,000	12,500	17,500

Algerie reduces vehicle miles the least.			
Vehicle Hour Reductions per day	900	1150	1300
Algerie has highest cost per mile reduced and per hour saved.			
Cost per Vehicle Mileage Reduction	\$2,520	\$2,360	\$1,943
Cost per Vehicle Hour Saved	\$42,000	\$25,652	\$26,154
<u>Ratio</u> of Algerie to other options			
Cost per Vehicle Mileage Reduction		1.07	1.30
Cost per Vehicle Hour Saved		1.64	1.61
Source: I-90 Interexchange Study, Working Group Meeting #4 February 7, 2019			

DRAFT



**From:** [Lawrence Abrams](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [Lawrence Abrams](#)  
**Subject:** Fwd: Opposition to the Algeria Interchange Part 2 to DOT Official and Study Working Group  
**Date:** Tuesday, September 17, 2019 9:35:28 AM

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Begin forwarded message:

**From:** Lawrence Abrams <[labrams00@gmail.com](mailto:labrams00@gmail.com)>  
**Subject:** **Opposition to the Algeria Interchange Part 2 to DOT Official and Study Working Group**  
**Date:** September 16, 2019 at 2:19:33 PM EDT  
**To:** Lawrence Abrams <[labrams00@gmail.com](mailto:labrams00@gmail.com)>

### **Opposition to the Algeria Interchange Part 2**

Larry Abrams, coordinator  
email: [labrams00@gmail.com](mailto:labrams00@gmail.com)

The October 2, 2019 meeting of the Study Working Group (in Lenox Town Hall at 3 PM) is crucial to make our argument that the Algeria Road alternative must be rejected as a viable option. Thus, we have worked hard to create documents to support our position, and emailed them to Ms. Bligh to study within her planning committee. We also emailed them directly Study/Working Group members with publicly available email addresses. We did this because people may not read *The Berkshire Record* or *Berkshire Eagle* and need to understand the effects an Algeria Interchange would have on our rural community.

Is the Algeria option the right move to relieve congestion and spur economic development?  
Over 300 people we represent have answered a resounding **no!** We are not opposed to development, only to ill-conceived development which will do more harm than good. The proposed Algeria interchange poses an existential threat to our community and should be stopped now.

This package (Part 2) builds on the evidence and arguments we included in the first packet we sent to you. The attachments below incorporate additional, more specific, information and arguments to support our position. We hope they will lead you to do well on the "final exam" that will be submitted to policy makers. Thus, we urge you to:

1. Look at the comparative analysis of the three alternatives done by an economist (and Becket homeowner) using the AECOM data. It shows that **Algeria is the most expensive, least beneficial option**. For example:
  - a. It costs the most,
  - b. It does least to divert traffic from the Lee and Westfield Exits, and
  - c. It saves the least driving time.
2. Look at the possibility that real cost of the Algeria Interchange is not \$38 million, but closer to \$60 million. If Algeria is still in contention, we ask that DOT officials and AECOM engineers provide ballpark figures for each of the extra costs delineated by the October 2nd meeting. **These additional costs must be considered in your decision-making process.** If \$60 million is closer to the true cost, you could easily build two interchanges emptying directly onto state routes. Furthermore, the documents show the idea of a two-exit solution was presented to the DOT as early of February of this year. Were you asked to consider it as a viable option or were you constrained to look at only single-exit options?

3. Look at why **the Algeria Interchange may not lead to the promised economic development.** Interchange supporters are selling the project based on economic development, but chances are it won't boost the economy. Rather, **it could leave Becket and Otis financially stressed by the costs of maintaining and policing rural routes that were never designed for the added traffic.**
4. Look at how the Berkshire Record reports on the discussion of the Algeria Interchange at a Becket Selectman's meeting to understand how **the DOT's process was frustrating those seeking to have their voices heard before the recommendations were finalized.**
5. Look at the various other documents from 2018 to today warning the Algeria Interchange should be eliminated as an option. Some letters advocate Mass DOT's priorities are misplaced and the state government should focus more on providing high speed internet, repairing our crumbling local bridges or preserving local communities.

Regarding the process, as the Study Working Group knows, it has been 8 months since you met in February, and our group has been frustrated because we could not present our position in the spring as promised. A vital decision affecting our lives was apparently already complete in the draft report located somewhere in Ms. Pollack's office. The Berkshire Eagle reported that the next meeting would not be scheduled until Thanksgiving.

Our emails were not acknowledged by the DOT, until additional pressure was applied. Fortunately, when the DOT finally responded they took a more reasonable approach. The meetings were scheduled in early October, the draft report presentation would be available at the next Study Working Group Meeting; thus, the public could have access to it at the public roll out the following week. This scheduling makes it possible to study the draft report, develop intelligent comments, and express them in a public forum (and not just via an on-line website.)

Ms. Bligh wrote us these reassuring thoughts:

Public opposition to the Algeria Road alternative will certainly be discussed at the Working Group meeting in October, as well as at the Public Meeting. As noted, public opposition to this alternative has had a large role in the alternatives analysis and will also be reflected in the study's findings. **The Working Group is encouraged to share any position they may hold regarding the study or its draft findings, and Mass DOT relies on the Working Group to provide this type of feedback for the study process.**

If Algeria remains in contention, we hope you will be true to the charge (in bold above), whether or not you agree with us. Have the open discussion, and if you fully considering our arguments and data, we are very hopeful that the Study Working Group will recommend that the DOT eliminates the Algeria option from contention. (Of course, if Algeria has already been eliminated in the draft report then the point is moot.) If not, we need to rely on your voice and that is why we worked so hard to develop this packet.

On October 2nd, we will be there, newspapers reporters will be there, but most of all we need you to be there to hopefully advocate our cause.

My community welcomes feedback because it helps us refine our position. As coordinator of the Opposition to the Algeria Interchange, I greatly appreciated the many responses I received after the first packet and look forward to your responses to this one as well.

[Consider the Issues](#)  
[Comparison of Data for 3 Alternatives](#)  
[DOT Squandering Taxpayer Money](#)  
[Berkshire Record](#)  
[Algeria Interchange Won't Bring Development](#)  
[Active Recruitment Petition for No New Exits](#)  
[Re-route Funds Not Roads](#)  
[DOT Should Focus on Repairing Bridges](#)  
[High Speed Internet, Not New Pike](#)

[DOT Should Explore Alternative Turnpike Exit Sites](#)  
[Letter to Governor Baker, Rep Pignatelli and Senator Hinds](#)  
[Pike Exit Will Alter Town's Character](#)  
[Pollack Letter and Case Against Algeria](#)  
[Eagle Editorial Time to Roll Out Pike Report](#)

DRAFT

**From:** [Gould, Jonathan \(SEN\)](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Sen. Hinds" constituent opposes Algeria Road proposal  
**Date:** Wednesday, September 18, 2019 9:13:35 AM

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Hi Cassandra,

I just spoke to Barbara Mandler who lives at 3 Hiawatha Hill Road in Beckett. She said she hadn't yet contacted MassDOT to express her opposition to the Algeria Road interchange and wanted me to pass that along. She said that interchange would change their neighborhood from one where people hike and bike to one with more traffic. She said many in Beckett feel similarly that an interchange should not be put there. She said the area is very rural and she wants it to remain that way and also mentioned that the hill on Bonny Rigg will be difficult for trucks to navigate.

Thanks and best,

Jon

Jon Gould  
Hilltown Community Liaison  
Senator Adam Hinds  
Commons coworking  
16 Main Street  
Williamsburg, MA 01096  
(413) 768-2373

**From:** [H Ware](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [Lawrence Abrams](#)  
**Subject:** Revised Comparison of Algeria and Blanford Exits  
**Date:** Wednesday, September 18, 2019 10:33:50 AM  
**Attachments:** [Comparison of Algeria and Blanford Exits Amended 9-17.pdf](#)

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Dear Ms. Gascon,

Attached is an updated comparison of the costs and impacts of the Algeria and Blanford exits. In reviewing the draft that Larry circulated, I noticed that there was an incorrect heading in the table above "Vehicle Hour Reductions per Day." The erroneous heading above the Vehicle Hour Reductions per Day data was: "Algeria reduces vehicle miles the least." Of course, it should have read: "Algeria reduces vehicle hours the least." Please share the corrected comparison attached below with the leadership team. Note that I also made some minor edits to the end notes and added that the data on cost per vehicle mile reduced and per vehicle hour saved per day are intended only as relative measures of the relationships among the three options.

We would greatly appreciate any feedback from you and your team, and AECOM as soon as possible so we can address any concerns or critiques of the comparison chart and the implications I drew from the data. Larry suggested I hold off in sending this corrected copy to the Study Working Group until Wednesday, October 25th so your leadership team and especially the AECOM engineers would have a chance to review my work; however, if this requests cannot be met because of DOT procedures, just let me know and I can send it out earlier.

We look forward to hearing from you so we can improve our analysis if needed.

Best Regards,

Harold Ware

**Comparison of Costs and Impacts of Algeria and Blanford Exits**  
**(Amended 9-17-2019)**  
**Harold Ware, PhD<sup>i</sup>**

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<b>Summary of Interchange Costs and Impacts<sup>ii</sup></b>			
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<b>Algerie has highest cost per mile reduced and per hour saved per day.</b>			
Cost per Vehicle Mileage Reduction	\$2,520	\$2,360	\$1,943
Cost per Vehicle Hour Saved	\$42,000	\$25,652	\$26,154
<b>Ratio of Algeria to other options</b>			
Cost per Vehicle Mileage Reduction		1.07	1.30
Cost per Vehicle Hour Saved		1.64	1.61
Source: I-90 Interexchange Study, Working Group Meeting #4, February 7, 2019			

<sup>i</sup> I have a PhD in economics from Cornell University. I have been a Becket homeowner for over 16 years. Before retiring, I was a vice president for an international economics consulting firm, at which I directed numerous projects including: cost/benefit analyses, consumer demand studies and technology assessments. I also prepared testimony and position papers for many clients. Some of my work was published as book chapters and in economic journals.

<sup>ii</sup> I have not evaluated the methodology employed by the DOT working group, I have simply relied on the data from the presentation cited above. The cost per mile reduced and per hour saved per day are presented as relative measures. The relative relationships among the exits for the cost per vehicle mile reduced and hour saved would be the same if miles and hours saved were presented on a monthly or annual basis, for example.

**From:** [koppel](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Algerie Road proposal  
**Date:** Wednesday, September 18, 2019 10:40:59 PM

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I am a resident of Bonny Rigg Hill Road, Becket. I chose a rural tree-lined, narrow road in which to enjoy clean air and the green environment. The road has no shoulder and a very steep grade. Remnants of a ski lift still exit on my property at the top of the hill parallel to the road.

Now, granite trucks gear-up, gear-down, screech brakes and present hazards to the community that is on both sides of Bonny Rigg Hill Road. Increasing the traffic by considering an exit on the turnpike is an ill conceived idea.

We have no contemporary internet, only town budgets that finance our roads, a northern end of Bonny Rigg that is Environmentally Protected and the community has no interest in the State's spending millions of dollars to ruin the reason we live in Becket. Danger to pedestrians, bikers and residents' air and sound pollution is inevitable.

The State should consider improvement and enhancement to the community through high speed internet, not propose traffic, dirty air, noise and environmental pollution from the trucks gear shifting and braking, community disruption, separation and rural ruination by spending millions of dollars on a project that is not needed or wanted.

Judith Koppel



**From:** [Gould, Jonathan \(SEN\)](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** FW: [External]: Giving a voice to those without  
**Date:** Friday, September 20, 2019 2:21:41 PM

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Hi Cassandra,

Hope you've had a nice week. I'm forwarding along an email with links to some nature cam videos to include in the public comment. They are from constituents of Sen. Hinds in Beckett.

Thanks,

Jon

Jon Gould  
Hilltown Community Liaison  
Senator Adam Hinds  
Commons coworking  
16 Main Street  
Williamsburg, MA 01096  
(413) 768-2373

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**From:** Hinds, Adam (SEN)  
**Sent:** Thursday, September 19, 2019 4:44 PM  
**To:** Gould, Jonathan (SEN)  
**Subject:** FW: [External]: Giving a voice to those without

[CC, issue group, share with MassDOT, thank them.](#)

**From:** Stan Wolkoff [mailto:stanwolkoff@gmail.com]  
**Sent:** Thursday, September 19, 2019 4:25 PM  
**To:** Hinds, Adam (SEN); Pignatelli, Smitty - Rep. (HOU)  
**Cc:** Lawrence Abrams  
**Subject:** [External]: Giving a voice to those without

Dear Representative Pignatelli and Senator Hinds,

We are residents of Moberg Road in Becket, MA.

Our community Indian Lake encompasses almost 700 acres of near pristine woods, as well as a lake and a pond. While 125 families certainly enjoy the privilege of quiet country homes in these woods, Indian Lake is also a de facto sanctuary for wildlife. We have birds, bears, deer, fox, and wild turkey; even a fabled moose. It's no exaggeration - the cast of our menagerie is extensive.

Construction of a Mass Pike Interchange on nearby Algeria Road threatens the safety and survival of animals living year-round in and about our wooded community. An increase in traffic, noise and environmental devastation pose existential threats to our wildlife, while residents' peaceful and safe enjoyment of bucolic Becket will suffer considerably.

You have already received many objections from residents of Indian Lake, Becket and nearby Berkshire hill towns. We implore you now to watch and listen to those that have no voice by clicking the links below.

These video clips are from our tree cameras that secretly spy on our furry friends when we humans are not present. So many beautiful creatures are alive and thrive in our woodlands; these are the beings that indeed hear the sound of a tree falling in the forest.

Now ask yourselves: if these creatures could speak out, do you honestly believe they would support this ill-conceived highway interchange?

Respectfully in protest,

Stan & Robin Wolkoff  
63 Moberg Road  
Becket, MA 01223

<https://youtu.be/PaEal-WXvGg>

<https://youtu.be/evJ9SIRBrJw>

<https://youtu.be/pSTwm1rwd2o>

<https://youtu.be/n4qpMgMJE-s>

<https://youtu.be/OT7QU5Sc1P8>

<https://www.youtube.com/watch?v=RsRfqjCQiSE>

<https://youtu.be/WHt4kHqdlE>

**From:** [Gould, Jonathan \(SEN\)](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** FW: [External]: New Turnpike Exit  
**Date:** Friday, September 20, 2019 2:38:40 PM

---

Hi Cassandra,

Passing along an email regarding the Algeria Road interchange proposal.

Thanks,

Jon

Jon Gould  
Hilltown Community Liaison  
Senator Adam Hinds  
Commons coworking  
16 Main Street  
Williamsburg, MA 01096  
(413) 768-2373

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**From:** Jacqueline Gentile [mailto:[jackieag43@yahoo.com](mailto:jackieag43@yahoo.com)]  
**Sent:** Tuesday, September 17, 2019 3:34 PM  
**To:** Hinds, Adam (SEN)  
**Subject:** [External]: New Turnpike Exit

Dear Senator Hinds,

I am an East Otis resident and writing to voice my concern of the possibility of adding an I-90 interchange exit off Algeria Road. If you have visited this location, which I have to assume you did, you can understand my puzzlement with the idea of traffic on this country road. It truly does not make any sense to me. As I expressed to Representative Pignatelli, I didn't take this issue too seriously, but then again, I never dreamed that we would have our current president. Look where that got us! So here I am using my voice asking for your support against Algeria Road for an exit.

Thank you for your time.

Kind regards,  
Jackie Gentile

**From:** [Gould, Jonathan \(SEN\)](#)  
**To:** [Sisig, Cassandra \(DQ1\)](#)  
**Subject:** FW: [External]: New interchange - Becket  
**Date:** Friday, September 20, 2019 3:05:07 PM

---

Hi Cassandra,

Passing along an email from two of Sen. Hinds' constituents regarding the I-90 interchange proposal.

Thanks,

Jon

Jon Gould  
Hilltown Community Liaison  
Senator Adam Hinds  
Commons coworking  
16 Main Street  
Williamsburg, MA 01096  
(413) 768-2373

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**From:** Walt and Pam Ferris [mailto:[wnpferris1657@gmail.com](mailto:wnpferris1657@gmail.com)]  
**Sent:** Monday, September 16, 2019 7:58 PM  
**To:** Hinds, Adam (SEN)  
**Subject:** [External]: New interchange - Becket

I sent this same email to Smitty Pignatelli but got no response.

**Walt and Pam Ferris** <[wnpferris1657@gmail.com](mailto:wnpferris1657@gmail.com)>

Sat, Mar 2, 10:58 AM



to Smitty.Pignatelli



I grew up in South Lee and have lived in a few different areas of the Berkshires. I have been a resident of Becket for 26 years now. I read that you will listen to the people on the proposed new exit between Lee and Westfield. Let me emphatically state that I am against this proposal. Our roads are not equipped for heavy traffic nor are our bridges. Our "side" roads are generally dirt or "airport mix". Here are some examples of issues that I have seen or experienced in the last month. These are not atypical examples. I live on Fred Snow Road. A road that in some cases is barely wide enough for two cars to pass each other when the road is dry and there is no snow. So, basically from April through December. This road is quite long with one end at Route 8 and one end at Route 20. People many times use this road as a shortcut to get to Otis via Werden Road. A few weeks ago, a box truck was using the road as a quick way to get to Connecticut via Otis. It slid off the road into an open drainage ditch. It took RW's towing over 2 hours to get the vehicle righted. Many times, GPS sends people to our road via Tyne Road when they are travelling off of Exit 2. This road is not plowed in the winter. Earlier this week, our Dish Network technician was routed over Tyne Road. When he realized he couldn't get through, he was rerouted over Plumb Road, another road that is not fully plowed in the winter. I had a scary experience two mornings ago. I met the town plow truck in an area that was too narrow for both of us to pass one another. ended up partially off the road and had to use low 4WD to get out. Once out, I had to back up about 750 feet on a windy road in the dark (6 am) so I could get far enough back for the plow to pull into a manually made turnout. Just this morning, I was out shoveling snow off the driveway and realized that a car was off the road. It took two peoples help and over 45 minutes for this person to get back on the road. Others who were travelling the road either had to turn around or had to wait for the vehicle to move so they could get by. Like I said before, this is not atypical in the winter. In the spring or when we have thawing of the frost, the road is generally closed due to muddy conditions. I moved to Becket to get away from bustle. I know that it takes 25 minutes to get to Lee. Heck, I've been doing that commute 2x a day for 26 years. I chose that. I know that if I want to use the turnpike, my options are to go via route 20 or go back to Lee to Exit 2. Those are the choices that I knew before moving here. I feel that if we have an interchange, my home value will be decreased. I can very easily see the drug dealers that come from Springfield and Holyoke or other areas getting off the proposed exit and travelling over Washington Mountain Road to get to Pittsfield. Additionally, Washington Mountain Road would be used by trailer trucks and that road is not equipped at the Dalton end for the air brakes that would need to be used to travel that grade. Even at the lowball amount of money that is being talked about, it's too much. If there is that much money to be spent, how about it gets spent on roads and bridges. If you would like to contact me, you have my email address. I would love for you to take a ride down a bunch of our "side" roads to see how they are in the winter. Then do it again during mud season. That way maybe you can get a good feel of what unknowing people will be exposed to. Many of us have beautiful homes and yards. We are out in the "woods" for a reason. Please let us keep our peace.

**From:** [J.R.](#)  
**To:** [Bligh, Cassandra \(DOT\)](#); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov)  
**Cc:** [bombasticsg](#)  
**Subject:** Construction of a Mass Pike Interchange on Algerie Road  
**Date:** Saturday, September 21, 2019 3:55:30 PM

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Dear Representative Pignatelli and Senator Hinds,

We are home owners on Seneca Drive in Becket, MA and members of the Indian Lake Association. We built our home here over 25 years ago in order to enjoy the bucolic and pastoral countryside of Becket with its forests, lakes and streams. The construction of a proposed Mass Pike Interchange on nearby Algerie Road now threatens to destroy the peace and tranquility of our community and the idyllic countryside that we hold so dear.

Clearly, this ruinous proposed plan to place a Mass Pike interchange so near our community, will disrupt our lives and threaten our health and well-being. The Mass Pike Interchange will result in a substantial loss of habitat for the flora and fauna of the area, which has been thriving, and diminish the quality of life for the area's human inhabitants. The noise, the traffic, the pollution and commercialization of an area which is not appropriate, suitable or adequate for such industrial exploitation will destroy a quiet and vibrant community at great cost to the State when other much more efficient alternatives with larger potential benefits are available.

The burdens that the interchange imposes on our community are immeasurable both in monetary cost and the and the devastation and disruption that it would wreak upon our lives and the lives of our neighbors. The other alternatives, which will connect to existing State Routes rather than our community's small country roads make far more sense, will result in far less disruption and destruction of the environment and will be much more cost effective.

As residents and taxpayers of Becket, we beseech and implore you to reject the proposed Mass Pike Interchange at Algerie Road. It would be a senseless and destructive use of taxpayer funds and a misguided choice in the face of other far more efficient and beneficial options.

Sincerely,

Jeffrey E. Rothman

and

DRAFT

**From:** [Judy G Pillinger](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Concern about the interchange discussion  
**Date:** Saturday, September 21, 2019 9:58:12 PM

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Dear Ms. Gascon-Bligh,

I am writing to state that I am deeply opposed to any access ramp off of the Mass Pike in Becket —these will permanently destroy the Arcadian quality of our wonderful Hidden Hills Communities.

More specifically, I want to express my strong concern about an apparently unconsidered, but critically important potential consequence if a highway exit were added to Algeria Road – pedestrian fatalities.

Bonny Rigg Hill Road, and quite a bit of Algeria, are used regularly by pedestrians, runners and bikers, both on weekdays and weekends, through all the non-icy weeks of the year in the Berkshires. These are narrow roads with no shoulder, hills and turns with hidden views and no room for error for vehicles. With light traffic made up of our own neighbors, courtesy reigns and there is room for cars to move across the road. Increased traffic, whether by cars or trucks, would create a clear and present danger to the local travelers.

Those who exercise, walk their dogs or visit their nearby neighbors will be in peril if the flow of traffic is affected, which it would inevitably be the case with a nearby highway exit. Moreover, biking tour groups would lose a treasured rural route which by extension would also affect the local businesses that benefit from their stops (whether at a neighborhood watering hole, an organic farm stand or a state preserve.)

It would only be a matter of time before a fatality occurs. We do not need to have regrets in hindsight.

Hoping that your wisdom and forethought will prevail.

Sincerely,



Judy Pillinger

222 Bonny Rigg Hill Road  
Becket, MA 01223

DRAFT

Stephen Feldman  
621 Moberg Rd  
Becket, MA

9/22/19

Dear Ms Gascon:

Although environmental and ecological concerns of the average citizen tend, in the current political zeitgeist, to be subordinated to the interests of corporations, our town, Becket, and our community, Indian Lake, are, at the moment, still able to partake of nature's beauty, comfort, quiet, and purity, protected from the traffic noise and pollution that increasingly characterizes eastern and central Massachusetts. Apparently, however, this privilege that our community currently enjoys is very fragile; its existence is threatened by the potential construction of a new Mass Pike interchange to be located on Algeria Rd.

The plan under consideration will clearly benefit the local quarry, whose trucks currently run up and down Algeria and Bonnie Riggs Hill Roads daily, with increasing frequency. Proponents of the plan say that, by enhancing access to the area proximal to the proposed turnpike access, an economic advantage will accrue to regional businesses and local communities. As I see it, the average citizen who lives in relative proximity to the proposed turnpike interchange would experience economic contraction and spiritual depletion.

Proponents of the plan say that enhanced access would make these communities more reachable, therefore more desirable, and consequently more economically viable. But this argument ignores the fact that the greatest asset value attached to communities such as Becket and E. Otis arises from the quiet, beauty, and comfort that they offer its residents. People **choose** to live in these areas because of these features and because of their isolation. They **choose** to raise their children in relative serenity, away from the noise and pollution that are everyday features of more accessible communities. For most current residents, enhanced access and convenience to the turnpike will detract from the attractiveness of living where they live. The very nature of their communities will be immutably altered.

The interests and views of the people who live near the proposed interchange should be weighed impartially and honestly, independent of the advantages that politicians and bureaucrats may personally accrue by deciding in favor of corporate interests. I wonder if this is asking too much of our decision-makers.

Yours truly,

Stephen L. Feldman

**From:** [moenan2](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** No exit in Becket  
**Date:** Monday, September 23, 2019 10:57:34 AM

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As Becket residents for 20 years we continue to enjoy the unspoiled rural quality of our community, its forests, lakes, hills and less traveled byways. It's a way of life we treasure and wish to preserve. An exit off the turnpike in our midst would destroy what many of us found in our search for serenity and which we had hoped to pass on to our son and grandchildren. Please preserve their heritage and all those who come after us.

Morris and Nancy Freedman  
75 Seneca Dr.  
Becket, MA 01223

**From:** [Telegen, Arthur](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** ["smitty.pignatelli@mahouse.gov"](#); ["jonathan.gould@mahouse.gov"](#)  
**Subject:** The proposed Algeria interchange  
**Date:** Monday, September 23, 2019 12:12:11 PM

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Dear Ms. Gascon,

I invite you to spend an afternoon at our home at 805 Seneca Drive in Becket. You will see a lovely lake, its wooded surroundings and, if you are lucky, an occasional beaver. You will hear the drone of crickets, an occasional croak of a frog, and the sound of children at the beach 100 yards up the road. And, once in a while, you will hear a pickup truck or a motorcycle going down Algeria Road, which is within a couple hundred yards. In context, this very occasional noise is tolerable.

Then I would ask you to imagine that noise occurring thousands of times each day.

I understand that government always has to weigh competing interests. I would like you to understand that whatever value the proposed interchange is believed to provide should be weighed against the cost of the destruction of the community around Indian Lake.

Sincerely, Arthur

Telegen

**Arthur Telegen** | Partner | Seyfarth Shaw LLP  
Seaport East | Two Seaport Lane, Suite 300 | Boston, Massachusetts 02210-2028  
Direct: +1-617-946-4949 | Fax: +1-617-790-5333  
[atelegen@seyfarth.com](mailto:atelegen@seyfarth.com) | [www.seyfarth.com](http://www.seyfarth.com)



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**From:** [Ellen Offner](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov)  
**Subject:** Opposition to Algeria Road Turnpike Site  
**Date:** Monday, September 23, 2019 12:42:09 PM

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**September 23, 2019**

**Dear Ms. Gascon,**

**Like others in Becket, I am absolutely opposed to the Algeria Road turnpike site. It must be eliminated from contention at your next meeting. It will have a highly adverse impact on the Indian Lake Association community, which brings significant revenue to Berkshire County, specifically Becket, including Jacobs' Pillow and Dreamaway Lodge, as well as to Lee, Stockbridge, and even Great Barrington. Many Indian Lake homeowners will likely sell their homes, probably at a personal loss to them and causing degradation of Becket, which already has a struggling economy. Indian Lake homeowners provide an important backbone to the Town of Becket, helping to support amenities enjoyed by local Becket residents.**

**In addition the Algeria Road turnpike site will:**

- 1. endanger our safety and put lives at risk by 5771 commercial and passenger vehicles using the interchange daily;**
- 2. destroy our back-road lifestyle;**
- 3. costs the taxpayers perhaps as much as \$60 million to construct;**
- 4. endanger our wildlife;**
- 5. destroy our prime maple trees;**
- 6. not bring the economic development falsely promised;**
- 7. increase Becket taxes to maintain the access roads; and**
- 8. detract from funding from other important initiatives like high-speed rail, high-speed internet and saving our crumbling local bridges.**

**Please add my name to DOT's list registering the strong opinion that the**

**Algerie Interchange should never be built and send me a confirmation you received this email.**

**Thank you for your consideration.**

**Respectfully,**

**PROFESSOR ARNOLD A. OFFNER**

**ELLEN S. OFFNER**

**395 BONNY RIGG HILL ROAD**

**BECKET, MA**

DRAFT

**From:** [Dru Greenwood](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [Jonathan.gould@masenate.gov](mailto:Jonathan.gould@masenate.gov)  
**Subject:** Who wants an Algeria Road I-90 Interchange?  
**Date:** Monday, September 23, 2019 1:10:07 PM

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Dear Ms. Gascon:

Really. It can't be simply because the Westfield/Lee stretch of I-90 is long. To me, it's a welcome relief after the crowded up interchanges of Springfield/Westfield and brings you right into Lee where roads are all set to take you where you want to go in the Berkshires, including right back up Rte 20 to the eastern end of Becket to my home. None of my Becket or Otis friends is clamoring for a shorter route east or west or to the airport. Rte 20 or 23 or 8 are just fine. Does East Otis need additional commercial traffic to bring goods to the camp store there? Seems a high price to pay for the pollution, noise, wear and tear and higher taxes that would ensue—making the camp and surrounding areas so much less appealing to those who now seek it out for the clear air, quiet, gentility and affordability it now offers. Maybe it would be a pass through for trucks seeking a shorter way to Pittsfield. Is it truck drivers who are clamoring for a shortened route? Do they know about the steep hill on Bonnie Rigg Hill Road, whose bridge over Walker Brook at the bottom before Rte 20 has had to be replaced multiple times over the past few years? And we have frequent fog—low visibility as well. Do they know? Would they also want options for gas stations and repair facilities? Those are all set to go in Lee and in Westfield, not to mention the rest stop on the Pike in Blandford. Becket is not any of these and, as a resident, I for one do not want to see it become a truck support depot. I and the wildlife who live here are happy now. Rte 20 east from Lee and through Becket is known as the "Jacob's Ladder Scenic Byway." Let's keep it that way.

The Algeria Road turnpike site must be eliminated from contention at your next meeting. Please add my name to DOT's list registering my strong opposition to the Algeria Interchange. It should never be built. Please send me a confirmation you received this email.

Respectfully,

Catherine Greenwood  
220 Seneca Drive, Becket MA 01223



**From:** [Donna Schmidt](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [jonathan.gould@masenate.gov](mailto:jonathan.gould@masenate.gov); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov)  
**Subject:** Proposed Algeria Road and Blandford Mass Pike exits  
**Date:** Monday, September 23, 2019 1:23:09 PM

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Dear Ms. Gascon,

I am writing in regard to the proposed turnpike exits in Otis and Blandford. I am opposed to any new exit that would not exit directly onto an existing state route.

How can an exit that does not exit DIRECTLY onto a STATE ROUTE even be considered? Is it even legally allowable for the state to propose this situation? It certainly isn't safe or reasonable. The towns of Becket and Blandford do not have funds to upgrade and maintain roads in the manner required to support additional traffic and heavy commercial vehicles. I was shocked when these three proposed sites were left as the only remaining considerations.

If one wants to alleviate the traffic at the Lee exit, it seems obvious that an exit onto route 20 near route 8 would be the solution. To alleviate the traffic congestion in Westfield would require a new exit in western Westfield, Russel, or Blandford, again one that exits directly onto route 20 or route 23.

I own property in Blandford and Becket. I drive through Westfield to get there. My permanent residence is in Massachusetts. An exit at Algeria would be extremely convenient for me, but the cost for that convenience is too high.

Please add my name to DOT's list registering the strong opposition to an Algeria Interchange. Please send me a confirmation you received this email.

Sincerely,

Donna Schmidt  
Moberg Road Becket

**From:** [cs611@aol.com](mailto:cs611@aol.com)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [pignatelli@madhouse.gov](mailto:pignatelli@madhouse.gov); [jonathan.gould@masenate.gov](mailto:jonathan.gould@masenate.gov); [labrams00@gmail.com](mailto:labrams00@gmail.com)  
**Subject:** Opposition to the proposed Algeria Road interchange  
**Date:** Monday, September 23, 2019 1:26:06 PM

---

Dear Ms. Gaston,

We join with our neighbors in the Indian Lake Community within the town of Becket in opposing the construction of the Algeria Road turnpike interchange.

Our community is nestled within a bucolic setting living in harmony with the natural life of the area. Algeria Road is a two lane rather primitive road which along with Bonny Rigg Road could not withstand the estimated 5000+ additional trucks and cars expected from such construction. The imagined economic development which proponents of the exit have promised seems to be a product of wishful thinking. Our community's way of life would be negatively impacted beyond repair.

Please add our names to the DOT's list of those registering their opposition to the building of the Algeria Road interchange, and kindly send us a confirmation that you have received this e-mail.

Paula and Chuck Miller  
338 Moberg Road  
Becket, MA 01223

**From:** [Marc Pillinger](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Algeria Road Exchange  
**Date:** Monday, September 23, 2019 1:42:04 PM

---

Dear Ms. Gascon:

As a resident of Indian Lakes, I am opposed to the proposed Algeria Road Turnpike Interchange. At a time when the environment is endangered by actions being take in Washington D.C., to place the exchange in such a bucolic setting would be a tragedy.

Thank you for your time .

Marc H. Pillinger

Partner

**Pillinger Miller Tarallo, LLP**

555 Taxter Road, Fifth Floor

Elmsford, New York 10523

p: (914) 703-6300 ext. 1210

f: (914) 703-6688

e: [mpillinger@pmtlawfirm.com](mailto:mpillinger@pmtlawfirm.com)

website: [www.pmtlawfirm.com](http://www.pmtlawfirm.com)

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**From:** [DG DG](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [jonathan.gould@masenate.gov](mailto:jonathan.gould@masenate.gov)  
**Subject:** Gods Country  
**Date:** Monday, September 23, 2019 3:46:48 PM

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My wife and I spent 2 years searching for the perfect spot for our home in the country. When we discovered Becket we knew we had found Gods Country. We built our home in the Indian Lake community, the privacy and seclusion was perfect.

The only drawback has been the noise pollution created by the huge dump trucks traveling up and down Bonny Rigg Hill Road. The acceleration/deceleration of these big rigs is a constant nuisance, not to mention the smell of their exhaust. Entering Bonny Rigg from Moberg is a nail biting experience due to the high downhill speeds these trucks attain. We can live with this, it comes with living in quarry country. We absolutely cannot tolerate more traffic.

If this interchange comes to pass, we have decided that we will move and undoubtedly take a huge financial hit. With 1 stroke of your pen you will alter the environment for people and wildlife and destroy the beauty and calm we were so eager to find. In a short time I think you will find the Becket tax base shrink as longtime homeowners look to find other homesites. Maybe a new gas station and a Dunkin Donuts will bring more people to Becket, somehow I doubt it.

Why do you want to mess with Gods Country???

David and Rowena Geisler

**From:** [gnacheman](#)  
**To:** [Bligh, Cassandra \(DOT\)](#); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [jonathan.gould@mahoudr.hov](mailto:jonathan.gould@mahoudr.hov)  
**Subject:** Algeria Road  
**Date:** Monday, September 23, 2019 4:47:29 PM

---

Dear Ms Gascon

We are absolutely opposed to the Algeria Road Turnpike site. It must be eliminated from contention at your next meeting it will destroy our back road lifestyle with thousands of trucks and vehicles on our rural roads that are not designed for this type of traffic  
Please add our names to the DOT list registering strong opposition to the Algeria Road interchange. Please send a confirmation of this email

Thank you

Gerry&Bev Nacheman

Moberg Rd Becket

[Sent from Yahoo Mail for iPhone](#)

DRAFT

**From:** [Laurie Thomas](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** NO TURNPIKE EXIT ON ALGERIE  
**Date:** Monday, September 23, 2019 6:49:24 PM

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Dear Ms Gascon,

I am president of the Indian Lake Estates homeowners association in Becket. I've written to you before but today I'm writing as an individual, a mother, a grandmother, a taxpayer, a nature lover. I stand strongly against the DOT even considering an interchange on Algeria Road.

An interchange there would:

Create a dangerous condition on our country roads which are not wide enough for trucks, cyclists, pedestrians to share!

Endanger native species; old growth maple trees would be destroyed.

Pollute our environment with exhaust and noise.

Please register my strong opposition to an Algeria Road interchange. And please confirm receipt of this email.

Respectfully yours,  
Laurie Thomas  
568 Seneca Drive  
Becket, MA 01223

**From:** [Frayda Sharaby](#)  
**To:** [jonathan.gould@masenate.gov](mailto:jonathan.gould@masenate.gov); [Bligh, Cassandra \(DOT\)](#); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov)  
**Subject:** Algeria Interchange  
**Date:** Monday, September 23, 2019 8:16:02 PM

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Dear Ms. Gascon,

Like others in Becket, I am absolutely opposed to the Algeria Road turnpike site. It must be eliminated from contention at your next meeting. It will endanger our safety and put lives at risk by 5771 commercial and passenger vehicles using the interchange daily. It will also destroy our back-road life-style and endanger wildlife.

Please add my name to DOT's list registering the strong option the Algeria Interchange should never be built and send me a confirmation you received this email.

Respectfully,

Frayda and Offer Sharaby  
450 Bonny Rigg Hill Road  
Becket, Ma.



**From:** [Ludington, Karen](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** <mailto:smitty.pignatelli@mahouse.gov>; [Tom Lynch](#)  
**Subject:** Mass Turnpike Exit in the Berkshires  
**Date:** Monday, September 23, 2019 9:25:01 PM

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Dear Ms. Gascon:

This message is to state my opposition to the proposed Massachusetts Turnpike exit on Algeria Road. Putting an exit there will damage the environment, cause traffic problems because the roads are not built for this use, and cost the taxpayers an unreasonable amount of money. There are better locations. I am a Massachusetts voter (albeit in the town of Shirley, not Becket).

Thank you for your attention.

*Karen*

Karen E. Ludington  
121 Hiawatha Hill  
Box 211  
Becket MA 01223

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**From:** [Faith Rubin](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [jonathan.gould@masenate.gov](mailto:jonathan.gould@masenate.gov)  
**Subject:** Opposition to the proposed interchange  
**Date:** Monday, September 23, 2019 11:38:15 PM

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Dear Ms. Gascon,

Like others in Becket, I am absolutely opposed to the Algeria Road turnpike site. It must be eliminated from contention at your next meeting. It will endanger our safety and put lives at risk by 5771 commercial and passenger vehicles using the interchange daily. It would endanger our wildlife. It would not bring the economic development falsely promised. It would increase Becket taxes to maintain the access roads.

Respectfully,

Faith Rubin  
186 Seneca Drive  
Becket, MA 01223

**From:** [Glenna R](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [jonathan.gould@masenate.gov](mailto:jonathan.gould@masenate.gov)  
**Subject:** OPPOSITION TO THE ALGERIE ROAD INTERCHANGE  
**Date:** Monday, September 23, 2019 11:59:18 PM

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Dear Ms. Gascon,

I am absolutely opposed to the Algeria Road turnpike site. It must be eliminated from contention at your next meeting. It will endanger our safety and put lives at risk by the increased commercial and passenger vehicles using the interchange daily. I am a property owner in Becket because I fell in love with the rural nature of the community. I and my fellow Indian Lake residents contribute to the economic well-being of the community in many ways: we dine in local restaurants, shop in local stores, employ the services of many local professionals for home construction, road maintenance, well-digging, snow removal, painting, exterminating, landscaping and the like. We are active supporters of the arts and cultural activities in Chester, Becket, and the greater Berkshire area. If the quiet nature of my surroundings and the natural beauty that drew me here is destroyed, as it undoubtedly would be by the proposed interchange, I and many of us would likely feel compelled to move elsewhere. The area would lose its appeal as a second home destination. Thus, the proposed interchange would have a significant negative effect on the local economies. Also, local wildlife would be harmed because their natural habitat would be disrupted. That kind of damage cannot be undone. Finally, the enormously expensive interchange would detract from funding from other important initiatives like high-speed rail, high-speed internet and saving our crumbling local bridges.

Please add my name to DOT's list registering the strong option the Algeria Interchange should never be built and send me a confirmation you received this email.

Respectfully,

Glenna Rubin  
Lot A12 Seneca Drive  
Becket, MA 01223

**From:** [Jeremy Lichtman](#)  
**To:** [Bligh, Cassandra \(DOT\)](#); [Rep.Smitty@mahouse.gov](mailto:Rep.Smitty@mahouse.gov); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov)  
**Subject:** Opposing Turnpike exit in Becket  
**Date:** Tuesday, September 24, 2019 9:37:48 AM

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To whom it may concern,

We own a house in Becket, in the Indian Lake community. We bought the house 11 years ago because of the quiet, peaceful nature of the area, beautiful lakes and privacy in the woods. We love the location and feel that buying this house was one of the very best decisions we have ever made. We feel we will lose many of the advantages of this community if a turnpike exit is constructed in Becket on Algeria Road. Our community will become a major route north to Pittsfield and to the Hilltowns. That route will become heavily travelled by cars and trucks. The sound of traffic travels far from the road and we are aware of the occasional truck coming by currently. If the traffic is multiplied one hundred fold, the noise pollution will be incredibly disturbing to our country community. We strongly add our voice opposing an exit in Becket.

Thank you for your consideration.

Jeremy and Susan Lichtman

**From:** [Melissa Stadlen](#)  
**To:** [Bligh, Cassandra \(DOT\)](#); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [jonathan.gould@masenate.gov](mailto:jonathan.gould@masenate.gov)  
**Subject:** Opposition to Algeria Interchange in Becket  
**Date:** Tuesday, September 24, 2019 11:21:31 AM

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Dear Ms. Gascon,

I am writing to you to voice my opposition to the proposed Algeria Road Interchange in Becket, Mass. Our community and all the surrounding areas will be greatly impacted in a multitude of negative ways if this proposal actually proceeds. I feel strongly that the resources of time and money be better served in funding other more important initiatives like high speed internet and restoration of existing decaying roads and bridges. Cost to benefit ratio seems totally imbalanced and misguided.

I would appreciate it if you would add my name to the DOT's list of registered voices who strongly oppose the Algeria Interchange construction and send me confirmation that you have received this email.

Sincerely,  
Melissa Stadlen  
812 Seneca Drive  
Becket, MA

**From:** [Ginny Guenette](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [jonathan.gould@masenate.gov](mailto:jonathan.gould@masenate.gov)  
**Subject:** Against the Algeria Road I-90 interchange  
**Date:** Tuesday, September 24, 2019 12:51:32 PM

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Dear Ms. Gascon,

It is very distressing to hear about the proposed additional interchange between Westfield and Lee Ma at Algeria Road in Becket. I live in Lenox, but am happy to spend much of the summer in Becket, enjoying the quiet of the woods, lakes and cultural destinations. It is a special place because it is a "road less traveled"! It is a wonderfully peaceful retreat.

Please don't add the burden of more heavy traffic on Becket and Otis residents...or on the air, the roads, and particularly, the wildlife. Please eliminate Algeria Road from your turnpike site discussion at your earliest opportunity.

Sincerely,

Ginny Guenette  
16 Maple Street, Lenox, MA 01240

**From:** [Susan Dworkin](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Dear Ms. Gascon  
**Date:** Tuesday, September 24, 2019 4:37:24 PM

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I am writing to echo my neighbors in opposing the use of Algeria Road as part of the projected new Turnpike interchange. It would wreck the lives of the people and the animals who live in this pristine and beautiful area. It would cost a fortune that could be better spent in a hundred ways for the benefit of our citizens. Please listen to us, to our representatives in the State Legislature, and keep the Interchange out of our towns.

Yours truly,

Susan Dworkin  
P.O. Box 207  
Becket, MA 01223

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[www.susandworkin.com](http://www.susandworkin.com)

<https://www.amazon.com/author/susandworkin>

THE COMMONS, THE NAZI OFFICER'S WIFE, STOLEN GOODS, MAKING TOOTSIE,  
MISS AMERICA 1945, THE GARDEN LADY



**From:** [James McGee](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Turnpike exit in Otis  
**Date:** Tuesday, September 24, 2019 8:56:54 PM

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When I was growing up I lived on a very busy street.

There was the constant rumble of traffic that reverberated throughout the neighborhood. We had a number of pets back then, mostly cats and dogs, and in those days they ran free. Most of these animals ended up living a long and happy life, but for some of the less intelligent or slower moving ones, well let's just say that with all that traffic I had the misfortune of witnessing Darwin's theory of natural selection up close and personally.

Decades later when I moved to the Berkshires one of my top priorities was to buy a home on a quiet street with little traffic. One I could walk down without fearing for my life and one where I could sit on my front porch and actually hear the sounds of nature instead of the noise of traffic, luckily I found that in Becket.

But now that tranquility is being threatened, after many years there is once again a committee studying a plan to add another Mass pike exit somewhere between Lee and Westfield. One of these proposed locations would empty directly on to my street.

Needless to say neither I nor the community in which I live is for this plan. We do not wish to sacrifice our small town way of life for the sake of convenience.

I know the rebuttal to the, 'not in my backyard' argument is that these things need to go somewhere but that only applies to infrastructure projects that are either critical or absolutely necessary, this project is neither. The time it takes me to travel from either Lee or Westfield to Becket is somewhere around 25 to 35 minutes. Traveling the mass pike at 65mph would probably save me between 10 and 15 minutes. That is Hardly worth destroying the peace and tranquility of hundreds if not thousands of people.

Most of the people who live out here don't do it for convenience, there are no supermarkets, no malls, few restaurants and bars and that is exactly the point, we like to live in the wild places among the wild things and we don't mind the extra time it takes to get here.

Please add my name to DOT's list registering the strong option the Algeria Interchange should never be built and send me a confirmation you received this email.

Respectfully,  
James McGee  
471 Bonny Rigg Hill Rd  
Becket Ma  
[ROLLSTNE@VERIZON.NET](mailto:ROLLSTNE@VERIZON.NET)

**From:** [Lauren Ricci-Warren](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [jonathan.gould@masenate.gov](mailto:jonathan.gould@masenate.gov)  
**Subject:** We oppose Algeria Road turnpike site.  
**Date:** Wednesday, September 25, 2019 3:00:00 PM

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Dear Ms. Gascon,

Like others in Becket, we are absolutely opposed to the Algeria Road turnpike site. It must be eliminated from contention at your next meeting.

An exit there would destroy the rural nature of our property, the very reason we selected to purchase our home in Becket in 2009. Bonny Rigg Hill Road is very steep and is already too busy with large trucks that can barely fit and stop. Please focus your attention and our tax dollars on bringing high-speed internet to Becket.

Respectfully,

Ken and Lauren Warren  
188 Chippewa Drive  
Becket, MA

**From:** [tony](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [Rep.Smitty@mahouse.gov](mailto:Rep.Smitty@mahouse.gov); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov)  
**Subject:** New Turnpike Interchange  
**Date:** Wednesday, September 25, 2019 3:20:31 PM

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Dear Ms. Gascon-Bligh, Senator Hinds and State Rep. Pignatelli

I am writing to you on behalf of my wife and myself because we are unable to attend any of the meetings on the Algeria Road turnpike interchange in Otis.

We own a home in the Island Lake Association Community in Becket, Mass. and have used it as a vacation home, summer and winter, to get away from our main home on Long Island, New York. We purchased the home over 10 years ago because we loved the simple, calm, beautiful surroundings of the Berkshire area. We also loved the fact that the Island Lake Association helped protect the surrounding land and water with its rules and regulations. Our home is located on Bonny Rigg Hill Road off of Algeria Road. It is used by many cars and trucks (from the Quarry) traveling from Algeria Road to Bonny Rigg Hill Road to Route 8 or Route 20. Even now at times the noise can be quite loud. If the New Turnpike Interchange were to be placed on Algeria Road then traffic (truck and car) would increase tremendously. The noise would be almost like living in a city which I believe most people that came to the Berkshires were trying to get away from. I also believe that the traffic would adversely affect the surrounding environment, increasing the noise and pollution levels in the area, be detrimental to the abundant plant and wildlife and reduce the overall beauty of the area. I then begin to question if there really is a need for a new exit? What is driving this need for a new exit? Would not the money be better used somewhere else?

Thank you for your attention and consideration to this matter.

Anthony Maiorella

**From:** [Ron Klagsbrun](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Algerie Interchange  
**Date:** Thursday, September 26, 2019 4:03:25 AM

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My family and I have been residents of becket over 35 years.  
It's inconceivable to me that a  
commercial thoroughfare could be built in this community;

Sent from my iPhone

DRAFT

**From:** [Constance Mittler](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [Smitty.pignatelli@mahouse.gov](mailto:Smitty.pignatelli@mahouse.gov); [Jonathan.gould@masenate.gov](mailto:Jonathan.gould@masenate.gov)  
**Subject:** Algeria Road Interchange  
**Date:** Thursday, September 26, 2019 10:27:05 AM

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Dear Ms. Gascon,

Like other in Becket, we are absolutely opposed to the Algeria Road turnpike site. It must be eliminated from consideration at your next meeting for the following reasons:

- It will endanger our safety and put lives at risk with over 5000 commercial and passenger vehicle using the interchange and accessing our rural backcountry roads.
- The economic burden imposed on the taxpayers and the Town of Becket to upgrade and maintain our town roads would be significant.
- Cost to the taxpayers will detract from other important economic development initiatives such as high speed internet and rail, and infrastructure improvements.

Please add our names to DOT's list registering our opinion that the Algeria Rd interchange should never be built, and please confirm your receipt of this email.

Thank you

David Mittler  
Constance Mittler  
19 Cherokee Rd.  
Becket, MA

**From:** [Lawrence Abrams](#)  
**Subject:** A Viewer's Guide to the Mass Pike Interchange Sweepstakes Parts 1 and 2- To be published in The Berkshire Record this Thursday and Next  
**Date:** Thursday, September 26, 2019 11:06:13 AM  
**Attachments:** [Do Math w/o top notes.docx](#)  
[Invest in our future, not our past.docx](#)

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Dear Study Working Group Members and the DOT Leadership Team,

Attached are two op eds which will be published in The Berkshire Record. Since people east of Becket may not read the Berkshire Record, I am sharing the copy I submitted with you. It raises important issues for you to consider when evaluating the recommendation(s) of the DOT's Leadership Team on Wednesday, October 2nd. The first piece mirrors the comparison chart of the three alternatives which Dr. Ware sent to you earlier and the second probes the opportunity costs of the Algerie Interchange vs other better development options.

Based on the evidence and strong community opposition, our hope is the Algerie Road option will be eliminated from any future consideration on October 2nd. Thank you, in advance, for considering these op eds in your deliberations.

Larry Abrams,  
Coordinator of the Opposition to the Algerie Interchange

**A Viewer's Guide to the Mass Pike Interchange Sweepstakes**  
**DOT decision-makers: DO THE MATH**  
**Larry Abrams**

In full disclosure, I have lived in Becket for over 30 years and have been a critic of the DOT's plans to develop the Algeria interchange. I have studied the issue intensively and have concluded people who think they will not be affected by the Mass DOT decision because they live nowhere near the proposed interchange sites, must think again. A wrong decision would waste tens of millions of taxpayer dollars is not likely to produce true development as promised by the project's advocates.

Representative Smitty Pignatelli obtained \$75,000 to fund a DOT study to decide which new turnpike interchange would benefit his constituency. He was interested in bringing economic development to promote better opportunities for the people he serves. He was interested in a 10-year or more "conversation" to decide the best choice which may simply be no choice at all. After all, his colleague Senator Donald Humason has a problem with Westfield traffic congestion at exit 2, so doesn't it make sense to find a new interchange between exits 2 and 3? Exit 2.5 is not a new idea and was proposed several times before this study, but fortunately it never materialized.

The DOT has announced that it will soon release its recommendation as to which, if any, of the contending exits—Algeria Road, Blandford Maintenance Center or Blandford Service Plaza—will be passed onto the State Legislature for further consideration. It is scheduled for October 2nd, at the DOT Building on 270 Main Street in Lenox from 3:00pm to 5:00pm. The event is open to the public and our comments will be solicited after the Working Study Group session. I hope the meeting makes it onto the interesting list of things to do in *The Berkshire Eagle*.

Dr. Harold Ware, an economist and Becket homeowner for 16 years, completed a comparison of the costs and impacts of the three options using the data given to the DOT's Study Working Group of community leaders including Senator Hinds and Representative Pignatelli, during their meeting on February 7, 2019. (Coincidentally during the meeting, Senator Hinds made the motion to advance the three alternatives, Algeria and two in Blandford, to the next study phase.) Based on his analysis of the data presented to the Study Working Group Dr. Ware, who was a vice president of a major economics consulting firm, concludes that:

- the Algeria option costs the most; Algeria diverts fewest trips from Exits 2, and 3 (Lee and Westfield);
- Blandford Service Plaza reduces vehicle miles the most; the Blandford Exits reduce vehicle hours much more than the Algeria option;
- the cost per mile reduced is higher for Algeria than either of the other interchanges; and
- the cost per vehicle hour saved is over 60 percent higher for Algeria than either of the other options.

Dr. Ware's overall conclusion is the data imply that **Algeria is the least effective, most costly of the 3 options studied.** This does not necessarily imply that either of the Blandford options should be approved. The chart summarizing the Interchange Cost and Impacts is attached below.



Therefore, given these data and the opposition from our community, Algeria should be eliminated from contention at the October 2<sup>nd</sup> meeting. If it is not, is it possible that money and influence from trucking and commercial interests are keeping Algeria in contention? I don't have any evidence that this lobbying is the case; but, why else would Algeria remain under consideration?

Indeed, the true cost of Algeria road could much higher than the \$38 million DOT estimate, perhaps as high as \$60 million, once you factor the expenses needed to turn rural Becket's Bonny Rigg Hill Road into a conduit for the estimated thousands of passenger and commercial vehicle trips via the Algeria Interchange **every day!** Policy makers must also factor externalities—i.e., the side effects or unintended consequences of an activity that imposes costs (or benefits) on others that are not reflected in the direct costs (or revenues) of the goods or services being produced. The potentially large negative externalities include environmental and quality of life impacts of all this traffic that could devastate our community and make it less desirable to those who seek to enjoy the recreational and culture activities that the Berkshires offer.

**Comparison of Costs and Impacts of Algeria and Blanford Exits  
(Amended 9-17-2019)  
Harold Ware, PhD**

Summary of Interchange Costs and Impacts			
	Algeria	Blanford Maintenance	Blanford Service Plaza
<b>Algeria costs the most.</b>			
	-----Cost, Millions-----		
Interchange	\$ 26.3	\$ 19.4	\$ 20.4
Local	11.5	10.1	13.6
Total	\$ 37.8	\$29.5	\$34.0
<b>Algeria diverts fewest trips from Exits 2 and 3.</b>			
Diversion from Ex 2 Lee	64	346	134
Diversion from Ex 3 Westfield	597	1044	1433
Total Trip Reductions	661	1,390	1,567
<b>Blanford Service Plaza reduces vehicle miles the most.</b>			
Vehicle Mile Reductions per day	15,000	12,500	17,500
<b>Algeria reduces vehicle hours the least.</b>			

Vehicle Hour Reductions per day	900	1150	1300
<b>Algerie has highest cost per mile reduced and per hour saved per day.</b>			
Cost per Vehicle Mileage Reduction	\$2,520	\$2,360	\$1,943
Cost per Vehicle Hour Saved	\$42,000	\$25,652	\$26,154
<b><u>Ratio of Algerie to other options</u></b>			
Cost per Vehicle Mileage Reduction		1.07	1.30
Cost per Vehicle Hour Saved		1.64	1.61
<p>Source: I-90 Interexchange Study, Working Group Meeting #4, February 7, 2019</p> <p>Note that the cost per mile reduced and per hour saved per day are presented as relative measures. The relative relationships among the exits for the cost per vehicle mile reduced and hour saved would be the same if miles and hours saved were presented on a monthly or annual basis, for example.</p>			

**A Viewer's Guide to the Mass Pike Interchange Sweepstakes:  
Invest in our future, not our past  
Larry Abrams**

If politicians or community leaders argue that any new turnpike interchange 2.5 will spur economic growth in the region, it is a “marketing tool” to sell the idea to an uninformed and vulnerable public. “You need this interchange, you want this interchange, this interchange will make your life better if you support its development.” It is a false promise which is designed to raise expectations leaving taxpayers bearing the burden of a backward looking development plan. Furthermore it gives false hope to distressed families whose children need to move out of our region to find the better jobs.

So as Representative Smitty Pignatelli said, “let’s have the conversation.” How do we provide better economic development to attract a modern workforce to our region and how we give our residents a chance to get a larger slice of the pie?

A modern workforce communicates via computers for individual and group meetings to plan, execute and evaluate projects. This new productivity is more on-line than in the factory or other physical workplace. People have the opportunity not to commute to the office each day. Some unfamiliar with this on-line option may have the attitude people who work from home are not really working. Just from watching my daughter and her husband, they do work on-line via computer and teleconferencing, and the hours go beyond the 9 to 5 of the traditional workplace.

Residents and policy makers must consider the concept of opportunity costs. Economists define them as the loss of potential gains from other alternatives when one alternative is chosen—e.g., the lost opportunity of spending money on the interchange option, instead of investing in broadband infrastructure and training for local residents.

Spending tens of millions of dollars on a highway interchange (potentially as much as \$60 million for the Algerie interchange) is investing in a 20th century technology. Let’s look at the opportunity costs of spending these funds—i.e., the foregone opportunity to investment in forward looking technology.

If the goal is to attract jobs and development to the region, politicians and the public should be looking at 21st century technologies like high-speed broad band and high-speed rail. The workplace has changed and regions which successfully promote economic development have a 21st century infrastructure. Attracting a workforce that communicates via computers and is better able to join in the digital economy will do more to stimulate the economy than seeking to attract older forms of production. .

DOT has a study in progress on this high-speed rail option running parallel with the outdated Turnpike study. Which one of these studies should be our priority? To the extent people need to commute to a physical workspace, in Boston or Springfield for example, high speed rail would

be a faster, more comfortable and more productive option than the potential to shorten drive times by building Exit 2.5.

DOT's goals, are far more comprehensive for the high-speed rail project: better transportation to/from Western MA; support economic development; improve attractiveness of Western MA as an affordable place to live; reduce the number of automobile trips; and reduce greenhouse gasses and air quality impact from transportation.

If the Pittsfield to Boston rail corridor comes into existence within the next 10 to 15 years ([mass.gov/east-west-passenger-rail-study](http://mass.gov/east-west-passenger-rail-study)), along with high-speed internet throughout the Berkshires and the Hill Towns, the region will develop. Younger generations will stay in and/or move back to the Berkshires and Hill Towns for job opportunities while living in a bucolic environment.

If we continue to invest precious resources into old infrastructure projects like a "new" interchange, people who want better economic opportunities for themselves and their families will look elsewhere.

I am hopeful that our political and community leaders agree that The DOT should not waste our taxpayer dollars, time and effort on old solutions. I am concerned that people who have participated in a sporadic process for almost two years may view their mission through blinders which will eventually lead to an interchange. I urge policy makers to remove the blinders and see that other options are better for the region.

Please come to the meeting to find out if politicians and community leaders will have the foresight and courage to advocate new solutions which will really bring desired change to our region. The DOT's planning group will compile the final study report after the October 10th public meeting at Blandford Twin Hall commencing at 6:30 PM. Public comments are welcome and people who can't make the meeting will have 30 days to comment on-line if they google Mass DOT I-90 Interchange Study.

No doubt post time at the October 2nd Interchange Sweepstakes Meeting in Lenox should be very exciting as long as you know how the horses are positioned. Which horses will run with a forward stride and which will employ a backwards gait?

No matter how the horses run, the public needs to be made aware that our state and region must invest in more forward looking development options and hold policy-makers and elected officials accountable if they don't deliver a better future for us all.

**From:** [Carl Katz](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** opposition to algerie road interchange  
**Date:** Thursday, September 26, 2019 1:16:28 PM

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Dear Ms. Gascon:

i am thoroughly opposed to a turnpike exit on Algeria road. my wife and i have had a house in the town of Becket for over 30 years, and absolutely do not want the environment in which we spend over half of our year to be despoiled by what such an interchange will bring. the cost to taxpayers, the safety of the local roads upon which we travel, the danger to the wildlife, and the unlikelihood of the economic development that has been promised ( always a two sided issue), the noise of the additional heavy traffic, are among others, factors that my wife and i find mind numbing when thinking about this possibility. please don't let this happen!

truly yours,

carl and jeanette katz  
48 sioux road  
becket 01223

**From:** [H Ware](#)  
**Subject:** Comparison of Costs and Impacts of Algeria and Blanford Exits  
**Date:** Thursday, September 26, 2019 9:47:21 PM  
**Attachments:** [Comparison of Algeria and Blanford Exits Amended 9-17.pdf](#)

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Attached is a comparison of the costs and impacts of the Algeria and Blanford Exits that I did using data from the February 7, 2019 presentation by the Mass DOT and AECOM to the I-90 Interchange Study Working Group. Mr. Abrams incorporated much of my data into his recent letter to the Berkshire Record and put into context for the upcoming (October 2) meeting in Lenox. However, I thought it might be useful to send you the document I prepared and I would find it useful to get your views on it.  
If you have any questions or suggestions for improving the data please feel free to contact me.

Thanks,  
Harold Ware  
[hwpics@gmail.com](mailto:hwpics@gmail.com)

DRAFT

**Comparison of Costs and Impacts of Algeria and Blanford Exits**  
**(Amended 9-17-2019)**  
**Harold Ware, PhD<sup>i</sup>**

In the table below, I compare several quantitative measures of the costs and impacts of the three options contained in the I-90 Interexchange Study Working Group, Meeting #4, February 7, 2019 presentation by the Mass DOT and AECOM. Data in that presentation show that:

- The Algeria option costs the most;
- Algeria diverts fewest trips from Exits 2, and 3 (Lee and Westfield);
- Blanford Service Plaza reduces vehicle miles the most;
- The Blanford Exits reduce vehicle hours much more than the Algeria option;
- The cost per mile reduced is highest for Algeria than either of the other interchanges;
- The cost per vehicle hour saved is over 60 percent higher for Algeria than either of the other options.

Thus, the data imply that Algeria is the least effective, most costly of the 3 options studied.

This does not necessarily imply that either of the Blanford options should be approved. Other investments, e.g., broadband infrastructure, could do more to promote Hilltown development.

<b>Summary of Interchange Costs and Impacts<sup>ii</sup></b>			
	<b>Algerie</b>	<b>Blanford Maintenance</b>	<b>Blanford Service Plaza</b>
<b>Algerie costs the most.</b>			
	-----Cost, Millions-----		
Interchange	\$ 26.3	\$ 19.4	\$ 20.4
Local	11.5	10.1	13.6
Total	\$ 37.8	\$29.5	\$34.0
<b>Algerie diverts fewest trips from Exits 2 and 3.</b>			
Diversion from Ex 2 Lee	64	346	134
Diversion from Ex 3 Westfield	597	1044	1433
Total Trip Reductions	661	1,390	1,567
<b>Blanford Service Plaza reduces vehicle miles the most.</b>			
Vehicle Mile Reductions per day	15,000	12,500	17,500
<b>Algerie reduces vehicle hours the least.</b>			
Vehicle Hour Reductions per day	900	1150	1300
<b>Algerie has highest cost per mile reduced and per hour saved per day.</b>			
Cost per Vehicle Mileage Reduction	\$2,520	\$2,360	\$1,943
Cost per Vehicle Hour Saved	\$42,000	\$25,652	\$26,154
<b>Ratio of Algeria to other options</b>			
Cost per Vehicle Mileage Reduction		1.07	1.30
Cost per Vehicle Hour Saved		1.64	1.61
Source: I-90 Interexchange Study, Working Group Meeting #4, February 7, 2019			

<sup>i</sup> I have a PhD in economics from Cornell University. I have been a Becket homeowner for over 16 years. Before retiring, I was a vice president for an international economics consulting firm, at which I directed numerous projects including: cost/benefit analyses, consumer demand studies and technology assessments. I also prepared testimony and position papers for many clients. Some of my work was published as book chapters and in economic journals.

<sup>ii</sup> I have not evaluated the methodology employed by the DOT working group, I have simply relied on the data from the presentation cited above. The cost per mile reduced and per hour saved per day are presented as relative measures. The relative relationships among the exits for the cost per vehicle mile reduced and hour saved would be the same if miles and hours saved were presented on a monthly or annual basis, for example.

**From:** [Ron klagsbrun](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Interchange  
**Date:** Saturday, September 28, 2019 7:23:54 AM

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My family and I have been residents of Becket for over 30 years. We treasure the rustic environment; the scenery, the peacefulness, the beauty.  
It's inconceivable that a commercial road would be built in this area, especially as there are multiple alternatives.  
Thanks for your attention.  
Sent from my iPhone

DRAFT



# Letter: Becket, East Otis residents are there for a reason

Posted Thursday, September 26, 2019 11:21 am

To the editor:

Although environmental and ecological concerns of the average citizen tend, in the current political zeitgeist, to be subordinated to the interests of corporations, our town, Becket, and our community, Indian Lake, are, at the moment, still able to partake of nature's beauty, comfort, quiet and purity, protected from the traffic noise and pollution that increasingly characterizes eastern and central Massachusetts. Apparently, however, this privilege that our community currently enjoys is very fragile; its existence is threatened by the potential construction of a new Mass Pike interchange to be located on Algeria Road in Becket.

The plan under consideration will clearly benefit the local quarry, whose trucks currently run up and down Algeria and Bonnie Riggs Hill Roads daily, with increasing frequency. Proponents of the plan say that, by enhancing access to the area proximal to the proposed turnpike access, an economic advantage will accrue to regional businesses and local communities. As I see it, the average citizen who lives in relative proximity to the proposed Turnpike interchange would experience economic contraction and spiritual depletion.

Proponents of the plan say that enhanced access would make these communities more reachable, therefore more desirable, and consequently more economically viable. But this argument ignores the fact that the greatest asset value attached to communities such as Becket and East Otis arises from the quiet, beauty, and comfort that they offer its residents. People chose to live in these areas because of these features and because of their isolation. They chose to raise their children in relative serenity, away from the noise and pollution that are everyday features of more accessible communities. For most current residents, enhanced access and convenience to the Turnpike will detract from the attractiveness of living where they live. The very nature of their communities will be immutably altered.

The interests and views of the people who live near the proposed interchange should be weighed impartially and honestly, independent of the advantages that politicians and bureaucrats may personally accrue by deciding in favor of corporate interests. I wonder if this is asking too much of our decision-makers.

*Stephen L. Feldman,*  
Becket

**From:** [David Davison](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [jonathan.gould@masenate.gov](mailto:jonathan.gould@masenate.gov)  
**Subject:** Proposed Algeria Rd Tpke Interchange  
**Date:** Monday, September 30, 2019 8:41:02 PM

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Dear Ms. Gascon,

I am writing to convey our family's strong opposition to the proposed site at Algeria Road for a new Mass Turnpike interchange. We believe this would be a very bad idea for several reasons, and Algeria Rd. option must be taken out of consideration at your next meeting. An interchange there would be bad for the environment and for the residents of the general area. It is estimated that 5771 commercial and passenger vehicles would use it daily, creating safety risks for everyone, especially considering the local roads that are not ready to handle such traffic. The cost of an estimated 60 million in taxpayer dollars would be wasteful in itself, while an interchange would not provide economic development for the area, as is supposed. Such promises are based on faulty estimates. Our region is a rural haven, not just another place to attract unplanned, undesirable development. My wife's family has owned property in Becket for nearly 40 years and we strongly oppose an interchange in our community.

Please add our names to those who oppose this potential plan. And please confirm receipt of this email. Thank you.

Respectfully,

David Davison  
Emily Davison  
15 Wishing Way  
Becket, MA

--

*David Davison*  
cell: 203-848-7736

**From:** [Marilyn Katzman](#)  
**To:** [Bligh, Cassandra \(DOT\)](#); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov)  
**Subject:** I 90 interchange between Westfield and Lee  
**Date:** Tuesday, October 1, 2019 10:43:49 AM

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I am very curious as to why this is contemplated, when it, appears to me, that so many people are opposed to this construction, and there is such great need in so many communities, such as mine (New Marlborough) and Great Barrington that desperately require either bridge repairs or replacement. These projects are not being addressed because it is claimed that there is no available funding. Could not the I 90 project funds be used for these projects instead? Isn't it possible that the same people could be put to work?

Elihu Katzman  
New Marlborough, MA

DRAFT

**From:** [David Davison](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Cc:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [jonathan.gould@masenate.gov](mailto:jonathan.gould@masenate.gov)  
**Subject:** Tpke proposed exit at Algeria Rd  
**Date:** Thursday, October 3, 2019 10:15:04 AM

---

Dear Ms. Gascon,

On behalf of the board of directors and officers of the Berkshire Lakes Owners Association, I am writing to express our firm opposition to the proposed Algeria Road turnpike interchange site. We believe this site must be eliminated from consideration at your next meeting. An interchange at that location would create serious environmental and safety problems that would permanently degrade our surrounding communities. The estimated 5771 commercial and passenger vehicles using it daily would further stress our local roads which already deal with increasing car and truck traffic now. This interchange would provide no real advantage to the region's traffic patterns while putting lives and lifestyles at risk. The promise of economic development is based on faulty estimates and would in any case not justify the \$60 million cost to taxpayers.

Please add our names as representatives of the members of the Berkshire Lakes Owners Association to DOT's list registering our strong opposition to the Algeria option. Please confirm receipt of this email. Thank you.

Respectfully,

David Davison  
President  
Berkshire Lakes Estates Owners Association

--

*David Davison*  
*Guilford, CT*  
*cell: 203-848-7736*

**From:** [tony](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** New Turnpike Interchange  
**Date:** Friday, October 4, 2019 8:07:25 AM

---

Dear Ms. Gascon

I want to thank you and the Study Working Group for taking into account the many factors concerning the selection for a new interchange. Based on these many factors I am pleased that Algeria Road in Otis is no longer under consideration as an alternative for a new interchange. I own a home in the Island Lake Community and a new interchange on Algeria Road would have been devastating for the community and surrounding area.

Thank you. Thank you. Thank you.

Anthony Maiorella

**From:** [Alice Heffner](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Opposition to the proposed Mass Pike Interchange at Algeria Road  
**Date:** Saturday, October 5, 2019 11:39:49 AM

---

Dear Ms. Gascon,

I am writing in reference to the proposed siting of a new Mass Pike interchange at Algeria Road in Becket. Our family is opposed to this location. We believe an interchange at this site imposes environmental costs, particularly related to the surrounding wetlands, compared to the other sites in question. The other proposed sites already have infrastructure in place. The Algeria Road interchange would have adverse effects on the residents in the area as the roads are not able to handle the anticipated volume of commercial and passenger traffic. The cost for the project is prohibitive and it wouldn't yield economic benefit to the area. In fact, it is likely to change the rural character of the town. Our family is a long-time property owner in Becket and we strongly oppose an interchange in our community.

Please add our names to those who oppose this potential plan. Thank you for your consideration.

Respectfully,  
Alice Heffner  
Alan Lieber  
15 Wishing Way  
Becket, MA

**From:** [Neil Toomey](#)  
**To:** [Bligh, Cassandra \(DOT\)](#); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [Adam.Hinds@masenate.gov](mailto:Adam.Hinds@masenate.gov)  
**Subject:** No new exit  
**Date:** Sunday, October 6, 2019 9:51:54 AM  
**Attachments:** [Turnpike interchange 10-1-19.docx](#)

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Hi Cassandra, Smitty, and Adam, I am attaching a copy of my statement from the October 2, 2019 meeting for the record. I've been informed that the report of that meeting will not be available for a few weeks. Is that true? If so, are you going to give a full report to the Blandford audience this Thursday? I hope so, as opposition to this plan has been consistently loud and clear. It would be a disservice to those of us from the communities involved to not have our voices heard. Thank you all for your work, Neil

Sent from [Outlook](#)

DRAFT

My name is Neil Toomey, 37 Mitchell Rd, Becket Mass.

With respect, this proposal for an interchange in the hill towns appears to me to be Manifest Destiny posing as infrastructure improvements. Westfield has a serious truck and traffic problem brought on, by themselves through poor planning. The effort to shift this problem, with its's incumbent air, noise and congestion onto one of the last great places in Massachusetts is something the Study Group has largely ignored. False, unsubstanciated narratives of pollution reductions and economic benefits only underscore the impression that the monied interests of the Westfield Chamber of Commerce and real estate speculators are driving this ham fisted approach.

We have now, a beautiful part of the Berkshires with abundant natural resources and landowners who have lived here for decades and generations protecting these values, precisely from this kind of degradation. The feeder roads, that will inevitably follow the construction of an exit anywhere, will permanently scar this landscape at a cost of tens of millions of taxpayer dollars. This kind of forest fragmentation not only degrades the environment, but makes it less likely that the natural resources already at our disposal will be available to build a sustainable and durable economy.



Our elected representatives have a responsibility to advocate for those of us who have lived here, and desire a modern day approach to infrastructure improvements. Commuter rail options, farming and forest based industries, including passive recreational opportunities are economies that are more in keeping with working towards a goal of supporting our existing communities. Our elected officials must also understand, that our rural communities don't have the resources necessary to deal with the litter, the speeding traffic, and the crime that will inundate us should this exit be built in any of our towns.

The opportunity to protect and nourish our rural communities has never been greater, or more important. The Study Group has stated that "no exit" is an option. Promoting an exit in the hill towns does a disservice to those of us living here, by ignoring our values and destroying a landscape that we have demonstrated a responsibility to protect and preserve. Thank You

**From:** [Molly Elliot](#)  
**To:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov); [Bligh, Cassandra \(DOT\)](#)  
**Subject:** No New Interchange in Western Massachusetts  
**Date:** Monday, October 7, 2019 9:28:31 AM

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Dear Rep. Smitty Pignatelli, Senator Adam Hinds, and Ms. Cassandra Gascon Bligh,  
MassDOT project manager,

Thank you for your work on our behalf. We are writing to express our opposition to any new interchange between Exit 2 in Lee and Exit 3 in Westfield. As residents and taxpayers of western Massachusetts. We feel an interchange would be extremely detrimental to our local communities, to both people and wildlife. We request that you immediately stop any further consideration of an interchange, including engineering studies.

Thank you,  
Molly and Mark Elliot  
185 West Street, Lenox, MA 01240

**From:** [Ann Spadafora](#)  
**To:** [Lynne Hertzog](#); [Adam Hinds](#); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Re: No New Turnpike Interchange UPDATE  
**Date:** Monday, October 7, 2019 10:55:23 AM

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Thank you, Lynne, for your hard work and updates! I shall be out of town from Oct 9-16 so sadly will be unable to attend. I did pass your previous communication to several dozen people and hope they sign the petitions.

I relocated to Becket in 1973 from Stamford ,CT....and prior to that from NYC....because Stamford was rapidly changing from a lovely 19th century town to an ever-expanding suburb of New York City. I wanted peace and quiet and the clean air that our trees provide. Cannot imagine heavy trucks crashing through our narrow roads and destroying the rural charm which brings our major "industry" to Becket and Otis....SECOND HOMES!! We rely on those homes for almost 60% of our tax revenue....from people who do not overburden our schools and other amenities. If Becket, Blandford, Chester and surrounding small towns become fast routes for trucking and bedroom communities for larger cities (Springfield and Albany come to mind, of course) the enormous appeal to build a home in a private community will slowly disappear. We would probably have to seriously consider building larger schools at great cost to the taxpayers who are already leaving for less expensive areas.

I am already greatly disturbed by the increasing numbers of logging trucks careening up and down my road and other town-maintained roads. The companies that use these trucks destroy our habitat...for wildlife and also for our clean air....and they tear up roads which we taxpayers have to constantly repair at great cost. An exit to the turnpike would simply make things far worse!

I think those who govern - and who mostly live in the eastern part of the Commonwealth - are not really concerned about the quality of life in these pristine Hilltowns!! Their only concern is money for the state coffers.

I honestly doubt an exit will be built in our lifetime - and hopefully not in the future. Certainly a Becket/Otis exit made no sense located just 7 miles from Lee! The driving time would be roughly 8-10 minutes longer on the turnpike! I hope the small town of Blandford can shout down any attempt to destroy its character.

By the way - at our FinCom meeting last week we learned that there may be a 28 month delay for Becket broadband!!!!

Best.

Ann

ANN SPADAFORA REAL ESTATE  
(By Appointment only)  
465 Fred Snow Road  
Becket, MA 01223  
Tel: 413-623-5000  
Cell: 413-496-0055  
Fax: 413-623-AFAX (2329)  
E-mail: [england@bcn.net](mailto:england@bcn.net)

On 10/7/2019 8:00 AM, Lynne Hertzog wrote:

October 7, 2019

To: Signers of the **No New Turnpike Interchange**  
Petition

1. The I-90 Working Group meeting occurred on October 2. The Algeria Road, Otis location is no longer being considered. That leaves 3 options –

\*\*\*No Build\*\*\* (what we want), and both Blandford locations

2. Next -

**[I-90 Interchange - Public Open House](#)**

*Blandford Town Hall, Blandford, MA 01008*

Thursday, October 10, 2019

6:30 p.m. - 9 p.m.

With Governor Charlie Baker in attendance to make an announcement about high-speed internet.

**Please attend and voice your opposition to a new interchange. We need to stop this now!**

**Also very important, take a few minutes now, before the Open House, to write up your personal opposition, to go “on the record.” Send to –**

**Rep. Smitty Pignatelli, [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov)**

**Senator Adam Hinds, [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov)**

## **Cassandra Gascon Bligh, MassDOT project manager, [cassandra.gascon@dot.state.ma.us](mailto:cassandra.gascon@dot.state.ma.us)**

From Neil Toomey, Becket Chairman of the Community Preservation Committee and land steward of 300 acres in Becket -

"I think the study group is finally taking us seriously with so many speaking out about all the different liabilities this project poses.

Now, we have to show up at the Open House in Blandford and reinforce the concept of modern day solutions for a strong rural economy.

I'm sure we all would like to see this project nipped in the bud, and I think we have a strong chance of doing just that! I think we have to impress the study group with the impact on all the communities, with as many voices as possible.

With that in mind, everyone please contact 3-5 (or more) people they are confident will support **no exit**, and ask them to come to Blandford next Thursday, 10-10-19, @ 6:30 with a prepared statement, as there will be many people there who support this exit. *Pollution, truck traffic, degradation caused by feeder roads and the lack of any supporting data from the study group demonstrating a need for this, are all good talking points."*

**Astronomical Costs** - MassDot's Cassandra Bligh, leading the study presentation, noted that "using federal funds would require bringing the entire Western Turnpike up to federal standards – shoulder width, medians, geometry"

WOW! I can't imagine what that adds to the cost (which they did not project).

Our state should be investing in east-west passenger rail.

### **Minimal Time Savings for Drivers**

And wait till you see the numbers MassDOT presents for time and mileage saved for drivers. Hint – it's not much.

3. Our No New Turnpike Interchange Petition  
at [bit.ly/TurnpikePetition](https://bit.ly/TurnpikePetition)

will remain open for additional signatures and will be sent again in November. Encourage your neighbors to sign.

**Please, make your voice heard! We need to protest – email your thoughts NOW before the meeting, come to the meeting, sign the petition.**

Many thanks for your efforts. Our beautiful western Massachusetts is worth it!

Sincerely,

Lynne Hertzog

Becket

Ps. The Berkshire Eagle appears to be in agreement with us. All these articles have been in the paper since this past week.

[https://www.berkshireeagle.com/stories/eag-l-pike-1004\\_web,586408](https://www.berkshireeagle.com/stories/eag-l-pike-1004_web,586408)

<https://www.berkshireeagle.com/stories/dont-add-an-exit-to-western-turnpike-just-improve-it,586654>

<https://www.berkshireeagle.com/stories/donald-morrison-an-offramp-to-the-past,586603>

**From:** [satcbt@aol.com](mailto:satcbt@aol.com)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** New Exits of MASS PIKE  
**Date:** Monday, October 7, 2019 11:00:20 AM

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Dear Cassandra,

My husband and I are confused. We bought a house in the Berkshires of Massachusetts because of the serenity, wildlife, and expansive pristine forests this rural environment offers. We were pleased to know there were Conservation Commissions established in towns to oversee the necessary and unique developments of the area.

I understand that a Becket exit off the MA pike has been taken off the table, which is fantastic news, but Blanford's landscape and its citizens' serenity are still up for destruction. So I'm asking you, and quite seriously, that if Massachusetts proudly created town conservation commissions for a reason deemed vital to our communities, why would the politicians of the state destroy what these important commissions were given authority to protect when there are other options to bring rural economic developments to the area.

Please say NO to additional exits. Do not destroy the Berkshires, a valued gem of Massachusetts.

Respectfully,  
Cynthia and Scott Trenholm  
Becket

**From:** [Blandford TA](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** RE: connecting  
**Date:** Tuesday, October 8, 2019 1:33:07 PM  
**Attachments:** [2014 Petition - Pike.pdf](#)

---

Cassandra, thanks for taking my call. As discussed, see attached petition for your records.

See you Thursday,

Joshua A. Garcia, MPA  
Town Administrator  
Town of Blandford  
\*\*\*\*\*

Town Offices  
1 Russell Stage Road  
Blandford, MA 01008  
P: (413) 848-4279

[www.townofblandford.com](http://www.townofblandford.com)

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DRAFT





June 29, 2014

Senator Benjamin Downing

State House, Room 413-F

Boston, MA 02133

Honorable Senator Downing;

We, the Selectmen of Blandford Massachusetts, in concert with the large majority of residents of our community, are requesting your assistance in providing access for vehicular traffic, to the Massachusetts Turnpike at the Blandford rest areas on the Turnpike. Since gates behind both eastbound and westbound rest areas already exist, it would appear a practical expedient to install transponder readers at the gates, for vehicles to legally pass, paying the appropriate toll.

To demonstrate our serious and anxious interest in activating this access, we are attaching a petition for said access, with the signatures of approximately 350 town voters in support. This is in response to your initial recommendation of a petition for this particular request.

We also believe you are familiar with the extraordinary length of highway that extends from Lee to Westfield (30 miles) with no access to the Turnpike in between. Nevertheless, the turnpike bisects the town of Blandford at the half way point of these to exit points. Therefore, we believe that creating an access to the turnpike in our town will accomplish two important goals:

First, the current residents will have a shortened journey to many destination points, going either east or west. There are innumerable destinations that can be reached in shorter time spans with this road at our disposal, providing a major convenience to residents who are isolated now.

Second, we anticipate that "opening the turnpike" to local traffic will encourage people looking for affordable, country housing to consider Blandford, where in the past, it would have been too far to travel on a daily basis. We have watched our demographic change with the overall population dropping, the age of our residents increasing and many properties listed for sale. A

major goal of the town is to bring in new families as a means of improving the overall health of the community. We believe that this change will be an invitation to accomplish that goal.

Therefore, we ask for your assistance in making the requested change directly through your contacts and arrangements with DOT, or through a Home Rule Petition in the legislature, (or both) whichever has a greater chance of success.

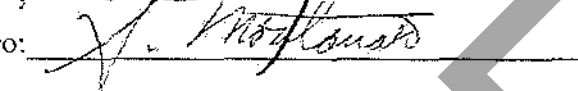
In anticipation of your success on our behalf, we thank you for your efforts and support.

Sincerely,

Blandford Selectmen

William Levakis: 

Adam Dolby: 

Andrew Montanaro: 

DRAFT

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26<sup>th</sup>, 2014.

NAME	ADDRESS	DATE
1 <del>Pat</del> M. Hebert	1 Nye Brook	5-26-14
2 Cara Loomis	3 Herrick Rd Blandford	5/26/14
3 Scott Loomis	3 Herrick Rd Blandford	5/26/14
4 <del>Bryan</del> Yang	4 WYMAN RD Blandford	5/26/14
5 Chagdaleng Zoiiko	21 Birch Hill Rd. Blandford	5/26/14
6 <del>Jeff</del> M. Kubit	75 Blair Road Blandford	5/26/14
7 Shannon Kopeck	59 Main St Blandford	5/26/14
8 Justin Kopeck	59 Main St Blandford	5-26-14
9 James Krawchuk	89 main st Blandford	5/26/14
10 Kelly O'Neill	110 Main St Blandford	5/26/14
11 PAT COMBAND	34 Russell St Stage Rd	5/26
12 Edward LaFonte	245 Otis Stage Road	5/26/14
13 Lisa Layore	18 Herrick Rd	5/26/14
14 <del>Laura</del> Proffman	99 MAIN ST	5-26-14
15 J. Tardif	32 Nye Brook	5-26-14
16 Mary Moriarty	25 Herrick Rd	5-26-14

17 Dana Kocher 25 HERRICK RD 5-26-14  
18 C. L. Hutcheson 61 Chester Rd 5-26-14  
19 Janet L. Lusk 34 Russell Rd 5-26-14  
20 Robin Sturges 44 BLAIR RD. 5-26-14  
21 ~~Janet Lusk~~ 44 Blair Rd. 5/26/14  
22 Tracy Valquez P.O. Box 257 5-26-14  
23 Harry Brown 96 Main 5-26-14  
24 Chuck Brown 9 Houghton Rd 5/26/14  
25 Douglas W. Ellis 105 MAIN ST. 5/26/14  
26 Pamela A. Ridout 66 Russell Stage Rd 5/26/14  
27 Ann Savery 108 Main St 5/26/14  
28 Ronald Brown 96 Main St 5/26/14  
29 Patricia Gleason 92 Main St 5/26/14  
30 Susan A. Agnew 23 N. Blandford Rd. 5/26/14  
31 Cindy LaPlante 245 Gros Stage Rd  
32 Eileen M. Gatos 39 Herrick Road 5/26/14  
33 Mary W. Gatos 39 HERRICK RD 5/26/14  
34 Adam Tobey 11 Gouth St 5/26/14  
35 Mary E. Oleksak 118 Chester Rd 5/26/14  
36 Patricia A. Hall 18 Birch Hill Rd 5/26/14  
37 Heidi E. Taborman P.O. Box 83 5/26/14

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NAME	ADDRESS	DATE
------	---------	------

37	Andrew Montanaro	6 GEORGE MILLARD RD	5/27/14
38	Alyssa Lemme	91 Main St Blandford	MA 01561
39	Jayne Rudzik	55 RUSSELL STAGE RD	BLANDFORD
40	AMANDA BEVENS	55 RUSSELL STAGE RD	BLANDFORD
41	Steve Deat	3 Huntington Rd Blandford	5/28/2014
42	Andrew DeMoss	6 Haul Rd. Blandford	5/28/14
43	Bob Burt	39 Russell Stage Rd	BLANDFORD 5/28/14
44	PHIL BRUNO	105 CHESTER RD. BLANDFORD	5-28-14
45	Richard J. Mezger	56 North Blandford Rd., Blandford	MA 5/28/14
46	Ch. Bacon	9 Kaolin RD	5-28-14
47	Laura Hessler	9 Kaolin RD	5-28-14
48	Stephen Zelt	73 Chester Rd	5/28/14
49	Kimberly A. Blanchuto	4 Birch Hill Rd	5/28/14
50	Nathan Bowers	33 North St.	5/28/14
51	Chris H Smith	56 Chester Rd	5/28/14
52	Joe Bacon	21 Russell Stage Road	5/28/14

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NAME

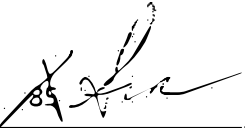
ADDRESS

DATE

53	Diane Rundstrom	25 Russell Stage Rd, Blandford MA	5-27-14
54	Cheryl Hopson	55 Woronoco Rd Blandford, MA	5-27-14
55			
56			
57	Lisa Reynolds (yes)	Blandford MA	5/30/14
58	Curtis R. Est	26 Main St. Blandford MA	5/30/14
59	Milton Eldredge	21 HERRICK BLANDFORD MA	5/30/14
60	Dawnalyn Ranson	910 Beech Hill Rd	5/31/14
61	Andrea Christopher	4 Beech Hill Rd Blandford MA	31 May 14
62	Arman / Trish	14 Kaelin Rd Blandford	5/31/14
63	Judith MacFarlane	2 Huntington Rd Blandford MA	5/31/14
64	Wanda Deitner	113 Chester Rd Blandford, MA	5/31/14
65	Davis B Alexander	7 Russell Stage Rd Blandford MA	5-30-14
66	Mark A. Miller	51 Beech Hill rd - Blandford MA	0608
67	Destiny Davis	51 Beech Hill Rd Blandford MA	0608
68	Maurice Blanchette	10 Maple Lane " "	6/1/14

We, the residents of the town of Blandford, Massachusetts do hereby petition and request that the Commonwealth of Massachusetts open the Massachusetts Turnpike (Interstate 90) to vehicular traffic onto and off of said turnpike in the Town of Blandford. This Home Rule Petition is hereby initiated on Memorial Day, May 26<sup>th</sup>, 2014.

	NAME	ADDRESS	DATE
69	Mitch Drenga	4 Sanderson Brook Rd	5/31/14
70	Aaron LaBrecque	49 North St.	5-31-14
71	Lynn Berthelme	53 Russell Stage Rd.	5-31-14
72	Allen Parkis	119 Otis Rd	5/31/14
73	John & Piper	4 Hadley Rd.	6/1/14
74	Jolene Salaske	9 Cobble Mtn. Rd	6/1/14
75	Clarissa Hart	73 Chester Rd	6-1-14
76	Angela Mikal	PO Box 82 Blandford	6-1-14
77	Christina Dragan	241 Otis Stage Rd	6/1/14
78	Penny Fitzgerald	30 Blair Rd	6-1-14
79	MIKE GOFF	9 Cobble Mountain Rd	6-1-14
80	Tom Agan	1 Hall pond	6-1-14
81	Erica Tye	78 main St	6-1-14
82	Chris Lagasse	5 Glasgow Rd.	6-1-14
83	Mike St. Denis	62 Main Street	6-1-14
84	Michael Saviau	36 North Blandford Rd.	6-1-14

*85* 

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NAME	ADDRESS	DATE
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86	Marvin Bosco	Rochester Rd	5/27/14
87	Chris Egerton	Glasgow Rd #1	5/27/2014
88	Wayne Mosisser	41 Worowoco Rd	5/27/14
89	Jean Piper	6 N Blandford Rd.	5-27-14
90	Thomas Piper	" "	5-27-14
91	Kevin Roman	" "	5-27-14
92	Jill Savery	104 Main St Bland	5/27/14
93	Dawn Schile	126 N Blandford Rd	5/27/14
94	Sharon Brasaloe	3 Birch Hill Rd	5/27/14
95	Robert Debbins	98 Main St	5/27/14
96	Elyse Shepard	171 Chester	5/27/14
97	Robert Bettant	10 Russell Stage Road	5/27/14
98	Cindy Henson	8 Glasgow Rd	5/27/14
99	Robert Avery	18 Kaslin Rd	5-27-14
100	Yoch Ann W	18 Kaslin Rd	5-27-14
101	Tim W Greaves	24 North St	5-27-14



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NAME	ADDRESS	DATE
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ZACH SMITH	15 HERRICK RD BLANDFORD, MA 01008	5-27
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Jordan Kofnacki	88 main st Blandford MA 01008	5-27
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Brian Boisseau	24 Sperry Rd Blandford MA	5-27
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Wendy Boisseau	24 Sperry Rd Blandford 10 Birch Hill Road	5-27
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FREDERICK R KOCHANER JR	BLANDFORD MA 01008	5-27-14
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John Fisher SR	25 NORTH ST BLANDFORD	5-27-14
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DAN AND WENDY OKS ZULAK	112 Chester Rd 134 N. Blandford Rd	5/27/14
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Susan E. Vanden Barselaar		5-27/14
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John A. Zwart		5-27/14
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Michael S. Perra	9 RUSSELL RD BLANDFORD MA	5-28-14
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Lynn McCann	52 Chester Rd Blandford, MA	5/28/14
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Paul Bous	7 North St	5/28/14
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Harold Holman	40 Huntington Rd Blandford, MA	5/28/14
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Bonnie Lemme	91 main st Blandford	5/28/14
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Scott Lemme	91 main st Blandford	5/28/14
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	NAME	ADDRESS	DATE
150	Gay Roy	138 Chester Rd	6-1-14
151	<del>John Smith</del>	15 Herrick Rd	5/30/14
152	Rick Simpson	62 Main St	5/30/14
153	Jeri Harfield	4 Hall Rd	5/30/14
154	Greg Garfield	4 Hall Rd	5/30/14
155	Heather Gasher	3 Herrick Rd	5/30/14
156	<del>John M. Buttery</del>	1 Herrick Rd	5/30/14
157	Lisa Brainard	59 Chester Rd	5/30/14
158	Marz Semilo	29 North St.	5/30/14
159	Lynn Semilo	29 North St.	5/30/14
160	Jim Semilo	29 North St.	5/30/14
161	Denise Fisher	25 North St	5/30/14
162	Mollie Fisher	25 North St	5/30/14
163	Oliver Fisher	25 North St	5/30/14
164	John Fisher Jr.	25 North St	5/30/14
165	Harry Mc	168 Otis Stage Rd	5/30/14
166	Ray Chaffer	21 Kaulin Rd	5-30-14

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	NAME	ADDRESS	DATE
167	Thomas Decker	113 Chasr Rd	6/2/14
168	NICOLE GEARY	1 Beash club RD	6/2/14
169	CYNTHIA CARA	101 CHESTER RD	6/2/14
170	Bruce Capra	Berksh rd	6-2-14
171	Wendy K S Berman	6 Birch Hill Rd	6/2/14
172	Tami Fik	150 Chester Rd	6-2-14
173	Jessy Gowan	150 Chester Rd	6-2-14
174	NIKI MAYER	40 N. BLANDFORD	6/2/14
175	Frank Lucita	38 Birch Hill RD	6/2/14
176	Charlotte Kozalski	11 Beaulah Land Rd	6/2/14
177	Ronald E Champagne	9 Glasgow Rd	6/2/14
178	Christine KERNAN	71 main ST	6/2/14
179	Eric Kusnick	15 Woronoco Rd	6/3/14
180	Dawn Snow	256 Otis Rd	6/3/14
181	Aaron Poterat	John Knox Rd	6/3/14
182	Rebecca Poterat	John Knox Rd	6/3/14
183	Valerie	3 Hefley Rd.	6-3-14

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	NAME	ADDRESS	DATE
	McKAYON GUAN	OTIS MA	6-3-14
184	Tim Blood	7 Beagles Rd	6-3
185	BRIAN GANNON	124 N. BLANDFORD	6-3
186	NEL MCKAYON	2 HUNTINGTON RD	6-3
187	Mark Boomsma	10 Nye Brook	6-4
188	Chris Kulig	97 Main St	6/4
189	Paul Abatayo	46 Woronoco Rd	6/4
190	Michael Brennan	102 Otis Stage Rd	6/4
191	David Chaffee	7 Kaolin rd	6/4
192	Jana Kueig	97 Main St.	6/5
193	Larry Banned	59 Chester rd	6/4
194	Edna Wilander	5 MAPLE LANE	6/5
195	Mike Vineyett	2 Sunset Rd	6/6
196	Dan Hamel	139 Chester rd	6/6
197	JON LETENDRE		
198	Mary Martin	89 Chester Rd	6/6
199	Robert Fisher	125 Chester	6/6

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	NAME	ADDRESS	DATE
200	Judy Brennan	Old Stage Rd	6-4
	Jason Parent	Main St.	6-6-14
201	Kathy Stockeith	Kadwin Rd	6-6-14
202	Jennifer Hawle	Gore Rd	6-6-14
203	LILL BURNICK	NORTH ST	6-6-14
204	Jeffrey Wojcik	5 KADWIN RD	6-7-14
205	Katherine Conway	6 Island Acres Rd.	6-7-14
206	Myles Conway	6 Island Acres Rd	6-7-14
207	Laurie Parent	72 Main St.	6-7-14
208	John <del>Parent</del>	23 South St	6-7-14
209	Kyle Normandin	31 South St	6-7-14
210	PETE SPARKS	9 HALL RD.	6-7-14
211	David Toporowski	140 Chester Rd	6-7-14
212	Amy Toporowski	140 Chester Rd	6-7-14
213	Craig Kavalzky	142 Chester Rd	6-7-14
214	Wendy Krupa	Borden Brook Rd	6-7-14
215	Anna Avery	18 Kadwin Rd.	6/8/14

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NAME	ADDRESS	DATE
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216	William L. Howe	28 Woronoco Rd Blandford, MA	06/08/14
217	Lisa Bruno	117 Chester Rd Blandford MA	6/9/14
218	Philip T Bruno	"	6/9/14
219	Barbara Blair	16 Sunset Rd Blandford ma	6/9/14
220	Maryanne Meczywor	56 N. Blandford Rd Blandford, MA	6/9/14
221	Lynn Jensen	29 North St Blandford, ma	6/11/14
222	Ann G Southworth	79 Main St. Blandford MA	6/10/14
223	Rhonda Boulette	29 So. St Blandford MA	6/11/14
224	John Boulette	29 So St Blandford MA	6/11/14
225	JEREMIAH BRADY	3 HAYDEN RD BLANDFORD MA	6-11-14
226	Michael Albert	4 Beagle Club RD Blandford, MA	6/11/14
227	THEODORE COSSIDEAU	99 CHESTER RD BLANDFORD MA.	6/11/14
228	Cosette Cossineau	99 Chester Rd Blandford MA	6-11-14
229	Marc Yost	16 Woronoco Rd Blandford	6/11/14
230	DAVID OLKSON	118 CHESTER RD BLANDFORD, MA	6-11-14
231	Natalie Murphy	39 Woronoco RD Blandford MA	6-12-14

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	NAME	ADDRESS	DATE
	Ryan Murphy	39 Worcester Rd Blandford	06-12-14
232	Joann Martin	152 Chester Rd Blandford	6-12-14
233	Erk Hansen	140 Old Stage Road Blandford	6-13-14
234	Ron Pelletier	22 Herrick Rd Blandford	6/14/14
235	Keith Meyer	2 Birch Hill Rd Blandford	6/14/14
236	Margaret Coolidge	11 Glasgow Rd	6/14/14
237	Theresa Nitas	12 George Milard Rd Blandford	6/14/14
238	<del>Joseph R. Jr.</del>	" " " "	" "
239	Sandra Lortsher	47 North St. Blandford, MA	6/14/14
240	Karl Lemme	17 Karon Rd Blandford MA	6/14/14
241	Glen A. Kestler	3 Russell Stage Blandford	6/14/14
242	Lared Heeter	8 Beagle Club Blandford	6/14/14
243	Cori Heeter	8 Beagle Club Blandford	6/14/14
244	Jada Smith	56 Chester Rd Blandford	6/14/14
245	Mary Van Nuden	15 Cottle Hill Blandford	6-15-14
246	Mike Bisgrove	8 Herrick Rd Blandford	6-15-14
247	Neil Stettin	7 Glasgow Rd	6/15/14

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NAME	ADDRESS	DATE
248 Michael Anthony	85 Main St	6/14/14
249 Ben Anderson	132 Chester Rd	6/16/14
250 Shelly (Michelle) Anderson	132 Chester Rd	6/16/2014
251 Spencer Martin	189 Chester Rd	6/17/2014
252 Diana Williams	78 main St	6-17-14
253 Travis Stone	45 Russell Stage Rd	6-17-14
254 Janet Strachan	1 Herrick Rd	6/17/14
255 Doreen E. M. B. B.	134 Chester Rd	6/17/14
256 H. O. L.	37 Gore Rd	6/17/14
257 Tang Thayer	Otis Stage	6-17-14
258 John Coffey	172 Otis stage Rd	6-17-14
259 C. J. P. J.	2 Old Chester Rd	6-17-14
260 R. T. A.	30 Russell Stage Rd.	6-18-14
261 Betty Jordt	44 Nye Brook Rd	6-18-14
262 Barbara Wronski	16 Beulah Land Rd	6/19/14
263 W. WRONSKI	16 BEULAH LAND RD	6-19-14



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NAME	ADDRESS	DATE
Scott Mezzoff	24 Sperry Rd	6-19-14
Nina Dava	112 N. Blandford Rd	6/19/14
Sarah Beard	23 South St Blandford	6/19/14
Bill McEwan	215 Otis Stage Rd Blandford	6-20-14
Kurt Boll	37 Gore Rd	6/19/2014
Susan Weed	23 Herrick Rd	6/20/2014
Danielle Lucia	38 Birch Hill Rd Blandford	6/20/14
Mary Curro	115 Chester Rd	6/20/14
Joe Carr	101 Chester Rd	06/20/14
Cheryl Konradt	14 Herrick Rd	6-2014
Alba De Donno	4 Hayden Rd	6/20/14
Janet Stephens	25 So St	6/21/14
Joanne Gush	22 N. Blandford Rd	6/21/14
V. Chubbelle	45 Main St.	6/21/14
Doretta M. Brounma	8 Nye Brook Rd	06/22/2014
Lyn Avery	32 Woronoco Rd	6/22/14

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NAME	ADDRESS	DATE
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280

William Remington	25 Russell St. Rd	6/6/14
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281

Mason Mearns	27 Russell Stage Rd	6/6/14
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282

Don Macaito	27 Russell Stage Rd	6/6/14
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283

Paul Menton	29 Russell Stage Rd	6/6/14
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284

Linda Paddock	54 N. Blandford Rd	6/10/14
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285

Donal Coffey	172 Otis Stage Road	6/11/14
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286

Linda Reynolds	Blandford	6/13/2014
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287

mtl	14 NORTH ST. BLANDFORD	6/14/2014
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288

Stephen W. Briggs	282 Westington Rd	6/17/14
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289

Linda Coffey	172 Otis Stage Rd	6/19/14
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290

Rhonda Dunn	15 North St Blandford	6/24/14
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291

June H. Mearns	21 S DERRY RD BLANDFORD	6/26/14
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292

Ann M. Hollis	9 N Blandford Rd	6/26/14
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293

Phil Stanton	34 Nye Brook Rd.	
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294

Ross P. Bennett	80 Ingell Rd Chester	6/27/14
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295

GARY DUNN	125 Chest Lane Grafton MA - 01834	6/27/14
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NAME	ADDRESS	DATE
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296	Gray V Boyce 2E GORE RD	5/27/14
297	Tony van Weephaoven 25 Millard Rd	5/27/14
298	Julian H Mueller 9 Sunset Creek Rd	5/27/14
299	William D. Runkle 19 RUSSELL STAGE Rd	5/27/14
300	Baldwin 1 Island Pass	5/27/14
301	Mary Groszlow 89 Main St	5/27/14
302	Cynthia G. Montano 6 Geo Millard Rd	5/29/14
303	Wright J. White 25 W. Main Rd	5/30/14
304	Walter La Rue 87 Chester Rd	5/30/14
305	Lori La Rue 87 Chester Rd	5/30/14
306	Karen Buchinsky 21 Herrick Rd	5/30/14
307	John Carrington 105 Otis stage Rd	5/30/14
308	Jessica Carrington 105 Otis stage Rd	5-30-14
309	Andrea Lator 37 South St	5-30-14
310	Jay Rotundo 37 South St	5-30-14
311	Henry G. Ropale 77 Chester Rd	5-30-14
312	Harold Meslin 89 Chester Rd	5-31-14

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	NAME	ADDRESS	DATE
313	Leah Bacon	21 Russell Stage Rd	5/28/14
314	Chris Strongy	104 main st	5/28/14
315	MARRK PRUSSMAN	128 N. BLANDFORD RD	5/28/14
316	Renee Talia	128 N. BLANDFORD RD	5/28/14
317	M. Mirsiner	44 North St.	5/29/14
318	Ann Smithworth	79 Main St.	5/29/14
319	GASTON THIBAUT	P.O. BOX 162 BOTIS	5-29-14
320	KEVIN MASON	Blandford MA	
321	Allen Oyle	119 N. Blandford Road	5/29/14
322	Michael Leysa	8 BEACLE CLUB RD	5/29/14
323	MAUREEN DION	63 CHESTER RD.	5/29/14
324	Laura S. Dean	12 Russell Stage Rd	5/29/14
325	Dany Smith	15 Herrick Rd	5/29/14
326	Tala Brown	4 Beagle club house Rd	5/29/14
327	Licky Bisgrove	8 Herrick Rd	5/29/14
328	Brandon F. Preston	65 Main St.	5/29/14
329	Rachel	63 chester rd	5/29/14

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NAME	ADDRESS	DATE
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330	Alexandra Anthony	85 Main St. Blandford MA	5/29/2014
331	Michele Baulieu	3 Buick Hill Blandford MA	5/29/2014
332	DAVID BOIVIN	147 Chester Rd. Bld-Ma.	5/29/2014
333	DAVID PROCTOR	1 MAPLE LANE BLANDFORD	5/29/2014
334	BERTHA S. PEASE	9 RUSSELL STAGE RD	5-29-14
335	Shawn + Eric Kusnick	15 Woronoco Rd	5-29-14
336	Bud & Margaret Walsh	25 Woronoco Rd	5/29/14
337	Bob Nichols	106 Main Street	5/29/14
338	E. W. Myers	203 Otis Rd	5/29/14
339	Sarah Amable	154 Otis Stage Rd	5.29.14
340	Jonathan Thompson	154 Otis Stage Road	5.29.14
341	Eric Mayo	98 MAIN Blandford	5.29.14
342	Peter Curro	115 Chester Rd	5.29.14
343	Janice Buss	7 North St.	5-30-14
344	Ryan W. W. W.	8 BEAR CLUB RD	5-30-14
345	Denise Audena	44 main Rd	5/30/14

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NAME	ADDRESS	DATE
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346	Patricia Daviau	36 N Blandford Rd.	6/24/14
347	Louis B. Daviau	36 N Blandford Rd	6/24/14
348	Nicole Daviau	38 N Blandford Rd	6/24/14
349	Sam Malanson	60 Main St Blandford MA	6/24/14
350	John Malanson	60 Main St Blandford MA	6/24/14
351	Carol Wheaton	Blandford	6/25/14
352	Joseph Sanctuary	6 Russell Stage Rd. Blandford	6/25/14
353	ROGER NOFFKE	243 OTIS STAGE RD BLANDFORD	6/25/14
354	Eileen Boyle	119 Chester Rd. Blandford MA	6/28/14
355	Roy Squitieri	119 Chester Rd Blandford	6-28-14
356	Nude Denn	30 Nye Brook Rd Blandford	6/29/14
357	Mark Padlak	54 N Blandford Rd Blandford	6/29/14
358	Patricia Regan	24 North St Blandford	6/29/14
359	Susan Whitman	30 Huntington Rd Blandford	6/30/14
60	Michael Michalski	38 Russell Stage Rd Blandford	6/30/14
61	Craig M. Antonowski	20 Russell Stage Rd Blandford	6-30-14

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NAME	ADDRESS	DATE
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362	Charlie Bush	23 North St.	6/30/14
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363	Mary Brainerd	28 North St.	7/1/14
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**From:** [Liz Queler](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** No New Turnpike Exchange  
**Date:** Tuesday, October 8, 2019 11:46:54 PM

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Dear Ms. Gascon,

My family and I have had a home on North St. in Blandford, a 1/2 mile down the street from one of the proposed new interchange sites, for 40 years. We love our quiet hilltown, our scenic surroundings and safe, remote streets. We did not move here for easy access to the highway, or to have thousands of trucks and cars driving by our house daily. Ten minutes less on our commute, hardly warrants the devastating impact an exit would bring. The pollution and truck traffic alone would alter Blandford and it's neighboring towns irreparably.

We ask you to please shelve this project permanently.

Thank you,

Liz Queler



**From:** [Ken Smith](#)  
**To:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [Bligh, Cassandra \(DOT\)](#); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov)  
**Cc:** [Neil Toomey](#)  
**Subject:** Turnpike exit  
**Date:** Wednesday, October 9, 2019 9:10:11 AM

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Smitty Pignatelli , Adam Hinds and Cassandra Gascon:

I am writing to you as president of the Becket Land Trust and as a 35 year resident of Becket. The Becket Land Trust and our 300 community members are staunch opponents of a new Turnpike exit anywhere between Westfield and Lee. We strongly believe that any new exit would greatly compromise the rural character and quality of life that this area offers. The vast majority of people living here are opposed to this proposal and we ask that you do everything within your powers as our representatives to stop this proposal.

Regards,

Ken Smith  
1017 George Carter Rd, Becket, MA 01223  
President  
Becket Land Trust

**From:** [Jane Pinsley](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Fwd: "No" New Exit in Hilltowns  
**Date:** Wednesday, October 9, 2019 12:23:19 PM

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-----Original Message-----

From: Jane Pinsley <eapinsley@aol.com>  
To: Adam.Hinds <Adam.Hinds@masenate.gov>  
Sent: Wed, Oct 9, 2019 12:21 pm  
Subject: Fwd: "No" New Exit in Hilltowns

-----Original Message-----

From: Jane Pinsley <eapinsley@aol.com>  
To: smitty.pignatelli <smitty.pignatelli@mahouse.gov>; Adam.Hinds  
<Adam.Hinds@masenate.gov>Cassandra.Gascon  
Sent: Wed, Oct 9, 2019 12:16 pm  
Subject: "No" New Exit in Hilltowns

### "No" to Any New Exit in the Hilltowns!

My name is Bill Missimer. About eight years ago I married Jane Pinsley. We were widow and widower, seeking a new life together after our losses. We tried city life and traveling but found them empty compared to the beauty and history of the hill towns of the Eastern Berkshires. The rural charm, breathtaking natural beauty and quiet lifestyle in Blandford made the path back to Jane's childhood home and farm reviving. As we began to restore the house and fields I came to appreciate how profoundly this farm, the home base of her dad, Blueberry Joe, had positively affected the town for most of the last century. The house was "The Boise Tavern" more than 200 years ago. The blueberry fields cover Fort Hill, where the early settlers built a safe place for protection on the frontier. The house has been restored and the blueberry fields are producing again. Plans are underway for an addition to the house, using local skills wherever possible. We look forward to transitioning the farm to Jane's daughters and their families. All this will come to an end if a new Turnpike Exit is created on North Street where the farm is located.

The DOT Study Group has concluded that a new exit should be in Blandford. Their computer models indicate that a Blandford exit will unload more traffic from Westfield than other possible locations would and that it will cost the least. Well that's good for Westfield but their gain would be Blandford's loss. All that traffic would land here in a village with narrow winding roads totally ill-equipped to handle it. Furthermore, "lowest cost" suggests that the huge impact of such an endeavor needs further examination.

Are the citizens of Blandford ready for the air and noise pollution that will descend on them when 5,000 - 6,000 more vehicles per day clog our roads, particularly at rush

hour? Jane and i are certainly not. Our plans for any Farmhouse addition or further improvement are on hold until this issue is resolved. Are you ready for traffic lights, turn lanes, dangerous crossings to get your mail or play the next golf hole? Or how about when attending an event at the White Church, and trying to cross North Street from the parking area to do so? This will no longer be a safe country town in which to raise a family, ride a bicycle or take a jog or walk the dog.

Our daughters and their families come to visit the Farm to relax and escape the hustle and bustle of life in the city. They live in the Washington, DC and Boston areas and dread the impact of an exit on their family haven where they worked and played as children, with its historic house, open fields and woodlands. It would truncate their dream of keeping the Farm in the family for generations to come.

So we all say "NO" to a new exit in Blandford or anywhere else in the Hilltowns!

Respectfully submitted,

Bill Missimer  
44 North Street  
Blandford, MA 01008

**From:** [Sarah Clapper](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Support for the New I-90 Exit  
**Date:** Wednesday, October 9, 2019 12:28:24 PM

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Dear Ms. Gascon,

I currently live in Dalton and work in Connecticut, I'm writing you to voice my support for a new highway exit on the Mass Pike. An additional exit could improve the lives of many hilltown residents. My husband is a Berkshire County native and I was born in New England. We are proud to call the Berkshires our home, and we love all of the seasons of the Berkshires. We also own property in Becket and are planning on building a home there. We feel that the Berkshires is a wonderful place to raise a family.

However as you are aware, in many rural areas job opportunities can be limited. Several years ago I had a job opportunity that provides me with a good salary, free benefits, and a generous retirement plan; however this job was not located in the Berkshires. American families cannot afford to pass up this type of opportunity and I currently commute 85 minutes each way to work. My husband is also fortunate to have a good job. He works for an air carrier and commuting is also a part of his job. Another highway exit would allow for us to spend more of our time at home enjoying the community that we care so much about.

Greater transportation access can improve rural communities. Greater access creates more jobs, and gives residents better access to goods and services. With the potential for these types of opportunities on the horizon, this could keep future generations in our community. My family is lucky enough to have employment opportunities that allow us to commute and still contribute to our local economy. But many other families have to leave the area all together. We support the building of an additional highway exit. I would love to have a shorter commute and spend more time with my family in my community.

Sincerely,

Sarah Clapper  
53 Sunnyside Drive  
Dalton, MA 01226  
Cell: 860-302-4801

**From:** [Christopher Clapper](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** In Favor of New Turnpike Exit  
**Date:** Thursday, October 10, 2019 11:31:44 AM

---

Dear Ms. Gascon,

I am writing in support of the new turnpike exit between exits 2 and 3. I am a lifelong resident of Berkshire County and currently live in Dalton. I think increasing accessibility to the hill towns of western Massachusetts can only improve the standard of living and bring more money and families to the area. As the populations decline we need to do everything we can to attract more people to the area. Reducing driving times can only help make Western Mass more attractive to families like this. I know many people don't want to attract more second homeowners and tourists to the region but they are a huge part of the economy and increasing transportation infrastructure can only help to make the area more economically viable.

I work as a pilot and my usual commute involves traveling to the Boston airport usually about a 2:45-3:15 hour drive from my house. Adding an exit between the two existing would defiantly reduce commuting time. I recently bought a piece of land in Becket to build a house so that I could reduce my commuting time. I think there are others in the area who have similar commutes or they may work 3-4 days a week in Boston and then stay the weekends in the Berkshires and this project can only help with that.

Thank you,

Christopher Clapper

**From:** [Jacqueline Clapper](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** I-90 Blandford exit  
**Date:** Thursday, October 10, 2019 11:54:56 AM

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To whom it may concern,

I am not able to attend the meeting tonight regarding the new interchange/exit on the Mass. Pike in Blandford. However, it has been a long time coming that this issue is addressed and an exit be constructed.

Please count me in as a strong supporter of public Mass. Pike access in the Blandford area.

~Jacqueline Clapper

DRAFT

**From:** [Bruce Clapper](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Blandford Turnpike Exit  
**Date:** Thursday, October 10, 2019 1:55:04 PM

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Dear Madam,

I am writing in support of the creation of an exit from the Mass Pike in Blandford. We often travel the Pike and have to go all the way to the Lee exit and back east on route 20 to our destination in Becket. It would be much more convenient to be able to exit in Blandford. Now without the need for toll booths, the expense of creating an exit has never been less. A Blandford exit would save a great deal of time for local folks who need to commute to work.

Thank You

Bruce Clapper  
413-822-1844  
[Bruce.Clapper@gmail.com](mailto:Bruce.Clapper@gmail.com)

**From:** [Real Tanguay](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Support for the new I-90 exit.  
**Date:** Thursday, October 10, 2019 2:00:45 PM

---

[cassandra.gascon@state.ma.us](mailto:cassandra.gascon@state.ma.us)

Dear Ms. Gascon,

I live in Westfield and am writing you to voice my support for a new highway exit on the Mass Pike. An additional exit would greatly reduce the congestion of exit 3 in Westfield, and would also provide a better quality of life for many of the hilltown residents.

Improved infrastructure and greater transportation access can help improve rural communities. Greater access creates more jobs, and gives residents better access to goods and services. With the potential for these types of opportunities, this could keep future generations in Western Massachusetts. My family and I support the building of an additional highway exit.

Sincerely,

Real Tanguay



**From:** [Jeff Penn Sue Dion](#)  
**To:** [Westfield News Amy Porter](#); [dpw@cityofwestfield.org](mailto:dpw@cityofwestfield.org)  
**Cc:** [MA Rep Smitty Pignatelli](#); [Bligh, Cassandra \(DOT\)](#); [Neil Toomey](#)  
**Subject:** jeff penn Westfield Traffic Turnpike Exit  
**Date:** Thursday, October 10, 2019 2:04:38 PM

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hi guys -

many of us are upset over having to oppose a proposed Hilltown MassPike Exit for the third time since 1995. first, there is no "solution" required as most of us understand the slight inconvenience of remoteness from an existing Exit is fundamental to our Rural Qualities and keeps our housing costs lower. Second, the conditions observable at any other Exit are exactly what we have moved out here to avoid. Third, a better solution would be to improve traffic flow to and thru Westfield (Lee does not seem to suffer the same problems since the Hilltown traffic reaches the Pike before Lee). if a Solution is required, then the proper way to come to the understanding is to gather the affected communities in a forum and openly discuss problems and possible solutions.

attached here is an idea of how Westfield could improve the Turnpike Exit Access. further measures to improve flow thru Westfield could include two-lane one-way travel East along East/West Silver Street/Noble Ave; South on Washington Street, West on East Main Street from Noble Ave to the Rotary (and/or Meadow Street from East Main to Elm); North along Elm Street from the Rotary to Franklin St. removing the need for at least 11 stop lights and improving traffic flow. and this didn't cost \$300,000 to propose.

further overall travel planning would reveal successes elsewhere including:

1. increase Rural Speeds like Europe ie.: Entering Town; Reduce Speed (25 or 30 mph) and Leaving Town; Resume Speed (should be 55 mph like New York State) - the current schizophrenia of nanny signs altering peoples speeds (perhaps 20 times between Huntington and Westfield) desensitizes people so they just travel safely - the policy proposed creates clarity and people actually slow down in the dense areas.
2. legalize the policy (or perhaps just create signs) "Cars behind you? Let them Pass!" which is law in Oregon - hilltowners have great frustration behind slow-pokes with few passing zones (for example, no passing zones over the entirety of Montgomery Mountain Main Street - one 25mph car adds 5-10 minutes to a trip)
3. two-lanes wherever possible to reduce congestion and increase passing opportunity
4. public transportation alternatives including Train Service at each of the former town stops (Russell, Huntington, Chester, Bancroft, North Becket, Washington Depot) and/or Rural Bus service and/or increased funding for medical rides.

we live in the dagger of black in the night photo of Megalopolis; we are Massachusetts' last great wilderness  
please end the consideration of adding any Exit in the region to MassPike - forever!  
so we can get to the job of properly managing this extraordinary place

i will be hosting an upcoming symposium: Protecting the Western Highlands of 413

this will tentatively be held at the Gateway School campus either in November or April (scheduling with the School)

the purpose will be to identify qualities, places and things which are important to protect in the region while we carefully grow, and problems and possible solutions to myriad life, life quality and nature issues. we need an overarching foundation and sentiment of love and curatorship for this special place so that we avoid major destruction as we advance.

thank you  
cheers  
jeff

jeffrey scott penn, architect  
77 worthington road  
huntington, ma 01050  
413-531-1868

DRAFT

**Westfield Ma pike exit**



Industrial Park  
to route 10 via  
one-way  
Servistar or  
New Road

New  
Rotary

10

**From:** [Karl Merriam](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Proposed Mass Pike Exit  
**Date:** Thursday, October 10, 2019 2:09:45 PM

---

Dear Ms. Gascon,

I live in Southwick and am writing you to voice my support for a new highway exit on the Mass Pike. The proposed new exit locations in Blandford would be offer my family a more convenient access point to the turnpike. An additional exit would greatly reduce the congestion of exit 3 in Westfield, and would also provide a better quality of life for many of the hilltown residents.

Improved infrastructure and greater transportation access can help improve rural communities. Greater access creates more jobs, and gives residents better access to goods and services. With the potential for these types of opportunities, this could keep future generations in Western Massachusetts. My family and I support the building of an additional highway exit.

Sincerely,

Karl Merriam  
69 Honey Pot Rd  
Southwick MA

Sent from [Mail](#) for Windows 10

**From:** [Peter Barton](#)  
**To:** [Bligh, Cassandra \(DOT\)](#); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov)  
**Subject:** New Turnpike Interchange  
**Date:** Thursday, October 10, 2019 3:22:27 PM

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Please speak out against the proposed Blandford Turnpike exit/entrance. It would harm the rural environment and reduce our quality of life. It would also be dangerous for our local bridges and culverts, which weren't designed for heavy truck traffic.

An upgrade to the Turnpike exit/entrance in Westfield makes much more sense. It would be less expensive, less damaging to the environment, and be good for the local Westfield economy.

Peter Barton  
50 Blandford Road  
Becket, Mass. 01011

DRAFT



From: [Richard T Hamel](#)  
To: [Bligh, Cassandra \(DOT\)](#)  
Subject: New Turnpike Exit Study  
Date: Thursday, October 10, 2019 3:40:47 PM

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Dear Cassandra,

I built a self-help passive solar house in 1978 on the narrow and quiet Gore Road in Blandford. Over the years my wife and two sons have enjoyed the peace and quiet of living in a rural setting surrounded by woods. Should a turnpike exit be built at the Blandford Service Plaza I fear our road will become a popular feeder for individuals looking to reach East Otis and the reservoir area. Regardless of the fact Rte. 23 may be a shorter drive, people may opt for the back way by traveling down Gore Road to North Blandford Rd, onto Algeria Road into East Otis as there are some who still enjoy driving.

For the above considerations, I would like your study group to recommend "no exit".

Thank you,

Richard T. Hamel  
31 Gore Road  
Blandford, MA 01008  
[commodor47@verizon.net](mailto:commodor47@verizon.net)  
413 848-2493

**From:** [Neil Toomey](#)  
**To:** [Bligh, Cassandra \(DOT\)](#); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [Adam.Hinds@masenate.gov](mailto:Adam.Hinds@masenate.gov)  
**Subject:** 10-10-19 Statement for no build exit  
**Date:** Friday, October 11, 2019 8:58:42 AM  
**Attachments:** [No new exit on the Mass Pike Statement for 10.docx](#)

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Hi Cassandra, Enclosed is my statement from last night. Thank you for the opportunity to speak. I hope the study group takes seriously the opposition to the exit in Blandford from the surrounding towns as well as from Blandford. As Jeff Penn said in his statement, the meeting we had last week in Lenox, as well as last night's meeting, should have been held at the beginning of this process, instead of the end. Whether that oversight was intentional on the part of the study group or not, the impact of not bringing community members together clearly has not made this process as smooth and seamless as it could have been. Please remind the study group that a "no build option" is a path that will bring all community members together to discuss and plan for 21st century solutions to our emerging rural economy. Thank you again for your work, Neil  
Sent from [Outlook](#)

No new exit on the Mass Pike Statement for 10-10-19 Blandford 6:30 p.m.

One week ago on Wednesday, October 2, The Mass DOT study group heard loud and clear the opposition to a turnpike interchange anywhere in our hill towns. Environmental degradation, forest fragmentation, truck and car traffic (6000 trips a day), air pollution, noise pollution as a result of the feeder road that will inevitably follow the construction of an exit, were just a few of the pitfalls the study group has largely ignored.

I was happy to hear the Algierie Rd proposed exit was off the table. Mass DOT immediately cited “steep grades”, “lack of public support”, “complex terrain”, “minimal benefits”, “minimum travel time savings”, and “increased traffic” on “local” roads.

For all these same reasons the Blandford siting of an interchange should be scrapped. The steep hills, sharp curves, deteriorated culverts and bridges, all speak to the same issues that ruled out the proposed Algierie Rd. exit. The access road to U S Route 20, from Blandford empties right on the Becket town line, also the Berkshire County line. A series of sharp, dangerous curves on Route 20 await travelers from Blandford.

This would be the only exit on 3000 miles of I 90 that is not accessed from a state highway. Yet the Mass DOT study group keeps trotting out the narrative that this exit is necessary because there is no exit for 30 miles between Westfield and Lee. I say “so what”? That fact could and should be promoted as a destination selling point for our rural towns. A fraction of the \$300,000 dollars spent on this study could be used to promote a rural landscape that most of us want to see preserved.



The Mass DOT study group should move beyond the quarter mile impact range used in the analysis. After all that is what was done to eliminate The Algierie Rd. exit proposal. Wetland impacts, water resource impacts, open space impacts, Right of Way, environmental justice, property taking, parcels with residences, and emission reductions, which, by the way, are not reduced by putting more cars and trucks into narrow steep valleys, are appropriate impacts to study, but, the study could and should move several miles out in all directions to clearly gauge the impacts on all our rural communities. A 10 to 13 minute savings in travel time hardly warrants the \$29.5 to \$34 million price tag for the exit. What study has been done to estimate the cost of the feeder road access from both Route 23 and Route 20?

Westfield has a truck and traffic problem brought on by themselves, through poor planning. The impression is, that the big monied interests of the Westfield Chamber of Commerce and real estate speculators are using Mass DOT and this study group in a “grab and smash” attempt to put 6000 more vehicles onto our rural roads, and shift congestion from Westfield onto our communities.

Mass DOT and our elected officials have a duty to represent the interests of all the communities impacted by this project. We all deserve a voice in whether this project should move forward. A “no build” option to save our communities is well warranted. This process whether intentional or not, has only served to divide the residents of our towns by playing a zero-sum game. Progress is measured by bringing all stake holders together. Rail service, internet access, common sense repairs to our roads and bridges, are all issues we can sit down and plan for. A rural economy that is planned and implemented by our own residents and communities would be a much more effective solution for moving toward a modern 21<sup>st</sup> century approach for improving and protecting this shared landscape.

For all of the above reasons, our elected leaders, Smitty Pignatelli, and Adam Hinds, should speak out now against a new interchange for Blandford and our surrounding communities. Thank you.

**From:** [germaine moore](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** New exit  
**Date:** Saturday, October 12, 2019 11:01:06 AM

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Dear Ms. Gascon,

I live in Pittsfield and am writing you to voice my support for a new highway exit on the Mass Pike. The proposed new exit locations in Blandford would offer Western Mass residents more convenient access to the turnpike. An additional exit would greatly reduce the congestion of exit 3 in Westfield, and would also provide a better quality of life for many Western Mass residents.

Improved infrastructure and greater transportation access can help improve rural communities. Greater access creates more jobs, and gives residents better access to goods and services. With the potential for these types of opportunities, this could keep future generations in Western Massachusetts. My family and I support the building of an additional highway exit.

Sincerely,

Germaine Moore  
351 Williams St  
Pittsfield, MA

Sent from my iPhone

**From:** [Pat Vint](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Turnpike Exit  
**Date:** Saturday, October 12, 2019 3:08:22 PM

---

Dear Cassandra

I have been a Becket resident for fifteen years. I'm very opposed to the proposed new exit. I do not want the nature of our area to become more densely populated and commercial. That would ruin what many of us came here to enjoy

Sincerely

Pat Vint LMHC

413-575-3331

153 High Street

Becket, MA

Sent from my iPhone

DRAFT

**From:** [dave@labrecquecreativesound.com](mailto:dave@labrecquecreativesound.com)  
**To:** [Bligh, Cassandra \(DOT\)](#); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov)  
**Subject:** Proposed Blandford Interchange  
**Date:** Monday, October 14, 2019 12:10:28 PM

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Dear Ms. Gascon, Rep. Pignatelli, and Sen. Hinds,

I appreciate all the work you're doing toward determining the best path forward regarding a new Turnpike interchange between Lee and Westfield.

As a Becket resident who moved here seven years ago because I wanted to get away from many of the trappings of populous civilization, I'd like to voice my preference for not adding an interchange to the western Massachusetts segment of I-90 in the foreseeable future. I enjoy the isolation that living between the existing exits affords me, even if it means a fifteen-minute trip west to Lee in order to go east to the coast. It's a trade-off that I'm glad to accept.

I'd add that I'm a self-employed voice-artist with a home-based recording studio, and the fewer the trucks driving by my house on Route 8, the better for my business. Quiet is essential for recording, and big trucks are loud!

Keep up the good work. And thanks for listening.

Best,

Dave Labrecque



2825 Main Street | Becket MA 01223-9733  
520.240.6001 | [dave@labrecquecreativesound.com](mailto:dave@labrecquecreativesound.com)

**From:** [Dalibornyc.](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** I-90 Interchange Study  
**Date:** Monday, October 14, 2019 3:44:09 PM  
**Attachments:** [I-90 Interchange study.pdf](#)

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Dear Ms. Gascon,  
Thank you for the meeting in Blandford and for your excellent presentation.  
Please see attached. I hope this Interchange will not happen.  
Sincerely,  
North Street resident

DRAFT

# I-90 Interchange Study



## COMMENTS

Name (optional): \_\_\_\_\_

Address/Email: North Street Blandford, Ma Dalibornyc@gmail.com

Please write any comments or questions you have in the space provided below. (If you need additional space, please use the reverse side.)

What benefits would a new interchange provide you?

None

What drawbacks do you see in a new interchange?

1-Intrusion into my life of noise, and rumbling of trucks past my house at all hours.

2- immediate devaluation of my house and property.

3- danger of commercial, heavy duty traffic having access to our town.

4- Need for more police and protection causing increase in taxes.

5- Increased air pollution from exhausts of trucks. North Street where it meets Route 23 is very high elevation. Trucks will have to use much fuel to get to the top of the hill creating pollution. The Mass pike is on a lowered more even road.

Our roads are mountainous and curvy. Air quality will be lowered for us from the Trucks emissions.

What aspect of a new interchange is most important to you? All of the above

Are improved travel times something you care about?

Yes but the improvement is so minimal as to be non-relevant

Do you believe a new interchange could provide you with new or better opportunities economic or otherwise?

No. Any improved opportunities would be overshadowed with the liability of living in a town with the equivalent of a Thruway out side my door and my front windows. A walk on the road is a nice idea and it will be missed

You may leave this comment sheet with project staff at the door, mail it to Cassandra Gascon, Project Manager, Office of Transportation Planning, Ten Park Plaza, Room 4150, Boston, MA 02116, or email comments to [Cassandra.Gascon@state.ma.us](mailto:Cassandra.Gascon@state.ma.us).

**From:** [Aaron LaBrecque](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** I-90 exit concerns from 49 North St, Blandford.  
**Date:** Monday, October 14, 2019 3:59:05 PM

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Dear Cassandra,

My name is Aaron LaBrecque and I live at 49 North St in Blandford. Which is, for your reference, about 500 ft from the proposed exit for westbound traffic in option #3 (the service plaza exit). I know you are not personally responsible for any of this. You did a really great job and your team has done a great job as well. I cannot imagine what's going through your mind when you have to stand before an obviously riled up crowd at a town meeting. You've been subjected to indirect verbal attacks because people don't know how to communicate their dismay at the impending announcement of the exit location. Thank you for being brave enough to stand up there and walk us through all the data points and possibilities that the future exit change could bring. The slight tremor in your voice could have been from being nervous or just plain old public speaking anxieties, but either way I felt sympathetic to your position.

My wife and I were married at 19 years old and have been blessed over the past 23 years with 3 great children and our wonderful home. I've sat in on the town meetings regarding the exit and it's now been narrowed down to 2 locations. Both locations would add thousands of vehicles per day driving past my house which only sets 50 feet back from the road. I'm not sure if you can imagine my dismay. Its absolutely horrifying to think about. We already deal with numerous dump truck and 18 wheelers accelerating up the hill or using their tremendously loud jake-brakes headed down the hill. Never mind the obnoxious fumes from these same vehicles exhausts. Adding an exit will multiply this, literally, a thousand times over.

We know it will destroy our home. By the same token the exit will have taken away any chance for us to ever sell our home. You claim the process could take another 9 years but the anxiety and stress this has applied to our daily lives is unbearable. We have seen our elderly neighbors suffer from this. Someone even stole their protest sign and flowers right off their front lawn. I am sorely disappointed in how my community has divided some individual to the point of theft and vandalism.

We live in the hill towns because we want to be in a rural community. I do not sympathize with the residents complain about their commute, that's part of the equation when you choose to buy a home here. The residents of the surrounding communities that support the I-90 exit in Blandford have zero concerns over what happens to my family. Their materialistic and selfish desires will mask any sympathy or regret and it will never weigh heavily upon their conscience. Myself and my family, we are lost. We don't know how to proceed. I'm 42 years old and all the hard work and sacrifice we have made to be where we are has come to this.

Can you help me understand what will become of us? Say this actually moves ahead and the exit will be put in to one of those locations. We have so many questions and we don't know who to turn to. We wouldn't be able to live like that and no one would ever buy a home like that. We can't talk to other residents who oppose the pike exit because they really have no factual knowledge of what will happen. We cannot talk to you at a meeting because there are so many distractions. I hope you



have taken the time to read my letter and sincerely appreciate anything you can do to address my concerns.

Best regards,

Aaron LaBrecque

DRAFT

**From:** [Jeff Penn Sue Dion](#)  
**To:** [Bligh, Cassandra \(DOT\)](#); [Bligh, Cassandra \(DOT\)](#); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov); [MA Rep Smitty Pignatelli](#)  
**Cc:** [Neil Toomey](#)  
**Subject:** jeff p turnpike exit proposal  
**Date:** Tuesday, October 22, 2019 4:33:35 PM

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hello again -

the process which resulted in Biomap II was a comprehensive study of wildlife (habitat and passage) and wild lands. it required most of the environmental and management agencies operating in the state and the map should be required for regional and landscape planning. this map illustrates the intact forestlands most necessary for biodiversity.

thank you

cheers

jeff

[Natural Heritage BioMap 2](#)



**From:** [Jane Pinsley](#)  
**To:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov); [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Proposed Turnpike Exit in Blandford  
**Date:** Wednesday, October 23, 2019 11:25:05 AM  
**Attachments:** [Dear Edito1.docx](#)

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Dear Rep. Pignatelli, Sen. Adam Hinds and Ms. Gascon,

The attached is a statement regarding the proposed MassTnpk exit at Blandford, submitted by: Jane Pinsley of Blandford, Mass.

DRAFT

Dear Editor:

The thinking that has led some to believe that the Hilltowns of the Eastern Berkshires need a breach of their integrity with an exit on the Mass Pike in Blandford is sorely outdated. It is the same kind of thinking that led to a disastrous miscalculation of transportation needs in the area 100 years ago. Are we really doomed to repeat our own mistakes?

In the early years of the last century a trolley line was carefully constructed across the Hilltowns including Blandford. It was called the Huckleberry Line. It took years of planning and was celebrated as a feat of modern engineering when it went into operation. Sadly, however, while this was going on, no one noticed that a visionary named Henry Ford was providing a new means of transportation called an "automobile", which gave people unprecedented new choices, giving them control over such things as where to live, when to travel, and opened their imaginations to a new and better life.

Here we go again, at a similar crossroads. Will we as an area worship the past with the default philosophy of "build an exit and they will come" or will we smartly step into the future with the electronic highway, now that broadband is on the table? People that can take their jobs with them can afford to be particular. Will we slow down the juggernaut of exploitive interests to carefully and thoughtfully assess our unique culture and choose the best way to build on it? I know we can and I believe we will!

Contact your representatives today, Rep. Pignatelli and Sen. Hinds, even if you only want to express two words: "NO EXIT", and then let's pull together to educate ourselves on the world of today, and be part of the exciting part of the future.

**From:** [Eileen FitzGerald](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** It is time to abandon the exit idea  
**Date:** Thursday, October 24, 2019 11:28:53 AM

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State legislators, empowered to wisely spend our taxes, and the state Department of Transportation, now have the information needed to abandon the idea of adding a Blandford exit on the Massachusetts turnpike.

The DOT's just-released \$300,000 study demonstrates that the primary reasons for a new exit are not addressed by building one.

The report concludes that an exit would save hilltown commuters merely 10 minutes per trip and provide no measurable improvement in traffic flow at turnpike entrances in Lee or Westfield, key goals of the project.

Construction unlikely would hold to its \$30-40 million estimated cost. Damage to local forestland, ponds and rivers, and increasingly threatened wildlife, would be beyond measure.

Lawmakers, and DOT officials, not building an exit was an option for your study. Take it. It's irresponsible to use taxpayer money on a project that cannot meet its goals. More urgent projects need funds.

The state concluded there are two possible sites for an exit, both on Chester Road in Blandford, which becomes Blandford Road in Chester.

This road, with narrow, winding, hilly sections, cannot absorb 5,000 vehicle trips the study projects. Even with yet undetermined costly improvements, trucks and big rigs would pose a major danger. These same challenges caused the DOT to eliminate a third site on Algeria Road

in Otis.

Area officials hope an exit entices new residents, populates schools, and improves local economies, but it's not a solution. Birth rates are declining across the nation. It could mean 8.5 percent fewer public school students a decade from now, according to The Western Interstate Commission for Higher Education. High school numbers are projected to fall from 15.4 million students in 2022 to 14.3 million students in 2028.

Besides, many people seek the hilltowns for the ruralness, lost forever with an exit and its sure to follow stores and gas stations.

The state's set objectives to reduce greenhouse gases and concentrate on smart growth is defied by this exit, which would encourage uncontrolled growth, or sprawl.

Seasoned urban planners, writing on the Useful Community Development website, believe a town or city can grow its physical boundaries outward without necessarily sprawling, if the population growth matches the physical growth. The DOT study projects little growth, or decline in the area.

Please, build economic development around the area's strengths, like outdoor recreation, its beauty and serenity, not on an exit, and support transportation alternatives like rail.

Sincerely,

Eileen FitzGerald

Blandford Road, Chester, MA

860 919-0336

DRAFT

**From:** [Seth & Liz](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Mass Turnpike new exit  
**Date:** Thursday, October 24, 2019 11:34:13 AM

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Dear Ms. Gascon,  
Regarding the proposed new Mass. Turnpike exit in Blandford, I am strongly opposed to it.  
Please count me among those against this terrible idea.

Regards,  
Seth Farber

DRAFT



**From:** [Liz Queler](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Strongly oppose new turnpike exit  
**Date:** Thursday, October 24, 2019 4:42:53 PM

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Dear Cassandra,

Thanks so much for your very in depth presentation at the Town Meeting in Blandford on October 10th. I was very happy to hear so many of my neighbours speaking up to protect all that is so very special about Blandford, and astonished that some residents are willing to sacrifice all of that, just to save a few minutes on their commutes. What I heard more however, was non-property owners of Blandford supporting the need for easier access to the Pike from the Hilltowns. There was the woman from East Otis who complained about her commute, the older gentleman from Becket who brought up the need for quicker access to the hospitals in Springfield, and the woman from the Gateway school system discussing how attendance has dwindle (also not a resident of Blandford). It's not surprising that people who's home lives and properties would not be affected by the exit are supportive of it. These people all expressed reasonable desires, but they speak from a safe distance having first saved their own towns from hosting the proposed exit.

Our house is on North Street, which would become the feeder road to the Mass Pike. Our lives would be profoundly impacted by the added traffic on our road, the noise pollution, air pollution, devaluation of our property and compromised safety. The 5000-6000 additional daily vehicles would drive right by our front door, and the safe and quiet life in the country that we treasure would be lost. Blandford, as we know it, would not survive such a change and it's important to ask if it's worth sacrificing our town for the convenience of a few, or the speculation that adding the exit, and severely compromising the character of our community would somehow draw young families.

We bought our home 40 years ago, and love it. We're enormously attached to the town and to the land itself, however, we would not be able to withstand this transition. We didn't come here for easy access to the highway. We came for a lifestyle we cherish. I imagine we are not the only ones who would sell our homes in hope of finding another Blandford somewhere else.

Other questions that were left dangling are also of great concern for me and my family. It was suggested that the added truck traffic would require widening of the access roads. Do we then lose some of our property to the state? Who pays for that? What do we get for sacrificing our front lawn?

Thank you for hearing all of our concerns.

Sincerely,  
Liz Queler

**From:** [twipiper@reagan.com](mailto:twipiper@reagan.com)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** i90 study  
**Date:** Friday, October 25, 2019 10:26:52 AM

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Good Morning,

I'm responding to the open house you held in Blandford on October 10th. I'd like to start by saying thank you to everyone at Massdot that worked so hard on the research for this project.

I am a lifelong resident of Blandford, I and my wife are unconditional proponents of the exit going in at the rest area, but for very different reasons.

I am the Deputy Chief of our Fire Rescue Department and know from almost 20 years of answering calls on the Turnpike that an exit at the rest area would shorten our response times, saving money and possibly lives in the process.

My wife is a medical secretary in Springfield and has to fight the traffic on a daily basis. Compared to the traffic you get out east ours must seem light, but to us it's horrible. Her commute, as well as everyone else, always occurs when the kids are going to school in the morning so the safety issues concern not just Westfield, but West Springfield, and Springfield as well. I would think that issue alone would be the deciding factor for most people. Most mornings the line to get on the Pike goes most of the way back down Elm Street to the bottom of the hill at Notre Dame. She has also been in a very long line trying to get off the Pike in the evening, there are times when it is well past the barracks, which again is a horrible safety concern with cars stopped on the Pike in traffic lanes.

I think the wait times at the Westfield street lights from Franklin Street / Elm Street to the turnpike were a little short, but that is subjective when I'm stuck in line, especially in the morning and afternoon during the school year.

Most of the people that I recognized that were opposed to the exit do not live on Route 23. We already have the trucks going by our houses and that will not change with a new exit.

Again, thank you for all the hard work.

Tom Piper  
Gina Piper

**From:** [Henry Frey](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** No new turnpike exit in Blandford  
**Date:** Friday, October 25, 2019 1:00:52 PM

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Please end discussions on a new turnpike exit in Blandford. It is not necessary and will be a waste of taxpayer dollars.

It does not improve commute times by enough to warrant the permanent devastation of the environment in the area.

And it does not improve Westfield's congestion either.

Blandford Road and Chester Road cannot be improved enough to handle exit traffic without a lot more money than has been allocated. And such improvements would destroy this area. I live on this road.

Henry Frey  
Chester, Ma.

Sent from my iPhone

**From:** [Eileen FitzGerald](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** It is time to abandon the exit idea  
**Date:** Friday, October 25, 2019 1:02:13 PM

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transportation alternatives like rail.

Sincerely,

Eileen FitzGerald

Blandford Road, Chester, MA

860 919-0336

DRAFT

Dear Ms. Gascon:

I was provided your contact information by our State Senator Adam Hinds with whom I have discussed the proposed Interstate 90 interchange between Exits 2 & 3. After our conversation, his office expressed the importance of registering my comments and concerns with you, the Head Transportation Program Planner with MassDOT, directly.

First, I would like to begin by giving some background on myself to show my credibility and legitimacy of concern with this matter, and so as to be forthright regarding my motivation for this writing. I grew up approximately a half mile from the Turnpike in East Otis, MA, residing there from 1993-2010, and again from 2015-2016. My wife and I now live in Sandisfield, MA on the Otis town line. My folks still live in the house I was raised in, and don't plan on moving. I've worked at one of the stone quarries in East Otis and have family members who still work there. My family on my Mother's side has been in Otis since before it acquired its incorporation in 1810—when it was still two entities, Loudon and Bethlehem. My parents' home was built by my paternal grandparents in the 1950s, and my Father has lived there the majority of his life.

My wife commutes over 3 hours each day to work, and until this past spring I commuted 2.5 hours every day (my new commute is only 1.5 hours round trip). We commute a total of 15 hours a week *more* than we did when we had our apartment in the city, and we're fine with that because we know the trade-off for the long commute is well worth the quality of life we enjoy here in the hill towns. My wife and I got married here in Otis last September. We bought our home 2 years ago just south of town, and we now are planning to start a family. To be perfectly candid, this is my motivation for calling Senator Adam Hinds and our State Representative Smitty Pignatelli, and for writing you this letter. I want to know that when it came time to fight for our way of life here in the hilltowns, I raised my voice for the best interest of posterity.

### Unintended Consequences

It's not difficult for folks get excited about an exit between Lee and Westfield; the flashy selling points are all there—"quicker commute," "less wear and tear to personal vehicles," "Reduced costs of town-owned road repair," "booming economic growth," "better access for emergency vehicles." All of these reasons are sound attractive. However, with some background knowledge and a critical thought, it becomes apparent that maybe it is not such a "great deal for the hilltowns." It is, as much as anything, a feather in the cap for a few select politicians. The fallacies purported in the "Exit 2.5" discussion warrant speculation.

*Quicker Commute.* This point I cannot argue. Yes, it would be a quicker commute. From the Gulf gas station in East Otis to the junction of Route 20 and Route 10/202, in the center of Westfield, takes 26 minutes with average traffic. From the proposed "Exit 2.5" on Algeria Road in East Otis to the junction of Route 20 and Route 10/202 with average traffic, it takes *five* minutes less than the current route, with a total travel time of 21 minutes. From the same Gulf

gas station, with average traffic, to Interstate 91, it takes 17 minutes longer than it would if using the proposed exit on Algeria Road in East Otis. These savings are minimal but would accumulate to a fairly significant amount of time if extrapolated over a lifetime. We live in a free country, the economy is booming, jobs are plentiful in the Pioneer Valley and beyond. ***If the strain of the commute is so harmful that it outweighs the quality of life—of living in these magnificent hilltowns—then I would suggest the proponents of this proposed exit move closer to their places of employment, rather than burden the rest of us.*** There is ample housing down in the valley. Granted, once down there you won't have the close-knit, small-town feel, the same quality school systems, the abundant natural beauty, and a way of life that is closer to what our forefathers enjoyed, but at least you'll have a nice short commute to solve life's problems. **Bring the city to you, or travel to the city.**

*Less wear and tear on personal vehicles.* Route 23, Route 20, Route 8—these are our main routes into and out of the hilltowns. Ask anyone who has lived up here for more than 20 years how these roads today compared to the old days. The resounding answer is night and day, that these routes and the majority of the other town roads are in the best shape they've ever been. Some roads aren't perfect, but relative to what they once were it is a world of difference. All three major hilltown Routes have recently been paved, widened, and have had adequate drainage added. If a personal vehicle can't handle the day-to-day driving on these rural roads, then racing along at highway speeds on I-90 shouldn't be an option either. Furthermore, it's 2018; the average American buys a new vehicle every two and a half years. Let's say for argument's sake the average hilltown resident's vehicle is 10 years old, even still we are not driving around the old rattletraps of yesteryear. I find it amusing when folks complain to me about the "condition" of the roads, because I still remember having to straddle trunk-size pot holes in my old boneshaking 1979 pickup just to get to the gas station. That is NOT the case today. The cars these days ride better than they ever have, and are only improving, and the same can be said for our local roads and thoroughfares.

*Reduced cost of town road repair.* How can we reduce the wear and tear of our roads if we are inviting increased traffic? Many of the town roads up here were originally cow paths. They've all been improved upon, of course; most have been paved, widened, adequate drainage added, but generally they still have the same base under that pavement that the old horse and buggies drove on. The addition of an exit won't stop the frost heaves from coming in the winter. It will not stop the plow trucks from tearing up the roads while removing snow in the winter. My point: even if the proposed exit was installed and we *magically* reduced our town road traffic, say, to half of what it is, THE ROADS WILL STILL HAVE THE SAME ISSUES, AND WILL NEED TO BE REPLACED JUST AS OFTEN, OR ALMOST AS OFTEN.

*Booming economic growth for the hilltowns.* I hate to say it, but it needs to be said. There won't be another rake factory on North Blandford Road, there won't be any more tanneries nestled on small hilltown creeks, there won't be more mills, factories, or any of the other industrial growth



we once knew up here in the 19<sup>th</sup> and early 20<sup>th</sup> centuries. We're lucky enough that we're still able to produce lumber and granite. Even if we put a Turnpike exit every 2 miles from Westfield to Lee, the jobs that our parents, grandparents, and great grandparents knew won't be coming back here. Like it or not we now live in a global economy. There's an old railroad bed 500 yards from my childhood home in East Otis, but most people don't know that because it's grown in and runs nothing but high-tension power lines now. It was pulled up in 1917. The hilltown population's most significant decline was in the early 1900s, not in the past 30 years. The economy in the Pioneer Valley is a shadow of its glory days. There lies an exit off I-90, on both sides of the Connecticut River, not to mention I-91, and Route 5. If these major points of access can't help them bring back *good*, blue collar, working class jobs representative of the glory days, why would it help us?

The ONLY economic boost we'd see from an exit in our hilltowns would be in a tight radius surrounding the proposed exit. The businesses this would attract would be in the form of gas stations, Burger Kings, Dollar Generals, maybe even a Walmart. These businesses do not embody the type of life we live here in the hilltowns, and they most certainly do not provide middle class jobs. This potential economic boost would severely detract from our largest industry in the hilltowns: tourism. The beauty in the hilltowns has always attracted tourists, and increasingly over the past 50 years it has become more and more important to our hilltown economies. As the rest of the New England has been built up, crowding out small towns and natural places, we here have only become more attractive as a destination. Our natural features and small-town culture become more magnetic as we become more of an oddity by our lack of development. These hills are sought out for their seclusion, not their easy access.

*We have an aging population, and we need better access for emergency vehicles.* I find this argument puzzling, because there is an emergency vehicle access to I-90 on Algeria Road in East Otis currently. If need be, there is also potential emergency vehicle access at the Blandford Highway Department, and the Blandford Plaza. Noble Hospital in Westfield is more easily reached from RT-20 or RT-23 than Exit 3 off I-90, and there are two excellent BMC hospitals here in Berkshire county.

Relating to this argument of emergency vehicles, who is expected to pick up the cost of the extra police presence and police cruisers necessary for defending our towns from the crime that will be able to effortlessly access our homes and businesses should we make our towns more "accessible"?

I ask of all my neighbors who read this, please consider the long-term consequences this proposed hilltown I-90 exit would inflict. We are strong, resilient, self-reliant, and proud of who we are and our communities. Do not let superficiality or quick-fix, slick talking politicians influence us to do something we will only regret.

**“If future generations are to remember us with gratitude rather than contempt, we must leave them something more than the miracles of technology. We must leave them a glimpse of the world as it was in the beginning, not just after we got through with it.” -Lyndon B. Johnson**

Respectfully,

**Alex Nikituk, CWI**

DRAFT

PETITION to MA Senator Adam G. Hines, MA Representative  
William ("Smitty") Pignatelli, and All MA DOT Highway Division  
Officials

We the Undersigned are OPPOSED to the construction of an Interchange Exit anywhere on MA Rte. 90 between the Lee Exit (Exit #2) and the Westfield Exit (#3) for reasons included, but not limited to, the following:

Increased traffic on our roads would endanger and diminish the bucolic/rural Quality of Life year-round residents and part-time home owners/visitors value and want to preserve;

Many local roads are narrow, steep, and with many curves, and thereby are not suitable for diverted heavy turnpike traffic;

Local towns would become "pass thru" towns for traffic headed to commercial/government/entertainment centers; and

Local roads accessed by "pass-thru" traffic would increase our tax burden for increased road repair costs.

Name(Print)	Signature	Address	Date
Katie Malone-Smith	[Signature]	821 Peru Rd Hinsdale, MA	9/5
Jody Lampro	[Signature]	1417 So. Washington State Rd. Washington	9/5
LINDA GURSICI	[Signature]	445 County Rd	9/5
P.J. CRISPO	[Signature]	445 County Rd	9/5
S. ROSENTHAL	[Signature]	84 Mystic Valley Rd Becket, MA	10/9/19
Howard G. Lerner	[Signature]	21 Mystic Valley Rd	10/9/19
Jeanne Morano	[Signature]	1525 Wade Inn Rd Becket, MA	10/10/19
Julia Maynard	[Signature]	1525 Wade Inn Rd Becket MA	10/10/19

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Name(Print)	Signature	Address	Date
Charles E. Walter, Jr.		2349 Main St. Becket	10/5/19
Elliot Slotnick		28 Sioux Rd Becket	10/5/19
PATRICIA NORTH		40 TROST CLOSE Becket	10/5/19
Melinda Riisua			
Sally Soluri		379 McNeary Box	10/5/19
CATHY HOLLAND		538 SUMNER RD Becket	10/5/19
Therese Hock		548 SUMNER RD Becket	10/5/19
Frank Crave		134 Little Jethu Dr Becket	10/5/19
		DVGR	

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Name(Print)	Signature	Address	Date
Dawn Greene	Dawn McGee	344 County Rd, Becket	10/5/19
Michael Chin	Michael Chin	186 Brookert Hill Rd Becket	10/5/19
Alan Daly	Alan Daly	110 S. Washington Rd - Washington	10/5/19
Katherine Bick	Katherine Bick	71 Schulze Rd Washington	10/5/19
Sarah Pesina	Sarah Pesina	53 Washington St	10/5/19
MARK D WHITE	Mark D. White	264 CARLTON RD.	10/15/19
MARIE S. WHITE	Marie S White	264 CARLTON RD.	10/15/19
Alan Smith	Alan Smith	676 Main St	10/5/19

\*Speak Up @  
Blandford Town Hall  
10/10 6:30 OR  
\*Return to Ann Krawet  
623-6069

OVER →

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Name(Print)	Signature	Address	Date
Tracey Cheney	Tracey Cheney	354 Wells Rd. Becket	10.5.19
Tom Lynch	Tom Lynch	121 Hawatha Hill	" "
Patrick Pendergast	Patrick Pendergast	2226 main St. Becket	10.5.19
Patricia G. G. G.	Patricia G. G. G.	167 Berry Hill Hill Rd	" "
Angela S Grumley	Angela S Grumley	167 Bonny Rigg Hill Rd	10/5/19
Dan Rogers	Dan Rogers	357 Wade Inn rd	10/5/19
Luz Bravo-Gleicher	Luz Bravo-Gleicher	113 J Rogers Ave.	10-5-19
Robert Grosi	Robert Grosi	137 Hawatha Hill	10-5-19

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Name(Print)	Signature	Address	Date
ROBERT W. WELLS	Robert Wells	577 BECKETT SURRENDER RD	10/5/19
Anne-Mare Ebner	[Signature]	34 Iroquois Ave Beckett MA 01223	10/5/19
William Ebner	[Signature]	34 Iroquois Ave BECKETT MA 01223	10/5/19
Al Whitehead	[Signature]	577 Leominster Rd Beckett	10/5
Judy Keckner	Judy Keckner	415 Barry Piggott Rd Beckett, MA 01223	10/5
Paul Bunt	[Signature]	564 Lionhardt Rd Beckett	10/5
Hugh Powers	Hugh Powers	25 S. Edwards Way	10/5
Larry Patale	[Signature]	318 County Rd	10/5

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Name(Print)	Signature	Address	Date
Lawrence Dean	[Signature]	923 Bonny Rigg Hill Rd	10/5/19
Vince Puzos	[Signature]	986 Beckst Mtn Rd	10/5/19
Anthony Orcutt	[Signature]	376 Long Ben Lane West	10-5-19
William Vsetecka	[Signature]	419 Fred Snow Rd	10-5-19
Michael H Caropre	[Signature]	72 Weeden Rd	10-5-19
William F Caropre	[Signature]	1088 Chester Rd	10-5-19
Sara Markel Alt	[Signature]	328 Lakeshore Drive Southfield	10/5/19
Chloris Ann	[Signature]	821 Peru Rd Hinsdale	10.5.19
OVER →			



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Name(Print)	Signature	Address	Date
Brandon Boley	Brandon Boley	261 - Willis Rd	10/5
Constance Mithen	Constance Mithen	14 Cherokee Rd	10/5
David Mithen	David Mithen	"	10/5
Laura / Rose	Laura / Rose	536 Brooks Hill	10/5
Greg Connor	Greg Connor	2072 Main St	10/5
John Fenner	John Fenner	8 Switzer Lane	10/5
Betsy Rosenwald	Betsy Rosenwald	8 Switzer Lane	10/5
Jack White	JACK White	219 Bancroft Rd	10/8

PETITION to MA Senator Adam G. Hines, MA Representative

William ("Smitty") Pignatelli, and All MA DOT Highway Division

Officials

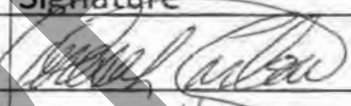

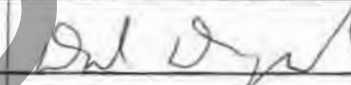
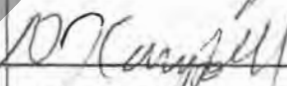



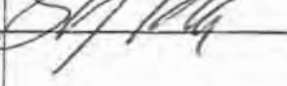
We the Undersigned are OPPOSED to the construction of an Interchange Exit anywhere on MA Rte. 90 between the Lee Exit (Exit #2) and the Westfield Exit (#3) for reasons included, but not limited to, the following:

Increased traffic on our roads would endanger and diminish the bucolic/rural Quality of Life year-round residents and part-time home owners/visitors value and want to preserve;

Many local roads are narrow, steep, and with many curves, and thereby are not suitable for diverted heavy turnpike traffic;

Local towns would become "pass thru" towns for traffic headed to commercial/government/entertainment centers; and

Local roads accessed by "pass-thru" traffic would increase our tax burden for increased road repair costs.

Name(Print)	Signature	Address	Date
Keresa L. Gorton		448 Market Street Washington MA 01558	10-5-2019
Don Hatch		1170 S Washington St Washington MA	10-5-19
David DeGennaro		572 Washington Mt Rd Washington MA	10/5/19
Don Campbell		172 Simmons Rd Washington MA	10/5/19
Melissa Campbell		172 Simmons Rd Washington MA	10/5/19
Jan Garrow		636 Rt. Wash. St. 6 Washington MA 01558	
Ellen Bond		112 Frost Rd Wash 01558	10/5/19
Stacey Knapp		1710 Wash Mt Rd Wash 01558	10/5/19
OVER →			

## Officials

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[illegible]

## Officials

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Local roads accessed by “pass-thru” traffic would increase our tax burden for increased road repair costs.

[illegible]

Dear Cassandra Gascon,

Blandford is not a destination! Traffic passes through mainly on route 23, to the recreational area of East Otis. An exit here would not be a convenience for most our inhabitants.

Let me illustrate some real examples of that impact: Gore Road is a mile of hilly, winding, narrow road ending across from the Service Plaza on North Street. On October 3<sup>rd</sup> at 9:00 AM my husband and I followed a large gasoline tanker on Gore Road, going toward the Turnpike. There was no room for an oncoming car – or truck. So I wondered “where could a gas tanker be coming from?” The only answer would be East Otis, where there are 2 gas stations. The truck could have used route 23 from there, so why take North Blandford Road (which is a mess) and Gore Road – unless the driver knew it was closer to the plaza. Or, as anyone who uses GPS knows – the GPS just chose that route. How many others will make that mistake? Will Gore Road become a “feeder” to the entrance? And can you make it safe for traffic? I doubt it.

That brings me to a second example: The intersection at North Street and route 23 is dangerous because one must make the turn uphill, or in winter, descend a treacherous slope. The town’s Historical Society Building is on one side and the White Church, on the National Register of Historic Building is on the other side. How will the state deface the very essence of our town to modify this intersection for traffic?

We did not move here for convenience. What benefit could a Pike entrance bring us? To shop in Westfield, downtown, or at the Plazas on route 20, we would not use it. Exit 3 puts one on the North Side of Westfield. By the time you fight the traffic and congestion from one side of town to the other, you could have been there!

And how about the hospital? Again, routes 23 and 20 are closer and quicker than the circuitous route across town.

Frankly, an exit on route 20 in Russell or Westfield would better relieve the congestion at exit 3 because of all the University traffic. So what if it places 2 exits in close proximity? That’s not unusual, but it will be needed as WSU expands, and should be planned.

Most people in Blandford would not mind some population growth. An exit here would not be an enticement. Be aware that much land here is owned by the state and city of Springfield (watershed). High speed Internet would be an incentive, especially for those who work at home.

Please consider saving the taxpayers’ money and the character of our town. Look at where an exit is needed instead of mileage between exits.

Sincerely,  
  
Jeri Hamel  
31 Gore Road  
Blandford, MA 01008  
[jhamell@verizon.net](mailto:jhamell@verizon.net)  
413 848-2493

**From:** [RICHARD & MARCIA PAXSON](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** I-90 exit study  
**Date:** Tuesday, October 29, 2019 11:46:41 AM

---

Dear Cassandra,

You made a good presentation on October 10th about the exit study. However, I do not see a benefit. I do not support the new exit.

Best regards,  
Rich Paxson  
2 Fenton Drive  
Southwick, MA

DRAFT

I live in Westfield  
so I am not directly  
affected by the spit  
debate. However I feel  
it will be a very  
very costly mistake.  
The people I know  
who live in Lee  
took the pike one  
time and it took  
them 40 minutes to  
get across Westfield  
to Southwick, so they  
now take #23.  
It is just not a

solution for these  
people in the hills  
as they will discover.  
Way too expensive  
for taxpayers to  
save people 10 mins.

I thank you.

M Fitzgerald



**From:** [GORDON III](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** I-90 Interchange  
**Date:** Friday, November 22, 2019 2:18:26 PM

---

Dear Cassandra,

Most people who live up here in the hill towns do not want an exit in their back yard. The Blandford rest area would put too much wear and tear on the town road that are not designed for that amount of traffic. The exit would end up on town roads. Not state roads. You have made all accommodations to justify where the money would come from for the creation of this exit. But what about everything else it will impact. The towns DO NOT have that kind of income to keep up with the upgrades, improvements or repairs that will be required. This would also DESTROY the center of Blandford as a small town, community and a place to live. Look at Ludlow, Lee, Westfield center for example. They are nothing more than a traffic interchange now for the traffic to pass thru. What about the extra traffic running up the pike to the entrance? It already has caused too much noise and Air pollution as it is. This does not benefit Blandford or the Hilltowns In this Area. It benefits Westfield And Lee. There Poor planning should not be out downfall. This is not done for us in mind. This is done for Westfield and Lee. If you have to put one up here that has the least impact on the towns and the infrastructure. Use the Russell Property that is at the top of route 23. It was not voted out by us but you as a committee. You talk about cost in the report and give vague estimates as to why you can't do something but it is never a problem when you do want to do something. The Russell Location would still relieve the pressure on Westfield and save the Town of Blandford.

Thank You

Gordon Avery III

**From:** [Pat Daviau](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** I90 interchange in ? Blandford  
**Date:** Friday, November 22, 2019 3:51:49 PM

---

Hi Cassandra,

I would like to tell you that I attended the October 10 interchange meeting at Blandford Town Hall. I did not have the opportunity to verbalize by thoughts since it was a very busy night with very long 'opinion' lines. The opinions seemed to be mostly negative, the room seemed to be mostly negative.

First, you did an amazing job educating everyone, Thank you.

Second, I am so glad this is being considered, I can only see positive things from this.

I recently retired, worked as a nurse for 50 years. My last 20 years were at Shriners Hospital and Baystate Hospital. As a nurse, you are counted on to be there to relieve the other shifts. During stormy weather I have had to sleep at my families house in Agawam to be closer to work for the next day so I wouldn't miss my shift. It has taken me as long as 2+1/2 hours to drive into work from Blandford because R23 and R20 were not plowed, too icy or just so dangerous!

Under normal conditions, it would have been so nice to just hop onto I90 and be into work in 1/2 the time since it always took minimum 50 minutes from home. That's more time with my family, less on gas and wear and tear on my car and less frustrating dealing with all the traffic on Rt 23 and Rt 20. A win for me.

The driving conditions have changed approaching I90 since they fixed the bridges and roads in Westfield. That doesn't change though if Rt 20 is used which is stop and go all the way. The Hilltowns especially Blandford and Huntington are putting a lot of wear and tear on the Westfield Roads because we do not have an interchange up here. It is also so dangerous at the Westfield I90 Exit. Have you ever been at that exit between 4-6pm on weekdays?? If you've missed it, you just have to see it to believe it. There is traffic at a 'dead stop' at least 1 1/2 miles from the exit tying up an entire lane. So now all the traffic is using 1 lane until they're passed the exit. Talk about a nightmare, can you imagine the last car getting run into and what a chain reaction would take place? Many deaths and serious injuries would occur for sure! I'm so surprised it hasn't happened so far.

My point for bringing this up is that I hope Westfield has a say in our I90 exit since we are all putting wear and tear on their roads and increasing their traffic.

Third:

Our Town will not become any larger. Our building criteria is very strict with large frontage needed for a building lot and really tough perc requirements. These things will not change as you can see Blandford is not an easy town to accept *any* changes!

-

I do have a question.

This was mentioned to me after the meeting and I would like you to comment on this. If I90 has an entrance/exit ramp off of North Road will there be sidewalks installed on North Road? I was told that

is part of the plan. I hope it is, I go walking on that street at least 3-4 times/week and have almost been run over.

Regards,  
Pat Daviau  
N. Blandford Rd  
Blandford, MA

DRAFT

**From:** [Bynack-Bolduc, Susan](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** I 90  
**Date:** Tuesday, December 3, 2019 3:17:15 PM

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Dear Ms Bligh,

My husband and I own the property directly across from the Blandford rest area. When we went to one of the first public meetings the various overlays showed our property used for all type exit designs. We have owned this property for over 4 years and it was still shown under the old owner Steve Zayac. We have never had any personal contact concerning our property.

We both oppose the exit. Other than time in college, I have always lived in the surrounding towns and moved to Blandford because Otis was becoming too crowded. This exit would ruin our quality of life. We live on North Street and the increased traffic would make it too dangerous to even walk down the road. The Country Club has it's golf course of both sides of the street and would be a nightmare for the elderly to try and cross.

I feel this project already has been a a huge waste of taxpayers money, especially when there is a question of funding.

Sincerely, James and Susan Bolduc

Bolduc  
31 North Street  
Blandford, MA 01008

413-848-0910

**From:** [Neil Toomey](#)  
**To:** [Bligh, Cassandra \(DOT\)](#); [Bligh, Cassandra \(DOT\)](#); [Neil Toomey](#); [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov); [Adam.Hinds@masenate.gov](mailto:Adam.Hinds@masenate.gov)  
**Subject:** No new exit Blandford 12-9-19  
**Date:** Monday, December 9, 2019 4:46:36 PM  
**Attachments:** [No new exit on the Mass Pike Statement for 10.docx](#)

---

Hi Cassandra, I hope your having nice holidays. Here are some more thoughts on the exit.  
Thanks, Neil

Sent from [Outlook](#)

DRAFT

Hi Cassandra, Thank you for your work on this project. The DOT has committed to the necessity for strong local public support in order for this exit in Blandford project to move forward. Smitty Pignatelli has on numerous occasions, at the study group meetings, and to the press, said that he would not support this project if those most affected by it opposed it. The meetings that the study group held in Lenox and Blandford, clearly demonstrated widespread dissatisfaction with the concept of an exit in the hill towns. There is no "substantial support" for an exit.

Indeed, the whole process has been flawed by virtue of the fact that local stakeholders were not brought together before \$ 300,000 of tax payer money was spent on the study. Now the DOT has the opportunity to recommend a "no build" option to the legislature before \$30,000,000 is wasted on a project that only serves a few and alters forever our local communities.

Westfield's truck and traffic problem(s) should not be foisted on the hill towns. The air pollution from 6,000 additional vehicles a day, the impact on the character of our landscape and town centers, shows an appalling lack of concern from Westfield planners for their neighbors in the hill towns. Many people from Westfield come out to our towns to enjoy the arts, natural beauty, hiking, dining, canoeing and skiing. One has to wonder why so many benefits should be radically altered by poor judgement and callous disregard for neighboring communities, by Westfield city planners.

Steep grades, lack of public support, complex terrain, minimal benefits, minimal travel time savings, and increased traffic on local roads, all contributed to removing Algierie Rd. from the exit options list. Indeed it was even touted as "no new exit" for Becket. Yet all those conditions apply as well for any exit in Blandford. The feeder road with 6,000 vehicles a day will pour traffic exactly on the Becket Town line where Rt. 20 and Blandford road meet. The sharp curves, steep grades, three bridges (none of which can handle the weights of tractor trailers), should not have been ignored by the study group or the DOT engineers. These are all reasons why interstate exits are not constructed on local roads anywhere in the whole country. A comprehensive assessment of our local roads, natural features and terrain should have been done several miles out from the proposed exits.

MassDOT, and our elected officials have been entrusted to protect our communities from poor planning and projects that are widely seen as destructive to our lives and values. Progress should be measured by bringing all stakeholders together, not by playing a zero sum game. Common sense repairs to our roads and bridges, train and internet access, are issues that could bring a 21<sup>st</sup> century approach to improving our economy, and protecting our shared landscape. Respectfully, Neil F Toomey, 37 Mitchell Rd. Becket, Mass.

**From:** [Jane Pinsley](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Fwd: The Exit Survey Hoax  
**Date:** Monday, December 9, 2019 7:00:54 PM  
**Attachments:** [The Exit Survey Hoax.docx](#)

---

Dear Ms. Gascon: Would you please be kind enough to enter this into the appropriate record for the DOT. Thank you, Jane Pinsley

-----Original Message-----

From: Jane Pinsley <eapinsley@aol.com>  
To: Adam.Hinds <Adam.Hinds@masenate.gov>  
Sent: Mon, Dec 9, 2019 6:57 pm  
Subject: Fwd: The Exit Survey Hoax

Dear Sen. Hinds: Would you please enter this statement into the appropriate Legislative record. Thank you, Jane Pinsley

-----Original Message-----

From: Jane Pinsley <eapinsley@aol.com>  
To: Smitty.pignatelli <Smitty.pignatelli@mahouse.gov>  
Sent: Mon, Dec 9, 2019 6:52 pm  
Subject: The Exit Survey Hoax

Dear Rep. Pignatelli: Please enter this statement into the Legislative record. Thank you, Jane Pinsley

## The Exit Survey Hoax

It has been stated publicly that Blandford residents have in the past voted in favor of a Mass Turnpike exit on North St., implying that the “vote” was both formal and on the same “exit “ that is being studied presently by the DOT. Both of these implications are misleading at a minimum and outright falsehoods at worst.

A careful review of selectboard meeting minutes from March 18, 2014 through May 15, 2017 revealed that two informal surveys were conducted during that period. One was a form placed in the general store and the other an attachment to the town paper, the Blandford Bugle. Neither survey required a signature let alone proof of residency or accreditation of any sort. Furthermore the subject of the surveys was to permit Blandford residents access to the Pike through the existing service gates at the Rest Stop. Both “surveys” were forwarded to the Lt. Governor by the selectboard and were then denied by the DOT.

A restricted access through service gates is totally different than the full access public exit being studied now in its destructive effects upon our village. It would not deposit 6000 cars and trucks per day on our rural roads. So let's face facts, no valid survey of the opinions of Blandford residents regarding the new exit has been conducted. Perhaps it's time we had one.



**From:** [bmiss246@aol.com](mailto:bmiss246@aol.com)  
**To:** [smitty.pignatelli@mahouse.gov](mailto:smitty.pignatelli@mahouse.gov)  
**Cc:** [adam.hinds@masenate.gov](mailto:adam.hinds@masenate.gov); [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Turnpike Exit Study  
**Date:** Thursday, December 12, 2019 10:51:27 AM  
**Attachments:** [No to any new exit in the Hilltowns.docx](#)

---

Dear Sir-- Attached please find the text of my testimony read at the last Turnpike Exit Study team review meeting. I am sending it to register my position against either exit location in Blandford.

Respectfully submitted, W. C. Missimer

DRAFT

## “No” to Any New Exit in the Hilltowns

My name is Bill Missimer. About eight years ago I married Jane Pinsley. We were widow and widower, seeking a new life together after our losses. We tried city life and traveling but found them empty compared to the beauty and history of the hill towns of the Eastern Berkshires. The rural charm, breath taking natural beauty and quiet lifestyle in Blandford made the path back to Jane's childhood home and farm reviving. As we began to restore the house and fields, I came to appreciate how profoundly this farm, the home base of her dad, Blueberry Joe, had positively affected the town for most of the last century. The house was “The Boise Tavern” more than 200 years ago. The blueberry fields cover Fort Hill, where the early settlers built a safe place for protection on the frontier. The house has been restored and the blueberry fields are producing again. Plans are underway for an addition to the house, and local skills will be used wherever possible. We look forward to transitioning the farm to Jane's daughters and their families. All this will come to an end if a new Turnpike exit is created on North St. where the farm is located. The graceful row of maple trees and the centuries old stone walls will likely disappear. And for what purpose?

The DOT Study Group has concluded that the new exit should be in Blandford. Their computer models indicate that a Blandford exit will unload more traffic from Westfield than other possible locations would and that it will cost the least. Well that's good for Westfield but their gain is Blandford's loss. All that traffic lands here in a village with narrow winding roads totally ill-equipped to handle it. Furthermore “lowest cost” suggests that the huge impact of such an endeavor needs further examination.

Are the citizens of Blandford ready for the air and noise pollution that will descend on them when 5000-6000 more vehicles per day clog our roads, particularly at rush hour? Jane and I are certainly not. Our plans for any Farmhouse addition or improvement are on hold until this issue is resolved. Are you ready for traffic lights, turn lanes, dangerous crossings to get your mail or play the next golf hole? Or how about attending an event at the White Church and crossing North St. to get from your car to the auditorium? This will no longer be a

safe country town in which to raise a family, ride a bicycle or take a jog or walk the dog.

Our daughters and their families come to visit the Farm to relax and escape the hustle and bustle of life in the city. They live in the Boston and Washington DC areas and dread the impact of an exit on their family haven and its historic house, open fields, and woodlands. It would truncate their dream of keeping the Farm in the family for generations to come.

So we all vote "NO" to a new exit in Blandford or anywhere in the Hilltowns!

Respectfully submitted,

Bill Missimer

44 North St.

Blandford, MA 01008

**From:** [Hello From Becket](#)  
**To:** [Bligh, Cassandra \(DOT\)](#)  
**Subject:** Proposed RTE 90 Exit at Blandford and elsewhere  
**Date:** Sunday, December 15, 2019 9:04:24 PM  
**Attachments:** [Letter to the Editor - No Turnpike exit.docx](#)  
[Letter to the Editor- No Exit - Health and Safety Issue.docx](#)

---

Hello Ms. Gascon -

Attached are two letters I sent to the Berkshire Editor and our legislators.

Now that I have experienced our winter weather's impact on driving conditions on the roads in our area, I have realized that such Exit construction is much more than a Quality of Life issue. It is a Health and Safety issue.

Read the letter and perhaps drive here during bad weather conditions to compare the relatively straight Rte 90 highway road for truck and car vehicles to the curving, oddly banked Rte 20 that such vehicles would be accessing.

Thank you -

Ann krawet

[anndavek@gmail.com](mailto:anndavek@gmail.com)

## It's a Quality Of Life Issue

The construction of a new turnpike exit between Lee and Westfield will do way more harm than good. More car and truck traffic, more noise, more exhaust fumes. Can't deny that. Becket especially will become a "Pass-Thru" town for vehicles on their way to the larger towns nearby. Other towns will be negatively impacted in this way too. Shame on those officials who, by supporting an exit, endanger the bucolic Quality of Life that full time residents now enjoy and cherish and which, for many years, has attracted second homeowners and campers to Becket.

Ann and I. David Krawet

To the Editor:

It's A Health and Safety Issue!

I have recently dealt with the vagaries of our winter weather (snow, snow drifts, ice, sleet, fog) while driving on RTE 20 and adjacent local roads. These hilly, multiply winding, frequently oddly-banked roads would become increasingly dangerous as traffic from the proposed Blandford exit off RTE 90 is added to them. How in good conscience can our legislators tacitly facilitate this project? They should strongly be speaking out against it! That old saying is applicable here – “An ounce of prevention is worth a pound of cure.” This is definitely a health and safety issue!

Ann Krawet

## Appendix C: Capacity Analysis

DRAFT

# Existing Conditions (2018)

DRAFT



# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Existing AM Peak Hour

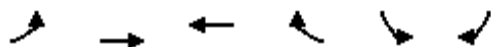


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations		↑↑	↑↑		↑↑		
Traffic Volume (vph)	0	404	341	0	153	0	
Future Volume (vph)	0	404	341	0	153	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Fr t							
Flt Protected					0.950		
Satd. Flow (prot)	0	3505	3471	0	2993	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3505	3471	0	2993	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.75	0.80	0.92	0.89	0.25	
Heavy Vehicles (%)	0%	3%	4%	0%	17%	0%	
Adj. Flow (vph)	0	539	426	0	172	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	539	426	0	172	0	
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		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
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		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Existing AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		26.0	26.0		44.0		24.0
Total Split (%)		27.7%	27.7%		46.8%		26%
Maximum Green (s)		21.0	21.0		39.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		73.2	73.2		10.8		
Actuated g/C Ratio		0.78	0.78		0.11		
v/c Ratio		0.20	0.16		0.50		
Control Delay		3.1	3.8		43.7		
Queue Delay		0.0	0.0		0.0		
Total Delay		3.1	3.8		43.7		
LOS		A	A		D		
Approach Delay		3.1	3.8		43.7		
Approach LOS		A	A		D		
Queue Length 50th (ft)		34	30		50		
Queue Length 95th (ft)		45	55		78		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2729	2702		1241		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.20	0.16		0.14		

### Intersection Summary

Area Type: Other

Cycle Length: 94

Actuated Cycle Length: 94

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Existing AM Peak Hour

Offset: 15 (16%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.50

Intersection Signal Delay: 9.5





Intersection LOS: A

Intersection Capacity Utilization 23.9%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 1: Route 20 & I-90 Exit

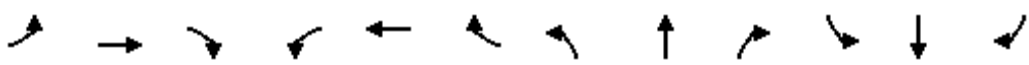
 Ø2 (R) 26 s	 Ø4 44 s	 Ø9 24 s
 Ø6 (R) 26 s		

DRAFT

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Existing AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	122	418	61	135	123	206	76	51	0	0	0
Future Volume (vph)	17	122	418	61	135	123	206	76	51	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.923				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1543	3406	1495	1752	2743	0	1752	1712	1495	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1543	3406	1495	1752	2743	0	1752	1712	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			459		178				162			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.98	0.91	0.88	0.80	0.69	0.95	0.74	0.63	0.92	0.92	0.92
Heavy Vehicles (%)	17%	6%	8%	3%	2%	40%	3%	11%	8%	0%	0%	0%
Adj. Flow (vph)	34	124	459	69	169	178	217	103	81	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	124	459	69	347	0	217	103	81	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)		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	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	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)	6	6	20	18	6		18	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)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

Lanes, Volumes, Timings  
2: Route 102/I-90 Entrance & Route 20













Existing AM Peak Hour

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
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	
Heavy Vehicles (%)	
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)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Existing AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	CI+Ex						CI+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0						0.0					
Detector 4 Position(ft)	36						36					
Detector 4 Size(ft)	6						6					
Detector 4 Type	CI+Ex						CI+Ex					
Detector 4 Channel												
Detector 4 Extend (s)	0.0						0.0					
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	20.0	26.0	26.0	20.0	26.0		24.0	24.0	24.0			
Total Split (%)	21.3%	27.7%	27.7%	21.3%	27.7%		25.5%	25.5%	25.5%			
Maximum Green (s)	15.0	21.0	21.0	15.0	21.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
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	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	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	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	7.6	56.1	56.1	9.0	59.8		16.0	16.0	16.0			
Actuated g/C Ratio	0.08	0.60	0.60	0.10	0.64		0.17	0.17	0.17			
v/c Ratio	0.27	0.06	0.43	0.41	0.19		0.73	0.36	0.21			
Control Delay	37.6	11.7	6.5	46.5	4.9		51.3	37.0	1.2			
Queue Delay	0.0	0.0	0.3	0.0	0.0		0.0	0.0	0.0			
Total Delay	37.6	11.7	6.8	46.5	4.9		51.3	37.0	1.2			
LOS	D	B	A	D	A		D	D	A			
Approach Delay	9.5				11.8				37.5			
Approach LOS	A				B				D			
Queue Length 50th (ft)	18	23	71	39	22		123	54	0			
Queue Length 95th (ft)	24	43	135	77	38		195	80	0			
Internal Link Dist (ft)	324				528				295			
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	246	2033	1077	279	1809		354	346	431			
Starvation Cap Reductn	0	0	187	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.14	0.06	0.52	0.25	0.19		0.61	0.30	0.19			
Intersection Summary												

Lanes, Volumes, Timings  
2: Route 102/I-90 Entrance & Route 20

Existing AM Peak Hour

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	26%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Existing AM Peak Hour

Area Type: Other

Cycle Length: 94

Actuated Cycle Length: 94

Offset: 15 (16%), Referenced to phase 2:WBT and 6:EBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 18.0

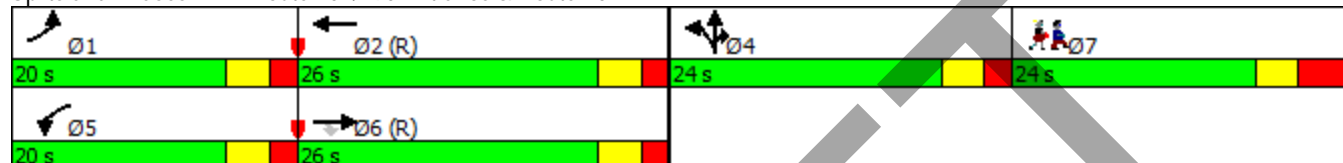
Intersection LOS: B

Intersection Capacity Utilization 38.4%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20

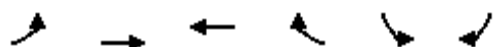




# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Existing PM Peak Hour

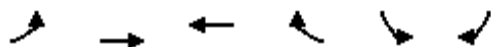


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations		↑↑	↑↑		↑↑		
Traffic Volume (vph)	0	460	428	0	236	0	
Future Volume (vph)	0	460	428	0	236	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Frnt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3574	3574	0	3127	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3574	3574	0	3127	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.85	0.91	0.91	0.68	0.25	
Heavy Vehicles (%)	0%	1%	1%	0%	12%	0%	
Adj. Flow (vph)	0	541	470	0	347	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	541	470	0	347	0	
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		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
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		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Existing PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		41.0	41.0		39.0		24.0
Total Split (%)		39.4%	39.4%		37.5%		23%
Maximum Green (s)		36.0	36.0		34.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		77.1	77.1		16.9		
Actuated g/C Ratio		0.74	0.74		0.16		
v/c Ratio		0.20	0.18		0.68		
Control Delay		4.6	7.0		47.8		
Queue Delay		0.0	0.0		0.0		
Total Delay		4.6	7.0		47.8		
LOS		A	A		D		
Approach Delay		4.6	7.0		47.8		
Approach LOS		A	A		D		
Queue Length 50th (ft)		48	89		113		
Queue Length 95th (ft)		74	m132		110		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2648	2648		1022		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.20	0.18		0.34		

### Intersection Summary

Area Type: Other

Cycle Length: 104

Actuated Cycle Length: 104

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Existing PM Peak Hour

Offset: 16 (15%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

Intersection Signal Delay: 16.5

Intersection LOS: B

Intersection Capacity Utilization 27.8%

ICU Level of Service A

Analysis Period (min) 15

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





















Splits and Phases: 1: Route 20 & I-90 Exit

→ Ø2 (R)	Ø4	Ø9
41 s	39 s	24 s
← Ø6 (R)		
41 s		

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Existing PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	297	372	120	200	90	228	12	230	0	0	0
Future Volume (vph)	27	297	372	120	200	90	228	12	230	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.953				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1262	3505	1568	1805	3307	0	1787	1776	1599	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1262	3505	1568	1805	3307	0	1787	1776	1599	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			428		77				267			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.91	0.87	0.82	0.90	0.90	0.75	0.79	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	43%	3%	3%	0%	0%	13%	1%	7%	1%	0%	0%	0%
Adj. Flow (vph)	54	326	428	146	222	100	304	15	267	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	326	428	146	322	0	304	15	267	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)		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	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	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)	6	6	20	18	6		18	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)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20













Existing PM Peak Hour

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
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	
Heavy Vehicles (%)	
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)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Existing PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex						Cl+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0						0.0					
Detector 4 Position(ft)	36						36					
Detector 4 Size(ft)	6						6					
Detector 4 Type	Cl+Ex						Cl+Ex					
Detector 4 Channel												
Detector 4 Extend (s)	0.0						0.0					
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	15.0	41.0	41.0	15.0	41.0		24.0	24.0	24.0			
Total Split (%)	14.4%	39.4%	39.4%	14.4%	39.4%		23.1%	23.1%	23.1%			
Maximum Green (s)	10.0	36.0	36.0	10.0	36.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
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	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	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	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	9.8	55.5	55.5	14.6	62.4		18.9	18.9	18.9			
Actuated g/C Ratio	0.09	0.53	0.53	0.14	0.60		0.18	0.18	0.18			
v/c Ratio	0.46	0.17	0.41	0.58	0.16		0.94	0.05	0.52			
Control Delay	50.8	18.5	10.6	50.6	8.0		79.1	35.7	8.7			
Queue Delay	0.0	0.0	0.5	0.0	0.0		0.0	0.0	0.0			
Total Delay	50.8	18.5	11.1	50.6	8.0		79.1	35.7	8.7			
LOS	D	B	B	D	A		E	D	A			
Approach Delay	16.7				21.3				45.9			
Approach LOS	B				C				D			
Queue Length 50th (ft)	34	84	105	92	36		201	8	0			
Queue Length 95th (ft)	39	123	164	136	64		#267	23	58			
Internal Link Dist (ft)	324				528				295			
Turn Bay Length (ft)	100		200						180			
Base Capacity (vph)	135	1869	1035	253	2014		326	324	510			
Starvation Cap Reductn	0	0	254	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.40	0.17	0.55	0.58	0.16		0.93	0.05	0.52			
Intersection Summary												

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Existing PM Peak Hour

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	23%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20

Existing PM Peak Hour

Area Type: Other

Cycle Length: 104

Actuated Cycle Length: 104

Offset: 16 (15%), 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: 27.1

Intersection LOS: C

Intersection Capacity Utilization 40.0%

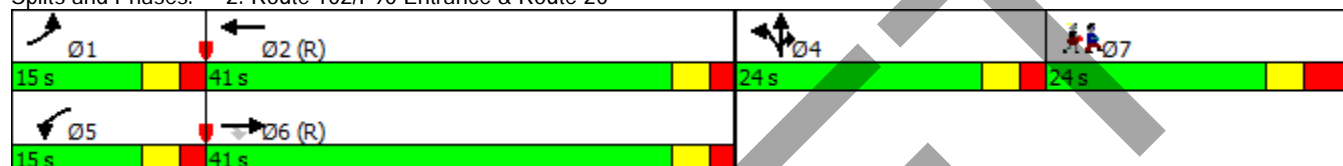
ICU Level of Service A

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20


























# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp













Existing AM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	591	1	5	386	317	191	50	645	19	799	2
Future Volume (vph)	0	591	1	5	386	317	191	50	645	19	799	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	300		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.999				0.850			0.850			
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3536	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	3536	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						352			451			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			1032			374	
Travel Time (s)		8.6			13.8			23.5			8.5	
Peak Hour Factor	0.92	0.84	0.38	0.35	0.73	0.90	0.78	0.54	0.92	0.47	0.81	0.80
Adj. Flow (vph)	0	704	3	14	529	352	245	93	701	40	986	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	707	0	14	529	352	245	93	701	40	989	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			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		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	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)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp

Existing AM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type	NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA		
Protected Phases	6		5	2	2	7	4	4	3	8		
Permitted Phases												
Detector Phase	6		5	2	2	7	4	4	3	8		
Switch Phase												
Minimum Initial (s)	10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0		
Minimum Split (s)	15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0		
Total Split (s)	35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0		
Total Split (%)	35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%		
Maximum Green (s)	30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0		
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	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	5.0	6.0	6.0	5.0	6.0		
Lead/Lag	Lag		Lead			Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes		Yes			Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0		
Recall Mode	None		None	None	None	None	C-Max	C-Max	None	C-Max		
Act Effect Green (s)	24.8		6.4	27.4	27.4	19.9	53.3	53.3	7.8	36.8		
Actuated g/C Ratio	0.25		0.06	0.27	0.27	0.20	0.53	0.53	0.08	0.37		
v/c Ratio	0.81		0.12	0.55	0.51	0.70	0.09	0.67	0.29	0.76		
Control Delay	42.8		46.0	32.2	5.1	47.4	17.1	12.0	48.3	35.4		
Queue Delay	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	42.8		46.0	32.2	5.1	47.4	17.1	12.0	48.3	35.4		
LOS	D		D	C	A	D	B	B	D	D		
Approach Delay	42.8			21.8			20.8			35.9		
Approach LOS	D			C			C			D		
Queue Length 50th (ft)	223		9	157	0	146	29	99	25	274		
Queue Length 95th (ft)	243		11	120	50	177	48	#411	29	#564		
Internal Link Dist (ft)	297			527			952			294		
Turn Bay Length (ft)						300						
Base Capacity (vph)	1066		265	1769	967	385	992	1054	354	1300		
Starvation Cap Reductn	0		0	0	0	0	0	0	0	0		
Spillback Cap Reductn	0		0	0	0	0	0	0	0	0		
Storage Cap Reductn	0		0	0	0	0	0	0	0	0		
Reduced v/c Ratio	0.66		0.05	0.30	0.36	0.64	0.09	0.67	0.11	0.76		

### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

## Lanes, Volumes, Timings

### 1: Southampton Rd & Friendly's Way/I-90 Ramp

Existing AM Peak Hour

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 29.5

Intersection LOS: C

Intersection Capacity Utilization 68.1%

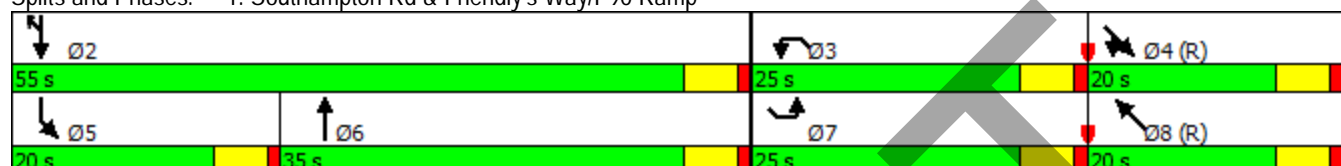
ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.






















Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp













Existing PM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	450	1	4	630	250	190	89	737	54	695	3
Future Volume (vph)	0	450	1	4	630	250	190	89	737	54	695	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	350		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt						0.850			0.850			0.999
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3536	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3536	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						316			349			1
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			752			374	
Travel Time (s)		8.6			13.8			17.1			8.5	
Peak Hour Factor	0.92	0.92	0.92	0.71	0.95	0.79	0.79	0.77	0.77	0.78	0.92	0.46
Adj. Flow (vph)	0	489	1	6	663	316	241	116	957	69	755	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	490	0	6	663	316	241	116	957	69	762	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			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		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	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)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp

Existing PM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type	NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA		
Protected Phases	6		5	2	2	7	4	4	3	8		
Permitted Phases												
Detector Phase	6		5	2	2	7	4	4	3	8		
Switch Phase												
Minimum Initial (s)	10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0		
Minimum Split (s)	15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0		
Total Split (s)	35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0		
Total Split (%)	35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%		
Maximum Green (s)	30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0		
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	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	5.0	6.0	6.0	5.0	6.0		
Lead/Lag	Lag		Lead			Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes		Yes			Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0		
Recall Mode	None		None	None	None	None	C-Max	C-Max	None	C-Max		
Act Effect Green (s)	26.0		6.0	28.3	28.3	19.5	48.5	48.5	9.3	36.1		
Actuated g/C Ratio	0.26		0.06	0.28	0.28	0.20	0.48	0.48	0.09	0.36		
v/c Ratio	0.53		0.06	0.66	0.47	0.70	0.13	1.01	0.42	0.60		
Control Delay	33.9		45.2	34.4	5.1	48.0	18.4	51.5	49.9	31.2		
Queue Delay	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	33.9		45.2	34.4	5.1	48.0	18.4	51.5	49.9	31.2		
LOS	C		D	C	A	D	B	D	D	C		
Approach Delay	33.9			25.0			48.0			32.8		
Approach LOS	C			C			D			C		
Queue Length 50th (ft)	137		4	196	0	144	41	~531	42	204		
Queue Length 95th (ft)	196		13	226	30	179	78	#625	71	#383		
Internal Link Dist (ft)	297			527			672			294		
Turn Bay Length (ft)						350						
Base Capacity (vph)	1074		265	1769	949	381	904	948	354	1278		
Starvation Cap Reductn	0		0	0	0	0	0	0	0	0		
Spillback Cap Reductn	0		0	0	0	0	0	0	0	0		
Storage Cap Reductn	0		0	0	0	0	0	0	0	0		
Reduced v/c Ratio	0.46		0.02	0.37	0.33	0.63	0.13	1.01	0.19	0.60		

### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

## Lanes, Volumes, Timings

### 1: Southampton Rd & Friendly's Way/I-90 Ramp

Existing PM Peak Hour

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 36.3

Intersection LOS: D

Intersection Capacity Utilization 80.5%

ICU Level of Service D

Analysis Period (min) 15

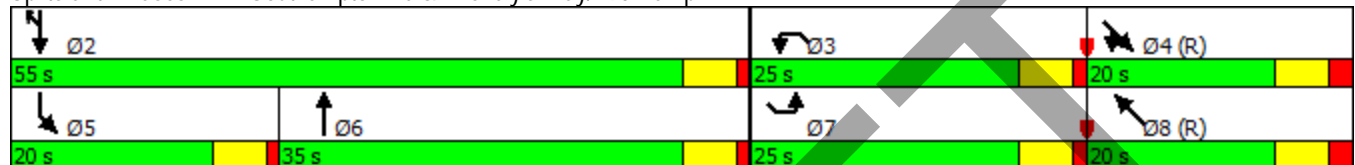
~ Volume exceeds capacity, queue is theoretically infinite.




















Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

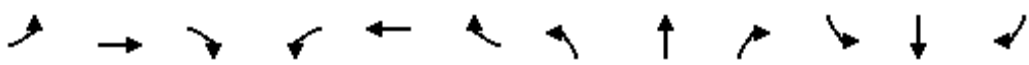
Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



															
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR			
Lane Configurations															
Traffic Volume (veh/h)	28	161	1	8	107	504	0	0	0	401	0	95			
Future Volume (Veh/h)	28	161	1	8	107	504	0	0	0	401	0	95			
Sign Control	Stop			Stop			Free			Free					
Grade	0%			0%			0%			0%					
Peak Hour Factor	0.74	0.74	0.74	0.91	0.91	0.91	1.00	1.00	1.00	0.91	0.91	0.91			
Hourly flow rate (vph)	38	218	1	9	118	554	0	0	0	441	0	104			
Pedestrians	2						2								
Lane Width (ft)	12.0						16.0								
Walking Speed (ft/s)	3.5						3.5								
Percent Blockage	0						0								
Right turn flare (veh)							8								
Median type							None			None					
Median storage (veh)															
Upstream signal (ft)															
pX, platoon unblocked															
vC, conflicting volume	995	936	56	1046	988	0	106				0				
vC1, stage 1 conf vol															
vC2, stage 2 conf vol															
vCu, unblocked vol	995	936	56	1046	988	0	106				0				
tC, single (s)	7.2	6.6	6.3	7.2	6.6	6.3	4.2				4.2				
tC, 2 stage (s)															
tF (s)	3.6	4.1	3.4	3.6	4.1	3.4	2.3				2.3				
p0 queue free %	0	0	100	0	31	48	100				72				
cM capacity (veh/h)	38	188	995	0	172	1059	1416				1591				
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1										
Volume Total	38	219	681	0	545										
Volume Left	38	0	9	0	441										
Volume Right	0	1	554	0	104										
cSH	38	189	857	1700	1591										
Volume to Capacity	1.00	1.16	0.79	0.00	0.28										
Queue Length 95th (ft)	94	278	210	0	29										
Control Delay (s)	306.9	165.7	25.2	0.0	7.0										
Lane LOS	F	F	D		A										
Approach Delay (s)	186.5		25.2	0.0	7.0										
Approach LOS	F		D												
Intersection Summary															
Average Delay				46.5											
Intersection Capacity Utilization				46.9%	ICU Level of Service			A							
Analysis Period (min)				15											

I-90 Interchange Study - Lee  
5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road

Existing AM  
2018 Existing

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	9	22	9	7	74	9	219	3	52	427	0
Future Volume (vph)	40	9	22	9	7	74	9	219	3	52	427	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1678	1633	0	1770	1606	0	1586	1781	0	1631	1776	0
Flt Permitted	0.687			0.728			0.437			0.541		
Satd. Flow (perm)	1213	1633	0	1356	1606	0	730	1781	0	928	1776	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		31			99			1				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.71	0.71	0.71	0.75	0.75	0.75	0.93	0.93	0.93	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	10%	10%	10%	7%	7%	7%
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)	56	44	0	12	108	0	10	238	0	59	485	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	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		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effect Green (s)	8.5	8.5		8.5	8.5		26.2	21.9		28.4	26.2	
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.57	0.47		0.61	0.57	
v/c Ratio	0.25	0.14		0.05	0.29		0.02	0.28		0.09	0.48	
Control Delay	26.2	14.6		24.6	10.4		8.2	15.2		7.8	14.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.2	14.6		24.6	10.4		8.2	15.2		7.8	14.1	



Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

## 5: Pleasant Street (Route 102) &amp; Big Y Plaza/Tyringham Road

2018 Existing

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	B		A	B		A	B	
Approach Delay		21.1			11.8			14.9			13.4	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	10	2		2	1		1	38		4	55	
Queue Length 95th (ft)	54	26		19	33		12	173		39	359	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	624	856		698	875		667	1505		751	1501	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.09	0.05		0.02	0.12		0.01	0.16		0.08	0.32	

## Intersection Summary

Area Type: Other

Cycle Length: 106

Actuated Cycle Length: 46.3

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.48

Intersection Signal Delay: 14.3

Intersection Capacity Utilization 47.2%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service A

Splits and Phases: 5: Pleasant Street (Route 102) &amp; Big Y Plaza/Tyringham Road

13 s	40.5 s	25.5 s	27 s
13 s	40.5 s	25.5 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

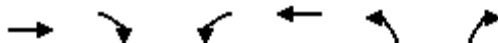
I-90 Interchange Study - Lee  
10: Premium Outlet Boulevard & Route 20

Existing AM  
2018 Existing

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations	↑↑		↘	↑	↖↖		
Traffic Volume (vph)	149	24	8	309	10	1	
Future Volume (vph)	149	24	8	309	10	1	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3128	0	1703	1852	2645	0	
Flt Permitted			0.559		0.957		
Satd. Flow (perm)	3128	0	1002	1852	2645	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	16				2		
Link Speed (mph)	30			30	30		
Link Distance (ft)	474			486	343		
Travel Time (s)	10.8			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.90	0.90	0.55	0.55	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	13%	13%	6%	6%	27%	27%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	196	0	9	343	20	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effect Green (s)	28.5		27.4	29.8	6.0		
Actuated g/C Ratio	0.89		0.85	0.93	0.19		
v/c Ratio	0.07		0.01	0.20	0.04		
Control Delay	2.9		1.4	1.6	13.5		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	2.9		1.4	1.6	13.5		

I-90 Interchange Study - Lee  
10: Premium Outlet Boulevard & Route 20

Existing AM  
2018 Existing



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	2.9			1.6	13.5		
Approach LOS	A			A	B		
Queue Length 50th (ft)	0		0	0	1		
Queue Length 95th (ft)	27		3	57	5		
Internal Link Dist (ft)	394			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3046		1194	1852	2136		
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	0.06		0.01	0.19	0.01		

Intersection Summary

Area Type: Other  
Cycle Length: 120  
Actuated Cycle Length: 32.1  
Natural Cycle: 60  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.20  
Intersection Signal Delay: 2.5  
Intersection Capacity Utilization 28.8%  
Analysis Period (min) 15

Intersection LOS: A  
ICU Level of Service A

Splits and Phases: 10: Premium Outlet Boulevard & Route 20

Ø2 63 s	Ø9 27 s	Ø4 30 s
Ø5 18 s	Ø6 45 s	

I-90 Interchange Study - Blandford  
 1: Otis Stage Road (Route 23)/Main Street (Route 23) & North Street

Existing AM  
 2018 Existing

Intersection

Int Delay, s/veh 1.9

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations

Traffic Vol, veh/h 7 87 51 25 34 3

Future Vol, veh/h 7 87 51 25 34 3

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 75 75 72 72 82 82

Heavy Vehicles, % 0 0 13 13 8 8

Mvmt Flow 9 116 71 35 41 4

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 106 0 - 0 223 89

Stage 1 - - - - 89 -

Stage 2 - - - - 134 -

Critical Hdwy 4.1 - - - 6.48 6.28

Critical Hdwy Stg 1 - - - - 5.48 -

Critical Hdwy Stg 2 - - - - 5.48 -

Follow-up Hdwy 2.2 - - - 3.572 3.372

Pot Cap-1 Maneuver 1498 - - - 752 953

Stage 1 - - - - 920 -

Stage 2 - - - - 878 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 1498 - - - 747 953

Mov Cap-2 Maneuver - - - - 747 -

Stage 1 - - - - 914 -

Stage 2 - - - - 878 -

Approach EB WB SB

HCM Control Delay, s 0.6 0 10

HCM LOS B

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 1498 - - - 760

HCM Lane V/C Ratio 0.006 - - - 0.059

HCM Control Delay (s) 7.4 0 - - 10

HCM Lane LOS A A - - B

HCM 95th %tile Q(veh) 0 - - - 0.2

I-90 Interchange Study - Blandford  
5: Main Street (Route 23) & Russell Stage Road

Existing AM  
2018 Existing

Intersection

Int Delay, s/veh 1.9

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations

Traffic Vol, veh/h 14 107 61 3 9 15

Future Vol, veh/h 14 107 61 3 9 15

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 76 76 80 80 60 60

Heavy Vehicles, % 3 3 13 13 8 8

Mvmt Flow 18 141 76 4 15 25

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 80 0 - 0 255 78

Stage 1 - - - - 78 -

Stage 2 - - - - 177 -

Critical Hdwy 4.13 - - - 6.48 6.28

Critical Hdwy Stg 1 - - - - 5.48 -

Critical Hdwy Stg 2 - - - - 5.48 -

Follow-up Hdwy 2.227 - - - 3.572 3.372

Pot Cap-1 Maneuver 1512 - - - 721 966

Stage 1 - - - - 930 -

Stage 2 - - - - 839 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 1512 - - - 712 966

Mov Cap-2 Maneuver - - - - 712 -

Stage 1 - - - - 918 -

Stage 2 - - - - 839 -

Approach EB WB SB

HCM Control Delay, s 0.9 0 9.4

HCM LOS A

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 1512 - - - 852

HCM Lane V/C Ratio 0.012 - - - 0.047

HCM Control Delay (s) 7.4 0 - - 9.4

HCM Lane LOS A A - - A

HCM 95th %tile Q(veh) 0 - - - 0.1

Intersection

Int Delay, s/veh 4.4

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations	↰	↰	↰	↱	↱	↰
Traffic Vol, veh/h	12	166	45	119	239	11
Future Vol, veh/h	12	166	45	119	239	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	82	82	89	89	92	92
Heavy Vehicles, %	3	3	11	11	5	5
Mvmt Flow	15	202	51	134	260	12

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	496	260	260	0	-	0
Stage 1	260	-	-	-	-	-
Stage 2	236	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.21	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.299	-	-	-
Pot Cap-1 Maneuver	531	776	1254	-	-	0
Stage 1	781	-	-	-	-	0
Stage 2	801	-	-	-	-	0
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	509	776	1254	-	-	-
Mov Cap-2 Maneuver	509	-	-	-	-	-
Stage 1	749	-	-	-	-	-
Stage 2	801	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s	11.4	2.2	0
HCM LOS	B		

Minor Lane/Major Mvmt NBL NBT EBLn1 EBLn2 SBT

Capacity (veh/h)	1254	-	509	776	-
HCM Lane V/C Ratio	0.04	-	0.029	0.261	-
HCM Control Delay (s)	8	-	12.3	11.3	-
HCM Lane LOS	A	-	B	B	-
HCM 95th %tile Q(veh)	0.1	-	0.1	1	-



I-90 Interchange Study - Westfield  
1: Southampton Road & Servistar Industrial Way

Existing AM  
2018 Existing

Intersection

Int Delay, s/veh 1.9

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations      

Traffic Vol, veh/h 18 52 42 477 456 55

Future Vol, veh/h 18 52 42 477 456 55

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length 0 - - - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 73 73 82 82 88 88

Heavy Vehicles, % 36 36 12 12 6 6

Mvmt Flow 25 71 51 582 518 63

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 1234 550 581 0 - 0

Stage 1 550 - - - - -

Stage 2 684 - - - - -

Critical Hdwy 6.76 6.56 4.22 - - -

Critical Hdwy Stg 1 5.76 - - - - -

Critical Hdwy Stg 2 5.76 - - - - -

Follow-up Hdwy 3.824 3.624 2.308 - - -

Pot Cap-1 Maneuver 167 475 946 - - -

Stage 1 516 - - - - -

Stage 2 443 - - - - -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 154 475 946 - - -

Mov Cap-2 Maneuver 154 - - - - -

Stage 1 475 - - - - -

Stage 2 443 - - - - -

Approach EB NB SB

HCM Control Delay, s 21.8 0.7 0

HCM LOS C

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 946 - 309 - -

HCM Lane V/C Ratio 0.054 - 0.31 - -

HCM Control Delay (s) 9 0 21.8 - -

HCM Lane LOS A A C - -













HCM 95th %tile Q(veh) 0.2 - 1.3 - -

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗				↖	↕			↕	
Traffic Volume (vph)	28	78	131	0	0	0	47	564	628	0	967	83
Future Volume (vph)	28	78	131	0	0	0	47	564	628	0	967	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1590	1322	0	0	0	1616	3044	0	0	3351	0
Flt Permitted		0.987					0.950					
Satd. Flow (perm)	0	1590	1322	0	0	0	1616	3044	0	0	3351	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			158					304			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												
Peak Hour Factor	0.83	0.83	0.83	0.25	0.25	0.25	0.91	0.91	0.91	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	14%	14%	14%	0%	0%	0%	8%	8%	8%	10%	10%	10%
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)	0	128	158	0	0	0	52	1310	0	0	1236	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	18				1	6			2	
Permitted Phases												
Detector Phase	8	8	18				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
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)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effect Green (s)		14.8	31.1				11.4	92.0			75.7	
Actuated g/C Ratio		0.12	0.26				0.10	0.77			0.63	
v/c Ratio		0.66	0.34				0.34	0.54			0.58	
Control Delay		65.4	6.9				57.1	6.2			16.2	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		65.4	6.9				57.1	6.2			16.2	

I-90 Interchange Study - Westfield  
 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road

Existing AM  
 2018 Existing

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
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	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effect Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			B	
Approach Delay		33.1						8.2			16.2	
Approach LOS		C						A			B	
Queue Length 50th (ft)		96	0				39	110			247	
Queue Length 95th (ft)		142	37				79	317			457	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		265	490				202	2405			2116	
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		0.48	0.32				0.26	0.54			0.58	

**Intersection Summary**

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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: 0.66

Intersection Signal Delay: 14.1

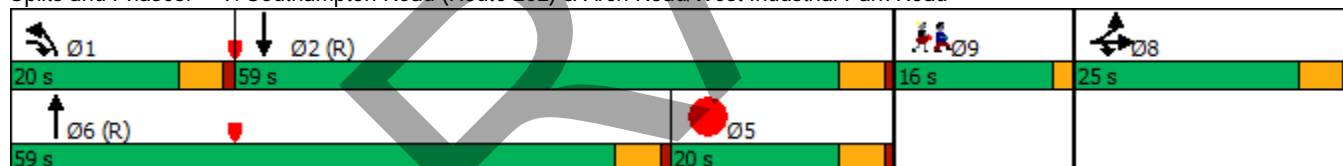
Intersection Capacity Utilization 54.1%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service A

Splits and Phases: 9: Southampton Road (Route 202) &amp; Arch Road/West Industrial Park Road
























Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
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		

DRAFT

## I-90 Interchange Study - Westfield

Existing AM

## 13: North Elm Street (Route 10)/North Main Street (Route 202) &amp; Notre Dame Street 2018 Existing

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	102	81	4	80	69	43	1022	11	38	794	96
Future Volume (vph)	205	102	81	4	80	69	43	1022	11	38	794	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1677	1473	0	1654	0	1604	3316	0	1560	3171	0
Flt Permitted		0.603			0.990		0.110			0.089		
Satd. Flow (perm)	0	1044	1452	0	1640	0	186	3316	0	146	3171	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		21			1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	1					1	2		1	1		2
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.89	0.89	0.89	0.68	0.68	0.68	0.90	0.90	0.90	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	7%	7%	7%	5%	5%	5%	8%	8%	8%
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)	0	345	91	0	225	0	48	1148	0	45	1047	0
Turn Type	pm+pt	NA	custom	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4		1	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	35.0	56.0	21.0	21.0	21.0		21.0	58.0		14.0	51.0	
Total Split (%)	22.6%	36.1%	13.5%	13.5%	13.5%		13.5%	37.4%		9.0%	32.9%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effect Green (s)		50.4	7.0		50.4		59.2	53.5		57.4	50.7	
Actuated g/C Ratio		0.39	0.05		0.39		0.45	0.41		0.44	0.39	
v/c Ratio		0.86	0.48		0.35		0.30	0.85		0.33	0.85	
Control Delay		59.5	13.0		29.7		25.0	43.1		26.7	44.6	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		59.5	13.0		29.7		25.0	43.1		26.7	44.6	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	B		C		C	D		C	D	
Approach Delay		49.8			29.7			42.4			43.9	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)		252	0		115		19	439		18	387	
Queue Length 95th (ft)		#566	29		170		57	#795		51	#651	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		402	273		645		254	1358		152	1233	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.86	0.33		0.35		0.19	0.85		0.30	0.85	

## Intersection Summary

Area Type: Other

Cycle Length: 155

Actuated Cycle Length: 130.8

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 43.1

Intersection Capacity Utilization 76.1%

Analysis Period (min) 15

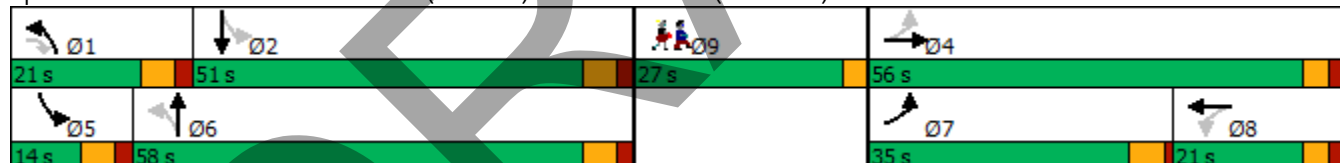
# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection LOS: D

ICU Level of Service D

Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) &amp; Notre Dame Street





Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

I-90 Interchange Study - Westfield  
 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway

Existing AM  
 2018 Existing

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱				↰	↱			↰↱	↰
Traffic Volume (vph)	639	32	153	0	0	0	75	415	18	0	458	353
Future Volume (vph)	639	32	153	0	0	0	75	415	18	0	458	353
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1820	1777	0	0	0	1687	1704	0	0	3261	1711
Flt Permitted		0.955					0.321					
Satd. Flow (perm)	0	1820	1777	0	0	0	568	1704	0	0	3261	1668
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			165					3				401
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			5	5			4		10	10		4
Confl. Bikes (#/hr)												
Peak Hour Factor	0.93	0.93	0.93	0.50	0.50	0.50	0.87	0.87	0.87	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	7%	7%	7%	7%	7%	7%
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)	0	721	165	0	0	0	86	498	0	0	520	401
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effect Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.36	0.56				0.35	0.39			0.16	0.52
v/c Ratio		1.09	0.15				0.27	0.75			0.99	0.37
Control Delay		89.7	3.0				27.1	31.7			73.5	2.1
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		89.7	3.0				27.1	31.7			73.5	2.1

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

I-90 Interchange Study - Westfield  
 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway

Existing AM  
 2018 Existing

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
LOS		F	A				C	C			E	A
Approach Delay		73.6						31.0			42.4	
Approach LOS		E						C			D	
Queue Length 50th (ft)		257	0				20	141			103	0
Queue Length 95th (ft)		#761	34				72	#442			#287	28
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		661	1065				323	668			523	1071
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		1.09	0.15				0.27	0.75			0.99	0.37

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 73.8

Natural Cycle: 110

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.09

Intersection Signal Delay: 51.2

Intersection Capacity Utilization 71.0%

Analysis Period (min) 15






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

Queue shown is maximum after two cycles.

Intersection LOS: D




















ICU Level of Service C

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway

 Ø2	 Ø4	 Ø9
31 s	32 s	27 s
 Ø6	 Ø5	
17 s	14 s	

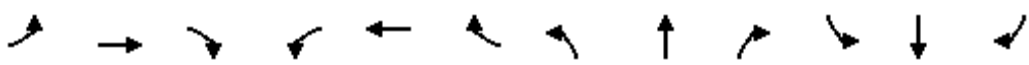








Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

DRAFT

																					
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR									
Lane Configurations																					
Traffic Volume (veh/h)	82	151	0	4	111	533	0	0	0	570	1	84									
Future Volume (Veh/h)	82	151	0	4	111	533	0	0	0	570	1	84									
Sign Control	Stop			Stop			Free			Free											
Grade	0%			0%			0%			0%											
Peak Hour Factor	0.81	0.81	0.81	0.90	0.90	0.90	0.67	0.67	0.67	0.94	0.94	0.94									
Hourly flow rate (vph)	101	186	0	4	123	592	0	0	0	606	1	89									
Pedestrians	7						14														
Lane Width (ft)	12.0						16.0														
Walking Speed (ft/s)	3.5						3.5														
Percent Blockage	1						2														
Right turn flare (veh)							8														
Median type							None			None											
Median storage (veh)																					
Upstream signal (ft)																					
pX, platoon unblocked																					
vC, conflicting volume	1326	1264	66	1364	1309	0	97				0										
vC1, stage 1 conf vol																					
vC2, stage 2 conf vol																					
vCu, unblocked vol	1326	1264	66	1364	1309	0	97				0										
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.2				4.1										
tC, 2 stage (s)																					
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.3				2.2										
p0 queue free %	0	0	100	0	0	45	100				62										
cM capacity (veh/h)	0	105	973	0	98	1079	1421				1610										
Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1																
Volume Total	101	186	719	0	696																
Volume Left	101	0	4	0	606																
Volume Right	0	0	592	0	89																
cSH	0	105	390	1700	1610																
Volume to Capacity	Err	1.77	1.85	0.00	0.38																
Queue Length 95th (ft)	Err	371	1173	0	45																
Control Delay (s)	Err	453.5	413.8	0.0	7.9																
Lane LOS	F	F	F		A																
Approach Delay (s)	Err		413.8	0.0	7.9																
Approach LOS	F		F																		
Intersection Summary																					
Average Delay				Err																	
Intersection Capacity Utilization				55.5%	ICU Level of Service			B													
Analysis Period (min)				15																	

I-90 Interchange Study - Lee  
5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road

Existing PM  
2018 Existing

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	136	18	39	59	8	4	16	330	11	71	418	3
Future Volume (vph)	136	18	39	59	8	4	16	330	11	71	418	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1745	1679	0	1671	1651	0	1662	1860	0	1678	1825	0
Flt Permitted	0.748			0.715			0.458			0.407		
Satd. Flow (perm)	1370	1679	0	1258	1651	0	800	1860	0	719	1825	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44			5			2				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.89	0.89	0.89	0.85	0.85	0.85	0.98	0.98	0.98	0.97	0.97	0.97
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	8%	8%	8%	5%	5%	5%	4%	4%	4%
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)	153	64	0	69	14	0	16	348	0	73	434	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	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		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effect Green (s)	13.1	13.1		13.1	13.1		27.8	21.5		30.2	26.3	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.50	0.38		0.54	0.47	
v/c Ratio	0.48	0.15		0.24	0.04		0.03	0.49		0.14	0.51	
Control Delay	28.9	13.4		25.3	20.6		10.2	20.4		9.9	16.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.9	13.4		25.3	20.6		10.2	20.4		9.9	16.9	

I-90 Interchange Study - Lee  
5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road

Existing PM  
2018 Existing

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



I-90 Interchange Study - Lee  
 5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road

Existing PM  
 2018 Existing

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	C		B	C		A	B	
Approach Delay		24.4			24.5			19.9			15.9	
Approach LOS		C			C			B			B	
Queue Length 50th (ft)	35	4		15	2		2	76		7	64	
Queue Length 95th (ft)	159	46		77	21		18	288		53	359	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	565	719		519	684		603	1316		585	1293	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.27	0.09		0.13	0.02		0.03	0.26		0.12	0.34	

Intersection Summary

Area Type: Other  
 Cycle Length: 106  
 Actuated Cycle Length: 56.1  
 Natural Cycle: 80  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.51  
 Intersection Signal Delay: 19.3  
 Intersection Capacity Utilization 52.2%  
 Analysis Period (min) 15

Intersection LOS: B  
 ICU Level of Service A

Splits and Phases: 5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road

13 s	40.5 s	25.5 s	27 s
13 s	40.5 s	25.5 s	

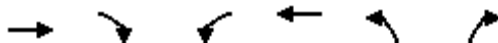
Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

DRAFT

I-90 Interchange Study - Lee  
10: Premium Outlet Boulevard & Route 20

Existing PM  
2018 Existing

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations	↑↑		↘	↑	↘↘		
Traffic Volume (vph)	344	134	15	224	186	16	
Future Volume (vph)	344	134	15	224	186	16	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3263	0	1719	1870	3236	0	
Flt Permitted			0.361		0.956		
Satd. Flow (perm)	3263	0	653	1870	3236	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	52				7		
Link Speed (mph)	30			30	30		
Link Distance (ft)	324			486	343		
Travel Time (s)	7.4			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.85	0.85	0.91	0.91	0.85	0.85	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	6%	6%	5%	5%	4%	4%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	563	0	16	246	238	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effect Green (s)	13.6		17.1	15.0	8.8		
Actuated g/C Ratio	0.40		0.50	0.44	0.26		
v/c Ratio	0.42		0.03	0.30	0.28		
Control Delay	8.7		4.4	7.2	12.0		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	8.7		4.4	7.2	12.0		



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	8.7			7.0	12.0		
Approach LOS	A			A	B		
Queue Length 50th (ft)	26		1	24	13		
Queue Length 95th (ft)	84		6	58	48		
Internal Link Dist (ft)	244			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3142		833	1870	2466		
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	0.18		0.02	0.13	0.10		

#### Intersection Summary

Area Type: Other  
Cycle Length: 120  
Actuated Cycle Length: 34.2  
Natural Cycle: 60  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.42  
Intersection Signal Delay: 9.0  
Intersection Capacity Utilization 27.9%  
Analysis Period (min) 15




Intersection LOS: A  
ICU Level of Service A

Splits and Phases: 10: Premium Outlet Boulevard & Route 20

Ø2	Ø9	Ø4
63 s	27 s	30 s
Ø5	Ø6	
18 s	45 s	

I-90 Interchange Study - Blandford  
 1: Otis Stage Road (Route 23)/Main Street (Route 23) & North Street

Existing PM  
 2018 Existing

Intersection						
Int Delay, s/veh	1.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	70	100	30	28	3
Future Vol, veh/h	5	70	100	30	28	3
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	85	85	69	69	70	70
Heavy Vehicles, %	3	3	5	5	13	13
Mvmt Flow	6	82	145	43	40	4
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	188	0	-	0	261	167
Stage 1	-	-	-	-	167	-
Stage 2	-	-	-	-	94	-
Critical Hdwy	4.13	-	-	-	6.53	6.33
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	2.227	-	-	-	3.617	3.417
Pot Cap-1 Maneuver	1380	-	-	-	705	849
Stage 1	-	-	-	-	837	-
Stage 2	-	-	-	-	903	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1380	-	-	-	701	849
Mov Cap-2 Maneuver	-	-	-	-	701	-
Stage 1	-	-	-	-	833	-
Stage 2	-	-	-	-	903	-
Approach	EB		WB		SB	
HCM Control Delay, s	0.5		0		10.4	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1380	-	-	-	713	
HCM Lane V/C Ratio	0.004	-	-	-	0.062	
HCM Control Delay (s)	7.6	0	-	-	10.4	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0.2	

I-90 Interchange Study - Blandford  
5: Main Street (Route 23) & Russell Stage Road

Existing PM  
2018 Existing

Intersection

Int Delay, s/veh 2.9

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations

Traffic Vol, veh/h 24 74 87 12 10 43

Future Vol, veh/h 24 74 87 12 10 43

Conflicting Peds, #/hr 2 0 0 2 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 82 82 73 73 70 70

Heavy Vehicles, % 6 6 4 4 6 6

Mvmt Flow 29 90 119 16 14 61

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 137 0 - 0 277 129

Stage 1 - - - - 129 -

Stage 2 - - - - 148 -

Critical Hdwy 4.16 - - - 6.46 6.26

Critical Hdwy Stg 1 - - - - 5.46 -

Critical Hdwy Stg 2 - - - - 5.46 -

Follow-up Hdwy 2.254 - - - 3.554 3.354

Pot Cap-1 Maneuver 1423 - - - 704 910

Stage 1 - - - - 887 -

Stage 2 - - - - 870 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 1420 - - - 686 908

Mov Cap-2 Maneuver - - - - 686 -

Stage 1 - - - - 866 -

Stage 2 - - - - 868 -

Approach EB WB SB

HCM Control Delay, s 1.9 0 9.6

HCM LOS A

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 1420 - - - 856

HCM Lane V/C Ratio 0.021 - - - 0.088

HCM Control Delay (s) 7.6 0 - - 9.6

HCM Lane LOS A A - - A







HCM 95th %tile Q(veh) 0.1 - - - 0.3

I-90 Interchange Study - Russell  
1: Westfield Road & Blandford Road

Existing PM  
2018 Existing

Intersection

Int Delay, s/veh 3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	85	141	293	186	12
Future Vol, veh/h	11	85	141	293	186	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	92	92	87	87
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	13	102	153	318	214	14




Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	838	214	214
Stage 1	214	-	-
Stage 2	624	-	-
Critical Hdwy	6.44	6.24	4.11
Critical Hdwy Stg 1	5.44	-	-
Critical Hdwy Stg 2	5.44	-	-
Follow-up Hdwy	3.536	3.336	2.209
Pot Cap-1 Maneuver	334	821	1362
Stage 1	817	-	-
Stage 2	530	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	297	821	1362
Mov Cap-2 Maneuver	297	-	-
Stage 1	725	-	-
Stage 2	530	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.9	2.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1362	-	297	821	-
HCM Lane V/C Ratio	0.113	-	0.045	0.125	-
HCM Control Delay (s)	8	-	17.7	10	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.4	-	0.1	0.4	-

I-90 Interchange Study - Westfield  
1: Southampton Road & Servistar Industrial Way

Existing PM  
2018 Existing

Intersection						
Int Delay, s/veh	15.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	43	56	40	577	646	23
Future Vol, veh/h	43	56	40	577	646	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	49	49	89	89	93	93
Heavy Vehicles, %	23	23	8	8	3	3
Mvmt Flow	88	114	45	648	695	25
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1446	708	720	0	-	0
Stage 1	708	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Critical Hdwy	6.63	6.43	4.18	-	-	-
Critical Hdwy Stg 1	5.63	-	-	-	-	-
Critical Hdwy Stg 2	5.63	-	-	-	-	-
Follow-up Hdwy	3.707	3.507	2.272	-	-	-
Pot Cap-1 Maneuver	130	401	855	-	-	-
Stage 1	452	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	119	401	855	-	-	-
Mov Cap-2 Maneuver	119	-	-	-	-	-
Stage 1	415	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Approach	EB		NB	SB		
HCM Control Delay, s	119.3		0.6	0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	855	-	198	-	-	
HCM Lane V/C Ratio	0.053	-	1.02	-	-	
HCM Control Delay (s)	9.4	0	119.3	-	-	
HCM Lane LOS	A	A	F	-	-	
HCM 95th %tile Q(veh)	0.2	-	9	-	-	



	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗				↖	↕			↕	
Traffic Volume (vph)	35	83	217	0	0	0	131	417	580	0	1308	113
Future Volume (vph)	35	83	217	0	0	0	131	417	580	0	1308	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1740	1449	0	0	0	1694	3200	0	0	3572	0
Flt Permitted		0.985					0.950					
Satd. Flow (perm)	0	1740	1449	0	0	0	1692	3200	0	0	3572	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			256					382			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)			1	1			2					2
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.73	0.73	0.73	0.92	0.92	0.92	0.93	0.93	0.93	0.96	0.96	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	3%	3%	3%	3%	3%	3%
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)	0	162	297	0	0	0	141	1072	0	0	1481	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	18				1	6			2	
Permitted Phases												
Detector Phase	8	8	18				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
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)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effect Green (s)		16.1	35.5				14.4	90.7			71.3	
Actuated g/C Ratio		0.13	0.30				0.12	0.76			0.59	
v/c Ratio		0.70	0.49				0.69	0.43			0.70	
Control Delay		65.0	8.6				68.5	4.5			21.2	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		65.0	8.6				68.5	4.5			21.2	

I-90 Interchange Study - Westfield  
 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road

Existing PM  
 2018 Existing

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
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	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effect Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
LOS		E	A				E	A			C	
Approach Delay		28.5						12.0			21.2	
Approach LOS		C						B			C	
Queue Length 50th (ft)		121	23				105	65			374	
Queue Length 95th (ft)		149	40				#189	188			#709	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		290	608				220	2512			2125	
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		0.56	0.49				0.64	0.43			0.70	

## Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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: 0.70

Intersection Signal Delay: 18.7

Intersection Capacity Utilization 68.1%

Analysis Period (min) 15

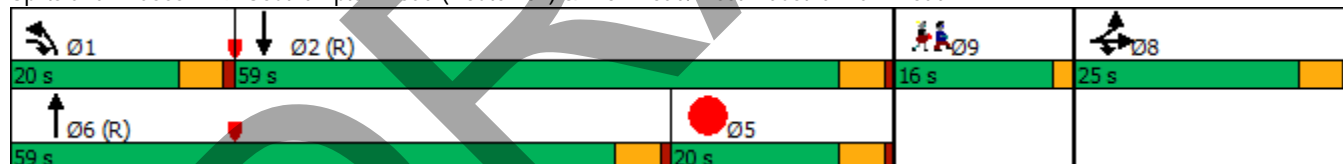
# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection LOS: B

ICU Level of Service C

Splits and Phases: 9: Southampton Road (Route 202) &amp; Arch Road/West Industrial Park Road



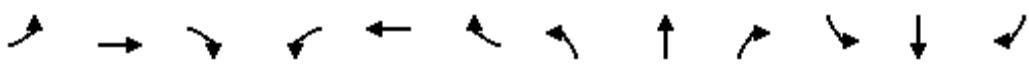
Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
Queue Length 50th (ft)		
Queue Length 95th (ft)		
Internal Link Dist (ft)		
Turn Bay Length (ft)		
Base Capacity (vph)		
Starvation Cap Reductn		
Spillback Cap Reductn		
Storage Cap Reductn		
Reduced v/c Ratio		
Intersection Summary		

DRAFT

## I-90 Interchange Study - Westfield

Existing PM

## 13: North Elm Street (Route 10)/North Main Street (Route 202) &amp; Notre Dame Street 2018 Existing

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↗	↕↗		↗	↕↗	
Traffic Volume (vph)	90	65	42	12	117	68	55	950	5	81	1182	174
Future Volume (vph)	90	65	42	12	117	68	55	950	5	81	1182	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1750	1531	0	1772	0	1620	3352	0	1636	3313	0
Flt Permitted		0.581			0.977		0.076			0.151		
Satd. Flow (perm)	0	1044	1510	0	1736	0	130	3352	0	260	3313	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			45		14						11	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	7		1	1		7	2		3	3		2
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.93	0.93	0.93	0.82	0.82	0.82	0.97	0.97	0.97	0.94	0.94	0.94
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	4%	4%	4%	3%	3%	3%
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)	0	167	45	0	241	0	57	984	0	86	1442	0
Turn Type	pm+pt	NA	pm+ov	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	1		8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	20.0	46.0	26.0	26.0	26.0		26.0	68.0		14.0	56.0	
Total Split (%)	12.9%	29.7%	16.8%	16.8%	16.8%		16.8%	43.9%		9.0%	36.1%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effect Green (s)		39.1	46.4		39.1		58.2	51.0		59.8	54.2	
Actuated g/C Ratio		0.31	0.37		0.31		0.47	0.41		0.48	0.43	
v/c Ratio		0.51	0.08		0.44		0.39	0.72		0.42	1.00	
Control Delay		46.8	8.7		39.0		26.4	36.3		25.0	60.4	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		46.8	8.7		39.0		26.4	36.3		25.0	60.4	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A		D		C	D		C	E	
Approach Delay		38.8			39.0			35.7			58.4	
Approach LOS		D			D			D			E	
Queue Length 50th (ft)		94	0		124		19	302		29	539	
Queue Length 95th (ft)		239	29		259		57	527		80	#1020	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		346	749		553		314	1722		216	1442	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.48	0.06		0.44		0.18	0.57		0.40	1.00	

## Intersection Summary

Area Type: Other

Cycle Length: 155

Actuated Cycle Length: 124.9

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 47.7

Intersection Capacity Utilization 82.9%

Analysis Period (min) 15

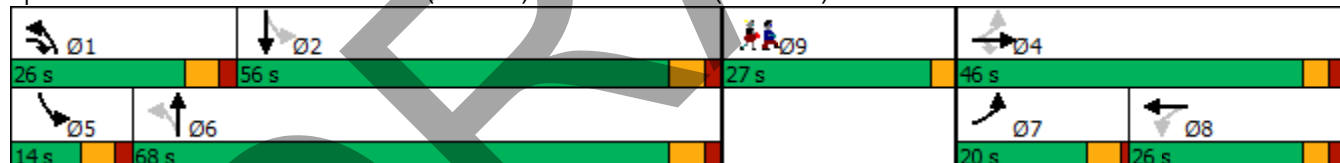
# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection LOS: D

ICU Level of Service E

Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) &amp; Notre Dame Street



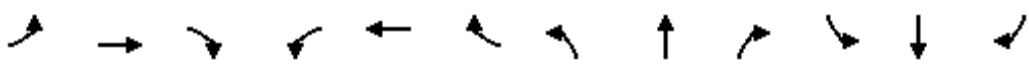
Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

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I-90 Interchange Study - Westfield  
 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway

Existing PM  
 2018 Existing

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	513	16	161	0	0	0	241	492	15	0	603	342
Future Volume (vph)	513	16	161	0	0	0	241	492	15	0	603	342
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1854	1812	0	0	0	1752	1773	0	0	3421	1794
Flt Permitted		0.954					0.196					
Satd. Flow (perm)	0	1854	1812	0	0	0	359	1773	0	0	3421	1733
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			171					2				366
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			10	10			12		27	27		12
Confl. Bikes (#/hr)												
Peak Hour Factor	0.94	0.94	0.94	0.92	0.92	0.92	0.95	0.95	0.95	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	3%	3%	3%	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)	0	563	171	0	0	0	254	534	0	0	655	372
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effect Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.34	0.52				0.33	0.36			0.15	0.48
v/c Ratio		0.90	0.17				0.97	0.83			1.28	0.36
Control Delay		48.5	3.0				86.8	39.5			172.3	2.1
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		48.5	3.0				86.8	39.5			172.3	2.1

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

I-90 Interchange Study - Westfield  
 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway

Existing PM  
 2018 Existing






	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
LOS		D	A				F	D			F	A
Approach Delay		37.9						54.7			110.7	
Approach LOS		D						D			F	
Queue Length 50th (ft)		~353	0				~142	296			~274	1
Queue Length 95th (ft)		#551	34				#280	#506			#384	31
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		627	1025				261	647			512	1045
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		0.90	0.17				0.97	0.83			1.28	0.36

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 79.2  
 Natural Cycle: 100  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 1.28  
 Intersection Signal Delay: 72.4  
 Intersection Capacity Utilization 73.9%  
 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.

Intersection LOS: E  
 ICU Level of Service D

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway

 Ø2	 Ø4	 Ø9
31 s	32 s	27 s
 Ø6	 Ø5	
17 s	14 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

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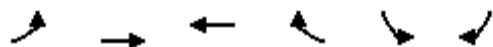
# Future Year (2040) No-Build Conditions

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# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

No Build AM Peak Hour

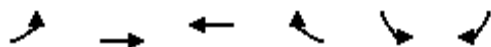


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations		↑↑	↑↑		↑↑		
Traffic Volume (vph)	0	414	351	0	201	0	
Future Volume (vph)	0	414	351	0	201	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Fr t							
Flt Protected					0.950		
Satd. Flow (prot)	0	3505	3471	0	2993	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3505	3471	0	2993	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.75	0.80	0.92	0.89	0.25	
Heavy Vehicles (%)	0%	3%	4%	0%	17%	0%	
Adj. Flow (vph)	0	552	439	0	226	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	552	439	0	226	0	
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		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
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		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

No Build AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		26.0	26.0		44.0		24.0
Total Split (%)		27.7%	27.7%		46.8%		26%
Maximum Green (s)		21.0	21.0		39.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		71.5	71.5		12.5		
Actuated g/C Ratio		0.76	0.76		0.13		
v/c Ratio		0.21	0.17		0.57		
Control Delay		3.7	4.9		43.5		
Queue Delay		0.0	0.0		0.0		
Total Delay		3.7	4.9		43.5		
LOS		A	A		D		
Approach Delay		3.7	4.9		43.5		
Approach LOS		A	A		D		
Queue Length 50th (ft)		39	57		65		
Queue Length 95th (ft)		53	77		97		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2666	2640		1241		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.21	0.17		0.18		

### Intersection Summary

Area Type: Other

Cycle Length: 94

Actuated Cycle Length: 94

Lanes, Volumes, Timings

1: Route 20 & I-90 Exit

No Build AM Peak Hour

Offset: 15 (16%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.57	
Intersection Signal Delay: 11.5	Intersection LOS: B
Intersection Capacity Utilization 25.5%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Route 20 & I-90 Exit

 Ø2 (R) 26 s	 Ø4 44 s	 Ø9 24 s
 Ø6 (R) 26 s		





















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# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

No Build AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	136	444	85	144	123	207	88	56	0	0	0
Future Volume (vph)	17	136	444	85	144	123	207	88	56	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.925				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1543	3406	1495	1752	2762	0	1752	1712	1495	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1543	3406	1495	1752	2762	0	1752	1712	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			488		178				162			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.98	0.91	0.88	0.80	0.69	0.95	0.74	0.63	0.92	0.92	0.92
Heavy Vehicles (%)	17%	6%	8%	3%	2%	40%	3%	11%	8%	0%	0%	0%
Adj. Flow (vph)	34	139	488	97	180	178	218	119	89	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	139	488	97	358	0	218	119	89	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)		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	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	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)	6	6	20	18	6		18	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)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20













No Build AM Peak Hour

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
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	
Heavy Vehicles (%)	
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)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

No Build AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex						Cl+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0						0.0					
Detector 4 Position(ft)	36						36					
Detector 4 Size(ft)	6						6					
Detector 4 Type	Cl+Ex						Cl+Ex					
Detector 4 Channel												
Detector 4 Extend (s)	0.0						0.0					
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	20.0	26.0	26.0	20.0	26.0		24.0	24.0	24.0			
Total Split (%)	21.3%	27.7%	27.7%	21.3%	27.7%		25.5%	25.5%	25.5%			
Maximum Green (s)	15.0	21.0	21.0	15.0	21.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
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	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	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	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	7.6	54.8	54.8	10.5	59.8		16.0	16.0	16.0			
Actuated g/C Ratio	0.08	0.58	0.58	0.11	0.64		0.17	0.17	0.17			
v/c Ratio	0.27	0.07	0.45	0.50	0.20		0.73	0.41	0.23			
Control Delay	41.7	13.0	7.8	47.3	5.0		51.5	38.4	1.5			
Queue Delay	0.0	0.0	0.3	0.0	0.0		0.0	0.0	0.0			
Total Delay	41.7	13.0	8.1	47.3	5.0		51.5	38.4	1.5			
LOS	D	B	A	D	A		D	D	A			
Approach Delay	10.8				14.0				37.4			
Approach LOS	B				B				D			
Queue Length 50th (ft)	19	27	90	55	23		123	63	0			
Queue Length 95th (ft)	26	51	162	98	40		196	91	0			
Internal Link Dist (ft)	324				528				295			
Turn Bay Length (ft)	100		200								180	
Base Capacity (vph)	246	1986	1075	279	1821		354	346	431			
Starvation Cap Reductn	0	0	177	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.14	0.07	0.54	0.35	0.20		0.62	0.34	0.21			
Intersection Summary												

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

No Build AM Peak Hour

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	26%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

No Build AM Peak Hour

Area Type: Other

Cycle Length: 94

Actuated Cycle Length: 94

Offset: 15 (16%), Referenced to phase 2:WBT and 6:EBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 19.1

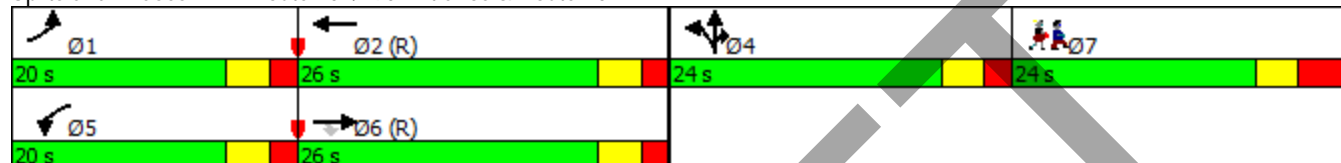
Intersection LOS: B

Intersection Capacity Utilization 40.5%

ICU Level of Service A

Analysis Period (min) 15

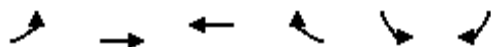
Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

No Build PM Peak Hour

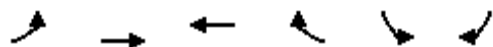


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations		↑↑	↑↑		↑↑		
Traffic Volume (vph)	0	526	431	0	256	0	
Future Volume (vph)	0	526	431	0	256	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Flt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3574	3574	0	3127	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3574	3574	0	3127	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.85	0.91	0.91	0.68	0.25	
Heavy Vehicles (%)	0%	1%	1%	0%	12%	0%	
Adj. Flow (vph)	0	619	474	0	376	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	619	474	0	376	0	
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		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
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		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

No Build PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		41.0	41.0		39.0		24.0
Total Split (%)		39.4%	39.4%		37.5%		23%
Maximum Green (s)		36.0	36.0		34.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		76.1	76.1		17.9		
Actuated g/C Ratio		0.73	0.73		0.17		
v/c Ratio		0.24	0.18		0.70		
Control Delay		5.1	7.6		47.4		
Queue Delay		0.0	0.0		0.0		
Total Delay		5.1	7.6		47.4		
LOS		A	A		D		
Approach Delay		5.1	7.6		47.4		
Approach LOS		A	A		D		
Queue Length 50th (ft)		60	101		122		
Queue Length 95th (ft)		90	m133		118		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2615	2615		1022		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.24	0.18		0.37		

### Intersection Summary

Area Type: Other

Cycle Length: 104

Actuated Cycle Length: 104

Lanes, Volumes, Timings

1: Route 20 & I-90 Exit

No Build PM Peak Hour

Offset: 16 (15%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.70





Intersection Signal Delay: 16.7 Intersection LOS: B

Intersection Capacity Utilization 30.2% ICU Level of Service A

Analysis Period (min) 15

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

Splits and Phases: 1: Route 20 & I-90 Exit





















 Ø2 (R)	 Ø4	 Ø9
41 s	39 s	24 s
 Ø6 (R)		
41 s		



# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

No Build PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	304	387	126	205	97	226	46	253	0	0	0
Future Volume (vph)	27	304	387	126	205	97	226	46	253	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.952				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1262	3505	1568	1805	3299	0	1787	1776	1599	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1262	3505	1568	1805	3299	0	1787	1776	1599	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			445		83				294			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.91	0.87	0.82	0.90	0.90	0.75	0.79	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	43%	3%	3%	0%	0%	13%	1%	7%	1%	0%	0%	0%
Adj. Flow (vph)	54	334	445	154	228	108	301	58	294	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	334	445	154	336	0	301	58	294	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)		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	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	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)	6	6	20	18	6		18	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)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20













No Build PM Peak Hour

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
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	
Heavy Vehicles (%)	
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)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

No Build PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex						Cl+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0						0.0					
Detector 4 Position(ft)	36						36					
Detector 4 Size(ft)	6						6					
Detector 4 Type	Cl+Ex						Cl+Ex					
Detector 4 Channel												
Detector 4 Extend (s)	0.0						0.0					
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	15.0	41.0	41.0	15.0	41.0		24.0	24.0	24.0			
Total Split (%)	14.4%	39.4%	39.4%	14.4%	39.4%		23.1%	23.1%	23.1%			
Maximum Green (s)	10.0	36.0	36.0	10.0	36.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
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	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	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	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	9.8	54.7	54.7	15.4	62.5		18.9	18.9	18.9			
Actuated g/C Ratio	0.09	0.53	0.53	0.15	0.60		0.18	0.18	0.18			
v/c Ratio	0.46	0.18	0.43	0.58	0.17		0.93	0.18	0.55			
Control Delay	55.1	18.3	10.1	49.6	8.0		78.2	37.7	8.8			
Queue Delay	0.0	0.0	0.4	0.0	0.0		0.0	0.0	0.0			
Total Delay	55.1	18.3	10.5	49.6	8.0		78.2	37.7	8.8			
LOS	E	B	B	D	A		E	D	A			
Approach Delay	16.5				21.1				43.4			
Approach LOS	B				C				D			
Queue Length 50th (ft)	36	86	104	96	37		199	33	0			
Queue Length 95th (ft)	40	125	164	141	65		#262	61	60			
Internal Link Dist (ft)	324				528				295			
Turn Bay Length (ft)	100				200							
Base Capacity (vph)	135	1843	1035	267	2014		326	324	532			
Starvation Cap Reductn	0	0	235	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.40	0.18	0.56	0.58	0.17		0.92	0.18	0.55			

### Intersection Summary

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

No Build PM Peak Hour

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	23%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20

No Build PM Peak Hour

Area Type: Other

Cycle Length: 104

Actuated Cycle Length: 104

Offset: 16 (15%), Referenced to phase 2:WBT and 6:EBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 26.5

Intersection LOS: C

Intersection Capacity Utilization 40.4%

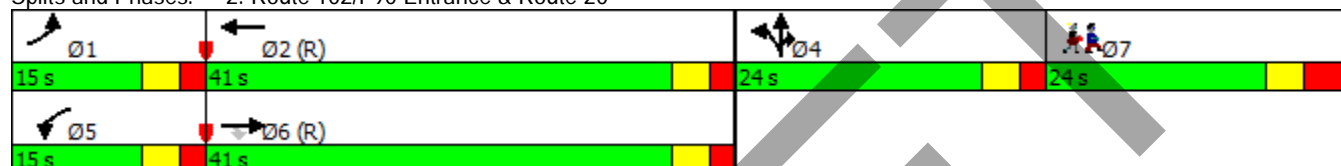
ICU Level of Service A

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.






















Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp













No Build AM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	633	1	0	421	351	164	60	714	19	834	19
Future Volume (vph)	0	633	1	0	421	351	164	60	714	19	834	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	300		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.999				0.850			0.850		0.997	
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3529	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3529	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						390			428			2
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			1032			374	
Travel Time (s)		8.6			13.8			23.5			8.5	
Peak Hour Factor	0.92	0.84	0.38	0.35	0.73	0.90	0.78	0.54	0.92	0.47	0.81	0.80
Adj. Flow (vph)	0	754	3	0	577	390	210	111	776	40	1030	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	757	0	0	577	390	210	111	776	40	1054	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			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		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	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)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp

No Build AM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type	NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA		
Protected Phases	6		5	2	2	7	4	4	3	8		
Permitted Phases												
Detector Phase	6		5	2	2	7	4	4	3	8		
Switch Phase												
Minimum Initial (s)	10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0		
Minimum Split (s)	15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0		
Total Split (s)	35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0		
Total Split (%)	35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%		
Maximum Green (s)	30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0		
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	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	5.0	6.0	6.0	5.0	6.0		
Lead/Lag	Lag		Lead			Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes		Yes			Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0		
Recall Mode	None		None	None	None	None	C-Max	C-Max	None	C-Max		
Act Effect Green (s)	26.3			26.3	26.3	17.8	54.4	54.4	7.8	39.9		
Actuated g/C Ratio	0.26			0.26	0.26	0.18	0.54	0.54	0.08	0.40		
v/c Ratio	0.81			0.62	0.55	0.67	0.11	0.74	0.29	0.75		
Control Delay	41.9			35.0	6.0	48.2	14.8	14.4	48.3	32.1		
Queue Delay	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	41.9			35.0	6.0	48.2	14.8	14.4	48.3	32.1		
LOS	D			D	A	D	B	B	D	C		
Approach Delay	41.9			23.3			20.9			32.7		
Approach LOS	D			C			C			C		
Queue Length 50th (ft)	238			170	0	126	36	174	25	297		
Queue Length 95th (ft)	257			161	64	159	45	#485	29	#435		
Internal Link Dist (ft)	297			527			952			294		
Turn Bay Length (ft)						300						
Base Capacity (vph)	1076			1769	986	368	1012	1055	354	1408		
Starvation Cap Reductn	0			0	0	0	0	0	0	0		
Spillback Cap Reductn	0			0	0	0	0	0	0	0		
Storage Cap Reductn	0			0	0	0	0	0	0	0		
Reduced v/c Ratio	0.70			0.33	0.40	0.57	0.11	0.74	0.11	0.75		

### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

## Lanes, Volumes, Timings

### 1: Southampton Rd & Friendly's Way/I-90 Ramp

No Build AM Peak Hour

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 28.9

Intersection LOS: C

Intersection Capacity Utilization 73.3%

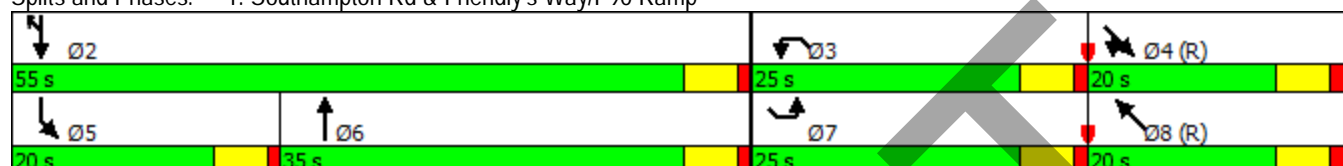
ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp


























# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp













No Build PM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	492	1	15	667	237	226	110	793	54	765	0
Future Volume (vph)	0	492	1	15	667	237	226	110	793	54	765	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	350		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt						0.850			0.850			
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						300			336			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			752			374	
Travel Time (s)		8.6			13.8			17.1			8.5	
Peak Hour Factor	0.92	0.92	0.92	0.71	0.95	0.79	0.79	0.77	0.77	0.78	0.92	0.46
Adj. Flow (vph)	0	535	1	21	702	300	286	143	1030	69	832	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	536	0	21	702	300	286	143	1030	69	832	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			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		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	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)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp

No Build PM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type	NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA		
Protected Phases	6		5	2	2	7	4	4	3	8		
Permitted Phases												
Detector Phase	6		5	2	2	7	4	4	3	8		
Switch Phase												
Minimum Initial (s)	10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0		
Minimum Split (s)	15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0		
Total Split (s)	35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0		
Total Split (%)	35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%		
Maximum Green (s)	30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0		
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	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	5.0	6.0	6.0	5.0	6.0		
Lead/Lag	Lag		Lead			Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes		Yes			Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0		
Recall Mode	None		None	None	None	None	C-Max	C-Max	None	C-Max		
Act Effect Green (s)	24.9		6.8	30.1	30.1	22.4	46.8	46.8	9.3	31.4		
Actuated g/C Ratio	0.25		0.07	0.30	0.30	0.22	0.47	0.47	0.09	0.31		
v/c Ratio	0.61		0.18	0.66	0.44	0.72	0.16	1.12	0.42	0.75		
Control Delay	36.6		46.8	32.9	4.7	46.1	19.8	89.8	49.9	38.9		
Queue Delay	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	36.6		46.8	32.9	4.7	46.1	19.8	89.8	49.9	38.9		
LOS	D		D	C	A	D	B	F	D	D		
Approach Delay	36.6			24.9			74.4			39.8		
Approach LOS	D			C			E			D		
Queue Length 50th (ft)	147		13	205	0	169	53	~652	42	249		
Queue Length 95th (ft)	215		29	233	29	205	96	#739	71	#492		
Internal Link Dist (ft)	297			527			672			294		
Turn Bay Length (ft)						350						
Base Capacity (vph)	1061		265	1769	941	412	871	919	354	1112		
Starvation Cap Reductn	0		0	0	0	0	0	0	0	0		
Spillback Cap Reductn	0		0	0	0	0	0	0	0	0		
Storage Cap Reductn	0		0	0	0	0	0	0	0	0		
Reduced v/c Ratio	0.51		0.08	0.40	0.32	0.69	0.16	1.12	0.19	0.75		

### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

## Lanes, Volumes, Timings

### 1: Southampton Rd & Friendly's Way/I-90 Ramp

No Build PM Peak Hour

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.12

Intersection Signal Delay: 48.3

Intersection LOS: D

Intersection Capacity Utilization 85.0%

ICU Level of Service E

Analysis Period (min) 15

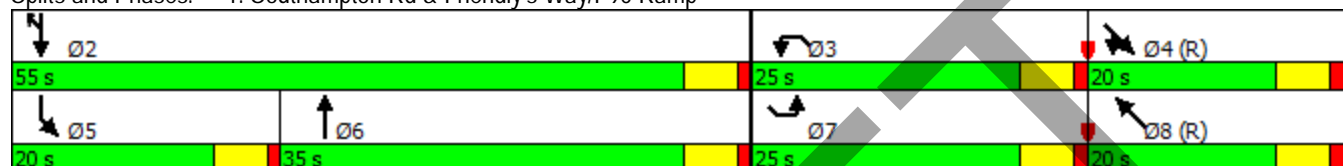
~ Volume exceeds capacity, queue is theoretically infinite.







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: 1: Southampton Rd & Friendly's Way/I-90 Ramp



Intersection												
Int Delay, s/veh	41.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	160	1	8	112	579	0	4	4	400	0	108
Future Vol, veh/h	34	160	1	8	112	579	0	4	4	400	0	108
Conflicting Peds, #/hr	0	0	2	2	0	0	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	6	6	6	11	11	11	13	13	13	7	7	7
Mvmt Flow	39	182	1	9	127	658	0	5	5	455	0	123
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1045	984	66	1073	1043	-	125	0	0	10	0	0
Stage 1	974	974	-	8	8	-	-	-	-	-	-	-
Stage 2	71	10	-	1065	1035	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.21	6.61	-	4.23	-	-	4.17	-	-
Critical Hdwy Stg 1	6.16	5.56	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.599	4.099	-	2.317	-	-	2.263	-	-
Pot Cap-1 Maneuver	203	245	987	190	221	0	1396	-	-	1577	-	-
Stage 1	298	325	-	991	871	0	-	-	-	-	-	-
Stage 2	929	879	-	259	298	0	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	47 ~ 168	983	-	151	-	1393	-	-	1577	-	-	-
Mov Cap-2 Maneuver	47 ~ 168	-	-	151	-	-	-	-	-	-	-	-
Stage 1	297	223	-	991	871	-	-	-	-	-	-	-
Stage 2	793	879	-	33	204	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	159.9						0			6.5		
HCM LOS	F											
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1393	-	-	47	169	-	-	1577	-	-		
HCM Lane V/C Ratio	-	-	-	0.822	1.083	-	-	0.288	-	-		
HCM Control Delay (s)	0	-	-	214.6	148.4	-	0	8.2	0	-		
HCM Lane LOS	A	-	-	F	F	-	A	A	A	-		
HCM 95th %tile Q(veh)	0	-	-	3.3	9.2	-	-	1.2	-	-		
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)	42	10	22	9	10	80	9	230	2	55	464	9
Future Volume (vph)	42	10	22	9	10	80	9	230	2	55	464	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1678	1637	0	1770	1613	0	1586	1783	0	1631	1770	0
Flt Permitted	0.691			0.734			0.392			0.533		
Satd. Flow (perm)	1220	1637	0	1367	1613	0	655	1783	0	914	1770	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			91							1
Link Speed (mph)		30			30			30				30
Link Distance (ft)		172			514			566				291
Travel Time (s)		3.9			11.7			12.9				6.6
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	10%	10%	10%	7%	7%	7%
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)	48	36	0	10	102	0	10	263	0	63	537	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	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		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effect Green (s)	8.0	8.0		8.0	8.0		27.8	23.6		30.1	27.9	
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.59	0.50		0.64	0.59	
v/c Ratio	0.23	0.12		0.04	0.29		0.02	0.30		0.09	0.51	
Control Delay	26.8	15.8		25.1	11.2		7.9	14.9		7.4	14.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.8	15.8		25.1	11.2		7.9	14.9		7.4	14.5	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	B		A	B		A	B	
Approach Delay		22.1			12.4			14.6			13.7	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	9	2		2	2		1	42		4	61	
Queue Length 95th (ft)	60	33		20	50		11	184		40	#435	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	600	819		673	840		643	1492		757	1481	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.04		0.01	0.12		0.02	0.18		0.08	0.36	

## Intersection Summary

Area Type: Other

Cycle Length: 106

Actuated Cycle Length: 47.4

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.51

Intersection Signal Delay: 14.5

Intersection Capacity Utilization 49.8%

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Intersection LOS: B

ICU Level of Service A

Splits and Phases: 5: Pleasant Street (Route 102) &amp; Big Y Plaza/Tyringham Road

13 s	40.5 s	25.5 s	27 s
13 s	40.5 s	25.5 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT



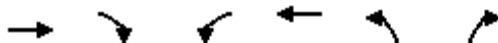
I-90 Interchange Study - Lee  
10: Premium Outlet Boulevard & Route 20

No Build AM  
2040 No Build

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations	↑↑		↘	↑	↖↖		
Traffic Volume (vph)	164	29	15	340	12	4	
Future Volume (vph)	164	29	15	340	12	4	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3121	0	1703	1852	2599	0	
Flt Permitted			0.545		0.964		
Satd. Flow (perm)	3121	0	977	1852	2599	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	18				5		
Link Speed (mph)	30			30	30		
Link Distance (ft)	474			486	343		
Travel Time (s)	10.8			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	13%	13%	6%	6%	27%	27%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	219	0	17	386	19	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effect Green (s)	27.9		26.9	29.3	5.9		
Actuated g/C Ratio	0.88		0.85	0.92	0.19		
v/c Ratio	0.08		0.02	0.23	0.04		
Control Delay	3.1		1.5	1.8	11.9		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	3.1		1.5	1.8	11.9		

I-90 Interchange Study - Lee  
10: Premium Outlet Boulevard & Route 20

No Build AM  
2040 No Build



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	3.1			1.8	11.9		
Approach LOS	A			A	B		
Queue Length 50th (ft)	0		0	0	1		
Queue Length 95th (ft)	31		4	64	7		
Internal Link Dist (ft)	394			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3078		1183	1852	2109		
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	0.07		0.01	0.21	0.01		

Intersection Summary

Area Type: Other  
Cycle Length: 120  
Actuated Cycle Length: 31.7  
Natural Cycle: 60  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.23  
Intersection Signal Delay: 2.5  
Intersection Capacity Utilization 30.4%  
Analysis Period (min) 15




Intersection LOS: A  
ICU Level of Service A

Splits and Phases: 10: Premium Outlet Boulevard & Route 20

Ø2 63 s	Ø5 18 s	Ø6 45 s	Ø9 27 s	Ø4 30 s
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I-90 Interchange Study - Blandford  
 1: Otis Stage Road (Route 23)/Main Street (Route 23) & North Street

No Build AM  
 2040 No Build

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	91	57	36	44	3
Future Vol, veh/h	8	91	57	36	44	3
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	88	88	88	88	88	88
Heavy Vehicles, %	0	0	13	13	8	8
Mvmt Flow	9	103	65	41	50	3
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	106	0	-	0	207	86
Stage 1	-	-	-	-	86	-
Stage 2	-	-	-	-	121	-
Critical Hdwy	4.1	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.2	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1498	-	-	-	768	956
Stage 1	-	-	-	-	922	-
Stage 2	-	-	-	-	890	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1498	-	-	-	763	956
Mov Cap-2 Maneuver	-	-	-	-	763	-
Stage 1	-	-	-	-	916	-
Stage 2	-	-	-	-	890	-
Approach	EB	WB		SB		
HCM Control Delay, s	0.6	0		10		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1498	-	-	-	773	
HCM Lane V/C Ratio	0.006	-	-	-	0.069	
HCM Control Delay (s)	7.4	0	-	-	10	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	0.2	

I-90 Interchange Study - Blandford  
5: Main Street (Route 23) & Russell Stage Road

No Build AM  
2040 No Build







Intersection						
Int Delay, s/veh	1.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	19	115	70	3	9	23
Future Vol, veh/h	19	115	70	3	9	23
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	88	88	88	88	88	88
Heavy Vehicles, %	3	3	13	13	8	8
Mvmt Flow	22	131	80	3	10	26
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	83	0	-	0	257	82
Stage 1	-	-	-	-	82	-
Stage 2	-	-	-	-	175	-
Critical Hdwy	4.13	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.227	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1508	-	-	-	719	961
Stage 1	-	-	-	-	926	-
Stage 2	-	-	-	-	841	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1508	-	-	-	707	961
Mov Cap-2 Maneuver	-	-	-	-	707	-
Stage 1	-	-	-	-	911	-
Stage 2	-	-	-	-	841	-
Approach	EB	WB		SB		
HCM Control Delay, s	1.1	0		9.3		
HCM LOS				A		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1508	-	-	-	873	
HCM Lane V/C Ratio	0.014	-	-	-	0.042	
HCM Control Delay (s)	7.4	0	-	-	9.3	
HCM Lane LOS	A	A	-	-	A	
HCM 95th %tile Q(veh)	0	-	-	-	0.1	

I-90 Interchange Study - Russell  
1: Westfield Road & Blandford Road

No Build AM  
2040 No Build

Intersection

Int Delay, s/veh 4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	174	53	162	248	11
Future Vol, veh/h	12	174	53	162	248	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	11	11	5	5
Mvmt Flow	14	198	60	184	282	13

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	586	282	282
Stage 1	282	-	-
Stage 2	304	-	-
Critical Hdwy	6.43	6.23	4.21
Critical Hdwy Stg 1	5.43	-	-
Critical Hdwy Stg 2	5.43	-	-
Follow-up Hdwy	3.527	3.327	2.299
Pot Cap-1 Maneuver	471	755	1230
Stage 1	763	-	-
Stage 2	746	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	448	755	1230
Mov Cap-2 Maneuver	448	-	-
Stage 1	726	-	-
Stage 2	746	-	-

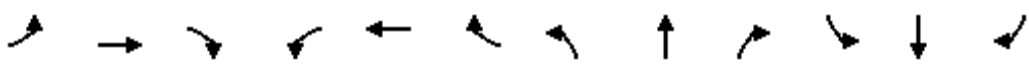
Approach	EB	NB	SB
HCM Control Delay, s	11.6	2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1230	-	448	755	-
HCM Lane V/C Ratio	0.049	-	0.03	0.262	-
HCM Control Delay (s)	8.1	-	13.3	11.5	-
HCM Lane LOS	A	-	B	B	-
HCM 95th %tile Q(veh)	0.2	-	0.1	1	-

I-90 Interchange Study - Westfield  
1: Southampton Road & Servistar Industrial Way

No Build AM  
2040 No Build

Intersection						
Int Delay, s/veh	2.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			W	W	
Traffic Vol, veh/h	37	53	42	529	519	67
Future Vol, veh/h	37	53	42	529	519	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	36	36	12	12	6	6
Mvmt Flow	40	58	46	575	564	73
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1268	601	637	0	-	0
Stage 1	601	-	-	-	-	-
Stage 2	667	-	-	-	-	-
Critical Hdwy	6.76	6.56	4.22	-	-	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.624	2.308	-	-	-
Pot Cap-1 Maneuver	158	443	900	-	-	-
Stage 1	487	-	-	-	-	-
Stage 2	452	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	146	443	900	-	-	-
Mov Cap-2 Maneuver	146	-	-	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	452	-	-	-	-	-
Approach	EB		NB	SB		
HCM Control Delay, s	29.8		0.7	0		
HCM LOS	D					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	900	-	241	-	-	
HCM Lane V/C Ratio	0.051	-	0.406	-	-	
HCM Control Delay (s)	9.2	0	29.8	-	-	
HCM Lane LOS	A	A	D	-	-	
HCM 95th %tile Q(veh)	0.2	-	1.9	-	-	













												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗				↖	↕			↕	↗
Traffic Volume (vph)	32	102	131	0	0	0	47	602	642	0	967	83
Future Volume (vph)	32	102	131	0	0	0	47	602	642	0	967	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1592	1322	0	0	0	1616	3052	0	0	3351	0
Flt Permitted		0.988					0.950					
Satd. Flow (perm)	0	1592	1322	0	0	0	1616	3052	0	0	3351	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			142					293			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)									1	1		
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 (%)	14%	14%	14%	0%	0%	0%	8%	8%	8%	10%	10%	10%
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)	0	146	142	0	0	0	51	1352	0	0	1141	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
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)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effect Green (s)		15.7	32.1				11.4	91.1			74.7	
Actuated g/C Ratio		0.13	0.27				0.10	0.76			0.62	
v/c Ratio		0.70	0.31				0.33	0.57			0.55	
Control Delay		67.3	6.8				57.0	6.8			15.8	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		67.3	6.8				57.0	6.8			15.8	

I-90 Interchange Study - Westfield  
 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road

No Build AM  
 2040 No Build

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
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	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effect Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			B	
Approach Delay		37.5						8.6			15.8	
Approach LOS		D						A			B	
Queue Length 50th (ft)		109	0				38	129			226	
Queue Length 95th (ft)		176	46				78	342			445	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		265	483				202	2387			2090	
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		0.55	0.29				0.25	0.57			0.55	

**Intersection Summary**

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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: 0.70

Intersection Signal Delay: 14.5

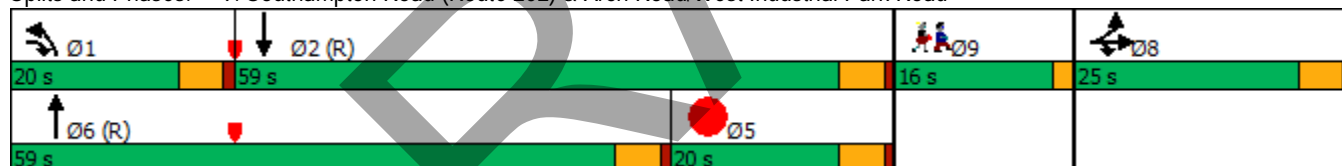
Intersection Capacity Utilization 54.5%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service A

Splits and Phases: 9: Southampton Road (Route 202) &amp; Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
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		

DRAFT

# I-90 Interchange Study - Westfield

No Build AM

## 13: North Elm Street (Route 10)/North Main Street (Route 202) & Notre Dame Street 2040 No Build

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↕		↖	↕	
Traffic Volume (vph)	207	104	81	14	81	72	43	1023	21	36	861	96
Future Volume (vph)	207	104	81	14	81	72	43	1023	21	36	861	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1677	1473	0	1655	0	1604	3312	0	1560	3175	0
Flt Permitted		0.656			0.958		0.113			0.094		
Satd. Flow (perm)	0	1136	1452	0	1592	0	191	3312	0	154	3175	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		19			1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	1					1	2		1	1		2
Confl. Bikes (#/hr)			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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	7%	7%	7%	5%	5%	5%	8%	8%	8%
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)	0	338	88	0	181	0	47	1135	0	39	1040	0
Turn Type	pm+pt	NA	custom	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4		1	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	35.0	56.0	21.0	21.0	21.0		21.0	58.0		14.0	51.0	
Total Split (%)	22.6%	36.1%	13.5%	13.5%	13.5%		13.5%	37.4%		9.0%	32.9%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effect Green (s)		50.4	6.9		50.4		59.1	53.5		57.2	50.6	
Actuated g/C Ratio		0.39	0.05		0.39		0.45	0.41		0.44	0.39	
v/c Ratio		0.77	0.46		0.29		0.29	0.84		0.28	0.84	
Control Delay		50.1	12.0		28.4		24.8	42.5		25.5	44.2	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		50.1	12.0		28.4		24.8	42.5		25.5	44.2	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	B		C		C	D		C	D	
Approach Delay		42.2			28.4			41.8			43.5	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)		235	0		88		19	430		16	383	
Queue Length 95th (ft)		#530	26		196		56	#781		49	#714	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		438	274		626		256	1357		156	1234	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.77	0.32		0.29		0.18	0.84		0.25	0.84	

## Intersection Summary

Area Type: Other

Cycle Length: 155

Actuated Cycle Length: 130.6

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 41.7

Intersection Capacity Utilization 77.2%

Analysis Period (min) 15









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

Queue shown is maximum after two cycles.

Intersection LOS: D

ICU Level of Service D

## Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) &amp; Notre Dame Street

 Ø1	 Ø2	 Ø9	 Ø4	
21 s	51 s	27 s	56 s	
 Ø5	 Ø6		 Ø7	 Ø8
14 s	58 s		35 s	21 s

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

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	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱				↰	↱			↰	↱
Traffic Volume (vph)	626	32	179	0	0	0	108	466	18	0	517	367
Future Volume (vph)	626	32	179	0	0	0	108	466	18	0	517	367
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1820	1777	0	0	0	1687	1704	0	0	3261	1711
Flt Permitted		0.955					0.284					
Satd. Flow (perm)	0	1820	1777	0	0	0	503	1704	0	0	3261	1668
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			195					2				399
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			5	5			4		10	10		4
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 (%)	3%	3%	3%	0%	0%	0%	7%	7%	7%	7%	7%	7%
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)	0	715	195	0	0	0	117	527	0	0	562	399
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effect Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.36	0.56				0.35	0.39			0.16	0.52
v/c Ratio		1.08	0.18				0.38	0.79			1.07	0.37
Control Delay		86.7	2.9				30.2	34.2			94.4	2.1
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		86.7	2.9				30.2	34.2			94.4	2.1

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
LOS		F	A				C	C			F	A
Approach Delay		68.8						33.5			56.1	
Approach LOS		E						C			E	
Queue Length 50th (ft)		254	0				28	153			113	0
Queue Length 95th (ft)		#754	36				97	#509			#326	30
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		661	1079				307	667			523	1070
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		1.08	0.18				0.38	0.79			1.07	0.37

## Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 73.8

Natural Cycle: 120

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.08

Intersection Signal Delay: 54.9

Intersection Capacity Utilization 71.9%

Analysis Period (min) 15






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

Queue shown is maximum after two cycles.

Intersection LOS: D

ICU Level of Service C

Splits and Phases: 18: Elm Street &amp; Franklin Street (Route 20)/Mobil Gas Station Driveway

 Ø2	 Ø4	 Ø9
31 s	32 s	27 s
 Ø6	 Ø5	
17 s	14 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

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**Intersection**

Int Delay, s/veh 5.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	98	154	0	4	107	538	0	0	8	666	1	94
Future Vol, veh/h	98	154	0	4	107	538	0	0	8	666	1	94
Conflicting Peds, #/hr	0	0	14	14	0	0	7	0	0	0	0	7
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	4	4	4	13	13	13	4	4	4
Mvmt Flow	111	175	0	5	122	611	0	0	9	757	1	107

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1642	1585	76	1675	1634	-	115	0	0	9	0	0
Stage 1	1576	1576	-	5	5	-	-	-	-	-	-	-
Stage 2	66	9	-	1670	1629	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.14	6.54	-	4.23	-	-	4.14	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.536	4.036	-	2.317	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 80	~ 108	985	75	~ 100	0	1408	-	-	1598	-	-
Stage 1	138	~ 170	-	1012	888	0	-	-	-	-	-	-
Stage 2	945	888	-	120	158	0	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	-	~ 53	961	-	~ 49	-	1399	-	-	1598	-	-
Mov Cap-2 Maneuver	-	~ 53	-	-	~ 49	-	-	-	-	-	-	-
Stage 1	137	~ 83	-	1012	888	-	-	-	-	-	-	-
Stage 2	816	888	-	-	~ 77	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0	8.1
HCM LOS	-	-		













Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1399	-	-	-	53	-	-	1598	-	-
HCM Lane V/C Ratio	-	-	-	-	3.302	-	-	0.474	-	-
HCM Control Delay (s)	0	-	-	\$	1198.4	-	0	9.3	0	-
HCM Lane LOS	A	-	-	-	F	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	18.8	-	-	2.6	-	-

**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)	149	22	39	57	9	7	16	369	12	77	428	7
Future Volume (vph)	149	22	39	57	9	7	16	369	12	77	428	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1745	1694	0	1671	1625	0	1662	1860	0	1678	1823	0
Flt Permitted	0.746			0.712			0.426			0.320		
Satd. Flow (perm)	1367	1694	0	1253	1625	0	744	1860	0	565	1823	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44			8			2			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	8%	8%	8%	5%	5%	5%	4%	4%	4%
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)	169	69	0	65	18	0	18	433	0	88	494	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	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		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effect Green (s)	13.9	13.9		13.9	13.9		31.0	23.3		34.5	30.6	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.51	0.38		0.56	0.50	
v/c Ratio	0.54	0.16		0.23	0.05		0.04	0.61		0.19	0.54	
Control Delay	33.1	14.6		27.1	20.6		10.1	23.3		10.1	17.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	33.1	14.6		27.1	20.6		10.1	23.3		10.1	17.3	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	C		B	C		B	B	
Approach Delay		27.7			25.7			22.8			16.2	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	45	6		16	2		2	109		10	85	
Queue Length 95th (ft)	#179	51		77	25		18	357		60	407	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	500	648		458	600		583	1192		523	1178	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.34	0.11		0.14	0.03		0.03	0.36		0.17	0.42	

## Intersection Summary

Area Type: Other

Cycle Length: 106

Actuated Cycle Length: 61.1

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 21.0

Intersection Capacity Utilization 53.7%

Analysis Period (min) 15








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

Queue shown is maximum after two cycles.

Intersection LOS: C

ICU Level of Service A

Splits and Phases: 5: Pleasant Street (Route 102) &amp; Big Y Plaza/Tyringham Road

 Ø1	 Ø2	 Ø4	 Ø9
13 s	40.5 s	25.5 s	27 s
 Ø5	 Ø6	 Ø8	
13 s	40.5 s	25.5 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

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I-90 Interchange Study - Lee  
10: Premium Outlet Boulevard & Route 20

No Build PM  
2040 No Build

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations	↑↑		↘	↑	↖↖		
Traffic Volume (vph)	372	135	21	238	190	25	
Future Volume (vph)	372	135	21	238	190	25	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3269	0	1719	1870	3226	0	
Flt Permitted			0.360		0.958		
Satd. Flow (perm)	3269	0	651	1870	3226	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	46				11		
Link Speed (mph)	30			30	30		
Link Distance (ft)	324			486	343		
Travel Time (s)	7.4			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	6%	6%	5%	5%	4%	4%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	576	0	24	270	244	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effect Green (s)	14.4		17.9	15.9	9.1		
Actuated g/C Ratio	0.41		0.51	0.45	0.26		
v/c Ratio	0.42		0.05	0.32	0.29		
Control Delay	8.9		4.5	7.3	12.4		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	8.9		4.5	7.3	12.4		



I-90 Interchange Study - Lee  
10: Premium Outlet Boulevard & Route 20

No Build PM  
2040 No Build

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	8.9			7.1	12.4		
Approach LOS	A			A	B		
Queue Length 50th (ft)	30		2	28	15		
Queue Length 95th (ft)	94		8	63	53		
Internal Link Dist (ft)	244			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3133		814	1870	2491		
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	0.18		0.03	0.14	0.10		

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 35.4

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.42






Intersection Signal Delay: 9.2

Intersection Capacity Utilization 32.0%

Analysis Period (min) 15

Intersection LOS: A  
ICU Level of Service A

Splits and Phases: 10: Premium Outlet Boulevard & Route 20

 Ø2 63 s	 Ø9 27 s	 Ø4 30 s
 Ø5 18 s	 Ø6 45 s	

I-90 Interchange Study - Blandford  
 1: Otis Stage Road (Route 23)/Main Street (Route 23) & North Street

No Build PM  
 2040 No Build

Intersection

Int Delay, s/veh 2

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations

Traffic Vol, veh/h 5 76 104 45 46 3

Future Vol, veh/h 5 76 104 45 46 3

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 88 88 88 88 88 88

Heavy Vehicles, % 3 3 5 5 13 13

Mvmt Flow 6 86 118 51 52 3

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 169 0 - 0 242 144

Stage 1 - - - - 144 -

Stage 2 - - - - 98 -

Critical Hdwy 4.13 - - - 6.53 6.33

Critical Hdwy Stg 1 - - - - 5.53 -

Critical Hdwy Stg 2 - - - - 5.53 -

Follow-up Hdwy 2.227 - - - 3.617 3.417

Pot Cap-1 Maneuver 1402 - - - 723 875

Stage 1 - - - - 857 -

Stage 2 - - - - 899 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 1402 - - - 720 875

Mov Cap-2 Maneuver - - - - 720 -

Stage 1 - - - - 854 -

Stage 2 - - - - 899 -

Approach EB WB SB

HCM Control Delay, s 0.5 0 10.4

HCM LOS B

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 1402 - - - 728

HCM Lane V/C Ratio 0.004 - - - 0.076

HCM Control Delay (s) 7.6 0 - - 10.4

HCM Lane LOS A A - - B

HCM 95th %tile Q(veh) 0 - - - 0.2

I-90 Interchange Study - Blandford  
5: Main Street (Route 23) & Russell Stage Road

No Build PM  
2040 No Build

Intersection

Int Delay, s/veh 2.9

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations

Traffic Vol, veh/h 36 86 98 12 10 51

Future Vol, veh/h 36 86 98 12 10 51

Conflicting Peds, #/hr 2 0 0 2 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 88 88 88 88 88 88

Heavy Vehicles, % 6 6 4 4 6 6

Mvmt Flow 41 98 111 14 11 58

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 127 0 - 0 300 120

Stage 1 - - - - 120 -

Stage 2 - - - - 180 -

Critical Hdwy 4.16 - - - 6.46 6.26

Critical Hdwy Stg 1 - - - - 5.46 -

Critical Hdwy Stg 2 - - - - 5.46 -

Follow-up Hdwy 2.254 - - - 3.554 3.354

Pot Cap-1 Maneuver 1435 - - - 683 921

Stage 1 - - - - 895 -

Stage 2 - - - - 841 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 1432 - - - 660 919

Mov Cap-2 Maneuver - - - - 660 -

Stage 1 - - - - 866 -

Stage 2 - - - - 839 -

Approach EB WB SB

HCM Control Delay, s 2.2 0 9.5

HCM LOS A

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 1432 - - - 863

HCM Lane V/C Ratio 0.029 - - - 0.08

HCM Control Delay (s) 7.6 0 - - 9.5

HCM Lane LOS A A - - A







HCM 95th %tile Q(veh) 0.1 - - - 0.3

I-90 Interchange Study - Russell  
1: Westfield Road & Blandford Road

No Build PM  
2040 No Build

Intersection

Int Delay, s/veh 3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	95	151	309	230	12
Future Vol, veh/h	11	95	151	309	230	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	13	108	172	351	261	14

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	956	261	261
Stage 1	261	-	-
Stage 2	695	-	-
Critical Hdwy	6.44	6.24	4.11
Critical Hdwy Stg 1	5.44	-	-
Critical Hdwy Stg 2	5.44	-	-
Follow-up Hdwy	3.536	3.336	2.209
Pot Cap-1 Maneuver	284	773	1309
Stage 1	778	-	-
Stage 2	491	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	247	773	1309
Mov Cap-2 Maneuver	247	-	-
Stage 1	676	-	-
Stage 2	491	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.4	2.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1309	-	247	773	-
HCM Lane V/C Ratio	0.131	-	0.051	0.14	-
HCM Control Delay (s)	8.2	-	20.4	10.4	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.5	-	0.2	0.5	-

I-90 Interchange Study - Westfield  
1: Northampton Road (Route 10/202) & Servistar Industrial Way

No Build PM  
2040 No Build

Intersection						
Int Delay, s/veh	4.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	RT			LT	LT	
Traffic Vol, veh/h	61	36	12	655	685	51
Future Vol, veh/h	61	36	12	655	685	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	23	23	8	8	3	3
Mvmt Flow	66	39	13	712	745	55
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1511	773	800	0	-	0
Stage 1	773	-	-	-	-	-
Stage 2	738	-	-	-	-	-
Critical Hdwy	6.63	6.43	4.18	-	-	-
Critical Hdwy Stg 1	5.63	-	-	-	-	-
Critical Hdwy Stg 2	5.63	-	-	-	-	-
Follow-up Hdwy	3.707	3.507	2.272	-	-	-
Pot Cap-1 Maneuver	118	367	797	-	-	-
Stage 1	420	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	115	367	797	-	-	-
Mov Cap-2 Maneuver	115	-	-	-	-	-
Stage 1	409	-	-	-	-	-
Stage 2	437	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	68	0.2		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	797	-	154	-	-	
HCM Lane V/C Ratio	0.016	-	0.685	-	-	
HCM Control Delay (s)	9.6	0	68	-	-	
HCM Lane LOS	A	A	F	-	-	
HCM 95th %tile Q(veh)	0.1	-	3.9	-	-	

	↖	→	↘	↙	←	↗	↖	↑	↗	↘	↓	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗				↖	↕			↕	
Traffic Volume (vph)	82	88	217	0	0	0	131	411	644	0	1385	130
Future Volume (vph)	82	88	217	0	0	0	131	411	644	0	1385	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1725	1449	0	0	0	1694	3182	0	0	3568	0
Flt Permitted		0.977					0.950					
Satd. Flow (perm)	0	1725	1449	0	0	0	1693	3182	0	0	3568	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			236					429			11	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)			1	1			2					2
Confl. Bikes (#/hr)												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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	3%	3%	3%	3%	3%	3%
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)	0	185	236	0	0	0	142	1147	0	0	1646	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
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)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effect Green (s)		17.3	36.8				14.5	89.5			70.0	
Actuated g/C Ratio		0.14	0.31				0.12	0.75			0.58	
v/c Ratio		0.75	0.39				0.70	0.46			0.79	
Control Delay		67.3	5.5				68.5	4.8			24.7	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		67.3	5.5				68.5	4.8			24.7	

I-90 Interchange Study - Westfield  
 9: Southampton Road (Route 202) & Arch Road/West Industrial Park Road

No Build PM  
 2040 No Build

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
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	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effect Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
LOS		E	A				E	A			C	
Approach Delay		32.6						11.8			24.7	
Approach LOS		C						B			C	
Queue Length 50th (ft)		138	0				106	75			471	
Queue Length 95th (ft)		216	56				#190	202			#853	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		291	612				220	2482			2086	
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		0.64	0.39				0.65	0.46			0.79	

## Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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: 0.79

Intersection Signal Delay: 20.8

Intersection Capacity Utilization 73.3%

Analysis Period (min) 15







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

Queue shown is maximum after two cycles.

Intersection LOS: C

ICU Level of Service D

Splits and Phases: 9: Southampton Road (Route 202) &amp; Arch Road/West Industrial Park Road

 Ø1	 Ø2 (R)	 Ø9	 Ø8
20 s	59 s	16 s	25 s
 Ø6 (R)	 Ø5		
59 s	20 s		



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
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		

DRAFT

# I-90 Interchange Study - Westfield

No Build PM

## 13: North Elm Street (Route 10)/North Main Street (Route 202) & Notre Dame Street 2040 No Build

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↕		↖	↕	
Traffic Volume (vph)	92	68	43	29	121	73	72	1011	5	81	1248	181
Future Volume (vph)	92	68	43	29	121	73	72	1011	5	81	1248	181
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1750	1531	0	1770	0	1620	3352	0	1636	3313	0
Flt Permitted		0.583			0.939		0.072			0.123		
Satd. Flow (perm)	0	1047	1510	0	1673	0	123	3352	0	212	3313	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			47		13						11	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	7		1	1		7	2		3	3		2
Confl. Bikes (#/hr)			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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	4%	4%	4%	3%	3%	3%
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)	0	174	47	0	243	0	78	1104	0	88	1554	0
Turn Type	pm+pt	NA	pm+ov	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	1		8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	20.0	46.0	26.0	26.0	26.0		26.0	68.0		14.0	56.0	
Total Split (%)	12.9%	29.7%	16.8%	16.8%	16.8%		16.8%	43.9%		9.0%	36.1%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effect Green (s)		37.9	46.0		37.9		63.4	55.2		61.9	54.5	
Actuated g/C Ratio		0.30	0.36		0.30		0.50	0.43		0.48	0.43	
v/c Ratio		0.56	0.08		0.48		0.50	0.76		0.48	1.10	
Control Delay		50.3	8.5		41.9		31.2	37.4		27.1	90.5	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		50.3	8.5		41.9		31.2	37.4		27.1	90.5	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A		D		C	D		C	F	
Approach Delay		41.4			41.9			37.0			87.1	
Approach LOS		D			D			D			F	
Queue Length 50th (ft)		100	0		129		26	360		30	~674	
Queue Length 95th (ft)		250	28		298		80	617		81	#1174	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		337	719		504		307	1673		195	1417	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.52	0.07		0.48		0.25	0.66		0.45	1.10	

## Intersection Summary

Area Type: Other

Cycle Length: 155

Actuated Cycle Length: 128

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.10

Intersection Signal Delay: 62.7

Intersection Capacity Utilization 86.6%

Analysis Period (min) 15

Intersection LOS: E

ICU Level of Service E

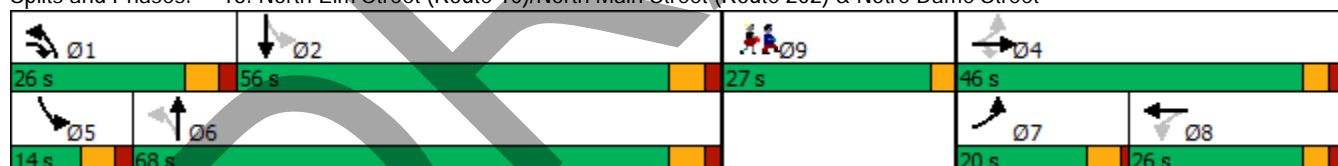
~ Volume exceeds capacity, queue is theoretically infinite.

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: 13: North Elm Street (Route 10)/North Main Street (Route 202) &amp; Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

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	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗				↖	↗			↖	↗
Traffic Volume (vph)	513	16	161	0	0	0	302	547	15	0	623	343
Future Volume (vph)	513	16	161	0	0	0	302	547	15	0	623	343
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1854	1812	0	0	0	1752	1773	0	0	3421	1794
Flt Permitted		0.954					0.196					
Satd. Flow (perm)	0	1854	1812	0	0	0	359	1773	0	0	3421	1733
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			175					2				356
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			10	10			12		27	27		12
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 (%)	1%	1%	1%	0%	0%	0%	3%	3%	3%	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)	0	575	175	0	0	0	328	611	0	0	677	373
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effect Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.34	0.52				0.33	0.36			0.15	0.48
v/c Ratio		0.92	0.17				1.26	0.94			1.32	0.36
Control Delay		51.2	3.0				174.3	54.2			189.6	2.3
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		51.2	3.0				174.3	54.2			189.6	2.3

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
LOS		D	A				F	D			F	A
Approach Delay		39.9						96.1			123.1	
Approach LOS		D						F			F	
Queue Length 50th (ft)		~367	0				~239	~401			~288	3
Queue Length 95th (ft)		#567	35				#385	#608			#398	33
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		627	1027				261	647			512	1039
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	0.17				1.26	0.94			1.32	0.36

## Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 79.2

Natural Cycle: 120

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.32

Intersection Signal Delay: 91.1

Intersection Capacity Utilization 77.8%

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.

Intersection LOS: F

ICU Level of Service D

Splits and Phases: 18: Elm Street &amp; Franklin Street (Route 20)/Mobil Gas Station Driveway

 Ø2	 Ø4	 Ø9
31 s	32 s	27 s
 Ø6	 Ø5	
17 s	14 s	



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

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# Future Year (2040) Build Conditions

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**Intersection**

Int Delay, s/veh 2.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		4			1		1					
Traffic Vol, veh/h	46	65	0	0	112	94	34	0	43	0	0	0
Future Vol, veh/h	46	65	0	0	112	94	34	0	43	0	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	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	-	-	-
Veh in Median Storage, #	-	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, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	50	71	0	0	122	102	37	0	47	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	224	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.2	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.29	-	-
Pot Cap-1 Maneuver	1299	-	0
Stage 1	-	-	0
Stage 2	-	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1299	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SE	NW	NE
HCM Control Delay, s	3.3	0	10.2
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	NWT	NWR	SEL	SET
Capacity (veh/h)	771	-	-	1299	-
HCM Lane V/C Ratio	0.109	-	-	0.038	-
HCM Control Delay (s)	10.2	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0.1	-

**Intersection**

Int Delay, s/veh 5.2

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↶			↷					↶		
Traffic Vol, veh/h	0	57	45	91	55	0	0	0	0	54	0	49
Future Vol, veh/h	0	57	45	91	55	0	0	0	0	54	0	49
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	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	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, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	62	49	99	60	0	0	0	0	59	0	53

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	-	0	0	111	0	0	344	-	60
Stage 1	-	-	-	-	-	-	258	-	-
Stage 2	-	-	-	-	-	-	86	-	-
Critical Hdwy	-	-	-	4.2	-	-	6.5	-	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	5.5	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.5	-	-
Follow-up Hdwy	-	-	-	2.29	-	-	3.59	-	3.39
Pot Cap-1 Maneuver	0	-	-	1430	-	0	637	0	983
Stage 1	0	-	-	-	-	0	767	0	-
Stage 2	0	-	-	-	-	0	918	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	1430	-	-	591	0	983
Mov Cap-2 Maneuver	-	-	-	-	-	-	591	0	-
Stage 1	-	-	-	-	-	-	712	0	-
Stage 2	-	-	-	-	-	-	918	0	-

Approach	SE	NW	SW
HCM Control Delay, s	0	4.8	10.8
HCM LOS			B

Minor Lane/Major Mvmt	NWL	NWT	SET	SERSWLn1
Capacity (veh/h)	1430	-	-	729
HCM Lane V/C Ratio	0.069	-	-	0.154
HCM Control Delay (s)	7.7	0	-	10.8
HCM Lane LOS	A	A	-	B
HCM 95th %tile Q(veh)	0.2	-	-	0.5

Intersection

Int Delay, s/veh 4.7

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		4			1		1					
Traffic Vol, veh/h	45	107	0	0	41	78	52	0	103	0	0	0
Future Vol, veh/h	45	107	0	0	41	78	52	0	103	0	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	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	0	-	-	-	-	-
Veh in Median Storage, #	-	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, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	49	116	0	0	45	85	57	0	112	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	129	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.2	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.29	-	-
Pot Cap-1 Maneuver	1409	0	0
Stage 1	-	0	0
Stage 2	-	0	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1409	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	SE	NW	NE
HCM Control Delay, s	2.3	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	NWT	NWR	SEL	SET
Capacity (veh/h)	804	-	-	1409	-
HCM Lane V/C Ratio	0.21	-	-	0.035	-
HCM Control Delay (s)	10.7	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.1	-

**Intersection**

Int Delay, s/veh 4.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↰			↱					↱		
Traffic Vol, veh/h	0	66	40	41	78	0	0	0	0	86	0	40
Future Vol, veh/h	0	66	40	41	78	0	0	0	0	86	0	40
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	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	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, %	10	10	10	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	72	43	45	85	0	0	0	0	93	0	43

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	-	0	0	115	0	0	267	-	85
Stage 1	-	-	-	-	-	-	174	-	-
Stage 2	-	-	-	-	-	-	93	-	-
Critical Hdwy	-	-	-	4.2	-	-	6.5	-	6.3
Critical Hdwy Stg 1	-	-	-	-	-	-	5.5	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.5	-	-
Follow-up Hdwy	-	-	-	2.29	-	-	3.59	-	3.39
Pot Cap-1 Maneuver	0	-	-	1426	-	0	705	0	952
Stage 1	0	-	-	-	-	0	837	0	-
Stage 2	0	-	-	-	-	0	911	0	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	1426	-	-	682	0	952
Mov Cap-2 Maneuver	-	-	-	-	-	-	682	0	-
Stage 1	-	-	-	-	-	-	809	0	-
Stage 2	-	-	-	-	-	-	911	0	-

Approach	SE	NW	SW
HCM Control Delay, s	0	2.6	10.9
HCM LOS			B

Minor Lane/Major Mvmt	NWL	NWT	SET	SERSWLn1	
Capacity (veh/h)	1426	-	-	-	749
HCM Lane V/C Ratio	0.031	-	-	-	0.183
HCM Control Delay (s)	7.6	0	-	-	10.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.7

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Alternative 1 AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations		↑↑	↑↑		↑↑		
Traffic Volume (vph)	0	402	341	0	214	0	
Future Volume (vph)	0	402	341	0	214	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Fr t							
Flt Protected					0.950		
Satd. Flow (prot)	0	3505	3471	0	2993	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3505	3471	0	2993	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.75	0.80	0.92	0.89	0.25	
Heavy Vehicles (%)	0%	3%	4%	0%	17%	0%	
Adj. Flow (vph)	0	536	426	0	240	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	536	426	0	240	0	
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		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
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		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Alternative 1 AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		26.0	26.0		44.0		24.0
Total Split (%)		27.7%	27.7%		46.8%		26%
Maximum Green (s)		21.0	21.0		39.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		71.0	71.0		13.0		
Actuated g/C Ratio		0.76	0.76		0.14		
v/c Ratio		0.20	0.16		0.58		
Control Delay		3.8	5.2		43.4		
Queue Delay		0.0	0.0		0.0		
Total Delay		3.8	5.2		43.4		
LOS		A	A		D		
Approach Delay		3.8	5.2		43.4		
Approach LOS		A	A		D		
Queue Length 50th (ft)		38	62		70		
Queue Length 95th (ft)		53	82		102		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2648	2622		1241		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.20	0.16		0.19		

### Intersection Summary

Area Type: Other

Cycle Length: 94

Actuated Cycle Length: 94



Lanes, Volumes, Timings

1: Route 20 & I-90 Exit

Alternative 1 AM Peak Hour

Offset: 15 (16%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 12.2	Intersection LOS: B
Intersection Capacity Utilization 25.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Route 20 & I-90 Exit





















 Ø2 (R)	 Ø4	 Ø9
26 s	44 s	24 s
 Ø6 (R)		
26 s		

DRAFT

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 1 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	135	435	74	135	108	207	88	46	0	0	0
Future Volume (vph)	17	135	435	74	135	108	207	88	46	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.928				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1543	3406	1495	1752	2785	0	1752	1712	1495	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1543	3406	1495	1752	2785	0	1752	1712	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			478		157				162			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.98	0.91	0.88	0.80	0.69	0.95	0.74	0.63	0.92	0.92	0.92
Heavy Vehicles (%)	17%	6%	8%	3%	2%	40%	3%	11%	8%	0%	0%	0%
Adj. Flow (vph)	34	138	478	84	169	157	218	119	73	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	138	478	84	326	0	218	119	73	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)		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	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	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)	6	6	20	18	6		18	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)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20













Alternative 1 AM Peak Hour

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
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	
Heavy Vehicles (%)	
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)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 1 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex						Cl+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0						0.0					
Detector 4 Position(ft)	36						36					
Detector 4 Size(ft)	6						6					
Detector 4 Type	Cl+Ex						Cl+Ex					
Detector 4 Channel												
Detector 4 Extend (s)	0.0						0.0					
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	20.0	26.0	26.0	20.0	26.0		24.0	24.0	24.0			
Total Split (%)	21.3%	27.7%	27.7%	21.3%	27.7%		25.5%	25.5%	25.5%			
Maximum Green (s)	15.0	21.0	21.0	15.0	21.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
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	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	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	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	7.6	55.4	55.4	9.8	59.8		16.0	16.0	16.0			
Actuated g/C Ratio	0.08	0.59	0.59	0.10	0.64		0.17	0.17	0.17			
v/c Ratio	0.27	0.07	0.44	0.46	0.18		0.73	0.41	0.19			
Control Delay	42.5	12.8	7.9	47.0	5.1		51.5	38.4	1.1			
Queue Delay	0.0	0.0	0.3	0.0	0.0		0.0	0.0	0.0			
Total Delay	42.5	12.8	8.2	47.0	5.1		51.5	38.4	1.1			
LOS	D	B	A	D	A		D	D	A			
Approach Delay	10.9				13.7				38.7			
Approach LOS	B				B				D			
Queue Length 50th (ft)	20	27	92	48	22		123	63	0			
Queue Length 95th (ft)	27	51	164	88	38		196	91	0			
Internal Link Dist (ft)	324				528				295			
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	246	2007	1077	279	1828		354	346	431			
Starvation Cap Reductn	0	0	189	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.14	0.07	0.54	0.30	0.18		0.62	0.34	0.17			

### Intersection Summary

## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20

Alternative 1 AM Peak Hour







Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	26%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

Lanes, Volumes, Timings  
2: Route 102/I-90 Entrance & Route 20

Alternative 1 AM Peak Hour

Area Type:	Other
Cycle Length:	94
Actuated Cycle Length:	94
Offset:	15 (16%), Referenced to phase 2:WBT and 6:EBT, Start of Green
Natural Cycle:	80
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.73
Intersection Signal Delay:	19.5
Intersection LOS:	B
Intersection Capacity Utilization	39.4%
ICU Level of Service	A
Analysis Period (min)	15

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20

 Ø1 20 s	 Ø2 (R) 26 s	 Ø4 24 s	 Ø7 24 s
 Ø5 20 s	 Ø6 (R) 26 s		

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Alternative 1 PM Peak Hour

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↑↑	
Traffic Volume (vph)	0	511	423	0	234	0
Future Volume (vph)	0	511	423	0	234	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00
Fr t						
Flt Protected					0.950	
Satd. Flow (prot)	0	3574	3574	0	3127	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	3574	3574	0	3127	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						
Link Speed (mph)		30	30		30	
Link Distance (ft)		524	404		357	
Travel Time (s)		11.9	9.2		8.1	
Peak Hour Factor	0.92	0.85	0.91	0.91	0.68	0.25
Heavy Vehicles (%)	0%	1%	1%	0%	12%	0%
Adj. Flow (vph)	0	601	465	0	344	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	601	465	0	344	0
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		2	2		4	
Detector Template		Thru	Thru		DT1	
Leading Detector (ft)		100	100		42	
Trailing Detector (ft)		0	0		0	
Detector 1 Position(ft)		0	0		0	
Detector 1 Size(ft)		6	6		6	
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)		0.0	0.0		0.0	
Detector 1 Queue (s)		0.0	0.0		0.0	
Detector 1 Delay (s)		0.0	0.0		0.0	
Detector 2 Position(ft)		94	94		12	
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	
Detector 3 Position(ft)					24	
Detector 3 Size(ft)					6	
Detector 3 Type					Cl+Ex	
Detector 3 Channel						
Detector 3 Extend (s)					0.0	

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Alternative 1 PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		41.0	41.0		39.0		24.0
Total Split (%)		39.4%	39.4%		37.5%		23%
Maximum Green (s)		36.0	36.0		34.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		77.2	77.2		16.8		
Actuated g/C Ratio		0.74	0.74		0.16		
v/c Ratio		0.23	0.18		0.68		
Control Delay		4.7	6.9		47.9		
Queue Delay		0.0	0.0		0.0		
Total Delay		4.7	6.9		47.9		
LOS		A	A		D		
Approach Delay		4.7	6.9		47.9		
Approach LOS		A	A		D		
Queue Length 50th (ft)		55	88		112		
Queue Length 95th (ft)		83	m132		109		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2653	2653		1022		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.23	0.18		0.34		

### Intersection Summary

Area Type: Other

Cycle Length: 104

Actuated Cycle Length: 104



Lanes, Volumes, Timings

1: Route 20 & I-90 Exit

Alternative 1 PM Peak Hour

Offset: 16 (15%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68





Intersection Signal Delay: 16.0 Intersection LOS: B

Intersection Capacity Utilization 29.1% ICU Level of Service A

Analysis Period (min) 15

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





















Splits and Phases: 1: Route 20 & I-90 Exit

 Ø2 (R)	 Ø4	 Ø9
41 s	39 s	24 s
 Ø6 (R)		
41 s		

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 1 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	269	375	114	197	94	226	82	221	0	0	0
Future Volume (vph)	27	269	375	114	197	94	226	82	221	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.952				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1262	3505	1568	1805	3299	0	1787	1776	1599	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1262	3505	1568	1805	3299	0	1787	1776	1599	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			431		83				257			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.91	0.87	0.82	0.90	0.90	0.75	0.79	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	43%	3%	3%	0%	0%	13%	1%	7%	1%	0%	0%	0%
Adj. Flow (vph)	54	296	431	139	219	104	301	104	257	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	296	431	139	323	0	301	104	257	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)		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	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	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)	6	6	20	18	6		18	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)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

Lanes, Volumes, Timings  
2: Route 102/I-90 Entrance & Route 20

Alternative 1 PM Peak Hour

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
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	
Heavy Vehicles (%)	
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)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 1 PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex						Cl+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0						0.0					
Detector 4 Position(ft)	36						36					
Detector 4 Size(ft)	6						6					
Detector 4 Type	Cl+Ex						Cl+Ex					
Detector 4 Channel												
Detector 4 Extend (s)	0.0						0.0					
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	15.0	41.0	41.0	15.0	41.0		24.0	24.0	24.0			
Total Split (%)	14.4%	39.4%	39.4%	14.4%	39.4%		23.1%	23.1%	23.1%			
Maximum Green (s)	10.0	36.0	36.0	10.0	36.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
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	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	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	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)	9.8	56.2	56.2	14.0	62.5		18.9	18.9	18.9			
Actuated g/C Ratio	0.09	0.54	0.54	0.13	0.60		0.18	0.18	0.18			
v/c Ratio	0.46	0.16	0.41	0.57	0.16		0.93	0.32	0.51			
Control Delay	52.2	17.1	9.6	51.2	7.9		78.2	40.2	8.7			
Queue Delay	0.0	0.0	0.4	0.0	0.0		0.0	0.0	0.0			
Total Delay	52.2	17.1	10.1	51.2	7.9		78.2	40.2	8.7			
LOS	D	B	B	D	A		E	D	A			
Approach Delay		15.7			20.9			45.2				
Approach LOS		B			C			D				
Queue Length 50th (ft)	34	74	99	88	35		199	61	0			
Queue Length 95th (ft)	39	110	157	130	63		#262	97	57			
Internal Link Dist (ft)		324			528			295			180	
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	135	1892	1044	245	2014		326	324	502			
Starvation Cap Reductn	0	0	249	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.40	0.16	0.54	0.57	0.16		0.92	0.32	0.51			
Intersection Summary												

## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20

Alternative 1 PM Peak Hour

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	23%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20

Alternative 1 PM Peak Hour

Area Type: Other

Cycle Length: 104

Actuated Cycle Length: 104

Offset: 16 (15%), Referenced to phase 2:WBT and 6:EBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 27.2

Intersection LOS: C

Intersection Capacity Utilization 38.8%

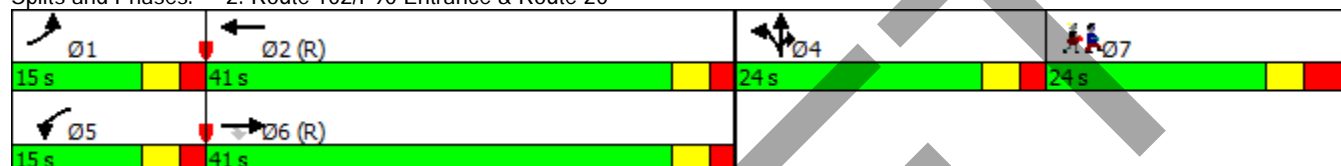
ICU Level of Service A

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.






















Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp













Alternative 1 AM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	633	1	0	421	349	165	66	698	19	803	19
Future Volume (vph)	0	633	1	0	421	349	165	66	698	19	803	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	300		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.999				0.850			0.850		0.996	
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3525	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3525	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						388			428			2
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			1032			374	
Travel Time (s)		8.6			13.8			23.5			8.5	
Peak Hour Factor	0.92	0.84	0.38	0.35	0.73	0.90	0.78	0.54	0.92	0.47	0.81	0.80
Adj. Flow (vph)	0	754	3	0	577	388	212	122	759	40	991	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	757	0	0	577	388	212	122	759	40	1015	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			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		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	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)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp

Alternative 1 AM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type	NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA		
Protected Phases	6		5	2	2	7	4	4	3	8		
Permitted Phases												
Detector Phase	6		5	2	2	7	4	4	3	8		
Switch Phase												
Minimum Initial (s)	10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0		
Minimum Split (s)	15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0		
Total Split (s)	35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0		
Total Split (%)	35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%		
Maximum Green (s)	30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0		
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	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	5.0	6.0	6.0	5.0	6.0		
Lead/Lag	Lag		Lead			Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes		Yes			Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0		
Recall Mode	None		None	None	None	None	C-Max	C-Max	None	C-Max		
Act Effect Green (s)	26.3			26.3	26.3	17.9	54.4	54.4	7.8	39.8		
Actuated g/C Ratio	0.26			0.26	0.26	0.18	0.54	0.54	0.08	0.40		
v/c Ratio	0.81			0.62	0.55	0.67	0.12	0.72	0.29	0.72		
Control Delay	41.9			35.0	6.0	48.3	14.8	13.7	48.3	31.4		
Queue Delay	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	41.9			35.0	6.0	48.3	14.8	13.7	48.3	31.4		
LOS	D			D	A	D	B	B	D	C		
Approach Delay	41.9			23.4			20.5			32.0		
Approach LOS	D			C			C			C		
Queue Length 50th (ft)	238			170	0	127	40	160	25	282		
Queue Length 95th (ft)	257			161	64	161	49	#461	29	#410		
Internal Link Dist (ft)	297			527			952			294		
Turn Bay Length (ft)						300						
Base Capacity (vph)	1076			1769	985	369	1012	1055	354	1404		
Starvation Cap Reductn	0			0	0	0	0	0	0	0		
Spillback Cap Reductn	0			0	0	0	0	0	0	0		
Storage Cap Reductn	0			0	0	0	0	0	0	0		
Reduced v/c Ratio	0.70			0.33	0.39	0.57	0.12	0.72	0.11	0.72		

### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green



## Lanes, Volumes, Timings

### 1: Southampton Rd & Friendly's Way/I-90 Ramp

Alternative 1 AM Peak Hour

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 28.5

Intersection LOS: C

Intersection Capacity Utilization 72.4%

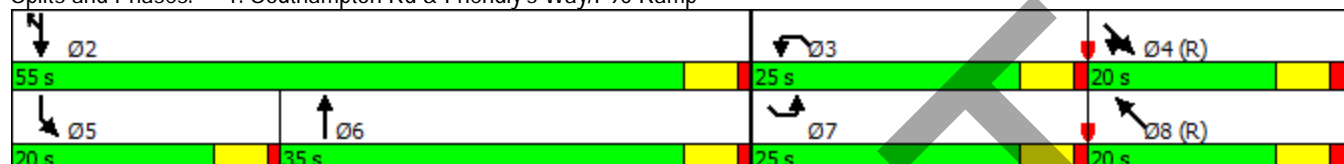
ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.






















Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp













Alternative 1 PM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	493	1	15	667	237	219	119	753	54	749	0
Future Volume (vph)	0	493	1	15	667	237	219	119	753	54	749	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	350		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt						0.850			0.850			
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						300			336			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			752			374	
Travel Time (s)		8.6			13.8			17.1			8.5	
Peak Hour Factor	0.92	0.92	0.92	0.71	0.95	0.79	0.79	0.77	0.77	0.78	0.92	0.46
Adj. Flow (vph)	0	536	1	21	702	300	277	155	978	69	814	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	537	0	21	702	300	277	155	978	69	814	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			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		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	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)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp

Alternative 1 PM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type		NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	
Protected Phases		6		5	2	2	7	4	4	3	8	
Permitted Phases												
Detector Phase		6		5	2	2	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)		15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0	
Total Split (s)		35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0	
Total Split (%)		35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%	
Maximum Green (s)		30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0	
Yellow Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	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	5.0	6.0	6.0	5.0	6.0	
Lead/Lag		Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?		Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)		4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	
Recall Mode		None		None	None	None	None	C-Max	C-Max	None	C-Max	
Act Effect Green (s)		25.0		6.8	30.1	30.1	21.9	46.7	46.7	9.3	32.0	
Actuated g/C Ratio		0.25		0.07	0.30	0.30	0.22	0.47	0.47	0.09	0.32	
v/c Ratio		0.61		0.18	0.66	0.44	0.72	0.18	1.07	0.42	0.72	
Control Delay		36.5		46.8	32.9	4.7	46.5	19.9	69.3	49.9	37.5	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		36.5		46.8	32.9	4.7	46.5	19.9	69.3	49.9	37.5	
LOS		D		D	C	A	D	B	E	D	D	
Approach Delay		36.5			24.9			59.4			38.5	
Approach LOS		D			C			E			D	
Queue Length 50th (ft)		148		13	205	0	164	58	~581	42	239	
Queue Length 95th (ft)		215		29	232	29	200	103	#677	71	#473	
Internal Link Dist (ft)		297			527			672			294	
Turn Bay Length (ft)							350					
Base Capacity (vph)		1061		265	1769	941	405	870	918	354	1132	
Starvation Cap Reductn		0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio		0.51		0.08	0.40	0.32	0.68	0.18	1.07	0.19	0.72	

### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

## Lanes, Volumes, Timings

### 1: Southampton Rd & Friendly's Way/I-90 Ramp

Alternative 1 PM Peak Hour

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 42.3

Intersection LOS: D

Intersection Capacity Utilization 82.6%

ICU Level of Service E

Analysis Period (min) 15

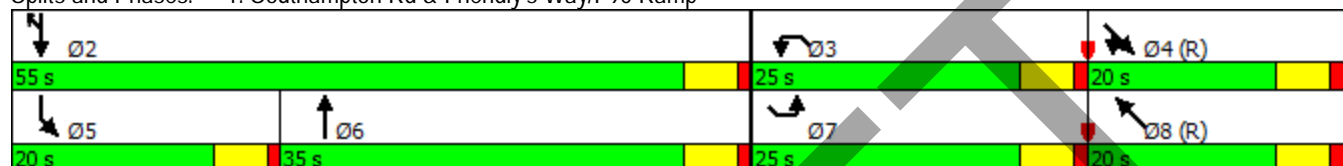
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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




Queue shown is maximum after two cycles.

Splits and Phases: 1: Southampton Rd & Friendly's Way/I-90 Ramp



**Intersection**

Int Delay, s/veh 3.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	30	37	81	82	103	55
Future Vol, veh/h	30	37	81	82	103	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	33	40	88	89	112	60

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	417	133	0
Stage 1	133	-	-
Stage 2	284	-	-
Critical Hdwy	6.45	6.25	-
Critical Hdwy Stg 1	5.45	-	-
Critical Hdwy Stg 2	5.45	-	-
Follow-up Hdwy	3.545	3.345	-
Pot Cap-1 Maneuver	587	908	-
Stage 1	886	-	-
Stage 2	757	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	538	908	-
Mov Cap-2 Maneuver	538	-	-
Stage 1	886	-	-
Stage 2	693	-	-




Approach	WB	NB	SB
HCM Control Delay, s	10.8	0	5.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	694	1381
HCM Lane V/C Ratio	-	-	0.105	0.081
HCM Control Delay (s)	-	-	10.8	7.8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.4	0.3

Intersection						
Int Delay, s/veh	4.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	1			1	2	
Traffic Vol, veh/h	39	153	31	44	103	21
Future Vol, veh/h	39	153	31	44	103	21
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	42	166	34	48	112	23
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	209	0	241	126
Stage 1	-	-	-	-	126	-
Stage 2	-	-	-	-	115	-
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	-	-	1344	-	741	916
Stage 1	-	-	-	-	892	-
Stage 2	-	-	-	-	902	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1344	-	722	916
Mov Cap-2 Maneuver	-	-	-	-	722	-
Stage 1	-	-	-	-	892	-
Stage 2	-	-	-	-	879	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		3.2		10.9	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1		EBT	EBR	WBL	WBT
Capacity (veh/h)	749		-	-	1344	-
HCM Lane V/C Ratio	0.18		-	-	0.025	-
HCM Control Delay (s)	10.9		-	-	7.7	0
HCM Lane LOS	B		-	-	A	A
HCM 95th %tile Q(veh)	0.7		-	-	0.1	-

**Intersection**

Int Delay, s/veh 5.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	72	92	34	45	59	71
Future Vol, veh/h	72	92	34	45	59	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	78	100	37	49	64	77

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	266	61	0
Stage 1	61	-	-
Stage 2	205	-	-
Critical Hdwy	6.45	6.25	-
Critical Hdwy Stg 1	5.45	-	-
Critical Hdwy Stg 2	5.45	-	-
Follow-up Hdwy	3.545	3.345	-
Pot Cap-1 Maneuver	717	996	-
Stage 1	954	-	-
Stage 2	822	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	685	996	-
Mov Cap-2 Maneuver	685	-	-
Stage 1	954	-	-
Stage 2	785	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.5	0	3.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	830	1492
HCM Lane V/C Ratio	-	-	0.215	0.043
HCM Control Delay (s)	-	-	10.5	7.5
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.8	0.1

**Intersection**

Int Delay, s/veh 5.3

**Movement** EBT EBR WBL WBT NBL NBRLane Configurations      

Traffic Vol, veh/h 57 65 13 49 135 28

Future Vol, veh/h 57 65 13 49 135 28

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 62 71 14 53 147 30

**Major/Minor** Major1 Major2 Minor1

Conflicting Flow All 0 0 133 0 179 97

Stage 1 - - - - 97 -

Stage 2 - - - - 82 -

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 - - 1433 - 804 951

Stage 1 - - - - 919 -

Stage 2 - - - - 934 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver - - 1433 - 796 951

Mov Cap-2 Maneuver - - - - 796 -

Stage 1 - - - - 919 -

Stage 2 - - - - 925 -

**Approach** EB WB NB

HCM Control Delay, s 0 1.6 10.6

HCM LOS B

**Minor Lane/Major Mvmt** NBLn1 EBT EBR WBL WBT

Capacity (veh/h) 819 - - 1433 -

HCM Lane V/C Ratio 0.216 - - 0.01 -

HCM Control Delay (s) 10.6 - - 7.5 0

HCM Lane LOS B - - A A

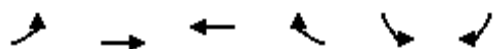
HCM 95th %tile Q(veh) 0.8 - - 0 -



# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Alternative 2 AM Peak Hour

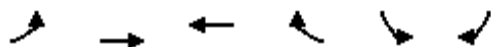


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations		↑↑	↑↑		↑↑		
Traffic Volume (vph)	0	405	345	0	213	0	
Future Volume (vph)	0	405	345	0	213	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Fr t							
Flt Protected					0.950		
Satd. Flow (prot)	0	3505	3471	0	2993	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3505	3471	0	2993	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.75	0.80	0.92	0.89	0.25	
Heavy Vehicles (%)	0%	3%	4%	0%	17%	0%	
Adj. Flow (vph)	0	540	431	0	239	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	540	431	0	239	0	
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		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
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		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Alternative 2 AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		26.0	26.0		44.0		24.0
Total Split (%)		27.7%	27.7%		46.8%		26%
Maximum Green (s)		21.0	21.0		39.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		71.1	71.1		12.9		
Actuated g/C Ratio		0.76	0.76		0.14		
v/c Ratio		0.20	0.16		0.58		
Control Delay		3.8	5.1		43.4		
Queue Delay		0.0	0.0		0.0		
Total Delay		3.8	5.1		43.4		
LOS		A	A		D		
Approach Delay		3.8	5.1		43.4		
Approach LOS		A	A		D		
Queue Length 50th (ft)		39	61		70		
Queue Length 95th (ft)		53	82		101		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2650	2624		1241		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.20	0.16		0.19		

### Intersection Summary

Area Type: Other

Cycle Length: 94

Actuated Cycle Length: 94

Lanes, Volumes, Timings

1: Route 20 & I-90 Exit

Alternative 2 AM Peak Hour

Offset: 15 (16%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 12.1	Intersection LOS: B
Intersection Capacity Utilization 25.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Route 20 & I-90 Exit





















 Ø2 (R)	 Ø4	 Ø9
26 s	44 s	24 s
 Ø6 (R)		
26 s		

DRAFT

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 2 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	133	444	80	139	110	207	86	50	0	0	0
Future Volume (vph)	17	133	444	80	139	110	207	86	50	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.928				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1543	3406	1495	1752	2788	0	1752	1712	1495	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1543	3406	1495	1752	2788	0	1752	1712	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			488		159				162			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.98	0.91	0.88	0.80	0.69	0.95	0.74	0.63	0.92	0.92	0.92
Heavy Vehicles (%)	17%	6%	8%	3%	2%	40%	3%	11%	8%	0%	0%	0%
Adj. Flow (vph)	34	136	488	91	174	159	218	116	79	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	136	488	91	333	0	218	116	79	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)		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	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	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)	6	6	20	18	6		18	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)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20













Alternative 2 AM Peak Hour

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
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	
Heavy Vehicles (%)	
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)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 2 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex						Cl+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0						0.0					
Detector 4 Position(ft)	36						36					
Detector 4 Size(ft)	6						6					
Detector 4 Type	Cl+Ex						Cl+Ex					
Detector 4 Channel												
Detector 4 Extend (s)	0.0						0.0					
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	20.0	26.0	26.0	20.0	26.0		24.0	24.0	24.0			
Total Split (%)	21.3%	27.7%	27.7%	21.3%	27.7%		25.5%	25.5%	25.5%			
Maximum Green (s)	15.0	21.0	21.0	15.0	21.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
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	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	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	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	7.6	55.1	55.1	10.2	59.8		16.0	16.0	16.0			
Actuated g/C Ratio	0.08	0.59	0.59	0.11	0.64		0.17	0.17	0.17			
v/c Ratio	0.27	0.07	0.45	0.48	0.18		0.73	0.40	0.20			
Control Delay	42.5	13.0	8.0	47.2	5.1		51.5	38.1	1.2			
Queue Delay	0.0	0.0	0.3	0.0	0.0		0.0	0.0	0.0			
Total Delay	42.5	13.0	8.3	47.2	5.1		51.5	38.1	1.2			
LOS	D	B	A	D	A		D	D	A			
Approach Delay	11.0				14.2				38.1			
Approach LOS	B				B				D			
Queue Length 50th (ft)	20	27	94	52	22		123	62	0			
Queue Length 95th (ft)	27	51	167	94	39		196	89	0			
Internal Link Dist (ft)	324				528				295			
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	246	1996	1078	279	1830		354	346	431			
Starvation Cap Reductn	0	0	182	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.14	0.07	0.54	0.33	0.18		0.62	0.34	0.18			

### Intersection Summary

## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20

Alternative 2 AM Peak Hour

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	26%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20

Alternative 2 AM Peak Hour

Area Type: Other

Cycle Length: 94

Actuated Cycle Length: 94

Offset: 15 (16%), Referenced to phase 2:WBT and 6:EBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 19.4

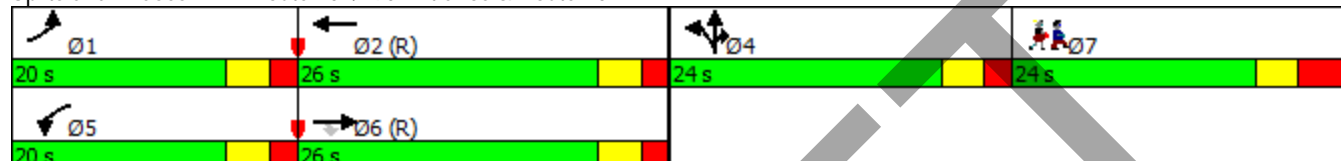
Intersection LOS: B

Intersection Capacity Utilization 40.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20





# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Alternative 2 PM Peak Hour

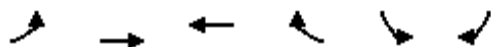


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations		↑↑	↑↑		↑↑		
Traffic Volume (vph)	0	516	427	0	232	0	
Future Volume (vph)	0	516	427	0	232	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Flt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3574	3574	0	3127	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3574	3574	0	3127	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.85	0.91	0.91	0.68	0.25	
Heavy Vehicles (%)	0%	1%	1%	0%	12%	0%	
Adj. Flow (vph)	0	607	469	0	341	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	607	469	0	341	0	
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		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
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		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Alternative 2 PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		41.0	41.0		39.0		24.0
Total Split (%)		39.4%	39.4%		37.5%		23%
Maximum Green (s)		36.0	36.0		34.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		77.3	77.3		16.7		
Actuated g/C Ratio		0.74	0.74		0.16		
v/c Ratio		0.23	0.18		0.68		
Control Delay		4.7	6.9		47.9		
Queue Delay		0.0	0.0		0.0		
Total Delay		4.7	6.9		47.9		
LOS		A	A		D		
Approach Delay		4.7	6.9		47.9		
Approach LOS		A	A		D		
Queue Length 50th (ft)		55	87		111		
Queue Length 95th (ft)		83	m132		109		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2655	2655		1022		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.23	0.18		0.33		

### Intersection Summary

Area Type: Other

Cycle Length: 104

Actuated Cycle Length: 104

Lanes, Volumes, Timings

1: Route 20 & I-90 Exit

Alternative 2 PM Peak Hour

Offset: 16 (15%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

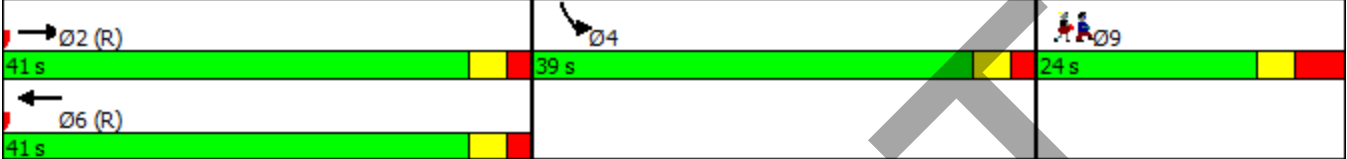
Intersection Signal Delay: 15.8 Intersection LOS: B

Intersection Capacity Utilization 29.2% ICU Level of Service A

Analysis Period (min) 15

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





















Splits and Phases: 1: Route 20 & I-90 Exit



# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 2 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	271	379	120	201	100	226	76	231	0	0	0
Future Volume (vph)	27	271	379	120	201	100	226	76	231	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.950				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1262	3505	1568	1805	3287	0	1787	1776	1599	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1262	3505	1568	1805	3287	0	1787	1776	1599	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			436		90				269			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.91	0.87	0.82	0.90	0.90	0.75	0.79	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	43%	3%	3%	0%	0%	13%	1%	7%	1%	0%	0%	0%
Adj. Flow (vph)	54	298	436	146	223	111	301	96	269	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	298	436	146	334	0	301	96	269	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)		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	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	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)	6	6	20	18	6		18	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)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20













Alternative 2 PM Peak Hour

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
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	
Heavy Vehicles (%)	
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)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 2 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex						Cl+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0						0.0					
Detector 4 Position(ft)	36						36					
Detector 4 Size(ft)	6						6					
Detector 4 Type	Cl+Ex						Cl+Ex					
Detector 4 Channel												
Detector 4 Extend (s)	0.0						0.0					
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	15.0	41.0	41.0	15.0	41.0		24.0	24.0	24.0			
Total Split (%)	14.4%	39.4%	39.4%	14.4%	39.4%		23.1%	23.1%	23.1%			
Maximum Green (s)	10.0	36.0	36.0	10.0	36.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
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	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	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	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Efect Green (s)	9.8	55.5	55.5	14.6	62.5		18.9	18.9	18.9			
Actuated g/C Ratio	0.09	0.53	0.53	0.14	0.60		0.18	0.18	0.18			
v/c Ratio	0.46	0.16	0.42	0.58	0.17		0.93	0.30	0.53			
Control Delay	52.3	17.5	9.7	50.6	7.8		78.2	39.7	8.8			
Queue Delay	0.0	0.0	0.4	0.0	0.0		0.0	0.0	0.0			
Total Delay	52.3	17.5	10.1	50.6	7.8		78.2	39.7	8.8			
LOS	D	B	B	D	A		E	D	A			
Approach Delay	15.8				20.8				44.6			
Approach LOS	B				C				D			
Queue Length 50th (ft)	35	74	99	92	36		199	56	0			
Queue Length 95th (ft)	39	111	157	136	64		#262	91	58			
Internal Link Dist (ft)	324				528				295			
Turn Bay Length (ft)	100				200							
Base Capacity (vph)	135	1871	1040	253	2010		326	324	511			
Starvation Cap Reductn	0	0	241	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.40	0.16	0.55	0.58	0.17		0.92	0.30	0.53			
Intersection Summary												

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 2 PM Peak Hour

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	23%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 2 PM Peak Hour

Area Type: Other

Cycle Length: 104

Actuated Cycle Length: 104

Offset: 16 (15%), Referenced to phase 2:WBT and 6:EBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 27.0

Intersection LOS: C

Intersection Capacity Utilization 39.2%

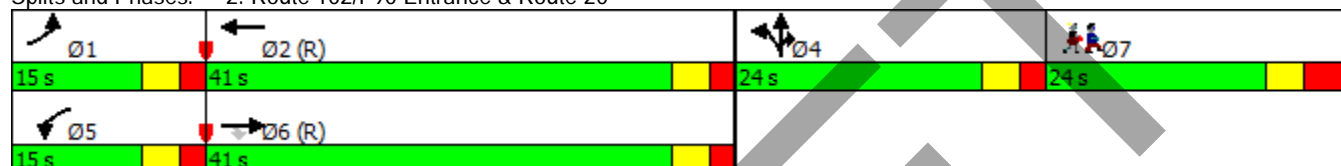
ICU Level of Service A

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20


























# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp













Alternative 2 AM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	635	1	0	418	351	164	69	693	19	754	19
Future Volume (vph)	0	635	1	0	418	351	164	69	693	19	754	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	300		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.999				0.850			0.850		0.996	
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3525	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3525	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						390			430			2
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			1032			374	
Travel Time (s)		8.6			13.8			23.5			8.5	
Peak Hour Factor	0.92	0.84	0.38	0.35	0.73	0.90	0.78	0.54	0.92	0.47	0.81	0.80
Adj. Flow (vph)	0	756	3	0	573	390	210	128	753	40	931	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	759	0	0	573	390	210	128	753	40	955	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			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		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	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)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp

Alternative 2 AM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type	NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA		
Protected Phases	6		5	2	2	7	4	4	3	8		
Permitted Phases												
Detector Phase	6		5	2	2	7	4	4	3	8		
Switch Phase												
Minimum Initial (s)	10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0		
Minimum Split (s)	15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0		
Total Split (s)	35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0		
Total Split (%)	35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%		
Maximum Green (s)	30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0		
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	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	5.0	6.0	6.0	5.0	6.0		
Lead/Lag	Lag		Lead			Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes		Yes			Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0		
Recall Mode	None		None	None	None	None	C-Max	C-Max	None	C-Max		
Act Effect Green (s)	26.3		26.3	26.3	17.8	54.3	54.3	7.8	39.9			
Actuated g/C Ratio	0.26		0.26	0.26	0.18	0.54	0.54	0.08	0.40			
v/c Ratio	0.82		0.62	0.55	0.67	0.13	0.71	0.29	0.68			
Control Delay	42.0		34.9	6.0	48.2	14.8	13.3	48.3	30.1			
Queue Delay	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Total Delay	42.0		34.9	6.0	48.2	14.8	13.3	48.3	30.1			
LOS	D		C	A	D	B	B	D	C			
Approach Delay	42.0		23.2			20.2			30.8			
Approach LOS	D		C			C			C			
Queue Length 50th (ft)	239		169	0	126	42	154	25	258			
Queue Length 95th (ft)	258		160	64	159	51	#413	29	#368			
Internal Link Dist (ft)	297		527			952			294			
Turn Bay Length (ft)						300						
Base Capacity (vph)	1076		1769	986	368	1012	1056	354	1406			
Starvation Cap Reductn	0		0	0	0	0	0	0	0			
Spillback Cap Reductn	0		0	0	0	0	0	0	0			
Storage Cap Reductn	0		0	0	0	0	0	0	0			
Reduced v/c Ratio	0.71		0.32	0.40	0.57	0.13	0.71	0.11	0.68			

### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100








Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

Lanes, Volumes, Timings  
1: Southampton Rd & Friendly's Way/I-90 Ramp

Alternative 2 AM Peak Hour

Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.82	
Intersection Signal Delay: 28.1	Intersection LOS: C
Intersection Capacity Utilization 72.0%	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: 1: Southampton Rd & Friendly's Way/I-90 Ramp

 Ø2		 Ø3	 Ø4 (R)
55 s		25 s	20 s
 Ø5	 Ø6	 Ø7	 Ø8 (R)
20 s	35 s	25 s	20 s

# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp













Alternative 2 PM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	496	1	12	662	242	214	121	733	54	741	0
Future Volume (vph)	0	496	1	12	662	242	214	121	733	54	741	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	350		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt						0.850			0.850			
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						306			337			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			752			374	
Travel Time (s)		8.6			13.8			17.1			8.5	
Peak Hour Factor	0.92	0.92	0.92	0.71	0.95	0.79	0.79	0.77	0.77	0.78	0.92	0.46
Adj. Flow (vph)	0	539	1	17	697	306	271	157	952	69	805	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	540	0	17	697	306	271	157	952	69	805	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			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		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	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)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp

Alternative 2 PM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				CI+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type	NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA		
Protected Phases	6		5	2	2	7	4	4	3	8		
Permitted Phases												
Detector Phase	6		5	2	2	7	4	4	3	8		
Switch Phase												
Minimum Initial (s)	10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0		
Minimum Split (s)	15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0		
Total Split (s)	35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0		
Total Split (%)	35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%		
Maximum Green (s)	30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0		
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	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	5.0	6.0	6.0	5.0	6.0		
Lead/Lag	Lag		Lead			Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes		Yes			Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0		
Recall Mode	None		None	None	None	None	C-Max	C-Max	None	C-Max		
Act Effect Green (s)	24.9		6.6	30.0	30.0	21.5	46.9	46.9	9.3	32.5		
Actuated g/C Ratio	0.25		0.07	0.30	0.30	0.22	0.47	0.47	0.09	0.32		
v/c Ratio	0.61		0.15	0.66	0.44	0.71	0.18	1.03	0.42	0.70		
Control Delay	36.6		46.4	33.0	4.8	46.7	19.8	59.3	49.9	36.5		
Queue Delay	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	36.6		46.4	33.0	4.8	46.7	19.8	59.3	49.9	36.5		
LOS	D		D	C	A	D	B	E	D	D		
Approach Delay	36.6			24.8			52.3			37.5		
Approach LOS	D			C			D			D		
Queue Length 50th (ft)	149		10	203	0	161	59	~545	42	234		
Queue Length 95th (ft)	216		25	231	29	196	104	#643	71	#460		
Internal Link Dist (ft)	297			527			672			294		
Turn Bay Length (ft)						350						
Base Capacity (vph)	1061		265	1769	944	401	873	921	354	1151		
Starvation Cap Reductn	0		0	0	0	0	0	0	0	0		
Spillback Cap Reductn	0		0	0	0	0	0	0	0	0		
Storage Cap Reductn	0		0	0	0	0	0	0	0	0		
Reduced v/c Ratio	0.51		0.06	0.39	0.32	0.68	0.18	1.03	0.19	0.70		

### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

## Lanes, Volumes, Timings

### 1: Southampton Rd & Friendly's Way/I-90 Ramp

Alternative 2 PM Peak Hour

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 39.3

Intersection LOS: D

Intersection Capacity Utilization 81.2%

ICU Level of Service D

Analysis Period (min) 15

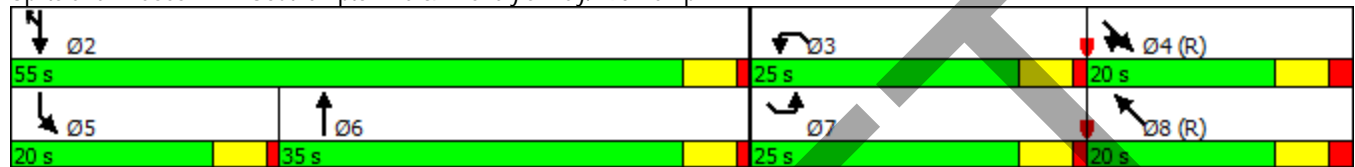
~ Volume exceeds capacity, queue is theoretically infinite.

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: 1: Southampton Rd & Friendly's Way/I-90 Ramp



**Intersection**

Int Delay, s/veh 1.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	36	19	145	196	34	111
Future Vol, veh/h	36	19	145	196	34	111
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	39	21	158	213	37	121

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	459	264	0
Stage 1	264	-	-
Stage 2	195	-	-
Critical Hdwy	6.45	6.25	-
Critical Hdwy Stg 1	5.45	-	-
Critical Hdwy Stg 2	5.45	-	-
Follow-up Hdwy	3.545	3.345	-
Pot Cap-1 Maneuver	555	767	-
Stage 1	773	-	-
Stage 2	831	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	536	767	-
Mov Cap-2 Maneuver	536	-	-
Stage 1	773	-	-
Stage 2	803	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	1.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	598	1171
HCM Lane V/C Ratio	-	-	0.1	0.032
HCM Control Delay (s)	-	-	11.7	8.2
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1

**Intersection**

Int Delay, s/veh 6.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	87	0	12	134	30	0	0	58	50
Future Vol, veh/h	0	0	0	87	0	12	134	30	0	0	58	50
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	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	0	0	95	0	13	146	33	0	0	63	54

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	414	- 33 117	0 - - 0
Stage 1	324	- - -	- - -
Stage 2	90	- - -	- - -
Critical Hdwy	6.45	- 6.25 4.15	- - -
Critical Hdwy Stg 1	5.45	- - -	- - -
Critical Hdwy Stg 2	5.45	- - -	- - -
Follow-up Hdwy	3.545	- 3.345 2.245	- - -
Pot Cap-1 Maneuver	589	0 1032 1453	- 0 0 - -
Stage 1	726	0 - -	0 0 - -
Stage 2	926	0 - -	0 0 - -
Platoon blocked, %			- - -
Mov Cap-1 Maneuver	529	0 1032 1453	- - - - -
Mov Cap-2 Maneuver	529	0 - -	- - - - -
Stage 1	652	0 - -	- - - - -
Stage 2	926	0 - -	- - - - -




Approach	WB	NB	SB
HCM Control Delay, s	12.9	6.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	SBT	SBR
Capacity (veh/h)	1453	- 562	- -	
HCM Lane V/C Ratio	0.1	- 0.191	- -	
HCM Control Delay (s)	7.8	0 12.9	- -	
HCM Lane LOS	A	A B	- -	
HCM 95th %tile Q(veh)	0.3	- 0.7	- -	



**Intersection**

Int Delay, s/veh 4.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	110	57	89	73	24	125
Future Vol, veh/h	110	57	89	73	24	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	5	5	5	5	5	5
Mvmt Flow	120	62	97	79	26	136

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	324	136	0
Stage 1	136	-	-
Stage 2	188	-	-
Critical Hdwy	6.45	6.25	-
Critical Hdwy Stg 1	5.45	-	-
Critical Hdwy Stg 2	5.45	-	-
Follow-up Hdwy	3.545	3.345	-
Pot Cap-1 Maneuver	664	905	-
Stage 1	883	-	-
Stage 2	837	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	651	905	-
Mov Cap-2 Maneuver	651	-	-
Stage 1	883	-	-
Stage 2	820	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	1.2
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	720	1382
HCM Lane V/C Ratio	-	-	0.252	0.019
HCM Control Delay (s)	-	-	11.7	7.7
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	1	0.1

**Intersection**

Int Delay, s/veh 5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	100	0	38	60	86	0	0	49	47
Future Vol, veh/h	0	0	0	100	0	38	60	86	0	0	49	47
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	0	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	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	0	0	109	0	41	65	93	0	0	53	51

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	303	- 93 104	0 - - 0
Stage 1	224	- - -	- - -
Stage 2	79	- - -	- - -
Critical Hdwy	6.45	- 6.25 4.15	- - -
Critical Hdwy Stg 1	5.45	- - -	- - -
Critical Hdwy Stg 2	5.45	- - -	- - -
Follow-up Hdwy	3.545	- 3.345 2.245	- - -
Pot Cap-1 Maneuver	682	0 956 1469	- 0 0 - -
Stage 1	806	0 - -	- 0 0 - -
Stage 2	937	0 - -	- 0 0 - -
Platoon blocked, %			- - -
Mov Cap-1 Maneuver	650	0 956 1469	- - - - -
Mov Cap-2 Maneuver	650	0 - -	- - - - -
Stage 1	768	0 - -	- - - - -
Stage 2	937	0 - -	- - - - -

Approach	WB	NB	SB
HCM Control Delay, s	11.4	3.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	SBT	SBR
Capacity (veh/h)	1469	- 713	- -	
HCM Lane V/C Ratio	0.044	- 0.21	- -	
HCM Control Delay (s)	7.6	0 11.4	- -	
HCM Lane LOS	A	A B	- -	
HCM 95th %tile Q(veh)	0.1	- 0.8	- -	

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Alternative 3 AM Peak Hour

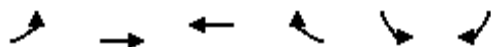


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations		↑↑	↑↑		↑↑		
Traffic Volume (vph)	0	407	347	0	214	0	
Future Volume (vph)	0	407	347	0	214	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Fr t							
Flt Protected					0.950		
Satd. Flow (prot)	0	3505	3471	0	2993	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3505	3471	0	2993	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.75	0.80	0.92	0.89	0.25	
Heavy Vehicles (%)	0%	3%	4%	0%	17%	0%	
Adj. Flow (vph)	0	543	434	0	240	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	543	434	0	240	0	
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		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
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		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Alternative 3 AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		26.0	26.0		44.0		24.0
Total Split (%)		27.7%	27.7%		46.8%		26%
Maximum Green (s)		21.0	21.0		39.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		71.0	71.0		13.0		
Actuated g/C Ratio		0.76	0.76		0.14		
v/c Ratio		0.21	0.17		0.58		
Control Delay		3.8	5.1		43.4		
Queue Delay		0.0	0.0		0.0		
Total Delay		3.8	5.1		43.4		
LOS		A	A		D		
Approach Delay		3.8	5.1		43.4		
Approach LOS		A	A		D		
Queue Length 50th (ft)		39	61		70		
Queue Length 95th (ft)		53	81		102		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2648	2622		1241		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.21	0.17		0.19		

### Intersection Summary

Area Type: Other

Cycle Length: 94

Actuated Cycle Length: 94

Lanes, Volumes, Timings

1: Route 20 & I-90 Exit

Alternative 3 AM Peak Hour

Offset: 15 (16%), Referenced to phase 2:EBT and 6:WBT, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 12.1	Intersection LOS: B
Intersection Capacity Utilization 25.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 1: Route 20 & I-90 Exit





















 Ø2 (R)	 Ø4	 Ø9
26 s	44 s	24 s
 Ø6 (R)		
26 s		

DRAFT

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 3 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	137	448	80	142	110	207	78	54	0	0	0
Future Volume (vph)	17	137	448	80	142	110	207	78	54	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.929				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1543	3406	1495	1752	2796	0	1752	1712	1495	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1543	3406	1495	1752	2796	0	1752	1712	1495	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			492		159				162			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.98	0.91	0.88	0.80	0.69	0.95	0.74	0.63	0.92	0.92	0.92
Heavy Vehicles (%)	17%	6%	8%	3%	2%	40%	3%	11%	8%	0%	0%	0%
Adj. Flow (vph)	34	140	492	91	178	159	218	105	86	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	34	140	492	91	337	0	218	105	86	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)		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	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	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)	6	6	20	18	6		18	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)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

Lanes, Volumes, Timings  
2: Route 102/I-90 Entrance & Route 20













Alternative 3 AM Peak Hour

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
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	
Heavy Vehicles (%)	
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)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 3 AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	CI+Ex						CI+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0						0.0					
Detector 4 Position(ft)	36						36					
Detector 4 Size(ft)	6						6					
Detector 4 Type	CI+Ex						CI+Ex					
Detector 4 Channel												
Detector 4 Extend (s)	0.0						0.0					
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	20.0	26.0	26.0	20.0	26.0		24.0	24.0	24.0			
Total Split (%)	21.3%	27.7%	27.7%	21.3%	27.7%		25.5%	25.5%	25.5%			
Maximum Green (s)	15.0	21.0	21.0	15.0	21.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
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	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	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	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	7.6	55.1	55.1	10.2	59.8		16.0	16.0	16.0			
Actuated g/C Ratio	0.08	0.59	0.59	0.11	0.64		0.17	0.17	0.17			
v/c Ratio	0.27	0.07	0.46	0.48	0.18		0.73	0.36	0.22			
Control Delay	42.6	12.9	8.0	47.2	5.2		51.5	37.2	1.3			
Queue Delay	0.0	0.0	0.3	0.0	0.0		0.0	0.0	0.0			
Total Delay	42.6	12.9	8.3	47.2	5.2		51.5	37.2	1.3			
LOS	D	B	A	D	A		D	D	A			
Approach Delay	11.0				14.1				37.3			
Approach LOS	B				B				D			
Queue Length 50th (ft)	20	28	94	52	23		123	55	0			
Queue Length 95th (ft)	27	52	168	94	40		196	82	0			
Internal Link Dist (ft)	324				528				295			
Turn Bay Length (ft)	100		200									
Base Capacity (vph)	246	1996	1079	279	1836		354	346	431			
Starvation Cap Reductn	0	0	181	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.14	0.07	0.55	0.33	0.18		0.62	0.30	0.20			
Intersection Summary												



## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20

Alternative 3 AM Peak Hour

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	26%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 3 AM Peak Hour

Area Type: Other

Cycle Length: 94

Actuated Cycle Length: 94

Offset: 15 (16%), Referenced to phase 2:WBT and 6:EBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

Intersection Signal Delay: 19.0

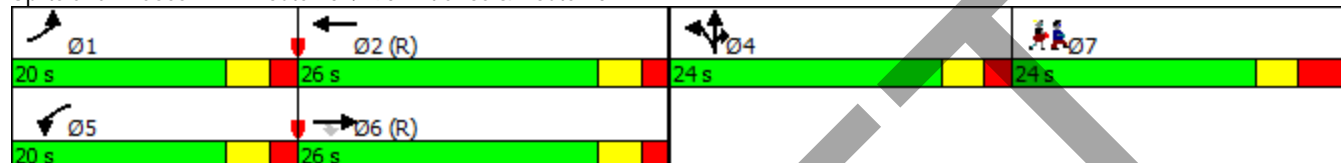
Intersection LOS: B

Intersection Capacity Utilization 40.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Alternative 3 PM Peak Hour

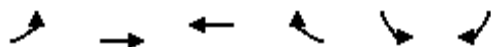


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Lane Configurations		↑↑	↑↑		↑↑		
Traffic Volume (vph)	0	522	429	0	238	0	
Future Volume (vph)	0	522	429	0	238	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	1.00	
Flt							
Flt Protected					0.950		
Satd. Flow (prot)	0	3574	3574	0	3127	0	
Flt Permitted					0.950		
Satd. Flow (perm)	0	3574	3574	0	3127	0	
Right Turn on Red				Yes		Yes	
Satd. Flow (RTOR)							
Link Speed (mph)		30	30		30		
Link Distance (ft)		524	404		357		
Travel Time (s)		11.9	9.2		8.1		
Peak Hour Factor	0.92	0.85	0.91	0.91	0.68	0.25	
Heavy Vehicles (%)	0%	1%	1%	0%	12%	0%	
Adj. Flow (vph)	0	614	471	0	350	0	
Shared Lane Traffic (%)							
Lane Group Flow (vph)	0	614	471	0	350	0	
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		2	2		4		
Detector Template		Thru	Thru		DT1		
Leading Detector (ft)		100	100		42		
Trailing Detector (ft)		0	0		0		
Detector 1 Position(ft)		0	0		0		
Detector 1 Size(ft)		6	6		6		
Detector 1 Type		Cl+Ex	Cl+Ex		Cl+Ex		
Detector 1 Channel							
Detector 1 Extend (s)		0.0	0.0		0.0		
Detector 1 Queue (s)		0.0	0.0		0.0		
Detector 1 Delay (s)		0.0	0.0		0.0		
Detector 2 Position(ft)		94	94		12		
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		
Detector 3 Position(ft)					24		
Detector 3 Size(ft)					6		
Detector 3 Type					Cl+Ex		
Detector 3 Channel							
Detector 3 Extend (s)					0.0		

# Lanes, Volumes, Timings

## 1: Route 20 & I-90 Exit

Alternative 3 PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø9
Detector 4 Position(ft)					36		
Detector 4 Size(ft)					6		
Detector 4 Type					Cl+Ex		
Detector 4 Channel							
Detector 4 Extend (s)					0.0		
Turn Type		NA	NA		Prot		
Protected Phases		2	6		4		9
Permitted Phases							
Detector Phase		2	6		4		
Switch Phase							
Minimum Initial (s)		8.0	8.0		5.0		7.0
Minimum Split (s)		14.0	14.0		14.0		24.0
Total Split (s)		41.0	41.0		39.0		24.0
Total Split (%)		39.4%	39.4%		37.5%		23%
Maximum Green (s)		36.0	36.0		34.0		17.0
Yellow Time (s)		3.0	3.0		3.0		3.0
All-Red Time (s)		2.0	2.0		2.0		4.0
Lost Time Adjust (s)		0.0	0.0		0.0		
Total Lost Time (s)		5.0	5.0		5.0		
Lead/Lag							
Lead-Lag Optimize?							
Vehicle Extension (s)		3.0	3.0		3.0		3.0
Recall Mode		C-Max	C-Max		None		None
Walk Time (s)							7.0
Flash Dont Walk (s)							10.0
Pedestrian Calls (#/hr)							0
Act Effct Green (s)		77.0	77.0		17.0		
Actuated g/C Ratio		0.74	0.74		0.16		
v/c Ratio		0.23	0.18		0.68		
Control Delay		4.8	7.0		47.8		
Queue Delay		0.0	0.0		0.0		
Total Delay		4.8	7.0		47.8		
LOS		A	A		D		
Approach Delay		4.8	7.0		47.8		
Approach LOS		A	A		D		
Queue Length 50th (ft)		57	91		114		
Queue Length 95th (ft)		85	m132		111		
Internal Link Dist (ft)		444	324		277		
Turn Bay Length (ft)							
Base Capacity (vph)		2645	2645		1022		
Starvation Cap Reductn		0	0		0		
Spillback Cap Reductn		0	0		0		
Storage Cap Reductn		0	0		0		
Reduced v/c Ratio		0.23	0.18		0.34		

### Intersection Summary

Area Type: Other

Cycle Length: 104

Actuated Cycle Length: 104

Lanes, Volumes, Timings

1: Route 20 & I-90 Exit

Alternative 3 PM Peak Hour

Offset: 16 (15%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 55

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.68

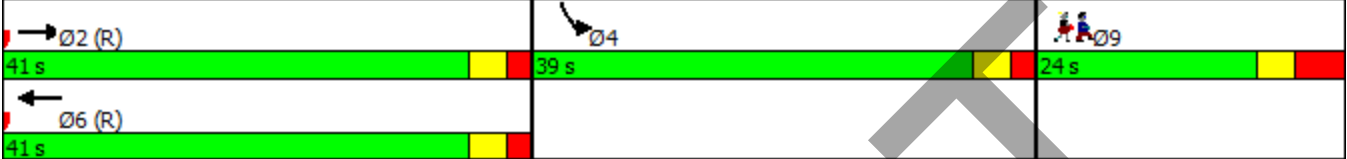
Intersection Signal Delay: 16.0 Intersection LOS: B

Intersection Capacity Utilization 29.6% ICU Level of Service A

Analysis Period (min) 15

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





















Splits and Phases: 1: Route 20 & I-90 Exit



# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 3 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	283	384	124	204	93	226	58	245	0	0	0
Future Volume (vph)	27	283	384	124	204	93	226	58	245	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		200	0		0	0		0	0		0
Storage Lanes	1		1	1		0	1		1	0		0
Taper Length (ft)	50			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.953				0.850			
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1262	3505	1568	1805	3306	0	1787	1776	1599	0	0	0
Flt Permitted	0.950			0.950			0.950					
Satd. Flow (perm)	1262	3505	1568	1805	3306	0	1787	1776	1599	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			441		77				285			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		404			608			375			260	
Travel Time (s)		9.2			13.8			8.5			5.9	
Peak Hour Factor	0.50	0.91	0.87	0.82	0.90	0.90	0.75	0.79	0.86	0.92	0.92	0.92
Heavy Vehicles (%)	43%	3%	3%	0%	0%	13%	1%	7%	1%	0%	0%	0%
Adj. Flow (vph)	54	311	441	151	227	103	301	73	285	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	311	441	151	330	0	301	73	285	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)		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	4	2	1	2	2		2	4	1			
Detector Template	DT1	Thru	Right	DT2	Thru		DT2	DT1	Right			
Leading Detector (ft)	42	100	20	42	100		42	42	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)	6	6	20	18	6		18	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)	12	94		24	94		24	12				
Detector 2 Size(ft)	6	6		18	6		18	6				
Detector 2 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0				
Detector 3 Position(ft)	24							24				
Detector 3 Size(ft)	6							6				

## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20













Alternative 3 PM Peak Hour

Lane Group	Ø7
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
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	
Heavy Vehicles (%)	
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)	
Detector 3 Position(ft)	
Detector 3 Size(ft)	

# Lanes, Volumes, Timings

## 2: Route 102/I-90 Entrance & Route 20

Alternative 3 PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector 3 Type	Cl+Ex						Cl+Ex					
Detector 3 Channel												
Detector 3 Extend (s)	0.0						0.0					
Detector 4 Position(ft)	36						36					
Detector 4 Size(ft)	6						6					
Detector 4 Type	Cl+Ex						Cl+Ex					
Detector 4 Channel												
Detector 4 Extend (s)	0.0						0.0					
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	Prot			
Protected Phases	1	6		5	2		4	4	4			
Permitted Phases			6									
Detector Phase	1	6	6	5	2		4	4	4			
Switch Phase												
Minimum Initial (s)	5.0	8.0	8.0	5.0	8.0		5.0	5.0	5.0			
Minimum Split (s)	10.0	21.0	21.0	10.0	21.0		21.0	21.0	21.0			
Total Split (s)	15.0	41.0	41.0	15.0	41.0		24.0	24.0	24.0			
Total Split (%)	14.4%	39.4%	39.4%	14.4%	39.4%		23.1%	23.1%	23.1%			
Maximum Green (s)	10.0	36.0	36.0	10.0	36.0		19.0	19.0	19.0			
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0			
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	0.0			
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0			
Lead/Lag	Lead	Lag	Lag	Lead	Lag							
Lead-Lag Optimize?	Yes	Yes	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	C-Max	C-Max	None	C-Max		None	None	None			
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	9.8	55.0	55.0	15.1	62.5		18.9	18.9	18.9			
Actuated g/C Ratio	0.09	0.53	0.53	0.15	0.60		0.18	0.18	0.18			
v/c Ratio	0.46	0.17	0.43	0.58	0.16		0.93	0.23	0.54			
Control Delay	53.2	17.9	9.9	49.9	8.1		78.2	38.4	8.8			
Queue Delay	0.0	0.0	0.4	0.0	0.0		0.0	0.0	0.0			
Total Delay	53.2	17.9	10.3	49.9	8.1		78.2	38.4	8.8			
LOS	D	B	B	D	A		E	D	A			
Approach Delay	16.1				21.2				43.8			
Approach LOS	B				C				D			
Queue Length 50th (ft)	35	78	101	94	37		199	42	0			
Queue Length 95th (ft)	40	116	160	138	65		#262	73	59			
Internal Link Dist (ft)	324				528				295			
Turn Bay Length (ft)	100				200							
Base Capacity (vph)	135	1854	1037	262	2016		326	324	525			
Starvation Cap Reductn	0	0	236	0	0		0	0	0			
Spillback Cap Reductn	0	0	0	0	0		0	0	0			
Storage Cap Reductn	0	0	0	0	0		0	0	0			
Reduced v/c Ratio	0.40	0.17	0.55	0.58	0.16		0.92	0.23	0.54			

### Intersection Summary



## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20

Alternative 3 PM Peak Hour

Lane Group	Ø7
Detector 3 Type	
Detector 3 Channel	
Detector 3 Extend (s)	
Detector 4 Position(ft)	
Detector 4 Size(ft)	
Detector 4 Type	
Detector 4 Channel	
Detector 4 Extend (s)	
Turn Type	
Protected Phases	7
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	24.0
Total Split (s)	24.0
Total Split (%)	23%
Maximum Green (s)	17.0
Yellow Time (s)	3.0
All-Red Time (s)	4.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	10.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
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	

## Lanes, Volumes, Timings

### 2: Route 102/I-90 Entrance & Route 20

Alternative 3 PM Peak Hour

Area Type: Other

Cycle Length: 104

Actuated Cycle Length: 104

Offset: 16 (15%), Referenced to phase 2:WBT and 6:EBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 26.7

Intersection LOS: C

Intersection Capacity Utilization 39.7%

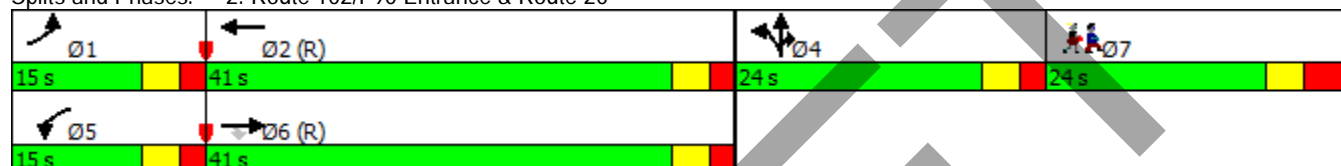
ICU Level of Service A

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.






















Splits and Phases: 2: Route 102/I-90 Entrance & Route 20



# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp













Alternative 3 AM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	628	1	0	420	351	170	73	691	19	727	19
Future Volume (vph)	0	628	1	0	420	351	170	73	691	19	727	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	300		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt		0.999				0.850			0.850		0.996	
Flt Protected							0.950			0.950		
Satd. Flow (prot)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3525	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	3536	0	1863	3539	1583	1770	1863	1583	1770	3525	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						390			429			2
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			1032			374	
Travel Time (s)		8.6			13.8			23.5			8.5	
Peak Hour Factor	0.92	0.84	0.38	0.35	0.73	0.90	0.78	0.54	0.92	0.47	0.81	0.80
Adj. Flow (vph)	0	748	3	0	575	390	218	135	751	40	898	24
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	751	0	0	575	390	218	135	751	40	922	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			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		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	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)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp

Alternative 3 AM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				Cl+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type	NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA		
Protected Phases	6		5	2	2	7	4	4	3	8		
Permitted Phases												
Detector Phase	6		5	2	2	7	4	4	3	8		
Switch Phase												
Minimum Initial (s)	10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0		
Minimum Split (s)	15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0		
Total Split (s)	35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0		
Total Split (%)	35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%		
Maximum Green (s)	30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0		
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
All-Red Time (s)	1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	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	5.0	6.0	6.0	5.0	6.0		
Lead/Lag	Lag		Lead			Lead	Lag	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes		Yes			Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0		
Recall Mode	None		None	None	None	None	C-Max	C-Max	None	C-Max		
Act Effect Green (s)	26.2			26.2	26.2	18.2	54.5	54.5	7.8	39.6		
Actuated g/C Ratio	0.26			0.26	0.26	0.18	0.54	0.54	0.08	0.40		
v/c Ratio	0.81			0.62	0.56	0.68	0.13	0.71	0.29	0.66		
Control Delay	41.9			35.1	6.0	48.3	14.8	13.2	48.3	29.8		
Queue Delay	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	41.9			35.1	6.0	48.3	14.8	13.2	48.3	29.8		
LOS	D			D	A	D	B	B	D	C		
Approach Delay	41.9			23.4			20.3			30.6		
Approach LOS	D			C			C			C		
Queue Length 50th (ft)	236			170	0	131	44	153	25	247		
Queue Length 95th (ft)	255			160	64	164	53	#408	29	#343		
Internal Link Dist (ft)	297			527			952			294		
Turn Bay Length (ft)						300						
Base Capacity (vph)	1076			1769	986	372	1014	1057	354	1397		
Starvation Cap Reductn	0			0	0	0	0	0	0	0		
Spillback Cap Reductn	0			0	0	0	0	0	0	0		
Storage Cap Reductn	0			0	0	0	0	0	0	0		
Reduced v/c Ratio	0.70			0.33	0.40	0.59	0.13	0.71	0.11	0.66		

### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green








Lanes, Volumes, Timings

1: Southampton Rd & Friendly's Way/I-90 Ramp

Alternative 3 AM Peak Hour

Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 28.0	Intersection LOS: C
Intersection Capacity Utilization 71.9%	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: 1: Southampton Rd & Friendly's Way/I-90 Ramp

 Ø2		 Ø3	 Ø4 (R)
55 s		25 s	20 s
 Ø5	 Ø6	 Ø7	 Ø8 (R)
20 s	35 s	25 s	20 s

# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp













Alternative 3 PM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	0	496	1	15	661	243	216	122	702	54	699	0
Future Volume (vph)	0	496	1	15	661	243	216	122	702	54	699	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	350		0	0		0
Storage Lanes	0		0	1		1	1		1	1		0
Taper Length (ft)	25			25			100			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt						0.850			0.850			
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Flt Permitted				0.950			0.950			0.950		
Satd. Flow (perm)	0	3539	0	1770	3539	1583	1770	1863	1583	1770	3539	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						308			338			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		377			607			752			374	
Travel Time (s)		8.6			13.8			17.1			8.5	
Peak Hour Factor	0.92	0.92	0.92	0.71	0.95	0.79	0.79	0.77	0.77	0.78	0.92	0.46
Adj. Flow (vph)	0	539	1	21	696	308	273	158	912	69	760	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	540	0	21	696	308	273	158	912	69	760	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			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		4	2	0	3	3	0	3	3	
Detector Template							DT1	DT1		DT1	DT1	
Leading Detector (ft)		106		42	106	0	30	30	0	30	30	
Trailing Detector (ft)		100		0	50	0	0	0	0	0	0	
Detector 1 Position(ft)		100		0	50	50	0	0	0	0	0	
Detector 1 Size(ft)		6		6	6	20	6	6	20	6	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)				12	100		12	12		12	12	
Detector 2 Size(ft)				6	6		6	6		6	6	
Detector 2 Type				Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)				0.0	0.0		0.0	0.0		0.0	0.0	
Detector 3 Position(ft)				24			24	24		24	24	
Detector 3 Size(ft)				6			6	6		6	6	
Detector 3 Type				Cl+Ex			Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	

# Lanes, Volumes, Timings

## 1: Southampton Rd & Friendly's Way/I-90 Ramp

Alternative 3 PM Peak Hour

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Detector 3 Channel												
Detector 3 Extend (s)				0.0			0.0	0.0		0.0	0.0	
Detector 4 Position(ft)				36								
Detector 4 Size(ft)				6								
Detector 4 Type				CI+Ex								
Detector 4 Channel												
Detector 4 Extend (s)				0.0								
Turn Type		NA		Prot	NA	Prot	Prot	NA	Prot	Prot	NA	
Protected Phases		6		5	2	2	7	4	4	3	8	
Permitted Phases												
Detector Phase		6		5	2	2	7	4	4	3	8	
Switch Phase												
Minimum Initial (s)		10.0		3.0	10.0	10.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)		15.0		8.0	15.0	15.0	10.0	11.0	11.0	10.0	11.0	
Total Split (s)		35.0		20.0	55.0	55.0	25.0	20.0	20.0	25.0	20.0	
Total Split (%)		35.0%		20.0%	55.0%	55.0%	25.0%	20.0%	20.0%	25.0%	20.0%	
Maximum Green (s)		30.0		15.0	50.0	50.0	20.0	14.0	14.0	20.0	14.0	
Yellow Time (s)		4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)		1.0		1.0	1.0	1.0	1.0	2.0	2.0	1.0	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	5.0	6.0	6.0	5.0	6.0	
Lead/Lag		Lag		Lead			Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?		Yes		Yes			Yes	Yes	Yes	Yes	Yes	
Vehicle Extension (s)		4.0		3.0	4.0	4.0	4.0	4.0	4.0	3.0	3.0	
Recall Mode		None		None	None	None	None	C-Max	C-Max	None	C-Max	
Act Effect Green (s)		24.9		6.8	30.1	30.1	21.6	46.8	46.8	9.3	32.3	
Actuated g/C Ratio		0.25		0.07	0.30	0.30	0.22	0.47	0.47	0.09	0.32	
v/c Ratio		0.61		0.18	0.65	0.45	0.71	0.18	0.99	0.42	0.67	
Control Delay		36.6		46.8	32.8	4.7	46.6	20.0	47.9	49.9	35.8	
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		36.6		46.8	32.8	4.7	46.6	20.0	47.9	49.9	35.8	
LOS		D		D	C	A	D	B	D	D	D	
Approach Delay		36.6			24.6			44.4			37.0	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)		149		13	203	0	162	59	~453	42	217	
Queue Length 95th (ft)		216		29	229	29	197	105	#595	71	#432	
Internal Link Dist (ft)		297			527			672			294	
Turn Bay Length (ft)							350					
Base Capacity (vph)		1061		265	1769	945	402	871	920	354	1142	
Starvation Cap Reductn		0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn		0		0	0	0	0	0	0	0	0	
Storage Cap Reductn		0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio		0.51		0.08	0.39	0.33	0.68	0.18	0.99	0.19	0.67	

### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 60 (60%), Referenced to phase 4:SET and 8:NWT, Start of Green

## Lanes, Volumes, Timings

### 1: Southampton Rd & Friendly's Way/I-90 Ramp

Alternative 3 PM Peak Hour

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 36.2

Intersection LOS: D

Intersection Capacity Utilization 79.2%

ICU Level of Service D

Analysis Period (min) 15

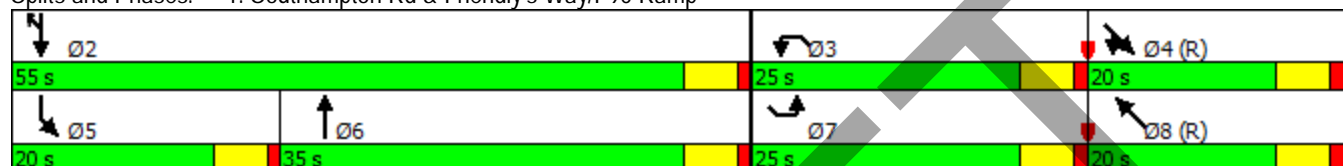
~ Volume exceeds capacity, queue is theoretically infinite.

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: 1: Southampton Rd & Friendly's Way/I-90 Ramp

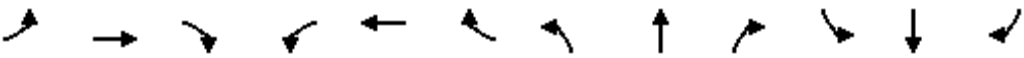




Intersection												
Int Delay, s/veh	37.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	160	1	8	113	572	0	4	4	392	0	108
Future Vol, veh/h	34	160	1	8	113	572	0	4	4	392	0	108
Conflicting Peds, #/hr	0	0	2	2	0	0	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	6	6	6	11	11	11	13	13	13	7	7	7
Mvmt Flow	39	182	1	9	128	650	0	5	5	445	0	123
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1026	964	66	1053	1023	-	125	0	0	10	0	0
Stage 1	954	954	-	8	8	-	-	-	-	-	-	-
Stage 2	72	10	-	1045	1015	-	-	-	-	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.21	6.61	-	4.23	-	-	4.17	-	-
Critical Hdwy Stg 1	6.16	5.56	-	6.21	5.61	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.21	5.61	-	-	-	-	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.599	4.099	-	2.317	-	-	2.263	-	-
Pot Cap-1 Maneuver	209	251	987	196	227	0	1396	-	-	1577	-	-
Stage 1	306	332	-	991	871	0	-	-	-	-	-	-
Stage 2	928	879	-	266	305	0	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	53 ~ 174	983	-	157	-	1393	-	-	1577	-	-	-
Mov Cap-2 Maneuver	53 ~ 174	-	-	157	-	-	-	-	-	-	-	-
Stage 1	305	230	-	991	871	-	-	-	-	-	-	-
Stage 2	791	879	-	38	211	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	141.4						0			6.4		
HCM LOS	F											
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1393	-	-	53	175	-	-	1577	-	-		
HCM Lane V/C Ratio	-	-	-	0.729	1.045	-	-	0.282	-	-		
HCM Control Delay (s)	0	-	-	173.2	134.7	-	0	8.2	0	-		
HCM Lane LOS	A	-	-	F	F	-	A	A	A	-		
HCM 95th %tile Q(veh)	0	-	-	3	8.8	-	-	1.2	-	-		
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)	45	7	22	9	3	62	9	234	2	42	467	0
Future Volume (vph)	45	7	22	9	3	62	9	234	2	42	467	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1678	1619	0	1770	1595	0	1586	1783	0	1631	1776	0
Flt Permitted	0.870			0.870			0.396			0.565		
Satd. Flow (perm)	1536	1619	0	1621	1595	0	661	1783	0	969	1776	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			70							
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	10%	10%	10%	7%	7%	7%
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)	51	33	0	10	73	0	10	268	0	48	531	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	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		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effect Green (s)	8.2	8.2		8.2	8.2		31.3	29.9		32.4	32.0	
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.67	0.64		0.70	0.69	
v/c Ratio	0.19	0.11		0.04	0.22		0.02	0.23		0.06	0.44	
Control Delay	25.1	15.2		24.8	10.6		7.9	12.5		7.3	12.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.1	15.2		24.8	10.6		7.9	12.5		7.3	12.9	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	B		A	B		A	B	
Approach Delay		21.2			12.3			12.4			12.4	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	9	1		2	1		1	25		3	61	
Queue Length 95th (ft)	62	30		20	39		11	186		32	#410	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	779	833		822	843		695	1498		844	1493	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.07	0.04		0.01	0.09		0.01	0.18		0.06	0.36	

**Intersection Summary**

Area Type: Other

Cycle Length: 106

Actuated Cycle Length: 46.6

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.44

Intersection Signal Delay: 13.1

Intersection Capacity Utilization 49.6%

Analysis Period (min) 15








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

Queue shown is maximum after two cycles.

Intersection LOS: B

ICU Level of Service A

**Splits and Phases: 5: Pleasant Street (Route 102) & Big Y Plaza/Tyringham Road**

 Ø1	 Ø2	 Ø4	 Ø9
13 s	40.5 s	25.5 s	27 s
 Ø5	 Ø6	 Ø8	
13 s	40.5 s	25.5 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

I-90 Interchange Study - Lee  
10: Premium Outlet Boulevard & Route 20

Build Alt 1 AM  
2040 Build

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations	↑↑		↘	↑	↖↖		
Traffic Volume (vph)	144	36	11	301	15	3	
Future Volume (vph)	144	36	11	301	15	3	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3099	0	1703	1852	2629	0	
Flt Permitted			0.553		0.959		
Satd. Flow (perm)	3099	0	991	1852	2629	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	28				3		
Link Speed (mph)	30			30	30		
Link Distance (ft)	474			486	343		
Travel Time (s)	10.8			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	13%	13%	6%	6%	27%	27%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	205	0	13	342	20	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effect Green (s)	28.0		27.0	29.3	5.9		
Actuated g/C Ratio	0.88		0.85	0.92	0.19		
v/c Ratio	0.07		0.01	0.20	0.04		
Control Delay	2.9		1.5	1.7	12.7		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	2.9		1.5	1.7	12.7		











	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	2.9			1.7	12.7		
Approach LOS	A			A	B		
Queue Length 50th (ft)	0		0	0	1		
Queue Length 95th (ft)	27		4	56	8		
Internal Link Dist (ft)	394			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3043		1190	1852	2137		
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	0.07		0.01	0.18	0.01		

#### Intersection Summary

Area Type: Other  
Cycle Length: 120  
Actuated Cycle Length: 31.7  
Natural Cycle: 60  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.20  
Intersection Signal Delay: 2.5  
Intersection Capacity Utilization 28.3%  
Analysis Period (min) 15

Intersection LOS: A  
ICU Level of Service A

Splits and Phases: 10: Premium Outlet Boulevard & Route 20

   	 	   
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I-90 Interchange Study - Blandford  
 1: Otis Stage Road (Route 23)/Main Street (Route 23) & North Street

Build Alt 1 AM  
 2040 Build

Intersection

Int Delay, s/veh 1.5

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations

Traffic Vol, veh/h 7 97 95 36 30 3

Future Vol, veh/h 7 97 95 36 30 3

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 88 88 88 88 88 88

Heavy Vehicles, % 0 0 13 13 8 8

Mvmt Flow 8 110 108 41 34 3

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 149 0 - 0 255 129

Stage 1 - - - - 129 -

Stage 2 - - - - 126 -

Critical Hdwy 4.1 - - - 6.48 6.28

Critical Hdwy Stg 1 - - - - 5.48 -

Critical Hdwy Stg 2 - - - - 5.48 -

Follow-up Hdwy 2.2 - - - 3.572 3.372

Pot Cap-1 Maneuver 1445 - - - 721 905

Stage 1 - - - - 882 -

Stage 2 - - - - 885 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 1445 - - - 717 905

Mov Cap-2 Maneuver - - - - 717 -

Stage 1 - - - - 877 -

Stage 2 - - - - 885 -

Approach EB WB SB

HCM Control Delay, s 0.5 0 10.2

HCM LOS B

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 1445 - - - 731

HCM Lane V/C Ratio 0.006 - - - 0.051

HCM Control Delay (s) 7.5 0 - - 10.2

HCM Lane LOS A A - - B

HCM 95th %tile Q(veh) 0 - - - 0.2



I-90 Interchange Study - Blandford  
5: Main Street (Route 23) & Russell Stage Road

Build Alt 1 AM  
2040 Build

Intersection

Int Delay, s/veh 3.9

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations		↰	↱		↰	↱
Traffic Vol, veh/h	22	105	92	3	9	114
Future Vol, veh/h	22	105	92	3	9	114
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	88	88	88	88	88	88
Heavy Vehicles, %	3	3	13	13	8	8
Mvmt Flow	25	119	105	3	10	130

Major/Minor Major1 Major2 Minor2

Conflicting Flow All	108	0	-	0	276	107
Stage 1	-	-	-	-	107	-
Stage 2	-	-	-	-	169	-
Critical Hdwy	4.13	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.227	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1476	-	-	-	701	931
Stage 1	-	-	-	-	903	-
Stage 2	-	-	-	-	846	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1476	-	-	-	688	931
Mov Cap-2 Maneuver	-	-	-	-	688	-
Stage 1	-	-	-	-	887	-
Stage 2	-	-	-	-	846	-

Approach EB WB SB







HCM Control Delay, s	1.3	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h)	1476	-	-	-	908
HCM Lane V/C Ratio	0.017	-	-	-	0.154
HCM Control Delay (s)	7.5	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection

Int Delay, s/veh 4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	159	66	144	241	11
Future Vol, veh/h	12	159	66	144	241	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	11	11	5	5
Mvmt Flow	14	181	75	164	274	13

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	588	274	274
Stage 1	274	-	-
Stage 2	314	-	-
Critical Hdwy	6.43	6.23	4.21
Critical Hdwy Stg 1	5.43	-	-
Critical Hdwy Stg 2	5.43	-	-
Follow-up Hdwy	3.527	3.327	2.299
Pot Cap-1 Maneuver	470	762	1239
Stage 1	770	-	-
Stage 2	738	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	441	762	1239
Mov Cap-2 Maneuver	441	-	-
Stage 1	723	-	-
Stage 2	738	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.4	2.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1239	-	441	762	-
HCM Lane V/C Ratio	0.061	-	0.031	0.237	-
HCM Control Delay (s)	8.1	-	13.4	11.2	-
HCM Lane LOS	A	-	B	B	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.9	-

I-90 Interchange Study - Westfield  
1: Southampton Road & Servistar Industrial Way

Build Alt 1 AM  
2040 Build

Intersection

Int Delay, s/veh 2.4

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations      

Traffic Vol, veh/h 36 55 42 532 515 67

Future Vol, veh/h 36 55 42 532 515 67

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length 0 - - - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 92 92 92 92 92 92

Heavy Vehicles, % 36 36 12 12 6 6

Mvmt Flow 39 60 46 578 560 73

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 1267 597 633 0 - 0

Stage 1 597 - - - - -

Stage 2 670 - - - - -

Critical Hdwy 6.76 6.56 4.22 - - -

Critical Hdwy Stg 1 5.76 - - - - -

Critical Hdwy Stg 2 5.76 - - - - -

Follow-up Hdwy 3.824 3.624 2.308 - - -

Pot Cap-1 Maneuver 159 445 904 - - -

Stage 1 489 - - - - -

Stage 2 450 - - - - -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 147 445 904 - - -

Mov Cap-2 Maneuver 147 - - - - -

Stage 1 452 - - - - -

Stage 2 450 - - - - -

Approach EB NB SB

HCM Control Delay, s 29 0.7 0

HCM LOS D

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

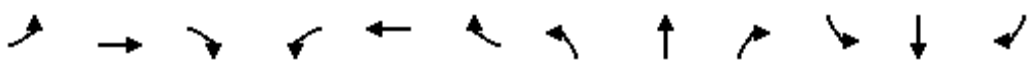
Capacity (veh/h) 904 - 247 - -

HCM Lane V/C Ratio 0.051 - 0.4 - -

HCM Control Delay (s) 9.2 0 29 - -

HCM Lane LOS A A D - -

HCM 95th %tile Q(veh) 0.2 - 1.8 - -

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗				↖	↕			↕	
Traffic Volume (vph)	28	99	131	0	0	0	47	606	604	0	949	83
Future Volume (vph)	28	99	131	0	0	0	47	606	604	0	949	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1593	1322	0	0	0	1616	3059	0	0	3351	0
Flt Permitted		0.989					0.950					
Satd. Flow (perm)	0	1593	1322	0	0	0	1616	3059	0	0	3351	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			142					274			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)									1	1		
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 (%)	14%	14%	14%	0%	0%	0%	8%	8%	8%	10%	10%	10%
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)	0	138	142	0	0	0	51	1316	0	0	1122	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
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)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effect Green (s)		15.3	31.6				11.4	91.5			75.2	
Actuated g/C Ratio		0.13	0.26				0.10	0.76			0.63	
v/c Ratio		0.68	0.31				0.33	0.55			0.53	
Control Delay		66.4	6.9				57.0	6.6			15.4	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		66.4	6.9				57.0	6.6			15.4	

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
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	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effect Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			B	
Approach Delay		36.2						8.4			15.4	
Approach LOS		D						A			B	
Queue Length 50th (ft)		103	0				38	121			217	
Queue Length 95th (ft)		167	46				78	329			435	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		265	481				202	2397			2102	
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	0.30				0.25	0.55			0.53	

**Intersection Summary**

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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: 0.68

Intersection Signal Delay: 14.1

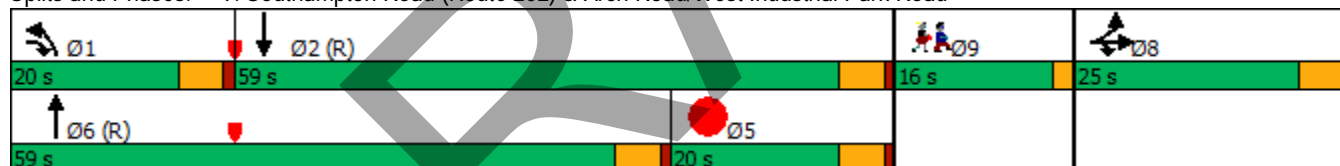
Intersection Capacity Utilization 54.2%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service A

Splits and Phases: 9: Southampton Road (Route 202) &amp; Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
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		

DRAFT

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↕		↖	↕	
Traffic Volume (vph)	208	103	81	14	81	72	43	1014	20	37	842	97
Future Volume (vph)	208	103	81	14	81	72	43	1014	20	37	842	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1677	1473	0	1655	0	1604	3312	0	1560	3175	0
Flt Permitted		0.655			0.958		0.120			0.098		
Satd. Flow (perm)	0	1134	1452	0	1592	0	203	3312	0	161	3175	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		19			1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	1					1	2		1	1		2
Confl. Bikes (#/hr)			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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	7%	7%	7%	5%	5%	5%	8%	8%	8%
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)	0	338	88	0	181	0	47	1124	0	40	1020	0
Turn Type	pm+pt	NA	custom	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4		1	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	35.0	56.0	21.0	21.0	21.0		21.0	58.0		14.0	51.0	
Total Split (%)	22.6%	36.1%	13.5%	13.5%	13.5%		13.5%	37.4%		9.0%	32.9%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effect Green (s)		50.4	6.9		50.4		59.2	53.5		57.3	50.6	
Actuated g/C Ratio		0.39	0.05		0.39		0.45	0.41		0.44	0.39	
v/c Ratio		0.77	0.46		0.29		0.28	0.83		0.28	0.83	
Control Delay		50.3	12.0		28.4		24.5	42.1		25.3	43.3	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		50.3	12.0		28.4		24.5	42.1		25.3	43.3	



Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	B		C		C	D		C	D	
Approach Delay		42.4			28.4			41.4			42.6	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)		235	0		88		19	424		16	372	
Queue Length 95th (ft)		#531	26		196		56	#768		49	#692	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		437	274		625		260	1357		158	1234	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.77	0.32		0.29		0.18	0.83		0.25	0.83	

## Intersection Summary

Area Type: Other

Cycle Length: 155

Actuated Cycle Length: 130.7

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 41.1

Intersection Capacity Utilization 77.2%

Analysis Period (min) 15









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

Queue shown is maximum after two cycles.

Intersection LOS: D

ICU Level of Service D

## Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) &amp; Notre Dame Street

 Ø1	 Ø2	 Ø9	 Ø4	
21 s	51 s	27 s	56 s	
 Ø5	 Ø6		 Ø7	 Ø8
14 s	58 s		35 s	21 s

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

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	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗				↖	↗			↖	↗
Traffic Volume (vph)	613	32	166	0	0	0	98	450	18	0	502	362
Future Volume (vph)	613	32	166	0	0	0	98	450	18	0	502	362
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1820	1777	0	0	0	1687	1704	0	0	3261	1711
Flt Permitted		0.955					0.298					
Satd. Flow (perm)	0	1820	1777	0	0	0	528	1704	0	0	3261	1668
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			180					2				393
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			5	5			4		10	10		4
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 (%)	3%	3%	3%	0%	0%	0%	7%	7%	7%	7%	7%	7%
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)	0	701	180	0	0	0	107	509	0	0	546	393
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effect Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.36	0.56				0.35	0.39			0.16	0.52
v/c Ratio		1.06	0.17				0.34	0.76			1.04	0.37
Control Delay		80.1	2.9				29.1	32.7			85.6	2.1
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		80.1	2.9				29.1	32.7			85.6	2.1

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		F	A				C	C			F	A
Approach Delay		64.3						32.0			50.7	
Approach LOS		E						C			D	
Queue Length 50th (ft)		246	0				25	146			108	0
Queue Length 95th (ft)		#735	35				90	#486			#315	30
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		661	1071				313	667			523	1067
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		1.06	0.17				0.34	0.76			1.04	0.37

## Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 73.8

Natural Cycle: 110

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 50.9

Intersection Capacity Utilization 70.8%

Analysis Period (min) 15






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

Queue shown is maximum after two cycles.

Intersection LOS: D







ICU Level of Service C

Splits and Phases: 18: Elm Street &amp; Franklin Street (Route 20)/Mobil Gas Station Driveway

 Ø2	 Ø4	 Ø9
31 s	32 s	27 s
 Ø6	 Ø5	
17 s	14 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	













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Intersection												
Int Delay, s/veh	5.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	98	154	0	4	108	520	0	0	8	649	1	94
Future Vol, veh/h	98	154	0	4	108	520	0	0	8	649	1	94
Conflicting Peds, #/hr	0	0	14	14	0	0	7	0	0	0	0	7
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	4	4	4	13	13	13	4	4	4
Mvmt Flow	111	175	0	5	123	591	0	0	9	738	1	107
Major/Minor	Minor2		Minor1			Major1			Major2			
Conflicting Flow All	1604	1547	76	1637	1596	-	115	0	0	9	0	0
Stage 1	1538	1538	-	5	5	-	-	-	-	-	-	-
Stage 2	66	9	-	1632	1591	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.14	6.54	-	4.23	-	-	4.14	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.536	4.036	-	2.317	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 85	~ 114	985	80	~ 105	0	1408	-	-	1598	-	-
Stage 1	145	177	-	1012	888	0	-	-	-	-	-	-
Stage 2	945	888	-	126	165	0	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	~ 57	961	-	~ 52	-	1399	-	-	1598	-	-
Mov Cap-2 Maneuver	-	~ 57	-	-	~ 52	-	-	-	-	-	-	-
Stage 1	144	~ 88	-	1012	888	-	-	-	-	-	-	-
Stage 2	814	888	-	-	~ 82	-	-	-	-	-	-	-
Approach	EB		WB			NB			SB			
HCM Control Delay, s						0			8			
HCM LOS												
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1399	-	-	-	57	-	-	1598	-	-		
HCM Lane V/C Ratio	-	-	-	-	3.07	-	-	0.462	-	-		
HCM Control Delay (s)	0	-	-	\$	1085.5	-	0	9.2	0	-		
HCM Lane LOS	A	-	-	-	F	-	A	A	A	-		
HCM 95th %tile Q(veh)	0	-	-	-	18.3	-	-	2.5	-	-		
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)	156	14	39	57	5	0	16	380	12	58	430	0
Future Volume (vph)	156	14	39	57	5	0	16	380	12	58	430	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1745	1664	0	1671	1759	0	1662	1860	0	1678	1827	0
Flt Permitted	0.754			0.718			0.389			0.316		
Satd. Flow (perm)	1381	1664	0	1263	1759	0	680	1860	0	558	1827	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44						2				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	8%	8%	8%	5%	5%	5%	4%	4%	4%
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)	177	60	0	65	6	0	18	446	0	66	489	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	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		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effect Green (s)	14.6	14.6		14.6	14.6		30.6	24.4		32.9	28.9	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.51	0.41		0.55	0.48	
v/c Ratio	0.53	0.14		0.21	0.01		0.04	0.59		0.15	0.56	
Control Delay	31.7	13.5		26.5	26.2		10.2	22.2		10.1	17.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.7	13.5		26.5	26.2		10.2	22.2		10.1	17.9	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	C		B	C		B	B	
Approach Delay		27.1			26.5			21.7			17.0	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	47	4		16	1		2	114		8	86	
Queue Length 95th (ft)	#195	43		77	15		18	370		47	403	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	521	656		477	664		553	1230		516	1217	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.34	0.09		0.14	0.01		0.03	0.36		0.13	0.40	

## Intersection Summary

Area Type: Other

Cycle Length: 106

Actuated Cycle Length: 60.2

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 20.9

Intersection Capacity Utilization 53.8%

Analysis Period (min) 15








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

Queue shown is maximum after two cycles.

Intersection LOS: C

ICU Level of Service A

Splits and Phases: 5: Pleasant Street (Route 102) &amp; Big Y Plaza/Tyringham Road

 Ø1	 Ø2	 Ø4	 Ø9
13 s	40.5 s	25.5 s	27 s
 Ø5	 Ø6	 Ø8	
13 s	40.5 s	25.5 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

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I-90 Interchange Study - Lee  
10: Premium Outlet Boulevard & Route 20

Build Alt 1 PM  
2040 Build

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations	↑↑		↘	↑	↖↗		
Traffic Volume (vph)	300	139	19	207	198	20	
Future Volume (vph)	300	139	19	207	198	20	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3246	0	1719	1870	3233	0	
Flt Permitted			0.378		0.957		
Satd. Flow (perm)	3246	0	684	1870	3233	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	68				8		
Link Speed (mph)	30			30	30		
Link Distance (ft)	324			486	343		
Travel Time (s)	7.4			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	6%	6%	5%	5%	4%	4%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	499	0	22	235	248	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effect Green (s)	12.4		15.9	13.8	8.7		
Actuated g/C Ratio	0.38		0.48	0.42	0.26		
v/c Ratio	0.40		0.04	0.30	0.29		
Control Delay	8.4		4.5	7.4	11.5		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	8.4		4.5	7.4	11.5		











	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	8.4			7.1	11.5		
Approach LOS	A			A	B		
Queue Length 50th (ft)	21		2	22	13		
Queue Length 95th (ft)	76		8	54	51		
Internal Link Dist (ft)	244			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3139		859	1870	2570		
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	0.16		0.03	0.13	0.10		

#### Intersection Summary

Area Type: Other  
Cycle Length: 120  
Actuated Cycle Length: 33  
Natural Cycle: 60  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.40  
Intersection Signal Delay: 8.8  
Intersection Capacity Utilization 30.4%  
Analysis Period (min) 15

Intersection LOS: A  
ICU Level of Service A

Splits and Phases: 10: Premium Outlet Boulevard & Route 20

   	 	   
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I-90 Interchange Study - Blandford  
 1: Otis Stage Road (Route 23)/Main Street (Route 23) & North Street

Build Alt 1 PM  
 2040 Build

Intersection

Int Delay, s/veh 1.6

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations

Traffic Vol, veh/h 5 120 113 28 41 3

Future Vol, veh/h 5 120 113 28 41 3

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 88 88 88 88 88 88

Heavy Vehicles, % 3 3 5 5 13 13

Mvmt Flow 6 136 128 32 47 3

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 160 0 - 0 292 144

Stage 1 - - - - 144 -

Stage 2 - - - - 148 -

Critical Hdwy 4.13 - - - 6.53 6.33

Critical Hdwy Stg 1 - - - - 5.53 -

Critical Hdwy Stg 2 - - - - 5.53 -

Follow-up Hdwy 2.227 - - - 3.617 3.417

Pot Cap-1 Maneuver 1413 - - - 676 875

Stage 1 - - - - 857 -

Stage 2 - - - - 853 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 1413 - - - 673 875

Mov Cap-2 Maneuver - - - - 673 -

Stage 1 - - - - 853 -

Stage 2 - - - - 853 -

Approach EB WB SB

HCM Control Delay, s 0.3 0 10.7

HCM LOS B

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 1413 - - - 684

HCM Lane V/C Ratio 0.004 - - - 0.073

HCM Control Delay (s) 7.6 0 - - 10.7

HCM Lane LOS A A - - B

HCM 95th %tile Q(veh) 0 - - - 0.2

I-90 Interchange Study - Blandford  
5: Main Street (Route 23) & Russell Stage Road

Build Alt 1 PM  
2040 Build

Intersection

Int Delay, s/veh 3.2

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations		↰	↱		↰	↱
Traffic Vol, veh/h	53	109	86	12	10	56
Future Vol, veh/h	53	109	86	12	10	56
Conflicting Peds, #/hr	2	0	0	2	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	88	88	88	88	88	88
Heavy Vehicles, %	6	6	4	4	6	6
Mvmt Flow	60	124	98	14	11	64

Major/Minor Major1 Major2 Minor2

Conflicting Flow All	114	0	-	0	351	107
Stage 1	-	-	-	-	107	-
Stage 2	-	-	-	-	244	-
Critical Hdwy	4.16	-	-	-	6.46	6.26
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	2.254	-	-	-	3.554	3.354
Pot Cap-1 Maneuver	1451	-	-	-	638	936
Stage 1	-	-	-	-	907	-
Stage 2	-	-	-	-	787	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1448	-	-	-	607	934
Mov Cap-2 Maneuver	-	-	-	-	607	-
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	785	-

Approach EB WB SB

HCM Control Delay, s	2.5	0	9.6
HCM LOS			A







Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h)	1448	-	-	-	864
HCM Lane V/C Ratio	0.042	-	-	-	0.087
HCM Control Delay (s)	7.6	0	-	-	9.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3



Intersection

Int Delay, s/veh 3.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	110	131	304	214	12
Future Vol, veh/h	11	110	131	304	214	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	13	125	149	345	243	14




Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	886	243	243
Stage 1	243	-	-
Stage 2	643	-	-
Critical Hdwy	6.44	6.24	4.11
Critical Hdwy Stg 1	5.44	-	-
Critical Hdwy Stg 2	5.44	-	-
Follow-up Hdwy	3.536	3.336	2.209
Pot Cap-1 Maneuver	312	791	1329
Stage 1	793	-	-
Stage 2	520	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	277	791	1329
Mov Cap-2 Maneuver	277	-	-
Stage 1	704	-	-
Stage 2	520	-	-

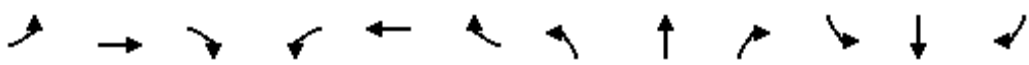
Approach	EB	NB	SB
HCM Control Delay, s	11.1	2.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1329	-	277	791	-
HCM Lane V/C Ratio	0.112	-	0.045	0.158	-
HCM Control Delay (s)	8.1	-	18.6	10.4	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.4	-	0.1	0.6	-

I-90 Interchange Study - Westfield  
 1: Northampton Road (Route 10/202) & Servistar Industrial Way

Build Alt 1 PM  
 2040 Build

Intersection						
Int Delay, s/veh	4.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	60	39	8	654	681	50
Future Vol, veh/h	60	39	8	654	681	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	23	23	8	8	3	3
Mvmt Flow	65	42	9	711	740	54
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1496	767	794	0	-	0
Stage 1	767	-	-	-	-	-
Stage 2	729	-	-	-	-	-
Critical Hdwy	6.63	6.43	4.18	-	-	-
Critical Hdwy Stg 1	5.63	-	-	-	-	-
Critical Hdwy Stg 2	5.63	-	-	-	-	-
Follow-up Hdwy	3.707	3.507	2.272	-	-	-
Pot Cap-1 Maneuver	121	370	801	-	-	-
Stage 1	423	-	-	-	-	-
Stage 2	442	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	119	370	801	-	-	-
Mov Cap-2 Maneuver	119	-	-	-	-	-
Stage 1	415	-	-	-	-	-
Stage 2	442	-	-	-	-	-
Approach	EB		NB	SB		
HCM Control Delay, s	62.8		0.1	0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	801	-	162	-	-	
HCM Lane V/C Ratio	0.011	-	0.664	-	-	
HCM Control Delay (s)	9.5	0	62.8	-	-	
HCM Lane LOS	A	A	F	-	-	
HCM 95th %tile Q(veh)	0	-	3.8	-	-	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗				↖	↕			↕	
Traffic Volume (vph)	79	88	217	0	0	0	131	415	625	0	1345	126
Future Volume (vph)	79	88	217	0	0	0	131	415	625	0	1345	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1725	1449	0	0	0	1694	3189	0	0	3568	0
Flt Permitted		0.977					0.950					
Satd. Flow (perm)	0	1725	1449	0	0	0	1693	3189	0	0	3568	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			236					412			11	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)			1	1			2					2
Confl. Bikes (#/hr)												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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	3%	3%	3%	3%	3%	3%
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)	0	182	236	0	0	0	142	1130	0	0	1599	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
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)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effect Green (s)		17.1	36.6				14.5	89.7			70.2	
Actuated g/C Ratio		0.14	0.30				0.12	0.75			0.58	
v/c Ratio		0.74	0.39				0.70	0.45			0.77	
Control Delay		67.0	5.5				68.5	4.8			23.8	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		67.0	5.5				68.5	4.8			23.8	

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
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	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effct Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			C	
Approach Delay		32.3						11.9			23.8	
Approach LOS		C						B			C	
Queue Length 50th (ft)		136	0				106	74			444	
Queue Length 95th (ft)		213	56				#190	200			#811	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		291	611				220	2486			2090	
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		0.63	0.39				0.65	0.45			0.77	

## Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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: 0.77

Intersection Signal Delay: 20.3

Intersection Capacity Utilization 71.9%

Analysis Period (min) 15

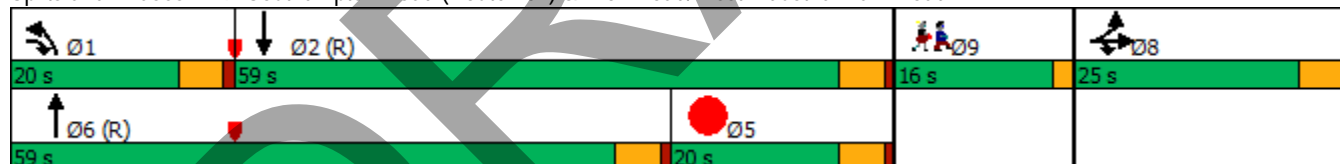
# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection LOS: C

ICU Level of Service C

Splits and Phases: 9: Southampton Road (Route 202) &amp; Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
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		

DRAFT

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↕		↖	↕	
Traffic Volume (vph)	92	68	43	28	120	73	72	995	5	82	1206	182
Future Volume (vph)	92	68	43	28	120	73	72	995	5	82	1206	182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1750	1531	0	1769	0	1620	3352	0	1636	3310	0
Flt Permitted		0.586			0.943		0.072			0.129		
Satd. Flow (perm)	0	1053	1510	0	1678	0	123	3352	0	222	3310	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			47		13							11
Link Speed (mph)		30			30			30				30
Link Distance (ft)		540			477			426				440
Travel Time (s)		12.3			10.8			9.7				10.0
Confl. Peds. (#/hr)	7		1	1		7	2		3	3		2
Confl. Bikes (#/hr)			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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	4%	4%	4%	3%	3%	3%
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)	0	174	47	0	239	0	78	1087	0	89	1509	0
Turn Type	pm+pt	NA	pm+ov	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	1		8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	20.0	46.0	26.0	26.0	26.0		26.0	68.0		14.0	56.0	
Total Split (%)	12.9%	29.7%	16.8%	16.8%	16.8%		16.8%	43.9%		9.0%	36.1%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effect Green (s)		37.9	46.0		37.9		63.4	55.2		61.9	54.5	
Actuated g/C Ratio		0.30	0.36		0.30		0.50	0.43		0.48	0.43	
v/c Ratio		0.56	0.08		0.47		0.50	0.75		0.47	1.07	
Control Delay		50.1	8.5		41.6		31.2	37.0		26.7	79.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		50.1	8.5		41.6		31.2	37.0		26.7	79.8	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A		D		C	D		C	E	
Approach Delay		41.3			41.6			36.6			76.9	
Approach LOS		D			D			D			E	
Queue Length 50th (ft)		100	0		126		26	352		30	~637	
Queue Length 95th (ft)		250	28		294		80	604		83	#1124	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		338	719		505		307	1673		199	1415	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.51	0.07		0.47		0.25	0.65		0.45	1.07	

## Intersection Summary

Area Type: Other

Cycle Length: 155

Actuated Cycle Length: 128

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 57.2

Intersection Capacity Utilization 85.4%

Analysis Period (min) 15

Intersection LOS: E

ICU Level of Service E

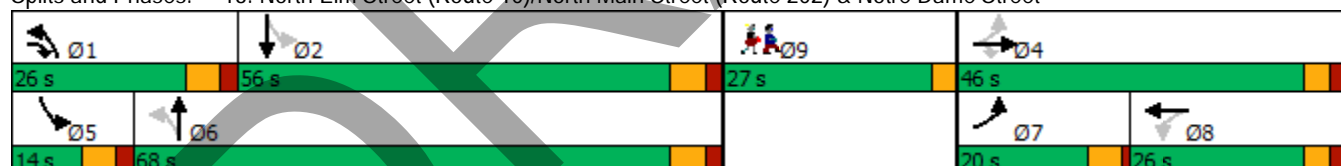
~ Volume exceeds capacity, queue is theoretically infinite.

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: 13: North Elm Street (Route 10)/North Main Street (Route 202) &amp; Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	504	16	151	0	0	0	265	538	15	0	621	325
Future Volume (vph)	504	16	151	0	0	0	265	538	15	0	621	325
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1854	1812	0	0	0	1752	1773	0	0	3421	1794
Flt Permitted		0.954					0.196					
Satd. Flow (perm)	0	1854	1812	0	0	0	359	1773	0	0	3421	1733
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			164					2				338
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			10	10			12		27	27		12
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 (%)	1%	1%	1%	0%	0%	0%	3%	3%	3%	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)	0	565	164	0	0	0	288	601	0	0	675	353
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effect Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.34	0.52				0.33	0.36			0.15	0.48
v/c Ratio		0.90	0.16				1.10	0.93			1.32	0.34
Control Delay		48.9	3.1				121.3	51.5			188.0	2.3
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		48.9	3.1				121.3	51.5			188.0	2.3

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

I-90 Interchange Study - Westfield  
 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway

Build Alt 1 PM  
 2040 Build






Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A				F	D			F	A
Approach Delay		38.6						74.1			124.3	
Approach LOS		D						E			F	
Queue Length 50th (ft)		~355	0				~185	~388			~287	3
Queue Length 95th (ft)		#554	33				#330	#595			#397	32
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		627	1022				261	647			512	1030
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		0.90	0.16				1.10	0.93			1.32	0.34

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 79.2  
 Natural Cycle: 110  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 1.32  
 Intersection Signal Delay: 83.8  
 Intersection Capacity Utilization 75.2%  
 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.

Intersection LOS: F  
 ICU Level of Service D

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway







 Ø2	 Ø4	 Ø9
31 s	32 s	27 s
 Ø6	 Ø5	
17 s	14 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

**Intersection**

Int Delay, s/veh 37.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	160	1	8	113	577	0	4	4	391	0	108
Future Vol, veh/h	34	160	1	8	113	577	0	4	4	391	0	108
Conflicting Peds, #/hr	0	0	2	2	0	0	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	6	6	6	11	11	11	13	13	13	7	7	7
Mvmt Flow	39	182	1	9	128	656	0	5	5	444	0	123

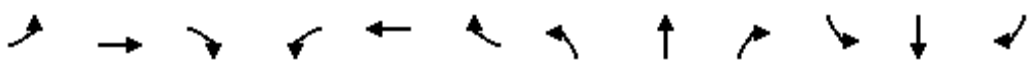








Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	1024	962	66	1051	1021	-	125	0
Stage 1	952	952	-	8	8	-	-	-
Stage 2	72	10	-	1043	1013	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.21	6.61	-	4.23	-
Critical Hdwy Stg 1	6.16	5.56	-	6.21	5.61	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.21	5.61	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.599	4.099	-	2.317	-
Pot Cap-1 Maneuver	210	252	987	197	228	0	1396	-
Stage 1	306	333	-	991	871	0	-	-
Stage 2	928	879	-	266	305	0	-	-
Platoon blocked, %								
Mov Cap-1 Maneuver	54	~ 174	983	-	158	-	1393	-
Mov Cap-2 Maneuver	54	~ 174	-	-	158	-	-	-
Stage 1	305	230	-	991	871	-	-	-
Stage 2	791	879	-	38	211	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	140.4		0	6.4
HCM LOS	F	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1393	-	-	54	175	-	-	1577	-	-
HCM Lane V/C Ratio	-	-	-	0.715	1.045	-	-	0.282	-	-
HCM Control Delay (s)	0	-	-	167.5	134.7	-	0	8.2	0	-
HCM Lane LOS	A	-	-	F	F	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	3	8.8	-	-	1.2	-	-

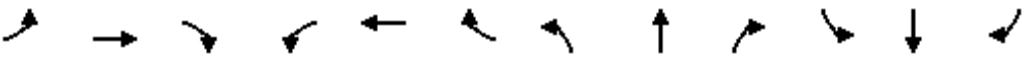
**Notes**

-: 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)	45	7	22	9	4	65	9	233	2	45	474	4
Future Volume (vph)	45	7	22	9	4	65	9	233	2	45	474	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1678	1619	0	1770	1600	0	1586	1783	0	1631	1774	0
Flt Permitted	0.706			0.736			0.371			0.563		
Satd. Flow (perm)	1247	1619	0	1371	1600	0	619	1783	0	966	1774	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			74							
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	10%	10%	10%	7%	7%	7%
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)	51	33	0	10	79	0	10	267	0	51	544	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	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		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effect Green (s)	8.0	8.0		8.0	8.0		30.5	27.5		31.7	29.7	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.62	0.56		0.65	0.61	
v/c Ratio	0.25	0.12		0.04	0.24		0.02	0.27		0.07	0.51	
Control Delay	27.4	15.4		25.2	11.1		7.9	13.2		7.4	14.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	27.4	15.4		25.2	11.1		7.9	13.2		7.4	14.3	



Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	B		A	B		A	B	
Approach Delay		22.7			12.7			13.0			13.7	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	10	2		2	1		1	25		3	63	
Queue Length 95th (ft)	63	30		20	42		11	185		34	#446	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	583	771		641	788		627	1486		783	1479	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.09	0.04		0.02	0.10		0.02	0.18		0.07	0.37	

## Intersection Summary

Area Type: Other

Cycle Length: 106

Actuated Cycle Length: 49

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.51

Intersection Signal Delay: 14.2

Intersection Capacity Utilization 50.2%

Analysis Period (min) 15








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

Queue shown is maximum after two cycles.

Intersection LOS: B

ICU Level of Service A

Splits and Phases: 5: Pleasant Street (Route 102) &amp; Big Y Plaza/Tyringham Road

 Ø1	 Ø2	 Ø4	 Ø9
13 s	40.5 s	25.5 s	27 s
 Ø5	 Ø6	 Ø8	
13 s	40.5 s	25.5 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

I-90 Interchange Study - Lee  
10: Premium Outlet Boulevard & Route 20

Build Alt 2 AM  
2040 Build

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations	↑↑		↘	↑	↘↘		
Traffic Volume (vph)	147	36	11	312	16	2	
Future Volume (vph)	147	36	11	312	16	2	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3099	0	1703	1852	2645	0	
Flt Permitted			0.551		0.957		
Satd. Flow (perm)	3099	0	988	1852	2645	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	27				2		
Link Speed (mph)	30			30	30		
Link Distance (ft)	474			486	343		
Travel Time (s)	10.8			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	13%	13%	6%	6%	27%	27%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	208	0	13	355	20	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effect Green (s)	28.1		27.1	29.4	6.0		
Actuated g/C Ratio	0.88		0.85	0.92	0.19		
v/c Ratio	0.08		0.01	0.21	0.04		
Control Delay	2.9		1.5	1.7	12.9		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	2.9		1.5	1.7	12.9		











	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	2.9			1.7	12.9		
Approach LOS	A			A	B		
Queue Length 50th (ft)	0		0	0	1		
Queue Length 95th (ft)	27		4	58	8		
Internal Link Dist (ft)	394			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3043		1188	1852	2145		
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	0.07		0.01	0.19	0.01		

#### Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 31.8  
 Natural Cycle: 60  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.21  
 Intersection Signal Delay: 2.5  
 Intersection Capacity Utilization 28.9%  
 Analysis Period (min) 15

Intersection LOS: A  
 ICU Level of Service A

Splits and Phases: 10: Premium Outlet Boulevard & Route 20

   	 	   
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I-90 Interchange Study - Blandford  
 1: Otis Stage Road (Route 23)/Main Street (Route 23) & North Street

Build Alt 2 AM  
 2040 Build

Intersection

Int Delay, s/veh 0.7

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations 4 4 4

Traffic Vol, veh/h 15 99 50 138 7 3

Future Vol, veh/h 15 99 50 138 7 3

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 88 88 88 88 88 88

Heavy Vehicles, % 0 0 13 13 8 8

Mvmt Flow 17 113 57 157 8 3

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 214 0 - 0 283 136

Stage 1 - - - - 136 -

Stage 2 - - - - 147 -

Critical Hdwy 4.1 - - - 6.48 6.28

Critical Hdwy Stg 1 - - - - 5.48 -

Critical Hdwy Stg 2 - - - - 5.48 -

Follow-up Hdwy 2.2 - - - 3.572 3.372

Pot Cap-1 Maneuver 1368 - - - 695 897

Stage 1 - - - - 876 -

Stage 2 - - - - 866 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 1368 - - - 686 897

Mov Cap-2 Maneuver - - - - 686 -

Stage 1 - - - - 865 -

Stage 2 - - - - 866 -

Approach EB WB SB

HCM Control Delay, s 1 0 10

HCM LOS B

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 1368 - - - 738

HCM Lane V/C Ratio 0.012 - - - 0.015

HCM Control Delay (s) 7.7 0 - - 10

HCM Lane LOS A A - - B

HCM 95th %tile Q(veh) 0 - - - 0

I-90 Interchange Study - Blandford  
5: Main Street (Route 23) & Russell Stage Road

Build Alt 2 AM  
2040 Build

Intersection

Int Delay, s/veh 2.1

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations

Traffic Vol, veh/h 21 85 146 3 9 42

Future Vol, veh/h 21 85 146 3 9 42

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 88 88 88 88 88 88

Heavy Vehicles, % 3 3 13 13 8 8

Mvmt Flow 24 97 166 3 10 48

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 169 0 - 0 313 168

Stage 1 - - - - 168 -

Stage 2 - - - - 145 -

Critical Hdwy 4.13 - - - 6.48 6.28

Critical Hdwy Stg 1 - - - - 5.48 -

Critical Hdwy Stg 2 - - - - 5.48 -

Follow-up Hdwy 2.227 - - - 3.572 3.372

Pot Cap-1 Maneuver 1402 - - - 667 861

Stage 1 - - - - 847 -

Stage 2 - - - - 868 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 1402 - - - 655 861

Mov Cap-2 Maneuver - - - - 655 -

Stage 1 - - - - 832 -

Stage 2 - - - - 868 -

Approach EB WB SB

HCM Control Delay, s 1.5 0 9.7

HCM LOS A

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 1402 - - - 816

HCM Lane V/C Ratio 0.017 - - - 0.071

HCM Control Delay (s) 7.6 0 - - 9.7

HCM Lane LOS A A - - A

HCM 95th %tile Q(veh) 0.1 - - - 0.2

Intersection

Int Delay, s/veh 4.2

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations	↰	↰	↰	↱	↱	↰
Traffic Vol, veh/h	12	139	118	134	240	11
Future Vol, veh/h	12	139	118	134	240	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	11	11	5	5
Mvmt Flow	14	158	134	152	273	13

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	693	273	273	0	-	0
Stage 1	273	-	-	-	-	-
Stage 2	420	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.21	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.299	-	-	-
Pot Cap-1 Maneuver	408	763	1240	-	-	0
Stage 1	771	-	-	-	-	0
Stage 2	661	-	-	-	-	0
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	364	763	1240	-	-	-
Mov Cap-2 Maneuver	364	-	-	-	-	-
Stage 1	688	-	-	-	-	-
Stage 2	661	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s	11.2	3.9	0
HCM LOS	B		




Minor Lane/Major Mvmt NBL NBT EBLn1 EBLn2 SBT

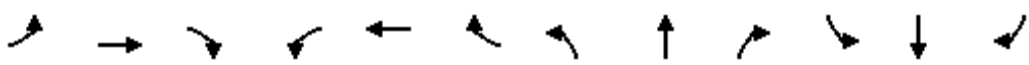
Capacity (veh/h)	1240	-	364	763	-
HCM Lane V/C Ratio	0.108	-	0.037	0.207	-
HCM Control Delay (s)	8.3	-	15.3	10.9	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.4	-	0.1	0.8	-



I-90 Interchange Study - Westfield  
1: Southampton Road & Servistar Industrial Way

Build Alt 2 AM  
2040 Build

Intersection						
Int Delay, s/veh	2.5					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	36	55	42	537	518	67
Future Vol, veh/h	36	55	42	537	518	67
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	36	36	12	12	6	6
Mvmt Flow	39	60	46	584	563	73
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1276	600	636	0	-	0
Stage 1	600	-	-	-	-	-
Stage 2	676	-	-	-	-	-
Critical Hdwy	6.76	6.56	4.22	-	-	-
Critical Hdwy Stg 1	5.76	-	-	-	-	-
Critical Hdwy Stg 2	5.76	-	-	-	-	-
Follow-up Hdwy	3.824	3.624	2.308	-	-	-
Pot Cap-1 Maneuver	157	443	901	-	-	-
Stage 1	487	-	-	-	-	-
Stage 2	447	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	145	443	901	-	-	-
Mov Cap-2 Maneuver	145	-	-	-	-	-
Stage 1	450	-	-	-	-	-
Stage 2	447	-	-	-	-	-
Approach	EB		NB	SB		
HCM Control Delay, s	29.5		0.7	0		
HCM LOS	D					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	901	-	244	-	-	
HCM Lane V/C Ratio	0.051	-	0.405	-	-	
HCM Control Delay (s)	9.2	0	29.5	-	-	
HCM Lane LOS	A	A	D	-	-	
HCM 95th %tile Q(veh)	0.2	-	1.9	-	-	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	91	131	0	0	0	47	613	554	0	945	80
Future Volume (vph)	24	91	131	0	0	0	47	613	554	0	945	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1595	1322	0	0	0	1616	3074	0	0	3351	0
Flt Permitted		0.990					0.950					
Satd. Flow (perm)	0	1595	1322	0	0	0	1616	3074	0	0	3351	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			142					247			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)									1	1		
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 (%)	14%	14%	14%	0%	0%	0%	8%	8%	8%	10%	10%	10%
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)	0	125	142	0	0	0	51	1268	0	0	1114	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
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)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effect Green (s)		14.6	30.9				11.4	92.2			75.9	
Actuated g/C Ratio		0.12	0.26				0.10	0.77			0.63	
v/c Ratio		0.65	0.32				0.33	0.52			0.52	
Control Delay		65.1	7.0				57.0	6.2			15.0	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		65.1	7.0				57.0	6.2			15.0	

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
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	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effect Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
LOS		E	A				E	A			B	
Approach Delay		34.2						8.2			15.0	
Approach LOS		C						A			B	
Queue Length 50th (ft)		94	0				38	109			209	
Queue Length 95th (ft)		152	46				78	313			431	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		265	478				202	2420			2122	
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		0.47	0.30				0.25	0.52			0.52	

**Intersection Summary**

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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: 0.65

Intersection Signal Delay: 13.6

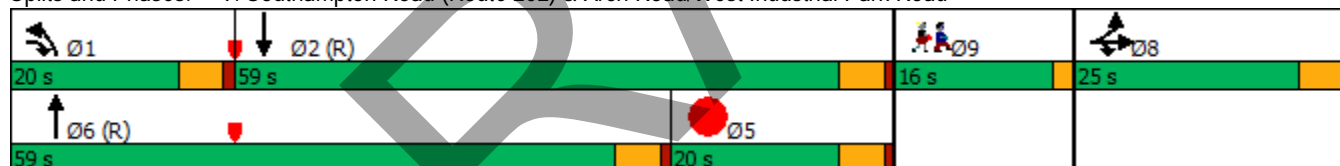
Intersection Capacity Utilization 54.1%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service A

Splits and Phases: 9: Southampton Road (Route 202) &amp; Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
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		

DRAFT

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↕		↖	↕	
Traffic Volume (vph)	208	103	81	14	81	72	43	997	20	38	836	97
Future Volume (vph)	208	103	81	14	81	72	43	997	20	38	836	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1677	1473	0	1655	0	1604	3312	0	1560	3171	0
Flt Permitted		0.655			0.958		0.123			0.104		
Satd. Flow (perm)	0	1134	1452	0	1592	0	208	3312	0	171	3171	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		19			1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	1					1	2		1	1		2
Confl. Bikes (#/hr)			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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	7%	7%	7%	5%	5%	5%	8%	8%	8%
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)	0	338	88	0	181	0	47	1106	0	41	1014	0
Turn Type	pm+pt	NA	custom	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4		1	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	35.0	56.0	21.0	21.0	21.0		21.0	58.0		14.0	51.0	
Total Split (%)	22.6%	36.1%	13.5%	13.5%	13.5%		13.5%	37.4%		9.0%	32.9%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effect Green (s)		50.4	6.9		50.4		59.2	53.5		57.3	50.6	
Actuated g/C Ratio		0.39	0.05		0.39		0.45	0.41		0.44	0.39	
v/c Ratio		0.77	0.46		0.29		0.28	0.82		0.28	0.82	
Control Delay		50.3	12.0		28.4		24.3	41.4		25.2	43.1	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		50.3	12.0		28.4		24.3	41.4		25.2	43.1	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	B		C		C	D		C	D	
Approach Delay		42.4			28.4			40.7			42.4	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)		235	0		88		19	414		16	368	
Queue Length 95th (ft)		#531	26		196		56	#748		51	#685	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		437	274		625		262	1357		162	1233	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.77	0.32		0.29		0.18	0.82		0.25	0.82	

## Intersection Summary

Area Type: Other

Cycle Length: 155

Actuated Cycle Length: 130.7

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 40.8

Intersection Capacity Utilization 77.2%

Analysis Period (min) 15









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

Queue shown is maximum after two cycles.

Intersection LOS: D

ICU Level of Service D

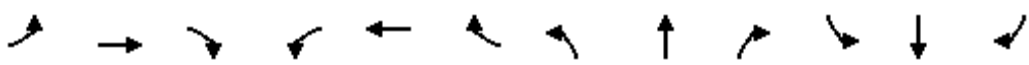
## Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) &amp; Notre Dame Street

 Ø1	 Ø2	 Ø9	 Ø4
21 s	51 s	27 s	56 s
 Ø5	 Ø6		 Ø7
14 s	58 s		35 s
			 Ø8
			21 s



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	610	32	145	0	0	0	91	474	18	0	503	355
Future Volume (vph)	610	32	145	0	0	0	91	474	18	0	503	355
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1820	1777	0	0	0	1687	1704	0	0	3261	1711
Flt Permitted		0.955					0.297					
Satd. Flow (perm)	0	1820	1777	0	0	0	526	1704	0	0	3261	1668
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			158					2				386
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			5	5			4		10	10		4
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 (%)	3%	3%	3%	0%	0%	0%	7%	7%	7%	7%	7%	7%
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)	0	698	158	0	0	0	99	535	0	0	547	386
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effect Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.36	0.56				0.35	0.39			0.16	0.52
v/c Ratio		1.06	0.15				0.32	0.80			1.05	0.36
Control Delay		78.7	3.1				28.6	35.0			86.1	2.1
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		78.7	3.1				28.6	35.0			86.1	2.1

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				C	D			F	A
Approach Delay		64.7						34.0			51.4	
Approach LOS		E						C			D	
Queue Length 50th (ft)		244	0				23	157			109	0
Queue Length 95th (ft)		#733	33				84	#520			#316	30
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		661	1062				313	667			523	1064
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		1.06	0.15				0.32	0.80			1.05	0.36

## Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 73.8

Natural Cycle: 110

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 51.5

Intersection Capacity Utilization 70.6%

Analysis Period (min) 15






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

Queue shown is maximum after two cycles.

Intersection LOS: D

ICU Level of Service C

Splits and Phases: 18: Elm Street &amp; Franklin Street (Route 20)/Mobil Gas Station Driveway







 Ø2	 Ø4	 Ø9
31 s	32 s	27 s
 Ø6	 Ø5	
17 s	14 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

**Intersection**

Int Delay, s/veh 5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	98	154	0	4	107	520	0	0	8	648	1	94
Future Vol, veh/h	98	154	0	4	107	520	0	0	8	648	1	94
Conflicting Peds, #/hr	0	0	14	14	0	0	7	0	0	0	0	7
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	4	4	4	13	13	13	4	4	4
Mvmt Flow	111	175	0	5	122	591	0	0	9	736	1	107

Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	1600	1543	76	1633	1592	-	115	0
Stage 1	1534	1534	-	5	5	-	-	-
Stage 2	66	9	-	1628	1587	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.14	6.54	-	4.23	-
Critical Hdwy Stg 1	6.12	5.52	-	6.14	5.54	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.14	5.54	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.536	4.036	-	2.317	-
Pot Cap-1 Maneuver	~ 85	~ 115	985	80	~ 106	0	1408	-
Stage 1	146	178	-	1012	888	0	-	-
Stage 2	945	888	-	127	166	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	~ 58	961	-	~ 53	-	1399	-
Mov Cap-2 Maneuver	-	~ 58	-	-	~ 53	-	-	-
Stage 1	145	~ 89	-	1012	888	-	-	-
Stage 2	816	888	-	-	~ 83	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0	8
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1399	-	-	-	58	-	-	1598	-	-
HCM Lane V/C Ratio	-	-	-	-	3.017	-	-	0.461	-	-
HCM Control Delay (s)	0	-	-	\$	1059.7	-	0	9.2	0	-
HCM Lane LOS	A	-	-	-	F	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	18.2	-	-	2.5	-	-

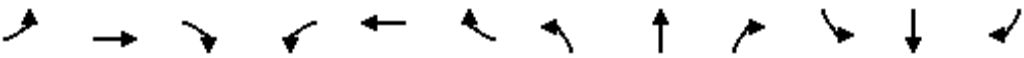
**Notes**

-: 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)	156	15	39	57	5	0	16	380	12	61	433	4
Future Volume (vph)	156	15	39	57	5	0	16	380	12	61	433	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1745	1668	0	1671	1759	0	1662	1860	0	1678	1823	0
Flt Permitted	0.754			0.717			0.380			0.316		
Satd. Flow (perm)	1381	1668	0	1261	1759	0	664	1860	0	558	1823	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44						2			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)	1					1	3					3
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	8%	8%	8%	5%	5%	5%	4%	4%	4%
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)	177	61	0	65	6	0	18	446	0	69	497	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	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		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effect Green (s)	14.6	14.6		14.6	14.6		30.6	24.4		32.8	28.8	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.51	0.41		0.54	0.48	
v/c Ratio	0.53	0.14		0.21	0.01		0.04	0.59		0.16	0.57	
Control Delay	31.6	13.6		26.5	26.2		10.2	22.2		10.1	18.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.6	13.6		26.5	26.2		10.2	22.2		10.1	18.2	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	C		B	C		B	B	
Approach Delay		27.0			26.5			21.8			17.2	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	47	4		16	1		2	114		8	88	
Queue Length 95th (ft)	#195	44		77	15		18	370		49	411	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	522	658		477	665		546	1232		515	1217	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.34	0.09		0.14	0.01		0.03	0.36		0.13	0.41	

## Intersection Summary

Area Type: Other

Cycle Length: 106

Actuated Cycle Length: 60.2

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 21.0

Intersection Capacity Utilization 54.2%

Analysis Period (min) 15








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

Queue shown is maximum after two cycles.

Intersection LOS: C

ICU Level of Service A

Splits and Phases: 5: Pleasant Street (Route 102) &amp; Big Y Plaza/Tyringham Road

 Ø1	 Ø2	 Ø4	 Ø9
13 s	40.5 s	25.5 s	27 s
 Ø5	 Ø6	 Ø8	
13 s	40.5 s	25.5 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

I-90 Interchange Study - Lee  
10: Premium Outlet Boulevard & Route 20

Build Alt 2 PM  
2040 Build

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations	↑↑		↘	↑	↖↖		
Traffic Volume (vph)	313	139	20	217	203	16	
Future Volume (vph)	313	139	20	217	203	16	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3249	0	1719	1870	3239	0	
Flt Permitted			0.373		0.956		
Satd. Flow (perm)	3249	0	675	1870	3239	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	63				6		
Link Speed (mph)	30			30	30		
Link Distance (ft)	324			486	343		
Travel Time (s)	7.4			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	6%	6%	5%	5%	4%	4%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	514	0	23	247	249	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effect Green (s)	12.6		16.1	14.0	8.8		
Actuated g/C Ratio	0.38		0.48	0.42	0.26		
v/c Ratio	0.41		0.04	0.31	0.29		
Control Delay	8.6		4.6	7.5	11.7		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	8.6		4.6	7.5	11.7		











	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	8.6			7.2	11.7		
Approach LOS	A			A	B		
Queue Length 50th (ft)	23		2	24	13		
Queue Length 95th (ft)	80		8	58	52		
Internal Link Dist (ft)	244			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3134		853	1870	2549		
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	0.16		0.03	0.13	0.10		

#### Intersection Summary

Area Type: Other  
Cycle Length: 120  
Actuated Cycle Length: 33.3  
Natural Cycle: 60  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.41  
Intersection Signal Delay: 9.0  
Intersection Capacity Utilization 31.2%  
Analysis Period (min) 15

Intersection LOS: A  
ICU Level of Service A

Splits and Phases: 10: Premium Outlet Boulevard & Route 20

   	 	   
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I-90 Interchange Study - Blandford  
 1: Otis Stage Road (Route 23)/Main Street (Route 23) & North Street

Build Alt 2 PM  
 2040 Build

Intersection

Int Delay, s/veh 1.4

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations

Traffic Vol, veh/h 9 145 95 41 33 3

Future Vol, veh/h 9 145 95 41 33 3

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 88 88 88 88 88 88

Heavy Vehicles, % 3 3 5 5 13 13

Mvmt Flow 10 165 108 47 38 3

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 155 0 - 0 317 132

Stage 1 - - - - 132 -

Stage 2 - - - - 185 -

Critical Hdwy 4.13 - - - 6.53 6.33

Critical Hdwy Stg 1 - - - - 5.53 -

Critical Hdwy Stg 2 - - - - 5.53 -

Follow-up Hdwy 2.227 - - - 3.617 3.417

Pot Cap-1 Maneuver 1419 - - - 654 889

Stage 1 - - - - 868 -

Stage 2 - - - - 821 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 1419 - - - 649 889

Mov Cap-2 Maneuver - - - - 649 -

Stage 1 - - - - 861 -

Stage 2 - - - - 821 -

Approach EB WB SB

HCM Control Delay, s 0.4 0 10.8

HCM LOS B

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 1419 - - - 664

HCM Lane V/C Ratio 0.007 - - - 0.062

HCM Control Delay (s) 7.6 0 - - 10.8

HCM Lane LOS A A - - B

HCM 95th %tile Q(veh) 0 - - - 0.2

I-90 Interchange Study - Blandford  
5: Main Street (Route 23) & Russell Stage Road

Build Alt 2 PM  
2040 Build

Intersection

Int Delay, s/veh 3.1

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations 

Traffic Vol, veh/h 55 124 79 12 10 57

Future Vol, veh/h 55 124 79 12 10 57

Conflicting Peds, #/hr 2 0 0 2 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 88 88 88 88 88 88

Heavy Vehicles, % 6 6 4 4 6 6

Mvmt Flow 63 141 90 14 11 65

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 106 0 - 0 366 99

Stage 1 - - - - 99 -

Stage 2 - - - - 267 -

Critical Hdwy 4.16 - - - 6.46 6.26

Critical Hdwy Stg 1 - - - - 5.46 -

Critical Hdwy Stg 2 - - - - 5.46 -

Follow-up Hdwy 2.254 - - - 3.554 3.354

Pot Cap-1 Maneuver 1460 - - - 626 946

Stage 1 - - - - 915 -

Stage 2 - - - - 769 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 1457 - - - 594 944

Mov Cap-2 Maneuver - - - - 594 -

Stage 1 - - - - 870 -

Stage 2 - - - - 767 -

Approach EB WB SB

HCM Control Delay, s 2.3 0 9.5

HCM LOS A

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 1457 - - - 868

HCM Lane V/C Ratio 0.043 - - - 0.088







HCM Control Delay (s) 7.6 0 - - 9.5

HCM Lane LOS A A - - A

HCM 95th %tile Q(veh) 0.1 - - - 0.3

Intersection

Int Delay, s/veh 3.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	11	125	123	303	210	12
Future Vol, veh/h	11	125	123	303	210	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	13	142	140	344	239	14

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	863	239	239
Stage 1	239	-	-
Stage 2	624	-	-
Critical Hdwy	6.44	6.24	4.11
Critical Hdwy Stg 1	5.44	-	-
Critical Hdwy Stg 2	5.44	-	-
Follow-up Hdwy	3.536	3.336	2.209
Pot Cap-1 Maneuver	322	795	1334
Stage 1	796	-	-
Stage 2	530	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	288	795	1334
Mov Cap-2 Maneuver	288	-	-
Stage 1	712	-	-
Stage 2	530	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1334	-	288	795	-
HCM Lane V/C Ratio	0.105	-	0.043	0.179	-
HCM Control Delay (s)	8	-	18.1	10.5	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.3	-	0.1	0.6	-

I-90 Interchange Study - Westfield  
1: Northampton Road (Route 10/202) & Servistar Industrial Way

Build Alt 2 PM  
2040 Build

Intersection

Int Delay, s/veh 4.2

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations      

Traffic Vol, veh/h 60 36 9 656 689 50

Future Vol, veh/h 60 36 9 656 689 50

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length 0 - - - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 92 92 92 92 92 92

Heavy Vehicles, % 23 23 8 8 3 3

Mvmt Flow 65 39 10 713 749 54

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 1509 776 803 0 - 0

Stage 1 776 - - - - -

Stage 2 733 - - - - -

Critical Hdwy 6.63 6.43 4.18 - - -

Critical Hdwy Stg 1 5.63 - - - - -

Critical Hdwy Stg 2 5.63 - - - - -

Follow-up Hdwy 3.707 3.507 2.272 - - -

Pot Cap-1 Maneuver 119 366 795 - - -

Stage 1 419 - - - - -

Stage 2 440 - - - - -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 117 366 795 - - -

Mov Cap-2 Maneuver 117 - - - - -

Stage 1 410 - - - - -

Stage 2 440 - - - - -

Approach EB NB SB

HCM Control Delay, s 64.5 0.1 0

HCM LOS F

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR

Capacity (veh/h) 795 - 157 - -

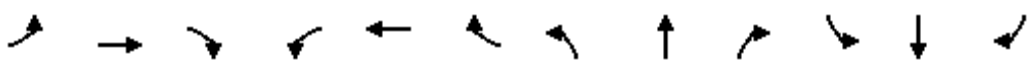
HCM Lane V/C Ratio 0.012 - 0.665 - -

HCM Control Delay (s) 9.6 0 64.5 - -

HCM Lane LOS A A F - -

HCM 95th %tile Q(veh) 0 - 3.8 - -



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗				↖	↕↗			↕↗	
Traffic Volume (vph)	78	88	217	0	0	0	131	419	616	0	1329	121
Future Volume (vph)	78	88	217	0	0	0	131	419	616	0	1329	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1725	1449	0	0	0	1694	3193	0	0	3568	0
Flt Permitted		0.977					0.950					
Satd. Flow (perm)	0	1725	1449	0	0	0	1692	3193	0	0	3568	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			236					402			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)			1	1			2					2
Confl. Bikes (#/hr)												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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	3%	3%	3%	3%	3%	3%
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)	0	181	236	0	0	0	142	1125	0	0	1577	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
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)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effect Green (s)		17.1	36.6				14.5	89.7			70.2	
Actuated g/C Ratio		0.14	0.30				0.12	0.75			0.58	
v/c Ratio		0.74	0.39				0.70	0.45			0.75	
Control Delay		66.9	5.5				68.5	4.9			23.4	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		66.9	5.5				68.5	4.9			23.4	

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
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	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effect Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group												
LOS		E	A				E	A			C	
Approach Delay		32.1						12.0			23.4	
Approach LOS		C						B			C	
Queue Length 50th (ft)		135	0				106	75			434	
Queue Length 95th (ft)		211	56				#190	201			#793	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		290	611				220	2488			2091	
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		0.62	0.39				0.65	0.45			0.75	

## Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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: 0.75

Intersection Signal Delay: 20.1

Intersection Capacity Utilization 71.2%

Analysis Period (min) 15







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

Queue shown is maximum after two cycles.

Intersection LOS: C

ICU Level of Service C

Splits and Phases: 9: Southampton Road (Route 202) &amp; Arch Road/West Industrial Park Road

 Ø1	 Ø2 (R)	 Ø9	 Ø8
20 s	59 s	16 s	25 s
 Ø6 (R)	 Ø5		
59 s	20 s		

Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
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		

DRAFT

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↗	↕↗		↗	↕↗	
Traffic Volume (vph)	92	68	43	28	120	73	72	989	5	83	1188	182
Future Volume (vph)	92	68	43	28	120	73	72	989	5	83	1188	182
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1750	1531	0	1769	0	1620	3352	0	1636	3310	0
Flt Permitted		0.586			0.943		0.072			0.131		
Satd. Flow (perm)	0	1053	1510	0	1678	0	123	3352	0	225	3310	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			47		13							12
Link Speed (mph)		30			30			30				30
Link Distance (ft)		540			477			426				440
Travel Time (s)		12.3			10.8			9.7				10.0
Confl. Peds. (#/hr)	7		1	1		7	2		3	3		2
Confl. Bikes (#/hr)			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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	4%	4%	4%	3%	3%	3%
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)	0	174	47	0	239	0	78	1080	0	90	1489	0
Turn Type	pm+pt	NA	pm+ov	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	1		8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	20.0	46.0	26.0	26.0	26.0		26.0	68.0		14.0	56.0	
Total Split (%)	12.9%	29.7%	16.8%	16.8%	16.8%		16.8%	43.9%		9.0%	36.1%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effect Green (s)		37.9	46.0		37.9		63.4	55.2		61.9	54.5	
Actuated g/C Ratio		0.30	0.36		0.30		0.50	0.43		0.48	0.43	
v/c Ratio		0.56	0.08		0.47		0.50	0.75		0.47	1.05	
Control Delay		50.1	8.5		41.6		31.2	36.8		26.7	75.2	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		50.1	8.5		41.6		31.2	36.8		26.7	75.2	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A		D		C	D		C	E	
Approach Delay		41.3			41.6			36.4			72.4	
Approach LOS		D			D			D			E	
Queue Length 50th (ft)		100	0		126		26	348		30	~620	
Queue Length 95th (ft)		250	28		294		80	600		83	#1102	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		338	719		505		307	1673		201	1416	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.51	0.07		0.47		0.25	0.65		0.45	1.05	

## Intersection Summary

Area Type: Other

Cycle Length: 155

Actuated Cycle Length: 128

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 54.9

Intersection Capacity Utilization 84.9%

Analysis Period (min) 15

Intersection LOS: D

ICU Level of Service E

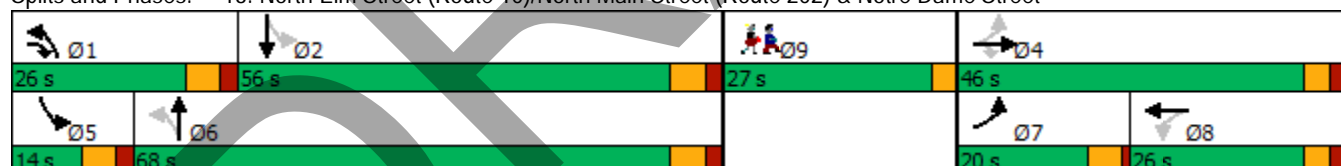
~ Volume exceeds capacity, queue is theoretically infinite.

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: 13: North Elm Street (Route 10)/North Main Street (Route 202) &amp; Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT



	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗				↖	↗			↖	↗
Traffic Volume (vph)	497	16	146	0	0	0	248	532	15	0	637	321
Future Volume (vph)	497	16	146	0	0	0	248	532	15	0	637	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1854	1812	0	0	0	1752	1773	0	0	3421	1794
Flt Permitted		0.954					0.196					
Satd. Flow (perm)	0	1854	1812	0	0	0	359	1773	0	0	3421	1733
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			159					2				326
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			10	10			12		27	27		12
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 (%)	1%	1%	1%	0%	0%	0%	3%	3%	3%	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)	0	557	159	0	0	0	270	594	0	0	692	349
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effect Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.34	0.52				0.33	0.36			0.15	0.48
v/c Ratio		0.89	0.16				1.03	0.92			1.35	0.34
Control Delay		47.2	3.1				101.8	49.8			201.6	2.4
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		47.2	3.1				101.8	49.8			201.6	2.4

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

I-90 Interchange Study - Westfield  
 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway

Build Alt 2 PM  
 2040 Build






Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A				F	D			F	A
Approach Delay		37.4						66.1			134.8	
Approach LOS		D						E			F	
Queue Length 50th (ft)		~346	0				~162	~380			~297	4
Queue Length 95th (ft)		#544	33				#303	#586			#408	34
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		627	1019				261	647			512	1024
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		0.89	0.16				1.03	0.92			1.35	0.34

Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 79.2  
 Natural Cycle: 110  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 1.35  
 Intersection Signal Delay: 85.5  
 Intersection Capacity Utilization 74.3%  
 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.

Intersection LOS: F  
 ICU Level of Service D

Splits and Phases: 18: Elm Street & Franklin Street (Route 20)/Mobil Gas Station Driveway







 Ø2	 Ø4	 Ø9
31 s	32 s	27 s
 Ø6	 Ø5	
17 s	14 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

**Intersection**

Int Delay, s/veh 41.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	34	160	1	8	113	579	0	4	4	400	0	108
Future Vol, veh/h	34	160	1	8	113	579	0	4	4	400	0	108
Conflicting Peds, #/hr	0	0	2	2	0	0	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	6	6	6	11	11	11	13	13	13	7	7	7
Mvmt Flow	39	182	1	9	128	658	0	5	5	455	0	123





















Major/Minor	Minor2		Minor1		Major1		Major2	
Conflicting Flow All	1046	984	66	1073	1043	-	125	0
Stage 1	974	974	-	8	8	-	-	-
Stage 2	72	10	-	1065	1035	-	-	-
Critical Hdwy	7.16	6.56	6.26	7.21	6.61	-	4.23	-
Critical Hdwy Stg 1	6.16	5.56	-	6.21	5.61	-	-	-
Critical Hdwy Stg 2	6.16	5.56	-	6.21	5.61	-	-	-
Follow-up Hdwy	3.554	4.054	3.354	3.599	4.099	-	2.317	-
Pot Cap-1 Maneuver	203	245	987	190	221	0	1396	-
Stage 1	298	325	-	991	871	0	-	-
Stage 2	928	879	-	259	298	0	-	-
Platoon blocked, %								
Mov Cap-1 Maneuver	46	~ 168	983	-	151	-	1393	-
Mov Cap-2 Maneuver	46	~ 168	-	-	151	-	-	-
Stage 1	297	223	-	991	871	-	-	-
Stage 2	791	879	-	33	204	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	161.4		0	6.5
HCM LOS	F	-		

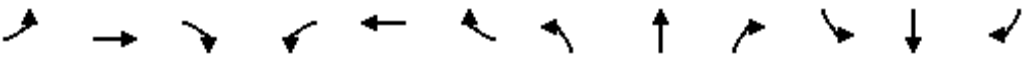
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1393	-	-	46	169	-	-	1577	-	-
HCM Lane V/C Ratio	-	-	-	0.84	1.083	-	-	0.288	-	-
HCM Control Delay (s)	0	-	-	223	148.4	-	0	8.2	0	-
HCM Lane LOS	A	-	-	F	F	-	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	3.4	9.2	-	-	1.2	-	-

**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)	43	9	22	9	8	64	9	233	2	46	476	4
Future Volume (vph)	43	9	22	9	8	64	9	233	2	46	476	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1678	1631	0	1770	1613	0	1586	1783	0	1631	1774	0
Flt Permitted	0.704			0.734			0.389			0.535		
Satd. Flow (perm)	1243	1631	0	1367	1613	0	650	1783	0	918	1774	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			73							
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	2%	2%	2%	10%	10%	10%	7%	7%	7%
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)	49	35	0	10	82	0	10	267	0	52	546	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	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		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effect Green (s)	7.9	7.9		7.9	7.9		29.7	25.4		31.8	29.7	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.61	0.52		0.65	0.61	
v/c Ratio	0.24	0.12		0.05	0.26		0.02	0.29		0.08	0.51	
Control Delay	27.4	15.7		25.3	11.7		7.8	14.4		7.3	14.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	27.4	15.7		25.3	11.7		7.8	14.4		7.3	14.3	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	B		A	B		A	B	
Approach Delay		22.5			13.2			14.2			13.7	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	9	2		2	2		1	42		3	63	
Queue Length 95th (ft)	61	32		20	44		11	185		34	#446	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	582	777		640	794		641	1442		764	1435	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.08	0.05		0.02	0.10		0.02	0.19		0.07	0.38	

## Intersection Summary

Area Type: Other

Cycle Length: 106

Actuated Cycle Length: 49

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.51

Intersection Signal Delay: 14.5

Intersection Capacity Utilization 50.2%

Analysis Period (min) 15








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

Queue shown is maximum after two cycles.

Intersection LOS: B

ICU Level of Service A

Splits and Phases: 5: Pleasant Street (Route 102) &amp; Big Y Plaza/Tyringham Road

 Ø1	 Ø2	 Ø4	 Ø9
13 s	40.5 s	25.5 s	27 s
 Ø5	 Ø6	 Ø8	
13 s	40.5 s	25.5 s	



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

I-90 Interchange Study - Lee  
10: Premium Outlet Boulevard & Route 20

Build Alt 3 AM  
2040 Build

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations	↑↑		↘	↑	↖↖		
Traffic Volume (vph)	158	33	11	318	13	3	
Future Volume (vph)	158	33	11	318	13	3	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3112	0	1703	1852	2626	0	
Flt Permitted			0.547		0.960		
Satd. Flow (perm)	3112	0	980	1852	2626	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	22				3		
Link Speed (mph)	30			30	30		
Link Distance (ft)	474			486	343		
Travel Time (s)	10.8			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	13%	13%	6%	6%	27%	27%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	218	0	13	361	18	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effect Green (s)	28.5		27.4	29.8	6.0		
Actuated g/C Ratio	0.89		0.85	0.93	0.19		
v/c Ratio	0.08		0.01	0.21	0.04		
Control Delay	2.9		1.4	1.7	13.0		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	2.9		1.4	1.7	13.0		











	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	2.9			1.7	13.0		
Approach LOS	A			A	B		
Queue Length 50th (ft)	0		0	0	1		
Queue Length 95th (ft)	29		4	58	8		
Internal Link Dist (ft)	394			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3038		1186	1852	2119		
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	0.07		0.01	0.19	0.01		

#### Intersection Summary

Area Type: Other  
Cycle Length: 120  
Actuated Cycle Length: 32.1  
Natural Cycle: 60  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.21  
Intersection Signal Delay: 2.4  
Intersection Capacity Utilization 29.2%  
Analysis Period (min) 15

Intersection LOS: A  
ICU Level of Service A

Splits and Phases: 10: Premium Outlet Boulevard & Route 20




   	 	   
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I-90 Interchange Study - Blandford  
 1: Otis Stage Road (Route 23)/Main Street (Route 23) & North Street

Build Alt 3 AM  
 2040 Build

Intersection

Int Delay, s/veh 3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	131	80	50	200	22	7
Future Vol, veh/h	131	80	50	200	22	7
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	88	88	88	88	88	88
Heavy Vehicles, %	0	0	13	13	8	8
Mvmt Flow	149	91	57	227	25	8

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	284	0	0 560 171
Stage 1	-	-	- 171 -
Stage 2	-	-	- 389 -
Critical Hdwy	4.1	-	- 6.48 6.28
Critical Hdwy Stg 1	-	-	- 5.48 -
Critical Hdwy Stg 2	-	-	- 5.48 -
Follow-up Hdwy	2.2	-	- 3.572 3.372
Pot Cap-1 Maneuver	1290	-	- 479 857
Stage 1	-	-	- 845 -
Stage 2	-	-	- 672 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1290	-	- 421 857
Mov Cap-2 Maneuver	-	-	- 421 -
Stage 1	-	-	- 742 -
Stage 2	-	-	- 672 -

Approach	EB	WB	SB
HCM Control Delay, s	5.1	0	13.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1290	-	-	-	480
HCM Lane V/C Ratio	0.115	-	-	-	0.069
HCM Control Delay (s)	8.2	0	-	-	13.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.4	-	-	-	0.2




I-90 Interchange Study - Blandford  
5: Main Street (Route 23) & Russell Stage Road

Build Alt 3 AM  
2040 Build

Intersection

Int Delay, s/veh 3.2

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations						
Traffic Vol, veh/h	22	79	162	3	9	88
Future Vol, veh/h	22	79	162	3	9	88
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	88	88	88	88	88	88
Heavy Vehicles, %	3	3	13	13	8	8
Mvmt Flow	25	90	184	3	10	100

Major/Minor Major1 Major2 Minor2

Conflicting Flow All	187	0	-	0	326	186
Stage 1	-	-	-	-	186	-
Stage 2	-	-	-	-	140	-
Critical Hdwy	4.13	-	-	-	6.48	6.28
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.227	-	-	-	3.572	3.372
Pot Cap-1 Maneuver	1381	-	-	-	656	841
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	872	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1381	-	-	-	644	841
Mov Cap-2 Maneuver	-	-	-	-	644	-
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	872	-

Approach EB WB SB







HCM Control Delay, s	1.7	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h)	1381	-	-	-	818
HCM Lane V/C Ratio	0.018	-	-	-	0.135
HCM Control Delay (s)	7.7	0	-	-	10.1
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection

Int Delay, s/veh 4.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	134	133	133	217	11
Future Vol, veh/h	12	134	133	133	217	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	3	3	11	11	5	5
Mvmt Flow	14	152	151	151	247	13

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	700	247	247
Stage 1	247	-	-
Stage 2	453	-	-
Critical Hdwy	6.43	6.23	4.21
Critical Hdwy Stg 1	5.43	-	-
Critical Hdwy Stg 2	5.43	-	-
Follow-up Hdwy	3.527	3.327	2.299
Pot Cap-1 Maneuver	404	789	1268
Stage 1	792	-	-
Stage 2	638	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	356	789	1268
Mov Cap-2 Maneuver	356	-	-
Stage 1	698	-	-
Stage 2	638	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	4.1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT
Capacity (veh/h)	1268	-	356	789	-
HCM Lane V/C Ratio	0.119	-	0.038	0.193	-
HCM Control Delay (s)	8.2	-	15.5	10.7	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.4	-	0.1	0.7	-

I-90 Interchange Study - Westfield  
1: Southampton Road & Servistar Industrial Way

Build Alt 3 AM  
2040 Build

Intersection

Int Delay, s/veh 2.4

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations      

Traffic Vol, veh/h 36 55 42 534 516 67

Future Vol, veh/h 36 55 42 534 516 67

Conflicting Peds, #/hr 0 0 0 0 0 0

Sign Control Stop Stop Free Free Free Free

RT Channelized - None - None - None

Storage Length 0 - - - - -

Veh in Median Storage, # 0 - - 0 0 -

Grade, % 0 - - 0 0 -

Peak Hour Factor 92 92 92 92 92 92

Heavy Vehicles, % 36 36 12 12 6 6

Mvmt Flow 39 60 46 580 561 73

Major/Minor Minor2 Major1 Major2

Conflicting Flow All 1270 598 634 0 - 0

Stage 1 598 - - - - -

Stage 2 672 - - - - -

Critical Hdwy 6.76 6.56 4.22 - - -

Critical Hdwy Stg 1 5.76 - - - - -

Critical Hdwy Stg 2 5.76 - - - - -

Follow-up Hdwy 3.824 3.624 2.308 - - -

Pot Cap-1 Maneuver 158 445 903 - - -

Stage 1 489 - - - - -

Stage 2 449 - - - - -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 146 445 903 - - -

Mov Cap-2 Maneuver 146 - - - - -

Stage 1 452 - - - - -

Stage 2 449 - - - - -

Approach EB NB SB

HCM Control Delay, s 29.1 0.7 0

HCM LOS D

Minor Lane/Major Mvmt NBL NBT EBLn1 SBT SBR


Capacity (veh/h) 903 - 246 - -

HCM Lane V/C Ratio 0.051 - 0.402 - -

HCM Control Delay (s) 9.2 0 29.1 - -













HCM Lane LOS A A D - -

HCM 95th %tile Q(veh) 0.2 - 1.8 - -

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱				↰	↰↱			↰↱	
Traffic Volume (vph)	24	84	131	0	0	0	47	606	527	0	942	83
Future Volume (vph)	24	84	131	0	0	0	47	606	527	0	942	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1593	1322	0	0	0	1616	3078	0	0	3351	0
Flt Permitted		0.989					0.950					
Satd. Flow (perm)	0	1593	1322	0	0	0	1616	3078	0	0	3351	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			142					239			10	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)									1	1		
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 (%)	14%	14%	14%	0%	0%	0%	8%	8%	8%	10%	10%	10%
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)	0	117	142	0	0	0	51	1232	0	0	1114	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
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)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effect Green (s)		14.1	30.4				11.4	92.7			76.4	
Actuated g/C Ratio		0.12	0.25				0.10	0.77			0.64	
v/c Ratio		0.63	0.32				0.33	0.51			0.52	
Control Delay		64.6	7.1				57.0	5.9			14.7	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		64.6	7.1				57.0	5.9			14.7	



Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
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	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effect Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			B	
Approach Delay		33.1						8.0			14.7	
Approach LOS		C						A			B	
Queue Length 50th (ft)		88	0				38	100			205	
Queue Length 95th (ft)		144	47				78	295			427	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		265	465				202	2432			2135	
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	0.31				0.25	0.51			0.52	

**Intersection Summary**

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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: 0.63

Intersection Signal Delay: 13.2

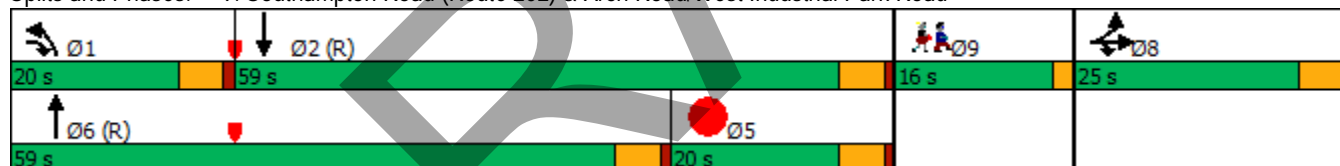
Intersection Capacity Utilization 54.1%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service A

Splits and Phases: 9: Southampton Road (Route 202) &amp; Arch Road/West Industrial Park Road



Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
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		

DRAFT

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↕		↖	↕	
Traffic Volume (vph)	208	103	81	14	81	72	43	964	20	38	834	97
Future Volume (vph)	208	103	81	14	81	72	43	964	20	38	834	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1677	1473	0	1655	0	1604	3312	0	1560	3171	0
Flt Permitted		0.656			0.958		0.121			0.114		
Satd. Flow (perm)	0	1136	1452	0	1592	0	204	3312	0	187	3171	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			120		19			1			8	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		540			477			426			440	
Travel Time (s)		12.3			10.8			9.7			10.0	
Confl. Peds. (#/hr)	1					1	2		1	1		2
Confl. Bikes (#/hr)			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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	7%	7%	7%	5%	5%	5%	8%	8%	8%
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)	0	338	88	0	181	0	47	1070	0	41	1012	0
Turn Type	pm+pt	NA	custom	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4			8		1	6		5	2	
Permitted Phases	4		1	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	35.0	56.0	21.0	21.0	21.0		21.0	58.0		14.0	51.0	
Total Split (%)	22.6%	36.1%	13.5%	13.5%	13.5%		13.5%	37.4%		9.0%	32.9%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effect Green (s)		50.4	6.9		50.4		58.2	52.5		56.3	49.7	
Actuated g/C Ratio		0.39	0.05		0.39		0.45	0.40		0.43	0.38	
v/c Ratio		0.77	0.46		0.29		0.28	0.80		0.27	0.83	
Control Delay		49.3	12.0		28.1		24.6	40.8		24.8	43.6	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		49.3	12.0		28.1		24.6	40.8		24.8	43.6	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	B		C		C	D		C	D	
Approach Delay		41.6			28.1			40.1			42.9	
Approach LOS		D			C			D			D	
Queue Length 50th (ft)		235	0		88		19	394		16	367	
Queue Length 95th (ft)		#530	26		196		56	#707		51	#683	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		441	275		630		261	1367		168	1219	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.77	0.32		0.29		0.18	0.78		0.24	0.83	

## Intersection Summary

Area Type: Other

Cycle Length: 155

Actuated Cycle Length: 129.7

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 40.6

Intersection Capacity Utilization 77.2%

Analysis Period (min) 15









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

Queue shown is maximum after two cycles.

Intersection LOS: D


ICU Level of Service D

## Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) &amp; Notre Dame Street

 Ø1	 Ø2	 Ø9	 Ø4
21 s	51 s	27 s	56 s
 Ø5	 Ø6		 Ø7
14 s	58 s		35 s
			 Ø8
			21 s

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	581	32	134	0	0	0	94	496	18	0	500	354
Future Volume (vph)	581	32	134	0	0	0	94	496	18	0	500	354
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1820	1777	0	0	0	1687	1706	0	0	3261	1711
Flt Permitted		0.955					0.300					
Satd. Flow (perm)	0	1820	1777	0	0	0	531	1706	0	0	3261	1668
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			146					2				385
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			5	5			4		10	10		4
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 (%)	3%	3%	3%	0%	0%	0%	7%	7%	7%	7%	7%	7%
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)	0	667	146	0	0	0	102	559	0	0	543	385
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effect Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.36	0.56				0.35	0.39			0.16	0.52
v/c Ratio		1.01	0.14				0.32	0.84			1.04	0.36
Control Delay		66.0	3.1				28.7	37.6			84.1	2.1
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		66.0	3.1				28.7	37.6			84.1	2.1



Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				C	D			F	A
Approach Delay		54.7						36.2			50.1	
Approach LOS		D						D			D	
Queue Length 50th (ft)		227	0				24	167			108	0
Queue Length 95th (ft)		#692	32				86	#553			#313	30
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		661	1057				314	668			523	1063
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		1.01	0.14				0.32	0.84			1.04	0.36

## Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 73.8

Natural Cycle: 110

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 47.8

Intersection Capacity Utilization 69.4%

Analysis Period (min) 15

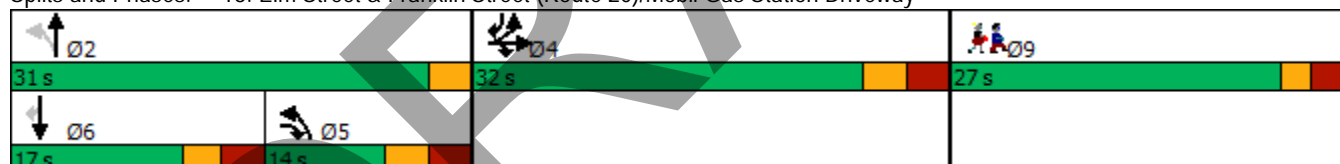
# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection LOS: D







ICU Level of Service C

Splits and Phases: 18: Elm Street &amp; Franklin Street (Route 20)/Mobil Gas Station Driveway



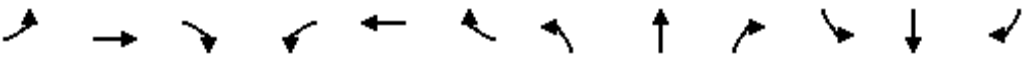
Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	
Intersection Summary	

DRAFT

Intersection												
Int Delay, s/veh	5.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	98	154	0	4	114	524	0	0	8	683	1	87
Future Vol, veh/h	98	154	0	4	114	524	0	0	8	683	1	87
Conflicting Peds, #/hr	0	0	14	14	0	0	7	0	0	0	0	7
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	200	-	-	-	-	200	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	4	4	4	13	13	13	4	4	4
Mvmt Flow	111	175	0	5	130	595	0	0	9	776	1	99
Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1680	1619	72	1709	1664	-	107	0	0	9	0	0
Stage 1	1610	1610	-	5	5	-	-	-	-	-	-	-
Stage 2	70	9	-	1704	1659	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.14	6.54	-	4.23	-	-	4.14	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.14	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.536	4.036	-	2.317	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 75	~ 103	990	71	~ 96	0	1418	-	-	1598	-	-
Stage 1	132	~ 163	-	1012	888	0	-	-	-	-	-	-
Stage 2	940	888	-	115	153	0	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	~ 49	966	-	~ 46	-	1409	-	-	1598	-	-
Mov Cap-2 Maneuver	-	~ 49	-	-	~ 46	-	-	-	-	-	-	-
Stage 1	131	~ 78	-	1012	888	-	-	-	-	-	-	-
Stage 2	803	888	-	-	~ 73	-	-	-	-	-	-	-
Approach	EB		WB		NB		SB					
HCM Control Delay, s					0		8.3					
HCM LOS	-		-									
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR		
Capacity (veh/h)	1409	-	-	-	49	-	-	1598	-	-		
HCM Lane V/C Ratio	-	-	-	-	3.571	-	-	0.486	-	-		
HCM Control Delay (s)	0	-	-	-	\$ 1330	-	0	9.4	0	-		
HCM Lane LOS	A	-	-	-	F	-	A	A	A	-		
HCM 95th %tile Q(veh)	0	-	-	-	19.2	-	-	2.8	-	-		
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)	150	20	39	57	8	0	16	381	12	69	433	5
Future Volume (vph)	150	20	39	57	8	0	16	381	12	69	433	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	12	12	12	12	12	11	13	13	11	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	50		0	155		0	225		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1745	1687	0	1671	1759	0	1662	1860	0	1678	1823	0
Flt Permitted	0.752			0.713			0.420			0.310		
Satd. Flow (perm)	1378	1687	0	1254	1759	0	734	1860	0	547	1823	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		44						2			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		172			514			566			291	
Travel Time (s)		3.9			11.7			12.9			6.6	
Confl. Peds. (#/hr)	1						1	3				3
Confl. Bikes (#/hr)			1									
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	8%	8%	8%	5%	5%	5%	4%	4%	4%
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)	170	67	0	65	9	0	18	447	0	78	498	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	6.0	6.0		6.0	6.0		4.0	10.0		4.0	10.0	
Minimum Split (s)	11.5	11.5		11.5	11.5		7.0	15.5		7.0	15.5	
Total Split (s)	25.5	25.5		25.5	25.5		13.0	40.5		13.0	40.5	
Total Split (%)	24.1%	24.1%		24.1%	24.1%		12.3%	38.2%		12.3%	38.2%	
Yellow Time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.5	2.5		2.5	2.5		0.0	2.5		0.0	2.5	
Lost Time Adjust (s)	0.0	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		3.0	5.5		3.0	5.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Recall Mode	None	None		None	None		None	Min		None	None	
Act Effect Green (s)	13.9	13.9		13.9	13.9		31.7	23.9		35.0	31.1	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.51	0.39		0.57	0.50	
v/c Ratio	0.55	0.16		0.23	0.02		0.04	0.62		0.17	0.54	
Control Delay	33.1	14.4		27.2	26.1		10.1	23.4		10.0	17.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	33.1	14.4		27.2	26.1		10.1	23.4		10.0	17.3	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	25%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	C		B	C		A	B	
Approach Delay		27.8			27.1			22.9			16.3	
Approach LOS		C			C			C			B	
Queue Length 50th (ft)	45	5		16	2		2	113		9	86	
Queue Length 95th (ft)	178	49		77	19		18	372		54	412	
Internal Link Dist (ft)		92			434			486			211	
Turn Bay Length (ft)				50			155			225		
Base Capacity (vph)	498	638		453	636		580	1178		515	1164	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.34	0.11		0.14	0.01		0.03	0.38		0.15	0.43	

**Intersection Summary**

Area Type: Other

Cycle Length: 106

Actuated Cycle Length: 61.6

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 21.2








Intersection Capacity Utilization 53.9%

Analysis Period (min) 15

Intersection LOS: C

ICU Level of Service A

Splits and Phases: 5: Pleasant Street (Route 102) &amp; Big Y Plaza/Tyringham Road

 Ø1	 Ø2	 Ø4	 Ø9
13 s	40.5 s	25.5 s	27 s
 Ø5	 Ø6	 Ø8	
13 s	40.5 s	25.5 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT



I-90 Interchange Study - Lee  
10: Premium Outlet Boulevard & Route 20

Build Alt 3 PM  
2040 Build

	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
Lane Configurations	↑↑		↘	↑	↖↖		
Traffic Volume (vph)	341	137	20	226	194	21	
Future Volume (vph)	341	137	20	226	194	21	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Width (ft)	12	11	12	13	11	12	
Grade (%)	0%			0%	0%		
Storage Length (ft)		0	250		0	0	
Storage Lanes		0	1		2	0	
Taper Length (ft)			25		25		
Satd. Flow (prot)	3259	0	1719	1870	3230	0	
Flt Permitted			0.366		0.957		
Satd. Flow (perm)	3259	0	662	1870	3230	0	
Right Turn on Red		Yes				Yes	
Satd. Flow (RTOR)	54				9		
Link Speed (mph)	30			30	30		
Link Distance (ft)	324			486	343		
Travel Time (s)	7.4			11.0	7.8		
Confl. Peds. (#/hr)							
Confl. Bikes (#/hr)							
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	
Growth Factor	100%	100%	100%	100%	100%	100%	
Heavy Vehicles (%)	6%	6%	5%	5%	4%	4%	
Bus Blockages (#/hr)	0	0	0	0	0	0	
Parking (#/hr)							
Mid-Block Traffic (%)	0%			0%	0%		
Shared Lane Traffic (%)							
Lane Group Flow (vph)	544	0	23	257	244	0	
Turn Type	NA		pm+pt	NA	Prot		
Protected Phases	6		5	2	4		9
Permitted Phases			2				
Detector Phase	6		5	2	4		
Switch Phase							
Minimum Initial (s)	8.0		5.0	8.0	5.0		7.0
Minimum Split (s)	13.0		8.0	13.0	10.0		27.0
Total Split (s)	45.0		18.0	63.0	30.0		27.0
Total Split (%)	37.5%		15.0%	52.5%	25.0%		23%
Yellow Time (s)	3.0		3.0	3.0	3.0		2.0
All-Red Time (s)	2.0		0.0	2.0	2.0		0.0
Lost Time Adjust (s)	0.0		0.0	0.0	0.0		
Total Lost Time (s)	5.0		3.0	5.0	5.0		
Lead/Lag	Lag		Lead				
Lead-Lag Optimize?	Yes		Yes				
Recall Mode	Min		None	Min	None		None
Act Effect Green (s)	13.3		16.8	14.7	8.8		
Actuated g/C Ratio	0.39		0.49	0.43	0.26		
v/c Ratio	0.42		0.04	0.32	0.29		
Control Delay	8.7		4.5	7.4	11.9		
Queue Delay	0.0		0.0	0.0	0.0		
Total Delay	8.7		4.5	7.4	11.9		






	→	↘	↙	←	↖	↗	
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR	Ø9
LOS	A		A	A	B		
Approach Delay	8.7			7.2	11.9		
Approach LOS	A			A	B		
Queue Length 50th (ft)	25		2	25	13		
Queue Length 95th (ft)	86		8	60	52		
Internal Link Dist (ft)	244			406	263		
Turn Bay Length (ft)			250				
Base Capacity (vph)	3136		837	1870	2485		
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	0.17		0.03	0.14	0.10		

#### Intersection Summary

Area Type: Other  
Cycle Length: 120  
Actuated Cycle Length: 34  
Natural Cycle: 60  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.42  
Intersection Signal Delay: 9.0  
Intersection Capacity Utilization 31.1%  
Analysis Period (min) 15

Intersection LOS: A  
ICU Level of Service A

Splits and Phases: 10: Premium Outlet Boulevard & Route 20

  63 s 18 s	 45 s	 27 s	 30 s
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I-90 Interchange Study - Blandford  
 1: Otis Stage Road (Route 23)/Main Street (Route 23) & North Street

Build Alt 3 PM  
 2040 Build

Intersection

Int Delay, s/veh 6.7

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations

Traffic Vol, veh/h 79 68 96 107 173 12

Future Vol, veh/h 79 68 96 107 173 12

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 88 88 88 88 88 88

Heavy Vehicles, % 3 3 5 5 13 13

Mvmt Flow 90 77 109 122 197 14

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 231 0 - 0 427 170

Stage 1 - - - - 170 -

Stage 2 - - - - 257 -

Critical Hdwy 4.13 - - - 6.53 6.33

Critical Hdwy Stg 1 - - - - 5.53 -

Critical Hdwy Stg 2 - - - - 5.53 -

Follow-up Hdwy 2.227 - - - 3.617 3.417

Pot Cap-1 Maneuver 1331 - - - 564 846

Stage 1 - - - - 834 -

Stage 2 - - - - 761 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 1331 - - - 524 846

Mov Cap-2 Maneuver - - - - 524 -

Stage 1 - - - - 775 -

Stage 2 - - - - 761 -

Approach EB WB SB

HCM Control Delay, s 4.2 0 16

HCM LOS C

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 1331 - - - 537

HCM Lane V/C Ratio 0.067 - - - 0.391

HCM Control Delay (s) 7.9 0 - - 16

HCM Lane LOS A A - - C

HCM 95th %tile Q(veh) 0.2 - - - 1.8

I-90 Interchange Study - Blandford  
5: Main Street (Route 23) & Russell Stage Road

Build Alt 3 PM  
2040 Build

Intersection

Int Delay, s/veh 3

Movement EBL EBT WBT WBR SBL SBR

Lane Configurations 

Traffic Vol, veh/h 66 174 123 12 10 80

Future Vol, veh/h 66 174 123 12 10 80

Conflicting Peds, #/hr 2 0 0 2 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 88 88 88 88 88 88

Heavy Vehicles, % 6 6 4 4 6 6

Mvmt Flow 75 198 140 14 11 91

Major/Minor Major1 Major2 Minor2

Conflicting Flow All 156 0 - 0 497 149

Stage 1 - - - - 149 -

Stage 2 - - - - 348 -

Critical Hdwy 4.16 - - - 6.46 6.26

Critical Hdwy Stg 1 - - - - 5.46 -

Critical Hdwy Stg 2 - - - - 5.46 -

Follow-up Hdwy 2.254 - - - 3.554 3.354

Pot Cap-1 Maneuver 1400 - - - 525 887

Stage 1 - - - - 869 -

Stage 2 - - - - 706 -

Platoon blocked, % - - - - -

Mov Cap-1 Maneuver 1397 - - - 491 885

Mov Cap-2 Maneuver - - - - 491 -

Stage 1 - - - - 815 -

Stage 2 - - - - 705 -

Approach EB WB SB

HCM Control Delay, s 2.1 0 10.1

HCM LOS B

Minor Lane/Major Mvmt EBL EBT WBT WBR SBLn1

Capacity (veh/h) 1397 - - - 813

HCM Lane V/C Ratio 0.054 - - - 0.126

HCM Control Delay (s) 7.7 0 - - 10.1

HCM Lane LOS A A - - B

HCM 95th %tile Q(veh) 0.2 - - - 0.4

Intersection

Int Delay, s/veh 4.1

Movement EBL EBR NBL NBT SBT SBR

Lane Configurations	↰	↰	↰	↱	↱	↰
Traffic Vol, veh/h	11	175	167	300	199	12
Future Vol, veh/h	11	175	167	300	199	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	None	-	Free
Storage Length	0	150	200	-	-	150
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	4	4	1	1	4	4
Mvmt Flow	13	199	190	341	226	14

Major/Minor Minor2 Major1 Major2

Conflicting Flow All	947	226	226	0	-	0
Stage 1	226	-	-	-	-	-
Stage 2	721	-	-	-	-	-
Critical Hdwy	6.44	6.24	4.11	-	-	-
Critical Hdwy Stg 1	5.44	-	-	-	-	-
Critical Hdwy Stg 2	5.44	-	-	-	-	-
Follow-up Hdwy	3.536	3.336	2.209	-	-	-
Pot Cap-1 Maneuver	287	808	1348	-	-	0
Stage 1	807	-	-	-	-	0
Stage 2	478	-	-	-	-	0
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	247	808	1348	-	-	-
Mov Cap-2 Maneuver	247	-	-	-	-	-
Stage 1	693	-	-	-	-	-
Stage 2	478	-	-	-	-	-

Approach EB NB SB

HCM Control Delay, s	11.5	2.9	0
HCM LOS	B		


Minor Lane/Major Mvmt NBL NBT EBLn1 EBLn2 SBT

Capacity (veh/h)	1348	-	247	808	-
HCM Lane V/C Ratio	0.141	-	0.051	0.246	-
HCM Control Delay (s)	8.1	-	20.4	10.9	-
HCM Lane LOS	A	-	C	B	-
HCM 95th %tile Q(veh)	0.5	-	0.2	1	-

I-90 Interchange Study - Westfield  
1: Northampton Road (Route 10/202) & Servistar Industrial Way

Build Alt 3 PM  
2040 Build

Intersection						
Int Delay, s/veh	3.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			W	W	
Traffic Vol, veh/h	60	36	0	663	687	50
Future Vol, veh/h	60	36	0	663	687	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	23	23	8	8	3	3
Mvmt Flow	65	39	0	721	747	54
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1495	774	801	0	-	0
Stage 1	774	-	-	-	-	-
Stage 2	721	-	-	-	-	-
Critical Hdwy	6.63	6.43	4.18	-	-	-
Critical Hdwy Stg 1	5.63	-	-	-	-	-
Critical Hdwy Stg 2	5.63	-	-	-	-	-
Follow-up Hdwy	3.707	3.507	2.272	-	-	-
Pot Cap-1 Maneuver	121	367	796	-	-	-
Stage 1	420	-	-	-	-	-
Stage 2	446	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	121	367	796	-	-	-
Mov Cap-2 Maneuver	121	-	-	-	-	-
Stage 1	420	-	-	-	-	-
Stage 2	446	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	60.5	0		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	796	-	162	-	-	
HCM Lane V/C Ratio	-	-	0.644	-	-	
HCM Control Delay (s)	0	-	60.5	-	-	
HCM Lane LOS	A	-	F	-	-	
HCM 95th %tile Q(veh)	0	-	3.6	-	-	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗				↖	↕			↕	
Traffic Volume (vph)	78	88	217	0	0	0	131	419	571	0	1285	133
Future Volume (vph)	78	88	217	0	0	0	131	419	571	0	1285	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	10	16	16	16	11	12	12	16	13	13
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		100	0		0	100		0	0		0
Storage Lanes	0		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1725	1449	0	0	0	1694	3200	0	0	3563	0
Flt Permitted		0.977					0.950					
Satd. Flow (perm)	0	1725	1449	0	0	0	1692	3200	0	0	3563	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			236					372			12	
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		455			385			388			191	
Travel Time (s)		10.3			8.8			7.6			3.7	
Confl. Peds. (#/hr)			1	1			2					2
Confl. Bikes (#/hr)												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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	4%	4%	0%	0%	0%	3%	3%	3%	3%	3%	3%
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)	0	181	236	0	0	0	142	1076	0	0	1542	0
Turn Type	Split	NA	pt+ov				Prot	NA			NA	
Protected Phases	8	8	1 8				1	6			2	
Permitted Phases												
Detector Phase	8	8	1 8				1	6			2	
Switch Phase												
Minimum Initial (s)	8.0	8.0					11.0	10.0			10.0	
Minimum Split (s)	13.0	13.0					16.0	15.0			15.0	
Total Split (s)	25.0	25.0					20.0	59.0			59.0	
Total Split (%)	20.8%	20.8%					16.7%	49.2%			49.2%	
Yellow Time (s)	4.0	4.0					4.0	4.0			4.0	
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)		5.0					5.0	5.0			5.0	
Lead/Lag							Lead	Lead			Lag	
Lead-Lag Optimize?							Yes	Yes			Yes	
Recall Mode	None	None					None	C-Min			C-Min	
Act Effect Green (s)		17.1	36.6				14.5	89.7			70.2	
Actuated g/C Ratio		0.14	0.30				0.12	0.75			0.58	
v/c Ratio		0.74	0.39				0.70	0.43			0.74	
Control Delay		66.9	5.5				68.5	4.8			22.9	
Queue Delay		0.0	0.0				0.0	0.0			0.0	
Total Delay		66.9	5.5				68.5	4.8			22.9	

Lane Group	Ø5	Ø9
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Lane Width (ft)		
Grade (%)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Satd. Flow (prot)		
Flt Permitted		
Satd. Flow (perm)		
Right Turn on Red		
Satd. Flow (RTOR)		
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	5	9
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	5.0	5.0
Minimum Split (s)	20.0	16.0
Total Split (s)	20.0	16.0
Total Split (%)	17%	13%
Yellow Time (s)	4.0	2.0
All-Red Time (s)	1.0	0.0
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lag	
Lead-Lag Optimize?	Yes	
Recall Mode	None	None
Act Effect Green (s)		
Actuated g/C Ratio		
v/c Ratio		
Control Delay		
Queue Delay		
Total Delay		





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A				E	A			C	
Approach Delay		32.1						12.2			22.9	
Approach LOS		C						B			C	
Queue Length 50th (ft)		135	0				106	72			416	
Queue Length 95th (ft)		211	56				#190	192			#762	
Internal Link Dist (ft)		375			305			308			111	
Turn Bay Length (ft)			100				100					
Base Capacity (vph)		290	611				220	2485			2089	
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		0.62	0.39				0.65	0.43			0.74	

## Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

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: 0.74

Intersection Signal Delay: 20.0

Intersection Capacity Utilization 70.4%

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Intersection LOS: C

ICU Level of Service C

Splits and Phases: 9: Southampton Road (Route 202) &amp; Arch Road/West Industrial Park Road

Ø1	Ø2 (R)	Ø9	Ø8
20 s	59 s	16 s	25 s
Ø6 (R)	Ø5		
59 s	20 s		

Lane Group	Ø5	Ø9
LOS		
Approach Delay		
Approach LOS		
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		

DRAFT

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↕		↖	↕	
Traffic Volume (vph)	92	68	43	28	121	75	72	943	4	83	1146	181
Future Volume (vph)	92	68	43	28	121	75	72	943	4	83	1146	181
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	12	12	10	11	11	10	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	150		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1750	1531	0	1769	0	1620	3352	0	1636	3309	0
Flt Permitted		0.583			0.944		0.073			0.147		
Satd. Flow (perm)	0	1047	1510	0	1680	0	124	3352	0	253	3309	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			47		13							12
Link Speed (mph)		30			30			30				30
Link Distance (ft)		540			477			426				440
Travel Time (s)		12.3			10.8			9.7				10.0
Confl. Peds. (#/hr)	7		1	1		7	2		3	3		2
Confl. Bikes (#/hr)			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
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	4%	4%	4%	3%	3%	3%
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)	0	174	47	0	244	0	78	1029	0	90	1443	0
Turn Type	pm+pt	NA	pm+ov	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4	1		8		1	6		5	2	
Permitted Phases	4		4	8			6			2		
Detector Phase	7	4	1	8	8		1	6		5	2	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0		6.0	10.0		6.0	10.0	
Minimum Split (s)	11.0	12.0	12.0	12.0	12.0		12.0	16.0		12.0	16.0	
Total Split (s)	20.0	46.0	26.0	26.0	26.0		26.0	68.0		14.0	56.0	
Total Split (%)	12.9%	29.7%	16.8%	16.8%	16.8%		16.8%	43.9%		9.0%	36.1%	
Yellow Time (s)	4.0	3.0	4.0	3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	3.0	2.0	3.0	3.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Act Effect Green (s)		38.2	46.3		38.2		62.8	54.6		61.2	53.9	
Actuated g/C Ratio		0.30	0.36		0.30		0.49	0.43		0.48	0.42	
v/c Ratio		0.56	0.08		0.48		0.50	0.72		0.45	1.03	
Control Delay		49.5	8.4		41.3		31.1	35.9		25.7	68.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		49.5	8.4		41.3		31.1	35.9		25.7	68.8	

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	7.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	17%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effect Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A		D		C	D		C	E	
Approach Delay		40.8			41.3			35.5			66.2	
Approach LOS		D			D			D			E	
Queue Length 50th (ft)		100	0		129		26	324		30	547	
Queue Length 95th (ft)		250	28		299		79	560		83	#1051	
Internal Link Dist (ft)		460			397			346			360	
Turn Bay Length (ft)							150			100		
Base Capacity (vph)		337	723		511		306	1673		212	1402	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.52	0.07		0.48		0.25	0.62		0.42	1.03	

## Intersection Summary

Area Type: Other

Cycle Length: 155

Actuated Cycle Length: 127.7

Natural Cycle: 140

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 51.5

Intersection Capacity Utilization 83.9%

Analysis Period (min) 15

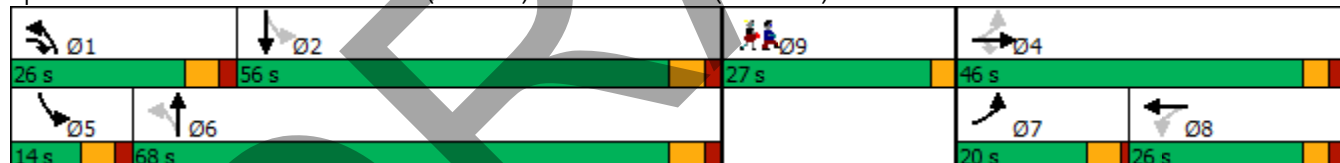
# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection LOS: D

ICU Level of Service E

Splits and Phases: 13: North Elm Street (Route 10)/North Main Street (Route 202) &amp; Notre Dame Street



Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱				↰	↱			↰	↱
Traffic Volume (vph)	483	16	142	0	0	0	247	496	15	0	640	316
Future Volume (vph)	483	16	142	0	0	0	247	496	15	0	640	316
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	16	16	16	16	12	11	11	11	11	16
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		100
Storage Lanes	0		1	0		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1854	1812	0	0	0	1752	1773	0	0	3421	1794
Flt Permitted		0.954					0.196					
Satd. Flow (perm)	0	1854	1812	0	0	0	359	1773	0	0	3421	1733
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			154					2				318
Link Speed (mph)		25			30			25			25	
Link Distance (ft)		424			143			347			275	
Travel Time (s)		11.6			3.3			9.5			7.5	
Confl. Peds. (#/hr)			10	10			12		27	27		12
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 (%)	1%	1%	1%	0%	0%	0%	3%	3%	3%	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)	0	542	154	0	0	0	268	555	0	0	696	343
Turn Type	Split	NA	pt+ov				pm+pt	NA			NA	pm+ov
Protected Phases	4	4	4 5				5	2			6	4
Permitted Phases							2					6
Detector Phase	4	4	4 5				5	2			6	4
Switch Phase												
Minimum Initial (s)	11.0	11.0					8.0	12.0			9.5	11.0
Minimum Split (s)	17.0	17.0					14.0	15.0			15.0	17.0
Total Split (s)	32.0	32.0					14.0	31.0			17.0	32.0
Total Split (%)	35.6%	35.6%					15.6%	34.4%			18.9%	35.6%
Yellow Time (s)	3.0	3.0					3.0	3.0			2.5	3.0
All-Red Time (s)	3.0	3.0					3.0	0.0			3.0	3.0
Lost Time Adjust (s)		0.0					0.0	0.0			0.0	0.0
Total Lost Time (s)		6.0					6.0	3.0			5.5	6.0
Lead/Lag							Lag				Lead	
Lead-Lag Optimize?							Yes				Yes	
Recall Mode	None	None					None	Max			Max	None
Act Effect Green (s)		26.8	41.2				25.8	28.9			11.9	38.1
Actuated g/C Ratio		0.34	0.52				0.33	0.36			0.15	0.48
v/c Ratio		0.86	0.15				1.03	0.86			1.36	0.34
Control Delay		44.5	3.1				99.9	42.4			204.8	2.5
Queue Delay		0.0	0.0				0.0	0.0			0.0	0.0
Total Delay		44.5	3.1				99.9	42.4			204.8	2.5

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
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	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	27.0
Total Split (s)	27.0
Total Split (%)	30%
Yellow Time (s)	2.0
All-Red Time (s)	3.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Recall Mode	None
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A				F	D			F	A
Approach Delay		35.3						61.1			138.0	
Approach LOS		D						E			F	
Queue Length 50th (ft)		~314	0				~160	~315			~300	5
Queue Length 95th (ft)		#524	33				#300	#534			#411	34
Internal Link Dist (ft)		344			63			267			195	
Turn Bay Length (ft)												100
Base Capacity (vph)		627	1016				261	647			512	1020
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		0.86	0.15				1.03	0.86			1.36	0.34

## Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 79.2

Natural Cycle: 100

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.36

Intersection Signal Delay: 85.3

Intersection Capacity Utilization 73.6%

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.

Intersection LOS: F

ICU Level of Service D

Splits and Phases: 18: Elm Street &amp; Franklin Street (Route 20)/Mobil Gas Station Driveway

 Ø2	 Ø4	 Ø9
31 s	32 s	27 s
 Ø6	 Ø5	
17 s	14 s	

Lane Group	Ø9
LOS	
Approach Delay	
Approach LOS	
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	

DRAFT

## Appendix D: Crash Data

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# Crash Summary

	West Park Street at Park Street/Main Street and Carr Hardware Store Driveway	Pleasant Street (Route 102) at Tyringham Road and Big Y Plaza	Route 20 at Premium Outlet Boulevard	Otis Stage Road/Main Street (Route 23) at North Street	Main Street at Russell Stage Road	Westfield Road at Blandford Road	Servistar Industrial Way at Southampton Road	North Elm Street at Arch Road and Westfield Industrial Park Road	North Elm Street at Notre Dame Street	Elm Street at Franklin Street and Mobil Gas Station Driveway
<b>Year</b>										
2011	0	0	0	0	0	2	3	6	12	19
2012	2	0	2	0	0	1	1	10	13	6
2013	2	0	1	0	0	1	2	4	12	8
2014	6	2	1	0	0	0	0	3	8	5
2015	3	1	1	0	0	1	0	8	10	9
<b>Total</b>	13	3	5	0	0	5	6	31	55	47
<b>Type</b>										
Angle	6	2	2	0	0	1	2	15	15	17
Rear-end	3	1	2	0	0	2	4	5	24	15
Sideswipe	0	0	1	0	0	1	0	5	9	5
Head-on	1	0	0	0	0	0	0	2	4	4
Other	3	0	0	0	0	1	0	4	3	6
<b>Total</b>	13	3	5	0	0	5	6	31	55	47
<b>Severity</b>										
Property Damage	8	3	5	0	0	3	3	20	44	34
Personal Injury	5	0	0	0	0	2	3	11	10	13
Fatality	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	1	0
<b>Total</b>	13	3	5	0	0	5	6	31	55	47
<b>Weather</b>										
Clear	8	1	3	0	0	3	4	21	34	32
Cloudy	3	2	2	0	0	0	0	4	6	6
Rain	1	0	0	0	0	1	0	4	11	7
Snow	1	0	0	0	0	1	0	1	4	2
Ice	0	0	0	0	0	0	0	0	0	0
Sleet	0	0	0	0	0	0	0	0	0	0
Fog	0	0	0	0	0	0	2	1	0	0
Unknown	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	13	3	5	0	0	5	6	31	55	47
<b>Time</b>										
7:00 AM to 9:00 AM	0	0	0	0	0	1	2	7	6	4
9:00 AM to 4:00 PM	10	2	4	0	0	3	1	9	22	15
4:00 PM to 6:00 PM	0	1	1	0	0	1	0	7	13	5
6:00 PM to 7:00 AM	3	0	0	0	0	0	3	8	14	23
<b>Total</b>	13	3	5	0	0	5	6	31	55	47
Crash Rate	0.42	0.13	0.27	0.00	0.00	0.38	0.19	0.47	0.85	0.86
District Average	0.44	0.80	0.80	0.44	0.44	0.44	0.62	0.89	0.89	0.89
State Average	0.57	0.78	0.78	0.57	0.57	0.57	0.57	0.78	0.78	0.78

Source: MassDOT

# Crash Data Worksheets

DRAFT

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Lee, MA COUNT DATE : 2018

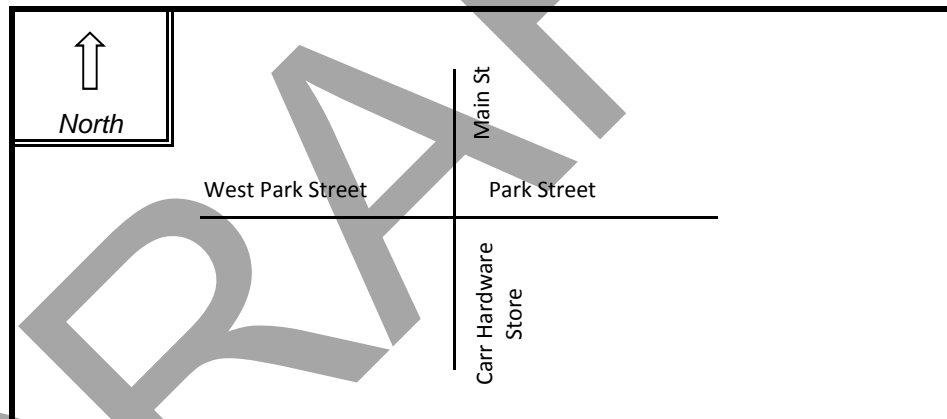
DISTRICT : 1 UNSIGNALIZED : ☒ X SIGNALIZED : ☐

### ~ INTERSECTION DATA ~

MAJOR STREET : West Park Street/Park Street

MINOR STREET(S) : Main Street and Carr Hardware Store Driveway

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM) :	233	648	8	655		1,544

" K " FACTOR : **0.09**

INTERSECTION ADT ( V ) = TOTAL DAILY  
APPROACH VOLUME :

**17,156**

TOTAL # OF CRASHES :

**13**

# OF  
YEARS :

**5**

AVERAGE # OF  
CRASHES PER YEAR ( A ) :

**2.60**

**CRASH RATE CALCULATION :**

**0.42**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: I-90 Interchange Study

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Lee, MA COUNT DATE : 2018

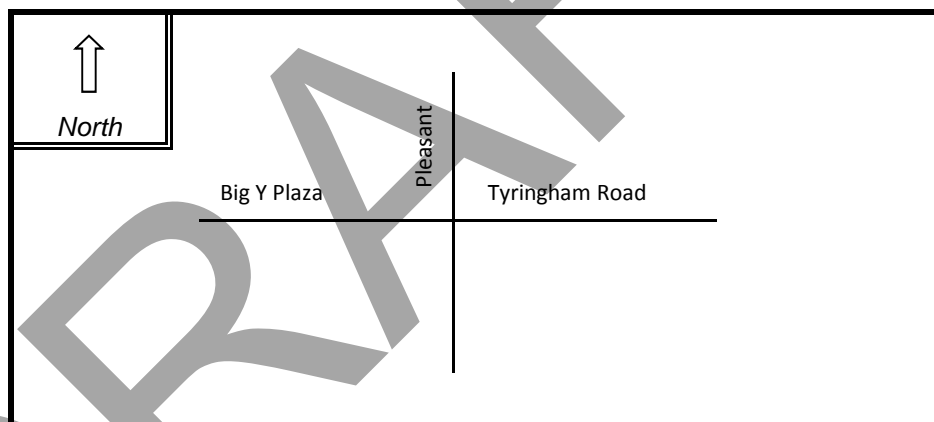
DISTRICT : 1 UNSIGNALIZED : ☐ SIGNALIZED : ☒

### ~ INTERSECTION DATA ~

MAJOR STREET : Pleasant Street (Route 102)

MINOR STREET(S) : Tyringham Road and Big Y Plaza

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM) :	193	71	357	492		1,113

" K " FACTOR : **0.09** INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME : **12,367**

TOTAL # OF CRASHES : **3** # OF YEARS : **5** AVERAGE # OF CRASHES PER YEAR ( A ) : **0.60**

**CRASH RATE CALCULATION :**

**0.13**

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date : I-90 Interchange Study

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Lee, MA COUNT DATE : 2018

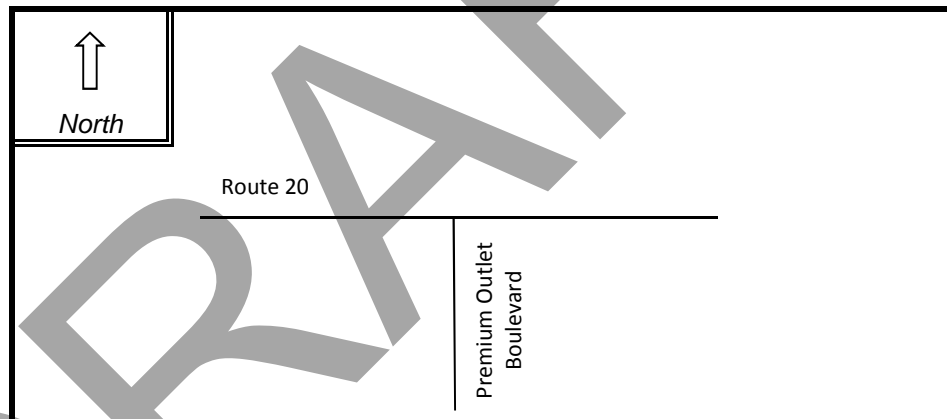
DISTRICT : 1 UNSIGNALIZED : ☐ SIGNALIZED : ☒

### ~ INTERSECTION DATA ~

MAJOR STREET : Route 20

MINOR STREET(S) : Premium Outlet Boulevard

**INTERSECTION  
DIAGRAM  
(Label Approaches)**



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB			
PEAK HOURLY VOLUMES (AM) :	478	239	202			919

" K " FACTOR : **0.09**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**10,211**

TOTAL # OF CRASHES : **5**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**1.00**

**CRASH RATE CALCULATION :**

**0.27**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: I-90 Interchange Study



## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Blandford, MA COUNT DATE : 2018

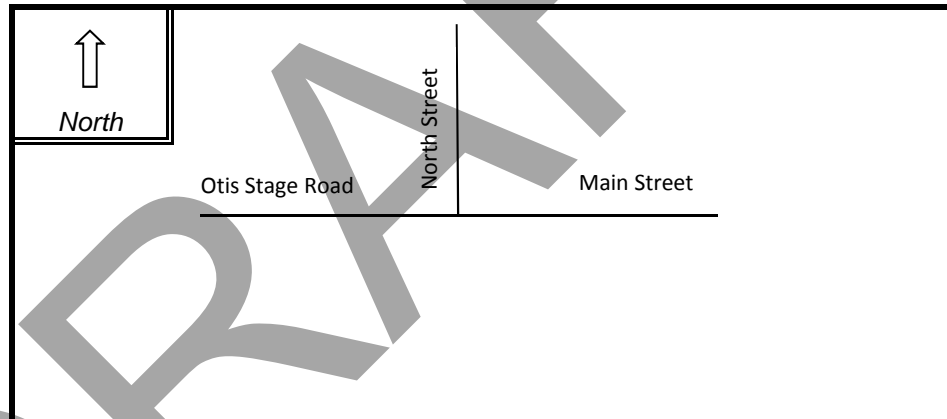
DISTRICT : 1 UNSIGNALIZED : ☒ X SIGNALIZED : ☐

### ~ INTERSECTION DATA ~

MAJOR STREET : Otis Stage Road/Main Street (Route 23)

MINOR STREET(S) : North Street

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB			
PEAK HOURLY VOLUMES (AM) :	75	130	31			236

" K " FACTOR : **0.08** INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME : **2,950**

TOTAL # OF CRASHES : **0** # OF YEARS : **5** AVERAGE # OF CRASHES PER YEAR ( A ) : **0.00**

CRASH RATE CALCULATION :

**0.00**

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: I-90 Interchange Study

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Blandford, MA COUNT DATE : 2018

DISTRICT : 1 UNSIGNALIZED : ☒ X SIGNALIZED : ☐

### ~ INTERSECTION DATA ~

MAJOR STREET : Main Street (Route 23)

MINOR STREET(S) : Russell Stage Road

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	SB			
PEAK HOURLY VOLUMES (AM) :	98	99	53			250

" K " FACTOR : **0.08**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**3,125**

TOTAL # OF CRASHES :

**0**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**0.00**

**CRASH RATE CALCULATION :**

**0.00**

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: I-90 Interchange Study

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Russell, MA COUNT DATE : 2018

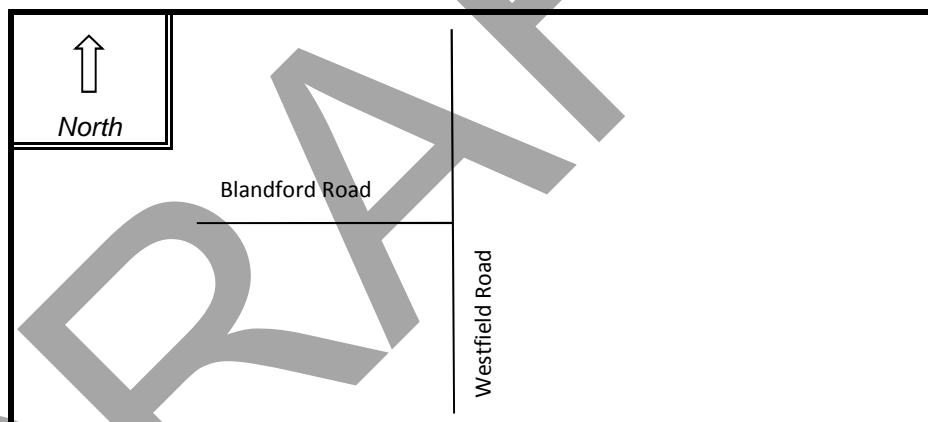
DISTRICT : 1 UNSIGNALIZED : ☒ X SIGNALIZED : ☐

### ~ INTERSECTION DATA ~

MAJOR STREET : Westfield Road

MINOR STREET(S) : Blandford Road

**INTERSECTION  
DIAGRAM  
(Label Approaches)**



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	NB	SB			
PEAK HOURLY VOLUMES (AM) :	96	434	198			728

" K " FACTOR :

**0.10**

INTERSECTION ADT ( V ) = TOTAL DAILY  
APPROACH VOLUME :

**7,280**

TOTAL # OF CRASHES :

**5**

# OF  
YEARS :

**5**

AVERAGE # OF  
CRASHES PER YEAR  
( A ) :

**1.00**

**CRASH RATE CALCULATION :**

**0.38**

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: I-90 Interchange Study

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Westfield, MA COUNT DATE : 2018

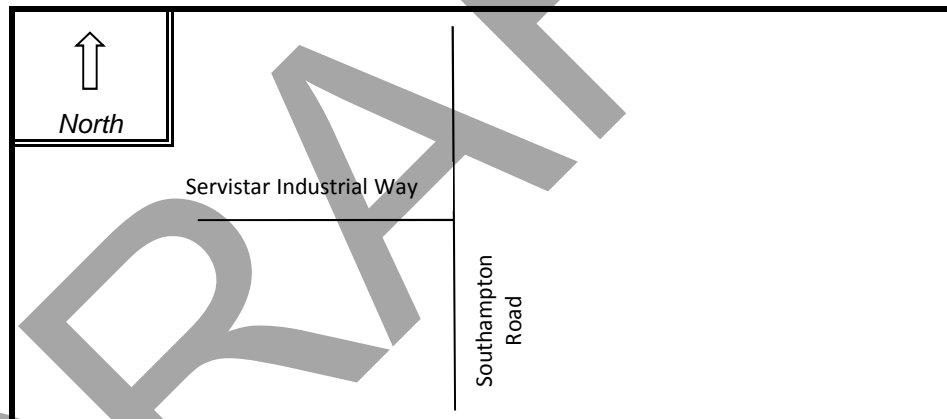
DISTRICT : 2 UNSIGNALIZED : ☒ X SIGNALIZED : ☐

### ~ INTERSECTION DATA ~

MAJOR STREET : Southampton Road

MINOR STREET(S) : Servistar Industrial Way

**INTERSECTION  
DIAGRAM  
(Label Approaches)**



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	NB	SB			
PEAK HOURLY VOLUMES (AM) :	99	617	669			1,385

" K " FACTOR :

**0.08**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**17,313**

TOTAL # OF CRASHES :

**6**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**1.20**

**CRASH RATE CALCULATION :**

**0.19**

RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : \_\_\_\_\_

Project Title & Date: I-90 Interchange Study

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Westfield, MA COUNT DATE : 2018

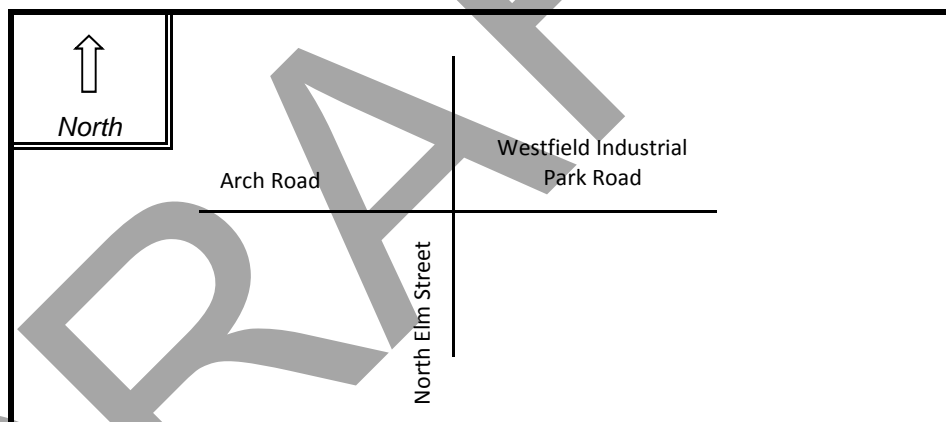
DISTRICT : 2 UNSIGNALIZED : ☐ SIGNALIZED : ☒

### ~ INTERSECTION DATA ~

MAJOR STREET : North Elm Street

MINOR STREET(S) : Arch Road and Westfield Industrial Park Road

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	NB	SB			
PEAK HOURLY VOLUMES (AM) :	335	1,128	1,421			2,884

" K " FACTOR :

**0.08**

INTERSECTION ADT ( V ) = TOTAL DAILY  
APPROACH VOLUME :

**36,050**

TOTAL # OF CRASHES :

**31**

# OF  
YEARS :

**5**

AVERAGE # OF  
CRASHES PER YEAR ( A ) :

**6.20**

**CRASH RATE CALCULATION :**

**0.47**

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: I-90 Interchange Study

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Westfield, MA COUNT DATE : 2018

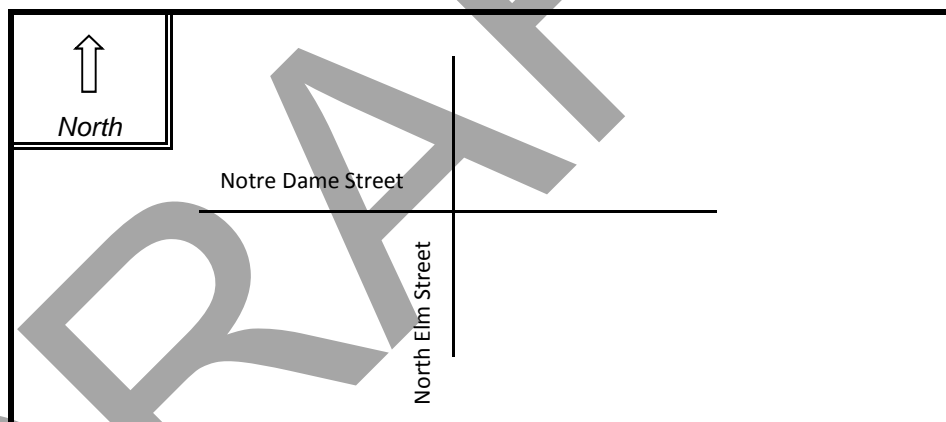
DISTRICT : 2 UNSIGNALIZED : ☐ SIGNALIZED : ☒

### ~ INTERSECTION DATA ~

MAJOR STREET : North Elm Street

MINOR STREET(S) : Notre Dame Street

**INTERSECTION  
DIAGRAM  
(Label Approaches)**



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB	SB		
PEAK HOURLY VOLUMES (AM) :	197	197	1,010	1,437		2,841

" K " FACTOR :

**0.08**

INTERSECTION ADT ( V ) = TOTAL DAILY  
APPROACH VOLUME :

**35,513**

TOTAL # OF CRASHES :

**55**

# OF  
YEARS :

**5**

AVERAGE # OF  
CRASHES PER YEAR ( A ) :

**11.00**

**CRASH RATE CALCULATION :**

**0.85**

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: I-90 Interchange Study

## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Westfield, MA COUNT DATE : 2018

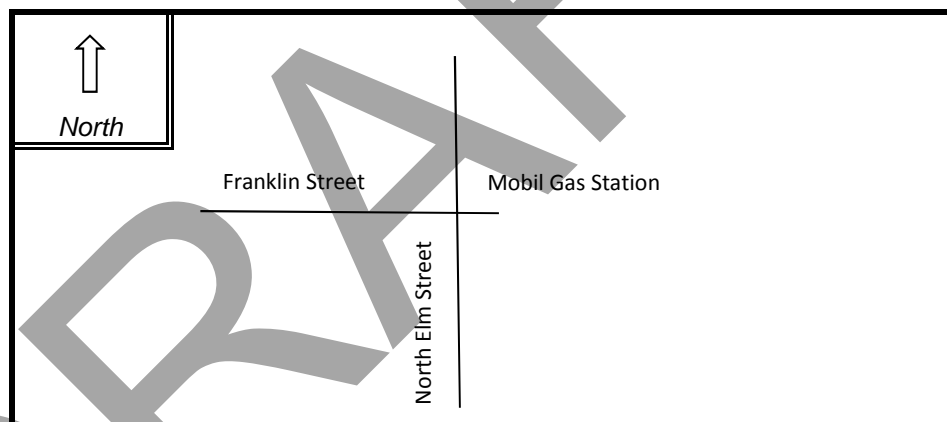
DISTRICT : 2 UNSIGNALIZED : ☐ SIGNALIZED : ☒

### ~ INTERSECTION DATA ~

MAJOR STREET : Elm Street

MINOR STREET(S) : Franklin Street and Mobil Gas Station Driveway

**INTERSECTION  
DIAGRAM**  
(Label Approaches)



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	NB	SB			
PEAK HOURLY VOLUMES (AM) :	690	748	945			2,383

" K " FACTOR : **0.08**

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**29,788**

TOTAL # OF CRASHES : **47**

# OF YEARS :

**5**

AVERAGE # OF CRASHES PER YEAR ( A ) :

**9.40**

CRASH RATE CALCULATION :

**0.86**

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: I-90 Interchange Study

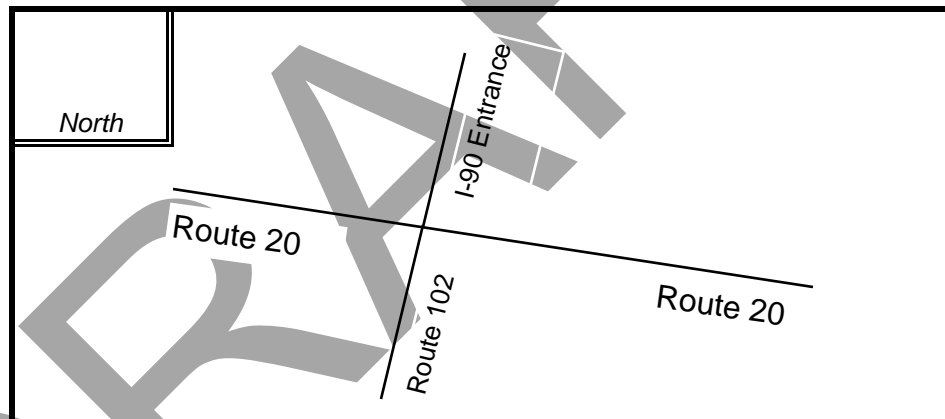
## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Lee COUNT DATE : 2018  
 DISTRICT : 1 UNSIGNALIZED : ☐ SIGNALIZED : ☒

### ~ INTERSECTION DATA ~

MAJOR STREET : Route 20  
 MINOR STREET(S) : I-90 Entrance Ramp

**INTERSECTION  
 DIAGRAM**  
 (Label Approaches)



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	EB	SB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	470	696	0	410		1,576

" K " FACTOR : .09

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**17,511**

TOTAL # OF CRASHES : 9

# OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR ( A ) :

**1.8**

**CRASH RATE CALCULATION :**

**0.28**

RATE =  $\frac{( A * 1,000,000 )}{( V * 365 )}$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_



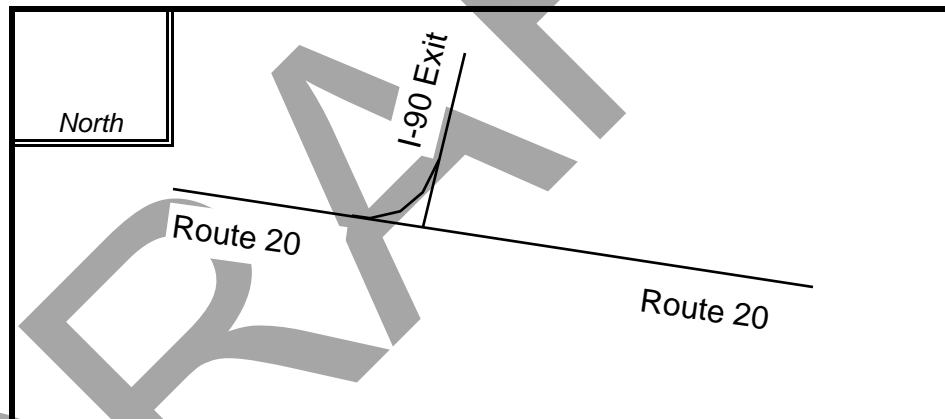
## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Lee COUNT DATE : 2018  
 DISTRICT : 1 UNSIGNALIZED : ☐ SIGNALIZED : ☒

### ~ INTERSECTION DATA ~

MAJOR STREET : Route 20  
 MINOR STREET(S) : I-90 Exit Ramp

**INTERSECTION  
 DIAGRAM**  
 (Label Approaches)



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :		EB	SB	WB		
PEAK HOURLY VOLUMES (AM/PM) :		460	236	428		1,124

" K " FACTOR : .09

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**12,489**

TOTAL # OF CRASHES : 20

# OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR ( A ) :

**4**

**CRASH RATE CALCULATION :**

**0.88**

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

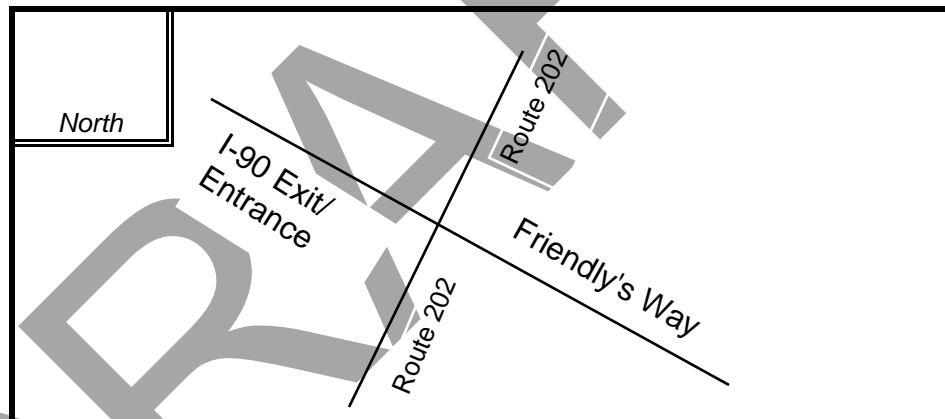
## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN: Westfield COUNT DATE: 2018  
 DISTRICT: 2 UNSIGNALIZED: ☐ SIGNALIZED: ☒

### ~ INTERSECTION DATA ~

MAJOR STREET: Route 202  
 MINOR STREET(S): I-90 Entrance/Exit Ramp  
Friendly's Way

**INTERSECTION  
 DIAGRAM**  
 (Label Approaches)



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	EB	SB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	451	1,016	884	752		3,103

" K " FACTOR : .09

INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :

**34,478**

TOTAL # OF CRASHES : 43

# OF YEARS : 5

AVERAGE # OF CRASHES PER YEAR ( A ) :

**8.6**

**CRASH RATE CALCULATION :**

**0.68**

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : \_\_\_\_\_

Project Title & Date: \_\_\_\_\_

## Appendix E: Tolling Analysis Memorandum

DRAFT

To: Stephen Collins  
MassDOT  
**DRAFT**

From: Suzanne Seegmuller, Rick Gobeille  
Stantec, NYC  
Date: May 2, 2019

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**Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis**

At your request, Stantec has prepared a sketch level traffic and revenue analysis for a proposed toll interchange on the Western Turnpike between Interchange 2 (Lee) and Interchange 3 (Westfield), within current Toll Zone 2 (TZ 2). Materials provided by MassDOT identified three alternative locations. Capital costs and CTPS modeled future traffic volumes were provided for each of the alternatives. In addition to the provided materials relative to the interchanges, we used Stantec's system-wide toll operating cost model, elements of Stantec's toll forecasting model, recent roadway operating cost data for the Western Turnpike provided by MassDOT, and other calculations of capital costs.

MassDOT requested a baseline estimate with a 10-year payback period. We also prepared two toll configuration scenarios. Our baseline scenario includes the addition of a new mainline toll gantry; the current toll between Interchange 2 and 3 would be split between TZ 2 and the new gantry. A second scenario assumes that no new toll gantry is installed and TZ 2 tolls remain the same, allowing a free section of Turnpike near the proposed interchange.

The following assumptions were used in the analysis:

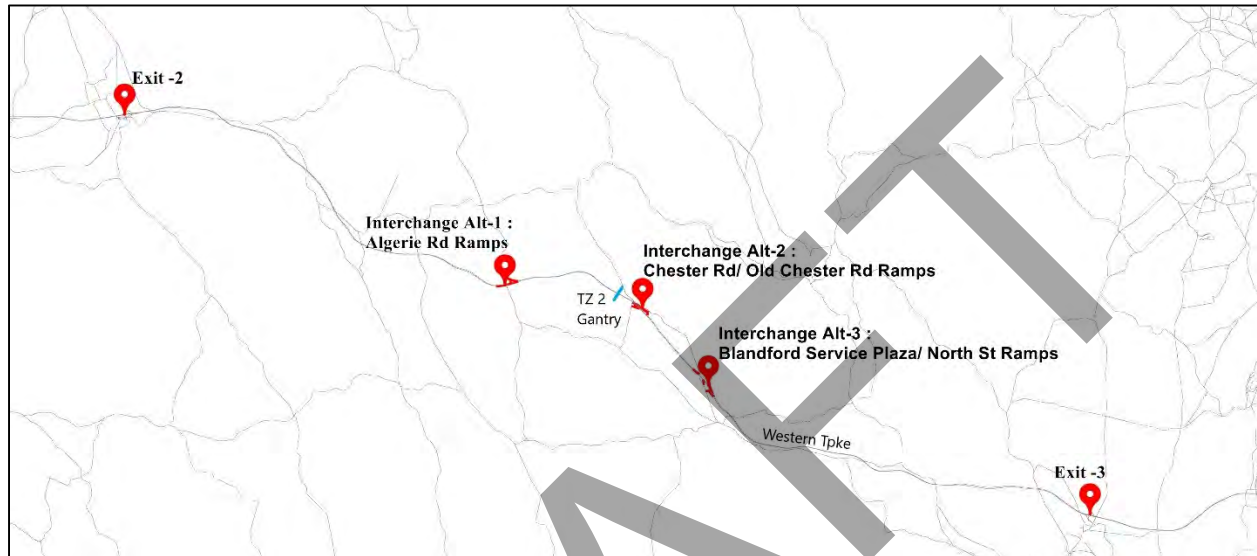
- 10 Year Total Cost / Revenue Comparison
- Capital Cost for Interchange provided by MassDOT – No inflation
- Capital Cost for New Gantry estimated by Stantec – No inflation
- Debt Service Gross Pledge (No Coverage), 10-year term, 6% interest
- Change in Toll/Fee Revenues estimated by Stantec – No toll increases
- Change in Toll O&M estimated by Stantec – Inflated about 2% annually
- Roadway O&M estimated using MassDOT financials – Inflated 2% annually

**Description of Alternatives**

The following figure shows the locations of the three proposed alternative interchange locations.

Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

**Figure 1: Alternative Interchange Locations**



*Alternative 1 – Algeria Road, Otis*

Algeria Road is an existing low-volume road serving sand and gravel/stone quarries and summer camps. There is an existing I-90 EB emergency access ramp. The Interchange has a projected AWDT of 5,771 trips per day in 2040. The conceptual cost estimate is \$37.8 million excluding ROW. The New Mainline Gantry Scenario assumes the construction of a gantry to the west of the proposed new interchange.

*Alternative 2 – Blandford Maintenance Facility, Blandford*

Chester Road / Old Chester Road is an existing low-volume road adjacent to the I-90 EB maintenance depot. The Interchange has a projected AWDT of 6,412 trips per day in 2040. The conceptual cost estimate is \$29.5 million excluding ROW. The New Mainline Gantry Scenario assumes the construction of a gantry to the east of the proposed new interchange.

*Alternative 3 – Blandford Service Plaza, Blandford*

North Street is an existing low-volume road adjacent to the I-90 EB and WB service plazas. The Interchange has a projected AWDT of 5,922 trips per day in 2040. The conceptual cost estimate is \$34.0 million excluding ROW. The New Mainline Gantry Scenario assumes the construction of a gantry to the east of the proposed new interchange.

Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

## BASELINE SCENARIO: NEW MAINLINE GANTRY

### Estimated Additional Revenues

Sketch level traffic and revenue analyses were prepared for each of the three interchange alternatives. MassDOT provided Stantec with AWDT traffic flow diagrams from the regional CTPS for the No Build and each alternative in 2040. We assumed that the Turnpike operates with the current cost per mile in the CTPS, and therefore the volumes are representative of the effects of splitting the TZ 2 tolls between TZ 2 and a new gantry based on distance. We converted the 2040 CTPS volumes to 2018 through 2028 annual traffic estimates at each location, assuming some ramp-up in new trips over time, and distributed the traffic among the classes and payment types. The tolls for TZ 2 and the new gantry were determined based on length of each zone, and add up to today's toll. Table 1 shows how today's \$1.00 toll for 2-Axle E-ZPass MA was split between toll zones. Note that while the full-length toll does not change for E-ZPass vehicles, Pay by Plate vehicles are charged an additional 30 cents for their trip due to the new gantry.

**Table 1: Toll Rate Split Assumptions with New Gantry for 2-Axle POVs with E-ZPass MA**

Location	No Build	ALT 1	ALT 2	ALT 3
Proposed TZ 1A		\$0.35		
TZ 2	\$1.00	\$0.65	\$0.55	\$0.60
Proposed TZ 2A			\$0.45	\$0.40

The estimated additional annual toll revenue produced by each alternative is shown in Table 2.

**Table 2: Annual Change in Toll Revenue with Interchange Alternative and New Gantry**

FY	ALT 1	ALT 2	ALT 3
2019	\$543,000	\$570,000	\$539,000
2020	\$555,000	\$583,000	\$550,000
2021	\$564,000	\$595,000	\$559,000
2022	\$575,000	\$609,000	\$570,000
2023	\$588,000	\$623,000	\$582,000
2024	\$602,000	\$639,000	\$595,000
2025	\$615,000	\$656,000	\$608,000
2026	\$628,000	\$670,000	\$621,000
2027	\$640,000	\$684,000	\$633,000
2028	\$653,000	\$698,000	\$645,000
<b>TOTAL</b>	<b>\$5,963,000</b>	<b>\$6,327,000</b>	<b>\$5,902,000</b>

In addition, because there has been an increase in Pay by Plate transactions, there would also be an increase in fees and fines collected. Invoice fees, three levels of late fees, RMV fees and a small amount of other fee revenues are included in these estimates, as shown in the following Table 3.

Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

**Table 3: Annual Change in Fees and Fines Revenue with Interchange Alternative and New Gantry**

FY	ALT 1	ALT 2	ALT 3
2019	\$48,000	\$49,000	\$44,000
2020	\$47,000	\$48,000	\$43,000
2021	\$46,000	\$47,000	\$42,000
2022	\$44,000	\$45,000	\$41,000
2023	\$43,000	\$44,000	\$39,000
2024	\$41,000	\$43,000	\$38,000
2025	\$40,000	\$41,000	\$37,000
2026	\$40,000	\$41,000	\$36,000
2027	\$40,000	\$41,000	\$36,000
2028	\$40,000	\$41,000	\$36,000
<b>TOTAL</b>	<b>\$ 429,000</b>	<b>\$ 440,000</b>	<b>\$ 392,000</b>

#### **Estimated Additional Capital Cost Related to New Mainline Toll Gantry**

We have estimated a capital cost of about \$1.5M to install an additional gantry on the mainline. The details are shown in Table 4. We assumed a single gantry over both direction of lanes. Tolling equipment and changing the system software to accommodate an additional toll zone have been included in the cost.

**Table 4: Estimated New Mainline Toll Gantry Capital Costs**

<b>Toll Collection Capital Costs</b>	<b>New Toll Location</b>
Software Modifications	\$250,000
Toll Equipment	\$486,000
Toll Gantry	\$250,000
Mobilization	\$49,000
Implementation	\$245,000
Training and Spares	\$35,000
Contingency (15%)	\$197,000
<b>Total</b>	<b>\$1,512,000</b>

Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

### Estimated Debt Service with New Mainline Toll Gantry

We prepared a simple estimate of debt service to finance the capital costs for the proposed interchange improvements and an additional mainline gantry. As detailed in the feasibility study provided to Stantec by MassDOT, we utilized a 6 percent interest rate. Per the direction of MassDOT, we applied that rate over a 10-year payback period. We also assumed there would be no debt service reserve requirements or minimum coverage ratios for this facility. Table 5 estimates debt service for each of the three alternatives. For comparison, we also included debt service for a 20-year and 30-year payback period.

**Table 5: Estimated Debt Service with New Mainline Toll Gantry**

	Alt. 1	Alt. 2	Alt. 3
10 Year Pay Back	\$5,300,000	\$4,200,000	\$4,800,000
10-Year Total	\$53,300,000	\$42,100,000	\$48,200,000
20 Year Pay Back	\$3,400,000	\$2,700,000	\$3,000,000
10 Year Total	\$34,200,000	\$27,000,000	\$30,900,000
30 Year Pay Back	\$2,800,000	\$2,200,000	\$2,500,000
10 Year Total	\$28,500,000	\$22,500,000	\$25,700,000

### Estimated Additional Toll Operating Costs with New Mainline Toll Gantry

Collection costs will increase due to the addition of a new toll gantry and additional trips on the Turnpike. Stantec calculated toll collection costs per transaction for new trips based on 2019 budgeted costs provided by MassDOT late last year. For existing trips that pass through the new gantry, certain cost elements were removed from the equation (such as account maintenance, transponder costs, and postage) because these would not be affected if the driver is already a customer. Table 6 presents the 2019 cost per transaction used in our toll collection cost estimates. These costs have been appropriately inflated each year. Table 7 shows the estimated annual additional collection costs for each alternative.

**Table 6: Western Turnpike Collection 2019 Cost Per Transaction**

	E-ZPass	I-Toll	PBP
For New Turnpike Trips	\$0.07	\$0.10	\$0.17
For Existing Turnpike Trips that pass through new gantry	\$0.02	\$0.04	\$0.07



Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

**Table 7: Annual Change in Toll Collection Costs with Interchange Alternative and New Gantry**

FY	ALT 1	ALT 2	ALT 3
2019	\$402,000	\$404,000	\$399,000
2020	\$409,000	\$413,000	\$407,000
2021	\$417,000	\$420,000	\$414,000
2022	\$425,000	\$428,000	\$422,000
2023	\$435,000	\$439,000	\$432,000
2024	\$444,000	\$448,000	\$441,000
2025	\$454,000	\$458,000	\$451,000
2026	\$465,000	\$470,000	\$462,000
2027	\$476,000	\$481,000	\$473,000
2028	\$497,000	\$502,000	\$493,000
<b>TOTAL</b>	<b>\$4,424,000</b>	<b>\$4,463,000</b>	<b>\$4,394,000</b>

**Estimated Additional Roadway Operating Costs**

Outside of toll collection costs, we prepared a rough estimate of the other annual operating and maintenance (O+M) costs for each alternative. Using the Western Turnpike's current O+M costs as presented in the file named "H015 Highway FY18 Actual FY19 Budget Dist....xlsx," we estimated a per-lane-mile maintenance cost of \$6,000. We applied this to lane-miles of construction we estimated from provided plans of the alternatives. For 2019 we estimated \$9,000 in O+M costs for Alternatives 1 and 2 and \$12,000 for Alternative 3. Estimated Roadway O&M costs are presented in Table 8. Note that the same costs apply to both toll gantry scenarios.

**Table 8: Estimated Roadway O+M Costs**

FY	Alt 1	Alt 2	Alt 3
2019	\$9,000	\$9,000	\$12,000
2020	\$9,200	\$9,200	\$12,300
2021	\$9,400	\$9,400	\$12,600
2022	\$9,600	\$9,600	\$12,900
2023	\$9,800	\$9,800	\$13,200
2024	\$10,000	\$10,000	\$13,500
2025	\$10,200	\$10,200	\$13,800
2026	\$10,500	\$10,500	\$14,100
2027	\$10,800	\$10,800	\$14,400
2028	\$11,100	\$11,100	\$14,700
<b>TOTAL</b>	<b>\$99,600</b>	<b>\$99,600</b>	<b>\$133,500</b>

Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

### Baseline Scenario Summary

For comparative purposes, Table 9 presents a summarized 10-year total comparison based a 10-year debt service to recover costs. For none of the alternatives can the capital and operating costs be recovered over a 10-year period. Alternative 2 comes closest with a total revenue shortfall of approximately \$40 million over the 10-year period.

**Table 9: Interchange Alternatives 10-Year Comparison, Baseline Scenario**

	Alt 1	Alt 2	Alt 3
Toll Revenue	\$5,963,000	\$6,327,000	\$5,902,000
Fee Revenue	\$429,000	\$440,000	\$392,000
Toll Collection O+M	\$(4,424,000)	\$(4,463,000)	\$(4,394,000)
Roadway O+M	\$(99,600)	\$(99,600)	\$(133,500)
Net Revenue Available for Debt Service	\$1,868,400	\$2,204,400	\$1,766,500
Debt Service	\$(53,400,000)	\$(42,100,000)	\$(48,200,000)
Total Revenue Surplus (Shortfall)	\$(51,531,600)	\$(39,895,600)	\$(46,433,500)

### ALTERNATE SCENARIO: NO NEW MAINLINE GANTRY

#### Estimated Additional Revenues with No New Mainline Toll Gantry

Sketch level traffic and revenue analyses were also prepared for each of the three interchange alternatives *without* a new mainline toll gantry. For this tolling scenario, the tolls at TZ 2 would remain the same, but each alternative has a free section of Turnpike just to the east or the west, as shown in Table 10.

**Table 10: Toll Rate Split Assumptions with No New Gantry for 2-Axle POVs with E-ZPass MA**

Location	No Build	ALT 1	ALT 2	ALT 3
Between Int 2 (Lee) and Proposed Int		No toll		
TZ 2	\$1.00	\$1.00	\$1.00	\$1.00
Between Proposed Int and Int 3 (Westfield)			No toll	No toll

To estimate traffic and revenue effects, we referred to origin-destination data from 2015 to see how many annual vehicles travel on the Turnpike solely between Interchanges 2 and 3, and assumed that half of would no longer pay at TZ 2 (they are estimated to use the free segment of Turnpike only). In addition, we applied a conservative toll elasticity of -0.30 to TZ 2 to adjust the CTPS model results, because of the higher cost per mile on this section compared to the modeled alternatives. This reduced new trips on this segment by 16 to 25 percent, depending on the alternative. Table 11 shows the estimated changes in toll revenue. There is some revenue loss in the early years of the estimate; however, the numbers become positive as traffic growth progresses at the new interchange.

Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

**Table 11: Annual Change in Toll Revenue with Interchange Alternative and No New Gantry**

FY	ALT 1	ALT 2	ALT 3
2019	\$(32,000)	\$(38,000)	\$(43,000)
2020	\$(17,000)	\$(24,000)	\$(30,000)
2021	\$(4,000)	\$(11,000)	\$(18,000)
2022	\$11,000	\$3,000	\$(4,000)
2023	\$23,000	\$14,000	\$6,000
2024	\$39,000	\$28,000	\$20,000
2025	\$54,000	\$42,000	\$33,000
2026	\$64,000	\$51,000	\$42,000
2027	\$74,000	\$61,000	\$50,000
2028	\$83,000	\$68,000	\$58,000
<b>TOTAL</b>	<b>\$295,000</b>	<b>\$194,000</b>	<b>\$114,000</b>

Table 12 shows that little change is expected in collected fees and fines for this scenario, because there is only a small increase in Pay by Plate trips expected with each new interchange alternative.

**Table 12: Annual Change in Fees and Fines Revenue with Interchange Alternative and No New Gantry**

FY	ALT 1	ALT 2	ALT 3
2019	\$2,000	\$4,000	\$4,000
2020	\$4,000	\$6,000	\$6,000
2021	\$5,000	\$7,000	\$8,000
2022	\$7,000	\$9,000	\$9,000
2023	\$7,000	\$9,000	\$9,000
2024	\$8,000	\$10,000	\$10,000
2025	\$9,000	\$11,000	\$12,000
2026	\$9,000	\$11,000	\$12,000
2027	\$10,000	\$12,000	\$12,000
2028	\$10,000	\$12,000	\$12,000
<b>TOTAL</b>	<b>\$71,000</b>	<b>\$91,000</b>	<b>\$94,000</b>

### Estimated Debt Service with No New Mainline Toll Gantry

We prepared a simple estimate of debt service to finance the capital costs for the proposed interchange improvements and an additional mainline gantry. As detailed in the feasibility study provided to Stantec by MassDOT, we utilized a 6 percent interest rate. Per the direction of MassDOT, we applied that rate over a 10-year payback period. We also assumed there would be no debt service reserve requirements or minimum

Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

coverage ratios for this facility. Table 13 estimates debt service for each of the three Alternatives. For comparison we also included debt service for a 20-year and 30-year payback period.

**Table 13: Estimated Debt Service with No New Mainline Toll Gantry**

	Alt. 1	Alt. 2	Alt. 3
10 Year Pay Back	\$5,100,000	\$4,000,000	\$4,600,000
10-Year Total	\$51,300,000	\$40,000,000	\$46,100,000
20 Year Pay Back	\$3,200,000	\$2,500,000	\$2,900,000
10 Year Total	\$32,900,000	\$25,700,000	\$29,600,000
30 Year Pay Back	\$2,700,000	\$2,100,000	\$2,400,000
10 Year Total	\$27,400,000	\$21,400,000	\$24,700,000

#### **Estimated Additional Toll Operating Costs with No New Mainline Toll Gantry**

With the proposed alternatives and no new mainline toll gantry, the increase in collection costs will be minimal because new toll transactions are only due to traffic on the new ramps that crosses TZ 2. In addition, there are a number of shorter existing and new trips expected to divert off of the tolled section of roadway. Costs per transaction of \$0.07 for E-ZPass, \$0.10 for I-Tolls, and \$0.17 for Pay by Plate were applied to the net change in transactions.

Table 14 shows the annual additional collection costs for each alternative assuming no new toll gantry.

**Table 14: Annual Change in Toll Collection Costs with Interchange Alternative and No New Gantry**

FY	ALT 1	ALT 2	ALT 3
2019	\$4,000	\$7,000	\$7,000
2020	\$6,000	\$9,000	\$9,000
2021	\$8,000	\$11,000	\$12,000
2022	\$10,000	\$14,000	\$15,000
2023	\$12,000	\$15,000	\$16,000
2024	\$14,000	\$18,000	\$19,000
2025	\$17,000	\$21,000	\$22,000
2026	\$18,000	\$23,000	\$24,000
2027	\$20,000	\$25,000	\$26,000
2028	\$22,000	\$28,000	\$29,000
<b>TOTAL</b>	<b>\$131,000</b>	<b>\$171,000</b>	<b>\$179,000</b>

Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

### Alternative Scenario Summary

For comparative purposes, Table 15 presents a summarized 10-year total comparison based a 10-year debt service to recover costs. For none of the alternatives can the capital and operating costs be recovered over a 10-year period. Alternative 2 comes closest with a similar total revenue shortfall of approximately \$40 million over the 10-year period.

**Table 15: Interchange Alternatives 10-Year Comparison, Alternative Scenario: No New Gantry**

	Alt 1	Alt 2	Alt 3
Toll Revenue	\$295,000	\$194,000	\$114,000
Fee Revenue	\$71,000	\$91,000	\$94,000
Toll Collection O+M	\$(131,000)	\$(171,000)	\$(179,000)
Roadway O+M	\$(99,600)	\$(99,600)	\$(133,500)
Net Revenue Available for Debt Service	\$135,400	\$14,400	\$(104,500)
Debt Service	\$(51,300,000)	\$(40,000,000)	\$(46,100,000)
Total Revenue Surplus (Shortfall)	\$(51,164,600)	\$(39,985,600)	\$(46,204,500)

### Summary of Results & Conclusion

None of the alternatives analyzed will result in a new interchange that will fully fund all capital and operating costs through the additional toll revenues generated. For both Scenarios, Alternative 2 has the lowest capital costs while also generating the highest revenues. Table 16 presents Alternative 2 for both gantry scenarios on a Net Revenue basis that is generally used when Toll Revenue Bond Financing is used. The baseline alternative produces the highest total 10-year net revenue of some \$2.2 million that equates to approximately 5 percent of the debt service associated with the interchange.

**Table 16: Interchange Alternative 2 10-Year Comparison, Baseline Scenario vs. No New Gantry**

	Baseline Alt 2	No New Gantry Alt 2
Toll Revenue	\$6,327,000	\$194,000
Fee Revenue	\$440,000	\$91,000
Toll Collection O+M	\$(4,463,000)	\$(171,000)
Roadway O+M	\$(99,600)	\$(99,600)
Net Revenue Available for Debt Service	\$2,204,400	\$14,400
Debt Service	\$(42,100,000)	\$(40,000,000)
Total Revenue Surplus (Shortfall)	\$(39,895,600)	\$(39,985,600)

Reference: I-90 Western Turnpike New Interchange Sketch Level Traffic and Revenue Analysis

Using the Baseline (New Gantry) Scenario for Alternative 2, other considerations that could be developed to improve the financial feasibility include:

- Applying longer term 30-year financing debt service. This would result in net revenues providing some seven to eight percent of the debt service.
- Obtain financing at rates lower than 6 percent. A 30-year 4 percent financing scenario would produce net revenues that would cover about 12 percent of debt service costs.

#### Notice

This is a sketch level analysis using accepted forecasting standards. Though we include estimates for debt service, we are not acting as an Independent Municipal Advisor and make no actual recommendations on financing. The results of this study ARE NOT SUITABLE FOR AND CAN NOT BE USED TO SUPPORT ANY REVENUE BOND OFFERING OR OTHER FINANCING.

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