TOWN OF HUDSON

Board of Selectmen

12 School Street · Hudson, New Hampshire 03051 · Tel: 603-886-6024 · Fax: 603-598-6481

BOARD OF SELECTMEN MEETING

July 25, 2023

Board of Selectmen Meeting Room, Town Hall

Agenda

1. CALL TO ORDER

2. PLEDGE OF ALLEGIANCE

3. ATTENDANCE

4. PUBLIC INPUT

5. RECOGNITIONS, NOMINATIONS & APPOINTMENTS - none

6. CONSENT ITEMS

   A. **Assessing Items** – none

   B. **Water/Sewer Items** – none

   C. **Licenses & Permits & Policies**
      1) Outdoor Gathering Permit – Hudson Old Home Days

   D. **Donations** – none

   E. **Acceptance of Minutes**
      1) Minutes of July 11, 2023

   F. **Calendar**

07/26	7:00	Planning Board	Buxton Meeting Room
07/27	7:00	Building Board of Appeals	BOS Meeting Room
07/27	7:00	Zoning Board of Adjustment	Buxton Meeting Room
08/01	7:00	Board of Selectmen Workshop	BOS Meeting Room
08/02	8:30	Highway Safety Committee	BOS Meeting Room
08/02	7:00	Budget Committee	Buxton Meeting Room
08/08	7:00	Board of Selectmen	BOS Meeting Room

7. OLD BUSINESS

A. Votes taken after Nonpublic Session on July 11, 2023

1. Selectman Morin made a motion, seconded by Selectman Guessferd to terminate Lieutenant Michael Mallen effective July 15, 2023, as recommended by the Fire Chief. Carried 4-0.

2. Selectman Morin made a motion, seconded by Selectman Dumont to amend the motion made on May 9, 2023, to hire Steven Lubinger for the position of Firefighter/EMT in the Fire Department at the contracted rate of $17.78 per hour (step 1), and change it to a contracted salary rate of $22.43 per hour (step 3), as recommended by the Fire Chief. Carried 4-0.

3. Selectman Dumont made a motion, seconded by Selectman Guessferd to hire Robert Soares for the position of Dispatcher in the Fire Department at the contracted salary of $19.36 per hour (step 1). This assignment will be a non-exempt position in accordance with the International Association of Firefighters Local #3154, as recommended by the Fire Chief. Carried 4-0.

4. Selectman Morin made a motion, seconded by Selectman Dumont to hire Cole Lodi, James Sheldon, Gavyn Torres for the position of Firefighter/EMT in the Fire Department at the contacted salary of $18.14 per hour (step 1). This assignment will be a non-exempt position in accordance with the International Association of Firefighters Local #3254, as recommended by the Fire Chief. Carried 4-0.

5. Selectman Morin made a motion, seconded by Selectman Guessferd to hire Joseph Walker for the position of Firefighter/EMT in the Fire Department at the contracted salary of $22.43 per hour (step 3). This assignment will be a non-exempt position in accordance with the International Association of Firefighters Local #3154, as recommended by the Fire Chief. Carried 4-0.

7. Selectman Guessferd made a motion to adjourn at 9:56pm. This was seconded by Selectman Morin. Carried 4-0.

B. Town Wide Traffic Study Results – Nashua Regional Planning Commission - Presentation

8. NEW BUSINESS

A. Hudson Highway Safety Grant Acceptance – HPD - Decision

B. Electric Aggregation Plan Update – Hudson Electric Aggregation Committee – Decision

C. Resignation of Firefighter/AEMT – HFD – Decision

D. Request to Adjust PT Videographer Hourly Compensation – HCTV – Decision

E. Town Code Ch.98 Updating Limits for Purchase, Contracts & Bids – Finance - Decision

F. Town of Hudson Firefighters Union Successor Contract – Fire – Decision

G. Town of Hudson Public Works Union Successor Contract – DPW - Decision

9. SELECTMEN LIASON REPORTS/OTHER REMARKS

10. REMARKS BY TOWN ADMINISTRATOR

11. REMARKS BY SCHOOL BOARD

12. NONPUBLIC SESSION

RSA 91-A:3 (II) (a) The dismissal, promotion, or compensation of any public employee or the disciplining of such employee, or the investigation of any charges against him or her, unless the employee affected (1) has a right to a meeting and (2) requests that the meeting be open, in which case the request shall be granted. **(b)** The hiring of any person as a public employee.

THE SELECTMEN MAY ALSO GO INTO NON-PUBLIC SESSION FOR ANY OTHER SUBJECT MATTER PERMITTED PURSUANT TO RSA 91-A:3 (II).

13. ADJOURNMENT

Reminder…….
Items for the next agenda, with complete backup, must be in the Selectmen's Office no later than 12:00 noon on Thursday, August 3rd, 2023.

Agenda 7-25-23

6C

OUTDOOR GATHERING PERMIT
(Chapter 253 of the Hudson, NH Town Code)

RECEIVED
JUN 30 2023
TOWN OF HUDSON
SELECTMENS OFFICE

Type of Activity Hudson Old Home Days

Date & Time of Activity August 10 - 13 2023

Site (address) of Activity Hills House Field

Name & Address of Company conducting Activity Hudson Old Home Days Committee
PO Box 572 Hudson NH 03051

I certify that all state regulations regarding this request have been met:

Signature of Officer of Company conducting Activity ______ President
Date

Name, Address & Phone No. of President/Manager Timothy J Malley
4 Saint John Street Hudson NH 03051

State of Incorporation (if incorporated)______

Name & Address of Registered Agent (if corporation)______

Name of Local Organization sponsoring Activity Many community groups and HOHD scholarships

Pres. Dir
Signature of Officer of Local Organization sponsoring Activity

4 Saint John Street
Address

603-765-2086
Phone Number

hudsonoldhomedays@gmail.com
e-mail Address

✦**Signed letter of authorization from establishment where the event will be held <u>must be provided with application</u>.** (BOS consensus 7/22/08)

✦**Proof of Insurance—Certificate must be provided w/application, setting forth policy limits, activity & location of activity.**

! ! Please note that the application, with attachments, must be submitted at least 30 days prior to the event ! !

e-mail completed form to dlgraham@hudsonnh.gov or FAX to 603-598-6481

****

For Office Use Only

Attachments to permit application: 1) Report of town Building Inspector/Health Officer, ensuring site of proposed activity is suitable, with minimum sanitary and safety requirements having been met, with signoff/clearance from the Fire Chief and Police Chief; 2) Signed letter of authorization; 3) Proof of insurance certificate.

Proof of public notice.

Date approved by Board of Selectmen

Chairman, Board of Selectmen

OFFICE USE ONLY

Applicant ______________________ Date of Event ______________

Map ________ Lot ________ Building Permit Req'd ________ Street ______________________

SANITARY APPROVALS

Stipulations ______________________

Health Officer/Date David R. Helo 6/30/23

FIRE SAFETY

Stipulations ______________________

Fire Dept./Date David R. Helo 6/30/23

ZONING

Stipulations ______________________

Zoning Administrator/Date 6/30/23

BUILDING

Stipulations ______________________

Building Inspector/Date 6/30/23

POLICE DEPARTMENT

Stipulations ______________________

Police Chief/Date 7-10-23

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 07/07/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Financial Insurance Services Inc
PO Box 950
Derry NH 03038

CONTACT NAME: Ryan Fragala
PHONE (A/C, No, Ext): (603) 432-6414 FAX (A/C, No): (603) 432-3852
E-MAIL ADDRESS: rfragala@fisins.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Western World / SCU	
INSURER B :	
INSURER C :	
INSURER D :	
INSURER E :	
INSURER F :	

INSURED
Hudson Old Home Days Committee
PO Box 422
Hudson NH 03051

COVERAGES CERTIFICATE NUMBER: 22-22 REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	[X] COMMERCIAL GENERAL LIABILITY; [ ] CLAIMS-MADE [X] OCCUR; GEN'L AGGREGATE LIMIT APPLIES PER: [X] POLICY [ ] PRO-JECT [ ] LOC; OTHER:			TBD	08/10/2023	08/13/2023	EACH OCCURRENCE	$ 1,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 100,000
							MED EXP (Any one person)	$ 5,000
							PERSONAL & ADV INJURY	$ 1,000,000
							GENERAL AGGREGATE	$ 2,000,000
							PRODUCTS - COMP/OP AGG	$ INCLUDED
								$
	AUTOMOBILE LIABILITY; [ ] ANY AUTO; [ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS; [ ] HIRED AUTOS ONLY [ ] NON-OWNED AUTOS ONLY						COMBINED SINGLE LIMIT (Ea accident)	$
							BODILY INJURY (Per person)	$
							BODILY INJURY (Per accident)	$
							PROPERTY DAMAGE (Per accident)	$
								$
	[ ] UMBRELLA LIAB [ ] OCCUR; [ ] EXCESS LIAB [ ] CLAIMS-MADE; [ ] DED [ ] RETENTION $						EACH OCCURRENCE	$
							AGGREGATE	$
								$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N; ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) [ ]; If yes, describe under DESCRIPTION OF OPERATIONS below	N/A					PER STATUTE / OTH-ER	
							E.L. EACH ACCIDENT	$
							E.L. DISEASE - EA EMPLOYEE	$
							E.L. DISEASE - POLICY LIMIT	$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

SAU 81 Hudson School District is included as an additional insured on the General Liability policie per written contract, permit, or agreement.

CERTIFICATE HOLDER

Town of Hudson
12 Scholl Street
Hudson NH 03051

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

HUDSON, NH BOARD OF SELECTMEN

Minutes of the July 11, 2023 Meeting

1. CALL TO ORDER - by Chairman McGrath the meeting of July 11, 2023 at 7:00 p.m. in the Selectmen Meeting Room at Town Hall.

2. PLEDGE OF ALLEGIANCE led by Selectman Dumont

3. ATTENDANCE

   Board of Selectmen: Dillon Dumont, Bob Guessferd, Marilyn McGrath, Dave Morin

   Selectman Roy had an excused absence this evening.

   Staff/Others: Steve Malizia, Town Administrator; Elvis Dhima, Town Engineer; Scott Tice, Fire Chief; Bill Collins, Conservation Commission Chairman; Gary Gasdia, School Board Chairman; Jill Laffin, Executive Assistant

4. PUBLIC INPUT - There was no public input this evening.

5. RECOGNITIONS, NOMINATIONS & APPOINTMENTS – none

6. CONSENT ITEMS

   Chairman McGrath asked, does anyone have anything they'd like removed for separate consideration? *Selectman Morin made a motion, seconded by Selectman Guessferd to approve Consent Items A, B, C, D, E, & F. Carried 4-0*.

   A. Assessing Items
      1) Elderly Exemption Requalification's: map 237, lot 021, 42A Gowing Rd.; map 225, lot 003, 15 Beaver Path
      2) Veteran Tax Credit: map 182, lot 010, 4 Chapin St.
      3) Certification of Yield Taxes Assessed/Timber Warrant: map 235, lot 012, 24 Dracut Rd.; map 235, lot 013, 14 Groves Farm Rd.
      4) Institutional Exemptions: map 136, lot 36-map 182, lot 100, VFW Hudson Post 5741; map 182, lot 49, Community Church of Hudson; map 228, lot 54, New Life Christian Church

   B. Water/Sewer Items – none

   C. Licenses & Permits & Policies
      1) Raffle Permit – Friends of Benson Park
      2) Pole Licenses: PSNH (3) new poles on Hawkview Ave. (1) new pole on Gibson Ave.

   D. Donations - none

   E. Acceptance of Minutes
      1) Minutes of June 27, 2023

F. Calendar

07/12	7:00	Planning Board	Buxton Meeting Room
07/13	7:00	Zoning Board of Adjustment	Buxton Meeting Room
07/18	7:00	Municipal Utility Committee	BOS Meeting Room
07/19	6:00	Library Trustees	Hills Memorial Library
07/19	7:00	Hudson Electric Aggregation Cmte.	Buxton Meeting Room
07/20	1:00	Trustees of the Trust Funds	Buxton Meeting Room
07/20	7:00	Benson Park Committee	HCTV Meeting Room
07/24	7:00	Sustainability Committee	Buxton Meeting Room
07/25	7:00	Board of Selectmen	BOS Meeting Room

7. OLD BUSINESS

A. Votes taken after Nonpublic Session on June 27, 2023

1) Selectman Morin made a motion, seconded by selectman Dumont to promote Jeremy Faulkner to the position of Public Works Street Supervisor, Step 5, at $107,567 per year, effective July 2, 2023. Carried 4-0.

2) Selectman Guessferd made a motion, seconded by Selectman Morin to hire Derek Cote of Methuen, MA effective July 3, 2023 at $21.98 per hour (Grade VIII, Step 1) in accordance with the Hudson Public Works Department Local #1801 AFSME Agreement. Carried 4-0.

3) Selectman Guessferd made a motion, seconded by Selectman Dumont to hire William Schofield for the position of Dispatcher in the Fire Department at the contracted salary rate of $19.36 per hour (step 1). This assignment will be non-exempt position in accordance with the International Association of Firefighters Local #3154, as recommended by the Fire Chief. Carried 4-0.

4) Selectman Morin made a motion, seconded by Selectman Guessferd to continue the employment of Lt. Michael Mallen in a light duty capacity through August 31, 2023, as recommended by the Fire Chief. Carried 4-0.

5) Selectman Morin made a motion, seconded by Selectman Dumont to authorize Chief Dionne to recognize and award Captain David Cayot, Captain Steven McElhinney, Captain Patrick McStravick, and Lieutenant Patrick Broderick with a merit award of $250 each per the Hudson Supervisors contract. Carried 4-0.

6) Selectman Guessferd made a motion, seconded by Selectman Morin to hire Dylan Chevalier with a starting salary of $31.99 (step 3), all in accordance with the Hudson Police Employee Association Contract, as recommended by the Police Chief. Carried 4-0.

7) Selectman Morin made a motion, seconded by Selectman Dumont to award a 3.0% salary adjustment to the non-union Department Heads effective Jul 1, 2023. Carried 4-0.

8) Selectman Morin made a motion to adjourn at 9:20 p.m. This was seconded by Selectman Guessferd. Carried 4-0.

8. NEW BUSINESS

A. Public Hearing – Updating Limits for Purchase, Contracts and Bids, under Town Code Chapters 98-5, 98-6 and 98-7

Chairman McGrath recognized the Town Administrator who said, as you recall, we've had several conversations about raising some of the bid limits that we've been working with for the last 30 or so years. We're looking to go from $10,000 and $25,000 to $20,000 and $50,000 respectively. This is for when we go out to bid and when we have to solicit for bids. Again, the numbers have been in place since at least 1993, at least 30 years. And we're just looking from an inflationary perspective. And actually what we see when we go out to bid that $10,000 is not what it was 30 odd years ago. So there's been a proposal in front of you to raise the limits in Town Code Chapters 98-5, 98-6 and 98-7. There's also a modest language change to make sure that we're documenting any bids that go out so that we put something in a file at this point. Now we're looking for the public hearing because we're changing Town Code and are required to hold a public hearing. And after that, should you choose to amend the Town Code, you'll do it at the next meeting.

Chairman McGrath opened the public hearing at 7:06 p.m. There was no one present to give public input. The Chairman said, and just to note, there was no one other than our Town Engineer, and Chairman of the Conservation Commission present. There's no one else in the room other than members of the Board of Selectmen. Chairman McGrath closed the public hearing at 7:06 p.m.

Selectman Guessferd then said, I was hoping just before you close it, if someone's come to use outside of this particular public hearing time should we be at least acknowledging it or anything like that? Because I know we've received at least one. We've we've received one email as a Board. Now, does that count as public input or does it have to be right here? Chairman McGrath replied saying, first of all, I haven't seen what you're talking about. Okay. I wasn't on. Selectman Guessferd replied, okay, I thought it went out to all the Board of Selectmen. Chairman McGrath replied, I didn't see, I haven't seen anything. Selectman Guessferd replied, okay. All right. Chairman McGrath then said and that's not the appropriate way to do it either because it's, you know, it's public input and it's for the public to hear thoughts and…. Selectman Guessferd interjected saying, I just wanted to mention that, yeah, I've seen something. Chairman McGrath replied,

Selectman Morin was recognized and said I understand, but from my perspective, I don't think that that's it doesn't fit the, you know, the meaning of public input. You know, we want the public to be able to come in and tell us their thoughts if they oppose something or if they are in favor of it, or maybe they just want to ask a question about it, that that's the appropriate time to do that. Selectman Guessferd replied, okay, okay, no problem.

Selectman Morin was recognized and said, I think we've done it in the past. We've had people send stuff in in the past, particularly what we've gone through for the last two years. I did, I did see it. I did get it. I mean, it's not going to hurt anything just to to make that we did receive a letter and against it. Selectman Guessferd interjected saying, right. Selectman Morin continued saying and that it was put on file, correct, Jill? That would have been put on file. The Executive Assistant replied yes, it's right here. Selectman Guessferd then said and, you know, I considered it, you know, in terms of, you know.

Chairman McGrath interjected saying if the two of you have seen it and you want to talk about it, you know, I'm not about to say you can't. Selectman Guessferd and Morin both said, no, no, no. Selectman Morin then said, but we just recognized with public input we did receive a letter. Did you see it, Selectman Dumont? Selectman Dumont replied, I did, yes. Selectman Morin went on to say so we'll just we'll just, we'll just it was…we did send it in. It was from a town resident. It was against raising these amounts. And it will be put on file with everything else. Chairman McGrath replied, okay.

The Town Administrator then said so the whole point of the public hearing, it gets advertised well in advance. It gets publicized. It is truly the opportunity for people to speak to the government on this specific issue. After you close this public hearing and you proceed to the next meeting, it's certainly up to you whether you vote yes or no on this. But you can take whatever input you'd like, but this is the correct forum to get that input. Selectman Guessferd replied yeah. And that's where I was going, is just making sure that we're at least acknowledging it. And I think we all seeing it would consider it, you know, and as part of the whole plus and minus idea.

Selectman Morin then said, now not to throw a worm into this, but because this is public input and we have our residents state the name and address, should we have to do that. So it's on public record who it was. The Town Administrator replied this is a public hearing. They're not in attendance at the public hearing. You can certainly take their correspondence. But they didn't show up at the public hearing. We'll put it with the file, duly noted. But they did not attend the public hearing. Selectman Morin replied okay. Selectman Dumont replied I would say that’s the right thing to do. Selectman Guessferd then said and this person did say, please consider my public input for this public hearing so. The Town Administrator replied, we’ll put it into the record. To which Selectman Guessferd replied yep, that’s fine. Selectman Morin said I’m good with that, too. Selectman Guessferd then said just trying to be transparent.

Chairman McGrath then addressed the Board saying, no, and I'm willing. I mean, if the Board, the majority of Board members want to take it up and put it into the record, you're more than able to do that. I'm not. You know, I'm not going to, I'm not going to take this (gavel) and bang the gavel. I mean, it's you know, we're all part of this body and we should be able to say whatever we'd like as long as it's respectful and it's long as it's, you know, not foul language things. I mean, you know, but you'd be surprised at what could happen at meetings. And and I'm not saying that that's ever happened here, but, you know, it's just we have we have a set of decorum that we want to maintain. And and this should be a professional environment. So but so if anybody wants to bring it up, you're more than able to welcome to. But okay. I didn't I didn't receive it. I haven't seen it that I'm aware of. I mean, maybe it got sent to me a month ago and I just don't remember. Selectman Guessferd replied, okay, okay, no worries.

Chairman McGrath then asked, so are we dispensed with that topic then? okay, then so we’ve closed the public hearing. The Town Administrator added, and at this point no action is required. You’ll take action at the next meeting.

B. On-Call Services Trenchless Pipeline Rehabilitation Contract Award

Chairman McGrath recognized Town Engineer Elvis Dhima. Mr. Dhima began by saying, Thank you, Madam Chair. Good evening, everyone. This is something we'll be doing in the past couple of years. It's related to our capital improvements related to our sewer infrastructure. In the past, the theme was dig it up, replace the pipe and go from there. It's a new way of doing it. It's been trying to line the existing pipes that were there if there's enough pipe material there to accommodate this approach. We went out to bid. We had a schematic matrix, how we evaluated everything, cost, ability to get it done, similar contracts with other municipalities, interviews which sometimes we waive. And at the end of the day, three companies really scored pretty close. National Water, which did the work last year for us at 90. Vortex also got awarded last year and scored 93. Then Green Mountain in 92, Insituform was at 80. So we feel because it was so close and they provide the same material, the same services to basically hire three companies on call as needed for this project, which is basically whatever we need for this year, starting July 1st to June 30th, 2020 for the budget we have for this is $250,000. And we call we'll be calling these three companies as we need them throughout the year. That said, I'll take any questions you might have.

Chairman McGrath asked, anyone have any comments or questions for Mr. Dhima? Selectman Dumont was recognized and he said, I just had a couple. Just curious. So I know it's for an on call basis. Is that, is that the reason behind choosing three, just because you're not sure, depending on when you'll need them? Mr. Dhima replied yeah, we got different pipe size. Sometimes they cannot find what are we looking for.

You know, if it is a UV liner or steamer, you know, diameter depending who gets what. And then also they vary a little bit on the cost. So if there's a little bit of savings there, like a dollar or two per linear foot, for example, and they can get the pipe, we'll go with that particular one. We have an idea to what we want to do this year, but we haven't decided yet because things are changing. But yeah, it gives us the ability to draw out of the three. They're pretty close, but some of them have slightly better price than others. So if we can save $1000 or two per project, that adds up a little bit. But yeah.

Selectman Dumont replied it seemed like Vortex had some had some good numbers, but that's why I was just curious. So it's just obviously cost is part of it, but availability. Mr. Dhima responded, that's right. That's right. And that's why on the matrix that you have in front of you, there's the ability to secure a staff and material schedule flexibility 15%. And so while it's mostly driven by cost, 50% of it, there is, you know, being able to show up, be able to complete the services and then similar projects. All these companies have done similar projects for municipalities around here, some more than others. But we have not had any issues with the two we have hired in the past, which is National and Vortex. They've done work in the past three or four years for us on different projects. Green Mountain will be new. And we'll see how they play out. But I felt that talking to the Public Works Director and the Sewer Foreman that they're so close. I think it's worth getting all three of them in and figure out what the things are like. We're in much better shape when it comes to being able to get the material that we need, but it's not as fluid as it used to be pre-covid. Still, there's a little bit of an issue there with getting what we need. This provides us with the flexibility to switch at the last minute if we need to.

Selectman Dumont then asked was the plan always to have three different companies or was it the original plan to pick one or going through this you decided it was better to have the three? Mr. Dhima replied saying last year we hired two and this year the plan was for two. But because they were so close, we felt like anything over 90, you know, we have three, so we'll go with that. I think the more the merrier, I guess, in this case. But I don't know. Three is my favorite number too, I guess. I don't know. We felt like we can't go wrong and we want to try Green Mountain for certain services to see if they perform well or not. And it depends year to year. If we have a bad experience with one of the three, probably it's going to be the same players. We might go with two next year, but there's enough to go around I guess, and it'll be up to Public Works to determine who they feel is a good fit for what we're trying to do.

Chairman McGrath asked, does anyone else have questions? Selectman Guessferd was recognized and said Selectman Dumont pretty much had some of the same questions I did. As you know, I'm always kind of a little bit concerned about the bidding process. I know we have three that we that we're going to use here. And yeah, it is significant like like Vortex on almost every every one of these is almost is less expensive. There are a couple where they're not, right? How can we assure or be assured that we're going to get the best bang for the buck on this? I mean, in terms of is there going to be some documentation of when we want to use somebody that they're going to kind of do a comparison of the prices at that point it's just not gonna get. Mr. Dhima replied you get the unit prices based on the the matrix for sewer manhole, the lining of different diameters, the pipe itself, the services, things of that. So the way that would work is we'll determine to what we need to do out there. And what'll happen is the Foreman Public Works will determine to which one provides that service the cheapest. Selectman Guessferd replied the best. Mr. Dhima replied, the best. The cheapest really at the end of the day the most conservative. Selectman Guessferd added 50% of it is cost. To which Mr. Dhima replied so we'll get that consultant for that particular pipe project to come in, inspect the pipe and basically give us a number for that Based on the matrix that I've provided. If they can get us that right of way. Great. If not for some reason and they have 2 or 3 months' delay, we'll get the next one in line to give us. So that's how it's going to be played out. And if we can wait a little bit, great. If not, we don't expect to use this for emergency cases. We expect this to be all planned work. That's how it works. It's called On Call because they will be required to kind of work with us. But it's not really like if something breaks, we need them to come in. It's all planned work and I think next year we might change the language a little bit on that too.

Selectman Guessferd asked it's a yearly contract, right? So we're gonna do this again next year, correct? So it'd be it'd be interesting to revisit this next year when you do this in terms of how this all worked out. In other words, did we save the taxpayer money by doing it this way with the three vendors? You know, and I think there's got to be some level of a little bit of documentation, if nothing else, so that we can come back. And for you guys, you can come back and look at it next year and go, okay, maybe we don't need three because maybe we got most of it from one of the three or whatever. I know I noticed Like I said, there's a couple, there's a couple of these like liners. One company was humongously expensive. Mr. Dhima replied yeah we probably wouldn't use for that particular one. Selectman Guessferd said so you know, you don't want to use them for everything, you know. Mr. Dhima replied, correct. But they were good on some other ones depending on what we have out there. Selectman Guessferd replied yeah. And some of them didn't make sense either because they knew, for example, like someone bid a one penny per linear foot for a 36-inch diameter pipe. Of course you're going to you know, that makes no sense. We don't have that pipe to begin with, but then to put a penny. But anyway, yeah, we we know the game. I can tell you that there's other communities that have hired only one and they got burned because that company did not perform and they had issues and they lost a whole year. Yeah, that's not a good approach either. So I feel like we're, we're doing it a little differently and it's been working out for us so far. Last year worked out pretty good. We were on budget. We got a lot for our money. We have a solid infrastructure. We're trying to keep it that way with minimum impact above the surface. This approach allows us to do that.

Selectman Guessferd replied yeah, it would be interesting to see how it all plays out. So we'll probably be, I'll probably be asking that question next year as to how it worked out. Mr. Dhima replied yeah, yeah, if I remember it, I might be like, I don't remember it. I'm just kidding. No, we'll see. I mean, we did this a year ago. I remember sitting in front of this Board and doing the same exercise. It's just amazing how fast time goes. But yeah, last year we had no issues. It worked out very well. This year we're going to try to go for the same thing and I'll report next year.

Selectman Morin was recognized and said just so I'm clear on Selectman Guessferd's question. Where you've got three basically they're bidding against each other on every job? Mr. Dhima replied yeah we actually we're not even going to let them bid on it. We're going to pick the one that makes the most sense for that particular job. So let's just say we have an eight-inch diameter pipe rehab that we want to do and one of the three provides the best cost. They're the first one that's gonna get the call. Selectman Morin then said so they're bidding all the time actually. Selectman Guessferd replied essentially. Mr. Dhima replied yeah and if for some reason that person says I can provide cheaper services, but I can't get you that line for six months because I have an issue, then it goes to the next guy that might be a dollar more and see if he can provide it. If we can wait and put that off for later because we have another project, so be it. But the idea is we get all these different unit prices and we pick out of the three knowing that they're locked in and we can call them in because my concern is you get one in and let's just say they can't perform. Now You lost the whole year, so it gives you more flexibility. But the idea is to still be using the most cost effective one for that job depending on what the job is. this matrix, multiple sheets that you got there allows us to see everything that we might we might encounter out there.

Chairman McGrath asked Selectman Dumont, do you have another question? To which Selectman Dumont replied yeah, just a couple that I was going through. I know it's probably been done in the past because I know this was originally thought the cheaper way instead of, instead of digging up the line. But since costs have obviously gone up a drastic amount, especially with this, have you guys revisited just for the sake of pricing it out? Digging, replacing versus lining? Mr. Dhima replied I wouldn't even get… we can't even… does not even get close. When you start putting traffic control, PD. Got to help them out with their retirement funds as well It's just it's the inconvenience it can be a bit much. The idea now is if you don't have to get in the ground, don't. if you don't have to dig into it, don't you know we're not one of those communities that we know exactly what everything is and we don't, you know we're aware of everything. That's not the case. There's a lot of stuff out there that we can hit that we don't know. I can tell you my experience here in the past eight, nine years, we have hit gas mains that even the gas company didn't know. They were dead, thank God. But I didn't know that was there. Let's document that while we're here. So. Yeah. Selectman Dumont then said I'm sure it doesn't work on every on every job, but I would say that there could be some here and there that it might be a little bit cheaper. Mr. Dhima replied, yeah, if I think the only way that makes sense is if Public Works actually doesn't work themselves. Selectman Dumont replied, correct. Mr. Dhima then said if we sub that out, actually do the digging through a third party, nope. Selectman Dumont replied no, I'm thinking you keep that stuff in-house. Mr. Dhima replied, that's right, so if they can make that work and they can fit in their schedule. Absolutely. And they still do still do certain ones. But they're mostly services. They're not, we're not getting into the big mains for long runs because it's just, there's only so many of them at the Public Works and they can only do so much. So trying to be more effective to get in and out. But the theme is, to answer your point, this is slightly cheaper than digging in, but not by much. Selectman Dumont replied, right, yeah. It's just enough to keep you going this direction, that's all.

Selectman Dumont replied Yeah. I remember. It was like that when we did it a couple of years ago. And that's why I was going to bring up. I mean, I'm sure you remember them, but Kenyon Pipeline. I don't know if you've, anybody reached out to them because at least when I did it personally they had very, very good crew. They had very good numbers. Mr. Dhima replied but that was a long time ago. To which Selectman Dumont replied, it was yeah, no, it was. But they're a reputable company. They do a lot of stuff for Nashua. They're in there all the time. Mr. Dhima then said, we put it out there and we had mandatory pre-bid meeting. People need to understand how we operate and what we expect out of them. But as I said, I'm not out there dragging people in here. I have sometimes, but for this one, if you get four people show up at the pre-bid meeting, that's a good turnout. So they're more than welcome to go next year if they want. We are going to do this on a yearly basis anyway. Selectman Dumont then said I was just curious. Mr. Dhima then said, give them a call, let them know for next year. But yeah, yeah, this if all goes well, we're going to continue to do this every year.

Chairman McGrath asked, anybody else have any other questions? If not, is anyone willing *to make a motion to approve the contract for On Call Services for Trenchless Pipeline Rehabilitation to National Water Main Cleaning Company, Vortex Services, LLC and Green Mountain Pipeline on an as needed basis using sewer capital project account #5564-640 as recommended by the Public Works Director, the Town Engineer and the Finance Director. Selectman Dumont made this motion, seconded by Selectman Guessferd. Carried 4-0.*

C. Engineering Services EPA MS4 Permit One Year Extension

Chairman McGrath recognized Town Engineer Elvis Dhima. Mr. Dhima said, Thank you, Madam Chair. This is related to Water Quality Act. It got implemented in 2018. At the time we were looking for a five-year contract, starting a pilot program related to the MS4. We file it every year. In 2018, we went out to bid and VHB was the most qualified low bid at the time, at approximately about $20,000 per year. To help us out with the water sampling, documentation, coming up with ways to improve the water quality and filing with the EPA. That contract is up this year. We went back and forth and we felt that the best way to do this moving forward was at the yearly basis now, because things are moving and it's very difficult to give a price based on how the EPA feels about changing their regulations and continue to modify their regulations. So with that said, I requested them to provide a proposal for just this year moving forward, and that number was $21,800, which is about just about 8 or 9% increase from about five years ago, which I thought that was pretty reasonable. With that said, I'm asking you to waive the bid process and hire them based on the fact that they were the low bid last time we did this. They were the low bid on other previous job that we put out, the Robinson Pond they were the only consultant that were in that put a bid on and they can do the work. And I think the number is pretty reasonable. And those provide us with one year to move forward to do what we need to do to stay in compliance with the feds. And I'll take any questions you might have.

Selectman Dumont was recognized and asked is there a time limit for when they need to be hired for this extension or is there a is there? Mr. Dhima replied, it will be July 1st of 2023 to June 30th, 2024. It will be for this upcoming fiscal year. Selectman Dumont went on to say because I was going to ask, quite frankly, why I didn't go out to bid. I know that they were the only ones that did on a similar project. But just again, for keeping everybody moving forward and transparent, why not just throw it out there to see what came in? Different scope of work. Maybe find somebody else. Mr. Dhima responded saying, for a one-year extension when someone was doing it for five years will be like a huge ask for a lot of people to come in. The read that I got from last time we went out for a $75,000 job was that one firm showed up VHB. It was a lot of effort put into it and to get one person show up for that, someone that actually does work in town, it was very discouraging. So we don't have the resources to keep putting bids out for small amounts and to get 0 or 1 bid. So I felt that if we went out, we would have the same person in. It probably would have been higher versus kind of being upfront about it and asking for basically someone that says we will consider to sole source it, if you basically give us a number on this. And that's what they did. And I think that's what the number is. If you go out to bid, you can get someone like them saying $25,000 or $30,000. There's no guarantee. Selectman Dumont replied, no, there's never a guarantee. Mr. Dhima then said and now we're paying $10,000 more than versus telling someone, If you give me a reasonable number, we're going to send you the contract. Selectman Dumont replied, yeah but you have the same changes of finding someone less. Mr. Dhima replied, not really. Not really. I put a $75,000 job about a month ago, and they were the only ones in $75,000 job. I should have been able to get multiple people to show up for $75 grand. Selectman Dumont then said, to be honest, I find it amazing how difficult Hudson has with finding bids. I mean, I know it is difficult. Mr. Dhima interjected saying, Nashua's not getting any at all. State, ah Concord is not getting any at all. I just got out of the phone with them when we locked in the one bid for that. Absolutely. You got a lot of communities that aren't getting anything at all. Selectman Dumont replied, no, but I bid projects all the time. I get three, four…Mr. Dhima interjected saying it's different when you're private versus municipality. There's a lot of requirements and there's a lot of paperwork. And a lot of people feel that after a consultant does enough work in there that that's basically their territory. So it's a little different. I understand which how you're looking at it from your point of view. I totally get it. It's a little different. Selectman Dumont replied, Oh, I know. Yeah. No, I completely agree. I'm not saying…. Mr. Dhima interjected saying, I can tell you that VHB has done enough work, for example, in town that people and some consultants consider that to be their territory. There is a lot of companies and firms in Nashua that do a lot of work that no one else will bid on because they know who gets those jobs over there and who they're familiar with. So they kind of pick their territories. Selectman Dumont say well, that's not good. To which Mr. Dhima replied, I know, but that's just how it works out there. You know, they get used to I'm sure he sees it on a federal job that he does. And you have certain consultants like you. That's just how it is. So it's a little different, but I totally get it, what you're saying. And you don't have a purchasing department here. You know, we can only pump so much out there. You know, I can either pursue grants and other things, or I can work on 40 hours to put a bid together for $20,000. And I'm not going to get anyone in or I'm going to get the same guy. I have to make those calls. I only have so much time. Selectman Dumont replied, yeah, I'm just asking the question. To which Mr. Dhima replied, No, no, I totally get it. But that's the theme. That's kind of the theme out there. So that is one of the reasons why you're pursuing trying to provide some relief on the numbers because you can't you can't carry on ten and 20. It's just not what it used to be. You have to provide a relief to yourself. We're not set up like that. You know, you go to Nashua, they have a purchasing department there. They can pump all day long under $50,000 RFPs and over $50,000 all day long. Selectman Dumont replied, that's fine, But I would still hope that they're looking for the best bang for the buck for the taxpayer. I would hope that they don't just know that they have a $50,000 limit, so they go out and find whoever they want. Mr. Dhima replied, no, but it's just different out there right now. Things have changed a little bit and with consultants, it's getting harder and harder. That's just how it is.

Chairman McGrath then said, VHB has has been for as long as I've been around. And I was on the Planning Board for a lot of years, Zoning Board. I've, you know, been around for a while and they were always considered the premier engineering company, always. Selectman Dumont replied, and I'm not discrediting them whatsoever. Chairman McGrath went on to say, I so I mean, it's they don't come. You know, I haven't dealt with them in a number of years because I haven't been on the Planning Board that, you know, that's where I had where I had the the the stroke happened. I was at a Planning Board meeting, so I haven't been back since. But planning was always, you know, that was always my thing to do. I always enjoyed it. But VRB was always considered to be a really good engineering company. In fact, I think that they were probably the first one that ever did a traffic study for us that ever, you know, they came up with the to get collect cap fees. We never you know, at one time it was unheard of to collect CAP fees of any kind. And so they deserve some credit for that. Selectman Dumont replied, and yeah I'm not taking away, because I remember them very much through my years on the Planning Board as well. They've always done a fantastic job. It's nothing against their work or just purely same way I would do my business. I always just look for multiple numbers. So I just wanted to ask the question. Chairman McGrath replied to Selectman Dumont saying, no, I'm not saying that you shouldn't ask it. It's just that that's my experience with VHB. I always found them to be a reputable, reputable company to come in and do work for the Town of Hudson. Selectman Dumont replied, I would agree. Chairman McGrath went on to say and they did do a lot with the Town of Hudson. Again, going back to the CAP fees, if we hadn't been able to utilize them and talk to them about it was a novel approach at that time to collect CAP fee, we would have lost out on a lot of money over the years. So. That's my experience with them. So are we…. anyone else have any questions or comments?

Selectman Guessferd was recognized and said just real quick, I won't try to belabor this too much, but I think this is a perfect example of why we're doing what we're doing with the limits, because it's it's a balance, right? I mean, we want to get the best bang for the buck. And sometimes that best bang for the buck is maybe not competing at $20 Million or $20,000 job. I'm thinking BAE. and and because it's going to cost us more and I know that's some calls that you have to make but it's it's an example and I mean we should always be thinking first you know go out and get bids if we can. And I think that's really kind of the mentality we need to have is is but there are some occasions where it's less money for the taxpayer in the end if if we go another route. So I just think we always need to have this in our heads and and you know, that's really kind of my thought about it.

Chairman McGrath then said, I'm also… excuse me, I'm going to add a comment here that I think needs to be said. Because I've sat here now for a few years and I have been over the years since I've gotten to know Mr. Dhima. I'm so impressed with his ability to and his his work ethic is beyond question. Beyond question. He looks out for the town like he lives here himself. And it's the truth. I'm not saying something that I consider to be a falsehood. It's I mean, I've been so impressed with his work ethic and what he does for the town of Hudson. And it's I don't think he would sell us down the road, you know, And I just think that that needs to be said. It needs to be put out there because there's people that are watching this meeting that are probably, you know, complaining about him and, you know, don't want to, you know, want to go out to bid and send out as many bids as you can and and it takes time. It takes time away from he has to he's working here eight, eight hours every day, some days longer. He's here at a meeting here. He goes to the Conservation Commission. He goes to the Municipal Utility meeting. So, I mean, it's not like he's not here a lot. So I just felt that that needed to be said.

Selectman Guessferd then said I get it, and no one's casting any…. Mr. Dhima interjected saying no, no, no, no. I totally get it. And I. And I get the speech. I totally get it. It's not the first time. I just, I just need you to know that the way it works is when, when, when things like this, this caliber, when you have, for example, they've gone through the process like, you know, like we have gone through like a lot of RFPs and go do the dance. And sometimes we get one, sometimes we get 2 or 3. But for something like this, when you ask for a scope of work and fee and you get someone to give you a price, that's 8.3% higher than five years ago. I don't like to gamble. It's just that simple. It really is. And when I get someone telling me that they're going to go 8.3% higher than five years ago, 2% average, less than no. That's about 1.5, 1.7% average per year. When I have had jobs that have gone up 50% or 100% from year to year. I'm going that route because I think that's the best route. That's what I would do for me. That's what I would do for you and the town. And those are the decisions that have to be made. So how could it be like, No, I don't like it, I'm going out to bid. You know, we did that with Pennichuck five years ago when we said, Give us a number. I didn't like it. All right. We're going out to bid. And now if we were, we've been away from them ever since. But that increase was significant. You know, that's a 20% markups on everything. When we knew very well we could have done better than that. My take on it was something like this, that it comes at 8% from five years ago. I don't think you'd be wise to walk away. I mean, that's what I would do if this was my own thing. You know, I wish every single one of this was like this 1.5% increase per year. I do. But that's not the world we live in. So certain calls need to be made that way. They came in and said, 25, 30. All right. What happened? I'd be worth a look. But it's also hard to bring someone new in. When someone was doing it for five years. They've done a good job. There's nothing to complain about. They're doing it for almost the same price, and be like, Nah, I don't like it. I'm going out next time. They won't even put a bid on for something else because I didn't do anything wrong. I don't understand why for a 1.7 per year, 1.5% per year, which is really low, you kicking me out and giving it to another guy because they're slightly cheaper and I don't even know what I'm going to get for that. If it's slightly less so for something like this, you're not getting a product, you're getting a service. It's a little different. It's not apples to apples like materials for wood. Yeah. Framer for last price. You can have someone that says, I can do the framing for less and find out that you make a mess.

Selectman Dumont replied that's why I asked the question because it was a service. It wasn't a product. You see a lot of products increase over the years. Services, they've kind of stayed. Mr. Dhima replied but even that has gone up a little bit like even their rates. So like when you come in and say someone at 1.5% average per year, engineering, even engineering is going to have to deal with that. Engineering is gone up. Engineering services. (inaudible)There's not work out there, but I get it. I get it. And we're going to continue to do that. We're going to try to do it for the best way possible, but sometimes it hurts more if you go out. It's just it really is. I think this is one of them. That's it in a nutshell.

Chairman McGrath then said okay. So have we exhausted this topic? So is anybody willing to make a *motion to waive the bid process for sole source sole source this work to VRB, Inc. for the following reasons. 1) they have been and currently are our water quality consultant. 2) they were recently the only bidder for similar work and the bid was within our budget*. Anyone willing to make that as a motion? Selectman Morin are you willing to make that motion? Selectman Guessferd? Going once, going twice…if not, Selectman Morin?

Selectman Morin then said, I listened to both Selectmen's comments and I fully agree with the bidding process and that's why I didn't do it, because, you know, they they had their comments, figured they'd make a motion one way or the other. When we talk and I get the bids, we're doing the best for our citizens. I get that. But sometimes knowing the amount of work, manpower, hours, money we have to spend to send stuff out. That it's, it's a tough thing. And and he's right. We don't have anybody to do that. And again, that's the town the way everybody else has somebody that takes care of that. But we dump it on our employees instead of having a department to do that kind of stuff. It just sometimes. We beat this to death for no reason. I mean, this this is not a big amount. We've had them for five years. If he's taken all this time, you know, doing bids when I was at the Fire Department being involved in that, I know what it takes. He's not going to be able to do anything else because we don't have the people to do it. You know, that's my only that's my only concern. I don't have a problem with this one. I do agree with you. But like I said, you guys, I get where you're coming from. So, you know, if you feel that strong, either you make the motion or don't. Selectman Guessferd replied, I don't have a problem with this one. Selectman Morin then said, yeah. Just like I said, it just I think we I think at some point we probably should have another discussion on this because I fully understand where you guys are coming from. But, But we got to figure out a cut off, you know what I'm saying? Selectman Guessferd said Yeah. That's why we're raising the limits. Okay, understood. Yeah.

Chairman McGrath then said, and, you know, it's I think it's fair to say every one of us in this room, with the exception of Mr. Dhima, because he doesn't live in Hudson. We're all taxpayers here. Every single one of us. Maybe not Jill, either. I don't know. But I'm not trying to point anybody out. But I'm just saying, you know, it's every one of us is a taxpayer, so it's meaningful to us, too. I don't like to see my taxes go up any more than anybody else likes them. And, you know, given the state of the country that we're in a heck of a mess. So anyway, I think that I think we've probably talked this out. And if you if you know, it's if we have it, if you want to talk more about it and more questions. But I think that. So did anyone make a motion? Is anyone willing to make a motion? I've read the motion. Do you want me to read it again? *Selectman Guessferd* replied, you don't need to read it again. *I'll make that motion for this one*. Absolutely. *Chairman McGrath* asked is there a second? I'll *second* the motion if no one else is willing to, just to move it along. *Motion carried 4-0*.

Selectman Morin made a motion, seconded by Selectman Dumont to award the one-year contract for Engineering Services to VHB, Inc. in the amount of not to exceed $21,800 as recommended by the Town Engineer. Carried 4-0.

D. Request to Apply – PROTECT Grant Program

Chairman McGrath recognized Mr. Dhima. Selectman Morin then spoke up saying, before we get into this one, we're going to run into the same. This one's for $9,700. The Town Administrator then said, Actually, this is under the $10,000 limit. He didn't even have to do that. He only did it because he wants to get permission to apply for the grant and he needs these folks to do that. Technically this one didn't need to go out to bid, under the old numbers.

Mr. Dhima then said, so this particular one is related to, as you all know, and probably have a missed drainage and the runoff and everything we've been having. So as you know, we're kind of locked in for everything that we have in place from July 1st to June 30th of next year. As you know, all the runoff we've been having, especially the last Tuesday, we were about 2.35 inches in one hour. We got a lot of requests, Selectman Morin has been involved with some of the cases we're dealing with right now. And unfortunately, the feedback that we have to provide is that we do not have any money for any drainage related projects as of now because of two previous default budgets. And the fact that moving in now to this fiscal year, the amount of money for the drainage is been fixed. So DPW has about $10,000 and I don't have any money related to drainage. So what we're doing is we're looking for ways to raise funds related to drainage related projects because they still need to be addressed. So it came to our attention that there is a program out there, federal related project, it's called PROTECT, and it's basically related to planning and construction for this particular item that I'm in front of you tonight is related to planning and designing projects that are going to improve drainage and transportation related to drainage structures. We came up with a list of eight. Out of the eight that we submitted to consultant for makes the most sense for us to move forward with, and we basically will hire a consultant to help us out with applying for these grant. And the amount for that grant is, work related to the grant, is $9,700. It'll be coming out of the engineering account and hopefully we get it. And if we get it, we'll have four projects that we can basically address, at least for the designing phase. If we get this grant, the next piece will be the construction portion. The construction portion of these projects will have a 20% match requirement by the town. The only way we can achieve that is by probably having a warrant article in March next year for this. I think that warrant article is probably going to be coming up anyways no matter if we get the grant or not because we do not have money to address drainage issues out there and it's coming to the point that we need to start doing some things. We're in good shape with the bridge and the bridge program, with the water, with the sewer, but there's a lot of drainage infrastructure out there and its kind of put it in the back burner for now because it's just underground no one cares until someone gets flooded. And I think that's going to be the next thing that we need to start paying attention to. The challenging part about that is that it costs a lot of money and no one is interested in it because it doesn't impact me. I don't have any water issues in front of me. I shouldn't have to pay for it. So that will be the next battle. But that's it in a nutshell. I'll take any questions you might have.

Selectman Morin was recognized and said just with the last two rainstorms that we've had, we've had one resident that's taken a beating out there. I actually talked to him, went to the site. They actually have three street drains within 50ft from each other. Problem is, everything goes into the street drains, but the pipes are too small, so it all backs up, floods into there. We went twice with the two last, to these, this particular place. And the only fix we can do for this, for a person which public works is going to work on, is there's a swale that we're going to have to extend across their driveway, try to put the water away from the driveway at this time, because every time we get a big storm, street floods, it goes into his basement. So this is not the only problem. I mean, if you went around town, they had, what, like 8 or 9 different large floods just from the rain. And it's all because we don't have the appropriate drainage. So I'm in support of this one because we're having some problems and the residents are taking a beating of it.

Mr. Dhima then said, and the design portion is 100% funded. It is no match required by the town. So that's the other nice thing about this. If we get it, it's 100% covered by the by the feds. So while we have a challenges on our own to raise money, maybe the one way to go is pursue grants. But that takes time too, as well as you know. But this is due in August, so we have to have a quick turnaround of this. But I think we can make the deadline. So getting $100,000 for drainage related projects out there, it's a good start. It shows that we're trying. And while we might not have the money on the budget for this year, maybe we can secure this funds to help to start addressing some of these projects out there. And this will take care of four out of 10 or 15 that we have out there.

Selectman Morin was recognized and said just a question. If we get this and the engineering is done, that would be considered shovel ready, which would make it easier for us to get grants because we have a project that's ready to go, correct? Mr. Dhima replied, that is correct. Yep. This particular grant has about $600 Million built into shovel ready projects. And even if we get 1 or 2 of those projects, it'll be huge because they can add up to hundreds of thousands. Those are expensive too. You have to close the road detouring, PD. It's not $50,000 job that used to be back in the old days everything. Now it's just it's significantly more money.

Seeing no further questions, *Selectman Morin made a motion, seconded by Selectman Guessferd any questions, to waive the bid process and to award the engineering services to CMA Engineers, Inc. for the amount of not to exceed $9,700 using engineering accounts. #5585-225. Carried 4-0*.

Selectman Morin made a motion, seconded by Selectman Guessferd to authorize the Town Engineer to file for the grant. Carried 4-0.

Selectman Guessferd made a motion, seconded by Selectman Morin to authorize the Town Engineer to be the principal for this grant. Mr. Dhima said, it's weird. They want someone to be authorized by the Board for all these things that we put in, and I feel weird about asking for it, but unfortunately, unless I had, I had something signed by the Board that allows the Chairman to sign for on behalf of the Board, because that's not enough. It's just it's just another thing for all the federal agencies not to require. So that's why that's in there. I don't want to be the principal. *Carried 4-0*.

E. Conservation Commission Property Purchase – 13 Tiger Road

Chairman McGrath recognized Town Engineer, Elvis Dhima and Conservation Commission Chairman, Bill Collins. Mr. Collins began by saying, Good evening, Madam Chairman, Chairperson and Select Board members. The Conservation Commission has another opportunity to purchase another tract of land in the southwestern side of Robinson Pond. It's located off of Tiger Road. It's got good public access. And it's it's really going to help protect more of the watershed back there. As you remember, a couple of years ago, we purchased the land on the south eastern side, the Berrigan property. And this kind of ties into all of that for a total of about 80 acres of conservation property. We feel it's at this time, it's a, it's a good deal. The landowner wishes it to stay as a conservation property. That's why she was willing to work with us and not look for a competitive bidding process for development or anything like that. And it's just another parcel that will help protect the outflow of Robinson Pond for the water quality and everything else like that from deterring development in that area.

Chairman McGrath replied, I think it's wonderful that you're able to get it. And I remember when when the former chairperson came in to try and Get it. And we had a rogue member that almost scuttled the deal for you. But anyway, it's it's good to see. And I questioned whether or not you had enough money left in the budget for other properties than you do. Mr. Collins replied, yeah we we probably have enough left to do one more large purchase somewhere in the community. Obviously, we're going to try to target properties that tie into other conservation lands for connectivity and things along that line and the value of the property itself. We're not just going to look at buying up house lots for that purpose. I think it our job is to seek out lands that should maintain themselves as undeveloped properties and take it from there. Chairman McGrath replied you're doing a good job.

Selectman Morin was recognized and asked how does this tie into the MS4 permit where we're purchasing around the pond. Mr. Dhima replied, it's going to help a lot. One of the recommendations by the VHB pilot program that's being run by NRPC, the $50,000 grant we got is basically one way to protect the pond or the the watershed related to is to purchase either property or to protect it further. This particular property that could have been developed. Falling under the jurisdiction of the Conservation Commission it's one less parcel that the town has to worry about creating run offs and develop, you know, so it it helps significantly. So we have this protected on this side of the pond. We have the other side that the Chairman just mentioned it. So we know that we're not going to just completely isolate Robinson, but anything that we can grab that's not going to be developed, it's a huge help because think about 1 or 2 lots being developed there with a septic system that's eventually discharges there. That won't be the case for this particular parcel. Seeing no further questions from the Board, *Selectman Morin made a motion, seconded by Selectman Dumont to approve and authorize the Town Administrator to sign the Purchase and Sales Agreement for the property located at 13 Tiger Road for the amount of not to exceed $327,750, as recommended by the Hudson Conservation Commission and the Town Engineer, and to remain under the jurisdiction of the Hudson Conservation Commission. Carried 4-0.*

F. Increase Police Detail Cruiser Rate Town Code Ch. 205-8M

Chairman McGrath recognized the Town Administrator who said, as you recall, at the last meeting, you had a public hearing regarding changing the private detail rate for cruisers at a detail from $15 to $20 an hour. I believe the last time the code was changed was somewhere back in 2007. So subsequently the cost of operating cruisers has gone up. Prior to the public hearing, you held a meeting. You basically looked at this at the public hearing. I don't believe you had anybody show up at the public hearing. If I recall. You might have received some comment or somebody did some sort of analysis, which that was about it. But bottom line, the Chief has requested that we raise the detail. This is, again, private detail. So if somebody's buying a utility or if somebody's private hires a detail officer and they want the cruiser, it'll be $20 per hour from $15. This is a pass through. So basically we collect the money, if you recall, half the money would be going into a newly established revolving fund to help pay for some of the cruiser expenses. The voters approved that. So monies we pull in for a police cruiser detail half will go into that revolving fund. The other half will come to the town to help defray the cost of the cruiser. So you held the hearing. I recommend you amend town code by approving this.

Selectman Guessferd made a motion, seconded by Selectman Morin to amend Town Code Chapter 205-8M, Police Department fees, by increasing the police cruiser present at details, by request, from $15 per hour to $20 per hour. Carried 4-0.

G. Proposed Application Fee Building Board of Appeals Town Code Ch. 205-18

Chairman McGrath recognized the Town Administrator who said, Similar to the similar to the previous item, you had a public hearing at the last meeting regarding establishing a fee for Building Board of Appeals applications. In my tenure here, I don't think we've ever had a Building Board of Appeal meeting, but certainly I think there's something coming this way which kind of stimulated the Building Board of Appeals to meet, established ground rules like chairman, vice chair, and they're also recommending a fee to cover the cost of advertising minutes, whatever. It's $200. Again, there's been no fee up to now, but this fee is consistent with the Zoning, I believe, application fee. I think it was very similar to that. So it's basically a fee that folks, if they want to make an appeal, they can make the appeal, but they have to pay the fee. You had a public hearing and prior to that you had it at a meeting. I don't think we got any comment on this one, if I recall. Chairman McGrath replied we didn't have any comments on anything. The Town Administrator replied I think you had some email on the police detail. Selectman Morin replied yeah on the police detail we did. The Town Administrator agreed saying but you didn't have any other public comment, but you didn't receive any email on that one either. So again, I'm recommending it. Selectman Morin added, and just for the record, that got submitted into the file will be part of the record for the police detail just so it's there.

Chairman McGrath asked, on this one, do we have any people serving on the Building Board of Appeals? The Town Administrator replied Yeah, you have three and they just organized. They had their first meeting. So Mr. Emanuelson is Chair, I believe. I think Mr. Malley is Vice Chair. And then I believe Mr. Lawlor is recording secretary. So there are three people on it. They've been on it for quite a while. We put bylaws, they put bylaws into place, they elected their officers and they came forward with this and they're ready to go.

Selectman Guessferd made a motion, seconded by Selectman Dumont to amend Town Code Chapter 205-18 Building Board of Appeals by adding Section A 1) building Board of Appeals fees are set at $200 per application. Carried 4-0.

H. Application for Payment from Capital Reserve Fund

The Town Administrator was recognized and said We have a request that came from the Finance Director. It's basically for reimbursement from the Sewer Capital Assessment Capital Reserve Fund. I believe these were expenses for sewer main and manhole lining. It fits the purpose of the Capital Reserve Fund. And basically the Trustees of Trust Fund have asked it whenever you ask for disbursement that the Board vote to make the disbursement. So this is coming from an established capital reserve fund. I believe it's been around since we've probably forever. It's been around since 1997 and it has $9.1 million in it. So they're asking for disbursement of $41,388.50.

Selectman Dumont was recognized and said, just a question. Was the cross out on the purchase order just a typo or did the cost actually increase that much? The Town Administrator replied, so when they got done, that was the cost. So they thought it would be $31,000. It ended up being $41,350. Selectman Dumont asked, and that's the same company that we're using for the next year? The Town Administrator replied this appears to be the same company, correct.

Selectman Dumont then said and the other thing I just noticed probably would've been a question for Elvis, but I don't know if you can answer it. It looks like they were charging about $65 a lineal foot for 15 inch pipe this year. But their new quote is about 14% higher going forward. The Town Administrator replied, if that's what the numbers say, I'm not probably qualified to answer that. He's probably better qualified. This is something they've already spent. So this is this is. Selectman Dumont replied yeah, I just figured this was a good this was a good comparison. I should have brought it up earlier. That was my fault. But I thought this was an older date until I realized it was 2023, but they were at $65 a linear foot for a 15-inch pipe, and now they're over 75. The Town Administrator replied, I know this one was right out here on the main drag over here, so I don't know if that made any more complex, but it certainly took more staging on their part. They literally did it right out here, I think, and tried to avoid daytime hours. I think they did some of this at night that may have made a difference in it. In and out, though. Selectman Dumont replied, alright, thank you. Chairman McGrath added so if you really want to know, you need to call Elvis. Selectman Dumont replied I'll reach out to Elvis to see what he has to say. I'm curious and I just want to make sure that we don't obviously have someone bid a job and then constantly have them come in 10 or $15,000 over that bid and just expecting us to pay for it. I don't want to. Yeah, the numbers aren't good at that point, obviously. The Town Administrator then said, or sometimes you get into the ground, you go, Oops, there's more here than we thought. Selectman Dumont replied that happens a lot. Normally that's why you're lining, because you're not digging up the ground. You're basically putting a balloon down a pipe. So normally you're not running into that as much. But I'll have the conversation with Elvis. Thank you.

Seeing no further questions from the Board, *Selectman Dumont made a motion, seconded by Selectman Guessferd to approve the disbursement from the Nashua Capital Assessment Capital Reserve Fund in the amount of $41,388.50 as requested by the Finance Director. Carried 4-0*.

I. June 2023 Revenues and Expenditures

Chairman McGrath recognized the Town Administrator who said, this is preliminary budget and actuals. This is preliminary. We're still getting expenses hitting the books. Obviously, invoices are still coming in close, but so we're not done. But just to get an idea where I think I think it's about $287,000 under budget on the on the general fund. But that's not a final number that will go down. But right now, we're less than 1% within budget. So it was it was close in my opinion. Anything under a 1% is close. And again, that number will decline. It won't be $287,000. We're still getting, I think, one more payables run to capture all the bills that not everybody gets to bill in here July 1st.

So, again, bottom line, it looks like it was a tight year, but we made it through. We continue to do very well with automobiles, $6.2 million with the registrations, which was $680,000 over the budget. Chairman McGrath said, people are racing to buy cars before they have to buy an electric car. The Town Administrator replied, I'm not sure what they're doing, but they're certainly registering a lot of cars. And also the interest. Our new Treasurer is working very well with our Finance Department and they're capitalizing on our investments. So they're moving the money. So I think we finished the year $161,000 over what we budgeted, which was pretty anemic, but the interest is picked back up. So all of that helps. It goes into our fund balance. From there, you can either use some to lower taxes, you can do a project or you can let it sit there and just for fiscal stability. But we look decent considering we've had a couple of default budgets. We're in decent shape. Now this year we can maybe get some of that stuff done we want to get done. Cuz a lot of stuff's been sort of put on the back burner, you know? Luckily we've had, you know, ARPA grants and whatnot and that helps. But still day to day stuff, you know, needs to get done. So if you have any questions. But again, this is not final is still again, there will be a payables run and there'll be the auditors come in in August. And when the auditors come in, they just they may or may not make certain adjustments, put things in the proper, proper bucket. So but just to tell you, it's under 1%. Selectman Guessferd replied, I'll take that. The Town Administrator then said, yeah. You know, you budgeting this stuff out? Almost 18 months ago, you know? Let me put it in this context. If you had a $50,000 budget at your house, this is $250. If you had $100,000 budget at your house, this is like under $1,000 bucks. That's close. Yeah. That's context.

J. Town Hall Relocation Discussion

Chairman McGrath said, this is to begin a discussion publicly about what we've talked about and considered. Mr. Malizia would you like to? The Town Administrator said, well, I think the thought was that the Board was considering maybe possibly a relocation of town hall. It's been identified through CIP process that this facility is aged. You'd have to not really a lot of possibilities to expand it. So the thought was, you know, maybe there was another location near here that we could possibly look at for town hall. And I think this Board wanted to maybe get a sense from the public what the pulse would be for something like that. You know, you want to be able to provide a visible location, a location that works for everybody. You don't want it down in the south end. You don't want it on the north end. You don't want it on the outskirts where the police station is. So as we are aware, there may be a parcel that might be available that would probably be in the discussion. And the thought was, is this something that perhaps the public would support? And I think this Board wanted to maybe discuss putting this to some sort of public session probably at the beginning of September, because I think summertime is just difficult. People on vacation to give the public some sort of say in, hey, is this something you folks are interested in? Would you be willing to support it or are we all wet?

Yeah, I think, I think that was the thought that I had is that's the I mean, we talked about it and I think that we should do, you know, have a public meeting at the Community Center where where it's big enough that, you know, there's a large number of people that are interested and want to come out and express an opinion or just get information about it to make a decision. I think that that would be an ideal place to have it. We couldn't really facilitate something like that here. There's just not enough room. So I think but, you know, we may be surprised and we may go out to the community center and there might be two people that show up or ten people, you know. So, I mean, it's I go back to the days when when we were when the town was considering buying the Friary property and that, that was a like a meeting, like it was a town meeting actually. And we had it at the Memorial School. The auditorium was filled. People were really interested and wanted to vote on it, and it failed by 20 something. How many? The Town Administrator replied, like 26. Something in the twenties. votes. Chairman McGrath went on to say, the town, the townspeople, I dare say, have been regretting that decision every day since, especially now that there's more development that isn't, you know, isn't considered to be, you know, something that they really want in that property. So, you know, this is an opportunity for people to express an opinion, get information, tell us what they want. Tell us if they, you know, tell us if we want want to go ahead with something like this, look into it further, get more plans, figure out, you know, parking, size of the building, what we're going to need and what and more importantly, other than all of those things, how much it's going to cost. And, I mean, that's going to be a big part of the decision making. But I think that, I think we owe it to…. I think we owe it to the townspeople. And I don't think that we're at liberty now to say what the, where the property is. But we've had some input over the last couple of years that people don't want to see a certain type of development on that property. And so, you know, it's it's just a it's an opportunity for all of us to find out what the townspeople want and whether they want it or they don't want it, whether they're willing to support it or not. So.

Selectman Dumont was recognized and said, yeah, I would agree. I think it's important to bring it to the voters. Especially kind of like a town forum like you had mentioned, to get their, to get the pulse on it or to see what their, what their views are. It was brought up in the CIP. It was brought up in a report last year. Obviously, that there's there's some issues. There's overcrowding, limited storage space. Bob actually has has has the full report. He could probably speak to a little bit better than I could, but it has been something that's been on the radar. I think it's time to see if the voters want to spend the money and move forward. So but ultimately leave it up to them, see what they want to do.

Chairman McGrath then said, and I think, you know, I think we'd be negligent not to bring it to, you know, bring it to the public and let them make the decision. I mean, it's it's their decision. It's their town and it's their money. So, yeah, my town. Our town. I mean, I've been doing this for a long time. And like I've said before, that meeting for the Friary property, my mother was alive and I took her with me, much to her chagrin, and much that she really didn't want to be there, but she went and cast a vote. So.

Selectman Morin was recognized and said, I think it's time to take a look at this building. As Selectman Dumont said, we've outgrown it. And it's been it's been a long time coming, and this will give us a chance to do it right, to make sure for the future. I would like to *make a motion that we hold the public meeting on our September workshop, Tuesday, September 5th*. Selectman Guessferd said yeah that would be right after Labor Day. The Town Administrator replied, the day after Labor Day. The 5th of September. And the folks will be the summer program will be done, which is also. You're not going to do this when they're in there. So they'll be done. So September 5th would be your scheduled workshop date. Chairman McGrath said, I thinking early September because that's when people are back from vacations. You know, they're back to school. The schools are back in session. Selectman Dumont seconded Selectman Morin's motion. Chairman McGrath then said, motion has been made and seconded to have a public public meeting about the the expansion, building and expansion of town hall facility and the location to be disclosed at that time. I mean, I don't think that we're I don't think we're able to do that at this point. Am I wrong or is there? The Town Administrator replied, I think we're being careful. That's fine. Selectman Guessferd then said, I mean, people need to be fully obviously informed both from the location perspective and from a general kind. The Town Administrator said do they want a new town hall. Is that something that they find important? Selectman Dumont replied, exactly.

Chairman McGrath then said, but there's also I mean, there's also another consideration that there's other property, you know, like what are we going to do with this town hall, this building, you know, what are we going to do to utilize that or are we going to sell it or are we going to, you know, I mean, there's other things, other things to take into consideration. And we've got the administration building for the Fire Department. That's another building. Do we want to keep that or can we sell it and offset some of the cost for the new town? So, I mean, there's a lot to go into this and a lot of thought to be put into it. And maybe we should have, you know, at some point, you know, give it some thought and maybe make a small subcommittee to get together and have these discussions, make a list of what we need to do and what, you know, what we think we should do. I don't know. I mean, that's just my thought.

Selectman Guessferd then said, well, like you said, there's a lot of moving parts here. But it's it's and we need to have some level of answers, I guess I'll say, for the September meeting. So say this is what the thought process is where and general it's it's going to be it's going to increase taxes. It's going to. The Town Administrator replied, yeah that's inevitable unfortunately. Selectman Dumont added we have that, you got the rough dollar amount. You could show roughly what the increase on the tax rate would be. Based off of that people can make the decision with, you know, pull it all together.

Selectman Morin then said, and chairpersons, you know, what do we do with the buildings. There's a possibility of two buildings we could sell to take those to help offset some of that tax burden. Selectman Guessferd said, yeah. Again, that's all got to be part of kind of the discussion. And if the townspeople want us to move forward with at least, you know, kind of investigation research more of that, like you say, are they interested in a new town hall building or do they just want this one to be renovated or.

Chairman McGrath replied, I don't think I don't know that I'm not certain about the, you know, whether or not we could expand it. I mean, I think. I mean, when KC was here, she talked about that and she was you know, she was had ideas of what you could do to expand this building. The Town Administrator replied, she's not an architect and I don't think you're going up. So no offense, but I don't think you could actually. Selectman Dumont replied, I think correct me if I'm wrong, Steve, but the original sketch at least was provided to the CIP was was talking about blowing out that that left side of the building over there towards the parking lot which would reduce parking and yeah, you get some more space on the inside but then you lose the spaces outside. The Town Administrator replied, maybe the one most logical is where you look where Land Use is. If you come up the ramp, if you could put something to the front there, yeah, you're going to gain 400ft or something like that. Selectman Dumont replied, yeah, not much. The Town Administrator then said, again, you know, you're dealing with a building that's been added onto through the years and not everybody's customer facing. In other words, not every department that needs to face the customer faces the customer. We're not unique. There's probably a lot of town halls like this. But on the other hand, there's the Londonderry. There's Derry, and they spent a lot of money doing those. Does this community want to support that? Because, I mean, 40 years from now, it'll all be in the cloud and you won't need to come here because kids like my kids, they don't. They do everything on their phone. You know, you'll need workers. But we have the interface that you have today. Maybe not. I don't know, 40 years from now, who knows? Chairman McGrath replied, I don't know The way Elon Musk, Musk is talking. And what's the other guy? Zuckerberg or…The Town Administrator said, all the high tech guys?
They know way more than I do.

Selectman Guessferd then said, I mean, another possibility. I mean, another thought that, again, brainstorming about all the different things here. I mean. I mean, who knows? Yeah, we can't expand this building, but, you know, instead of building a new building, is there an opportunity and I don't know of a smaller building that we could annex, you know, as part of the town hall.

The Town Administrator replied you start running into the issue where people come into this building, they want a certain service and then they go, oh, you got to go to building A they go to building and they say, well, really, really got to go back to building B. And who do you cleave off? You know what I'm saying? Selectman Guessferd said, I'm saying I'm just throwing everything, you know? To which the Town Administrator replied, I'm just saying, who who do you cleave off and how does that really work from a customer perspective? Because nobody likes to run around.

Selectman Morin was recognized and said and to your point, we talked about maybe the bank building over there at one point, but that's why we moved everybody from the Fire Department over here because people had to come here and then go there. And that was the problem. The Town Administrator replied, typically, if you move like if you move the Clerk over there, I need to know about my assessment. Oh, you got to go back to town hall, talk to those folks over there. I'm not making excuses. I'm just saying that seems to be the reality, because a lot of your customers are older. They're the ones that come in and deal with that. And you start sending them down a one-way road that you can't go that way. You got to go around or you got to go over there. That's all you know.

Chairman McGrath then aid, well, we've got a lot of things to talk about, and I'm sure that we're going to get a lot of feedback. The what is what are they called? The people that are sitting at home on their iPads or on their computers and they're shooting shooting off emails or that thing and and they're shooting off, you know, what they think are good ideas, bad ideas. So, you know, Facebook is going to be loaded with with all kinds of comments and it's you know, that's the way it is today. People can do it from their home and and not take, you know, like not coming out to speak about something that they want to have input to, but they're not willing to come out and do it themselves. They want other people to do it for them. The Town Administrator replied that's why we try to provide the opportunity to at least give them the opportunity.

Selectman Guessferd then said it sounds like when we were expanding the school system, you know, the school buildings, what, 20 years, 25 years ago or whatever it was when Hills and there were three different plans, there were different and we picked A, B or C, I mean, there's all kinds of different ways this could this could play out. The Town Administrator said, on the other hand, sometimes you just start digging and there it is. Sometimes. Get it done.

Selectman Morin said so we got a motion on the floor. To which Chairman McGrath replied, we do? The Town Administrator replied, yes, we do. Selectman Guessferd said to hold the hearing. Selectman Dumont replied made and seconded. Chairman McGrath replied, sorry, I got sidelined here. Okay. *Motion has been made and seconded (made by Selectman Morin, seconded by Selectman Dumont) to hold a public meeting on September 5th at the Community Center at 7 p.m*. And everyone that lives in town and is a voter and taxpayer, you're more than willing to come out. Selectman Guessferd said we got to get the word out. Chairman McGrath added, but we'll have we'll have ideas by then. We should have some some ideas and some information that that can be shared and hopefully the location can be shared by that time because I think that that will be an important consideration. Selectman Guessferd replied, Absolutely. Yeah. Yeah.

Chairman McGrath took the vote, which carried 4-0. She then addressed School Board Chairman, Gary Gasdia asking, Gary, would you like to say anything about any of that? I mean, I didn't give you that opportunity. Mr. Gasdia asked, about the town hall? And said, no, I. You know, it is an old building, right? I mean, it's. But it's up to the town's people. I think having a public forum is good. I hope the people come out. I know we did run into this with with our projects over the years. Right? Is that there's however many people in this town in a good night is 12 people. And so you get 12 people and they all tell you to go one direction and then everybody votes it down because they wanted option B, So I think it's great you're doing it. Get the word out. Hopefully people come because that's. Selectman Guessferd added, I remember some of those poorly attended meetings. Mr. Gasdia then said, I think it's great what you're doing. I think it's probably well past due and, you know, looking forward to see what comes out of it. Chairman McGrath then said, I didn't I didn't mean to put you on the spot about. Mr. Gasdia replied No, I appreciate it. I feel I feel the pain because we've been there the past several years. So I hope it. Chairman McGrath said thought it was fair to at least ask you if you wanted to have some input. Mr. Gasdia replied we got to move the town forward.

9. Board Liaison Reports/Other Remarks by Selectmen

Selectman Dumont: On Thursday the 29th, I attended New Hampshire's Municipal Association, local workshop or the Workshop for Local Officials. I found it very informative. Just want to encourage everybody on every board throughout town if they have the availability to go in person or even do Zoom. It's just a great thing to be able to be a part of and get all that information.

I participated in the ZBA site Walk. It was nice to see we had some a couple residents that came out and participated as well. Also wanted to encourage the townspeople that if you see a sidewalk or if you see a meeting posted to try to come out and and give you feedback, it's very, very helpful.

I want to point out that at the Bensons Park, the Friends of Friends of Bensons are putting on a Beatles tribute band on the 22nd. And that's about it. That's everything I had.

Chairman McGrath asked, how are you enjoying the ZBA? Selectman Dumont replied, I like it. It's good. It's yeah. Chairman McGrath replied, it's a good learning experience. Selectman Dumont replied it's a different side. You know, I was very used to the Planning Board side. ZBA is just a different aspect and it's a good process.

Selectman Guessferd: Okay, I've got a few things. Let's see. I'll just I'll start off with Planning. Tomorrow night, we're going to be talking about the traffic study. It finally is has reached us. Has been completed. So we're going to be talking about that. We're still working through the the Master Plan. And there's there's one project tomorrow night that we're we're looking over. And Selectman Morin is going to replace me tomorrow night for that because that will be unavailable.

As far as I guess I'll go to Rec Department next summer. Programs going really well. Lots of cool activities for the kids. They went to Stone Zoo today. They're having all kinds of different contests and stuff like that. Over 200 kids are going to these field trips, which is really cool. Adult softball, the program continues, but there's been a lot of rain delays and rain postponements, as everybody can understand. So they've been struggling through that. But still, the program is going well. And tennis, the program that started last year, the tennis program, they're kicking it off again in in mid-July, coming up probably next week. So that'll be great for for those folks that are interested in tennis.

And the only other one I have is kind of an update from our from the Electric Aggregation Plan and the Sustainability Committee. We we're trying to keep things moving forward to be able to implement the the plan for electric aggregation aggregation. We did, we approved, the selectmen, earlier this year. We approved a plan, a document. That document is now slightly out of date. In other words, we had we had things in there about, well, the town meeting is coming up. So what we want to do is update the plan and that's what they're doing right now. It's administrative more than anything else. Nothing is changing in terms of the intent of the plan or the content, really. But it's really they're kind of fine tuning it in terms of editing. And so what they want to do is bring that plan, although there's there's some discussion as to whether it's needed to be re approved. I think we just my view is and I think Mr. Putnam's view as well, is that let's bring it back to us real quick. We're not going to spend an hour on it, but we're going to try to get it to us before the meeting. People can take a quick look at it. It'll be red. So you better see exactly what changed. And then at the meeting, we just reapprove the plan. And again, it really should be nothing more than administrative and updating it to where we are now that it was approved at the town meeting and that sort of thing. So I just wanted to give everybody a heads up and we'll put it on the agenda for the next Selectmen's meeting to reapprove review that electric aggregation plan. And again, the idea here is to try to make this not a not a marathon agenda item, but to go over the plan real quick. If everybody looks at it ahead of time, we should be able to just reapprove it and then we can submit it to the Public Utility Commission and keep things momentum going forward to meet our possible goal of kicking off this early next year in spring, early spring of next year. So that's really the aim here, is to keep things moving forward. Anyway, that's, that's what I got.

Selectman Morin: Budget is not having a meeting this month. So that'll come back next month.

Conservation had a meeting last night, and as you heard tonight, they approved, they were coming in for the land purchase. There was some discussion on a possible warrant article related to wetland buffers, but that's there's a lot of work to go on that. And a couple of the members had stated that they've seen an increase at the boat access that we just rebuilt and everything. So that's working out well. People are starting to use it. That's all I have and appreciate it.

Chairman McGrath: Good. Okay. And I have nothing to report, other than you know, I'm glad that we're going to have a discussion about that town hall. And in September, I think that that's the right thing to do.

10. Remarks by Town Administrator

Chairman McGrath recognized Town Administrator Steve Malizia who said, I don't think I have anything this evening either.

11. Remarks by School Board

Chairman McGrath recognize School Board Member Gary Gasdia who said, No, we don't. We don't have much school. School is out, but a lot of work's going on. Some you can see. The parking lot over there is is in full swing, being being paved. There are classrooms being updated like normal. The science labs are being done. Sports teams are starting to practice. Bands practicing. But it's a slow year. We're in the best position we've been in in a while for hiring, but we still have a lot of open positions, especially in the non-teacher roles. So we still have a lot of paraprofessionals, lunch monitors, custodial staff really right down the line. So if anyone's interested in working for the District, go on our website. We're looking for great candidates, but we're in the best position we've been in for having a shortage in a long time. So thank you to the taxpayers because a lot of that came from the contracts they approved and things like that. So that's all I had.

12. Nonpublic Session

Motion by Selectman Morin at 8:31p.m., seconded by Selectman Dumont to go into non-public session under RSA 91-A:3 II (a) The dismissal, promotion, or compensation of any public employee or the disciplining of such employee, or the investigation of any charges against him or her, unless the employee affected (1) has a right to a meeting and (2) requests that the meeting be open, in which case the request shall be granted. (b) The hiring of any person as a public employee. A roll call vote was taken. Carried 4-0.

Nonpublic Session was entered at 8:31 p.m. thus ending the televised portion of the meeting. Any votes taken upon entering open session will be listed on the Board's next agenda. The public was asked to leave the room.

The Board entered open session at 9:52 p.m.

Motions made after nonpublic session:

1. Selectman Morin made a motion, seconded by Selectman Guessferd to terminate Lieutenant Michael Mallen effective July 15, 2023, as recommended by the Fire Chief. Carried 4-0.

2. Selectman Morin made a motion, seconded by Selectman Dumont to amend the motion made on May 9, 2023, to hire Steven Lubinger for the position of Firefighter/EMT in the Fire Department at the contracted rate of $17.78 per hour (step 1), and change it to a contracted salary rate of $22.43 per hour (step 3), as recommended by the Fire Chief. Carried 4-0.

3. Selectman Dumont made a motion, seconded by Selectman Guessferd to hire Robert Soares for the position of Dispatcher in the Fire Department at the contracted salary of $19.36 per hour (step 1). This assignment will be a non-exempt position in accordance with the International Association of Firefighters Local #3154, as recommended by the Fire Chief. Carried 4-0.

4. Selectman Morin made a motion, seconded by Selectman Dumont to hire Cole Lodi, James Sheldon, Gavyn Torres for the position of Firefighter/EMT in the Fire Department at the contacted salary of $18.14 per hour (step 1). This assignment will be a non-exempt position in accordance with the International Association of Firefighters Local #3254, as recommended by the Fire Chief. Carried 4-0.

5. Selectman Morin made a motion, seconded by Selectman Guessferd to hire Joseph Walker for the position of Firefighter/EMT in the Fire Department at the contracted salary of $22.43 per hour (step 3). This assignment will be a non-exempt position in accordance with the International Association of Firefighters Local #3154, as recommended by the Fire Chief. Carried 4-0.

7. Selectman Guessferd made a motion to adjourn at 9:56pm. This was seconded by Selectman Morin. Carried 4-0.

13. ADJOURNMENT

Motion to adjourn at 9:56 p.m.by Selectman Morin seconded by Selectman Guessferd. Carried 4-0.

Recorded by HCTV and transcribed by Jill Laffin, Executive Assistant.

Marilyn McGrath, Chairman	Dave Morin, Vice Chairman
Bob Guessferd, Selectman	Dillon Dumont, Selectman

ABSENT
Kara Roy, Selectman

7B

HUDSON TOWNWIDE TRAFFIC STUDY

Prepared by the

Nashua Regional Planning Commission

2022-2023

TABLE OF CONTENTS

Cover Image: Sunset over Benson Park

LIST OF TABLES

LIST OF MAPS

LIST OF APPENDICES

1. INTRODUCTION

The Town of Hudson has requested that the Nashua Regional Planning Commission (NRPC) conduct a study of long-term impacts of planned and potential future development on the town's arterial highway network and potential spillover onto local streets. This study involves analysis of both existing and future conditions and includes the following tasks: data collection, traffic modeling, capacity analysis, reporting and mapping, conclusions, and recommendations. The study will offer a report on the current (2022) road capacity (level of service) on existing conditions and forecast two reports for future conditions – one for 2030 and another for 2045.

2. PROJECT SCOPE

The NRPC prepared a scope of services to the New Hampshire Department of Transportation (NHDOT) to conduct the study utilizing its Unified Planning Work Program (UPWP) funding under the Special Projects category. The following work scope provides the format for this study.

2.1 Existing Conditions Analysis

- **Study Background** – Previous studies will be reviewed, including the Litchfield-Hudson Transportation Study conducted by Vollmer Associates in 2003. This study included a forecast of traffic and operational conditions in 2025. More recent studies that will be reviewed and findings incorporated into the townwide study include the Hudson Master Plan update of 2020 and the traffic analysis conducted for the Hudson Logistics Center.

  The Hudson Boulevard project was not included in the scope of work for this study because the project was removed from the NRPC FY2019-2045 Metropolitan Transportation Plan (MTP) during Amendment 3 to the NRPC FY2021-2024 Transportation Improvement Program (TIP), which was adopted on December 15th, 2021. There is a discussion about the Hudson Boulevard project in the conclusions section later in this study.
- **Automatic Traffic Recorder Counts –** Automatic traffic recorder counts will be conducted on weekdays at the 18 State and local road segments that are detailed in **Table 1**.
- **Arterial Capacity Analysis** – Arterial volume-to-capacity ratios will be developed for study area arterials and several local roads.
- **Intersection Turning Movement Counts (TMCs) –** Turning movement counts will be conducted during the morning (7-9 AM) and afternoon (4-6PM) peak periods at the 21 locations that are detailed in **Table 1**.
- **Intersection Capacity Analysis** – Intersection analysis will be based on the Highway Capacity Manual (HCM) methodology. NRPC utilizes the SYNCHRO software to perform this analysis.
- **Existing Conditions Mapping** – Mapping of existing weekday counts, TMCs and congestion conditions.

2.2 Future Conditions Analysis

- **Model Run for 2030 & 2045 Projected Growth Scenario** – A TransCAD assignment run for 2030 & 2045 based on NRPC's current regional land use growth projection will be conducted and post-processed to convert arterial segment volumes to forecasts (applying model error from calibration run).

- **Develop Intersection 2030 & 2045 Volumes** – Arterial growth factors for 2020-2045 will be applied to each intersection approach to estimate 2030 & 2045 turning movement volumes for the baseline growth forecast.
- **Capacity Analysis** – Procedures used for baseline capacity analysis will be repeated for the 2030 & 2045 forecast year for the baseline and full development scenarios.
- **Future Conditions Mapping** – Mapping of weekday counts, TMCs and congestion conditions for the forecast year.
- **Conclusions & Recommendations** – NRPC will meet with town officials to review results, formulate conclusions regarding the impacts of future baseline and development growth, and develop recommendations for traffic improvements as needed. The impacts of improvements on arterials and intersection operations will be evaluated.

3. Study Locations

This study was focused on the following roadway segments and intersections:

Table 1: Road Segments and Intersections That Were Analyzed

State Route Road Segments:	Intersections:
A. NH 3A (Central Street) west of Library Street	1. NH 111 Ferry Street/NH102 Derry Street/NH 3A Chase Street
B. NH 3A (Central Street) east of Library Street	2. NH 111 Ferry Street/Library Street
C. NH 3A (Lowell Road) south of Central Street	3. NH 3A&102 Derry Street/Library Street/Highland Street
D. NH 3A (Lowell Road) south of Pelham Road	4. NH 111 Burnham Road/Central Street
E. NH 3A (Lowell Road) south of Wason Road	5. NH 111 Central Street/Kimball Hill Road/Greeley Street
F. NH 3A (Lowell Road) south of Rena Avenue	6. NH 102 Derry Road/NH 3A Elm Street
G. NH 3A (River Road) at Massachusetts State Line	7. NH 102/Page Road
H. NH 102 at Litchfield Town Line	8. NH 3A Central Street/Chase Street
I. NH 102 north of Easy Street	9. NH 3A Central Street/Library Street
J. NH 102/3A north of Ledge Road	10. NH 3A Lowell Road/Central Street
K. NH 111 (Ferry Street) east of Library Street	11. NH 3A Lowell Road/Pelham Road
L. NH 111 (Burnham Road) north of Central Street	12. NH 3A Lowell Road/Executive Drive
M. NH 111 (Central Street) west of Kimball Hill Road	13. NH 3A Lowell Road/Hampshire Drive/Oblate Drive
Local Street Segments	14. NH 3A Lowell Road/Flagstone Drive/Wason Road
N. Belknap Road south of Central Street	15. NH 3A Lowell Road/Sagamore Bridge (Circumferential Highway)
O. Kimball Hill Road south of NH 111	16. NH 3A Lowell Road/Walmart Boulevard
P. Dracut Road at Massachusetts State Line	17. NH 3A Lowell Road/Rena Avenue
Q. Wason Road east of NH 3A	18. NH 3A Lowell Road/Dracut Road/Steele Road/River Road
R. Bush Hill Road north of Wason Road	19. Dracut Road/Sherburne Road
	20. Kimball Hill Road/Bush Hill Road
	21. Central Street/Belknap Road
	22. Lowell & Fox Hollow Drive
	23. Lowell & Birch Street

4. ADDITIONAL CONSIDERATIONS

4.1 NRPC Traffic Study for the Hudson Master Plan Transportation Chapter – June 2020

NRPC conducted an in-house traffic study in mid-2020 as part of the effort in updating the Hudson Master Plan Transportation Chapter. The study consists of a Level of Service (LOS) analysis on road segments, comparing observed traffic volumes with the projected traffic volumes in 2045. Furthermore, the analysis also includes an alternative 2045 scenario in which Hudson Boulevard was constructed (more discussion in **Section 4.2** below).

The then-current traffic volumes (in Average Weekday Traffic Trips, or AWDT) collected between 2017 and 2019 are consistently higher than the traffic volumes observed presently (2022), as reflected in the AWDT comparison in **Table 3,** which can likely be attributed to the Covid pandemic (more discussion in **Section 6**). Consequently, the LOS in the 2020 study is generally worse (often by a letter grade) than the LOS identified in the present study. Furthermore, the traffic volumes for the two 2045 scenarios, and the corresponding LOS, are also based on projections from pre-pandemic traffic volumes.

Despite the differences in AWDT and LOS the congested segments identified in the 2020 study are consistent with those identified in the present study, which are discussed in **Section 8**.

4.2 Hudson Boulevard

The Hudson Boulevard has evolved as a scaled-down southern segment of what was formerly known as the Circumferential Highway. In contrast to the limited-access, high-speed expressway once envisioned, the boulevard is now seen as an approximate 40 mph, controlled access roadway along the southern Circumferential Highway right-of-way between NH 3A and NH111 with at-grade intersections, and a parallel, separated nonmotorized multi-use path. The estimated project cost is $54 million.

The Draft Hudson Master Plan Transportation Chapter includes a discussion about the Hudson Boulevard project. The roadway is projected to carry between 20,000-23,000 vehicles per day over most of its length in the year 2045. A 10% decrease in Taylor Falls Bridge traffic is forecasted, along with a 13% increase in Sagamore Bridge volume, due to a faster travel path to the turnpike and south Nashua via this route. Significant decreases in traffic on NH 3A and NH 111 are projected as the Boulevard diverts traffic away from the town center area. Wason Road and Bush Hill Road, which now provide a local road path near the right-of-way originally reserved for the southern segment of the Circumferential Highway, would experience significant traffic relief from constructing the Boulevard. See **Table 2** on the following page for more details.

The Hudson Boulevard project was not included in the scope of work for this study as explained earlier in this document. It was therefore not included in the future highway network scenarios that were developed for this study. As a result, the impacts this project would have on the road network have not been factored into the results of this study.

The Hudson Boulevard project has since been added back into the NHDOT FY 2023-2032 Ten-Year Plan and the NRPC FY2023-2026 TIP as a feasibility study only.

Table 2. Hudson Master Plan Transportation Chapter Table V-13: 2045 Forecasted Traffic with Hudson Boulevard

Table 10 #			2045 Base Vol.	2045 Build – Hud Blvd	Based to Build % Change
-	Hudson Blvd	NH 3A to Musquash Rd.	-	23,620	-
-	Hudson Blvd	Musquash Rd to Bush Hill Rd	-	21,740	-
-	Hudson Blvd	Bush Hill Rd to Kimball Hill Rd	-	20,380	-
-	Hudson Blvd	Kimball Hill Rd to NH 111	-	12,995	-
-	Taylor Falls Bridge	Hudson/Nashua CL	43,160	39,050	-10%
-	Sagamore Bridge	Hudson/Nashua CL	56,790	63,970	13%
-	NH 111 Central St.	E. of Kimball Hill Rd.	20,200	14,300	-29%
-	NH 111 Central St.	E. of Greeley St.	25,100	20,200	-20%
L	NH 111 Burnham Rd.	N. of Central St.	13,160	11,470	-13%
B	NH 111 Ferry St.	E. of Library St.	14,280	12,720	-11%
J	NH 3A/102 Derry St	N. of Ledge Rd.	28,280	27,320	-3%
-	NH 3A/102 Derry St	N. of Ferry St.	18,010	16,810	-7%
C	NH 3A Lowell Rd	S. of Central St.	23,390	21,220	-9%
D	NH 3A Lowell Rd	S. of Pelham Rd.	27,490	23,290	-15%
E	NH 3A Lowell Rd	S. of Wason Rd.	44,940	33,940	-24%
-	Library St.	N. of NH 3A Central St.	9,930	9,390	-5%
-	Speare Rd.	E. of Bush Hill Rd.	3,460	2,620	-24%
-	Greeley St.	N. of NH 111 Central St.	5,850	5,830	0%
-	Central St.	E. of Adelaide St.	6,290	3,950	-37%
-	Melendy Rd.	S. of Central St.	2,590	2,180	-16%
N	Belknap Rd.	S. of Central St.	6,220	5,620	-10%
-	County Rd.	E. of NH 3A	5,520	4,950	-10%
-	Kimball Hill Rd.	E. of Bush Hill Rd.	5,450	4,200	-23%
O	Kimball Hill Rd.	S. of NH 111 Central St.	9,280	8,490	-9%
R	Bush Hill Rd.	S. of Kimball Hill Rd.	6,330	2,550	-60%
-	Bush Hill Rd.	S. of Speare Rd.	8,330	3,340	-60%
-	Bush Hill Rd.	E. of Wason Rd.	2,990	1,670	-44%
-	Pelham Rd.	W. of Bush Hill Rd.	2,930	2,270	-23%
-	Burns Hill Rd.	N. of Wason Rd.	3,140	4,150	32%
-	Wason Rd.	E. of Musquash Rd.	13,870	6,570	-53%
Q	Wason Rd.	E. of NH 3A	12,650	7,410	-41%

Source: NRPC traffic model estimate

4.3 NRPC Litchfield-Hudson Traffic Study – March 2003

Vollmer Associates LLP was retained by the Nashua Regional Planning Commission (NRPC), under a contract between the NRPC and the NH Department of Transportation, to aid in evaluating traffic conditions for the Towns of Litchfield and Hudson, New Hampshire. The project was conducted as a collaborative effort between the two towns, the NRPC and Vollmer Associates.

The study predicted future (2025) afternoon peak period intersection capacity (measured in Level of Service) for 20 intersections in Hudson. The study incorporated the following proposed roadway projects into the 2025 modeling scenario:

- Planned construction of the preferred alternative of the Nashua-Hudson Circumferential Highway,
- Planned construction of the Manchester Airport Access Road,
- NH 102 widening in Hudson,
- NH 102/West Rd. intersection improvements in Hudson,
- NH 3A widening from Rena St. to Dracut Rd. in Hudson, and,
- NH 3A widening from Wason Rd. to Executive Dr. in Hudson.

While most of these improvements have been completed the preferred alternative to the Nashua-Hudson Circumferential Highway has not. It is therefore difficult to compare the 2025 modeling scenario from the 2003 study to current conditions in the study area.

4.4 Hudson Logistics Center

The land use assumptions and proposed roadway improvements from the logistics center proposal have been incorporated into the future modeling scenarios of this study.

5. DATA COLLECTION

Traffic data was collected from the following sources:

- For intersections, turning movement counts captured by the Town's traffic signal cameras.
- For intersections not within the camera's coverage, NRPC conducted manual turning movement counts during AM and PM peak hours.
- For segments, NRPC maintained a series of automatic traffic recording locations, several as part of the annual traffic counting program and others specifically for this study.

These data were processed and summarized on an Excel spreadsheet as a record and as input for the next steps.

6. TRAFFIC TRENDS

Table 3 provides a snapshot of traffic trends during approximately the past decade on the eighteen road segments that were included in this study. Between approximately 2013 and 2022 traffic volume decreased on eleven segments and increased on seven segments. The decrease in traffic volume can likely be attributed to the Covid pandemic, as the most recent traffic counts were conducted in 2022, when the region was emerging from the pandemic. The pandemic has at least temporarily changed traffic patterns and it remains to be seen if these changes are permanent.

Additionally, a recent (2022) NRPC traffic study in the Town of Merrimack noted flat to moderate growth in traffic volume over the past twenty years (as compared to significant growth in the 1980s and 1990s). It is unknown if this two-decade trend of flat to moderate traffic growth will continue.

Table 3: Traffic Trends on Various Roadway Segments

Table 10 #	Description	Year	AWDT*	Year	AWDT*	Year	AWDT*	% Change#
A	NH 3A (Central St) west of Library St	2013	9,090	2019	10,095	2022	9,894	9%
B	NH 3A (Central St) east of Library St	2014	20,273	2017	15,643	2022	19,912	-2%
C	Lowell Rd south of Central St	2014	23,562	2017	22,636	2022	21,915	-7%
D	Lowell Rd south of Pelham Rd	2014	24,773	2017	25,402	2022	24,233	-2%
E	Lowell Rd south of Wason Rd	2014	36,537	2017	21,549	2022	39,160	7%
F	Lowell Rd south of Rena Ave	2014	24,611	2017	n/a	2022	25,864	5%
G	River Rd at Mass State Line	2014	8,112	2017	7,710	2022	7,194	-11%
H	NH 102 at Litchfield Town Line	2013	16,783	2019	16,786	2022	14,208	-10%
I	NH 102 north of Easy St	2013	18,181	2019	16,595	2022	16,733	-8%
J	NH 102/3A north of Ledge Rd	2014	28,100	2017	26,311	2022	24,648	-12%
K	NH 111 (Ferry St) east of Library St	2013	13,975	2019	13,199	2022	13,534	-3%
L	NH 111 (Burnham Rd) north of Central St	2013	13,124	2019	12,547	2022	11,720	-11%
M	NH 111 (Central St) west of Kimball Hill Rd	2014	22,017	2017	23,406	2022	20,816	-5%
N	Belknap Rd south of Central Str	2013	5,467	2019	5,141	2022	4,879	-11%
O	Kimball Hill Rd south of NH 111	2013	7,262	2019	7,846	2022	7,299	1%
P	Dracut Rd at Mass State Line	2013	8,072	2019	9,685	2022	9,795	21%
Q	Wason Rd east of NH 3A	2012	8,288	2018	9,331	2022	8,744	6%
R	Bush Hill Rd north of Wason Rd	2014	5,931	2017	6,760	2022	6,579	11%

* = AWDT = Average Weekday Traffic (Monday – Friday)

= % change (oldest vs. most recent count)

7. LEVEL OF SERVICE ANALYSIS – INTERSECTIONS

Level of service (LOS) is a qualitative measure used to relate the quality of motor vehicle traffic service. LOS is used to analyze roadways and intersections by categorizing traffic flow and assigning quality levels of traffic based on performance measures like vehicle speed, density, and congestion.

This study focuses on twenty-three intersections in Hudson. Turning movement counts were conducted for the morning (7-9 am) and afternoon (4-6 pm) peak periods. For the highest hour of traffic volume for each peak period, intersection capacity (measured in LOS) analysis was conducted utilizing the methods of the *Highway Capacity Manual 2003* as replicated by the *Synchro Traffic Signal Timing Software.* For **signalized intersections**, LOS is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS (**Table 4**) is stated in terms of average control delay per vehicle (in seconds) during a specified time-period (generally weekday AM or PM peak hours). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues.

For **unsignalized intersections**, LOS criteria can be reduced to three intersection types: all-way stop, two-way stop, and roundabout control (**Table 5**). All-way stop and roundabout control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way, stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major street through vehicles are assumed to experience zero delays, a weighted average of all movements results in a very low overall average delay, and this calculated low delay could mask deficiencies of minor movements.

Table 4: Level of Service Criteria for Signalized Intersections

LOS	Intersection Delay (seconds)
A	≤10
B	10 to 20
C*	*20 to 35*
D	35 to 55
E	55 to 80
F	>80

Source: Highway Capacity Manual
* LOS C is the target LOS for intersections

Table 5: Level of Service Criteria for Unsignalized/Stop-Controlled Intersections

LOS	Intersection Delay (seconds)
A	≤10
B	10 to 15
C*	*15 to 25*
D	25 to 35
E	35 to 50
F	>50

Source: Highway Capacity Manual
* LOS C is the target LOS for intersections

NRPC uses the Synchro Studio 11 software (hereafter Synchro) by Cubic Transportation Systems to model and analyze the collected traffic data for intersections. The key feature of Synchro is a methodological approach in calculating road capacity (measured in LOS) based on traffic delays modeled with traffic counts and a myriad of variables such as the layout of intersections and lanes and traffic signal settings (detection, phasing, and timing). Within Synchro, NRPC built a partial roadway model of Hudson covering all study locations. NRPC gathered the necessary information from the Town Engineer, as well as made field visits as necessary. By entering the collected traffic data into the completed model, Synchro calculates the road capacity (LOS), which is exported into a report appended to this study.

Another feature of Synchro is a visual simulation of the modeled road network that shows how virtual traffic traverses the virtual network. The simulation helps visualize the modeled intersection layout, traffic signal settings, and traffic flow. NRPC used this simulation feature at a meeting with the Town Engineer to verify the Synchro model against known conditions.

Table 6, **Map 1** and **Map 2** present information about existing (2022) and future (2030 & 2045) intersection delays and LOS for the twenty-three intersections that were analyzed in this study. **Appendix A** provides a more detailed summary of the LOS analysis, including intersection delay (seconds) and LOS for each intersection.

7.1 Existing (2022) Conditions – Intersections

During the morning (AM) Peak period, the following four intersections operate below LOS C:

- 111-102-3A (Ferry/Chase) – LOS F
- Burnham Rd & Central St – LOS D
- Central-Kimball-Greeley – LOS F
- Lowell Rd & Wason Rd – LOS D

During the afternoon (PM) Peak Period, the following nine intersections operate below LOS C:

- 111-102-3A (Ferry/Chase) – LOS F
- Library St & Highland St – LOS D
- Burnham Rd & Central St – LOS D
- Central-Kimball-Greeley – LOS F
- Lowell Rd & Pelham Rd – LOS D
- Lowell Rd & Wason Rd – LOS D
- Lowell Rd & Sagamore Br – LOS E
- Lowell Rd-Dracut Rd-Steele Rd-River Rd – LOS F
- Dracut Rd & Sherburne Rd – LOS F

7.2 Future (2030, 2045) Conditions – Intersections

Future conditions analysis for intersections involves using the NRPC regional travel demand model to predict future traffic growth. The predicted future traffic volumes are then inserted into the Synchro traffic software to predict the future LOS for the twenty-three intersections that were studied. Projected growth scenarios for the years 2030 and 2045 were used for this study.

7.3 Regional Traffic Modelling

The Nashua Regional Planning Commission maintains a regional travel demand model for the general purposes of transportation planning and air quality analysis. NRPC uses the software package TransCAD, the leading traffic demand modeling and GIS software package in the U.S. which is produced by the Caliper Corporation in Needham, MA. There are two key components to the model: the supply side, and the demand side. The supply side is a coded highway network with attributes such as roadway length, travel direction, number of travel lanes in each direction, posted speed, roadway functional classification, and area type. NRPC's model network consists of all arterials, collectors, and some local roads (over 1,480 miles of roadway segments) and major routes outside of the region to account for external travel.

The demand side inputs are employment and household data and are summarized by Transportation Analysis Zone (TAZ). The 13 NRPC communities are divided into 2,371 TAZs. Also, the model includes 52 external TAZs. External TAZs are used to aid in calculating trips with one end of the trip outside of NRPC, or trips that pass through NRPC.

Each TAZ contains totals of households, residents, and employees. Employees are by industry classification and include retail, manufacturing, professional services, finance, real estate, and others. Households are defined by household size and the number of vehicles available to household members. The base year model was calibrated to traffic counts conducted by NRPC along all arterials and other facilities. The model utilizes U.S. Census data and employment data from the State of New Hampshire.

The model uses a traditional three-step modeling process: trip generation, trip distribution, and trip assignment. A fourth step, mode choice, is not used by the NRPC model since travel other than by automobile represents a small fraction of the total traffic on the regional road network.

In step one, trip generation, the model uses the Institute of Transportation Engineers, and National Cooperative Highway Research Program trip generation rates applied to TAZ-based data. The product of this step is a summary of the number of trips produced by or attracted to a zone.

In step two, trip distribution, the model takes the expected number of trips produced and attracted by each zone and matches them with destinations, subject to other considerations such as average trip length in travel time and distance. NRPC uses a “gravity model” to distribute the trips, meaning that the likely destination of a trip is based on the size and separation of the destination zone, compared to all other zones and their size and distance from the location of where the trip is produced, subject to additional considerations such as the existing average travel times and distance for travel in the NRPC region. The model uses Census journey to work time and distance survey data to determine the appropriate percentage of trips distributed within each time and distance category. For example, if survey and Census data show that 60% of all work trips take between 20 and 30 minutes, the model will match that ratio.

Once the model determines the origins and destinations of the trips, trip assignment is the final step. The model begins by sending every trip via the shortest path possible path (in terms of time). Then, because of capacity constraints, it uses an iterative process to reassign certain trips along alternate routes. The assignment process continues to iterate until no trip would change its travel route as all alternative routes have similar travel times.

The three-step process results in future traffic forecasts based on anticipated future land use patterns, population projections, projected housing units, employment, and school enrollment. The projected growth in land use was made in consultation with local planners from the Nashua Region, and through a review of present and proposed zoning, physical constraints, and assumptions made regarding future area-wide growth rates.

To better reflect future conditions the model is updated with future supply-side conditions and demand-side conditions. On the supply side, foreseeable roadway and intersection projects are used to update the highway network. On the demand side, foreseeable development in the region and, specifically, the Town is used to update the household and employment data.

Once completed, for each of the two future conditions (2030 and 2045), a series of projected turning movement counts were exported onto an Excel spreadsheet like the one summarizing the collected counts for the existing conditions analysis, and then entered into the Synchro Road network model. Within Synchro, roadway layout, intersection layout, and traffic signal settings were modified to include proposed future roadway and intersection improvement projects. The key improvements include:

- Signalization of two previously unsignalized intersections
  - NH102/Page Rd
  - Dracut Rd/Sherburne Rd
- A series of roadway and intersection improvements on Lowell Road from Dracut Road to Wason Road.
  - NH 3A Lowell Rd/Dracut Rd/Steele Rd/River Rd
  - NH 3A Lowell Rd/Rena Ave
  - NH 3A Lowell Rd/Walmart Blvd
  - NH 3A Lowell Rd/Sagamore Br
  - Lowell Rd/Wason Rd

7.4 Future (2030) Conditions – Intersections

Table 6, Map 1 and **Map 2** present information about 2030 intersection delay and LOS for the twenty-three intersections that were analyzed in this study.

During the morning (AM) Peak period in 2030, eighteen intersections are predicted to operate at LOS C or better (nineteen intersections operated at LOS C or better in 2022). The following intersections experience a LOS below C:

- 111-102-3A (Ferry/Chase) – LOS F (LOS F in 2022)
- Library St & Highland St – LOS D (LOS C in 2022)
- Burnham Rd & Central St – LOS E (LOS D in 2022)
- Central-Kimball-Greeley – LOS F (LOS F in 2022)
- Lowell Rd & Wason Rd – LOS D (LOS D in 2022)

During the Afternoon (PM) Peak period in 2030, fifteen intersections are predicted to operate at LOS C or better (fourteen intersections operated at LOS C or better in 2022). The following intersections experience a LOS below C:

- 111-102-3A (Ferry/Chase) – LOS F (LOS F in 2022)
- Library St & Ferry St – LOS D (LOS C in 2022)
- Library St & Highland St – LOS D (LOS D in 2022)
- Burnham Rd & Central St – LOS D (LOS D in 2022)
- Central-Kimball-Greeley – LOS F (LOS F in 2022)
- Lowell Rd & Pelham Rd – LOS E (LOS D in 2022)
- Lowell Rd & Wason Rd – LOS D (LOS D in 2022)
- Lowell Rd & Sagamore Br – LOS D (LOS E in 2022)

7.5 Future (2045) Conditions – Intersections

Table 6, Map 1 and **Map 2** present information about 2045 intersection delays and LOS for the twenty-three intersections that were analyzed in this study. During the morning (AM) Peak period in 2045, seventeen intersections are predicted to operate at LOS C or better (nineteen intersections operated at LOS C or better in 2022). The following intersections experience a LOS below C:

- 111-102-3A (Ferry/Chase) – LOS F (LOS F in 2022 & 2030)
- Library St & Highland St – LOS D (LOS C in 2022, LOS D in 2030)
- Burnham Rd/Central St – LOS E (LOS D in 2022, LOS E in 2030)
- Central-Kimball-Greeley – LOS F (LOS F in 2022 & 2030)
- Lowell Rd & Executive Dr – LOS D (LOS C in 2022, LOS C in 2030)
- Lowell Rd & Wason Rd – LOS D (LOS D in 2022, LOS D in 2030)

During the Afternoon (PM) Peak period in 2045, fourteen intersections are predicted to operate at LOS C or better (fourteen intersections operated at LOS C or better in 2022).

- Library St & Ferry St – LOS C (improves from LOS D in 2030)

The following intersections experience a LOS below C:

- 111-102-3A (Ferry/Chase) – LOS F (LOS F in 2022 & 2030)
- Library St & Highland St – LOS D (LOS D in 2022 & 2030)
- Burnham Rd/Central St – LOS D (LOS D in 2022 & 2030)
- Central St/Kimball/Greeley – LOS F (LOS F in 2022 & 2030)
- Lowell Rd & Pelham Rd – LOS E (LOS D in 2022, LOS E in 2030)
- Lowell Rd & Wason Rd – LOS D (LOS D in 2022, LOS D in 2030)
- Lowell Rd & Sagamore Br – LOS E (LOS E in 2022, LOS D in 2030)
- Lowell Rd – Dracut Rd – Steele Rd – River Rd – LOS F (LOS F in 2022, LOS C in 2030)
- Lowell Rd & Fox Hollow Dr – LOS D (LOS C in 2022 & 2030)

Table 6: Level of Service – Study Area Intersections

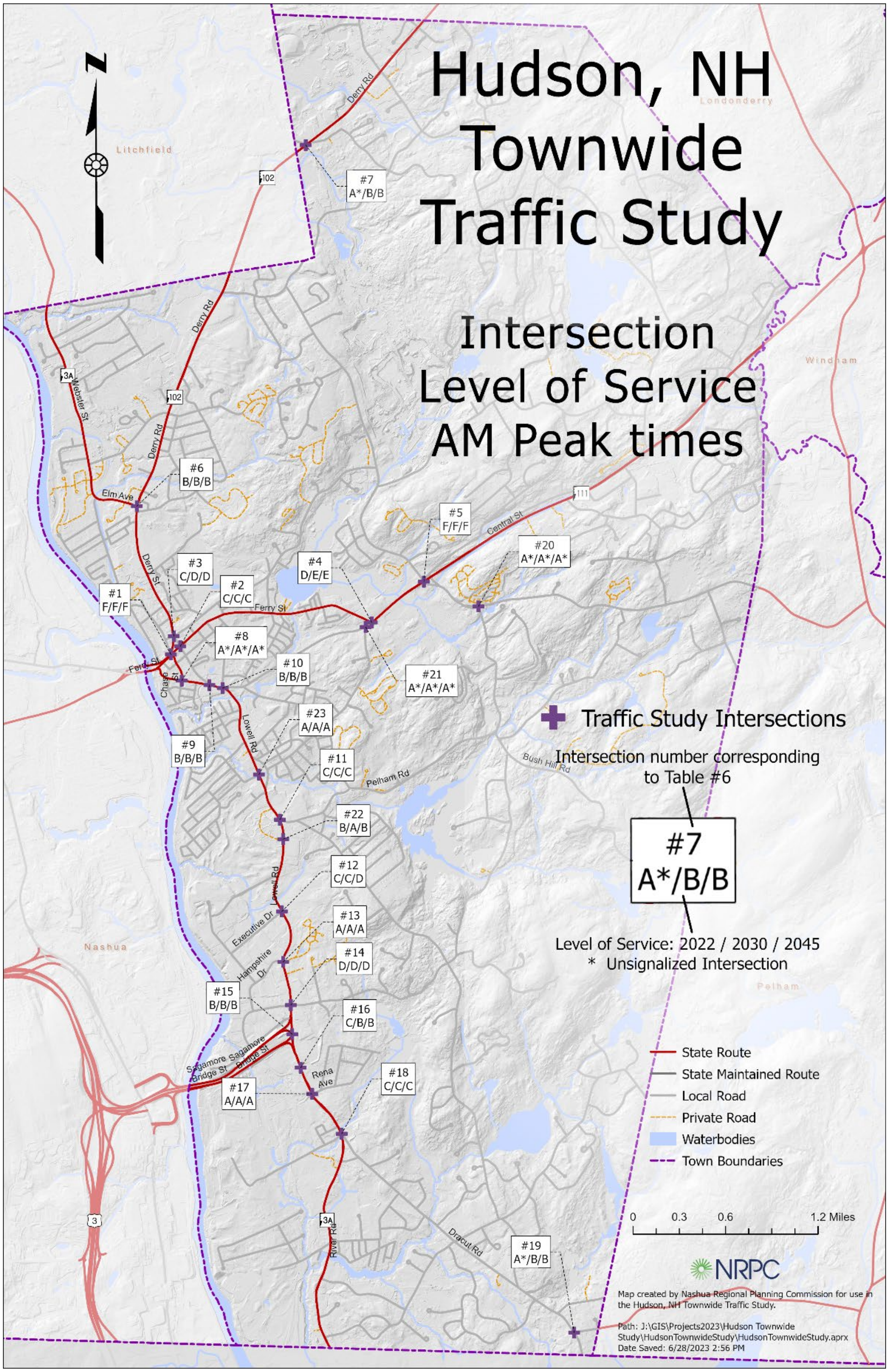
#	Intersection	AM Peak 2022 LOS	AM Peak 2030 LOS	AM Peak 2045 LOS	PM Peak 2022 LOS	PM Peak 2030 LOS	PM Peak 2045 LOS
1	111-102-3A (Ferry & Chase)	F	F	F	F	F	F
2	Library St & Ferry St	C	C	C	C	D	C
3	Library St & Highland St	C	D	D	D	D	D
4	Burnham Rd & Central St	D	E	E	D	D	D
5	Central-Kimball-Greeley (Rt.111 & Greeley)	F	F	F	F	F	F
6	NH102 & Elm Ave	B	B	B	B	B	B
7	NH 102 & Page Rd#	A*	B	B	A*	B	B
8	Central St & Chase St	A*	A*	A*	A*	A*	A*
9	Central St & Library St	B	B	B	C	B	B
10	Lowell Rd & Central Rd	B	B	B	C	C	C
11	Lowell Rd & Pelham Rd	C	C	C	D	E	E
12	Lowell Rd & Executive Dr	C	C	D	B	C	C
13	Lowell Rd-Hampshire Dr-Oblate Dr	A	A	A	A	A	A
14	Lowell Rd & Wason Rd#	D	D	D	D	D	D
15	Lowell Rd & Sagamore Br#	B	B	B	E	D	E
16	Lowell Rd & Walmart Blvd#	C	B	B	C	C	C
17	Lowell Rd & Rena Ave#	A	A	A	B	B	B
18	Lowell Rd/Dracut Rd/Steele Rd/River Rd#	C	C	C	F	C	F
19	Dracut Rd & Sherburne Rd#	A*	B	B	F*	B	B
20	Kimball Hill Rd & Bush Hill Rd	A*	A*	A*	A*	A*	A*
21	Central St & Belknap Rd	A*	A*	A*	A*	A*	A*
22	Lowell Rd & Fox Hollow Dr	B	A	B	C	C	D
23	Lowell Rd & Birch St	A	A	A	B	B	B

* Unsignalized intersection in various configurations.

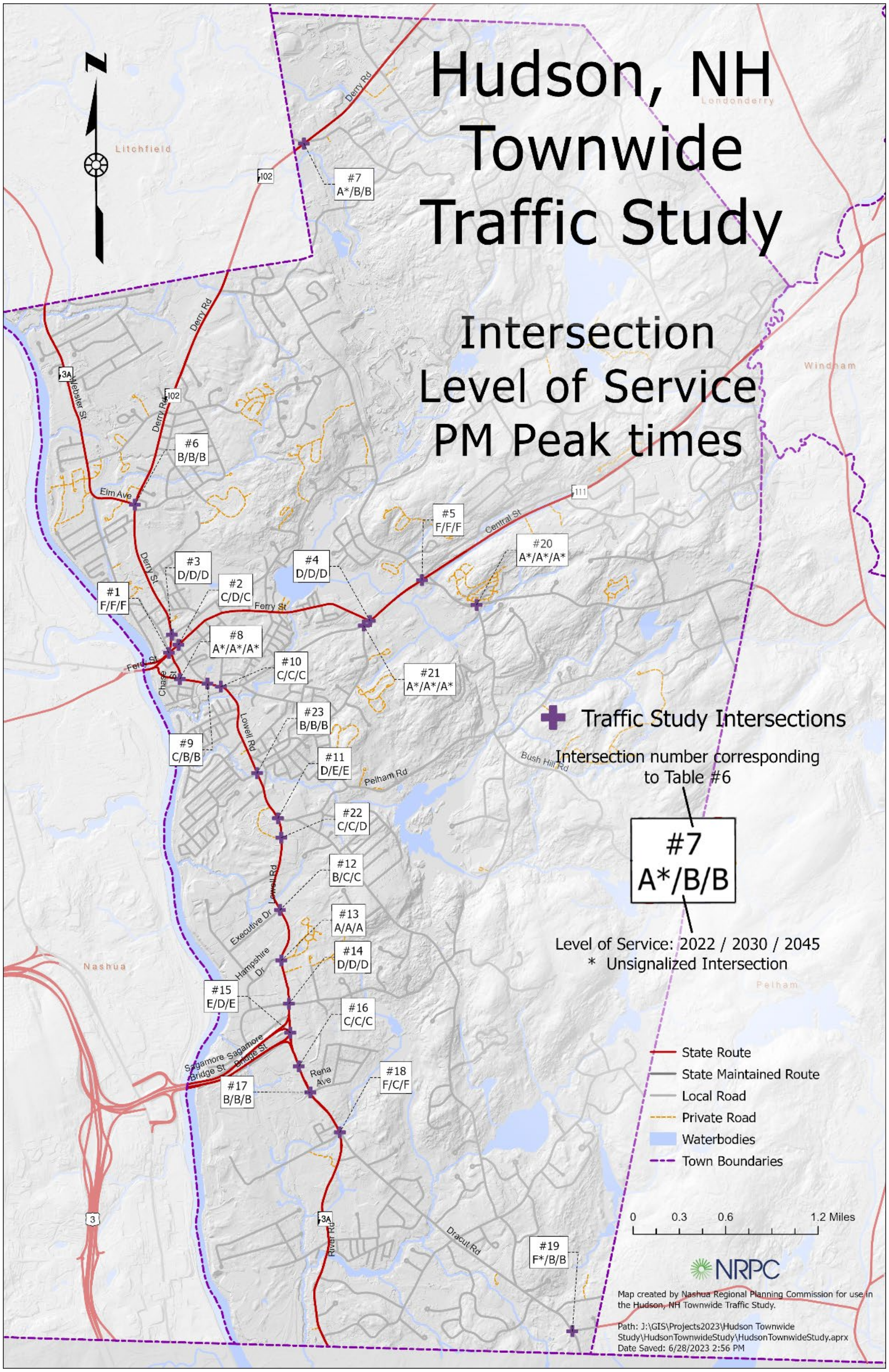
Improvement made to the intersection in 2030 and 2045

Blue LOS indicates an improvement In LOS and Red LOS indicates a decline in LOS

Map 1: Intersection Level of Service AM Peak Times



Map 2: Intersection Level of Service PM Peak Times



8. LEVEL OF SERVICE ANALYSIS – ROAD SEGMENTS

Existing conditions for road segments were modeled differently than intersections. Rather than using the Synchro analysis software, NRPC converted the collected traffic count data from average total weekday vehicle counts to peak hour counts (AM and PM) per direction and per lane via an Excel spreadsheet. The directional split was assumed to be 50/50. The converted counts were then classified by Volume to Capacity ratio and the resulting LOS according to the corresponding road segment class, as shown below:

Table 7: Freeways & Controlled Access

	Limited Access 60-70 MPH		Controlled Access 50-59 MPH	
LOS	V/C	VPL/Hr	V/C	VPL/Hr
A	0.40	920	0.40	800
B	0.50	1150	0.50	1000
C	0.70	1610	0.70	1400
D	0.85	1950	0.85	1700
E	1.00	2300	1.00	2000
F	>1	>2300	>1	>2000

Table 8: Single-Lane Arterials Uninterrupted Flow

	Ave Speed = 50		Ave Speed = 40		Ave Speed = 30	
LOS	V/C	VPL/Hr	V/C	VPL/Hr	V/C	VPL/Hr
A	0.30	480	0.30	420	0.30	360
B	0.40	640	0.40	560	0.40	480
C	0.60	960	0.60	840	0.60	720
D	0.80	1280	0.80	1120	0.80	960
E	1.00	1600	1.00	1400	1.00	1200
F	>1	>1600	>1	>1400	>1	>1200

Table 9: Signalized Arterials

	<2 signal int/mi.		2-4 signal int/mi.		>4 signal int/mi.	
LOS	V/C	VPL/Hr	V/C	VPL/Hr	V/C	VPL/Hr
A	..	..	..	..	..	..
B	0.40	420	0.40	360	..	..
C	0.60	630	0.60	540	0.60	450
D	0.80	840	0.80	720	0.80	600
E	1.00	1050	1.00	900	1.00	750
F	>1	>1050	>1	>900	>1	>750

Table 10, Map 3 and **Map 4** present information about existing (2022) and future (2030 & 2045) Volume to Capacity (V/C) and LOS for the eighteen road segments that were analyzed in this study.

During the morning (AM) Peak period in 2022, twelve road segments operate at LOS C or better. The following road segments experience a LOS below C:

- Lowell Road south of Central St – LOS E
- Lowell Road south of Pelham Rd – LOS D
- Lowell Road south of Wason Rd – LOS D
- NH 102/3A north of Ledge Rd – LOS D
- NH 111 (Burnham Road) north of Central Street – LOS D
- NH 111 (Central Street) west of Kimball Hill Road – LOS E

During the afternoon (PM) Peak period in 2022, seven road segments operate at LOS C or better. The following road segments experience a LOS below C:

- NH 3A (Central St) west of Library St – LOS D
- NH 3A (Central St) east of Library St – LOS D
- Lowell Road south of Central St – LOS F
- Lowell Road south of Pelham Rd – LOS D
- Lowell Road south of Wason Rd – LOS E
- Lowell Rd south of Rena Ave – LOS D
- NH102 N. of Easy St – LOS D
- NH 102/3A north of Ledge Rd – LOS E
- NH 111 (Burnham Road) north of Central Street – LOS D
- NH 111 (Central Street) west of Kimball Hill Road – LOS E
- Wason Rd east of NH3A – LOS E

8.1 Future Conditions Analysis – Road Segments

Future conditions analysis for road segments involved using the NRPC regional travel demand model to predict future traffic growth on those segments in 2030 and 2045. The change in traffic volume that was predicted for each segment was then added to the actual 2022 traffic volumes. The totals for each analysis year were then converted from total weekday counts to peak hour counts (AM and PM) per direction and per lane via an Excel spreadsheet. The directional split was assumed to be 50/50. The converted counts were then classified by Volume to Capacity ratio and the resulting LOS according to the corresponding road segment class, as described below.

8.2 Future (2030) Conditions – Road Segments

Table 10, Map 3 and **Map 4** present information about 2030 Volume to Capacity (V/C) and LOS for the eighteen road segments that were analyzed in this study.

During the morning (AM) Peak period in 2030, eleven road segments operate at LOS C or better.

- NH 111 (Burnham Road) north of Central Street – improved to LOS C (LOS D in 2022)

The following road segments experience a LOS below C:

- NH 3A (Central St) east of Library St – LOS D (LOS C in 2022)
- Lowell Road south of Central St – LOS E (LOS E in 2022)
- Lowell Road south of Pelham Rd – LOS D (LOS D in 2022)
- Lowell Road south of Wason Rd – LOS D (LOS D in 2022)

- NH 102/3A north of Ledge Rd – LOS D (LOS D in 2022)
- NH 111 (Central Street) west of Kimball Hill Road – LOS E (LOS E in 2022)

During the afternoon (PM) Peak period in 2030, seven road segments operate at LOS C or better. The following road segments experience a LOS below C:

- NH 3A (Central St) west of Library St – LOS D (LOS D in 2022)
- NH 3A (Central St) east of Library St – LOS D (LOS D in 2022)
- Lowell Road south of Central St – LOS F (LOS F in 2022)
- Lowell Road south of Pelham Rd – LOS D (LOS D on 2022)
- Lowell Road south of Wason Rd – LOS E (LOS E in 2022)
- Lowell Rd south of Rena Ave – LOS D (LOS D in 2022)
- NH102 N. of Easy St – LOS D (LOS D in 2022)
- NH 102/3A north of Ledge Rd – LOS E (LOS E in 2022)
- NH 111 (Burnham Road) north of Central Street – LOS D (LOS D in 2022)
- NH 111 (Central Street) west of Kimball Hill Road – LOS F (LOS E in 2022)
- Wason Rd east of NH3A/Lowell Rd – LOS E (LOS E in 2022)

8.3 Future (2045) Conditions – Road Segments

Table 10, Map 3 and **Map 4** present information about 2045 Volume to Capacity (V/C) and LOS for the eighteen road segments that were analyzed in this study.

During the morning (AM) Peak period in 2045, eleven road segments operate at LOS C or better.

- NH 111 (Burnham Road) north of Central Street – improved to LOS C (LOS D in 2022, LOS C in 2030)

The following road segments experience a LOS below C:

- NH 3A (Central St) east of Library St – LOS D (LOS C in 2022 & LOS D in 2030)
- Lowell Road south of Central St – LOS F (LOS E in 2022 & 2030)
- Lowell Road south of Pelham Rd – LOS D (LOS D in 2022 & 2030)
- Lowell Road south of Wason Rd – LOS D (LOS D in 2022 & 2030)
- NH 102/3A north of Ledge Rd – LOS D (LOS D in 2022, & 2030)
- NH 111 (Central Street) west of Kimball Hill Road – LOS E (LOS E in 2022 & 2030)

During the afternoon (PM) Peak period in 2045, eight road segments operate at LOS C or better.

- NH 111 (Burnham Road) north of Central Street – improved to LOS C (LOS D in 2022 & 2030)

The following road segments experience a LOS below C:

- NH 3A (Central St) west of Library St – LOS D (LOS D in 2022 & 2030)
- NH 3A (Central St) east of Library St – LOS E (LOS D in 2022 & 2030)
- Lowell Road south of Central St – LOS F (LOS F in 2022 & 2030)
- Lowell Road south of Pelham Rd – LOS E (LOS D in 2022 & 2030)
- Lowell Road south of Wason Rd – LOS F (LOS E in 2022 & 2030)
- Lowell Rd south of Rena Ave – LOS D (LOS D in 2022 & 2030)
- NH102 N. of Easy St – LOS D (LOS D in 2022 & 2030)
- NH 102/3A north of Ledge Rd – LOS E (LOS E in 2022 & 2030)
- NH 111 (Central Street) west of Kimball Hill Road – LOS F (LOS E in 2022 & LOS F in 2030)
- Wason Rd east of NH3A/Lowell Rd – LOS F (LOS E in 2022 & 2030)

Table 10: Segment Volume-to-Capacity Ratio and Level of Service (LOS)

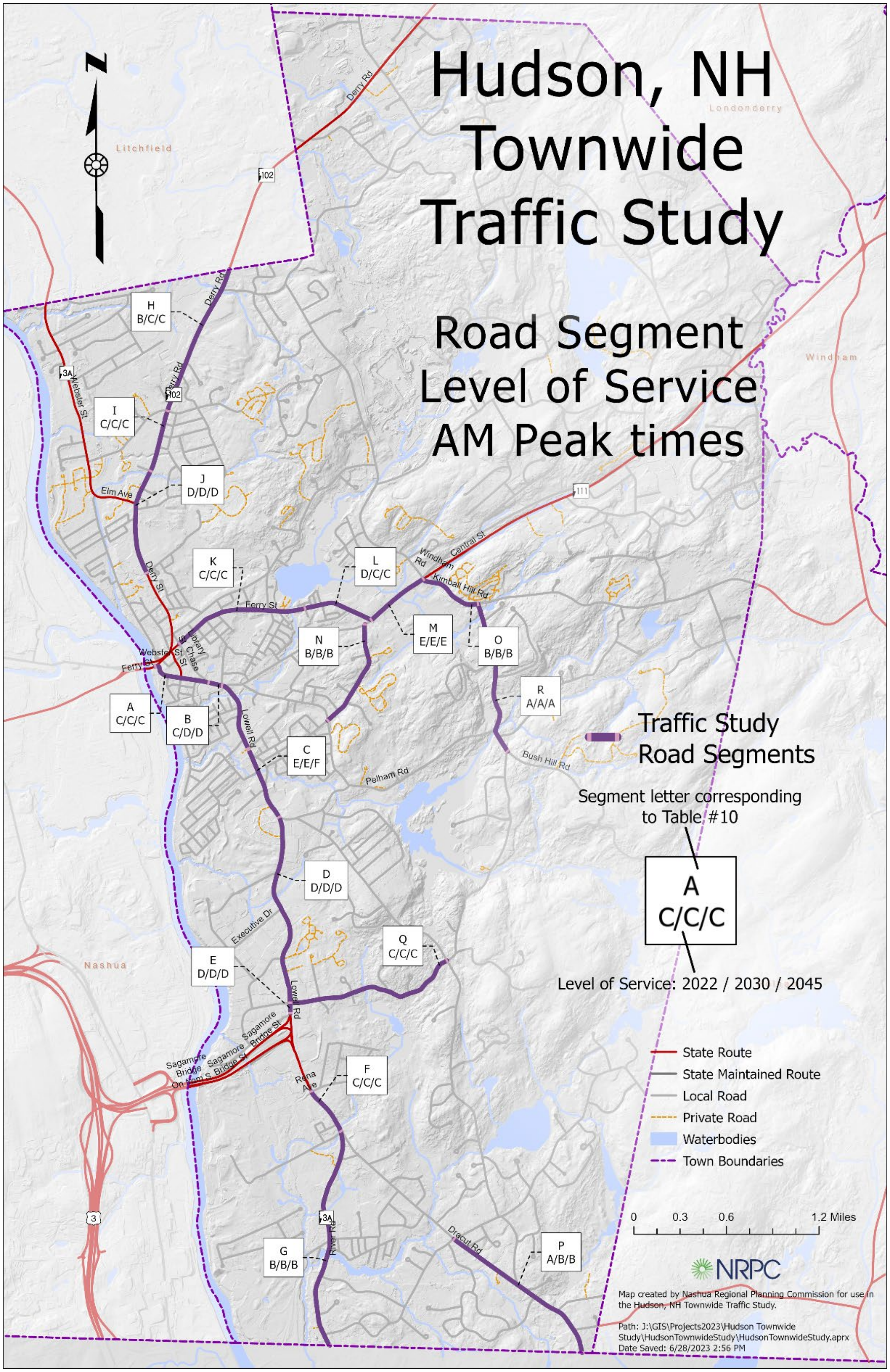
#	Segment	AM Peak						PM Peak					
		2022		2030		2045		2022		2030		2045	
		V/C	LOS	V/C	V/C	LOS	V/C	V/C	LOS	V/C	LOS	LOS	V/C
A	NH 3A (Central St) west of Library St	0.4	C	0.5	C	0.5	C	0.6	D	0.7	D	0.7	D
B	NH 3A (Central St) east of Library St	0.5	C	0.6	D	0.6	D	0.7	D	0.8	D	0.8	E
C	Lowell Rd south of Central St	0.9	E	1.0	E	1.0	F	1.1	F	1.2	F	1.3	F
D	Lowell Rd south of Pelham Rd	0.7	D	0.7	D	0.7	D	0.8	D	0.9	D	0.9	E
E	Lowell Rd south of Wason Rd#	0.6	D	0.7	D	0.8	D	0.8	E	1.0	E	1.0	F
F	Lowell Rd south of Rena Ave#	0.5	C	0.5	C	0.5	C	0.7	D	0.6	D	0.7	D
G	River Rd at Mass State Line	0.2	B	0.3	B	0.3	B	0.3	B	0.4	B	0.4	C
H	NH 102 at Litchfield Town Line#	0.3	B	0.5	C	0.5	C	0.4	B	0.6	C	0.6	C
I	NH 102 north of Easy St	0.5	C	0.5	C	0.6	C	0.7	D	0.7	D	0.7	D
J	NH 102/3A north of Ledge Rd	0.7	D	0.7	D	0.7	D	0.9	E	0.9	E	0.9	E
K	NH 111 (Ferry St) east of Library St	0.4	C	0.5	C	0.5	C	0.5	C	0.5	C	0.5	C
L	NH 111 (Burnham Rd) north of Central St	0.5	D	0.5	C	0.5	C	0.6	D	0.6	D	0.6	C
M	NH 111 (Central St) west of Kimball Hill Rd	0.8	E	0.9	E	0.9	E	0.9	E	1.0	F	1.0	F
N	Belknap Rd south of Central St	0.2	B	0.2	B	0.2	B	0.2	B	0.3	B	0.3	B
O	Kimball Hill Rd south of NH 111	0.3	B	0.4	B	0.4	B	0.4	B	0.4	C	0.4	C
P	Dracut Rd at Mass State Line#	0.2	A	0.2	B	0.2	B	0.3	B	0.4	C	0.4	C
Q	Wason Rd east of NH 3A	0.4	C	0.4	C	0.4	C	1.0	E	1.0	E	1.0	F
R	Bush Hill Rd north of Wason Rd	0.2	A	0.2	A	0.2	A	0.3	A	0.4	B	0.4	B

* Unsignalized intersection in various configurations.

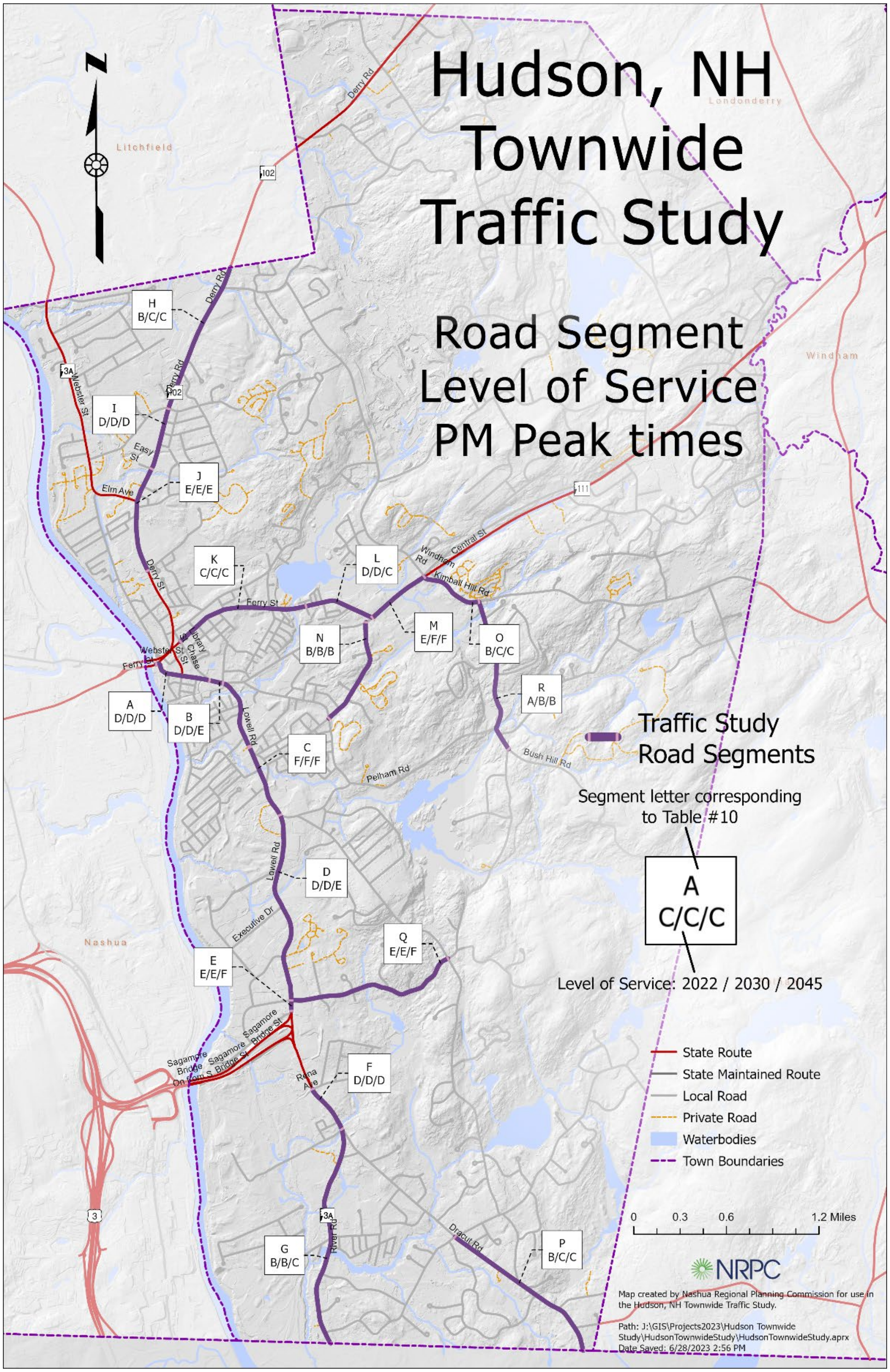
Improvement made to the intersection in 2030 and 2045

Blue LOS indicates an improvement In LOS and Red LOS indicates a decline in LOS

Map 3: Road Segment Level of Service AM Peak Times



Map 4: Road Segment Level of Service PM Peak Times



9. CONCLUSIONS

Level of service (LOS) is a qualitative measure used to relate the quality of motor vehicle traffic service. LOS is used to analyze roadways and intersections by categorizing traffic flow and assigning quality levels of traffic based on performance measures like vehicle speed, density, congestion, and other measures. Though not necessarily a universal view, LOS C is the target LOS for most intersections and roadways.

This study has shown that there are areas in Hudson where the intersection and road segment LOS is currently below LOS C or will be in the future. The following intersections are discussed because they each exhibit a LOS of D or worse either currently, or in future scenarios.

9.1 Intersections

Ferry St/Chase St (NH111/NH102/NH3A) – this multi-legged intersection exhibits LOS F for all three analysis years during both the morning and afternoon peak periods. Without roadway improvements, increasing traffic volume in the future will result in continued poor LOS and potentially longer delays in the afternoon peak period, particularly in 2045.

Mitigation Strategies to Consider:

- Further optimization of traffic signal timing to account for future traffic patterns.
- Coordinate with the City of Nashua to optimize traffic flow on Taylor Fall's Bridge between the City of Nashua and Hudson.
- Reconfigure the intersections to improve traffic flow.
- Update GridSmart cameras to accommodate the unique geometry of this intersection.

Central St (NH111)/Kimball Hill Rd/Greeley St – this multi-legged intersection exhibits LOS F for all three analysis years during both the morning and afternoon peak periods. There are several protected signal turn phases that, coupled with high traffic volume, result in long delays for other turning movements. This intersection also accommodates traffic that uses the shortcut through Wason Rd/Pelham Rd/Kimble Hill Rd/Bush Hill Rd.

Mitigation Strategies to Consider:

- Further optimization of traffic signal timing to account for future traffic patterns.
- Reconfigure the intersection to improve traffic flow.
- The Hudson Boulevard concept could potentially divert traffic away from this intersection.
- Update GridSmart cameras to accommodate intersections with more than 4 legs and include the channelized turns in both directions on NH111 and from Hamblett Avenue.

Library St/Highland St – the existing (2022) LOS at this signalized intersection is C during the morning peak period and D in the afternoon peak period. The LOS degrades to E (morning peak period) and D (afternoon peak period) in future scenarios.

Mitigation Strategies to Consider:

- Further optimization of traffic signal timing to account for future traffic patterns.

Burnham Rd/Central St – the existing (2022) LOS at this signalized intersection is D during the morning and afternoon peak periods. The LOS degrades to D in all future scenarios.

Mitigation Strategies to Consider:

- Further optimization of traffic signal timing to account for future traffic patterns.
- The Hudson Boulevard concept could potentially divert traffic away from this intersection.

Lowell Rd/Pelham Rd – the existing (2022) LOS at this signalized intersection is C during the morning and D during the afternoon peak period. The afternoon LOS degrades to E in future scenarios.

Mitigation Strategies to Consider:

- Further optimization of traffic signal timing to account for future traffic patterns.
- The Hudson Boulevard concept could potentially divert traffic away from this intersection.

Lowell Rd/Executive Dr, Lowell Rd/Hampshire Dr/Oblate Dr – the existing (2022) LOS at these intersections is acceptable at LOS C or better. Future LOS on Lowell Rd/Executive Dr, however, degrades to LOS D in 2045 due to gradual development and resultant traffic to and from the Sagamore Industrial Park.

Mitigation Strategies to Consider:

- Further optimization of traffic signal timing to account for future traffic patterns.
- Reconfigure the intersections to improve traffic flow.
- Collaborate with businesses on Transportation Demand Management (TDM) measures.

Lowell Rd/Wason Rd – this intersection exhibits LOS D in both morning and afternoon peak periods and in both existing (2022) and future scenarios. This will be true even with the planned additional southbound right turn lane from Lowell Road onto the Sagamore Bridge.

Mitigation Strategies to Consider:

- Further optimization of traffic signal timing to account for future traffic patterns.
- The Hudson Boulevard concept could potentially divert traffic away from this intersection.

Lowell Rd/Sagamore Bridge – this intersection exhibits an acceptable LOS during the morning peak period currently and in the future planning years. The current afternoon peak period LOS is E, improving to D in 2030 and then regressing to LOS E in 2045. This suggests that the intersection improvements associated with the Hudson Logistics Center are generally adequate in the near to mid-term, but the LOS E predicted in 2045 is cause for concern.

Mitigation Strategies to Consider:

- Further optimization of traffic signal timing to account for future traffic patterns.
- The Hudson Boulevard concept would impact this intersection.

Lowell Rd/Steele Rd/Dracut Rd/River Rd – this intersection exhibits an acceptable LOS during the morning peak period currently and in the future planning years. The current afternoon peak period LOS is F, improving to C in 2030 and then regressing to LOS F in 2045. This will be true even with the planned additional southbound left turn lane from Lowell Road onto Dracut Road.

Mitigation Strategies to Consider:

- Further optimization of traffic signal timing to account for future traffic patterns.
- Update GridSmart cameras to accommodate intersections with more than 4 legs.

Dracut Rd/Sherburne Rd – this intersection exhibits an acceptable LOS during the morning peak period currently and in the future planning years. The current afternoon peak period LOS is F, improving to B in both 2030 and 2045. The improvement is the result of the planned signalization of this intersection.

9.2 Road Segments

Central St/Kimble Hill Rd/ Bush Hill Rd/Pelham Rd/Wason Rd – these road segments carry traffic from across the Mass State Line (Dracut Rd & River Rd) or from the Sagamore Bridge to communities east of Hudson that is attempting to bypass the congestion on Lowell Rd between Wason Road and the downtown area of Hudson. This two-lane route passes through residential areas and must navigate several heavily traveled intersections (Lowell Rd/Sagamore Br & NH111/Kimble Hill Rd). The LOS for this corridor generally degrades in future analysis years.

Mitigation Strategies to Consider:

- Explore potential alternative corridors such as the Hudson Boulevard concept.
- TDM measures that reduce traffic volume in general.

NH3A (Central St) west of Library Street – this segment exhibits LOS C during the current and future morning peak periods. The segment exhibits LOS D in the current and future year afternoon peak periods.

Mitigation Strategies to Consider:

- TDM measures that reduce traffic volume in general.

NH3A (Central St) east of Library Street – this segment exhibits LOS C during the current morning peak period and degrades to LOS D in future morning peak periods. The segment exhibits LOS D in the current 2030 afternoon peak periods and degrades to LOS E in 2045.

Mitigation Strategies to Consider:

- TDM measures that reduce traffic volume in general.

Lowell Road south of Central Street – this segment exhibits LOS E during the current morning peak period, and LOS E (2030) and LOS F (2045) in future morning peak periods. The segment exhibits LOS F in the current and future year afternoon peak periods.

Mitigation Strategies to Consider:

- TDM measures that reduce traffic volume in general.
- Explore potential alternative corridors such as the Hudson Boulevard concept.

Lowell Road south of Pelham Rd – this segment exhibits LOS D during the current and future morning peak periods. The segment exhibits LOS D in the current and 2030 afternoon peak periods and LOS E in 2045.

Mitigation Strategies to Consider:

- TDM measures that reduce traffic volume in general.
- Explore potential alternative corridors such as the Hudson Boulevard concept.

Lowell Road south of Wason Road (between Wason Road and the Sagamore Bridge) – this segment exhibits LOS D during the current and future morning peak periods. The segment exhibits LOS E in the current and 2030 afternoon peak periods, and LOS F in 2045.

Mitigation Strategies to Consider:

- Explore potential alternative corridors such as the Hudson Boulevard concept.
- TDM measures that reduce traffic volume in general.
- Capacity improvements.

Lowell Road between Sagamore Bridge and Rena Avenue – traffic to the future Hudson Logistics Center will travel on this road segment. It is therefore notable that this segment of roadway exhibits LOS C in the current and future morning peak periods, and LOS D in the current in future afternoon peak periods. This suggests that future roadway improvements associated with the logistics center will accommodate the impacts of this future development.

NH102 north of Easy Street – this segment exhibits LOS C during the current and future morning peak periods. The segment exhibits LOS D in the current and future afternoon peak periods.

Mitigation Strategies to Consider:

- TDM measures that reduce traffic volume in general.

NH102 north of Ledge Road – this segment exhibits LOS D during the current and future morning peak periods. The segment exhibits LOS E in the current and future afternoon peak periods. This segment of the road has numerous retail businesses, and it is a significant arterial roadway.

Mitigation Strategies to Consider:

- TDM measures that reduce traffic volume in general.
- Further optimization of traffic signal timing at the various nearby intersections.

NH111 (Burnham Rd) north of Central St – this segment exhibits LOS C during the current and future morning peak periods. The segment exhibits LOS D in the current and 2030 afternoon peak periods and improves to LOS C in the 2045 afternoon peak period.

Mitigation Strategies to Consider:

- Continue with current measures.

9.3 Transportation Demand Management (TDM)

Transportation demand management (TDM) is defined as a set of strategies aimed at maximizing traveler choices. Traditionally, TDM has been narrowly defined as commuter ridesharing and its planning application restricted to air quality mitigation (conformity analysis), development mitigation (reducing trip generation rates and parking needs), or efforts to increase multi-modalism in transportation plans. A more contemporary definition of TDM consists of maximizing travel choices, as stated in the definition provided in an FHWA report on TDM:

> *Managing demand is about providing travelers, regardless of whether they drive alone, with travel choices, such as work location, route, time of travel and mode. In the broadest sense, demand management is defined as providing travelers with effective choices to improve travel reliability.*

Measures can include, but are not limited to, public transportation (transit), alternative modes (walk & bike), carpool/vanpool, remote work, flexible work hours, staggered schedules, and other measures.

Transportation Demand Management is most effective when partnering with major employers, local businesses, institutions, transit agencies, nonprofits, and other stakeholders.

Resources:

- CommuteSmartNH
- Federal Highway Administration (FHWA) TDM Definition
- Mobility Lab

Appendix A – Synchro Reports

A.1 Base Model (2022) - AM Peak (49 pages)

A.2 Base Model (2022) - PM Peak (49 pages)

A.3 Future 2030 Model - AM Peak (51 pages)

A.4 Future 2030 Model - PM Peak (51 pages)

A.5 Future 2045 Model - AM Peak (51 pages)

A.6 Future 2045 Model - PM Peak (53 pages)

Reference Table – Table 6 # to # in SYNCRHO Reports

Table 6 #	# in SYNCHRO Reports	Intersection / Direction TOWARD
1	**40**	111-102-3A (Ferry & Chase)
2	**38**	Library & Ferry
3	**39**	Library and Highland
4	**55**	Burnham and Central
5	**58**	Central-Kimball-Greeley (Rt.111 & Greeley)
6	**76**	Derry and 102 (Route 102 & Elm Ave)
7	**82**	NH 102/Page Rd
8	**34**	NH 3A Central St/Chase St
9	**33**	Central and Library
10	**29**	Lowell and Central
11	**25**	Lowell and Pelham
12	**22**	Lowell and Executive
13	**10**	Lowell-Hampshire-Oblate
14	**1**	Lowell & Wason
16	**4**	NH 3A Lowell Rd/Walmart Blvd
17	**5**	NH 3A Lowell Rd/Rena Ave
18	**7**	NH 3A Lowell Rd/Dracut Rd/Steele Rd
19	**67**	Dracut Rd/Sherburne Rd
20	**70**	Kimball Hill Rd/Bush Hill Rd
21	**73**	Central St/Belknap Rd
22	**24**	Lowell & Fox Hollow Dr
23	**27**	Lowell & Birch St
15_com	**2**	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined
15M	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section
15N	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section
15S	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section

A.1 Base Model (2022) - AM Peak (49 pages)

Reference Table – Table 6 # to # in SYNCRHO Reports

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9	**33**	Central and Library
10	**29**	Lowell and Central
11	**25**	Lowell and Pelham
12	**22**	Lowell and Executive
13	**10**	Lowell-Hampshire-Oblate
14	**1**	Lowell & Wason
16	**4**	NH 3A Lowell Rd/Walmart Blvd
17	**5**	NH 3A Lowell Rd/Rena Ave
18	**7**	NH 3A Lowell Rd/Dracut Rd/Steele Rd
19	**67**	Dracut Rd/Sherburne Rd
20	**70**	Kimball Hill Rd/Bush Hill Rd
21	**73**	Central St/Belknap Rd
22	**24**	Lowell & Fox Hollow Dr
23	**27**	Lowell & Birch St
15_com	**2**	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined
15M	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section
15N	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section
15S	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section

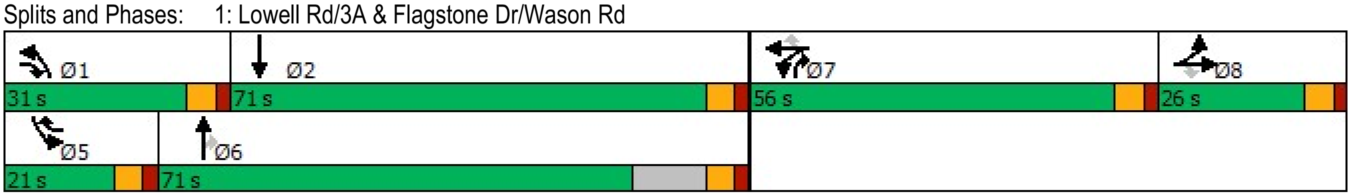
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	24	208	432	59	45	171	716	178	22	848	28
Future Volume (vph)	36	24	208	432	59	45	171	716	178	22	848	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	14	12	12	12	12	12	12
Storage Length (ft)	0		0	0		100	650		350	200		0
Storage Lanes	0		1	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.995	
Flt Protected		0.971		0.950	0.963		0.950			0.950		
Satd. Flow (prot)	0	1419	1408	1633	1655	1641	1719	3438	1538	1570	3123	0
Flt Permitted		0.971		0.950	0.963		0.950			0.950		
Satd. Flow (perm)	0	1419	1408	1633	1655	1641	1719	3438	1538	1570	3123	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			66			89			193		2	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		573			432			1014			1071	
Travel Time (s)		13.0			9.8			23.0			24.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	30%	30%	5%	5%	5%	5%	5%	5%	15%	15%	15%
Adj. Flow (vph)	39	26	226	470	64	49	186	778	193	24	922	30
Shared Lane Traffic (%)				44%								
Lane Group Flow (vph)	0	65	226	263	271	49	186	778	193	24	952	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	0.85	1.00	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	26.0	26.0	11.0	31.0	31.0	11.0	11.0	31.0	31.0	11.0	31.0	
Total Split (s)	26.0	26.0	31.0	56.0	56.0	21.0	31.0	71.0	56.0	21.0	71.0	
Total Split (%)	14.1%	14.1%	16.8%	30.4%	30.4%	11.4%	16.8%	38.6%	30.4%	11.4%	38.6%	
Maximum Green (s)	20.0	20.0	25.0	50.0	50.0	15.0	25.0	65.0	50.0	15.0	65.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None	None	None	Min	None	None	Min	
Walk Time (s)	7.0	7.0						7.0			7.0	
Flash Dont Walk (s)	11.0	11.0						11.0			11.0	
Pedestrian Calls (#/hr)	0	0						0			0	
Act Effct Green (s)		12.0	35.3	30.9	30.9	40.5	21.0	68.7	108.1	7.6	51.5	
Actuated g/C Ratio		0.09	0.26	0.23	0.23	0.30	0.15	0.50	0.79	0.06	0.38	
v/c Ratio		0.52	0.55	0.72	0.73	0.09	0.71	0.45	0.15	0.28	0.81	
Control Delay		84.4	37.9	64.3	64.9	0.3	76.1	26.8	1.0	82.2	47.5	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay		84.4	37.9	64.3	64.9	0.3	76.1	26.8	1.0	82.2	47.5	
LOS		F	D	E	E	A	E	C	A	F	D	
Approach Delay		48.3			59.2			30.5			48.3	
Approach LOS		D			E			C			D	
Queue Length 50th (ft)		60	125	244	252	0	166	254	0	22	426	
Queue Length 95th (ft)		130	255	405	415	1	#335	409	22	63	634	
Internal Link Dist (ft)		493			352			934			991	
Turn Bay Length (ft)						100	650		350	200		
Base Capacity (vph)		224	470	644	653	645	339	2067	1370	185	1604	
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio		0.29	0.48	0.41	0.42	0.08	0.55	0.38	0.14	0.13	0.59	

Intersection Summary

Area Type: Other
Cycle Length: 184
Actuated Cycle Length: 137.2
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 43.6 Intersection LOS: D
Intersection Capacity Utilization 69.0% 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: Lowell Rd/3A & Flagstone Dr/Wason Rd

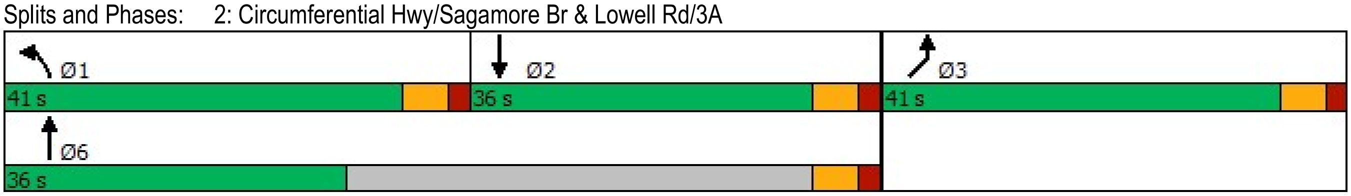


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	NEL	NER
Lane Configurations									
Traffic Volume (vph)	0	0	689	189	285	0	1103	735	638
Future Volume (vph)	0	0	689	189	285	0	1103	735	638
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	14	12
Storage Length (ft)	0	0	550			300		0	0
Storage Lanes	0	0	2			1		2	1
Taper Length (ft)	25		25					25	
Lane Util. Factor	1.00	1.00	0.97	0.95	0.95	1.00	1.00	0.97	1.00
Frt							0.850		0.850
Flt Protected			0.950					0.950	
Satd. Flow (prot)	0	0	3335	3139	3438	0	1538	3557	1538
Flt Permitted			0.950					0.950	
Satd. Flow (perm)	0	0	3335	3139	3438	0	1538	3557	1538
Right Turn on Red							Yes		Yes
Satd. Flow (RTOR)							722		564
Link Speed (mph)	55			30	30			42	
Link Distance (ft)	1050			613	1014			972	
Travel Time (s)	13.0			13.9	23.0			15.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	15%	5%	2%	5%	5%	5%
Adj. Flow (vph)	0	0	749	205	310	0	1199	799	693
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	0	749	205	310	0	1199	799	693
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right	Right	Left	Right
Median Width(ft)	0			24	24			28	
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	0.92	1.00
Turning Speed (mph)	15	9	15			9	9	15	9
Turn Type			Prot	NA	NA		Free	Prot	Free
Protected Phases			1	6	2			3	
Permitted Phases							Free		Free
Detector Phase			1	6	2			3	
Switch Phase									
Minimum Initial (s)			7.0	10.0	10.0			10.0	
Minimum Split (s)			13.0	16.0	16.0			16.0	
Total Split (s)			41.0	36.0	36.0			41.0	
Total Split (%)			34.7%	30.5%	30.5%			34.7%	
Maximum Green (s)			35.0	30.0	30.0			35.0	
Yellow Time (s)			4.0	4.0	4.0			4.0	
All-Red Time (s)			2.0	2.0	2.0			2.0	
Lost Time Adjust (s)			0.0	0.0	0.0			0.0	
Total Lost Time (s)			6.0	6.0	6.0			6.0	
Lead/Lag			Lead		Lag				
Lead-Lag Optimize?									
Vehicle Extension (s)			4.0	4.0	4.0			4.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	NEL	NER
Recall Mode			None	Min	Min			None	
Act Effct Green (s)			27.2	48.4	15.0		88.2	27.4	88.2
Actuated g/C Ratio			0.31	0.55	0.17		1.00	0.31	1.00
v/c Ratio			0.73	0.12	0.53		0.78	0.72	0.45
Control Delay			32.8	10.2	38.7		4.0	32.2	1.0
Queue Delay			0.0	0.0	0.0		0.0	0.0	0.0
Total Delay			32.8	10.2	38.7		4.0	32.2	1.0
LOS			C	B	D		A	C	A
Approach Delay				28.0	11.1			17.7	
Approach LOS				C	B			B	
Queue Length 50th (ft)			191	27	84		0	201	0
Queue Length 95th (ft)			301	51	146		0	318	0
Internal Link Dist (ft)	970			533	934			892	
Turn Bay Length (ft)			550				300		
Base Capacity (vph)			1365	2561	1206		1538	1456	1538
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			0.55	0.08	0.26		0.78	0.55	0.45

Intersection Summary	
Area Type: Other	
Cycle Length: 118	
Actuated Cycle Length: 88.2	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.78	
Intersection Signal Delay: 17.7	Intersection LOS: B
Intersection Capacity Utilization 64.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Circumferential Hwy/Sagamore Br & Lowell Rd/3A



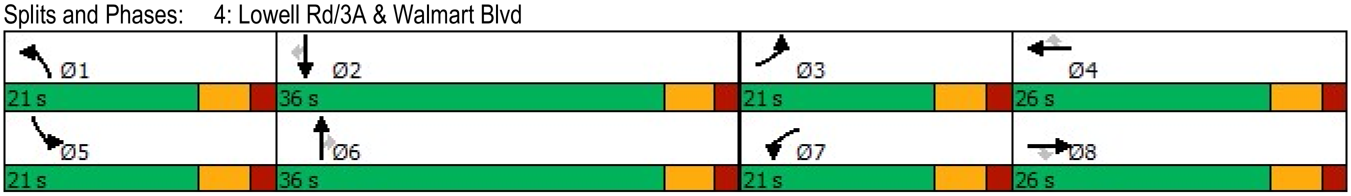
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	11	44	21	9	91	59	766	23	94	697	84
Future Volume (vph)	90	11	44	21	9	91	59	766	23	94	697	84
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	400		250	400		0
Storage Lanes	1		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1863	1583	3335	1863	1538	3433	3438	1583	3335	3438	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1719	1863	1583	3335	1863	1538	3433	3438	1583	3335	3438	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			157			157			157			157
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		304			245			982			569	
Travel Time (s)		6.9			5.6			22.3			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	5%	2%	5%	2%	5%	2%	5%	5%	5%
Adj. Flow (vph)	98	12	48	23	10	99	64	833	25	102	758	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	98	12	48	23	10	99	64	833	25	102	758	91
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)		24			24			24			24	
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
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8			4			6			2
Detector Phase	3	8	8	7	4	4	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	16.0	11.0	16.0	16.0
Total Split (s)	21.0	26.0	26.0	21.0	26.0	26.0	21.0	36.0	36.0	21.0	36.0	36.0
Total Split (%)	20.2%	25.0%	25.0%	20.2%	25.0%	25.0%	20.2%	34.6%	34.6%	20.2%	34.6%	34.6%
Maximum Green (s)	15.0	20.0	20.0	15.0	20.0	20.0	15.0	30.0	30.0	15.0	30.0	30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	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	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	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	12.7	16.9	16.9	9.2	9.2	9.2	10.0	34.5	34.5	10.8	35.2	35.2
Actuated g/C Ratio	0.18	0.24	0.24	0.13	0.13	0.13	0.14	0.49	0.49	0.15	0.50	0.50
v/c Ratio	0.32	0.03	0.10	0.05	0.04	0.29	0.13	0.49	0.03	0.20	0.44	0.11
Control Delay	35.4	29.2	0.4	35.9	36.2	4.1	35.3	21.4	0.0	35.0	19.9	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	29.2	0.4	35.9	36.2	4.1	35.3	21.4	0.0	35.0	19.9	0.8
LOS	D	C	A	D	D	A	D	C	A	C	B	A
Approach Delay		24.3			12.0			21.8			19.7	
Approach LOS		C			B			C			B	
Queue Length 50th (ft)	46	4	0	5	5	0	15	178	0	24	155	0
Queue Length 95th (ft)	95	20	0	18	20	14	36	276	0	50	240	5
Internal Link Dist (ft)		224			165			902			489	
Turn Bay Length (ft)							400		250	400		
Base Capacity (vph)	495	741	724	960	715	687	988	1690	858	960	1724	849
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.02	0.07	0.02	0.01	0.14	0.06	0.49	0.03	0.11	0.44	0.11

Intersection Summary

Area Type: Other
Cycle Length: 104
Actuated Cycle Length: 70.2
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.49
Intersection Signal Delay: 20.5 Intersection LOS: C
Intersection Capacity Utilization 52.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 4: Lowell Rd/3A & Walmart Blvd

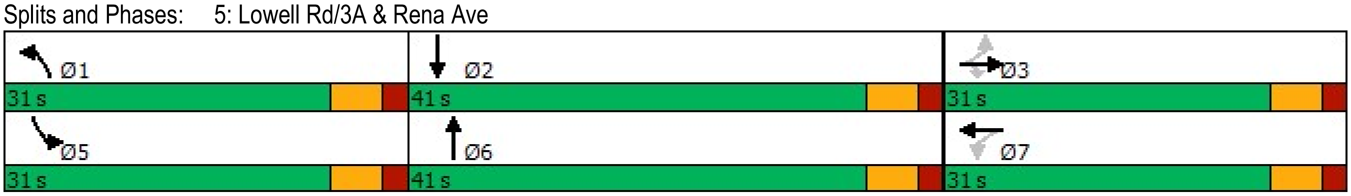


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	1	6	0	23	17	821	3	7	655	55
Future Volume (vph)	5	0	1	6	0	23	17	821	3	7	655	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12	12	12	12	12	12	12
Storage Length (ft)	0		60	0		0	350		0	350		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.895			0.999			0.988	
Flt Protected		0.950			0.989		0.950			0.950		
Satd. Flow (prot)	0	1388	1583	0	1827	0	1770	3435	0	1570	3404	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1462	1583	0	1847	0	1770	3435	0	1570	3404	0
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)			95								9	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		297			325			1749			982	
Travel Time (s)		6.8			7.4			39.8			22.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	2%	2%	2%	2%	5%	2%	5%	2%	15%	5%	2%
Adj. Flow (vph)	5	0	1	7	0	25	18	892	3	8	712	60
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	5	1	0	32	0	18	895	0	8	772	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			24			24	
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	0.85	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
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		3			7		1	6		5	2	
Permitted Phases	3		3	7								
Detector Phase	3	3	3	7	7		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	31.0	31.0	31.0	31.0	31.0		31.0	41.0		31.0	41.0	
Total Split (%)	30.1%	30.1%	30.1%	30.1%	30.1%		30.1%	39.8%		30.1%	39.8%	
Maximum Green (s)	25.0	25.0	25.0	25.0	25.0		25.0	35.0		25.0	35.0	
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)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None		None	None		None	None	
Act Effct Green (s)		8.6	8.6		9.1		8.7	28.8		8.5	28.8	
Actuated g/C Ratio		0.27	0.27		0.28		0.27	0.90		0.26	0.90	
v/c Ratio		0.01	0.00		0.06		0.04	0.29		0.02	0.25	
Control Delay		18.2	0.0		16.7		17.8	3.8		18.6	3.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		18.2	0.0		16.7		17.8	3.8		18.6	3.8	
LOS		B	A		B		B	A		B	A	
Approach Delay		15.2			16.7			4.1			3.9	
Approach LOS		B			B			A			A	
Queue Length 50th (ft)		1	0		3		2	0		1	0	
Queue Length 95th (ft)		11	0		35		24	177		15	150	
Internal Link Dist (ft)		217			245			1669			902	
Turn Bay Length (ft)			60				350			350		
Base Capacity (vph)		1232	1349		1557		1492	3096		1323	3069	
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		0.00	0.00		0.02		0.01	0.29		0.01	0.25	

Intersection Summary	
Area Type: Other	
Cycle Length: 103	
Actuated Cycle Length: 32.1	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.29	
Intersection Signal Delay: 4.3	Intersection LOS: A
Intersection Capacity Utilization 43.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Lowell Rd/3A & Rena Ave



Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	0	2	2	1	0	1	0	222	346	352	24
Future Volume (vph)	7	0	2	2	1	0	1	0	222	346	352	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0				0	240		820		0
Storage Lanes	1		0				0	2		1		0
Taper Length (ft)	25							25		25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	0.95
Frt		0.850				0.932					0.990	
Flt Protected	0.950					0.976				0.950		
Satd. Flow (prot)	1770	1583	0	0	0	1694	0	1863	3438	1719	3410	0
Flt Permitted										0.950		
Satd. Flow (perm)	1863	1583	0	0	0	1736	0	1863	3438	1719	3410	0
Right Turn on Red				Yes			Yes					Yes
Satd. Flow (RTOR)		132				132					6	
Link Speed (mph)		30				30			30		30	
Link Distance (ft)		386				220			909		1749	
Travel Time (s)		8.8				5.0			20.7		39.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	5%	5%	5%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Adj. Flow (vph)	8	0	2	2	1	0	1	0	241	376	383	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	4	0	0	0	2	0	0	241	376	409	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Right	Left	Left	Right	Left	Left	Left	Left	Right
Median Width(ft)		12				12			12		12	
Link Offset(ft)		0				0			0		0	
Crosswalk Width(ft)		16				16			16		16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	9	15		9	15		15		9
Turn Type	Perm	NA			Perm	NA		Prot	NA	Prot	NA	
Protected Phases		4				4		1	6	5	2	
Permitted Phases	4				4							
Detector Phase	4	4			4	4		1	6	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0	5.0		5.0	8.0	5.0	8.0	
Minimum Split (s)	11.0	11.0			11.0	11.0		11.0	16.0	11.0	14.0	
Total Split (s)	26.0	26.0			26.0	26.0		21.0	56.0	56.0	56.0	
Total Split (%)	14.9%	14.9%			14.9%	14.9%		12.1%	32.2%	32.2%	32.2%	
Maximum Green (s)	20.0	20.0			20.0	20.0		15.0	50.0	50.0	50.0	
Yellow Time (s)	4.0	4.0			4.0	4.0		4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0			2.0	2.0		2.0	2.0	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	Lag	Lag			Lag	Lag		Lead	Lag	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	4.0	5.0	4.0	

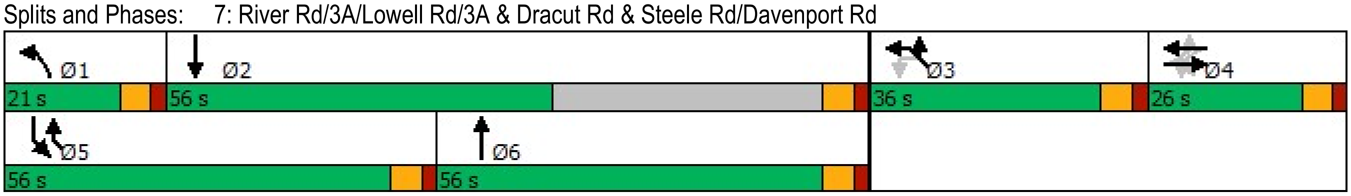
Lane Group	NWL2	NWL	NWR
Lane Configurations			
Traffic Volume (vph)	8	0	572
Future Volume (vph)	8	0	572
Ideal Flow (vphpl)	1900	1900	1900
Storage Length (ft)		120	0
Storage Lanes		1	1
Taper Length (ft)		25	
Lane Util. Factor	1.00	1.00	1.00
Frt			0.850
Flt Protected		0.950	
Satd. Flow (prot)	0	1770	1552
Flt Permitted		0.950	
Satd. Flow (perm)	0	1770	1552
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)		30	
Link Distance (ft)		960	
Travel Time (s)		21.8	
Peak Hour Factor	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%
Bus Blockages (#/hr)	0	0	5
Adj. Flow (vph)	9	0	622
Shared Lane Traffic (%)			
Lane Group Flow (vph)	0	9	622
Enter Blocked Intersection	No	No	No
Lane Alignment	Left	Left	Right
Median Width(ft)		12	
Link Offset(ft)		0	
Crosswalk Width(ft)		16	
Two way Left Turn Lane			
Headway Factor	1.00	1.00	1.03
Turning Speed (mph)	15	15	9
Turn Type	Perm	Prot	pt+ov
Protected Phases		3	3 5
Permitted Phases	3		
Detector Phase	3	3	3 5
Switch Phase			
Minimum Initial (s)	5.0	5.0	
Minimum Split (s)	11.0	11.0	
Total Split (s)	36.0	36.0	
Total Split (%)	20.7%	20.7%	
Maximum Green (s)	30.0	30.0	
Yellow Time (s)	4.0	4.0	
All-Red Time (s)	2.0	2.0	
Lost Time Adjust (s)		0.0	
Total Lost Time (s)		6.0	
Lead/Lag	Lead	Lead	
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Recall Mode	None	None			None	None		None	None	None	None	
Act Effct Green (s)	6.5	6.5				6.5			14.2	35.8	56.4	
Actuated g/C Ratio	0.07	0.07				0.07			0.14	0.36	0.57	
v/c Ratio	0.07	0.02				0.01			0.49	0.61	0.21	
Control Delay	56.0	0.2				0.0			46.7	31.9	11.3	
Queue Delay	0.0	0.0				0.0			0.0	0.0	0.0	
Total Delay	56.0	0.2				0.0			46.7	31.9	11.3	
LOS	E	A				A			D	C	B	
Approach Delay		37.4							46.7		21.2	
Approach LOS		D							D		C	
Queue Length 50th (ft)	5	0				0			70	174	54	
Queue Length 95th (ft)	24	0				0			144	354	111	
Internal Link Dist (ft)		306				140			829		1669	
Turn Bay Length (ft)	50									820		
Base Capacity (vph)	400	444				477			1848	924	2896	
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	0.02	0.01				0.00			0.13	0.41	0.14	

Intersection Summary

Area Type: Other
Cycle Length: 174
Actuated Cycle Length: 99.1
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 20.9 Intersection LOS: C
Intersection Capacity Utilization 61.3% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 7: River Rd/3A/Lowell Rd/3A & Dracut Rd & Steele Rd/Davenport Rd



Lane Group	NWL2	NWL	NWR
Recall Mode	None	None	
Act Effct Green (s)		25.8	66.1
Actuated g/C Ratio		0.26	0.67
v/c Ratio		0.02	0.60
Control Delay		35.9	10.1
Queue Delay		0.0	0.0
Total Delay		35.9	10.1
LOS		D	B
Approach Delay		10.5	
Approach LOS		B	
Queue Length 50th (ft)		4	144
Queue Length 95th (ft)		21	252
Internal Link Dist (ft)		880	
Turn Bay Length (ft)		120	
Base Capacity (vph)		570	1266
Starvation Cap Reductn		0	0
Spillback Cap Reductn		0	0
Storage Cap Reductn		0	0
Reduced v/c Ratio		0.02	0.49

Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	0	13	4	0	2	86	750	3	2	989	36
Future Volume (vph)	6	0	13	4	0	2	86	750	3	2	989	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	16	12	12	12	12	12	12
Storage Length (ft)	0		150	0		120	270		0	250		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.999			0.995	
Flt Protected		0.950			0.950		0.950			0.950		
Satd. Flow (prot)	0	1770	1794	0	1770	1794	1719	3435	0	1770	3522	0
Flt Permitted							0.950			0.950		
Satd. Flow (perm)	0	1863	1794	0	1863	1794	1719	3435	0	1770	3522	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			78			78		1			7	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			436			437			1173	
Travel Time (s)		9.4			9.9			9.9			26.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	7	0	14	4	0	2	93	815	3	2	1075	39
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	7	14	0	4	2	93	818	0	2	1114	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4		4						
Detector Phase	8	8	8	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0	4.0	15.0		4.0	15.0	
Minimum Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	8.0	28.0		8.0	28.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	66.0		16.0	66.0	
Total Split (%)	16.3%	16.3%	16.3%	16.3%	16.3%	16.3%	16.3%	67.3%		16.3%	67.3%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	12.0	60.0		12.0	60.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0	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	
Total Lost Time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0		2.0	3.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None	None	None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0		7.0			7.0	
Flash Dont Walk (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0			0	
Act Effct Green (s)		6.4	6.4		6.3	6.3	8.0	48.8		5.0	37.6	
Actuated g/C Ratio		0.11	0.11		0.11	0.11	0.14	0.88		0.09	0.68	
v/c Ratio		0.03	0.05		0.02	0.01	0.38	0.27		0.01	0.47	
Control Delay		30.2	0.4		30.5	0.0	30.4	2.9		32.5	8.1	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		30.2	0.4		30.5	0.0	30.4	2.9		32.5	8.1	
LOS		C	A		C	A	C	A		C	A	
Approach Delay		10.3			20.3			5.7			8.2	
Approach LOS		B			C			A			A	
Queue Length 50th (ft)		1	0		1	0	20	0		1	65	
Queue Length 95th (ft)		15	0		11	0	87	116		8	226	
Internal Link Dist (ft)		332			356			357			1093	
Turn Bay Length (ft)			150			120	270			250		
Base Capacity (vph)		365	414		365	414	404	3178		416	3259	
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		0.02	0.03		0.01	0.00	0.23	0.26		0.00	0.34	

Intersection Summary

Area Type: Other

Cycle Length: 98

Actuated Cycle Length: 55.7

Natural Cycle: 55

Control Type: Actuated-Uncoordinated

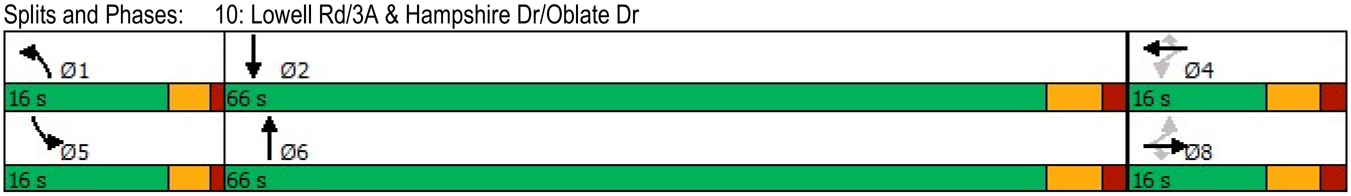
Maximum v/c Ratio: 0.47

Intersection Signal Delay: 7.1 Intersection LOS: A

Intersection Capacity Utilization 51.6% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 10: Lowell Rd/3A & Hampshire Dr/Oblate Dr



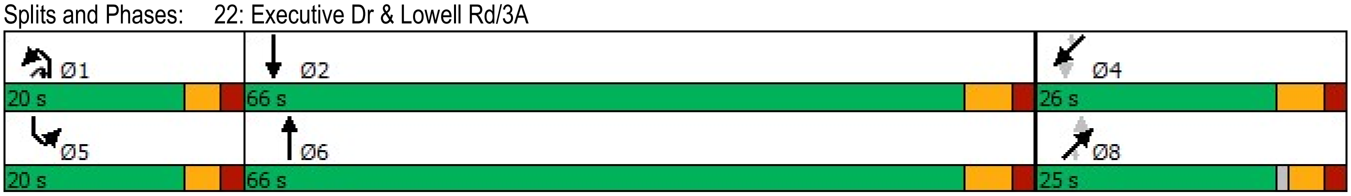
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	110	442	74	83	786	142	31	4	83	158	19	106
Future Volume (vph)	110	442	74	83	786	142	31	4	83	158	19	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	16	12	12	14
Storage Length (ft)	400		0	180		300	0		0	0		0
Storage Lanes	1		0	1		1	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.977				0.850			0.850
Flt Protected	0.950			0.950				0.957			0.957	
Satd. Flow (prot)	1719	3366	0	1770	3458	0	0	1732	1743	0	1783	1689
Flt Permitted	0.950			0.950				0.695			0.722	
Satd. Flow (perm)	1719	3366	0	1770	3458	0	0	1258	1743	0	1345	1689
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			28				90			115
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		669			399			262			149	
Travel Time (s)		15.2			9.1			6.0			3.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	5%	5%	5%	2%	2%	2%
Adj. Flow (vph)	120	480	80	90	854	154	34	4	90	172	21	115
Shared Lane Traffic (%)												
Lane Group Flow (vph)	120	560	0	90	1008	0	0	38	90	0	193	115
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA		Prot	NA		Perm	NA	pm+ov	Perm	NA	Perm
Protected Phases	1	6		5	2			8	1		4	
Permitted Phases							8		8	4		4
Detector Phase	1	6		5	2		8	8	1	4	4	4
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	3.0	3.0	4.0	4.0	4.0
Minimum Split (s)	8.0	31.0		8.0	31.0		25.0	25.0	8.0	26.0	26.0	26.0
Total Split (s)	20.0	66.0		20.0	66.0		25.0	25.0	20.0	26.0	26.0	26.0
Total Split (%)	17.9%	58.9%		17.9%	58.9%		22.3%	22.3%	17.9%	23.2%	23.2%	23.2%
Maximum Green (s)	15.0	60.0		15.0	60.0		20.0	20.0	15.0	20.0	20.0	20.0
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		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	6.0		5.0	6.0			5.0	5.0		6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag				Lead			
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	2.0

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	10.0	37.3		8.6	33.0			16.9	32.2		15.9	15.9
Actuated g/C Ratio	0.13	0.49		0.11	0.43			0.22	0.42		0.21	0.21
v/c Ratio	0.54	0.34		0.45	0.67			0.14	0.12		0.69	0.26
Control Delay	44.3	13.5		43.6	19.8			29.4	4.4		45.5	8.4
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	44.3	13.5		43.6	19.8			29.4	4.4		45.5	8.4
LOS	D	B		D	B			C	A		D	A
Approach Delay		19.0			21.7			11.8			31.7	
Approach LOS		B			C			B			C	
Queue Length 50th (ft)	55	84		41	191			14	0		85	0
Queue Length 95th (ft)	127	140		102	297			48	29		#215	45
Internal Link Dist (ft)		589			319			182			69	
Turn Bay Length (ft)	400			180								
Base Capacity (vph)	352	2676		362	2749			361	907		367	545
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	0.21		0.25	0.37			0.11	0.10		0.53	0.21

Intersection Summary

Area Type: Other
Cycle Length: 112
Actuated Cycle Length: 76.7
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 21.7 Intersection LOS: C
Intersection Capacity Utilization 62.9% ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 22: Executive Dr & Lowell Rd/3A



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	579	692	0
Future Volume (vph)	0	0	0	579	692	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
F						
S						
F						
S						
L						
L						
T						
F						
A						
S						
L						
E						
L						
M						
L						
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Free			Free	Free	

NOT PART OF STUDY

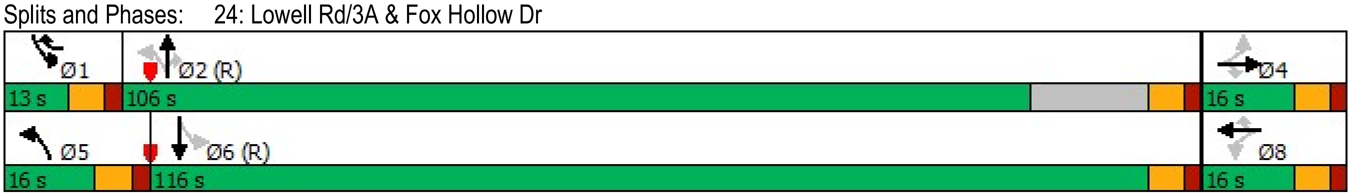
Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 39.8%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	1	31	17	4	25	39	930	6	17	644	3
Future Volume (vph)	35	1	31	17	4	25	39	930	6	17	644	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	14	14	12	12	12	12	12	12
Storage Length (ft)	0		120	0		0	250		400	220		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.954			0.961		0.950			0.950		
Satd. Flow (prot)	0	1726	1538	0	1909	1689	1770	1863	1583	1570	1651	0
Flt Permitted		0.716			0.738		0.354			0.218		
Satd. Flow (perm)	0	1296	1538	0	1466	1689	659	1863	1583	360	1651	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			66			27			66			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		271			227			1282			634	
Travel Time (s)		6.2			5.2			29.1			14.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	15%	15%	15%
Adj. Flow (vph)	38	1	34	18	4	27	42	1011	7	18	700	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	39	34	0	22	27	42	1011	7	18	703	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.92	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Detector Phase	4	4	4	8	8	1	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	31.0	31.0	11.0	31.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	13.0	16.0	106.0	106.0	13.0	116.0	
Total Split (%)	10.8%	10.8%	10.8%	10.8%	10.8%	8.8%	10.8%	71.6%	71.6%	8.8%	78.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	7.0	10.0	100.0	100.0	7.0	110.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag						Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.0	1.5	1.5	1.5	1.0	1.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	
Walk Time (s)								7.0	7.0		7.0	
Flash Dont Walk (s)								18.0	18.0		18.0	
Pedestrian Calls (#/hr)								0	0		0	
Act Effct Green (s)		8.6	8.6		8.6	17.4	124.8	122.0	122.0	124.8	122.0	
Actuated g/C Ratio		0.06	0.06		0.06	0.12	0.84	0.82	0.82	0.84	0.82	
v/c Ratio		0.52	0.23		0.26	0.12	0.07	0.66	0.01	0.05	0.52	
Control Delay		90.5	5.2		72.6	18.6	2.1	9.7	0.0	2.2	7.3	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	1.1	
Total Delay		90.5	5.2		72.6	18.6	2.1	9.7	0.0	2.2	8.4	
LOS		F	A		E	B	A	A	A	A	A	
Approach Delay		50.8			42.8			9.3			8.2	
Approach LOS		D			D			A			A	
Queue Length 50th (ft)		37	0		21	0	4	391	0	2	216	
Queue Length 95th (ft)		78	6		50	29	12	612	0	6	345	
Internal Link Dist (ft)		191			147			1202			554	
Turn Bay Length (ft)			120				250		400	220		
Base Capacity (vph)		92	171		105	244	648	1537	1318	364	1360	
Starvation Cap Reductn		0	0		0	0	0	0	0	0	405	
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		0.42	0.20		0.21	0.11	0.06	0.66	0.01	0.05	0.74	

Intersection Summary	
Area Type: Other	
Cycle Length: 148	
Actuated Cycle Length: 148	
Offset: 45 (30%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 70	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 11.4	Intersection LOS: B
Intersection Capacity Utilization 72.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 24: Lowell Rd/3A & Fox Hollow Dr



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	202	74	555	85	72	868
Future Volume (vph)	202	74	555	85	72	868
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12
Storage Length (ft)	0	100		0	160	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.982			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1743	1777	0	1388	1462
Flt Permitted	0.950				0.290	
Satd. Flow (perm)	1719	1743	1777	0	424	1462
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		58	11			
Link Speed (mph)	30		30			30
Link Distance (ft)	345		634			526
Travel Time (s)	7.8		14.4			12.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	30%	30%
Adj. Flow (vph)	220	80	603	92	78	943
Shared Lane Traffic (%)						
Lane Group Flow (vph)	220	80	695	0	78	943
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pm+ov	NA		pm+pt	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4			2	
Detector Phase	4	5	6		5	2
Switch Phase						
Minimum Initial (s)	5.0	3.0	10.0		3.0	10.0
Minimum Split (s)	11.0	9.0	31.0		9.0	16.0
Total Split (s)	31.0	13.0	106.0		13.0	106.0
Total Split (%)	20.7%	8.7%	70.7%		8.7%	70.7%
Maximum Green (s)	25.0	7.0	100.0		7.0	100.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5		1.5	1.5

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)			7.0			
Flash Dont Walk (s)			18.0			
Pedestrian Calls (#/hr)			0			
Act Effct Green (s)	23.4	35.7	102.3		114.6	114.6
Actuated g/C Ratio	0.16	0.24	0.68		0.76	0.76
v/c Ratio	0.82	0.17	0.57		0.21	0.84
Control Delay	84.5	15.4	15.6		6.6	22.1
Queue Delay	0.0	0.0	2.0		0.0	0.0
Total Delay	84.5	15.4	17.6		6.6	22.1
LOS	F	B	B		A	C
Approach Delay	66.1		17.6			20.9
Approach LOS	E		B			C
Queue Length 50th (ft)	211	17	325		17	547
Queue Length 95th (ft)	293	57	529		38	#1112
Internal Link Dist (ft)	265		554			446
Turn Bay Length (ft)		100			160	
Base Capacity (vph)	303	470	1237		370	1131
Starvation Cap Reductn	0	0	376		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.73	0.17	0.81		0.21	0.83

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 26.5 Intersection LOS: C

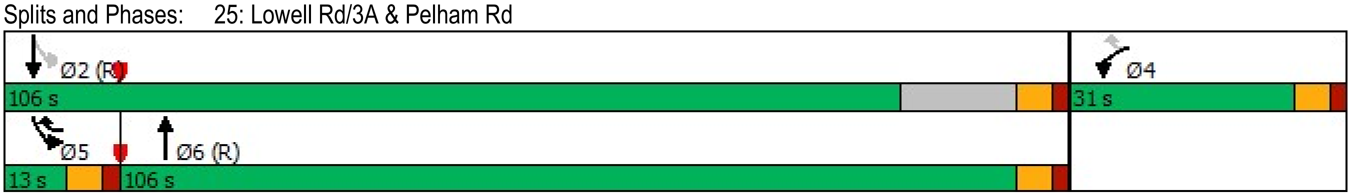
Intersection Capacity Utilization 66.9% ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 25: Lowell Rd/3A & Pelham Rd



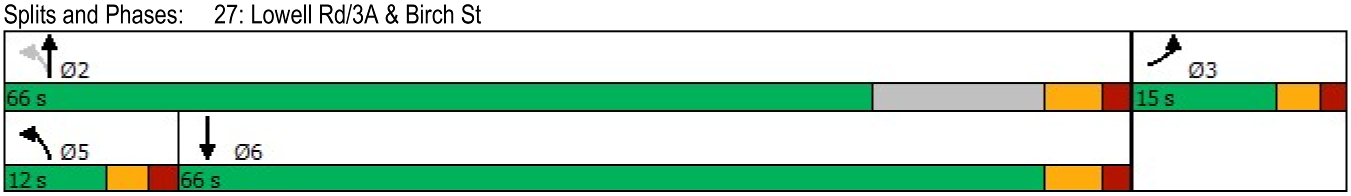
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	38	32	32	534	736	12
Future Volume (vph)	38	32	32	534	736	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	12	12	12	12	12
Storage Length (ft)	0	0	150			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.938				0.998	
Flt Protected	0.974		0.950			
Satd. Flow (prot)	1874	0	1719	1810	1806	0
Flt Permitted	0.974		0.216			
Satd. Flow (perm)	1874	0	391	1810	1806	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	35				2	
Link Speed (mph)	30			30	30	
Link Distance (ft)	442			1237	1199	
Travel Time (s)	10.0			28.1	27.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	41	35	35	580	800	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	76	0	35	580	813	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	3		5	2	6	
Permitted Phases			2			
Detector Phase	3		5	2	6	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	15.0		10.0	11.0	11.0	
Total Split (s)	15.0		12.0	66.0	66.0	
Total Split (%)	16.1%		12.9%	71.0%	71.0%	
Maximum Green (s)	10.0		7.0	60.0	60.0	
Yellow Time (s)	3.0		3.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	5.0		5.0	6.0	6.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0		2.0	2.0	2.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Recall Mode	None		None	Min	Min	
Walk Time (s)	7.0					
Flash Dont Walk (s)	3.0					
Pedestrian Calls (#/hr)	0					
Act Effct Green (s)	6.8		44.4	45.5	41.9	
Actuated g/C Ratio	0.12		0.76	0.78	0.72	
v/c Ratio	0.31		0.08	0.41	0.63	
Control Delay	22.8		2.6	4.4	10.9	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	22.8		2.6	4.4	10.9	
LOS	C		A	A	B	
Approach Delay	22.8			4.3	10.9	
Approach LOS	C			A	B	
Queue Length 50th (ft)	14		2	65	112	
Queue Length 95th (ft)	61		9	131	418	
Internal Link Dist (ft)	362			1157	1119	
Turn Bay Length (ft)			150			
Base Capacity (vph)	387		474	1751	1657	
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	0.20		0.07	0.33	0.49	

Intersection Summary

Area Type: Other
Cycle Length: 93
Actuated Cycle Length: 58.6
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 8.8 Intersection LOS: A
Intersection Capacity Utilization 52.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 27: Lowell Rd/3A & Birch St

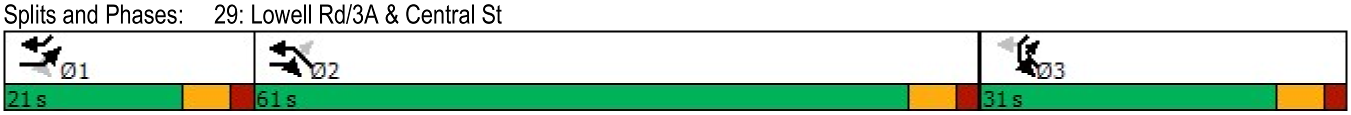


Lane Group	EBL	EBR	NWL	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	128	607	463	109	199	125
Future Volume (vph)	128	607	463	109	199	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	11	11
Storage Length (ft)	300	0	0	80	0	120
Storage Lanes	1	1	1	1	1	1
Taper Length (ft)	25		25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		0.850
Flt Protected	0.950		0.950		0.950	
Satd. Flow (prot)	1770	1583	1719	1641	1711	1531
Flt Permitted	0.950		0.950		0.950	
Satd. Flow (perm)	1770	1583	1719	1641	1711	1531
Right Turn on Red		Yes		Yes		Yes
Satd. Flow (RTOR)		307		118		136
Link Speed (mph)	30		30		30	
Link Distance (ft)	636		905		654	
Travel Time (s)	14.5		20.6		14.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	5%	2%	2%
Adj. Flow (vph)	139	660	503	118	216	136
Shared Lane Traffic (%)						
Lane Group Flow (vph)	139	660	503	118	216	136
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	12		12		11	
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	0.92	1.04	1.04
Turning Speed (mph)	15	9	15	9	15	9
Turn Type	Prot	pm+ov	Prot	pm+ov	Prot	pm+ov
Protected Phases	1	2	2	3	3	1
Permitted Phases		1		2		3
Detector Phase	1	2	2	3	3	1
Switch Phase						
Minimum Initial (s)	8.0	10.0	10.0	8.0	8.0	8.0
Minimum Split (s)	14.0	31.0	31.0	31.0	31.0	14.0
Total Split (s)	21.0	61.0	61.0	31.0	31.0	21.0
Total Split (%)	18.6%	54.0%	54.0%	27.4%	27.4%	18.6%
Maximum Green (s)	15.0	55.0	55.0	25.0	25.0	15.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag			Lead
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	2.5	2.5	2.0	2.0	1.5

Lane Group	EBL	EBR	NWL	NWR	SWL	SWR
Recall Mode	None	Min	Min	None	None	None
Walk Time (s)		7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		18.0	18.0	18.0	18.0	
Pedestrian Calls (#/hr)		0	0	0	0	
Act Effct Green (s)	11.0	52.0	34.6	56.2	15.2	32.6
Actuated g/C Ratio	0.14	0.65	0.43	0.70	0.19	0.41
v/c Ratio	0.57	0.58	0.68	0.10	0.67	0.19
Control Delay	47.5	6.2	23.9	0.9	43.9	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.5	6.3	23.9	0.9	43.9	4.4
LOS	D	A	C	A	D	A
Approach Delay	13.4		19.5		28.6	
Approach LOS	B		B		C	
Queue Length 50th (ft)	63	66	184	0	97	0
Queue Length 95th (ft)	163	195	369	12	222	38
Internal Link Dist (ft)	556		825		574	
Turn Bay Length (ft)	300			80		120
Base Capacity (vph)	356	1427	1253	1408	573	792
Starvation Cap Reductn	0	57	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	0.39	0.48	0.40	0.08	0.38	0.17

Intersection Summary	
Area Type: Other	
Cycle Length: 113	
Actuated Cycle Length: 80.1	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 18.6	Intersection LOS: B
Intersection Capacity Utilization 58.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 29: Lowell Rd/3A & Central St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	290	0	2	347	239	1	1	1	408	9	1
Future Volume (vph)	1	290	0	2	347	239	1	1	1	408	9	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	16	12
Storage Length (ft)	0		0	0		200	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.955				
Flt Protected								0.984			0.953	
Satd. Flow (prot)	0	1863	0	0	1863	1583	0	1750	0	0	2012	0
Flt Permitted		0.999			0.998						0.730	
Satd. Flow (perm)	0	1861	0	0	1859	1583	0	1779	0	0	1541	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						260		1				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		888			636			108			794	
Travel Time (s)		20.2			14.5			2.5			18.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	315	0	2	377	260	1	1	1	443	10	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	316	0	0	379	260	0	3	0	0	454	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			3			4	
Permitted Phases	2			6		6	3			4		
Detector Phase	2	2		6	6	6	3	3		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	5.0	5.0		10.0	10.0	
Minimum Split (s)	31.0	31.0		16.0	16.0	16.0	16.0	16.0		31.0	31.0	
Total Split (s)	46.0	46.0		46.0	46.0	46.0	16.0	16.0		31.0	31.0	
Total Split (%)	49.5%	49.5%		49.5%	49.5%	49.5%	17.2%	17.2%		33.3%	33.3%	
Maximum Green (s)	40.0	40.0		40.0	40.0	40.0	10.0	10.0		25.0	25.0	
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)	2.0	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	
Total Lost Time (s)		6.0			6.0	6.0		6.0			6.0	
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	2.0	2.0		3.0	3.0	
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Walk Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	3.0	3.0					3.0	3.0		3.0	3.0	
Pedestrian Calls (#/hr)	0	0					0	0		0	0	
Act Effct Green (s)		18.3			18.3	18.3		5.2			25.7	
Actuated g/C Ratio		0.32			0.32	0.32		0.09			0.44	
v/c Ratio		0.54			0.65	0.38		0.02			0.66	
Control Delay		20.1			22.8	4.2		27.7			22.8	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		20.1			22.8	4.2		27.7			22.8	
LOS		C			C	A		C			C	
Approach Delay		20.1			15.2			27.7			22.8	
Approach LOS		C			B			C			C	
Queue Length 50th (ft)		82			103	0		1			105	
Queue Length 95th (ft)		181			221	44		9			#388	
Internal Link Dist (ft)		808			556			28			714	
Turn Bay Length (ft)						200						
Base Capacity (vph)		1320			1319	1198		316			683	
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		0.24			0.29	0.22		0.01			0.66	

Intersection Summary

Area Type: Other

Cycle Length: 93

Actuated Cycle Length: 58

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.66

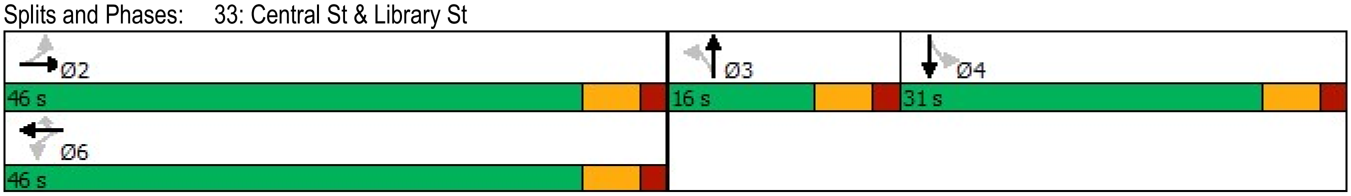
Intersection Signal Delay: 18.8 Intersection LOS: B

Intersection Capacity Utilization 59.5% ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 33: Central St & Library St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	259	1	3	8	227	0	2	3	62	2	4
Future Volume (vph)	18	259	1	3	8	227	0	2	3	62	2	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	16	16	12	16	12	12	16	12
Storage Length (ft)	0		0	0		250	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.919			0.993	
Flt Protected		0.997			0.988						0.956	
Satd. Flow (prot)	0	2067	0	0	2086	1743	0	1666	0	0	1794	0
Flt Permitted		0.997			0.988						0.956	
Satd. Flow (perm)	0	2067	0	0	2086	1743	0	1666	0	0	1794	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		439			888			261			628	
Travel Time (s)		10.0			20.2			5.9			14.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	2%	2%	2%	2%	5%	2%	2%	30%	15%	2%	2%
Adj. Flow (vph)	20	282	1	3	9	247	0	2	3	67	2	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	303	0	0	12	247	0	5	0	0	73	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	0.85	1.00	1.00	0.85	0.85	1.00	0.85	1.00	1.00	0.85	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 42.1%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	0	0	0	892	0	1420
Future Volume (vph)	0	0	0	892	0	1420
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	0.88
Frt						0.850
Flt						
Sa						
Flt						
Sa						
Lir						
Lir						
Tr						
Pe						
Ac						
Sh						
La						
Er						
La						
Me						
Lir						
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Free			Free	Free	

NOT PART OF STUDY

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 53.0%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	10	277	8	25	378	3	0	410	13	2	373	12
Future Volume (vph)	10	277	8	25	378	3	0	410	13	2	373	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	175		0	0		0	200		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.999			0.996			0.995	
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1770	1855	0	1770	1861	0	0	1855	0	1770	1853	0
Flt Permitted	0.257			0.409						0.430		
Satd. Flow (perm)	479	1855	0	762	1861	0	0	1855	0	801	1853	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			1			2			2	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		342			444			371			1247	
Travel Time (s)		7.8			10.1			8.4			28.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	301	9	27	411	3	0	446	14	2	405	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	310	0	27	414	0	0	460	0	2	418	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
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			1			6	
Permitted Phases	4			8						6		
Detector Phase	4	4		8	8			1		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0			10.0		10.0	10.0	
Minimum Split (s)	31.0	31.0		31.0	31.0			31.0		31.0	31.0	
Total Split (s)	46.0	46.0		46.0	46.0			46.0		46.0	46.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%			50.0%		50.0%	50.0%	
Maximum Green (s)	40.0	40.0		40.0	40.0			40.0		40.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0			2.0		2.0	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-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Recall Mode	None	None		None	None			C-Min		C-Min	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Flash Dont Walk (s)	18.0	18.0		18.0	18.0			18.0		18.0	18.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	
Act Effct Green (s)	26.7	26.7		26.7	26.7			53.3		53.3	53.3	
Actuated g/C Ratio	0.29	0.29		0.29	0.29			0.58		0.58	0.58	
v/c Ratio	0.08	0.58		0.12	0.77			0.43		0.00	0.39	
Control Delay	21.6	31.0		22.4	38.9			13.7		11.0	13.2	
Queue Delay	0.0	0.0		0.0	0.1			1.7		0.0	0.0	
Total Delay	21.6	31.0		22.4	39.0			15.4		11.0	13.2	
LOS	C	C		C	D			B		B	B	
Approach Delay		30.7			38.0			15.4			13.2	
Approach LOS		C			D			B			B	
Queue Length 50th (ft)	5	153		12	220			137		1	121	
Queue Length 95th (ft)	16	202		28	281			263		4	233	
Internal Link Dist (ft)		262			364			291			1167	
Turn Bay Length (ft)				175						200		
Base Capacity (vph)	208	807		331	809			1075		464	1074	
Starvation Cap Reductn	0	0		0	39			429		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	0.05	0.38		0.08	0.54			0.71		0.00	0.39	

Intersection Summary

Area Type: Other

Cycle Length: 92

Actuated Cycle Length: 92

Offset: 0 (0%), Referenced to phase 1:NET and 6:SWTL, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

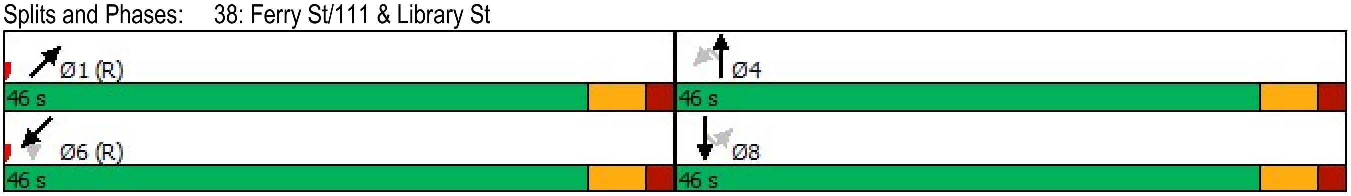
Maximum v/c Ratio: 0.77

Intersection Signal Delay: 23.9 Intersection LOS: C

Intersection Capacity Utilization 53.1% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 38: Ferry St/111 & Library St



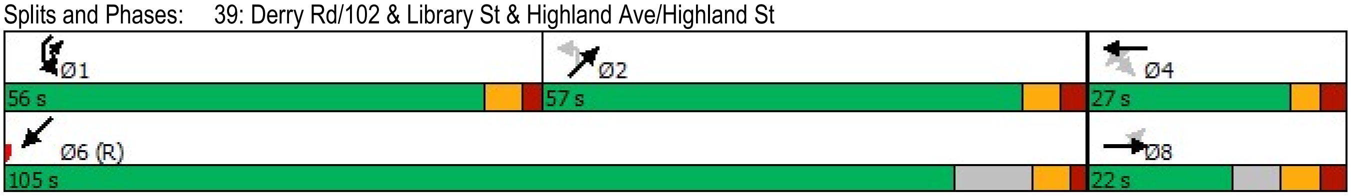
Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NWR	NWR2	NEL	NET
Lane Configurations												
Traffic Volume (vph)	10	10	4	6	2	2	13	52	357	6	1	570
Future Volume (vph)	10	10	4	6	2	2	13	52	357	6	1	570
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12	16	12	12	12	12	12
Storage Length (ft)	0		0			0		0	0		0	
Storage Lanes	0		0			0		0	1		0	
Taper Length (ft)	25					25					25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.955					0.897		0.865			0.998
Flt Protected		0.984					0.997					
Satd. Flow (prot)	0	1927	0	0	0	0	1834	0	1611	0	0	1859
Flt Permitted		0.781					0.980					0.999
Satd. Flow (perm)	0	1530	0	0	0	0	1803	0	1611	0	0	1857
Right Turn on Red				Yes				Yes		Yes		
Satd. Flow (RTOR)		7					57		86			
Link Speed (mph)		30					30					30
Link Distance (ft)		286					634					617
Travel Time (s)		6.5					14.4					14.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	11	11	4	7	2	2	14	57	388	7	1	620
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	33	0	0	0	0	75	0	395	0	0	632
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Right	Left	Left	Left	Right	Right	Right	Left	Left
Median Width(ft)		0					0					12
Link Offset(ft)		0					0					0
Crosswalk Width(ft)		16					16					16
Two way Left Turn Lane												
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	9	15	15		9	9	9	15	
Turn Type	Perm	NA			Perm	Perm	NA		Over		Perm	NA
Protected Phases		8					4		1			2
Permitted Phases	8				4	4					2	
Detector Phase	8	8			4	4	4		1		2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0	5.0	5.0		10.0		10.0	10.0
Minimum Split (s)	22.0	22.0			11.0	11.0	11.0		16.0		17.0	17.0
Total Split (s)	22.0	22.0			27.0	27.0	27.0		56.0		57.0	57.0
Total Split (%)	15.7%	15.7%			19.3%	19.3%	19.3%		40.0%		40.7%	40.7%
Maximum Green (s)	15.0	15.0			21.0	21.0	21.0		50.0		50.0	50.0
Yellow Time (s)	4.0	4.0			3.0	3.0	3.0		4.0		4.0	4.0
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0		2.0		3.0	3.0
Lost Time Adjust (s)		0.0					0.0		0.0			0.0
Total Lost Time (s)		7.0					6.0		6.0			7.0
Lead/Lag									Lead		Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0		4.0	4.0

Lane Group	NER	SWL	SWT
Lane Configurations			
Traffic Volume (vph)	10	361	576
Future Volume (vph)	10	361	576
Ideal Flow (vphpl)	1900	1900	1900
Lane Width (ft)	12	12	12
Storage Length (ft)	0	0	
Storage Lanes	0	1	
Taper Length (ft)		25	
Lane Util. Factor	1.00	1.00	1.00
Frt			
Flt Protected		0.950	
Satd. Flow (prot)	0	1719	1810
Flt Permitted		0.950	
Satd. Flow (perm)	0	1719	1810
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			30
Link Distance (ft)			845
Travel Time (s)			19.2
Peak Hour Factor	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	5%
Adj. Flow (vph)	11	392	626
Shared Lane Traffic (%)			
Lane Group Flow (vph)	0	392	626
Enter Blocked Intersection	No	No	No
Lane Alignment	Right	Left	Left
Median Width(ft)			12
Link Offset(ft)			0
Crosswalk Width(ft)			16
Two way Left Turn Lane			
Headway Factor	1.00	1.00	1.00
Turning Speed (mph)	9	15	
Turn Type		Prot	NA
Protected Phases		1	6
Permitted Phases			
Detector Phase		1	6
Switch Phase			
Minimum Initial (s)		10.0	10.0
Minimum Split (s)		16.0	16.0
Total Split (s)		56.0	105.0
Total Split (%)		40.0%	75.0%
Maximum Green (s)		50.0	99.0
Yellow Time (s)		4.0	4.0
All-Red Time (s)		2.0	2.0
Lost Time Adjust (s)		0.0	0.0
Total Lost Time (s)		6.0	6.0
Lead/Lag		Lead	
Lead-Lag Optimize?			
Vehicle Extension (s)		3.0	3.0

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NWR	NWR2	NEL	NET
Recall Mode	None	None			None	None	None		None		Min	Min
Walk Time (s)	7.0	7.0										
Flash Dont Walk (s)	8.0	8.0										
Pedestrian Calls (#/hr)	0	0										
Act Effct Green (s)		7.7					8.7		39.5			72.8
Actuated g/C Ratio		0.06					0.06		0.28			0.52
v/c Ratio		0.37					0.45		0.77			0.65
Control Delay		63.8					30.7		45.0			30.8
Queue Delay		0.0					0.0		1.5			3.2
Total Delay		63.8					30.7		46.4			34.0
LOS		E					C		D			C
Approach Delay		63.8					30.7					34.0
Approach LOS		E					C					C
Queue Length 50th (ft)		23					16		263			409
Queue Length 95th (ft)		59					67		349			666
Internal Link Dist (ft)		206					554					537
Turn Bay Length (ft)												
Base Capacity (vph)		224					318		631			966
Starvation Cap Reductn		0					0		100			232
Spillback Cap Reductn		0					0		0			0
Storage Cap Reductn		0					0		0			0
Reduced v/c Ratio		0.15					0.24		0.74			0.86

Intersection Summary	
Area Type: Other	
Cycle Length: 140	
Actuated Cycle Length: 140	
Offset: 0 (0%), Referenced to phase 6:SWT, Start of Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 32.3	Intersection LOS: C
Intersection Capacity Utilization 82.8%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 39: Derry Rd/102 & Library St & Highland Ave/Highland St



Lane Group	NER	SWL	SWT
Recall Mode		None	C-Min
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
Act Effct Green (s)		39.5	119.3
Actuated g/C Ratio		0.28	0.85
v/c Ratio		0.81	0.41
Control Delay		59.5	3.3
Queue Delay		0.0	0.0
Total Delay		59.5	3.3
LOS		E	A
Approach Delay			24.9
Approach LOS			C
Queue Length 50th (ft)		332	97
Queue Length 95th (ft)		411	156
Internal Link Dist (ft)			765
Turn Bay Length (ft)			
Base Capacity (vph)		614	1542
Starvation Cap Reductn		0	0
Spillback Cap Reductn		0	0
Storage Cap Reductn		0	0
Reduced v/c Ratio		0.64	0.41

Intersection Summary

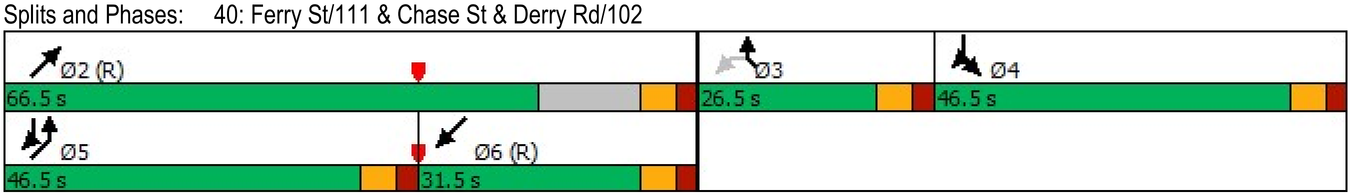
Lane Group	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	73	697	243	13	17	403	480	9	0	480	0
Future Volume (vph)	73	697	243	13	17	403	480	9	0	480	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	12	13	12	12	12	12	12
Storage Length (ft)	150	300	0	0		0		0	0		0
Storage Lanes	1	1	1	1		1		0	0		0
Taper Length (ft)	25		25			25			25		
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850		0.850			0.997				
Flt Protected	0.950		0.950			0.950					
Satd. Flow (prot)	1719	2707	1719	1641	0	1776	1804	0	0	3438	0
Flt Permitted	0.950		0.189			0.950					
Satd. Flow (perm)	1719	2707	342	1641	0	1776	1804	0	0	3438	0
Right Turn on Red		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		73		119			1				
Link Speed (mph)	30		30				30			30	
Link Distance (ft)	617		345				426			371	
Travel Time (s)	14.0		7.8				9.7			8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	2%	5%	2%
Adj. Flow (vph)	79	758	264	14	18	438	522	10	0	522	0
Shared Lane Traffic (%)											
Lane Group Flow (vph)	79	758	264	32	0	438	532	0	0	522	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12		12				13			13	
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	0.92	1.00	0.96	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	9	15		9	15		9
Turn Type	Prot	pt+ov	Perm	Prot		Prot	NA			NA	
Protected Phases	4	4 5		3		5	2			6	
Permitted Phases			3								
Detector Phase	4	4 5	3	3		5	2			6	
Switch Phase											
Minimum Initial (s)	8.0		5.0	5.0		8.0	10.0			10.0	
Minimum Split (s)	24.5		24.5	24.5		24.5	24.5			24.5	
Total Split (s)	46.5		26.5	26.5		46.5	66.5			31.5	
Total Split (%)	30.8%		17.5%	17.5%		30.8%	44.0%			20.9%	
Maximum Green (s)	40.0		20.0	20.0		40.0	60.0			25.0	
Yellow Time (s)	4.0		4.0	4.0		4.0	4.0			4.0	
All-Red Time (s)	2.5		2.5	2.5		2.5	2.5			2.5	
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.5		6.5	6.5		6.5	6.5			6.5	
Lead/Lag	Lag		Lead	Lead		Lead				Lag	
Lead-Lag Optimize?											
Vehicle Extension (s)	1.5		1.5	1.5		1.5	1.5			1.5	

Lane Group	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Recall Mode	None		None	None		None	C-Min			C-Min	
Walk Time (s)	7.0		7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	11.0		11.0	11.0		11.0	11.0			11.0	
Pedestrian Calls (#/hr)	0		0	0		0	0			0	
Act Effct Green (s)	32.2	82.0	21.2	21.2		43.3	78.1			28.3	
Actuated g/C Ratio	0.21	0.54	0.14	0.14		0.29	0.52			0.19	
v/c Ratio	0.22	0.50	5.50	0.10		0.86	0.57			0.81	
Control Delay	49.0	20.2	2101.9	0.6		68.0	28.6			69.9	
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0			1.7	
Total Delay	49.0	20.2	2101.9	0.6		68.0	28.6			71.6	
LOS	D	C	F	A		E	C			E	
Approach Delay	22.9		1874.7				46.4			71.6	
Approach LOS	C		F				D			E	
Queue Length 50th (ft)	66	217	~493	0		386	336			270	
Queue Length 95th (ft)	107	273	#651	0		#633	512			#376	
Internal Link Dist (ft)	537		265				346			291	
Turn Bay Length (ft)	150	300									
Base Capacity (vph)	455	1509	48	332		516	933			644	
Starvation Cap Reductn	0	0	0	0		0	0			38	
Spillback Cap Reductn	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.17	0.50	5.50	0.10		0.85	0.57			0.86	

Intersection Summary

Area Type: Other
Cycle Length: 151
Actuated Cycle Length: 151
Offset: 0 (0%), Referenced to phase 2:NET and 6:SWT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 5.50
Intersection Signal Delay: 250.1 Intersection LOS: F
Intersection Capacity Utilization 77.4% 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: 40: Ferry St/111 & Chase St & Derry Rd/102



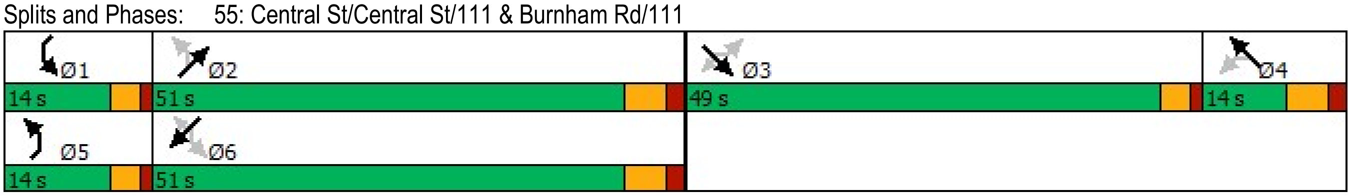
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	390	4	34	16	6	14	13	269	14	17	368	513
Future Volume (vph)	390	4	34	16	6	14	13	269	14	17	368	513
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	16	12	12	12	12	12	12	14
Storage Length (ft)	0		200	0		0	120		0	280		280
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.948			0.993				0.850
Flt Protected		0.953			0.979		0.950			0.950		
Satd. Flow (prot)	0	1775	1794	0	1959	0	1770	1850	0	1770	1863	1689
Flt Permitted		0.438			0.700		0.262			0.399		
Satd. Flow (perm)	0	816	1794	0	1401	0	488	1850	0	743	1863	1689
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			111		15			2				558
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		882			126			314			2248	
Travel Time (s)		20.0			2.9			7.1			51.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	424	4	37	17	7	15	14	292	15	18	400	558
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	428	37	0	39	0	14	307	0	18	400	558
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		3			4		5	2		1	6	
Permitted Phases	3		3	4			2			6		6
Detector Phase	3	3	3	4	4		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	4.0	4.0		4.0	10.0		4.0	10.0	10.0
Minimum Split (s)	14.0	14.0	14.0	10.0	10.0		8.0	16.0		8.0	16.0	16.0
Total Split (s)	49.0	49.0	49.0	14.0	14.0		14.0	51.0		14.0	51.0	51.0
Total Split (%)	38.3%	38.3%	38.3%	10.9%	10.9%		10.9%	39.8%		10.9%	39.8%	39.8%
Maximum Green (s)	45.0	45.0	45.0	8.0	8.0		10.0	45.0		10.0	45.0	45.0
Yellow Time (s)	3.0	3.0	3.0	4.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0		1.0	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)		4.0	4.0		6.0		4.0	6.0		4.0	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Act Effct Green (s)		47.0	47.0		7.0		33.7	29.6		33.7	29.6	29.6
Actuated g/C Ratio		0.48	0.48		0.07		0.35	0.30		0.35	0.30	0.30
v/c Ratio		1.09	0.04		0.34		0.06	0.55		0.06	0.71	0.62
Control Delay		102.0	0.1		44.2		20.2	32.8		20.1	38.4	5.7
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		102.0	0.1		44.2		20.2	32.8		20.1	38.4	5.7
LOS		F	A		D		C	C		C	D	A
Approach Delay		93.9			44.3			32.3			19.4	
Approach LOS		F			D			C			B	
Queue Length 50th (ft)		~309	0		14		6	158		8	220	0
Queue Length 95th (ft)		#672	0		56		18	272		22	366	74
Internal Link Dist (ft)		802			46			234			2168	
Turn Bay Length (ft)			200				120			280		280
Base Capacity (vph)		393	922		134		311	892		376	897	1103
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		1.09	0.04		0.29		0.05	0.34		0.05	0.45	0.51

Intersection Summary

Area Type: Other
Cycle Length: 128
Actuated Cycle Length: 97.6
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.09
Intersection Signal Delay: 41.4 Intersection LOS: D
Intersection Capacity Utilization 56.2% ICU Level of Service B
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: 55: Central St/Central St/111 & Burnham Rd/111



Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	26	28	478	26	137	267	124	28	149	102	3	11
Future Volume (vph)	26	28	478	26	137	267	124	28	149	102	3	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	12	12	12	16	12	12	16	12
Storage Length (ft)		300		300	300		300		140		300	
Storage Lanes		1		1	1		2		1		0	
Taper Length (ft)		25			25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850			0.850	0.850		0.982		
Flt Protected		0.950			0.950				0.950			
Satd. Flow (prot)	0	1719	1652	1641	1770	1810	1538	1743	1719	1824	0	0
Flt Permitted		0.260			0.260				0.514			
Satd. Flow (perm)	0	470	1652	1641	484	1810	1538	1743	930	1824	0	0
Right Turn on Red				Yes				Yes				Yes
Satd. Flow (RTOR)				132				132		3		
Link Speed (mph)			30			30				30		
Link Distance (ft)			2248			4120				755		
Travel Time (s)			51.1			93.6				17.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	15%	5%	2%	5%	5%	5%	5%	2%	2%	5%
Adj. Flow (vph)	28	30	520	28	149	290	135	30	162	111	3	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	58	520	28	149	290	135	30	162	126	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right	Left	Left	Right	Right
Median Width(ft)			12			12				12		
Link Offset(ft)			0			0				0		
Crosswalk Width(ft)			16			16				16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.85	1.00	1.00	0.85	1.00
Turning Speed (mph)	15	15		9	15		9	9	15		9	9
Turn Type	custom	Prot	NA	Free	custom	NA	Perm	Free	pm+pt	NA		
Protected Phases		1	6			2			7	4		
Permitted Phases	1			Free	5		2	Free	4			
Detector Phase	1	1	6		5	2	2		7	4		
Switch Phase												
Minimum Initial (s)	4.0	4.0	15.0		4.0	15.0	15.0		4.0	10.0		
Minimum Split (s)	8.0	8.0	21.0		8.0	21.0	21.0		8.0	16.0		
Total Split (s)	19.0	19.0	66.0		19.0	66.0	66.0		19.0	51.0		
Total Split (%)	10.9%	10.9%	37.9%		10.9%	37.9%	37.9%		10.9%	29.3%		
Maximum Green (s)	15.0	15.0	60.0		15.0	60.0	60.0		15.0	45.0		
Yellow Time (s)	3.0	3.0	4.0		3.0	4.0	4.0		3.0	4.0		
All-Red Time (s)	1.0	1.0	2.0		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		
Total Lost Time (s)		4.0	6.0		4.0	6.0	6.0		4.0	6.0		
Lead/Lag	Lead	Lead	Lag		Lead	Lag	Lag		Lag			
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	3.0		2.0	3.0	3.0		2.0	3.0		

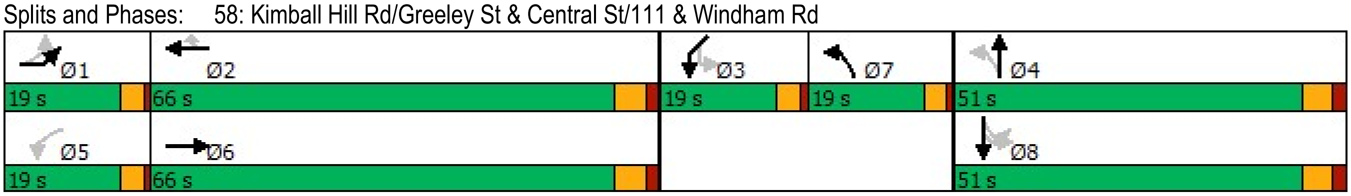
Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Traffic Volume (vph)	10	94	63	72	40	16	32	15
Future Volume (vph)	10	94	63	72	40	16	32	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	12	12	12
Storage Length (ft)		0		0		0	0	
Storage Lanes		0		0		1	0	
Taper Length (ft)		25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.959			0.938		
Flt Protected			0.979			0.974		
Satd. Flow (prot)	0	0	1925	0	0	1702	0	0
Flt Permitted			0.730			0.974		
Satd. Flow (perm)	0	0	1436	0	0	1702	0	0
Right Turn on Red				No				No
Satd. Flow (RTOR)								
Link Speed (mph)			30			30		
Link Distance (ft)			869			736		
Travel Time (s)			19.8			16.7		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	11	102	68	78	43	17	35	16
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	259	0	0	111	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right
Median Width(ft)			12			12		
Link Offset(ft)			0			0		
Crosswalk Width(ft)			16			16		
Two way Left Turn Lane								
Headway Factor	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	15	15	9	9
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			8			3		
Permitted Phases	8	8			3			
Detector Phase	8	8	8		3	3		
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0		4.0	4.0		
Minimum Split (s)	16.0	16.0	16.0		8.0	8.0		
Total Split (s)	51.0	51.0	51.0		19.0	19.0		
Total Split (%)	29.3%	29.3%	29.3%		10.9%	10.9%		
Maximum Green (s)	45.0	45.0	45.0		15.0	15.0		
Yellow Time (s)	4.0	4.0	4.0		3.0	3.0		
All-Red Time (s)	2.0	2.0	2.0		1.0	1.0		
Lost Time Adjust (s)			0.0			0.0		
Total Lost Time (s)			6.0			4.0		
Lead/Lag					Lead	Lead		
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0		

Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Recall Mode	None	None	Min		None	Min	Min		None	None		
Act Effct Green (s)		15.4	52.0	150.9	15.4	52.0	52.0	150.9	47.6	32.5		
Actuated g/C Ratio		0.10	0.34	1.00	0.10	0.34	0.34	1.00	0.32	0.22		
v/c Ratio		1.23	0.91	0.02	3.04	0.46	0.25	0.02	0.45	0.32		
Control Delay		258.4	69.9	0.0	996.2	42.7	38.8	0.0	41.3	52.4		
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay		258.4	69.9	0.0	996.2	42.7	38.8	0.0	41.3	52.4		
LOS		F	E	A	F	D	D	A	D	D		
Approach Delay			84.7			274.9				46.2		
Approach LOS			F			F				D		
Queue Length 50th (ft)		~79	513	0	~278	233	100	0	125	112		
Queue Length 95th (ft)		#198	#796	0	#461	355	172	0	189	177		
Internal Link Dist (ft)			2168			4040				675		
Turn Bay Length (ft)		300		300	300		300	300	140			
Base Capacity (vph)		47	675	1641	49	740	628	1743	384	561		
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		1.23	0.77	0.02	3.04	0.39	0.21	0.02	0.42	0.22		

Intersection Summary

Area Type: Other
Cycle Length: 174
Actuated Cycle Length: 150.9
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 3.04
Intersection Signal Delay: 140.7 Intersection LOS: F
Intersection Capacity Utilization 75.5% 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: 58: Kimball Hill Rd/Greeley St & Central St/111 & Windham Rd



Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Recall Mode	None	None	None		None	None		
Act Effct Green (s)			32.5			13.2		
Actuated g/C Ratio			0.22			0.09		
v/c Ratio			0.84			0.75		
Control Delay			81.6			99.9		
Queue Delay			0.0			0.0		
Total Delay			81.6			99.9		
LOS			F			F		
Approach Delay			81.6			99.9		
Approach LOS			F			F		
Queue Length 50th (ft)			267			116		
Queue Length 95th (ft)			382			#231		
Internal Link Dist (ft)			789			656		
Turn Bay Length (ft)								
Base Capacity (vph)			440			173		
Starvation Cap Reductn			0			0		
Spillback Cap Reductn			0			0		
Storage Cap Reductn			0			0		
Reduced v/c Ratio			0.59			0.64		

Intersection Summary

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	88	285	237	49	214	178
Future Volume (vph)	88	285	237	49	214	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	12	12	12	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.897		0.977			
Flt Protected	0.988					0.973
Satd. Flow (prot)	1777	0	1768	0	0	1694
Flt Permitted	0.988					0.973
Satd. Flow (perm)	1777	0	1768	0	0	1694
Link Speed (mph)	30		30			30
Link Distance (ft)	832		787			870
Travel Time (s)	18.9		17.9			19.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	5%	5%	5%	15%	2%
Adj. Flow (vph)	96	310	258	53	233	193
Shared Lane Traffic (%)						
Lane Group Flow (vph)	406	0	311	0	0	426
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	16		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 69.1%	ICU Level of Service C
Analysis Period (min) 15	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	164	133	54	170	87	23
Future Volume (vph)	164	133	54	170	87	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12
Storage Length (ft)		0	180		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.939				0.972	
Flt Protected			0.950		0.962	
Satd. Flow (prot)	1629	0	1770	1810	1705	0
Flt Permitted			0.950		0.962	
Satd. Flow (perm)	1629	0	1770	1810	1705	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1417			420	606	
Travel Time (s)	32.2			9.5	13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	15%	2%	5%	15%	30%
Adj. Flow (vph)	178	145	59	185	95	25
Shared Lane Traffic (%)						
Lane Group Flow (vph)	323	0	59	185	120	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	16	
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	0.85	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 36.3%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	142	2	174	226	9	201
Future Volume (vph)	142	2	174	226	9	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	16	12
Storage Length (ft)		0	80		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.998				0.871	
Flt Protected			0.950		0.998	
Satd. Flow (prot)	1646	0	1719	1872	1775	0
Flt Permitted			0.950		0.998	
Satd. Flow (perm)	1646	0	1719	1872	1775	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	2748			314	1025	
Travel Time (s)	62.5			7.1	23.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	30%	5%	15%	15%	5%
Adj. Flow (vph)	154	2	189	246	10	218
Shared Lane Traffic (%)						
Lane Group Flow (vph)	156	0	189	246	228	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	16	
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	0.85	0.85	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 40.2%	ICU Level of Service A
Analysis Period (min) 15	

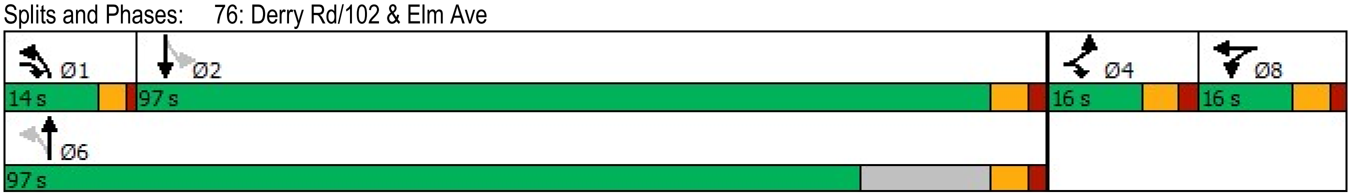
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	0	268	1	0	0	133	660	0	0	800	11
Future Volume (vph)	44	0	268	1	0	0	133	660	0	0	800	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	12	12	12	12	12	15	12
Storage Length (ft)	130		0	0		0	465		0	0		0
Storage Lanes	1		1	1		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850								0.998	
Flt Protected	0.950			0.950			0.950					
Satd. Flow (prot)	1719	0	1538	1770	1863	0	1770	1863	0	0	1986	0
Flt Permitted	0.950			0.950			0.119					
Satd. Flow (perm)	1719	0	1538	1770	1863	0	222	1863	0	0	1986	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			270								1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		468			79			2433			1216	
Travel Time (s)		10.6			1.8			55.3			27.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	5%	2%	2%	2%	2%	2%	2%	2%	5%	5%
Adj. Flow (vph)	48	0	291	1	0	0	145	717	0	0	870	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	48	0	291	1	0	0	145	717	0	0	882	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	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot		pt+ov	Split			pm+pt	NA			NA	
Protected Phases	4		4 1	8	8		1	6			2	
Permitted Phases							6			2		
Detector Phase	4		4 1	8	8		1	6		2	2	
Switch Phase												
Minimum Initial (s)	3.0			5.0	5.0		3.0	10.0		10.0	10.0	
Minimum Split (s)	9.0			11.0	11.0		7.0	16.0		16.0	16.0	
Total Split (s)	16.0			16.0	16.0		14.0	97.0		97.0	97.0	
Total Split (%)	11.2%			11.2%	11.2%		9.8%	67.8%		67.8%	67.8%	
Maximum Green (s)	10.0			10.0	10.0		10.0	91.0		91.0	91.0	
Yellow Time (s)	4.0			4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	2.0			2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0			0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0			6.0	6.0		4.0	6.0			6.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5			0.4	0.4		2.0	5.0		5.0	5.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None			None	None		None	Min		Min	Min	
Act Effct Green (s)	7.7		18.1	5.4			61.1	58.9			47.7	
Actuated g/C Ratio	0.10		0.22	0.07			0.75	0.73			0.59	
v/c Ratio	0.29		0.53	0.01			0.49	0.53			0.75	
Control Delay	47.0		9.4	51.0			9.0	6.6			17.1	
Queue Delay	0.0		0.0	0.0			0.0	0.0			0.0	
Total Delay	47.0		9.4	51.0			9.0	6.6			17.1	
LOS	D		A	D			A	A			B	
Approach Delay		14.8			51.0			7.0			17.1	
Approach LOS		B			D			A			B	
Queue Length 50th (ft)	21		7	0			13	109			259	
Queue Length 95th (ft)	80		87	7			47	298			605	
Internal Link Dist (ft)		388			1			2353			1136	
Turn Bay Length (ft)	130						465					
Base Capacity (vph)	230		576	237			374	1797			1872	
Starvation Cap Reductn	0		0	0			0	0			0	
Spillback Cap Reductn	0		0	0			0	0			0	
Storage Cap Reductn	0		0	0			0	0			0	
Reduced v/c Ratio	0.21		0.51	0.00			0.39	0.40			0.47	

Intersection Summary

Area Type: Other
Cycle Length: 143
Actuated Cycle Length: 81
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 12.6 Intersection LOS: B
Intersection Capacity Utilization 99.9% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 76: Derry Rd/102 & Elm Ave



Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	95	68	34	435	504	47
Future Volume (vph)	95	68	34	435	504	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	12	12	12	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.944				0.989	
Flt Protected	0.972			0.996		
Satd. Flow (prot)	1904	0	0	1659	1775	0
Flt Permitted	0.972			0.996		
Satd. Flow (perm)	1904	0	0	1659	1775	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	420			2236	3657	
Travel Time (s)	9.5			50.8	83.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	15%	5%	15%
Adj. Flow (vph)	103	74	37	473	548	51
Shared Lane Traffic (%)						
Lane Group Flow (vph)	177	0	0	510	599	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary		
Area Type:	Other	
Control Type: Unsignalized		
Intersection Capacity Utilization 67.0%		ICU Level of Service C
Analysis Period (min) 15		

A.2 Base Model (2022) - PM Peak (49 pages)

Reference Table – Table 6 # to # in SYNCRHO Reports

Table 6 #	# in SYNCHRO Reports	Intersection / Direction TOWARD
1	**40**	111-102-3A (Ferry & Chase)
2	**38**	Library & Ferry
3	**39**	Library and Highland
4	**55**	Burnham and Central
5	**58**	Central-Kimball-Greeley (Rt.111 & Greeley)
6	**76**	Derry and 102 (Route 102 & Elm Ave)
7	**82**	NH 102/Page Rd
8	**34**	NH 3A Central St/Chase St
9	**33**	Central and Library
10	**29**	Lowell and Central
11	**25**	Lowell and Pelham
12	**22**	Lowell and Executive
13	**10**	Lowell-Hampshire-Oblate
14	**1**	Lowell & Wason
16	**4**	NH 3A Lowell Rd/Walmart Blvd
17	**5**	NH 3A Lowell Rd/Rena Ave
18	**7**	NH 3A Lowell Rd/Dracut Rd/Steele Rd
19	**67**	Dracut Rd/Sherburne Rd
20	**70**	Kimball Hill Rd/Bush Hill Rd
21	**73**	Central St/Belknap Rd
22	**24**	Lowell & Fox Hollow Dr
23	**27**	Lowell & Birch St
15_com	**2**	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined
15M	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section
15N	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section
15S	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	72	292	314	32	38	143	875	529	60	836	32
Future Volume (vph)	47	72	292	314	32	38	143	875	529	60	836	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	14	12	12	12	12	12	12
Storage Length (ft)	0		0	0		100	650		350	200		0
Storage Lanes	0		1	1		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.95
Frt			0.850			0.850			0.850		0.994	
Flt Protected		0.981		0.950	0.961		0.950			0.950		
Satd. Flow (prot)	0	1621	1592	1491	1508	1498	1719	3438	1538	1570	3120	0
Flt Permitted		0.981		0.950	0.961		0.950			0.950		
Satd. Flow (perm)	0	1621	1592	1491	1508	1498	1719	3438	1538	1570	3120	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			107			87			402		2	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		573			432			1014			1071	
Travel Time (s)		13.0			9.8			23.0			24.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	5%	5%	5%	15%	15%	15%
Adj. Flow (vph)	51	78	317	341	35	41	155	951	575	65	909	35
Shared Lane Traffic (%)				45%								
Lane Group Flow (vph)	0	129	317	188	188	41	155	951	575	65	944	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	0.85	1.00	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Split	NA	pm+ov	Split	NA	pm+ov	Prot	NA	pm+ov	Prot	NA	
Protected Phases	8	8	1	7	7	5	1	6	7	5	2	
Permitted Phases			8			7			6			
Detector Phase	8	8	1	7	7	5	1	6	7	5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	5.0	5.0	10.0	
Minimum Split (s)	26.0	26.0	11.0	31.0	31.0	11.0	11.0	31.0	31.0	11.0	31.0	
Total Split (s)	26.0	26.0	31.0	56.0	56.0	21.0	31.0	81.0	56.0	21.0	76.0	
Total Split (%)	13.8%	13.8%	16.4%	29.6%	29.6%	11.1%	16.4%	42.9%	29.6%	11.1%	40.2%	
Maximum Green (s)	20.0	20.0	25.0	50.0	50.0	15.0	25.0	75.0	50.0	15.0	70.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3.0	2.5	2.5	3.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None	None	None	Min	None	None	Min	
Walk Time (s)	7.0	7.0						7.0			7.0	
Flash Dont Walk (s)	11.0	11.0						11.0			11.0	
Pedestrian Calls (#/hr)	0	0						0			0	
Act Effct Green (s)		16.4	41.5	26.5	26.5	37.5	18.8	58.3	91.2	11.0	50.5	
Actuated g/C Ratio		0.12	0.30	0.19	0.19	0.27	0.14	0.42	0.66	0.08	0.37	
v/c Ratio		0.67	0.57	0.66	0.65	0.09	0.66	0.65	0.50	0.52	0.82	
Control Delay		81.7	33.4	66.3	65.7	0.4	75.9	34.8	4.4	85.2	47.7	
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	
Total Delay		81.7	33.4	66.3	65.7	0.4	75.9	34.8	4.5	85.2	47.7	
LOS		F	C	E	E	A	E	C	A	F	D	
Approach Delay		47.4			59.5			28.2			50.2	
Approach LOS		D			E			C			D	
Queue Length 50th (ft)		113	159	168	167	0	135	355	56	58	405	
Queue Length 95th (ft)		#248	334	306	305	0	263	529	130	134	605	
Internal Link Dist (ft)		493			352			934			991	
Turn Bay Length (ft)						100	650		350	200		
Base Capacity (vph)		250	639	576	583	522	332	2126	1371	181	1689	
Starvation Cap Reductn		0	0	0	0	0	0	0	90	0	0	
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	
Reduced v/c Ratio		0.52	0.50	0.33	0.32	0.08	0.47	0.45	0.45	0.36	0.56	

Intersection Summary

Area Type: Other
Cycle Length: 189
Actuated Cycle Length: 137.7
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 40.5 Intersection LOS: D
Intersection Capacity Utilization 66.7% 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: Lowell Rd/3A & Flagstone Dr/Wason Rd

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	NEL	NER
Lane Configurations									
Traffic Volume (vph)	0	0	941	520	472	0	1117	1316	962
Future Volume (vph)	0	0	941	520	472	0	1117	1316	962
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	14	12
Storage Length (ft)	0	0	550			300		0	0
Storage Lanes	0	0	2			1		2	1
Taper Length (ft)	25		25					25	
Lane Util. Factor	1.00	1.00	0.97	0.95	0.95	1.00	1.00	0.97	1.00
Frt							0.850		0.850
Flt Protected			0.950					0.950	
Satd. Flow (prot)	0	0	3335	3438	3539	0	1538	3557	1583
Flt Permitted			0.950					0.950	
Satd. Flow (perm)	0	0	3335	3438	3539	0	1538	3557	1583
Right Turn on Red							Yes		Yes
Satd. Flow (RTOR)							712		476
Link Speed (mph)	55			30	30			42	
Link Distance (ft)	1050			613	1014			972	
Travel Time (s)	13.0			13.9	23.0			15.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	5%	2%	2%	5%	5%	2%
Adj. Flow (vph)	0	0	1023	565	513	0	1214	1430	1046
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	0	1023	565	513	0	1214	1430	1046
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right	Right	Left	Right
Median Width(ft)	0			24	24			28	
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	0.92	1.00
Turning Speed (mph)	15	9	15			9	9	15	9
Turn Type			Prot	NA	NA		Free	Prot	Free
Protected Phases			1	6	2			3	
Permitted Phases							Free		Free
Detector Phase			1	6	2			3	
Switch Phase									
Minimum Initial (s)			7.0	10.0	10.0			10.0	
Minimum Split (s)			13.0	16.0	16.0			16.0	
Total Split (s)			41.0	36.0	36.0			41.0	
Total Split (%)			34.7%	30.5%	30.5%			34.7%	
Maximum Green (s)			35.0	30.0	30.0			35.0	
Yellow Time (s)			4.0	4.0	4.0			4.0	
All-Red Time (s)			2.0	2.0	2.0			2.0	
Lost Time Adjust (s)			0.0	0.0	0.0			0.0	
Total Lost Time (s)			6.0	6.0	6.0			6.0	
Lead/Lag			Lead		Lag				
Lead-Lag Optimize?									
Vehicle Extension (s)			4.0	4.0	4.0			4.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	NEL	NER
Recall Mode			None	Min	Min			None	
Act Effct Green (s)			35.1	64.1	23.0		111.2	35.1	111.2
Actuated g/C Ratio			0.32	0.58	0.21		1.00	0.32	1.00
v/c Ratio			0.97	0.29	0.70		0.79	1.28	0.66
Control Delay			60.6	12.2	46.2		4.2	164.5	2.2
Queue Delay			0.0	0.0	0.0		0.0	0.0	0.0
Total Delay			60.6	12.2	46.2		4.2	164.5	2.2
LOS			E	B	D		A	F	A
Approach Delay				43.4	16.7			95.9	
Approach LOS				D	B			F	
Queue Length 50th (ft)			369	101	180		0	~663	0
Queue Length 95th (ft)			#562	132	237		0	#873	0
Internal Link Dist (ft)	970			533	934			892	
Turn Bay Length (ft)			550				300		
Base Capacity (vph)			1051	2198	956		1538	1121	1583
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			0.97	0.26	0.54		0.79	1.28	0.66

Intersection Summary

Area Type: Other

Cycle Length: 118

Actuated Cycle Length: 111.2

Natural Cycle: 110

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.28

Intersection Signal Delay: 57.9 Intersection LOS: E

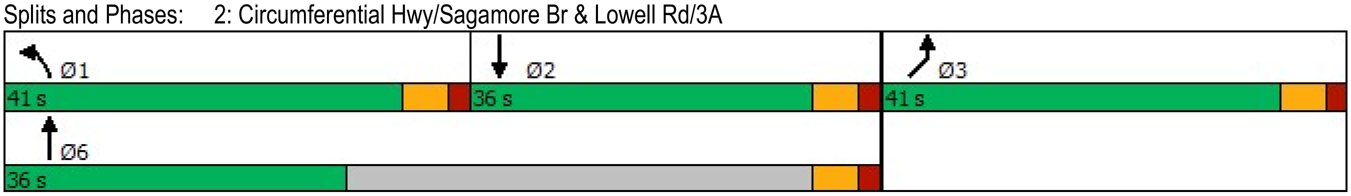
Intersection Capacity Utilization 92.4% ICU Level of Service F

Analysis Period (min) 15

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

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

Splits and Phases: 2: Circumferential Hwy/Sagamore Br & Lowell Rd/3A



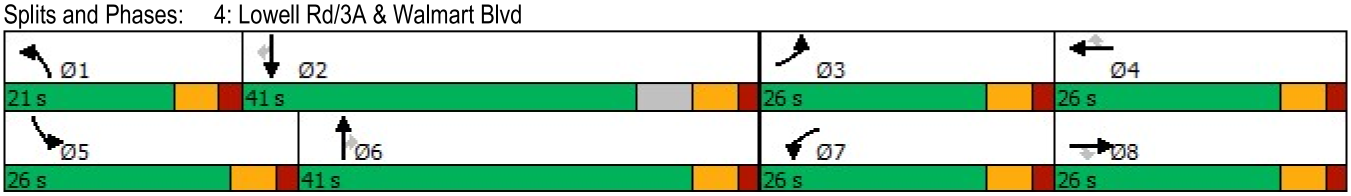
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	184	23	74	72	17	195	76	1013	54	199	1000	179
Future Volume (vph)	184	23	74	72	17	195	76	1013	54	199	1000	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	400		250	400		0
Storage Lanes	1		1	2		1	2		1	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	0.97	0.95	1.00	0.97	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1719	1863	1583	3433	1863	1583	3433	3539	1583	3433	3539	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1719	1863	1583	3433	1863	1583	3433	3539	1583	3433	3539	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			138			212			138			171
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		304			245			982			569	
Travel Time (s)		6.9			5.6			22.3			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	200	25	80	78	18	212	83	1101	59	216	1087	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	200	25	80	78	18	212	83	1101	59	216	1087	195
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)		24			24			24			24	
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
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8			4			6			2
Detector Phase	3	8	8	7	4	4	1	6	6	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	16.0	16.0	11.0	16.0	16.0
Total Split (s)	26.0	26.0	26.0	26.0	26.0	26.0	21.0	41.0	41.0	26.0	41.0	41.0
Total Split (%)	21.8%	21.8%	21.8%	21.8%	21.8%	21.8%	17.6%	34.5%	34.5%	21.8%	34.5%	34.5%
Maximum Green (s)	20.0	20.0	20.0	20.0	20.0	20.0	15.0	35.0	35.0	20.0	35.0	35.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	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	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	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	6.0	4.0	6.0	6.0
Recall Mode	None	None	None	None	None	None	None	None	None	None	None	None

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	16.6	19.6	19.6	8.6	8.7	8.7	8.8	35.2	35.2	12.4	41.8	41.8
Actuated g/C Ratio	0.17	0.20	0.20	0.09	0.09	0.09	0.09	0.36	0.36	0.13	0.43	0.43
v/c Ratio	0.68	0.07	0.19	0.26	0.11	0.63	0.27	0.86	0.09	0.49	0.71	0.25
Control Delay	51.2	34.6	1.6	45.4	43.6	15.3	45.3	38.2	0.3	44.4	28.4	5.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.2	34.6	1.6	45.4	43.6	15.3	45.3	38.2	0.3	44.4	28.4	5.8
LOS	D	C	A	D	D	B	D	D	A	D	C	A
Approach Delay		36.8			24.6			36.9			27.8	
Approach LOS		D			C			D			C	
Queue Length 50th (ft)	114	13	0	23	11	0	24	323	0	64	296	9
Queue Length 95th (ft)	211	38	6	50	33	68	52	#547	0	110	452	59
Internal Link Dist (ft)		224			165			902			489	
Turn Bay Length (ft)							400		250	400		
Base Capacity (vph)	356	415	460	710	385	495	533	1282	661	710	1551	790
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.56	0.06	0.17	0.11	0.05	0.43	0.16	0.86	0.09	0.30	0.70	0.25

Intersection Summary

Area Type: Other
Cycle Length: 119
Actuated Cycle Length: 97.2
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 31.7 Intersection LOS: C
Intersection Capacity Utilization 65.5% 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: 4: Lowell Rd/3A & Walmart Blvd



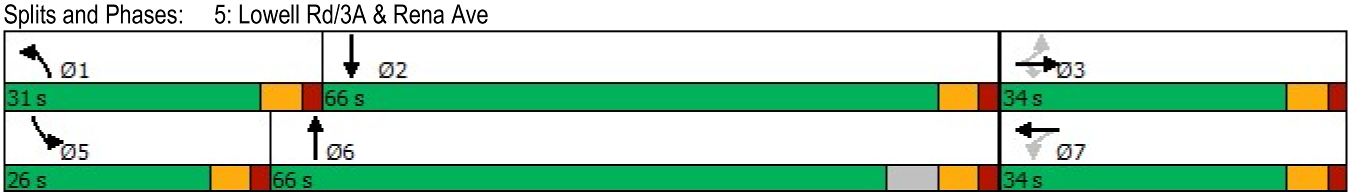
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	1	22	32	1	7	22	1034	14	64	1077	5
Future Volume (vph)	85	1	22	32	1	7	22	1034	14	64	1077	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12	12	12	12	12	12	12
Storage Length (ft)	0		60	0		0	350		0	350		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850		0.975			0.998			0.999	
Flt Protected		0.953			0.962		0.950			0.950		
Satd. Flow (prot)	0	1725	1583	0	1980	0	1770	3532	0	1770	3532	0
Flt Permitted		0.696			0.708		0.950			0.950		
Satd. Flow (perm)	0	1260	1583	0	1457	0	1770	3532	0	1770	3532	0
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)			75					1				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		297			325			1749			982	
Travel Time (s)		6.8			7.4			39.8			22.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	30%
Adj. Flow (vph)	92	1	24	35	1	8	24	1124	15	70	1171	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	93	24	0	44	0	24	1139	0	70	1176	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			24			24	
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	0.85	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
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		3			7		1	6		5	2	
Permitted Phases	3		3	7								
Detector Phase	3	3	3	7	7		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0		11.0	16.0		11.0	16.0	
Total Split (s)	34.0	34.0	34.0	34.0	34.0		31.0	66.0		26.0	66.0	
Total Split (%)	26.0%	26.0%	26.0%	26.0%	26.0%		23.7%	50.4%		19.8%	50.4%	
Maximum Green (s)	28.0	28.0	28.0	28.0	28.0		25.0	60.0		20.0	60.0	
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)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0		6.0	6.0		6.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None		None	None		None	None	
Act Effct Green (s)		14.5	14.5		13.8		9.4	44.8		11.5	52.2	
Actuated g/C Ratio		0.19	0.19		0.18		0.12	0.59		0.15	0.69	
v/c Ratio		0.38	0.07		0.16		0.11	0.54		0.26	0.48	
Control Delay		39.9	0.4		35.2		42.0	16.0		40.1	10.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		39.9	0.4		35.2		42.0	16.0		40.1	10.8	
LOS		D	A		D		D	B		D	B	
Approach Delay		31.8			35.3			16.5			12.5	
Approach LOS		C			D			B			B	
Queue Length 50th (ft)		42	0		19		11	215		32	123	
Queue Length 95th (ft)		111	0		59		43	354		90	336	
Internal Link Dist (ft)		217			245			1669			902	
Turn Bay Length (ft)			60				350			350		
Base Capacity (vph)		583	773		674		743	2864		595	2709	
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		0.16	0.03		0.07		0.03	0.40		0.12	0.43	

Intersection Summary

Area Type: Other
Cycle Length: 131
Actuated Cycle Length: 75.5
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 15.6 Intersection LOS: B
Intersection Capacity Utilization 58.0% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 5: Lowell Rd/3A & Rena Ave



Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBT	WBR	NBL	NBT	SBL2	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	22	0	8	4	1	0	1	0	413	1	761	355
Future Volume (vph)	22	0	8	4	1	0	1	0	413	1	761	355
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0				0	240			820	
Storage Lanes	1		0				0	2			1	
Taper Length (ft)	25							25			25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95
Frt		0.850				0.932						0.991
Flt Protected	0.950					0.976					0.950	
Satd. Flow (prot)	1770	1583	0	0	0	1694	0	1863	3438	0	1770	3413
Flt Permitted	0.784					0.835					0.066	
Satd. Flow (perm)	1460	1583	0	0	0	1450	0	1863	3438	0	123	3413
Right Turn on Red				Yes			Yes					
Satd. Flow (RTOR)		132				132						6
Link Speed (mph)		30				30			30			30
Link Distance (ft)		386				220			909			1749
Travel Time (s)		8.8				5.0			20.7			39.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	5%
Adj. Flow (vph)	24	0	9	4	1	0	1	0	449	1	827	386
Shared Lane Traffic (%)												
Lane Group Flow (vph)	24	13	0	0	0	2	0	0	449	0	828	412
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Right	Left	Left	Right	Left	Left	Left	Left	Left
Median Width(ft)		12				12			12			12
Link Offset(ft)		0				0			0			0
Crosswalk Width(ft)		16				16			16			16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	9	15		9	15		15	15	
Turn Type	Perm	NA			Perm	NA		Prot	NA	custom	Prot	NA
Protected Phases		4				4		1	6		5	2
Permitted Phases	4				4					5		
Detector Phase	4	4			4	4		1	6	5	5	2
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0	5.0		5.0	8.0	5.0	5.0	8.0
Minimum Split (s)	11.0	11.0			11.0	11.0		11.0	16.0	11.0	11.0	14.0
Total Split (s)	26.0	26.0			26.0	26.0		21.0	56.0	66.0	66.0	56.0
Total Split (%)	14.9%	14.9%			14.9%	14.9%		12.1%	32.2%	37.9%	37.9%	32.2%
Maximum Green (s)	20.0	20.0			20.0	20.0		15.0	50.0	60.0	60.0	50.0
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)	2.0	2.0			2.0	2.0		2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0				0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0				6.0		6.0	6.0		6.0	6.0
Lead/Lag	Lag	Lag			Lag	Lag		Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	4.0	5.0	5.0	4.0
Recall Mode	None	None			None	None		None	None	None	None	None

Lane Group	SBR	NWL2	NWL	NWR	NWR2
Lane Configurations					
Traffic Volume (vph)	24	5	2	634	1
Future Volume (vph)	24	5	2	634	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900
Storage Length (ft)	0		120	0	
Storage Lanes	0		1	1	
Taper Length (ft)			25		
Lane Util. Factor	0.95	1.00	1.00	1.00	1.00
Frt				0.850	
Flt Protected			0.950		
Satd. Flow (prot)	0	0	1770	1583	0
Flt Permitted			0.950		
Satd. Flow (perm)	0	0	1770	1583	0
Right Turn on Red	Yes				Yes
Satd. Flow (RTOR)				56	
Link Speed (mph)			30		
Link Distance (ft)			960		
Travel Time (s)			21.8		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%
Adj. Flow (vph)	26	5	2	689	1
Shared Lane Traffic (%)					
Lane Group Flow (vph)	0	0	7	690	0
Enter Blocked Intersection	No	No	No	No	No
Lane Alignment	Right	Left	Left	Right	Right
Median Width(ft)			12		
Link Offset(ft)			0		
Crosswalk Width(ft)			16		
Two way Left Turn Lane					
Headway Factor	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	9	15	15	9	9
Turn Type		Perm	Prot	pt+ov	
Protected Phases			3	3 5	
Permitted Phases		3			
Detector Phase		3	3	3 5	
Switch Phase					
Minimum Initial (s)		5.0	5.0		
Minimum Split (s)		11.0	11.0		
Total Split (s)		26.0	26.0		
Total Split (%)		14.9%	14.9%		
Maximum Green (s)		20.0	20.0		
Yellow Time (s)		4.0	4.0		
All-Red Time (s)		2.0	2.0		
Lost Time Adjust (s)			0.0		
Total Lost Time (s)			6.0		
Lead/Lag		Lead	Lead		
Lead-Lag Optimize?					
Vehicle Extension (s)		3.0	3.0		
Recall Mode		None	None		

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBT	WBR	NBL	NBT	SBL2	SBL	SBT
Act Effct Green (s)	7.8	7.8				7.8			24.0		60.5	90.6
Actuated g/C Ratio	0.06	0.06				0.06			0.18		0.46	0.69
v/c Ratio	0.28	0.06				0.01			0.71		14.79	0.17
Control Delay	70.8	0.5				0.0			57.8		6194.4	7.9
Queue Delay	0.0	0.0				0.0			0.0		0.0	0.0
Total Delay	70.8	0.5				0.0			57.8		6194.4	7.9
LOS	E	A				A			E		F	A
Approach Delay		46.1							57.8			4138.9
Approach LOS		D							E			F
Queue Length 50th (ft)	21	0				0			199		~1448	66
Queue Length 95th (ft)	55	0				0			265		#1826	94
Internal Link Dist (ft)		306				140			829			1669
Turn Bay Length (ft)	50										820	
Base Capacity (vph)	224	354				334			1320		56	2505
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	0.11	0.04				0.01			0.34		14.79	0.16

Intersection Summary

Area Type: Other

Cycle Length: 174

Actuated Cycle Length: 131.4

Natural Cycle: 50

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 14.79

Intersection Signal Delay: 2132.9 Intersection LOS: F

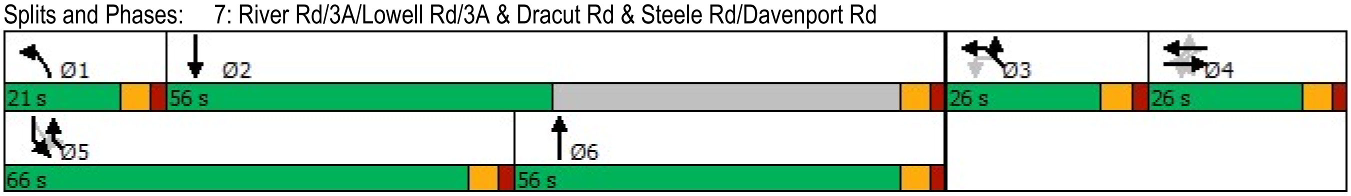
Intersection Capacity Utilization 117.1% ICU Level of Service H

Analysis Period (min) 15

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

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

Splits and Phases: 7: River Rd/3A/Lowell Rd/3A & Dracut Rd & Steele Rd/Davenport Rd



Lane Group	SBR	NWL2	NWL	NWR	NWR2
Act Effct Green (s)			20.2	83.4	
Actuated g/C Ratio			0.15	0.63	
v/c Ratio			0.03	0.67	
Control Delay			53.7	17.5	
Queue Delay			0.0	0.0	
Total Delay			53.7	17.5	
LOS			D	B	
Approach Delay			17.8		
Approach LOS			B		
Queue Length 50th (ft)			5	236	
Queue Length 95th (ft)			22	409	
Internal Link Dist (ft)			880		
Turn Bay Length (ft)			120		
Base Capacity (vph)			271	1025	
Starvation Cap Reductn			0	0	
Spillback Cap Reductn			0	0	
Storage Cap Reductn			0	0	
Reduced v/c Ratio			0.03	0.67	

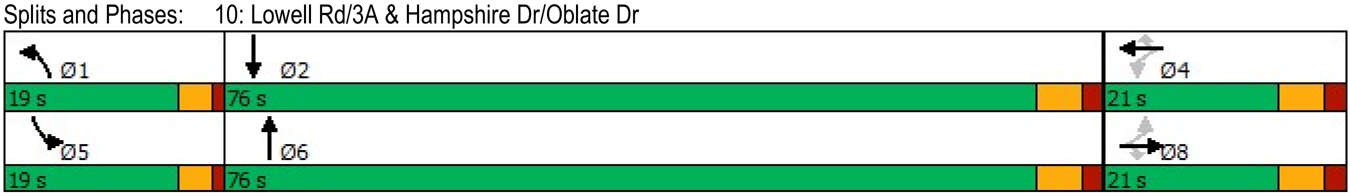
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	1	67	6	0	2	23	1004	11	3	915	18
Future Volume (vph)	19	1	67	6	0	2	23	1004	11	3	915	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	16	12	12	12	12	12	12
Storage Length (ft)	0		150	0		120	270		0	250		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.998			0.997	
Flt Protected		0.954			0.950		0.950			0.950		
Satd. Flow (prot)	0	1777	1794	0	1770	1794	1770	3532	0	1770	3529	0
Flt Permitted		0.752			0.769		0.950			0.950		
Satd. Flow (perm)	0	1401	1794	0	1432	1794	1770	3532	0	1770	3529	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73			66		2			3	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			436			437			1173	
Travel Time (s)		9.4			9.9			9.9			26.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	1	73	7	0	2	25	1091	12	3	995	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	22	73	0	7	2	25	1103	0	3	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)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4		4						
Detector Phase	8	8	8	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0	4.0	15.0		4.0	15.0	
Minimum Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	8.0	28.0		8.0	28.0	
Total Split (s)	21.0	21.0	21.0	21.0	21.0	21.0	19.0	76.0		19.0	76.0	
Total Split (%)	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	16.4%	65.5%		16.4%	65.5%	
Maximum Green (s)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	70.0		15.0	70.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0	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	
Total Lost Time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None	None	None	None	None	None	Min		None	Min	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0		7.0			7.0	
Flash Dont Walk (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0			0	
Act Effct Green (s)		6.7	6.7		6.3	6.3	5.6	33.8		4.9	33.6	
Actuated g/C Ratio		0.14	0.14		0.13	0.13	0.11	0.68		0.10	0.68	
v/c Ratio		0.12	0.24		0.04	0.01	0.13	0.46		0.02	0.42	
Control Delay		23.9	9.6		23.5	0.0	24.8	6.6		25.3	6.6	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		23.9	9.6		23.5	0.0	24.8	6.6		25.3	6.6	
LOS		C	A		C	A	C	A		C	A	
Approach Delay		12.9			18.3			7.0			6.7	
Approach LOS		B			B			A			A	
Queue Length 50th (ft)		5	0		2	0	6	72		1	63	
Queue Length 95th (ft)		28	34		14	0	31	186		9	180	
Internal Link Dist (ft)		332			356			357			1093	
Turn Bay Length (ft)			150			120	270			250		
Base Capacity (vph)		442	616		452	612	559	3532		559	3529	
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		0.05	0.12		0.02	0.00	0.04	0.31		0.01	0.29	

Intersection Summary	
Area Type: Other	
Cycle Length: 116	
Actuated Cycle Length: 49.6	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.46	
Intersection Signal Delay: 7.1	Intersection LOS: A
Intersection Capacity Utilization 49.8%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Lowell Rd/3A & Hampshire Dr/Oblate Dr

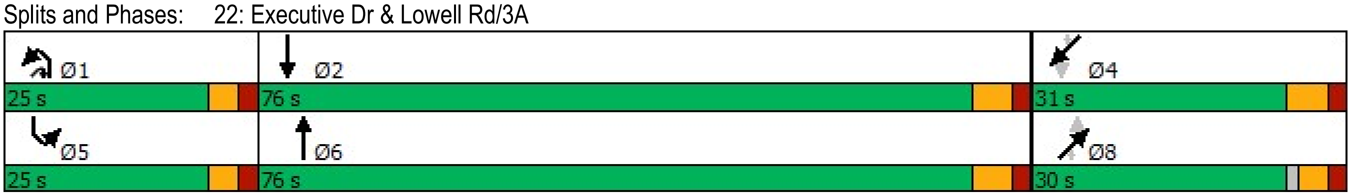


Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	63	834	32	36	722	105	128	3	140	74	3	49
Future Volume (vph)	63	834	32	36	722	105	128	3	140	74	3	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	16	12	12	14
Storage Length (ft)	400		0	180		300	0		0	0		0
Storage Lanes	1		0	1		1	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.981				0.850			0.850
Flt Protected	0.950			0.950				0.953			0.954	
Satd. Flow (prot)	1570	3120	0	1770	3472	0	0	1775	1794	0	1777	1689
Flt Permitted	0.950			0.950				0.670			0.634	
Satd. Flow (perm)	1570	3120	0	1770	3472	0	0	1248	1794	0	1181	1689
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			18				152			66
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		669			399			262			149	
Travel Time (s)		15.2			9.1			6.0			3.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	68	907	35	39	785	114	139	3	152	80	3	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	68	942	0	39	899	0	0	142	152	0	83	53
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA		Prot	NA		Perm	NA	pm+ov	Perm	NA	Perm
Protected Phases	1	6		5	2			8	1		4	
Permitted Phases							8		8	4		4
Detector Phase	1	6		5	2		8	8	1	4	4	4
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	3.0	3.0	4.0	4.0	4.0
Minimum Split (s)	8.0	31.0		8.0	31.0		30.0	30.0	8.0	31.0	31.0	31.0
Total Split (s)	25.0	76.0		25.0	76.0		30.0	30.0	25.0	31.0	31.0	31.0
Total Split (%)	18.9%	57.6%		18.9%	57.6%		22.7%	22.7%	18.9%	23.5%	23.5%	23.5%
Maximum Green (s)	20.0	70.0		20.0	70.0		25.0	25.0	20.0	25.0	25.0	25.0
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		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	6.0		5.0	6.0			5.0	5.0		6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag				Lead			
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	2.0

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		18.0			18.0		18.0	18.0		18.0	18.0	18.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	8.1	35.7		6.5	28.8			13.2	26.5		12.1	12.1
Actuated g/C Ratio	0.12	0.53		0.10	0.43			0.20	0.39		0.18	0.18
v/c Ratio	0.36	0.57		0.23	0.60			0.58	0.19		0.39	0.15
Control Delay	37.7	14.1		37.3	16.6			37.7	3.7		33.1	7.0
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	37.7	14.1		37.3	16.6			37.7	3.7		33.1	7.0
LOS	D	B		D	B			D	A		C	A
Approach Delay		15.7			17.5			20.2			22.9	
Approach LOS		B			B			C			C	
Queue Length 50th (ft)	26	142		15	132			52	0		30	0
Queue Length 95th (ft)	78	265		53	250			134	35		84	23
Internal Link Dist (ft)		589			319			182			69	
Turn Bay Length (ft)	400			180								
Base Capacity (vph)	498	2908		562	3237			515	1126		469	710
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	0.14	0.32		0.07	0.28			0.28	0.13		0.18	0.07

Intersection Summary	
Area Type: Other	
Cycle Length: 132	
Actuated Cycle Length: 67.1	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.60	
Intersection Signal Delay: 17.3	Intersection LOS: B
Intersection Capacity Utilization 54.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 22: Executive Dr & Lowell Rd/3A



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	1011	1133	0
Future Volume (vph)	0	0	0	1011	1133	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	2111	0	1863	1863	0
Flt						
Sat						
Lin						
Lin						
Tra						
Pea						
Adj						
Sha						
Lar						
Ent						
Lar						
Me						
Lin						
Cro						
Tw						
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Free			Free	Free	

NOT PART OF STUDY

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 63.0%	ICU Level of Service B
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	4	71	13	3	22	71	796	6	23	1049	16
Future Volume (vph)	50	4	71	13	3	22	71	796	6	23	1049	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	14	14	12	12	12	12	12	12
Storage Length (ft)	0		120	0		0	250		400	220		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850		0.998	
Flt Protected		0.956			0.960		0.950			0.950		
Satd. Flow (prot)	0	1781	1583	0	1549	1325	1719	1810	1538	1719	1806	0
Flt Permitted		0.728			0.724		0.146			0.281		
Satd. Flow (perm)	0	1356	1583	0	1168	1325	264	1810	1538	508	1806	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			77			24			62		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		271			227			1282			634	
Travel Time (s)		6.2			5.2			29.1			14.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	30%	5%	30%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	54	4	77	14	3	24	77	865	7	25	1140	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	58	77	0	17	24	77	865	7	25	1157	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.92	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Detector Phase	4	4	4	8	8	1	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	31.0	31.0	11.0	31.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	116.0	116.0	16.0	126.0	
Total Split (%)	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	73.4%	73.4%	10.1%	79.7%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	110.0	110.0	10.0	120.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag						Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.0	1.5	1.5	1.5	1.0	1.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	
Walk Time (s)								7.0	7.0		7.0	
Flash Dont Walk (s)								18.0	18.0		18.0	
Pedestrian Calls (#/hr)								0	0		0	
Act Effct Green (s)		9.9	9.9		9.9	20.9	131.5	127.3	127.3	129.8	124.8	
Actuated g/C Ratio		0.06	0.06		0.06	0.13	0.83	0.81	0.81	0.82	0.79	
v/c Ratio		0.68	0.45		0.23	0.12	0.29	0.59	0.01	0.05	0.81	
Control Delay		107.9	22.3		77.4	21.2	4.6	8.4	0.0	2.1	16.0	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	18.7	
Total Delay		107.9	22.3		77.4	21.2	4.6	8.4	0.0	2.1	34.7	
LOS		F	C		E	C	A	A	A	A	C	
Approach Delay		59.1			44.5			8.0			34.1	
Approach LOS		E			D			A			C	
Queue Length 50th (ft)		59	0		17	0	10	325	0	3	632	
Queue Length 95th (ft)		#135	55		45	30	16	406	0	7	854	
Internal Link Dist (ft)		191			147			1202			554	
Turn Bay Length (ft)			120				250		400	220		
Base Capacity (vph)		93	181		80	237	318	1458	1251	510	1426	
Starvation Cap Reductn		0	0		0	0	0	0	0	0	293	
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		0.62	0.43		0.21	0.10	0.24	0.59	0.01	0.05	1.02	

Intersection Summary

Area Type: Other

Cycle Length: 158

Actuated Cycle Length: 158

Offset: 45 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

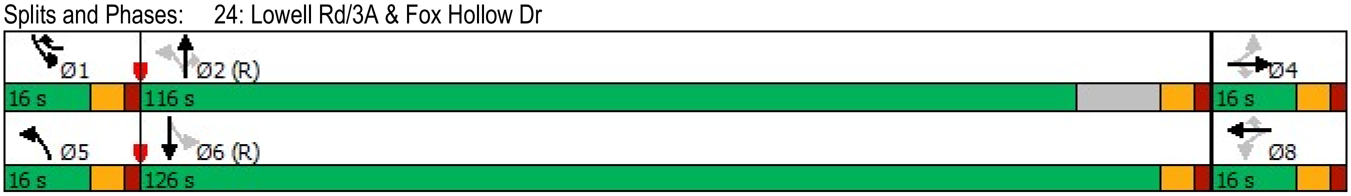
Intersection Signal Delay: 25.0 Intersection LOS: C

Intersection Capacity Utilization 79.7% 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: 24: Lowell Rd/3A & Fox Hollow Dr



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	118	119	1036	94	94	802
Future Volume (vph)	118	119	1036	94	94	802
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12
Storage Length (ft)	0	100		0	160	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.989			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1794	1842	0	1388	1462
Flt Permitted	0.950				0.048	
Satd. Flow (perm)	1719	1794	1842	0	70	1462
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		112	6			
Link Speed (mph)	30		30			30
Link Distance (ft)	345		634			526
Travel Time (s)	7.8		14.4			12.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	2%	30%	30%
Adj. Flow (vph)	128	129	1126	102	102	872
Shared Lane Traffic (%)						
Lane Group Flow (vph)	128	129	1228	0	102	872
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pm+ov	NA		pm+pt	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4			2	
Detector Phase	4	5	6		5	2
Switch Phase						
Minimum Initial (s)	5.0	3.0	10.0		3.0	10.0
Minimum Split (s)	11.0	9.0	31.0		9.0	16.0
Total Split (s)	36.0	16.0	116.0		16.0	116.0
Total Split (%)	21.4%	9.5%	69.0%		9.5%	69.0%
Maximum Green (s)	30.0	10.0	110.0		10.0	110.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5		1.5	1.5

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)			7.0			
Flash Dont Walk (s)			18.0			
Pedestrian Calls (#/hr)			0			
Act Effct Green (s)	16.4	35.4	120.6		139.6	139.6
Actuated g/C Ratio	0.10	0.21	0.72		0.83	0.83
v/c Ratio	0.76	0.28	0.93		0.64	0.72
Control Delay	100.5	12.3	34.5		47.2	10.9
Queue Delay	0.0	0.0	45.4		0.0	0.0
Total Delay	100.5	12.3	79.9		47.2	10.9
LOS	F	B	E		D	B
Approach Delay	56.2		79.9			14.7
Approach LOS	E		E			B
Queue Length 50th (ft)	140	15	1076		47	337
Queue Length 95th (ft)	210	69	#1692		120	613
Internal Link Dist (ft)	265		554			446
Turn Bay Length (ft)		100			160	
Base Capacity (vph)	306	472	1324		164	1214
Starvation Cap Reductn	0	0	240		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.42	0.27	1.13		0.62	0.72

Intersection Summary

Area Type: Other

Cycle Length: 168

Actuated Cycle Length: 168

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

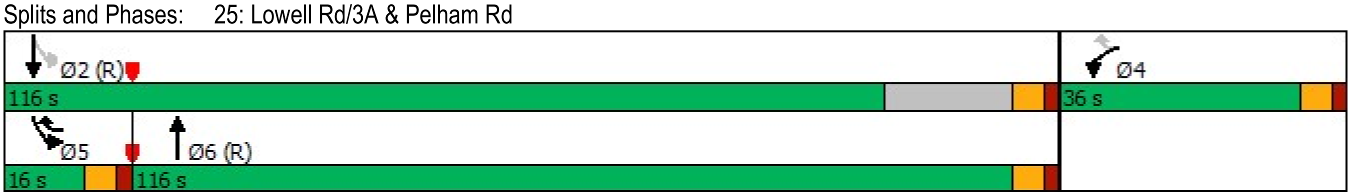
Intersection Signal Delay: 51.6 Intersection LOS: D

Intersection Capacity Utilization 87.0% ICU Level of Service E

Analysis Period (min) 15

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

Splits and Phases: 25: Lowell Rd/3A & Pelham Rd

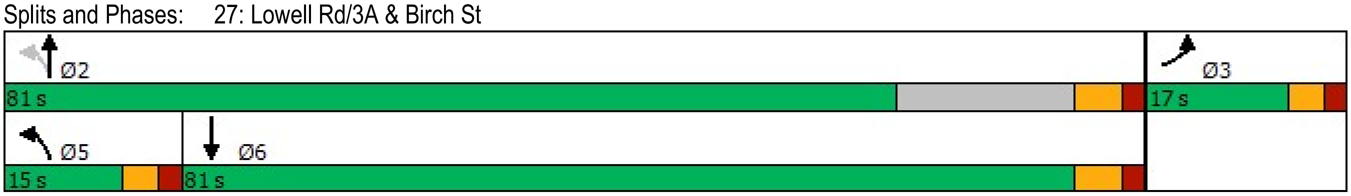


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	58	45	97	790	722	14
Future Volume (vph)	58	45	97	790	722	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	12	12	12	12	12
Storage Length (ft)	0	0	150			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.941				0.997	
Flt Protected	0.973		0.950			
Satd. Flow (prot)	1878	0	1570	1652	1804	0
Flt Permitted	0.973		0.187			
Satd. Flow (perm)	1878	0	309	1652	1804	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	28				2	
Link Speed (mph)	30			30	30	
Link Distance (ft)	442			1237	1199	
Travel Time (s)	10.0			28.1	27.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	15%	15%	5%	5%
Adj. Flow (vph)	63	49	105	859	785	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	112	0	105	859	800	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	3		5	2	6	
Permitted Phases			2			
Detector Phase	3		5	2	6	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	17.0		10.0	11.0	11.0	
Total Split (s)	17.0		15.0	81.0	81.0	
Total Split (%)	15.0%		13.3%	71.7%	71.7%	
Maximum Green (s)	12.0		10.0	75.0	75.0	
Yellow Time (s)	3.0		3.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	5.0		5.0	6.0	6.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0		2.0	2.0	2.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Recall Mode	None		None	Min	Min	
Walk Time (s)	7.0					
Flash Dont Walk (s)	3.0					
Pedestrian Calls (#/hr)	0					
Act Effct Green (s)	7.9		49.9	50.7	41.1	
Actuated g/C Ratio	0.12		0.76	0.78	0.63	
v/c Ratio	0.44		0.27	0.67	0.71	
Control Delay	31.0		4.5	8.6	16.8	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	31.0		4.5	8.6	16.8	
LOS	C		A	A	B	
Approach Delay	31.0			8.1	16.8	
Approach LOS	C			A	B	
Queue Length 50th (ft)	31		9	156	246	
Queue Length 95th (ft)	97		24	334	475	
Internal Link Dist (ft)	362			1157	1119	
Turn Bay Length (ft)			150			
Base Capacity (vph)	395		444	1642	1734	
Starvation Cap Reductn	0		0	0	0	
Spillback Cap Reductn	0		0	0	0	
Storage Cap Reductn	0		0	0	0	
Reduced v/c Ratio	0.28		0.24	0.52	0.46	

Intersection Summary	
Area Type: Other	
Cycle Length: 113	
Actuated Cycle Length: 65.4	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 13.2	Intersection LOS: B
Intersection Capacity Utilization 63.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 27: Lowell Rd/3A & Birch St



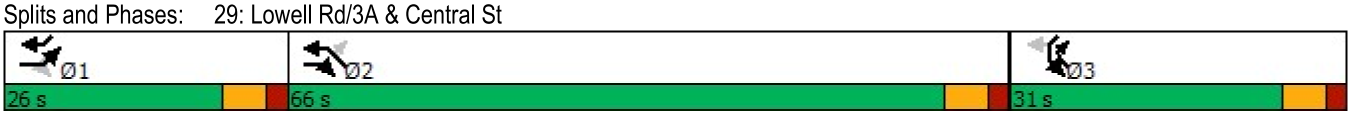
Lane Group	EBL	EBR	NWL	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	199	650	718	145	190	76
Future Volume (vph)	199	650	718	145	190	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	11	11
Storage Length (ft)	300	0	0	80	0	120
Storage Lanes	1	1	1	1	1	1
Taper Length (ft)	25		25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		0.850
Flt Protected	0.950		0.950		0.950	
Satd. Flow (prot)	1770	1583	1770	1689	1711	1531
Flt Permitted	0.950		0.950		0.950	
Satd. Flow (perm)	1770	1583	1770	1689	1711	1531
Right Turn on Red		Yes		Yes		Yes
Satd. Flow (RTOR)		289		96		83
Link Speed (mph)	30		30		30	
Link Distance (ft)	636		905		654	
Travel Time (s)	14.5		20.6		14.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	216	707	780	158	207	83
Shared Lane Traffic (%)						
Lane Group Flow (vph)	216	707	780	158	207	83
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	12		12		11	
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	0.92	1.04	1.04
Turning Speed (mph)	15	9	15	9	15	9
Turn Type	Prot	pm+ov	Prot	pm+ov	Prot	pm+ov
Protected Phases	1	2	2	3	3	1
Permitted Phases		1		2		3
Detector Phase	1	2	2	3	3	1
Switch Phase						
Minimum Initial (s)	8.0	10.0	10.0	8.0	8.0	8.0
Minimum Split (s)	14.0	31.0	31.0	31.0	31.0	14.0
Total Split (s)	26.0	66.0	66.0	31.0	31.0	26.0
Total Split (%)	21.1%	53.7%	53.7%	25.2%	25.2%	21.1%
Maximum Green (s)	20.0	60.0	60.0	25.0	25.0	20.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag			Lead
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	2.5	2.5	2.0	2.0	1.5
Recall Mode	None	Min	Min	None	None	None

Lane Group	EBL	EBR	NWL	NWR	SWL	SWR
Walk Time (s)		7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		18.0	18.0	18.0	18.0	
Pedestrian Calls (#/hr)		0	0	0	0	
Act Effct Green (s)	16.5	77.3	54.7	78.4	17.5	40.2
Actuated g/C Ratio	0.15	0.72	0.51	0.73	0.16	0.38
v/c Ratio	0.80	0.58	0.86	0.13	0.74	0.13
Control Delay	67.5	6.2	36.0	2.1	61.1	5.4
Queue Delay	0.0	0.5	0.0	0.0	0.0	0.0
Total Delay	67.5	6.7	36.0	2.1	61.1	5.4
LOS	E	A	D	A	E	A
Approach Delay	21.0		30.3		45.2	
Approach LOS	C		C		D	
Queue Length 50th (ft)	154	106	470	11	148	0
Queue Length 95th (ft)	#278	235	#817	29	234	31
Internal Link Dist (ft)	556		825		574	
Turn Bay Length (ft)	300			80		120
Base Capacity (vph)	340	1309	1021	1383	411	681
Starvation Cap Reductn	0	242	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	0.64	0.66	0.76	0.11	0.50	0.12

Intersection Summary

Area Type: Other
Cycle Length: 123
Actuated Cycle Length: 107.2
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 28.3 Intersection LOS: C
Intersection Capacity Utilization 76.3% 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: 29: Lowell Rd/3A & Central St



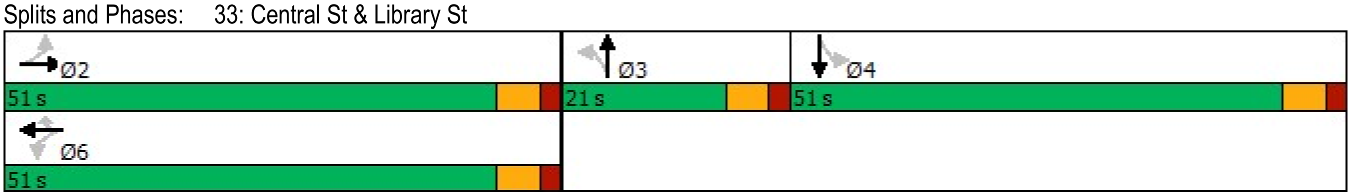
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	320	0	4	563	227	1	0	1	340	1	3
Future Volume (vph)	1	320	0	4	563	227	1	0	1	340	1	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	16	12
Storage Length (ft)	0		0	0		200	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.932			0.999	
Flt Protected								0.976			0.953	
Satd. Flow (prot)	0	1810	0	0	1863	1583	0	1694	0	0	2010	0
Flt Permitted		0.999			0.998						0.728	
Satd. Flow (perm)	0	1808	0	0	1859	1583	0	1736	0	0	1535	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						167		80				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		888			636			108			794	
Travel Time (s)		20.2			14.5			2.5			18.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1	348	0	4	612	247	1	0	1	370	1	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	349	0	0	616	247	0	2	0	0	374	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			3			4	
Permitted Phases	2			6		6	3			4		
Detector Phase	2	2		6	6	6	3	3		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	5.0	5.0		10.0	10.0	
Minimum Split (s)	31.0	31.0		16.0	16.0	16.0	21.0	21.0		31.0	31.0	
Total Split (s)	51.0	51.0		51.0	51.0	51.0	21.0	21.0		51.0	51.0	
Total Split (%)	41.5%	41.5%		41.5%	41.5%	41.5%	17.1%	17.1%		41.5%	41.5%	
Maximum Green (s)	45.0	45.0		45.0	45.0	45.0	15.0	15.0		45.0	45.0	
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)	2.0	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	
Total Lost Time (s)		6.0			6.0	6.0		6.0			6.0	
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	2.0	2.0		3.0	3.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	
Walk Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	8.0	8.0					8.0	8.0		8.0	8.0	
Pedestrian Calls (#/hr)	0	0					0	0		0	0	
Act Effct Green (s)		34.9			34.9	34.9		5.4			25.4	
Actuated g/C Ratio		0.47			0.47	0.47		0.07			0.34	
v/c Ratio		0.41			0.71	0.30		0.01			0.72	
Control Delay		16.8			23.4	6.6		0.0			32.1	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		16.8			23.4	6.6		0.0			32.1	
LOS		B			C	A		A			C	
Approach Delay		16.8			18.6						32.1	
Approach LOS		B			B						C	
Queue Length 50th (ft)		92			196	18		0			144	
Queue Length 95th (ft)		255			519	88		0			320	
Internal Link Dist (ft)		808			556			28			714	
Turn Bay Length (ft)						200						
Base Capacity (vph)		1174			1207	1086		438			997	
Starvation Cap Reductn		0			8	0		0			0	
Spillback Cap Reductn		0			0	0		0			0	
Storage Cap Reductn		0			0	0		0			0	
Reduced v/c Ratio		0.30			0.51	0.23		0.00			0.38	

Intersection Summary

Area Type: Other
Cycle Length: 123
Actuated Cycle Length: 74.8
Natural Cycle: 85
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 21.4 Intersection LOS: C
Intersection Capacity Utilization 68.3% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 33: Central St & Library St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	209	503	5	7	15	265	0	10	4	61	6	5
Future Volume (vph)	209	503	5	7	15	265	0	10	4	61	6	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	16	16	12	16	12	12	16	12
Storage Length (ft)	0		0	0		250	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850		0.964			0.991	
Flt Protected		0.986			0.984						0.959	
Satd. Flow (prot)	0	2037	0	0	2037	1743	0	2035	0	0	1958	0
Flt Permitted		0.986			0.984						0.959	
Satd. Flow (perm)	0	2037	0	0	2037	1743	0	2035	0	0	1958	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		439			888			261			628	
Travel Time (s)		10.0			20.2			5.9			14.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	5%	5%	2%	2%	2%	5%	2%	2%
Adj. Flow (vph)	227	547	5	8	16	288	0	11	4	66	7	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	779	0	0	24	288	0	15	0	0	78	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	0.85	1.00	1.00	0.85	0.85	1.00	0.85	1.00	1.00	0.85	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 68.1% ICU Level of Service C

Analysis Period (min) 15

Lane Group	EBL	EBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	0	0	0	926	0	1437
Future Volume (vph)	0	0	0	926	0	1437
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	0.88
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	0	0	3539	0	2787
Flt						
Sat						
Lin						
Lin						
Tra						
Pe						
Adj						
Sh						
Lar						
Ent						
Lar						
Me						
Lin						
Cro						
Tw						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Free			Free	Free	

NOT PART OF STUDY

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 53.6%	ICU Level of Service A
Analysis Period (min) 15	

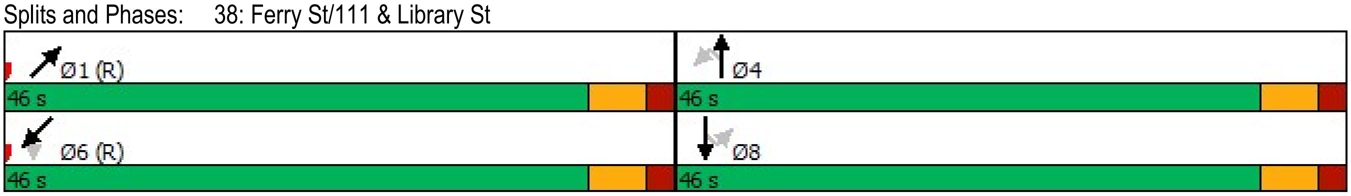
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	20	384	15	39	289	4	0	386	32	6	571	8
Future Volume (vph)	20	384	15	39	289	4	0	386	32	6	571	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	175		0	0		0	200		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.998			0.990			0.998	
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1770	1852	0	1770	1859	0	0	1844	0	1770	1859	0
Flt Permitted	0.412			0.252						0.428		
Satd. Flow (perm)	767	1852	0	469	1859	0	0	1844	0	797	1859	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			1			6			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		342			444			371			1247	
Travel Time (s)		7.8			10.1			8.4			28.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	417	16	42	314	4	0	420	35	7	621	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	433	0	42	318	0	0	455	0	7	630	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
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			1			6	
Permitted Phases	4			8						6		
Detector Phase	4	4		8	8			1		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0			10.0		10.0	10.0	
Minimum Split (s)	31.0	31.0		31.0	31.0			31.0		31.0	31.0	
Total Split (s)	46.0	46.0		46.0	46.0			46.0		46.0	46.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%			50.0%		50.0%	50.0%	
Maximum Green (s)	40.0	40.0		40.0	40.0			40.0		40.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0			2.0		2.0	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-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Recall Mode	None	None		None	None			C-Min		C-Min	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Flash Dont Walk (s)	18.0	18.0		18.0	18.0			18.0		18.0	18.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	
Act Effct Green (s)	28.1	28.1		28.1	28.1			51.9		51.9	51.9	
Actuated g/C Ratio	0.31	0.31		0.31	0.31			0.56		0.56	0.56	
v/c Ratio	0.09	0.76		0.29	0.56			0.44		0.02	0.60	
Control Delay	20.6	37.1		27.4	29.5			14.6		12.2	18.0	
Queue Delay	0.0	0.0		0.0	0.0			1.6		0.0	0.0	
Total Delay	20.6	37.1		27.4	29.5			16.3		12.2	18.0	
LOS	C	D		C	C			B		B	B	
Approach Delay		36.3			29.3			16.3			17.9	
Approach LOS		D			C			B			B	
Queue Length 50th (ft)	9	226		19	154			141		2	226	
Queue Length 95th (ft)	23	287		42	202			268		10	419	
Internal Link Dist (ft)		262			364			291			1167	
Turn Bay Length (ft)				175						200		
Base Capacity (vph)	333	806		203	808			1041		449	1048	
Starvation Cap Reductn	0	0		0	0			400		0	0	
Spillback Cap Reductn	0	0		0	0			0		0	0	
Storage Cap Reductn	0	0		0	0			0		0	0	
Reduced v/c Ratio	0.07	0.54		0.21	0.39			0.71		0.02	0.60	

Intersection Summary

Area Type: Other
Cycle Length: 92
Actuated Cycle Length: 92
Offset: 0 (0%), Referenced to phase 1:NET and 6:SWTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 24.1 Intersection LOS: C
Intersection Capacity Utilization 72.9% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 38: Ferry St/111 & Library St



Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NWR	NWR2	NET	NER
Lane Configurations												
Traffic Volume (vph)	28	13	11	16	1	1	15	27	449	10	665	16
Future Volume (vph)	28	13	11	16	1	1	15	27	449	10	665	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12	16	12	12	12	12	12
Storage Length (ft)	0		0			0		0	0			0
Storage Lanes	0		0			0		0	1			0
Taper Length (ft)	25					25						
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.946					0.917		0.865		0.997	
Flt Protected		0.980					0.998					
Satd. Flow (prot)	0	1901	0	0	0	0	1877	0	1611	0	1857	0
Flt Permitted		0.889					0.987					
Satd. Flow (perm)	0	1725	0	0	0	0	1856	0	1611	0	1857	0
Right Turn on Red				Yes				Yes		Yes		
Satd. Flow (RTOR)		9					29		86			
Link Speed (mph)		30					30				30	
Link Distance (ft)		286					634				617	
Travel Time (s)		6.5					14.4				14.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	30	14	12	17	1	1	16	29	488	11	723	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	73	0	0	0	0	47	0	499	0	740	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Right	Left	Left	Left	Right	Right	Right	Left	Right
Median Width(ft)		0					0				12	
Link Offset(ft)		0					0				0	
Crosswalk Width(ft)		16					16				16	
Two way Left Turn Lane												
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	9	15	15		9	9	9		9
Turn Type	Perm	NA			Perm	Perm	NA		Over		NA	
Protected Phases		8					4		1		2	
Permitted Phases	8				4	4						
Detector Phase	8	8			4	4	4		1		2	
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0	5.0	5.0		10.0		10.0	
Minimum Split (s)	22.0	22.0			11.0	11.0	11.0		16.0		17.0	
Total Split (s)	22.0	22.0			27.0	27.0	27.0		56.0		57.0	
Total Split (%)	15.7%	15.7%			19.3%	19.3%	19.3%		40.0%		40.7%	
Maximum Green (s)	15.0	15.0			21.0	21.0	21.0		50.0		50.0	
Yellow Time (s)	4.0	4.0			3.0	3.0	3.0		4.0		4.0	
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0		2.0		3.0	
Lost Time Adjust (s)		0.0					0.0		0.0		0.0	
Total Lost Time (s)		7.0					6.0		6.0		7.0	
Lead/Lag									Lead		Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0		4.0	

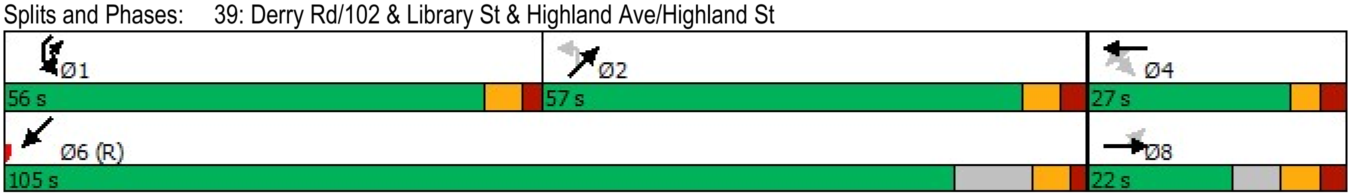
Lane Group	SWL	SWT	SWR
Lane Configurations			
Traffic Volume (vph)	302	446	2
Future Volume (vph)	302	446	2
Ideal Flow (vphpl)	1900	1900	1900
Lane Width (ft)	12	12	12
Storage Length (ft)	0		150
Storage Lanes	1		0
Taper Length (ft)	25		
Lane Util. Factor	1.00	1.00	1.00
Frt		0.999	
Flt Protected	0.950		
Satd. Flow (prot)	1770	1808	0
Flt Permitted	0.950		
Satd. Flow (perm)	1770	1808	0
Right Turn on Red			Yes
Satd. Flow (RTOR)			
Link Speed (mph)		30	
Link Distance (ft)		845	
Travel Time (s)		19.2	
Peak Hour Factor	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%
Adj. Flow (vph)	328	485	2
Shared Lane Traffic (%)			
Lane Group Flow (vph)	328	487	0
Enter Blocked Intersection	No	No	No
Lane Alignment	Left	Left	Right
Median Width(ft)		12	
Link Offset(ft)		0	
Crosswalk Width(ft)		16	
Two way Left Turn Lane			
Headway Factor	1.00	1.00	1.00
Turning Speed (mph)	15		9
Turn Type	Prot	NA	
Protected Phases	1	6	
Permitted Phases			
Detector Phase	1	6	
Switch Phase			
Minimum Initial (s)	10.0	10.0	
Minimum Split (s)	16.0	16.0	
Total Split (s)	56.0	105.0	
Total Split (%)	40.0%	75.0%	
Maximum Green (s)	50.0	99.0	
Yellow Time (s)	4.0	4.0	
All-Red Time (s)	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	
Total Lost Time (s)	6.0	6.0	
Lead/Lag	Lead		
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NWR	NWR2	NET	NER
Recall Mode	None	None			None	None	None		None		Min	
Walk Time (s)	7.0	7.0										
Flash Dont Walk (s)	8.0	8.0										
Pedestrian Calls (#/hr)	0	0										
Act Effct Green (s)		10.8					11.5		44.6		67.3	
Actuated g/C Ratio		0.08					0.08		0.32		0.48	
v/c Ratio		0.52					0.26		0.87		0.83	
Control Delay		66.4					32.1		53.1		43.8	
Queue Delay		0.0					0.0		13.7		12.3	
Total Delay		66.4					32.1		66.8		56.1	
LOS		E					C		E		E	
Approach Delay		66.4					32.1				56.1	
Approach LOS		E					C				E	
Queue Length 50th (ft)		57					15		361		604	
Queue Length 95th (ft)		107					55		469		#1017	
Internal Link Dist (ft)		206					554				537	
Turn Bay Length (ft)												
Base Capacity (vph)		254					303		642		892	
Starvation Cap Reductn		0					0		130		142	
Spillback Cap Reductn		0					0		0		0	
Storage Cap Reductn		0					0		0		0	
Reduced v/c Ratio		0.29					0.16		0.97		0.99	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 6:SWT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.87
Intersection Signal Delay: 44.6 Intersection LOS: D
Intersection Capacity Utilization 91.6% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 39: Derry Rd/102 & Library St & Highland Ave/Highland St



Lane Group	SWL	SWT	SWR
Recall Mode	None	C-Min	
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
Act Effct Green (s)	44.6	120.0	
Actuated g/C Ratio	0.32	0.86	
v/c Ratio	0.58	0.31	
Control Delay	43.2	3.4	
Queue Delay	0.0	0.0	
Total Delay	43.2	3.4	
LOS	D	A	
Approach Delay		19.4	
Approach LOS		B	
Queue Length 50th (ft)	247	82	
Queue Length 95th (ft)	315	142	
Internal Link Dist (ft)		765	
Turn Bay Length (ft)			
Base Capacity (vph)	645	1550	
Starvation Cap Reductn	0	0	
Spillback Cap Reductn	0	0	
Storage Cap Reductn	0	0	
Reduced v/c Ratio	0.51	0.31	

Intersection Summary

Lane Group	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	65	541	349	35	128	368	547	11	0	547	0
Future Volume (vph)	65	541	349	35	128	368	547	11	0	547	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	12	13	12	12	12	12	12
Storage Length (ft)	150	300	0	0		0		0	0		0
Storage Lanes	1	1	1	1		1		0	0		0
Taper Length (ft)	25		25			25			25		
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850		0.850			0.997				
Flt Protected	0.950		0.950			0.950					
Satd. Flow (prot)	1719	2707	1719	1641	0	1829	1857	0	0	3539	0
Flt Permitted	0.950		0.133			0.950					
Satd. Flow (perm)	1719	2707	241	1641	0	1829	1857	0	0	3539	0
Right Turn on Red		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		70		110			1				
Link Speed (mph)	30		30				30			30	
Link Distance (ft)	617		345				426			371	
Travel Time (s)	14.0		7.8				9.7			8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	71	588	379	38	139	400	595	12	0	595	0
Shared Lane Traffic (%)											
Lane Group Flow (vph)	71	588	379	177	0	400	607	0	0	595	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12		12				13			13	
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	0.92	1.00	0.96	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	9	15		9	15		9
Turn Type	Prot	pt+ov	Perm	Prot		Prot	NA			NA	
Protected Phases	4	4 5		3		5	2			6	
Permitted Phases			3								
Detector Phase	4	4 5	3	3		5	2			6	
Switch Phase											
Minimum Initial (s)	8.0		5.0	5.0		8.0	10.0			10.0	
Minimum Split (s)	24.5		24.5	24.5		24.5	24.5			24.5	
Total Split (s)	46.5		36.5	36.5		46.5	66.5			33.5	
Total Split (%)	28.5%		22.4%	22.4%		28.5%	40.8%			20.6%	
Maximum Green (s)	40.0		30.0	30.0		40.0	60.0			27.0	
Yellow Time (s)	4.0		4.0	4.0		4.0	4.0			4.0	
All-Red Time (s)	2.5		2.5	2.5		2.5	2.5			2.5	
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.5		6.5	6.5		6.5	6.5			6.5	
Lead/Lag	Lag		Lead	Lead		Lead				Lag	
Lead-Lag Optimize?											
Vehicle Extension (s)	1.5		1.5	1.5		1.5	1.5			1.5	

Lane Group	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Recall Mode	None		None	None		None	C-Min			C-Min	
Walk Time (s)	7.0		7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	11.0		11.0	11.0		11.0	11.0			11.0	
Pedestrian Calls (#/hr)	0		0	0		0	0			0	
Act Effct Green (s)	27.4	76.9	30.0	30.0		43.0	86.1			36.6	
Actuated g/C Ratio	0.17	0.47	0.18	0.18		0.26	0.53			0.22	
v/c Ratio	0.25	0.45	8.61	0.45		0.83	0.62			0.75	
Control Delay	59.9	25.3	3478.9	26.7		71.4	31.1			66.0	
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0			12.9	
Total Delay	59.9	25.3	3478.9	26.7		71.4	31.1			78.9	
LOS	E	C	F	C		E	C			E	
Approach Delay	29.1		2379.9				47.1			78.9	
Approach LOS	C		F				D			E	
Queue Length 50th (ft)	67	203	~754	62		398	439			317	
Queue Length 95th (ft)	112	233	#973	142		529	626			#480	
Internal Link Dist (ft)	537		265				346			291	
Turn Bay Length (ft)	150	300									
Base Capacity (vph)	421	1334	44	391		497	981			793	
Starvation Cap Reductn	0	0	0	0		0	0			183	
Spillback Cap Reductn	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.17	0.44	8.61	0.45		0.80	0.62			0.98	

Intersection Summary

Area Type: Other

Cycle Length: 163

Actuated Cycle Length: 163

Offset: 0 (0%), Referenced to phase 2:NET and 6:SWT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 8.61

Intersection Signal Delay: 510.0 Intersection LOS: F

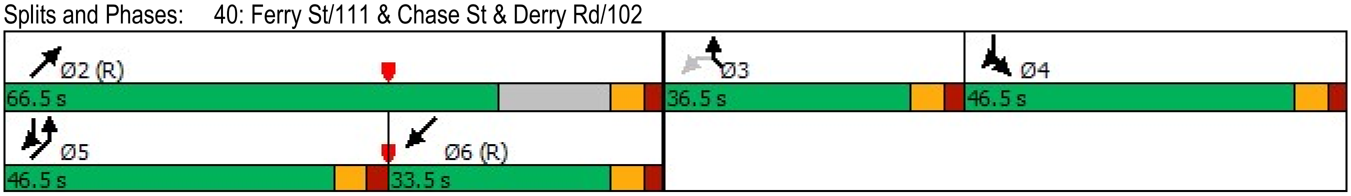
Intersection Capacity Utilization 83.2% ICU Level of Service E

Analysis Period (min) 15

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

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

Splits and Phases: 40: Ferry St/111 & Chase St & Derry Rd/102



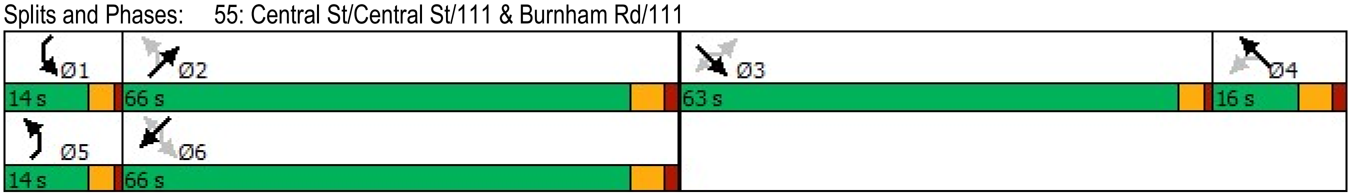
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	447	9	44	27	5	16	25	401	18	23	368	513
Future Volume (vph)	447	9	44	27	5	16	25	401	18	23	368	513
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	16	12	12	12	12	12	12	14
Storage Length (ft)	0		200	0		0	120		0	280		280
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.955			0.993				0.850
Flt Protected		0.953			0.972		0.950			0.950		
Satd. Flow (prot)	0	1775	1794	0	1960	0	1770	1850	0	1770	1863	1689
Flt Permitted		0.574			0.577		0.228			0.150		
Satd. Flow (perm)	0	1069	1794	0	1163	0	425	1850	0	279	1863	1689
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			89		12			2				558
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		882			126			314			2248	
Travel Time (s)		20.0			2.9			7.1			51.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	486	10	48	29	5	17	27	436	20	25	400	558
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	496	48	0	51	0	27	456	0	25	400	558
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		3			4		5	2		1	6	
Permitted Phases	3		3	4			2			6		6
Detector Phase	3	3	3	4	4		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	4.0	4.0		4.0	10.0		4.0	10.0	10.0
Minimum Split (s)	14.0	14.0	14.0	10.0	10.0		8.0	16.0		8.0	16.0	16.0
Total Split (s)	63.0	63.0	63.0	16.0	16.0		14.0	66.0		14.0	66.0	66.0
Total Split (%)	39.6%	39.6%	39.6%	10.1%	10.1%		8.8%	41.5%		8.8%	41.5%	41.5%
Maximum Green (s)	59.0	59.0	59.0	10.0	10.0		10.0	60.0		10.0	60.0	60.0
Yellow Time (s)	3.0	3.0	3.0	4.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0		1.0	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)		4.0	4.0		6.0		4.0	6.0		4.0	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Act Effct Green (s)		60.9	60.9		8.7		41.2	35.7		41.0	35.6	35.6
Actuated g/C Ratio		0.49	0.49		0.07		0.33	0.29		0.33	0.29	0.29
v/c Ratio		0.94	0.05		0.55		0.13	0.86		0.16	0.75	0.63
Control Delay		63.1	0.5		72.4		26.8	58.3		27.4	50.2	6.2
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		63.1	0.5		72.4		26.8	58.3		27.4	50.2	6.2
LOS		E	A		E		C	E		C	D	A
Approach Delay		57.5			72.4			56.5			24.6	
Approach LOS		E			E			E			C	
Queue Length 50th (ft)		~455	0		32		15	371		14	314	0
Queue Length 95th (ft)		#795	3		#95		34	509		33	436	83
Internal Link Dist (ft)		802			46			234			2168	
Turn Bay Length (ft)			200				120			280		280
Base Capacity (vph)		525	926		107		259	924		220	930	1122
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		0.94	0.05		0.48		0.10	0.49		0.11	0.43	0.50

Intersection Summary

Area Type: Other
Cycle Length: 159
Actuated Cycle Length: 124.1
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 42.0 Intersection LOS: D
Intersection Capacity Utilization 62.4% ICU Level of Service B
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: 55: Central St/Central St/111 & Burnham Rd/111



Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	77	26	613	60	171	295	65	26	190	146	25	63
Future Volume (vph)	77	26	613	60	171	295	65	26	190	146	25	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	12	12	12	16	12	12	12	12
Storage Length (ft)		300		300	300		300		140		300	
Storage Lanes		1		1	1		2		1		0	
Taper Length (ft)		25			25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850			0.850	0.850		0.944		
Flt Protected		0.950			0.950				0.950			
Satd. Flow (prot)	0	1770	1810	1689	1719	1810	1538	1794	1570	1713	0	0
Flt Permitted		0.261			0.261				0.558			
Satd. Flow (perm)	0	486	1810	1689	472	1810	1538	1794	922	1713	0	0
Right Turn on Red				Yes				Yes				Yes
Satd. Flow (RTOR)				121				121		9		
Link Speed (mph)			30			30				30		
Link Distance (ft)			2248			4120				755		
Travel Time (s)			51.1			93.6				17.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	2%	5%	5%	5%	2%	15%	5%	2%	5%
Adj. Flow (vph)	84	28	666	65	186	321	71	28	207	159	27	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	112	666	65	186	321	71	28	207	254	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right	Left	Left	Right	Right
Median Width(ft)			12			12				12		
Link Offset(ft)			0			0				0		
Crosswalk Width(ft)			16			16				16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.85	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	15		9	9	15		9	9
Turn Type	custom	Prot	NA	Free	custom	NA	Perm	Free	pm+pt	NA		
Protected Phases		1	6			2			7	4		
Permitted Phases	1			Free	5		2	Free	4			
Detector Phase	1	1	6		5	2	2		7	4		
Switch Phase												
Minimum Initial (s)	4.0	4.0	15.0		4.0	15.0	15.0		4.0	10.0		
Minimum Split (s)	8.0	8.0	21.0		8.0	21.0	21.0		8.0	16.0		
Total Split (s)	19.0	19.0	81.0		19.0	81.0	81.0		19.0	51.0		
Total Split (%)	10.1%	10.1%	42.9%		10.1%	42.9%	42.9%		10.1%	27.0%		
Maximum Green (s)	15.0	15.0	75.0		15.0	75.0	75.0		15.0	45.0		
Yellow Time (s)	3.0	3.0	4.0		3.0	4.0	4.0		3.0	4.0		
All-Red Time (s)	1.0	1.0	2.0		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		
Total Lost Time (s)		4.0	6.0		4.0	6.0	6.0		4.0	6.0		
Lead/Lag	Lead	Lead	Lag		Lead	Lag	Lag		Lag			
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	3.0		2.0	3.0	3.0		2.0	3.0		

Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Traffic Volume (vph)	3	59	49	50	33	19	32	7
Future Volume (vph)	3	59	49	50	33	19	32	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	12	12	12
Storage Length (ft)		0		0		0	0	
Storage Lanes		0		0		1	0	
Taper Length (ft)		25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.958			0.942		
Flt Protected			0.981			0.972		
Satd. Flow (prot)	0	0	1927	0	0	1706	0	0
Flt Permitted			0.429			0.972		
Satd. Flow (perm)	0	0	843	0	0	1706	0	0
Right Turn on Red				No				No
Satd. Flow (RTOR)								
Link Speed (mph)			30			30		
Link Distance (ft)			869			736		
Travel Time (s)			19.8			16.7		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	3	64	53	54	36	21	35	8
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	174	0	0	100	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right
Median Width(ft)			12			12		
Link Offset(ft)			0			0		
Crosswalk Width(ft)			16			16		
Two way Left Turn Lane								
Headway Factor	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	15	15	9	9
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			8			3		
Permitted Phases	8	8			3			
Detector Phase	8	8	8		3	3		
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0		4.0	4.0		
Minimum Split (s)	16.0	16.0	16.0		8.0	8.0		
Total Split (s)	51.0	51.0	51.0		19.0	19.0		
Total Split (%)	27.0%	27.0%	27.0%		10.1%	10.1%		
Maximum Green (s)	45.0	45.0	45.0		15.0	15.0		
Yellow Time (s)	4.0	4.0	4.0		3.0	3.0		
All-Red Time (s)	2.0	2.0	2.0		1.0	1.0		
Lost Time Adjust (s)			0.0			0.0		
Total Lost Time (s)			6.0			4.0		
Lead/Lag					Lead	Lead		
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0		

Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Recall Mode	None	None	Min		None	Min	Min		None	None		
Act Effct Green (s)		15.3	66.6	170.2	15.3	66.6	66.6	170.2	52.6	35.9		
Actuated g/C Ratio		0.09	0.39	1.00	0.09	0.39	0.39	1.00	0.31	0.21		
v/c Ratio		2.60	0.94	0.04	4.43	0.45	0.12	0.02	0.61	0.69		
Control Delay		804.6	72.5	0.1	1610.7	41.7	35.3	0.0	54.8	71.2		
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay		804.6	72.5	0.1	1610.7	41.7	35.3	0.0	54.8	71.2		
LOS		F	E	A	F	D	D	A	D	E		
Approach Delay			164.2			520.6				63.8		
Approach LOS			F			F				E		
Queue Length 50th (ft)		~230	752	0	~417	279	53	0	194	275		
Queue Length 95th (ft)		#385	#1046	0	#610	391	96	0	276	382		
Internal Link Dist (ft)			2168			4040				675		
Turn Bay Length (ft)		300		300	300		300	300	140			
Base Capacity (vph)		43	815	1689	42	815	693	1794	347	469		
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		2.60	0.82	0.04	4.43	0.39	0.10	0.02	0.60	0.54		

Intersection Summary

Area Type: Other

Cycle Length: 189

Actuated Cycle Length: 170.2

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 4.43

Intersection Signal Delay: 236.9 Intersection LOS: F

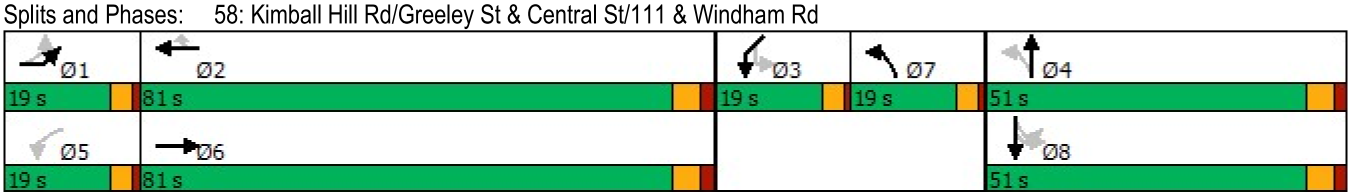
Intersection Capacity Utilization 90.8% ICU Level of Service E

Analysis Period (min) 15

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

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

Splits and Phases: 58: Kimball Hill Rd/Greeley St & Central St/111 & Windham Rd



Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Recall Mode	None	None	None		None	None		
Act Effct Green (s)			35.9			13.2		
Actuated g/C Ratio			0.21			0.08		
v/c Ratio			0.98			0.76		
Control Delay			130.0			113.7		
Queue Delay			0.0			0.0		
Total Delay			130.0			113.7		
LOS			F			F		
Approach Delay			130.0			113.7		
Approach LOS			F			F		
Queue Length 50th (ft)			210			120		
Queue Length 95th (ft)			#364			#224		
Internal Link Dist (ft)			789			656		
Turn Bay Length (ft)								
Base Capacity (vph)			227			153		
Starvation Cap Reductn			0			0		
Spillback Cap Reductn			0			0		
Storage Cap Reductn			0			0		
Reduced v/c Ratio			0.77			0.65		

Intersection Summary

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	85	299	358	103	332	452
Future Volume (vph)	85	299	358	103	332	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	12	12	12	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.895		0.970			
Flt Protected	0.989					0.979
Satd. Flow (prot)	1827	0	1795	0	0	1824
Flt Permitted	0.989					0.979
Satd. Flow (perm)	1827	0	1795	0	0	1824
Link Speed (mph)	30		30			30
Link Distance (ft)	832		787			870
Travel Time (s)	18.9		17.9			19.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	5%	2%	2%
Adj. Flow (vph)	92	325	389	112	361	491
Shared Lane Traffic (%)						
Lane Group Flow (vph)	417	0	501	0	0	852
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	16		0			0
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 100.4%	ICU Level of Service G
Analysis Period (min) 15	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	183	114	40	221	289	41
Future Volume (vph)	183	114	40	221	289	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12
Storage Length (ft)		0	180		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.948				0.983	
Flt Protected			0.950		0.958	
Satd. Flow (prot)	1492	0	1770	1652	1735	0
Flt Permitted			0.950		0.958	
Satd. Flow (perm)	1492	0	1770	1652	1735	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1417			420	606	
Travel Time (s)	32.2			9.5	13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	30%	2%	15%	15%	30%
Adj. Flow (vph)	199	124	43	240	314	45
Shared Lane Traffic (%)						
Lane Group Flow (vph)	323	0	43	240	359	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	16	
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	0.85	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 48.4%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	185	1	141	190	8	231
Future Volume (vph)	185	1	141	190	8	231
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	16	12
Storage Length (ft)		0	80		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.999				0.870	
Flt Protected			0.950		0.998	
Satd. Flow (prot)	1861	0	1770	2111	1833	0
Flt Permitted			0.950		0.998	
Satd. Flow (perm)	1861	0	1770	2111	1833	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	2748			314	1025	
Travel Time (s)	62.5			7.1	23.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	201	1	153	207	9	251
Shared Lane Traffic (%)						
Lane Group Flow (vph)	202	0	153	207	260	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	16	
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	0.85	0.85	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

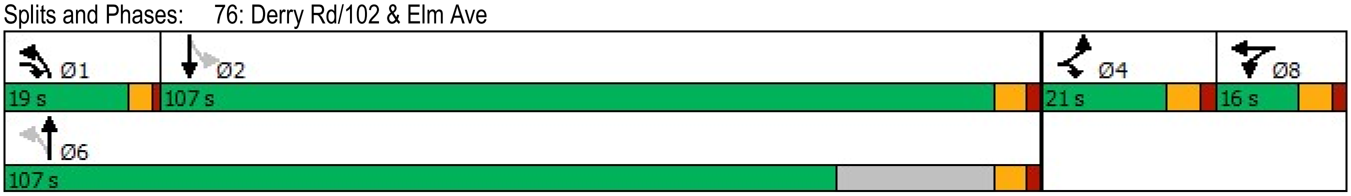
Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 42.3%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	0	186	1	0	0	251	728	0	0	644	14
Future Volume (vph)	63	0	186	1	0	0	251	728	0	0	644	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	12	12	12	12	12	15	12
Storage Length (ft)	130		0	0		0	465		0	0		0
Storage Lanes	1		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850								0.997	
Flt Protected	0.950				0.950		0.950					
Satd. Flow (prot)	1770	0	1583	0	1770	0	1770	1863	0	0	2043	0
Flt Permitted	0.950				0.950		0.162					
Satd. Flow (perm)	1770	0	1583	0	1770	0	302	1863	0	0	2043	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			202								1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		468			79			2433			1216	
Travel Time (s)		10.6			1.8			55.3			27.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	0	202	1	0	0	273	791	0	0	700	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	68	0	202	0	1	0	273	791	0	0	715	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	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot		pt+ov	Split	NA		pm+pt	NA			NA	
Protected Phases	4		4 1	8	8		1	6			2	
Permitted Phases							6			2		
Detector Phase	4		4 1	8	8		1	6		2	2	
Switch Phase												
Minimum Initial (s)	3.0			5.0	5.0		3.0	10.0		10.0	10.0	
Minimum Split (s)	9.0			11.0	11.0		7.0	16.0		16.0	16.0	
Total Split (s)	21.0			16.0	16.0		19.0	107.0		107.0	107.0	
Total Split (%)	12.9%			9.8%	9.8%		11.7%	65.6%		65.6%	65.6%	
Maximum Green (s)	15.0			10.0	10.0		15.0	101.0		101.0	101.0	
Yellow Time (s)	4.0			4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	2.0			2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0				0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0				6.0		4.0	6.0			6.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5			0.4	0.4		2.0	5.0		5.0	5.0	
Recall Mode	None			None	None		None	Min		Min	Min	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	8.6		21.3		5.4		53.2	51.0			37.5	
Actuated g/C Ratio	0.12		0.29		0.07		0.72	0.69			0.51	
v/c Ratio	0.33		0.34		0.01		0.68	0.62			0.69	
Control Delay	40.9		5.3		45.0		17.0	9.1			18.5	
Queue Delay	0.0		0.0		0.0		0.0	0.0			0.0	
Total Delay	40.9		5.3		45.0		17.0	9.1			18.5	
LOS	D		A		D		B	A			B	
Approach Delay		14.3			45.0			11.1			18.5	
Approach LOS		B			D			B			B	
Queue Length 50th (ft)	26		0		0		27	134			201	
Queue Length 95th (ft)	95		48		7		142	399			509	
Internal Link Dist (ft)		388			1			2353			1136	
Turn Bay Length (ft)	130						465					
Base Capacity (vph)	387		734		258		538	1863			1990	
Starvation Cap Reductn	0		0		0		0	0			0	
Spillback Cap Reductn	0		0		0		0	0			0	
Storage Cap Reductn	0		0		0		0	0			0	
Reduced v/c Ratio	0.18		0.28		0.00		0.51	0.42			0.36	

Intersection Summary	
Area Type: Other	
Cycle Length: 163	
Actuated Cycle Length: 74	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 14.1	Intersection LOS: B
Intersection Capacity Utilization 92.2%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 76: Derry Rd/102 & Elm Ave



Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	74	49	47	365	469	92
Future Volume (vph)	74	49	47	365	469	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	12	12	12	12	12
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.946				0.978	
Flt Protected	0.971			0.994		
Satd. Flow (prot)	1905	0	0	1805	1770	0
Flt Permitted	0.971			0.994		
Satd. Flow (perm)	1905	0	0	1805	1770	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	420			2236	3657	
Travel Time (s)	9.5			50.8	83.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	5%	5%	5%
Adj. Flow (vph)	80	53	51	397	510	100
Shared Lane Traffic (%)						
Lane Group Flow (vph)	133	0	0	448	610	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			0	0	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 69.2%	ICU Level of Service C
Analysis Period (min) 15	

A.3 Future 2030 Model - AM Peak (51 pages)

Reference Table – Table 6 # to # in SYNCRHO Reports

Table 6 #	# in SYNCHRO Reports	Intersection / Direction TOWARD
1	**40**	111-102-3A (Ferry & Chase)
2	**38**	Library & Ferry
3	**39**	Library and Highland
4	**55**	Burnham and Central
5	**58**	Central-Kimball-Greeley (Rt.111 & Greeley)
6	**76**	Derry and 102 (Route 102 & Elm Ave)
7	**82**	NH 102/Page Rd
8	**34**	NH 3A Central St/Chase St
9	**33**	Central and Library
10	**29**	Lowell and Central
11	**25**	Lowell and Pelham
12	**22**	Lowell and Executive
13	**10**	Lowell-Hampshire-Oblate
14	**1**	Lowell & Wason
16	**4**	NH 3A Lowell Rd/Walmart Blvd
17	**5**	NH 3A Lowell Rd/Rena Ave
18	**7**	NH 3A Lowell Rd/Dracut Rd/Steele Rd
19	**67**	Dracut Rd/Sherburne Rd
20	**70**	Kimball Hill Rd/Bush Hill Rd
21	**73**	Central St/Belknap Rd
22	**24**	Lowell & Fox Hollow Dr
23	**27**	Lowell & Birch St
15_com	**2**	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined
15M	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section
15N	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section
15S	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	24	246	432	64	45	186	859	178	22	848	29
Future Volume (vph)	36	24	246	432	64	45	186	859	178	22	848	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	14	12	12	12	12	12	12
Storage Length (ft)	0		0	0		200	650		350	200		0
Storage Lanes	0		1	1		1	1		2	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.971		0.950	0.964		0.950			0.950		
Satd. Flow (prot)	0	1419	1408	1633	1657	1641	1719	3438	2707	1570	3139	1404
Flt Permitted		0.971		0.950	0.964		0.950			0.950		
Satd. Flow (perm)	0	1419	1408	1633	1657	1641	1719	3438	2707	1570	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			267			145			193			211
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		573			432			1014			1071	
Travel Time (s)		13.0			9.8			23.0			24.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	30%	30%	5%	5%	5%	5%	5%	5%	15%	15%	15%
Adj. Flow (vph)	39	26	267	470	70	49	202	934	193	24	922	32
Shared Lane Traffic (%)				43%								
Lane Group Flow (vph)	0	65	267	268	272	49	202	934	193	24	922	32
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	0.85	1.00	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Split	NA	pm+ov	Split	NA	pt+ov	Prot	NA	pt+ov	Prot	NA	Perm
Protected Phases	3	3	1	4	4	4 5	1	6	6 4	5	2	
Permitted Phases			3									2
Detector Phase	3	3	1	4	4	4 5	1	6	6 4	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	13.0	12.0	12.0		13.0	16.0		13.0	16.0	16.0
Total Split (s)	15.0	15.0	30.0	30.0	30.0		30.0	50.0		15.0	35.0	35.0
Total Split (%)	10.0%	10.0%	20.0%	20.0%	20.0%		20.0%	33.3%		10.0%	23.3%	23.3%
Maximum Green (s)	9.0	9.0	22.0	23.0	23.0		22.0	44.0		7.0	29.0	29.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	4.0	3.0	3.0		4.0	2.0		4.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.0	8.0	7.0	7.0		8.0	6.0		8.0	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0

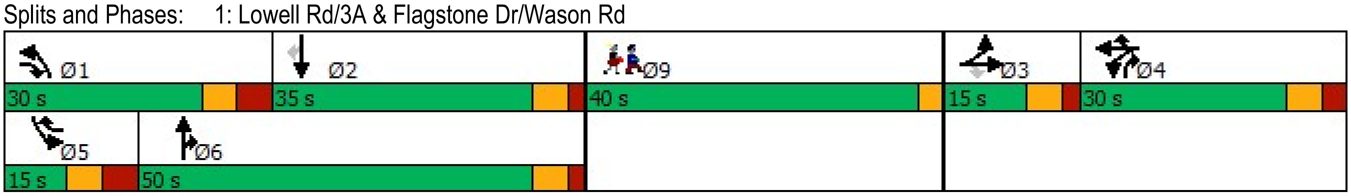
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link 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)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	40.0
Total Split (s)	40.0
Total Split (%)	27%
Maximum Green (s)	37.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		8.7	25.4	23.0	23.0	37.6	18.7	44.4	69.7	6.5	29.3	29.3
Actuated g/C Ratio		0.08	0.24	0.22	0.22	0.35	0.18	0.42	0.65	0.06	0.27	0.27
v/c Ratio		0.57	0.50	0.76	0.76	0.07	0.67	0.65	0.11	0.25	1.07	0.06
Control Delay		67.6	5.3	55.4	55.3	0.2	52.7	28.6	0.7	55.7	90.4	0.2
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		67.6	5.3	55.4	55.3	0.2	52.7	28.6	0.7	55.7	90.4	0.2
LOS		E	A	E	E	A	D	C	A	E	F	A
Approach Delay		17.5			50.8			28.2			86.6	
Approach LOS		B			D			C			F	
Queue Length 50th (ft)		45	0	188	191	0	132	281	0	16	~379	0
Queue Length 95th (ft)		#102	31	#324	#326	0	209	354	6	44	#522	0
Internal Link Dist (ft)		493			352			934			991	
Turn Bay Length (ft)						200	650		350	200		
Base Capacity (vph)		119	574	352	357	678	354	1458	1856	102	859	537
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.55	0.47	0.76	0.76	0.07	0.57	0.64	0.10	0.24	1.07	0.06

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 106.8
Natural Cycle: 145
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 48.9 Intersection LOS: D
Intersection Capacity Utilization 71.6% ICU Level of Service C
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: Lowell Rd/3A & Flagstone Dr/Wason Rd



Lane Group	Ø9
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	30.0
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

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	NEL	NER
Lane Configurations									
Traffic Volume (vph)	0	0	689	234	279	0	1120	830	603
Future Volume (vph)	0	0	689	234	279	0	1120	830	603
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	14	12
Storage Length (ft)	0	0	470			450		0	0
Storage Lanes	0	0	2			1		2	1
Taper Length (ft)	25		25					25	
Lane Util. Factor	1.00	1.00	0.94	0.95	0.95	1.00	1.00	0.97	1.00
Frt							0.850		0.850
Flt Protected			0.950					0.950	
Satd. Flow (prot)	0	0	4848	3139	3438	0	1538	3557	1538
Flt Permitted			0.950					0.950	
Satd. Flow (perm)	0	0	4848	3139	3438	0	1538	3557	1538
Right Turn on Red							Yes		Yes
Satd. Flow (RTOR)							805		507
Link Speed (mph)	55			30	30			42	
Link Distance (ft)	1050			613	1014			974	
Travel Time (s)	13.0			13.9	23.0			15.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	15%	5%	2%	5%	5%	5%
Adj. Flow (vph)	0	0	749	254	303	0	1217	902	655
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	0	749	254	303	0	1217	902	655
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right	Right	Left	Right
Median Width(ft)	0			36	36			28	
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	0.92	1.00
Turning Speed (mph)	15	9	15			9	9	15	9
Turn Type			Prot	NA	NA		Free	Prot	Free
Protected Phases			1	6	2			3	
Permitted Phases							Free		Free
Detector Phase			1	6	2			3	
Switch Phase									
Minimum Initial (s)			7.0	10.0	10.0			10.0	
Minimum Split (s)			14.0	17.0	17.0			19.0	
Total Split (s)			30.0	70.0	40.0			40.0	
Total Split (%)			27.3%	63.6%	36.4%			36.4%	
Maximum Green (s)			23.0	63.0	33.0			31.0	
Yellow Time (s)			4.0	4.0	4.0			4.0	
All-Red Time (s)			3.0	3.0	3.0			5.0	
Lost Time Adjust (s)			0.0	0.0	0.0			0.0	
Total Lost Time (s)			7.0	7.0	7.0			9.0	
Lead/Lag			Lead		Lag				
Lead-Lag Optimize?									
Vehicle Extension (s)			4.0	4.0	4.0			4.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	NEL	NER
Recall Mode			None	Min	Min			None	
Act Effct Green (s)			19.8	41.1	14.2		85.7	28.4	85.7
Actuated g/C Ratio			0.23	0.48	0.17		1.00	0.33	1.00
v/c Ratio			0.67	0.17	0.53		0.79	0.77	0.43
Control Delay			33.8	13.1	37.3		4.2	31.3	0.9
Queue Delay			0.0	0.0	0.0		0.0	0.0	0.0
Total Delay			33.8	13.1	37.3		4.2	31.3	0.9
LOS			C	B	D		A	C	A
Approach Delay				28.6	10.8			18.5	
Approach LOS				C	B			B	
Queue Length 50th (ft)			135	41	83		0	223	0
Queue Length 95th (ft)			187	63	127		0	328	0
Internal Link Dist (ft)	970			533	934			894	
Turn Bay Length (ft)			470				450		
Base Capacity (vph)			1318	2338	1341		1538	1303	1538
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			0.57	0.11	0.23		0.79	0.69	0.43

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 85.7
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 18.1 Intersection LOS: B
Intersection Capacity Utilization 64.3% ICU Level of Service C
Analysis Period (min) 15

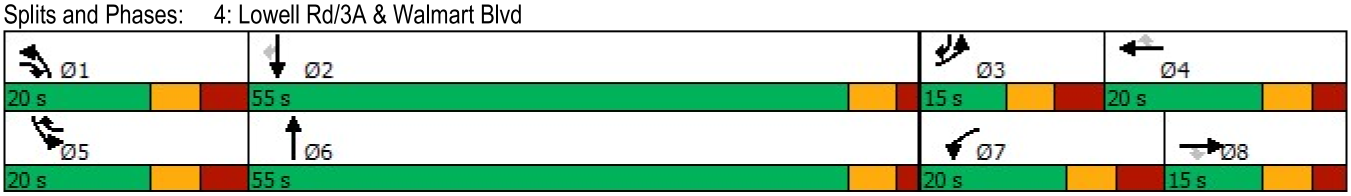
Splits and Phases: 2: Circumferential Hwy/Sagamore Br & Lowell Rd/3A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	11	45	23	9	96	55	744	25	99	718	71
Future Volume (vph)	94	11	45	23	9	96	55	744	25	99	718	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	425		0	400		0
Storage Lanes	2		1	2		1	3		0	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.91	0.91	0.97	0.91	1.00
Frt			0.850			0.850		0.995				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3335	1863	1583	3335	1863	1538	3433	4920	0	3335	4940	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3335	1863	1583	3335	1863	1538	3433	4920	0	3335	4940	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			109		6				119
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		304			245			982			569	
Travel Time (s)		6.9			5.6			22.3			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	5%	2%	5%	2%	5%	2%	5%	5%	5%
Adj. Flow (vph)	102	12	49	25	10	104	60	809	27	108	780	77
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	12	49	25	10	104	60	836	0	108	780	77
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)		24			24			24			24	
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
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	3	8	1	7	4	5	1	6		5	2	3
Permitted Phases			8			4						2
Detector Phase	3	8	1	7	4	5	1	6		5	2	3
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	5.0
Minimum Split (s)	13.0	12.0	13.0	13.0	12.0	13.0	13.0	16.0		13.0	16.0	13.0
Total Split (s)	15.0	15.0	20.0	20.0	20.0	20.0	20.0	55.0		20.0	55.0	15.0
Total Split (%)	13.6%	13.6%	18.2%	18.2%	18.2%	18.2%	18.2%	50.0%		18.2%	50.0%	13.6%
Maximum Green (s)	7.0	8.0	12.0	12.0	13.0	12.0	12.0	49.0		12.0	49.0	7.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	4.0	3.0	4.0	4.0	3.0	4.0	4.0	2.0		4.0	2.0	4.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	8.0	7.0	8.0	8.0	7.0	8.0	8.0	6.0		8.0	6.0	8.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0		4.0	6.0	4.0
Recall Mode	None	None	None	None	None	None	None	Min		None	Min	None

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	7.6	8.0	16.6	7.5	7.6	11.3	8.1	28.5		9.1	35.9	45.9
Actuated g/C Ratio	0.11	0.12	0.25	0.11	0.11	0.17	0.12	0.43		0.14	0.54	0.69
v/c Ratio	0.27	0.05	0.10	0.07	0.05	0.30	0.14	0.40		0.24	0.29	0.07
Control Delay	35.1	35.0	0.4	34.0	34.7	7.9	32.7	14.9		31.9	13.1	0.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	35.1	35.0	0.4	34.0	34.7	7.9	32.7	14.9		31.9	13.1	0.8
LOS	D	C	A	C	C	A	C	B		C	B	A
Approach Delay		24.6			14.5			16.1			14.2	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	19	4	0	4	4	0	10	80		19	72	0
Queue Length 95th (ft)	58	25	0	20	22	35	37	164		57	146	8
Internal Link Dist (ft)		224			165			902			489	
Turn Bay Length (ft)							425			400		
Base Capacity (vph)	381	241	585	649	392	434	668	3752		649	3766	1100
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.27	0.05	0.08	0.04	0.03	0.24	0.09	0.22		0.17	0.21	0.07

Intersection Summary	
Area Type: Other	
Cycle Length: 110	
Actuated Cycle Length: 66.3	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.40	
Intersection Signal Delay: 15.8	Intersection LOS: B
Intersection Capacity Utilization 45.9%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 4: Lowell Rd/3A & Walmart Blvd



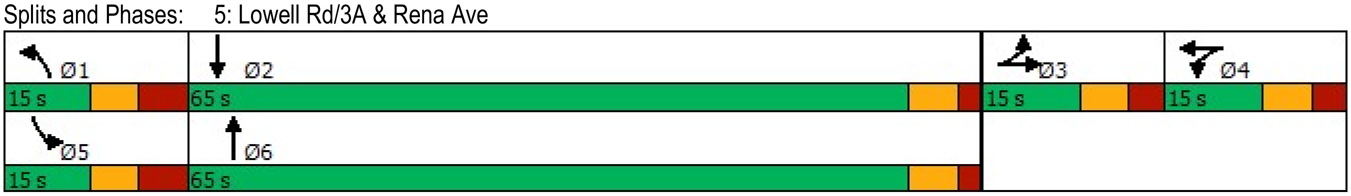
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	0	2	3	0	0	19	831	0	0	698	63
Future Volume (vph)	8	0	2	3	0	0	19	831	0	0	698	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12	12	12	12	12	12	12
Storage Length (ft)	200		200	0		0	350		0	425		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.91	0.91
Frt		0.850									0.988	
Flt Protected	0.950				0.950		0.950					
Satd. Flow (prot)	2694	1583	0	0	2006	0	1770	3438	0	1652	4892	0
Flt Permitted	0.950				0.950		0.950					
Satd. Flow (perm)	2694	1583	0	0	2006	0	1770	3438	0	1652	4892	0
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		351									20	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		301			325			1749			982	
Travel Time (s)		6.8			7.4			39.8			22.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	2%	2%	2%	2%	5%	2%	5%	2%	15%	5%	2%
Adj. Flow (vph)	9	0	2	3	0	0	21	903	0	0	759	68
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	2	0	0	3	0	21	903	0	0	827	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)		24			24			36			36	
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	0.85	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
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases												
Detector Phase	3	3		4	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	12.0		12.0	12.0		13.0	16.0		13.0	16.0	
Total Split (s)	15.0	15.0		15.0	15.0		15.0	65.0		15.0	65.0	
Total Split (%)	13.6%	13.6%		13.6%	13.6%		13.6%	59.1%		13.6%	59.1%	
Maximum Green (s)	8.0	8.0		8.0	8.0		7.0	59.0		7.0	59.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		4.0	2.0		4.0	2.0	
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0			7.0		8.0	6.0		8.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)	7.4	7.4			7.3		7.5	40.0			38.3	
Actuated g/C Ratio	0.17	0.17			0.17		0.17	0.91			0.87	
v/c Ratio	0.02	0.00			0.01		0.07	0.29			0.19	
Control Delay	22.9	0.0			23.7		23.2	3.3			5.3	
Queue Delay	0.0	0.0			0.0		0.0	0.0			0.0	
Total Delay	22.9	0.0			23.7		23.2	3.3			5.3	
LOS	C	A			C		C	A			A	
Approach Delay		18.7			23.7			3.7			5.3	
Approach LOS		B			C			A			A	
Queue Length 50th (ft)	1	0			1		3	0			0	
Queue Length 95th (ft)	9	0			9		30	171			141	
Internal Link Dist (ft)		221			245			1669			902	
Turn Bay Length (ft)	200						350					
Base Capacity (vph)	544	599			405		312	3273			4658	
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	0.02	0.00			0.01		0.07	0.28			0.18	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 43.9
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.29
Intersection Signal Delay: 4.6 Intersection LOS: A
Intersection Capacity Utilization 38.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 5: Lowell Rd/3A & Rena Ave

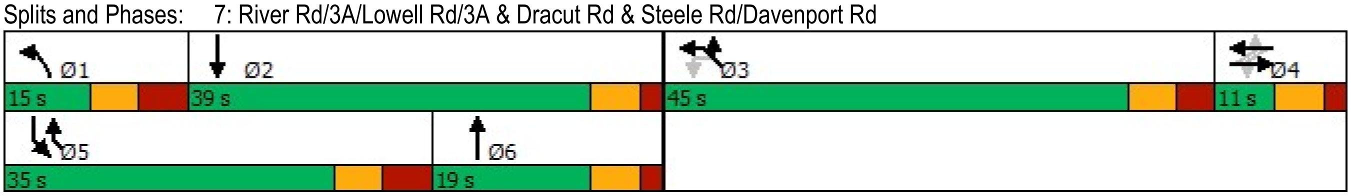


Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	0	0	0	0	285	83	404	5	8	0	666
Future Volume (vph)	0	0	0	0	285	83	404	5	8	0	666
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50			240		820		0		120	0
Storage Lanes	1			2		0		0		1	1
Taper Length (ft)	25			25		25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt							0.998				0.850
Flt Protected						0.950				0.950	
Satd. Flow (prot)	1863	1863	1863	1863	3438	3335	1806	0	0	1770	1538
Flt Permitted						0.950				0.950	
Satd. Flow (perm)	1863	1863	1863	1863	3438	3335	1806	0	0	1770	1538
Right Turn on Red								Yes			
Satd. Flow (RTOR)							1				
Link Speed (mph)		30	30		30		30			30	
Link Distance (ft)		386	220		910		1749			960	
Travel Time (s)		8.8	5.0		20.7		39.8			21.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	5%	5%	5%	2%	2%	2%	5%
Adj. Flow (vph)	0	0	0	0	310	90	439	5	9	0	724
Shared Lane Traffic (%)											
Lane Group Flow (vph)	0	0	0	0	310	90	444	0	0	9	724
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Left	Left	Left	Left	Right	Left	Left	Right
Median Width(ft)		12	12		36		36			12	
Link Offset(ft)		0	0		0		0			0	
Crosswalk Width(ft)		16	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
Turning Speed (mph)	15			15		15		9	15	15	9
Turn Type	Perm			Prot	NA	Prot	NA		Perm	Prot	pt+ov
Protected Phases		4	4	1	6	5	2			3	3 5
Permitted Phases	4								3		
Detector Phase	4	4	4	1	6	5	2		3	3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	13.0	16.0	18.0	16.0		17.0	17.0	
Total Split (s)	11.0	11.0	11.0	15.0	19.0	35.0	39.0		45.0	45.0	
Total Split (%)	10.0%	10.0%	10.0%	13.6%	17.3%	31.8%	35.5%		40.9%	40.9%	
Maximum Green (s)	5.0	5.0	5.0	7.0	13.0	27.0	33.0		38.0	38.0	
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)	2.0	2.0	2.0	4.0	2.0	4.0	2.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0	6.0	8.0	6.0	8.0	6.0			7.0	
Lead/Lag	Lag	Lag	Lag	Lead	Lag	Lead	Lag		Lead	Lead	
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0		4.0	4.0	
Recall Mode	None	None	None	None	Min	None	Min		None	None	

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR	NWL2	NWL	NWR
Act Effct Green (s)					12.4	17.8	38.4			30.6	56.5
Actuated g/C Ratio					0.15	0.22	0.47			0.37	0.69
v/c Ratio					0.60	0.13	0.53			0.01	0.69
Control Delay					40.3	27.9	19.2			17.6	11.3
Queue Delay					0.0	0.0	0.0			0.0	0.0
Total Delay					40.3	27.9	19.2			17.6	11.3
LOS					D	C	B			B	B
Approach Delay					40.3		20.7			11.4	
Approach LOS					D		C			B	
Queue Length 50th (ft)					80	20	162			3	190
Queue Length 95th (ft)					146	41	272			14	296
Internal Link Dist (ft)		306	140		830		1669			880	
Turn Bay Length (ft)						820				120	
Base Capacity (vph)					557	1123	860			839	1236
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	0.08	0.52			0.01	0.59

Intersection Summary	
Area Type: Other	
Cycle Length: 110	
Actuated Cycle Length: 82.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.69	
Intersection Signal Delay: 20.2	Intersection LOS: C
Intersection Capacity Utilization 60.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 7: River Rd/3A/Lowell Rd/3A & Dracut Rd & Steele Rd/Davenport Rd



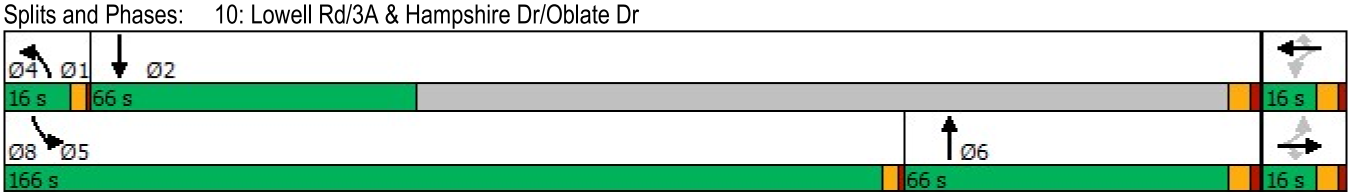
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	0	15	4	0	2	89	911	3	2	989	64
Future Volume (vph)	17	0	15	4	0	2	89	911	3	2	989	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	16	12	12	12	12	12	12
Storage Length (ft)	0		150	0		120	270		0	250		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850					0.991	
Flt Protected		0.950			0.950		0.950			0.950		
Satd. Flow (prot)	0	1770	1794	0	1770	1794	1719	3438	0	1770	3507	0
Flt Permitted		0.930			0.930		0.950			0.950		
Satd. Flow (perm)	0	1732	1794	0	1732	1794	1719	3438	0	1770	3507	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			48			48					12	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			436			437			1173	
Travel Time (s)		9.4			9.9			9.9			26.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	18	0	16	4	0	2	97	990	3	2	1075	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	18	16	0	4	2	97	993	0	2	1145	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4		4						
Detector Phase	8	8	8	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0	4.0	15.0		4.0	15.0	
Minimum Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	8.0	28.0		8.0	28.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	66.0		166.0	66.0	
Total Split (%)	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	26.6%		66.9%	26.6%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	12.0	60.0		162.0	60.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0	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	
Total Lost Time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0		2.0	3.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None	None	None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0		7.0			7.0	
Flash Dont Walk (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0			0	
Act Effct Green (s)		6.7	6.7		6.2	6.2	12.1	60.0		4.7	43.0	
Actuated g/C Ratio		0.09	0.09		0.08	0.08	0.17	0.82		0.06	0.59	
v/c Ratio		0.11	0.08		0.03	0.01	0.34	0.35		0.02	0.55	
Control Delay		32.9	1.7		32.0	0.0	31.3	4.0		34.0	11.5	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		32.9	1.7		32.0	0.0	31.3	4.0		34.0	11.5	
LOS		C	A		C	A	C	A		C	B	
Approach Delay		18.2			21.3			6.4			11.5	
Approach LOS		B			C			A			B	
Queue Length 50th (ft)		7	0		2	0	36	64		1	175	
Queue Length 95th (ft)		28	3		11	0	88	156		8	243	
Internal Link Dist (ft)		332			356			357			1093	
Turn Bay Length (ft)			150			120	270			250		
Base Capacity (vph)		239	288		239	288	284	3026		1770	3507	
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	0.06		0.02	0.01	0.34	0.33		0.00	0.33	

Intersection Summary

Area Type: Other
Cycle Length: 248
Actuated Cycle Length: 73.1
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 9.2 Intersection LOS: A
Intersection Capacity Utilization 55.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 10: Lowell Rd/3A & Hampshire Dr/Oblate Dr



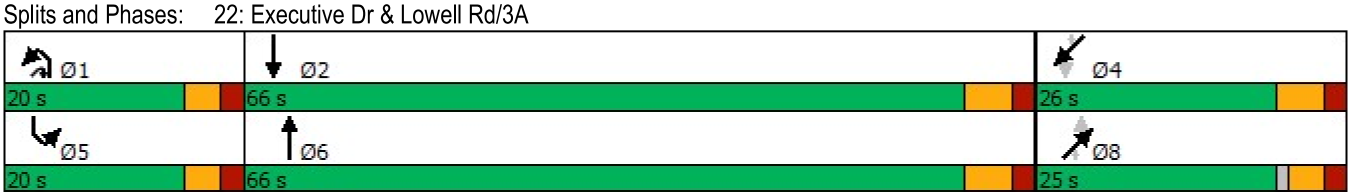
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	224	442	217	169	786	142	31	7	84	211	22	130
Future Volume (vph)	224	442	217	169	786	142	31	7	84	211	22	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	16	12	12	14
Storage Length (ft)	400		0	180		300	0		0	0		0
Storage Lanes	1		0	1		1	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.951			0.977				0.850			0.850
Flt Protected	0.950			0.950				0.961			0.957	
Satd. Flow (prot)	1719	3270	0	1770	3458	0	0	1739	1743	0	1783	1689
Flt Permitted	0.950			0.950				0.699			0.716	
Satd. Flow (perm)	1719	3270	0	1770	3458	0	0	1265	1743	0	1334	1689
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		116			28				91			141
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		669			399			262			149	
Travel Time (s)		15.2			9.1			6.0			3.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	5%	5%	5%	2%	2%	2%
Adj. Flow (vph)	243	480	236	184	854	154	34	8	91	229	24	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	243	716	0	184	1008	0	0	42	91	0	253	141
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA		Prot	NA		Perm	NA	pm+ov	Perm	NA	Perm
Protected Phases	1	6		5	2			8	1		4	
Permitted Phases							8		8	4		4
Detector Phase	1	6		5	2		8	8	1	4	4	4
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	3.0	3.0	4.0	4.0	4.0
Minimum Split (s)	8.0	31.0		8.0	31.0		25.0	25.0	8.0	26.0	26.0	26.0
Total Split (s)	20.0	66.0		20.0	66.0		25.0	25.0	20.0	26.0	26.0	26.0
Total Split (%)	17.9%	58.9%		17.9%	58.9%		22.3%	22.3%	17.9%	23.2%	23.2%	23.2%
Maximum Green (s)	15.0	60.0		15.0	60.0		20.0	20.0	15.0	20.0	20.0	20.0
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		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	6.0		5.0	6.0			5.0	5.0		6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag				Lead			
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	2.0

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	15.1	37.2		12.7	34.8			21.2	41.3		20.2	20.2
Actuated g/C Ratio	0.17	0.43		0.15	0.40			0.24	0.47		0.23	0.23
v/c Ratio	0.82	0.49		0.72	0.72			0.14	0.10		0.82	0.28
Control Delay	59.6	16.1		53.0	24.4			30.4	4.2		56.9	7.5
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	59.6	16.1		53.0	24.4			30.4	4.2		56.9	7.5
LOS	E	B		D	C			C	A		E	A
Approach Delay		27.2			28.8			12.5			39.2	
Approach LOS		C			C			B			D	
Queue Length 50th (ft)	128	122		95	232			18	0		131	0
Queue Length 95th (ft)	#300	173		#201	297			52	29		#312	50
Internal Link Dist (ft)		589			319			182			69	
Turn Bay Length (ft)	400			180								
Base Capacity (vph)	297	2303		306	2406			306	873		308	498
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	0.82	0.31		0.60	0.42			0.14	0.10		0.82	0.28

Intersection Summary

Area Type: Other
Cycle Length: 112
Actuated Cycle Length: 87.2
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 28.9 Intersection LOS: C
Intersection Capacity Utilization 72.3% ICU Level of Service C
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 22: Executive Dr & Lowell Rd/3A



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	709	851	0
Future Volume (vph)	0	0	0	709	851	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12
Storage Length (ft)	0	0	0			400
Storage Lanes	0	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Fl						
Sa						
Fl						
Sa						
Li						
Li						
Tr						
Pe						
Ac						
Sh						
La						
Er						
La						
Me						
Li						
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Free			Free	Free	

NOT PART OF STUDY

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 48.1%	ICU Level of Service A
Analysis Period (min) 15	

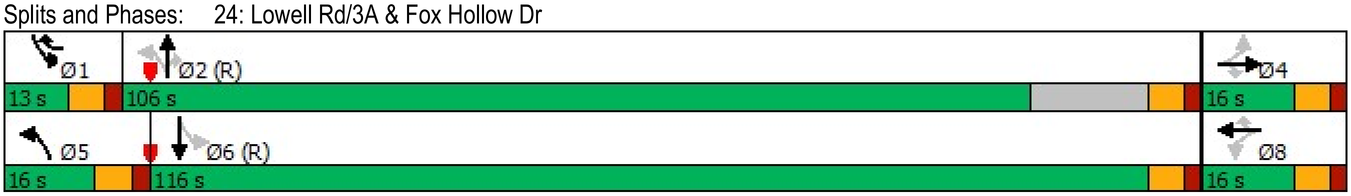
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	0	38	0	4	0	32	1011	0	0	813	3
Future Volume (vph)	34	0	38	0	4	0	32	1011	0	0	813	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	14	14	12	12	12	12	12	12
Storage Length (ft)	0		120	0		0	250		400	220		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850								0.999	
Flt Protected		0.950					0.950					
Satd. Flow (prot)	0	1719	1538	0	1987	1987	1770	1863	1863	1652	1651	0
Flt Permitted		0.755					0.259					
Satd. Flow (perm)	0	1366	1538	0	1987	1987	482	1863	1863	1652	1651	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			66									
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		271			227			1282			634	
Travel Time (s)		6.2			5.2			29.1			14.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	15%	15%	15%
Adj. Flow (vph)	37	0	41	0	4	0	35	1099	0	0	884	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	37	41	0	4	0	35	1099	0	0	887	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.92	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm		NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Detector Phase	4	4	4	8	8	1	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	31.0	31.0	11.0	31.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	13.0	16.0	106.0	106.0	13.0	116.0	
Total Split (%)	10.8%	10.8%	10.8%	10.8%	10.8%	8.8%	10.8%	71.6%	71.6%	8.8%	78.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	7.0	10.0	100.0	100.0	7.0	110.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag						Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.0	1.5	1.5	1.5	1.0	1.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	
Walk Time (s)								7.0	7.0		7.0	
Flash Dont Walk (s)								18.0	18.0		18.0	
Pedestrian Calls (#/hr)								0	0		0	
Act Effct Green (s)		8.1	8.1		8.1		130.1	131.3			122.5	
Actuated g/C Ratio		0.05	0.05		0.05		0.88	0.89			0.83	
v/c Ratio		0.49	0.28		0.04		0.07	0.67			0.65	
Control Delay		88.9	9.3		64.8		2.0	5.7			9.6	
Queue Delay		0.0	0.0		0.0		0.0	0.0			2.1	
Total Delay		88.9	9.3		64.8		2.0	5.7			11.6	
LOS		F	A		E		A	A			B	
Approach Delay		47.1			64.8			5.6			11.6	
Approach LOS		D			E			A			B	
Queue Length 50th (ft)		35	0		4		3	260			332	
Queue Length 95th (ft)		74	16		16		10	454			534	
Internal Link Dist (ft)		191			147			1202			554	
Turn Bay Length (ft)			120				250					
Base Capacity (vph)		96	169		139		510	1652			1366	
Starvation Cap Reductn		0	0		0		0	0			321	
Spillback Cap Reductn		0	0		0		0	0			0	
Storage Cap Reductn		0	0		0		0	0			0	
Reduced v/c Ratio		0.39	0.24		0.03		0.07	0.67			0.85	

Intersection Summary

Area Type: Other
Cycle Length: 148
Actuated Cycle Length: 148
Offset: 45 (30%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 9.8 Intersection LOS: A
Intersection Capacity Utilization 71.8% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 24: Lowell Rd/3A & Fox Hollow Dr



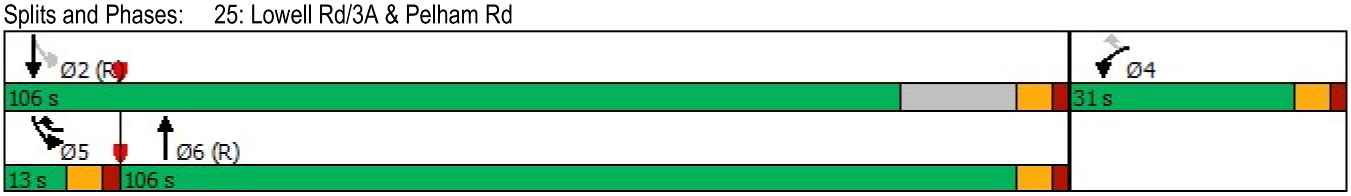
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	202	77	591	87	78	868
Future Volume (vph)	202	77	591	87	78	868
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12
Storage Length (ft)	0	100		0	160	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.983			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1743	1779	0	1388	1462
Flt Permitted	0.950				0.267	
Satd. Flow (perm)	1719	1743	1779	0	390	1462
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		61	11			
Link Speed (mph)	30		30			30
Link Distance (ft)	345		634			526
Travel Time (s)	7.8		14.4			12.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	30%	30%
Adj. Flow (vph)	220	84	642	95	85	943
Shared Lane Traffic (%)						
Lane Group Flow (vph)	220	84	737	0	85	943
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pm+ov	NA		pm+pt	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4			2	
Detector Phase	4	5	6		5	2
Switch Phase						
Minimum Initial (s)	5.0	3.0	10.0		3.0	10.0
Minimum Split (s)	11.0	9.0	31.0		9.0	16.0
Total Split (s)	31.0	13.0	106.0		13.0	106.0
Total Split (%)	20.7%	8.7%	70.7%		8.7%	70.7%
Maximum Green (s)	25.0	7.0	100.0		7.0	100.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5		1.5	1.5

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)			7.0			
Flash Dont Walk (s)			18.0			
Pedestrian Calls (#/hr)			0			
Act Effct Green (s)	23.4	35.9	102.1		114.6	114.6
Actuated g/C Ratio	0.16	0.24	0.68		0.76	0.76
v/c Ratio	0.82	0.18	0.61		0.25	0.84
Control Delay	84.5	15.3	16.7		7.0	22.1
Queue Delay	0.0	0.0	2.4		0.0	0.0
Total Delay	84.5	15.3	19.1		7.0	22.1
LOS	F	B	B		A	C
Approach Delay	65.3		19.1			20.9
Approach LOS	E		B			C
Queue Length 50th (ft)	211	18	360		19	547
Queue Length 95th (ft)	293	58	589		41	#1112
Internal Link Dist (ft)	265		554			446
Turn Bay Length (ft)		100			160	
Base Capacity (vph)	303	474	1237		347	1131
Starvation Cap Reductn	0	0	359		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.73	0.18	0.84		0.24	0.83

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 150
Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.84
Intersection Signal Delay: 26.8 Intersection LOS: C
Intersection Capacity Utilization 66.9% 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: 25: Lowell Rd/3A & Pelham Rd

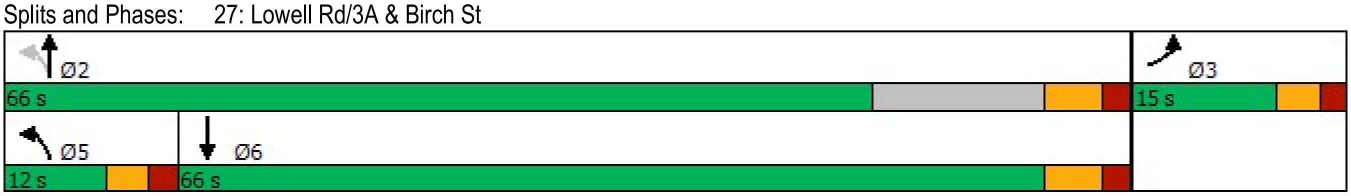


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	35	32	32	594	680	10
Future Volume (vph)	35	32	32	594	680	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	12	12	12	12	12
Storage Length (ft)	0	0	150			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.935				0.998	
Flt Protected	0.975		0.950			
Satd. Flow (prot)	1870	0	1719	1810	1806	0
Flt Permitted	0.975		0.250			
Satd. Flow (perm)	1870	0	452	1810	1806	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	35				2	
Link Speed (mph)	30			30	30	
Link Distance (ft)	442			1237	1199	
Travel Time (s)	10.0			28.1	27.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	38	35	35	646	739	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	73	0	35	646	750	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	3		5	2	6	
Permitted Phases			2			
Detector Phase	3		5	2	6	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	15.0		10.0	11.0	11.0	
Total Split (s)	15.0		12.0	66.0	66.0	
Total Split (%)	16.1%		12.9%	71.0%	71.0%	
Maximum Green (s)	10.0		7.0	60.0	60.0	
Yellow Time (s)	3.0		3.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	5.0		5.0	6.0	6.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0		2.0	2.0	2.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Recall Mode	None		None	Min	Min	
Walk Time (s)	7.0					
Flash Dont Walk (s)	3.0					
Pedestrian Calls (#/hr)	0					
Act Effct Green (s)	6.6		40.9	43.6	40.1	
Actuated g/C Ratio	0.13		0.78	0.83	0.77	
v/c Ratio	0.28		0.07	0.43	0.54	
Control Delay	20.4		2.6	4.1	9.3	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	20.4		2.6	4.1	9.3	
LOS	C		A	A	A	
Approach Delay	20.4			4.0	9.3	
Approach LOS	C			A	A	
Queue Length 50th (ft)	12		2	75	95	
Queue Length 95th (ft)	54		9	151	360	
Internal Link Dist (ft)	362			1157	1119	
Turn Bay Length (ft)			150			
Base Capacity (vph)	430		544	1786	1713	
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		0.06	0.36	0.44	

Intersection Summary	
Area Type: Other	
Cycle Length: 93	
Actuated Cycle Length: 52.4	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.54	
Intersection Signal Delay: 7.4	Intersection LOS: A
Intersection Capacity Utilization 49.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 27: Lowell Rd/3A & Birch St

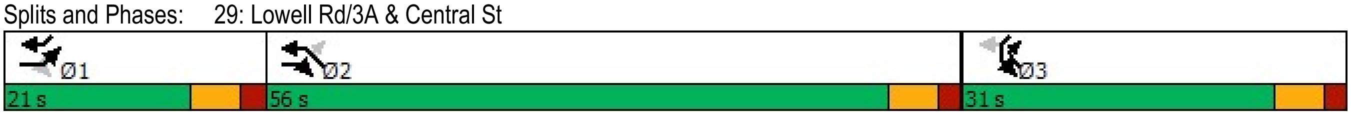


Lane Group	EBL	EBR	NWL	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	69	697	495	128	150	92
Future Volume (vph)	69	697	495	128	150	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	11	11
Storage Length (ft)	300	0	0	80	0	120
Storage Lanes	1	1	1	1	1	1
Taper Length (ft)	25		25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		0.850
Flt Protected	0.950		0.950		0.950	
Satd. Flow (prot)	1770	1583	1719	1641	1711	1531
Flt Permitted	0.950		0.950		0.950	
Satd. Flow (perm)	1770	1583	1719	1641	1711	1531
Right Turn on Red		Yes		Yes		Yes
Satd. Flow (RTOR)		440		139		100
Link Speed (mph)	30		30		30	
Link Distance (ft)	636		905		654	
Travel Time (s)	14.5		20.6		14.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	5%	2%	2%
Adj. Flow (vph)	75	758	538	139	163	100
Shared Lane Traffic (%)						
Lane Group Flow (vph)	75	758	538	139	163	100
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	12		12		11	
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	0.92	1.04	1.04
Turning Speed (mph)	15	9	15	9	15	9
Turn Type	Prot	pm+ov	Prot	pm+ov	Prot	pm+ov
Protected Phases	1	2	2	3	3	1
Permitted Phases		1		2		3
Detector Phase	1	2	2	3	3	1
Switch Phase						
Minimum Initial (s)	8.0	10.0	10.0	8.0	8.0	8.0
Minimum Split (s)	14.0	31.0	31.0	31.0	31.0	14.0
Total Split (s)	21.0	56.0	56.0	31.0	31.0	21.0
Total Split (%)	19.4%	51.9%	51.9%	28.7%	28.7%	19.4%
Maximum Green (s)	15.0	50.0	50.0	25.0	25.0	15.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag			Lead
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	2.5	2.5	2.0	2.0	1.5

Lane Group	EBL	EBR	NWL	NWR	SWL	SWR
Recall Mode	None	Min	Min	None	None	None
Walk Time (s)		7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		18.0	18.0	18.0	18.0	
Pedestrian Calls (#/hr)		0	0	0	0	
Act Effct Green (s)	9.6	46.5	35.4	57.0	12.8	29.0
Actuated g/C Ratio	0.13	0.64	0.49	0.79	0.18	0.40
v/c Ratio	0.32	0.65	0.64	0.11	0.54	0.15
Control Delay	39.8	5.6	19.2	0.8	39.3	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.8	5.6	19.2	0.8	39.3	5.2
LOS	D	A	B	A	D	A
Approach Delay	8.7		15.4		26.3	
Approach LOS	A		B		C	
Queue Length 50th (ft)	32	50	175	0	69	0
Queue Length 95th (ft)	89	161	343	12	157	32
Internal Link Dist (ft)	556		825		574	
Turn Bay Length (ft)	300			80		120
Base Capacity (vph)	404	1423	1220	1497	651	810
Starvation Cap Reductn	0	36	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	0.19	0.55	0.44	0.09	0.25	0.12

Intersection Summary	
Area Type: Other	
Cycle Length: 108	
Actuated Cycle Length: 72.5	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.65	
Intersection Signal Delay: 13.9	Intersection LOS: B
Intersection Capacity Utilization 57.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 29: Lowell Rd/3A & Central St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	325	0	2	282	295	1	1	1	382	9	1
Future Volume (vph)	1	325	0	2	282	295	1	1	1	382	9	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	16	12
Storage Length (ft)	0		0	0		200	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.955				
Flt Protected								0.984			0.954	
Satd. Flow (prot)	0	1863	0	0	1863	1583	0	1750	0	0	2014	0
Flt Permitted		0.999			0.997						0.730	
Satd. Flow (perm)	0	1861	0	0	1857	1583	0	1779	0	0	1541	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						321		1				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		888			636			108			794	
Travel Time (s)		20.2			14.5			2.5			18.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	353	0	2	307	321	1	1	1	415	10	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	354	0	0	309	321	0	3	0	0	426	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			3			4	
Permitted Phases	2			6		6	3			4		
Detector Phase	2	2		6	6	6	3	3		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	5.0	5.0		10.0	10.0	
Minimum Split (s)	31.0	31.0		16.0	16.0	16.0	16.0	16.0		31.0	31.0	
Total Split (s)	46.0	46.0		46.0	46.0	46.0	16.0	16.0		31.0	31.0	
Total Split (%)	49.5%	49.5%		49.5%	49.5%	49.5%	17.2%	17.2%		33.3%	33.3%	
Maximum Green (s)	40.0	40.0		40.0	40.0	40.0	10.0	10.0		25.0	25.0	
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)	2.0	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	
Total Lost Time (s)		6.0			6.0	6.0		6.0			6.0	
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	2.0	2.0		3.0	3.0	
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Walk Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	3.0	3.0					3.0	3.0		3.0	3.0	
Pedestrian Calls (#/hr)	0	0					0	0		0	0	
Act Effct Green (s)		16.0			16.0	16.0		5.1			25.6	
Actuated g/C Ratio		0.29			0.29	0.29		0.09			0.46	
v/c Ratio		0.66			0.58	0.47		0.02			0.60	
Control Delay		24.1			21.8	4.8		26.0			19.3	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		24.1			21.8	4.8		26.0			19.3	
LOS		C			C	A		C			B	
Approach Delay		24.1			13.1			26.0			19.3	
Approach LOS		C			B			C			B	
Queue Length 50th (ft)		94			80	0		1			87	
Queue Length 95th (ft)		207			179	50		9			#325	
Internal Link Dist (ft)		808			556			28			714	
Turn Bay Length (ft)						200						
Base Capacity (vph)		1370			1367	1250		328			709	
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		0.26			0.23	0.26		0.01			0.60	

Intersection Summary

Area Type: Other

Cycle Length: 93

Actuated Cycle Length: 55.6

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.66

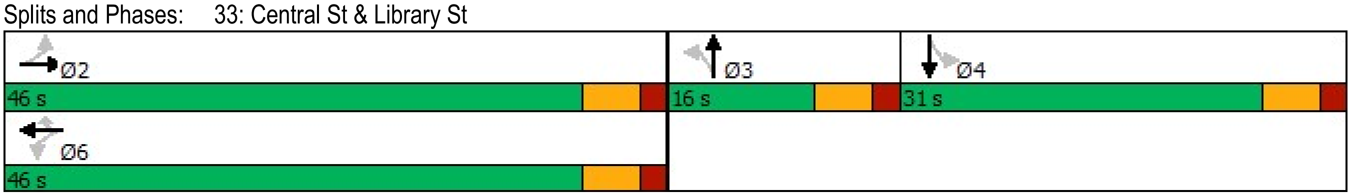
Intersection Signal Delay: 17.7 Intersection LOS: B

Intersection Capacity Utilization 56.3% ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 33: Central St & Library St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	294	0	3	8	194	0	2	3	61	2	4
Future Volume (vph)	18	294	0	3	8	194	0	2	3	61	2	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	16	16	12	16	12	12	16	12
Storage Length (ft)	0		0	0		250	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.919			0.992	
Flt Protected		0.997			0.988						0.956	
Satd. Flow (prot)	0	2071	0	0	2086	1743	0	1666	0	0	1793	0
Flt Permitted		0.997			0.988						0.956	
Satd. Flow (perm)	0	2071	0	0	2086	1743	0	1666	0	0	1793	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		439			888			261			628	
Travel Time (s)		10.0			20.2			5.9			14.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	2%	2%	2%	2%	5%	2%	2%	30%	15%	2%	2%
Adj. Flow (vph)	20	320	0	3	9	211	0	2	3	66	2	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	340	0	0	12	211	0	5	0	0	72	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	0.85	1.00	1.00	0.85	0.85	1.00	0.85	1.00	1.00	0.85	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 41.8% ICU Level of Service A

Analysis Period (min) 15

Lane Group	EBL	EBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	0	0	0	960	0	1353
Future Volume (vph)	0	0	0	960	0	1353
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	0.88
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	0	0	3539	0	2787
Fl						
Sa						
Li						
Li						
Tr						
Pe						
Ad						
Sh						
La						
En						
La						
M						
Li						
Cr						
Tv						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Free			Free	Free	

NOT PART OF STUDY

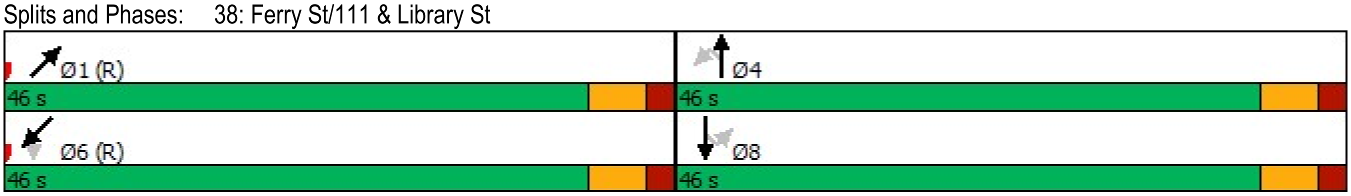
Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 50.7%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	53	268	5	24	361	3	0	457	13	0	318	11
Future Volume (vph)	53	268	5	24	361	3	0	457	13	0	318	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	175		0	0		0	200		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.999			0.996			0.995	
Flt Protected	0.950			0.950								
Satd. Flow (prot)	1770	1857	0	1770	1861	0	0	1855	0	1863	1853	0
Flt Permitted	0.267			0.419								
Satd. Flow (perm)	497	1857	0	780	1861	0	0	1855	0	1863	1853	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			1			2			2	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		342			444			371			1247	
Travel Time (s)		7.8			10.1			8.4			28.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	291	5	26	392	3	0	497	14	0	346	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	296	0	26	395	0	0	511	0	0	358	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
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			1			6	
Permitted Phases	4			8						6		
Detector Phase	4	4		8	8			1		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0			10.0		10.0	10.0	
Minimum Split (s)	31.0	31.0		31.0	31.0			31.0		31.0	31.0	
Total Split (s)	46.0	46.0		46.0	46.0			46.0		46.0	46.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%			50.0%		50.0%	50.0%	
Maximum Green (s)	40.0	40.0		40.0	40.0			40.0		40.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0			2.0		2.0	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-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Recall Mode	None	None		None	None			C-Min		C-Min	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Flash Dont Walk (s)	18.0	18.0		18.0	18.0			18.0		18.0	18.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	
Act Effct Green (s)	25.6	25.6		25.6	25.6			54.4			54.4	
Actuated g/C Ratio	0.28	0.28		0.28	0.28			0.59			0.59	
v/c Ratio	0.42	0.57		0.12	0.76			0.47			0.33	
Control Delay	34.8	31.9		23.2	39.6			13.7			11.8	
Queue Delay	0.0	0.0		0.0	0.1			2.1			0.0	
Total Delay	34.8	31.9		23.2	39.7			15.8			11.8	
LOS	C	C		C	D			B			B	
Approach Delay		32.4			38.7			15.8			11.8	
Approach LOS		C			D			B			B	
Queue Length 50th (ft)	28	148		11	210			153			96	
Queue Length 95th (ft)	58	199		28	274			291			188	
Internal Link Dist (ft)		262			364			291			1167	
Turn Bay Length (ft)				175								
Base Capacity (vph)	216	807		339	809			1097			1096	
Starvation Cap Reductn	0	0		0	32			429			0	
Spillback Cap Reductn	0	0		0	0			0			0	
Storage Cap Reductn	0	0		0	0			0			0	
Reduced v/c Ratio	0.27	0.37		0.08	0.51			0.76			0.33	

Intersection Summary	
Area Type:	Other
Cycle Length: 92	
Actuated Cycle Length: 92	
Offset: 0 (0%), Referenced to phase 1:NET and 6:SWTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 24.4	Intersection LOS: C
Intersection Capacity Utilization 67.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 38: Ferry St/111 & Library St



Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NWR	NWR2	NEL	NET
Lane Configurations												
Traffic Volume (vph)	8	6	6	7	2	12	13	50	376	6	6	619
Future Volume (vph)	8	6	6	7	2	12	13	50	376	6	6	619
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12	16	12	12	12	12	12
Storage Length (ft)	0		0			0		0	0		0	
Storage Lanes	0		0			0		0	1		0	
Taper Length (ft)	25					25					25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.935					0.912		0.865			0.983
Flt Protected		0.986					0.991					
Satd. Flow (prot)	0	1891	0	0	0	0	1853	0	1611	0	0	1831
Flt Permitted		0.828					0.929					0.994
Satd. Flow (perm)	0	1588	0	0	0	0	1738	0	1611	0	0	1820
Right Turn on Red				Yes				Yes		Yes		
Satd. Flow (RTOR)		8					54		86			
Link Speed (mph)		30					30					30
Link Distance (ft)		286					634					617
Travel Time (s)		6.5					14.4					14.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	9	7	7	8	2	13	14	54	409	7	7	673
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	31	0	0	0	0	83	0	416	0	0	776
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Right	Left	Left	Left	Right	Right	Right	Left	Left
Median Width(ft)		0					0					12
Link Offset(ft)		0					0					0
Crosswalk Width(ft)		16					16					16
Two way Left Turn Lane												
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	9	15	15		9	9	9	15	
Turn Type	Perm	NA			Perm	Perm	NA		Over		Perm	NA
Protected Phases		8					4		1			2
Permitted Phases	8				4	4					2	
Detector Phase	8	8			4	4	4		1		2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0	5.0	5.0		10.0		10.0	10.0
Minimum Split (s)	22.0	22.0			12.0	12.0	12.0		16.0		17.0	17.0
Total Split (s)	22.0	22.0			27.0	27.0	27.0		56.0		57.0	57.0
Total Split (%)	15.7%	15.7%			19.3%	19.3%	19.3%		40.0%		40.7%	40.7%
Maximum Green (s)	15.0	15.0			20.0	20.0	20.0		50.0		50.0	50.0
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0		4.0		4.0	4.0
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0		2.0		3.0	3.0
Lost Time Adjust (s)		0.0					0.0		0.0			0.0
Total Lost Time (s)		7.0					7.0		6.0			7.0
Lead/Lag									Lead		Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0		4.0	4.0

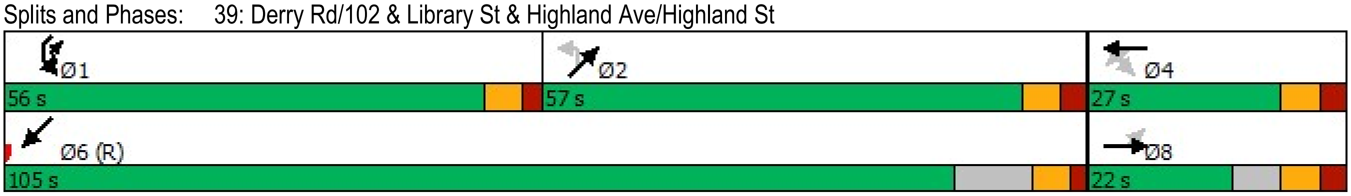
Lane Group	NER	SWL	SWT
Lane Configurations			
Traffic Volume (vph)	88	355	596
Future Volume (vph)	88	355	596
Ideal Flow (vphpl)	1900	1900	1900
Lane Width (ft)	12	12	12
Storage Length (ft)	0	0	
Storage Lanes	0	1	
Taper Length (ft)		25	
Lane Util. Factor	1.00	1.00	1.00
Frt			
Flt Protected		0.950	
Satd. Flow (prot)	0	1719	1810
Flt Permitted		0.950	
Satd. Flow (perm)	0	1719	1810
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			30
Link Distance (ft)			845
Travel Time (s)			19.2
Peak Hour Factor	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	5%
Adj. Flow (vph)	96	386	648
Shared Lane Traffic (%)			
Lane Group Flow (vph)	0	386	648
Enter Blocked Intersection	No	No	No
Lane Alignment	Right	Left	Left
Median Width(ft)			12
Link Offset(ft)			0
Crosswalk Width(ft)			16
Two way Left Turn Lane			
Headway Factor	1.00	1.00	1.00
Turning Speed (mph)	9	15	
Turn Type		Prot	NA
Protected Phases		1	6
Permitted Phases			
Detector Phase		1	6
Switch Phase			
Minimum Initial (s)		10.0	10.0
Minimum Split (s)		16.0	16.0
Total Split (s)		56.0	105.0
Total Split (%)		40.0%	75.0%
Maximum Green (s)		50.0	99.0
Yellow Time (s)		4.0	4.0
All-Red Time (s)		2.0	2.0
Lost Time Adjust (s)		0.0	0.0
Total Lost Time (s)		6.0	6.0
Lead/Lag		Lead	
Lead-Lag Optimize?			
Vehicle Extension (s)		3.0	3.0

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NWR	NWR2	NEL	NET
Recall Mode	None	None			None	None	None		None		Min	Min
Walk Time (s)	7.0	7.0										
Flash Dont Walk (s)	8.0	8.0										
Pedestrian Calls (#/hr)	0	0										
Act Effct Green (s)		8.3					8.3		39.2			72.4
Actuated g/C Ratio		0.06					0.06		0.28			0.52
v/c Ratio		0.30					0.54		0.81			0.82
Control Delay		56.9					39.2		48.9			39.2
Queue Delay		0.0					0.0		1.7			23.3
Total Delay		56.9					39.2		50.7			62.5
LOS		E					D		D			E
Approach Delay		56.9					39.2					62.5
Approach LOS		E					D					E
Queue Length 50th (ft)		20					26		287			576
Queue Length 95th (ft)		54					79		375			#1013
Internal Link Dist (ft)		206					554					537
Turn Bay Length (ft)												
Base Capacity (vph)		233					294		631			941
Starvation Cap Reductn		0					0		95			187
Spillback Cap Reductn		0					0		0			0
Storage Cap Reductn		0					0		0			0
Reduced v/c Ratio		0.13					0.28		0.78			1.03

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Offset: 0 (0%), Referenced to phase 6:SWT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 42.6 Intersection LOS: D
Intersection Capacity Utilization 91.6% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 39: Derry Rd/102 & Library St & Highland Ave/Highland St



Lane Group	NER	SWL	SWT
Recall Mode		None	C-Min
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
Act Effct Green (s)		39.2	118.7
Actuated g/C Ratio		0.28	0.85
v/c Ratio		0.80	0.42
Control Delay		59.0	3.7
Queue Delay		0.0	0.0
Total Delay		59.0	3.7
LOS		E	A
Approach Delay			24.3
Approach LOS			C
Queue Length 50th (ft)		327	104
Queue Length 95th (ft)		404	184
Internal Link Dist (ft)			765
Turn Bay Length (ft)			
Base Capacity (vph)		614	1534
Starvation Cap Reductn		0	0
Spillback Cap Reductn		0	0
Storage Cap Reductn		0	0
Reduced v/c Ratio		0.63	0.42

Intersection Summary

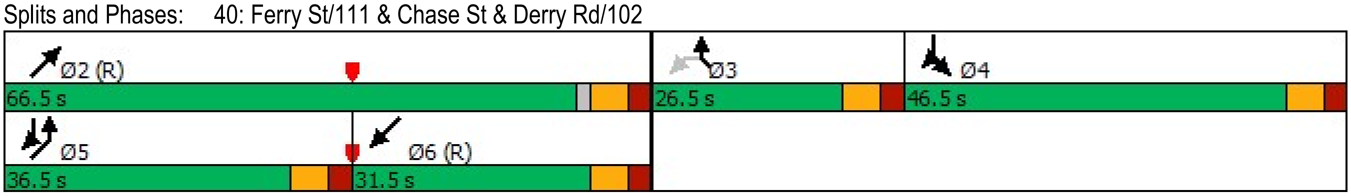
Lane Group	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	72	649	217	14	17	420	531	9	0	487	0
Future Volume (vph)	72	649	217	14	17	420	531	9	0	487	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	12	13	12	12	12	12	12
Storage Length (ft)	150	300	0	0		0		0	0		0
Storage Lanes	1	1	1	1		1		0	0		0
Taper Length (ft)	25		25			25			25		
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850		0.850			0.997				
Flt Protected	0.950		0.950			0.950					
Satd. Flow (prot)	1719	2707	1719	1641	0	1776	1804	0	0	3438	0
Flt Permitted	0.950		0.189			0.950					
Satd. Flow (perm)	1719	2707	342	1641	0	1776	1804	0	0	3438	0
Right Turn on Red		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		111		128			1				
Link Speed (mph)	30		30				30			30	
Link Distance (ft)	617		345				426			371	
Travel Time (s)	14.0		7.8				9.7			8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	2%	5%	2%
Adj. Flow (vph)	78	705	236	15	18	457	577	10	0	529	0
Shared Lane Traffic (%)											
Lane Group Flow (vph)	78	705	236	33	0	457	587	0	0	529	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12		12				13			13	
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	0.92	1.00	0.96	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	9	15		9	15		9
Turn Type	Prot	pt+ov	Perm	Prot		Prot	NA			NA	
Protected Phases	4	4 5		3		5	2			6	
Permitted Phases			3								
Detector Phase	4	4 5	3	3		5	2			6	
Switch Phase											
Minimum Initial (s)	8.0		5.0	5.0		10.0	10.0			10.0	
Minimum Split (s)	24.5		24.5	24.5		24.5	24.5			24.5	
Total Split (s)	46.5		26.5	26.5		36.5	66.5			31.5	
Total Split (%)	33.0%		18.8%	18.8%		25.9%	47.2%			22.3%	
Maximum Green (s)	40.0		20.0	20.0		30.0	60.0			25.0	
Yellow Time (s)	4.0		4.0	4.0		4.0	4.0			4.0	
All-Red Time (s)	2.5		2.5	2.5		2.5	2.5			2.5	
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.5		6.5	6.5		6.5	6.5			6.5	
Lead/Lag	Lag		Lead	Lead		Lead				Lag	
Lead-Lag Optimize?											
Vehicle Extension (s)	1.5		1.5	1.5		1.5	1.5			1.5	

Lane Group	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Recall Mode	None		None	None		Min	C-Min			C-Min	
Walk Time (s)	7.0		7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	11.0		11.0	11.0		11.0	11.0			11.0	
Pedestrian Calls (#/hr)	0		0	0		0	0			0	
Act Effct Green (s)	26.5	76.5	21.2	21.2		43.5	73.7			23.8	
Actuated g/C Ratio	0.19	0.54	0.15	0.15		0.31	0.52			0.17	
v/c Ratio	0.24	0.46	4.63	0.09		0.84	0.62			0.91	
Control Delay	48.2	17.4	1689.2	0.5		60.7	28.6			78.6	
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0			4.2	
Total Delay	48.2	17.4	1689.2	0.5		60.7	28.6			82.8	
LOS	D	B	F	A		E	C			F	
Approach Delay	20.4		1482.0				42.6			82.8	
Approach LOS	C		F				D			F	
Queue Length 50th (ft)	62	181	~403	0		389	360			251	
Queue Length 95th (ft)	101	236	#578	0		#692	570			#343	
Internal Link Dist (ft)	537		265				346			291	
Turn Bay Length (ft)	150	300									
Base Capacity (vph)	487	1506	51	355		547	944			609	
Starvation Cap Reductn	0	0	0	0		0	0			40	
Spillback Cap Reductn	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.16	0.47	4.63	0.09		0.84	0.62			0.93	

Intersection Summary

Area Type: Other
Cycle Length: 141
Actuated Cycle Length: 141
Offset: 0 (0%), Referenced to phase 2:NET and 6:SWT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 4.63
Intersection Signal Delay: 191.6 Intersection LOS: F
Intersection Capacity Utilization 77.1% 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: 40: Ferry St/111 & Chase St & Derry Rd/102



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	435	4	36	16	6	14	13	233	14	17	408	462
Future Volume (vph)	435	4	36	16	6	14	13	233	14	17	408	462
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	16	12	12	12	12	12	12	14
Storage Length (ft)	0		200	0		0	120		0	280		280
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.948			0.992				0.850
Flt Protected		0.953			0.979		0.950			0.950		
Satd. Flow (prot)	0	1775	1794	0	1959	0	1770	1848	0	1770	1863	1689
Flt Permitted		0.438			0.700		0.222			0.470		
Satd. Flow (perm)	0	816	1794	0	1401	0	414	1848	0	875	1863	1689
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			111		15			3				502
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		882			126			314			2248	
Travel Time (s)		20.0			2.9			7.1			51.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	473	4	39	17	7	15	14	253	15	18	443	502
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	477	39	0	39	0	14	268	0	18	443	502
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		3			4		5	2		1	6	
Permitted Phases	3		3	4			2			6		6
Detector Phase	3	3	3	4	4		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	4.0	4.0		4.0	10.0		4.0	10.0	10.0
Minimum Split (s)	14.0	14.0	14.0	10.0	10.0		8.0	16.0		8.0	16.0	16.0
Total Split (s)	49.0	49.0	49.0	14.0	14.0		14.0	51.0		14.0	51.0	51.0
Total Split (%)	38.3%	38.3%	38.3%	10.9%	10.9%		10.9%	39.8%		10.9%	39.8%	39.8%
Maximum Green (s)	45.0	45.0	45.0	8.0	8.0		10.0	45.0		10.0	45.0	45.0
Yellow Time (s)	3.0	3.0	3.0	4.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0		1.0	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)		4.0	4.0		6.0		4.0	6.0		4.0	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Act Effct Green (s)		46.9	46.9		7.1		35.9	31.8		35.8	31.8	31.8
Actuated g/C Ratio		0.47	0.47		0.07		0.36	0.32		0.36	0.32	0.32
v/c Ratio		1.24	0.04		0.35		0.06	0.45		0.05	0.75	0.57
Control Delay		158.3	0.1		45.1		19.9	30.2		19.7	39.8	5.3
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		158.3	0.1		45.1		19.9	30.2		19.7	39.8	5.3
LOS		F	A		D		B	C		B	D	A
Approach Delay		146.3			45.1			29.7			21.4	
Approach LOS		F			D			C			C	
Queue Length 50th (ft)		~392	0		15		6	134		8	252	0
Queue Length 95th (ft)		#762	0		56		18	235		22	415	71
Internal Link Dist (ft)		802			46			234			2168	
Turn Bay Length (ft)			200				120			280		280
Base Capacity (vph)		384	903		131		295	871		418	877	1060
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		1.24	0.04		0.30		0.05	0.31		0.04	0.51	0.47

Intersection Summary

Area Type: Other

Cycle Length: 128

Actuated Cycle Length: 99.7

Natural Cycle: 140

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 59.0 Intersection LOS: E

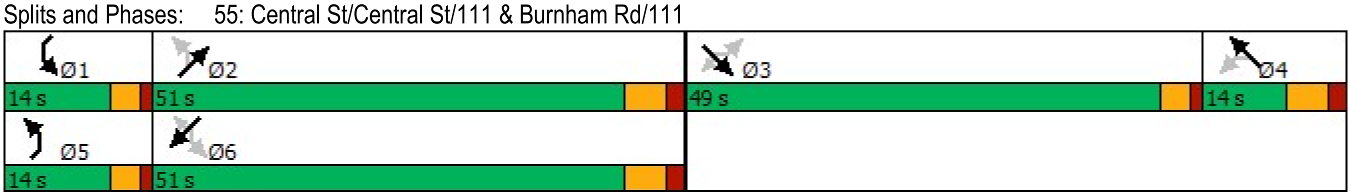
Intersection Capacity Utilization 60.8% ICU Level of Service B

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: 55: Central St/Central St/111 & Burnham Rd/111



Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	41	20	590	1	44	270	133	28	143	155	3	6
Future Volume (vph)	41	20	590	1	44	270	133	28	143	155	3	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	12	12	12	16	12	12	16	12
Storage Length (ft)		300		300	300		300		140		300	
Storage Lanes		1		1	1		2		1		0	
Taper Length (ft)		25			25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850			0.850	0.850		0.992		
Flt Protected		0.950			0.950				0.950			
Satd. Flow (prot)	0	1719	1652	1641	1770	1810	1538	1743	1719	1846	0	0
Flt Permitted		0.267			0.267				0.396			
Satd. Flow (perm)	0	483	1652	1641	497	1810	1538	1743	717	1846	0	0
Right Turn on Red				Yes				Yes				Yes
Satd. Flow (RTOR)				132				132		1		
Link Speed (mph)			30			30				30		
Link Distance (ft)			2248			4120				755		
Travel Time (s)			51.1			93.6				17.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	15%	5%	2%	5%	5%	5%	5%	2%	2%	5%
Adj. Flow (vph)	45	22	641	1	48	293	145	30	155	168	3	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	67	641	1	48	293	145	30	155	178	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right	Left	Left	Right	Right
Median Width(ft)			12			12				12		
Link Offset(ft)			0			0				0		
Crosswalk Width(ft)			16			16				16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.85	1.00	1.00	0.85	1.00
Turning Speed (mph)	15	15		9	15		9	9	15		9	9
Turn Type	custom	Prot	NA	Free	custom	NA	Perm	Free	pm+pt	NA		
Protected Phases		1	6			2			7	4		
Permitted Phases	1			Free	5		2	Free	4			
Detector Phase	1	1	6		5	2	2		7	4		
Switch Phase												
Minimum Initial (s)	4.0	4.0	15.0		4.0	15.0	15.0		4.0	10.0		
Minimum Split (s)	8.0	8.0	21.0		8.0	21.0	21.0		8.0	16.0		
Total Split (s)	19.0	19.0	66.0		19.0	66.0	66.0		19.0	51.0		
Total Split (%)	10.9%	10.9%	37.9%		10.9%	37.9%	37.9%		10.9%	29.3%		
Maximum Green (s)	15.0	15.0	60.0		15.0	60.0	60.0		15.0	45.0		
Yellow Time (s)	3.0	3.0	4.0		3.0	4.0	4.0		3.0	4.0		
All-Red Time (s)	1.0	1.0	2.0		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		
Total Lost Time (s)		4.0	6.0		4.0	6.0	6.0		4.0	6.0		
Lead/Lag	Lead	Lead	Lag		Lead	Lag	Lag		Lag			
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	3.0		2.0	3.0	3.0		2.0	3.0		

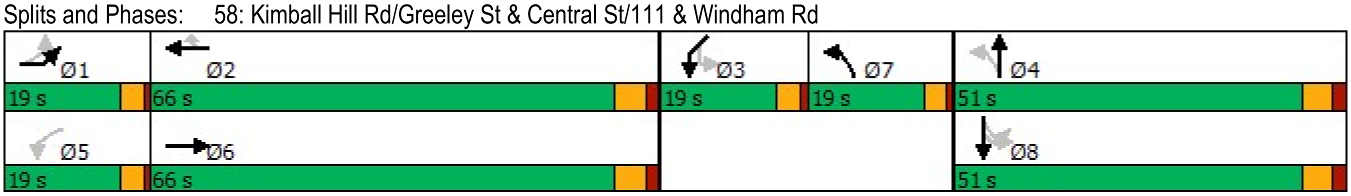
Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Traffic Volume (vph)	8	108	168	86	40	36	6	15
Future Volume (vph)	8	108	168	86	40	36	6	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	12	12	12
Storage Length (ft)		0		0		0	0	
Storage Lanes		0		0		1	0	
Taper Length (ft)		25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.969			0.970		
Flt Protected			0.985			0.962		
Satd. Flow (prot)	0	0	1957	0	0	1738	0	0
Flt Permitted			0.685			0.962		
Satd. Flow (perm)	0	0	1361	0	0	1738	0	0
Right Turn on Red				No				No
Satd. Flow (RTOR)								
Link Speed (mph)			30			30		
Link Distance (ft)			869			736		
Travel Time (s)			19.8			16.7		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	9	117	183	93	43	39	7	16
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	402	0	0	105	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right
Median Width(ft)			12			12		
Link Offset(ft)			0			0		
Crosswalk Width(ft)			16			16		
Two way Left Turn Lane								
Headway Factor	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	15	15	9	9
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			8			3		
Permitted Phases	8	8			3			
Detector Phase	8	8	8		3	3		
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0		4.0	4.0		
Minimum Split (s)	16.0	16.0	16.0		8.0	8.0		
Total Split (s)	51.0	51.0	51.0		19.0	19.0		
Total Split (%)	29.3%	29.3%	29.3%		10.9%	10.9%		
Maximum Green (s)	45.0	45.0	45.0		15.0	15.0		
Yellow Time (s)	4.0	4.0	4.0		3.0	3.0		
All-Red Time (s)	2.0	2.0	2.0		1.0	1.0		
Lost Time Adjust (s)			0.0			0.0		
Total Lost Time (s)			6.0			4.0		
Lead/Lag					Lead	Lead		
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0		

Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Recall Mode	None	None	Min		None	Min	Min		None	None		
Act Effct Green (s)		15.0	60.0	170.8	15.0	60.0	60.0	170.8	60.4	45.0		
Actuated g/C Ratio		0.09	0.35	1.00	0.09	0.35	0.35	1.00	0.35	0.26		
v/c Ratio		1.60	1.11	0.00	1.12	0.46	0.27	0.02	0.47	0.37		
Control Delay		401.6	119.4	0.0	238.3	46.4	42.1	0.0	41.8	54.3		
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay		401.6	119.4	0.0	238.3	46.4	42.1	0.0	41.8	54.3		
LOS		F	F	A	F	D	D	A	D	D		
Approach Delay			145.9			60.3				48.5		
Approach LOS			F			E				D		
Queue Length 50th (ft)		~109	~841	0	~63	262	120	0	121	167		
Queue Length 95th (ft)		#222	#1092	0	#162	359	185	0	182	246		
Internal Link Dist (ft)			2168			4040				675		
Turn Bay Length (ft)		300		300	300		300	300	140			
Base Capacity (vph)		42	580	1641	43	636	540	1743	347	487		
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		1.60	1.11	0.00	1.12	0.46	0.27	0.02	0.45	0.37		

Intersection Summary

Area Type: Other
Cycle Length: 174
Actuated Cycle Length: 170.8
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.60
Intersection Signal Delay: 106.0 Intersection LOS: F
Intersection Capacity Utilization 90.7% 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: 58: Kimball Hill Rd/Greeley St & Central St/111 & Windham Rd



Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Recall Mode	None	None	None		None	None		
Act Effct Green (s)			45.0			13.3		
Actuated g/C Ratio			0.26			0.08		
v/c Ratio			1.12			0.78		
Control Delay			140.1			112.3		
Queue Delay			0.0			0.0		
Total Delay			140.1			112.3		
LOS			F			F		
Approach Delay			140.1			112.3		
Approach LOS			F			F		
Queue Length 50th (ft)			~534			119		
Queue Length 95th (ft)			#758			#210		
Internal Link Dist (ft)			789			656		
Turn Bay Length (ft)								
Base Capacity (vph)			358			152		
Starvation Cap Reductn			0			0		
Spillback Cap Reductn			0			0		
Storage Cap Reductn			0			0		
Reduced v/c Ratio			1.12			0.69		

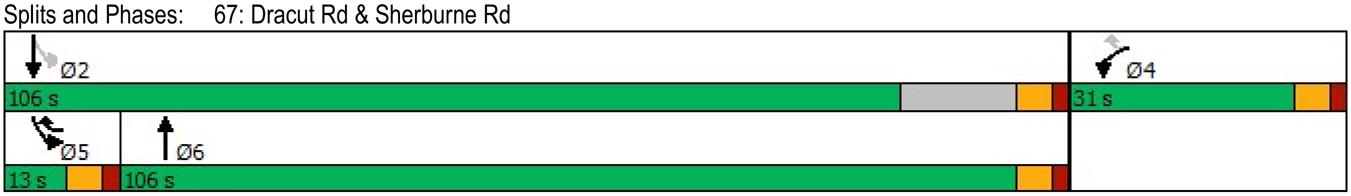
Intersection Summary

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	86	269	307	49	185	155
Future Volume (vph)	86	269	307	49	185	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	150		0	150	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.982			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1570	1538	1777	0	1570	1863
Flt Permitted	0.950				0.327	
Satd. Flow (perm)	1570	1538	1777	0	540	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		292	11			
Link Speed (mph)	30		30			30
Link Distance (ft)	832		787			870
Travel Time (s)	18.9		17.9			19.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	5%	5%	5%	15%	2%
Adj. Flow (vph)	93	292	334	53	201	168
Shared Lane Traffic (%)						
Lane Group Flow (vph)	93	292	387	0	201	168
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pm+ov	NA		pm+pt	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4			2	
Detector Phase	4	5	6		5	2
Switch Phase						
Minimum Initial (s)	5.0	3.0	10.0		3.0	10.0
Minimum Split (s)	11.0	9.0	16.0		9.0	16.0
Total Split (s)	31.0	13.0	106.0		13.0	106.0
Total Split (%)	20.7%	8.7%	70.7%		8.7%	70.7%
Maximum Green (s)	25.0	7.0	100.0		7.0	100.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5		1.5	1.5
Recall Mode	None	None	Min		None	Min

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Act Effct Green (s)	7.1	17.2	15.5		29.1	31.0
Actuated g/C Ratio	0.16	0.38	0.34		0.64	0.68
v/c Ratio	0.38	0.38	0.63		0.39	0.13
Control Delay	24.7	3.4	18.3		6.9	4.6
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	24.7	3.4	18.3		6.9	4.6
LOS	C	A	B		A	A
Approach Delay	8.6		18.3			5.8
Approach LOS	A		B			A
Queue Length 50th (ft)	23	0	86		21	16
Queue Length 95th (ft)	66	39	167		49	39
Internal Link Dist (ft)	752		707			790
Turn Bay Length (ft)		150			150	
Base Capacity (vph)	915	768	1777		514	1863
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	0.10	0.38	0.22		0.39	0.09

Intersection Summary	
Area Type: Other	
Cycle Length: 150	
Actuated Cycle Length: 45.4	
Natural Cycle: 45	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.63	
Intersection Signal Delay: 11.0	Intersection LOS: B
Intersection Capacity Utilization 49.1%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 67: Dracut Rd & Sherburne Rd



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	104	206	69	136	93	24
Future Volume (vph)	104	206	69	136	93	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12
Storage Length (ft)		0	180		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.910				0.972	
Flt Protected			0.950		0.962	
Satd. Flow (prot)	1549	0	1719	1652	1705	0
Flt Permitted			0.950		0.962	
Satd. Flow (perm)	1549	0	1719	1652	1705	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1417			420	606	
Travel Time (s)	32.2			9.5	13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	15%	5%	15%	15%	30%
Adj. Flow (vph)	113	224	75	148	101	26
Shared Lane Traffic (%)						
Lane Group Flow (vph)	337	0	75	148	127	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	16	
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	0.85	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 38.6%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	96	2	218	233	8	196
Future Volume (vph)	96	2	218	233	8	196
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	16	12
Storage Length (ft)		0	80		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.997				0.870	
Flt Protected			0.950		0.998	
Satd. Flow (prot)	1643	0	1719	1872	1774	0
Flt Permitted			0.950		0.998	
Satd. Flow (perm)	1643	0	1719	1872	1774	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	2748			314	1025	
Travel Time (s)	62.5			7.1	23.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	30%	5%	15%	15%	5%
Adj. Flow (vph)	104	2	237	253	9	213
Shared Lane Traffic (%)						
Lane Group Flow (vph)	106	0	237	253	222	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	16	
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	0.85	0.85	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 38.0%	ICU Level of Service A
Analysis Period (min) 15	

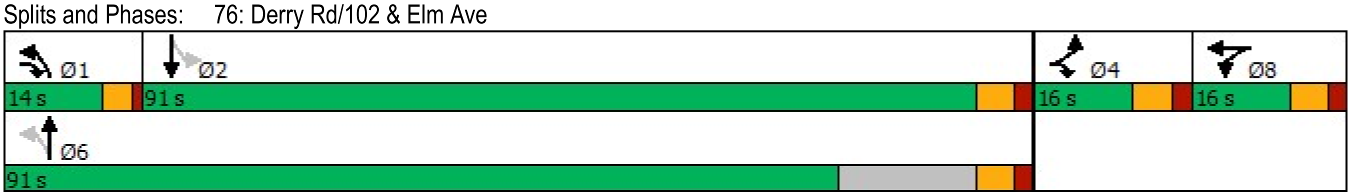
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	0	291	1	0	0	156	641	0	0	774	12
Future Volume (vph)	42	0	291	1	0	0	156	641	0	0	774	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	12	12	12	12	12	15	12
Storage Length (ft)	130		0	0		0	465		0	0		0
Storage Lanes	1		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850								0.998	
Flt Protected	0.950				0.950		0.950					
Satd. Flow (prot)	1719	0	1538	0	1770	0	1770	1863	0	0	1986	0
Flt Permitted	0.950				0.950		0.125					
Satd. Flow (perm)	1719	0	1538	0	1770	0	233	1863	0	0	1986	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			278								1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		468			79			2433			1216	
Travel Time (s)		10.6			1.8			55.3			27.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	5%	2%	2%	2%	2%	2%	2%	2%	5%	5%
Adj. Flow (vph)	46	0	316	1	0	0	170	697	0	0	841	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	46	0	316	0	1	0	170	697	0	0	854	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	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot		pt+ov	Split	NA		pm+pt	NA			NA	
Protected Phases	4		4 1	8	8		1	6			2	
Permitted Phases	4						6			2		
Detector Phase	4		4 1	8	8		1	6		2	2	
Switch Phase												
Minimum Initial (s)	3.0			5.0	5.0		3.0	10.0		10.0	10.0	
Minimum Split (s)	9.0			11.0	11.0		7.0	16.0		16.0	16.0	
Total Split (s)	16.0			16.0	16.0		14.0	91.0		91.0	91.0	
Total Split (%)	11.7%			11.7%	11.7%		10.2%	66.4%		66.4%	66.4%	
Maximum Green (s)	10.0			10.0	10.0		10.0	85.0		85.0	85.0	
Yellow Time (s)	4.0			4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	2.0			2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0				0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0				6.0		4.0	6.0			6.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5			0.4	0.4		2.0	5.0		5.0	5.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None			None	None		None	Min		Min	Min	
Act Effct Green (s)	7.7		18.3		5.4		58.9	56.8			45.4	
Actuated g/C Ratio	0.10		0.23		0.07		0.75	0.72			0.58	
v/c Ratio	0.27		0.55		0.01		0.55	0.52			0.75	
Control Delay	45.1		10.4		49.0		11.6	6.7			17.3	
Queue Delay	0.0		0.0		0.0		0.0	0.0			0.0	
Total Delay	45.1		10.4		49.0		11.6	6.7			17.3	
LOS	D		B		D		B	A			B	
Approach Delay		14.8			49.0			7.7			17.3	
Approach LOS		B			D			A			B	
Queue Length 50th (ft)	19		13		0		15	102			246	
Queue Length 95th (ft)	75		102		7		68	286			577	
Internal Link Dist (ft)		388			1			2353			1136	
Turn Bay Length (ft)	130						465					
Base Capacity (vph)	236		589		243		385	1789			1862	
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	0.19		0.54		0.00		0.44	0.39			0.46	

Intersection Summary

Area Type: Other
Cycle Length: 137
Actuated Cycle Length: 78.9
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 12.9 Intersection LOS: B
Intersection Capacity Utilization 94.4% ICU Level of Service F
Analysis Period (min) 15

Splits and Phases: 76: Derry Rd/102 & Elm Ave

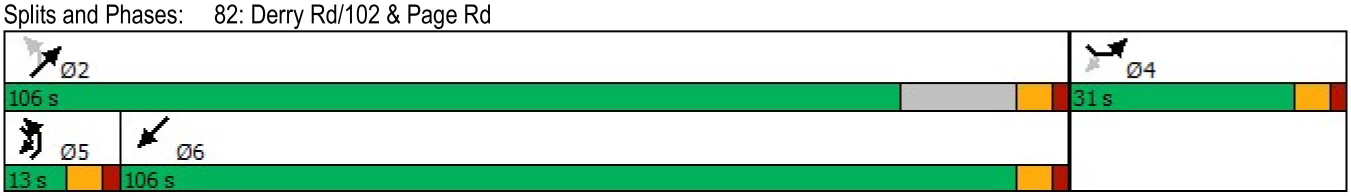


Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	101	67	26	449	489	51
Future Volume (vph)	101	67	26	449	489	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	150	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.987	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1719	1583	1770	1652	1770	0
Flt Permitted	0.950		0.255			
Satd. Flow (perm)	1719	1583	475	1652	1770	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		73			7	
Link Speed (mph)	30			30	30	
Link Distance (ft)	420			2236	3657	
Travel Time (s)	9.5			50.8	83.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	15%	5%	15%
Adj. Flow (vph)	110	73	28	488	532	55
Shared Lane Traffic (%)						
Lane Group Flow (vph)	110	73	28	488	587	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Turn Type	Prot	pm+ov	pm+pt	NA	NA	
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			
Detector Phase	4	5	5	2	6	
Switch Phase						
Minimum Initial (s)	5.0	3.0	3.0	10.0	10.0	
Minimum Split (s)	11.0	9.0	9.0	16.0	16.0	
Total Split (s)	31.0	13.0	13.0	106.0	106.0	
Total Split (%)	20.7%	8.7%	8.7%	70.7%	70.7%	
Maximum Green (s)	25.0	7.0	7.0	100.0	100.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	
Lead/Lag		Lead	Lead		Lag	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	
Recall Mode	None	None	None	Min	Min	

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Act Effct Green (s)	8.1	19.2	37.0	37.0	28.3	
Actuated g/C Ratio	0.14	0.33	0.64	0.64	0.49	
v/c Ratio	0.46	0.13	0.07	0.46	0.67	
Control Delay	31.3	5.5	4.2	6.9	16.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	31.3	5.5	4.2	6.9	16.7	
LOS	C	A	A	A	B	
Approach Delay	21.0			6.7	16.7	
Approach LOS	C			A	B	
Queue Length 50th (ft)	34	0	3	67	148	
Queue Length 95th (ft)	93	26	10	139	287	
Internal Link Dist (ft)	340			2156	3577	
Turn Bay Length (ft)		150	150			
Base Capacity (vph)	768	636	468	1652	1770	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.14	0.11	0.06	0.30	0.33	

Intersection Summary	
Area Type: Other	
Cycle Length: 150	
Actuated Cycle Length: 57.4	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 13.3	Intersection LOS: B
Intersection Capacity Utilization 44.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 82: Derry Rd/102 & Page Rd



A.4 Future 2030 Model - PM Peak (51 pages)

Reference Table – Table 6 # to # in SYNCRHO Reports

Table 6 #	# in SYNCHRO Reports	Intersection / Direction TOWARD
1	**40**	111-102-3A (Ferry & Chase)
2	**38**	Library & Ferry
3	**39**	Library and Highland
4	**55**	Burnham and Central
5	**58**	Central-Kimball-Greeley (Rt.111 & Greeley)
6	**76**	Derry and 102 (Route 102 & Elm Ave)
7	**82**	NH 102/Page Rd
8	**34**	NH 3A Central St/Chase St
9	**33**	Central and Library
10	**29**	Lowell and Central
11	**25**	Lowell and Pelham
12	**22**	Lowell and Executive
13	**10**	Lowell-Hampshire-Oblate
14	**1**	Lowell & Wason
16	**4**	NH 3A Lowell Rd/Walmart Blvd
17	**5**	NH 3A Lowell Rd/Rena Ave
18	**7**	NH 3A Lowell Rd/Dracut Rd/Steele Rd
19	**67**	Dracut Rd/Sherburne Rd
20	**70**	Kimball Hill Rd/Bush Hill Rd
21	**73**	Central St/Belknap Rd
22	**24**	Lowell & Fox Hollow Dr
23	**27**	Lowell & Birch St
15_com	**2**	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined
15M	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section
15N	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section
15S	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	73	324	314	32	38	196	875	529	60	939	32
Future Volume (vph)	48	73	324	314	32	38	196	875	529	60	939	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	14	12	12	12	12	12	12
Storage Length (ft)	0		0	0		200	650		350	200		0
Storage Lanes	0		1	1		1	1		2	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.981		0.950	0.961		0.950			0.950		
Satd. Flow (prot)	0	1621	1592	1491	1508	1498	1719	3438	2707	1570	3139	1404
Flt Permitted		0.981		0.950	0.961		0.950			0.950		
Satd. Flow (perm)	0	1621	1592	1491	1508	1498	1719	3438	2707	1570	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			352			115			575			167
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		573			432			1014			1071	
Travel Time (s)		13.0			9.8			23.0			24.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	5%	5%	5%	15%	15%	15%
Adj. Flow (vph)	52	79	352	341	35	41	213	951	575	65	1021	35
Shared Lane Traffic (%)				45%								
Lane Group Flow (vph)	0	131	352	188	188	41	213	951	575	65	1021	35
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	0.85	1.00	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Split	NA	pm+ov	Split	NA	pt+ov	Prot	NA	pt+ov	Prot	NA	Perm
Protected Phases	3	3	1	4	4	4 5	1	6	6 4	5	2	
Permitted Phases			3									2
Detector Phase	3	3	1	4	4	4 5	1	6	6 4	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	13.0	12.0	12.0		13.0	16.0		13.0	16.0	16.0
Total Split (s)	40.0	40.0	30.0	30.0	30.0		30.0	65.0		15.0	50.0	50.0
Total Split (%)	21.1%	21.1%	15.8%	15.8%	15.8%		15.8%	34.2%		7.9%	26.3%	26.3%
Maximum Green (s)	34.0	34.0	22.0	23.0	23.0		22.0	59.0		7.0	44.0	44.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	4.0	3.0	3.0		4.0	2.0		4.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.0	8.0	7.0	7.0		8.0	6.0		8.0	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
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)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	40.0
Total Split (s)	40.0
Total Split (%)	21%
Maximum Green (s)	37.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		15.9	35.9	23.0	23.0	38.0	22.0	59.0	83.1	7.0	44.0	44.0
Actuated g/C Ratio		0.12	0.27	0.17	0.17	0.29	0.17	0.45	0.63	0.05	0.33	0.33
v/c Ratio		0.67	0.51	0.73	0.72	0.08	0.74	0.62	0.30	0.78	0.98	0.06
Control Delay		72.5	4.6	69.1	68.3	0.3	69.6	30.5	0.9	114.5	66.2	0.2
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		72.5	4.6	69.1	68.3	0.3	69.6	30.5	0.9	114.5	66.2	0.2
LOS		E	A	E	E	A	E	C	A	F	E	A
Approach Delay		23.0			62.0			25.5			67.0	
Approach LOS		C			E			C			E	
Queue Length 50th (ft)		109	0	162	162	0	176	321	0	56	452	0
Queue Length 95th (ft)		178	41	#290	#287	0	#306	423	14	#149	#644	0
Internal Link Dist (ft)		493			352			934			991	
Turn Bay Length (ft)						200	650		350	200		
Base Capacity (vph)		417	689	259	262	513	286	1537	1916	83	1047	579
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.31	0.51	0.73	0.72	0.08	0.74	0.62	0.30	0.78	0.98	0.06

Intersection Summary

Area Type: Other

Cycle Length: 190

Actuated Cycle Length: 132

Natural Cycle: 145

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 41.6 Intersection LOS: D

Intersection Capacity Utilization 73.1% ICU Level of Service D

Analysis Period (min) 15

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

Splits and Phases: 1: Lowell Rd/3A & Flagstone Dr/Wason Rd

Lane Group	Ø9
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	30.0
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

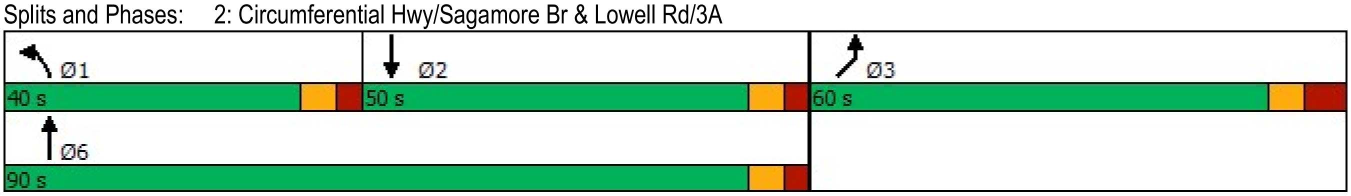
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	NEL	NER
Lane Configurations									
Traffic Volume (vph)	0	0	941	531	703	0	1365	1316	885
Future Volume (vph)	0	0	941	531	703	0	1365	1316	885
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	14	12
Storage Length (ft)	0	0	470			450		0	0
Storage Lanes	0	0	2			1		2	1
Taper Length (ft)	25		25					25	
Lane Util. Factor	1.00	1.00	0.94	0.95	0.95	1.00	1.00	0.97	1.00
Frt							0.850		0.850
Flt Protected			0.950					0.950	
Satd. Flow (prot)	0	0	4848	3139	3539	0	1538	3557	1583
Flt Permitted			0.950					0.950	
Satd. Flow (perm)	0	0	4848	3139	3539	0	1538	3557	1583
Right Turn on Red							Yes		Yes
Satd. Flow (RTOR)							808		345
Link Speed (mph)	55			30	30			42	
Link Distance (ft)	1050			613	1014			974	
Travel Time (s)	13.0			13.9	23.0			15.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	15%	2%	2%	5%	5%	2%
Adj. Flow (vph)	0	0	1023	577	764	0	1484	1430	962
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	0	1023	577	764	0	1484	1430	962
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right	Right	Left	Right
Median Width(ft)	0			36	36			28	
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	0.92	1.00
Turning Speed (mph)	15	9	15			9	9	15	9
Turn Type			Prot	NA	NA		Free	Prot	Free
Protected Phases			1	6	2			3	
Permitted Phases							Free		Free
Detector Phase			1	6	2			3	
Switch Phase									
Minimum Initial (s)			7.0	10.0	10.0			10.0	
Minimum Split (s)			14.0	17.0	17.0			19.0	
Total Split (s)			40.0	90.0	50.0			60.0	
Total Split (%)			26.7%	60.0%	33.3%			40.0%	
Maximum Green (s)			33.0	83.0	43.0			51.0	
Yellow Time (s)			4.0	4.0	4.0			4.0	
All-Red Time (s)			3.0	3.0	3.0			5.0	
Lost Time Adjust (s)			0.0	0.0	0.0			0.0	
Total Lost Time (s)			7.0	7.0	7.0			9.0	
Lead/Lag			Lead		Lag				
Lead-Lag Optimize?									
Vehicle Extension (s)			4.0	4.0	4.0			4.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	NEL	NER
Recall Mode			None	Min	Min			None	
Act Effct Green (s)			33.0	78.5	38.5		145.6	51.1	145.6
Actuated g/C Ratio			0.23	0.54	0.26		1.00	0.35	1.00
v/c Ratio			0.93	0.34	0.82		0.96	1.15	0.61
Control Delay			70.2	19.5	58.1		17.9	118.4	1.7
Queue Delay			0.0	0.0	0.0		0.0	0.0	0.0
Total Delay			70.2	19.5	58.1		17.9	118.4	1.7
LOS			E	B	E		B	F	A
Approach Delay				51.9	31.5			71.5	
Approach LOS				D	C			E	
Queue Length 50th (ft)			346	157	360		0	~838	0
Queue Length 95th (ft)			#445	198	437		#156	#1001	0
Internal Link Dist (ft)	970			533	934			894	
Turn Bay Length (ft)			470				450		
Base Capacity (vph)			1099	1791	1046		1538	1247	1583
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			0.93	0.32	0.73		0.96	1.15	0.61

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 145.6
Natural Cycle: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.15
Intersection Signal Delay: 52.1 Intersection LOS: D
Intersection Capacity Utilization 94.0% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Circumferential Hwy/Sagamore Br & Lowell Rd/3A



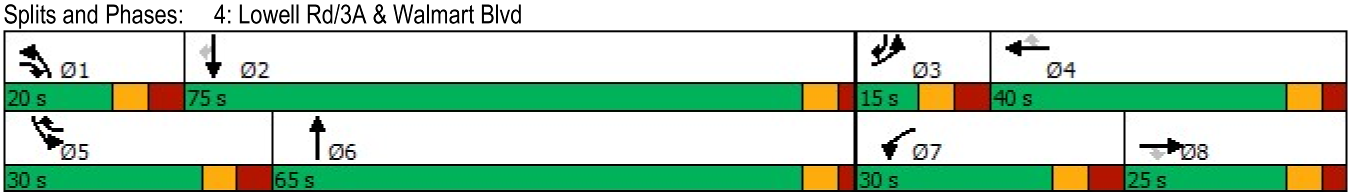
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	169	23	70	74	17	200	76	1013	56	204	974	179
Future Volume (vph)	169	23	70	74	17	200	76	1013	56	204	974	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	425		0	400		0
Storage Lanes	2		1	2		1	3		0	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.91	0.91	0.97	0.91	1.00
Frt			0.850			0.850		0.992				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3335	1863	1583	3433	1863	1583	3433	5045	0	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3335	1863	1583	3433	1863	1583	3433	5045	0	3433	5085	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			196			80		7				195
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		304			245			982			569	
Travel Time (s)		6.9			5.6			22.3			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	184	25	76	80	18	217	83	1101	61	222	1059	195
Shared Lane Traffic (%)												
Lane Group Flow (vph)	184	25	76	80	18	217	83	1162	0	222	1059	195
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)		24			24			24			24	
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
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	3	8	1	7	4	5	1	6		5	2	3
Permitted Phases			8			4						2
Detector Phase	3	8	1	7	4	5	1	6		5	2	3
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	5.0
Minimum Split (s)	13.0	12.0	13.0	13.0	12.0	13.0	13.0	16.0		13.0	16.0	13.0
Total Split (s)	15.0	25.0	20.0	30.0	40.0	30.0	20.0	65.0		30.0	75.0	15.0
Total Split (%)	10.0%	16.7%	13.3%	20.0%	26.7%	20.0%	13.3%	43.3%		20.0%	50.0%	10.0%
Maximum Green (s)	7.0	18.0	12.0	22.0	33.0	22.0	12.0	59.0		22.0	69.0	7.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	4.0	3.0	4.0	4.0	3.0	4.0	4.0	2.0		4.0	2.0	4.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	8.0	7.0	8.0	8.0	7.0	8.0	8.0	6.0		8.0	6.0	8.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0		4.0	6.0	4.0
Recall Mode	None	None	None	None	None	None	None	Min		None	Min	None

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	10.8	8.8	22.0	9.3	9.4	21.4	9.4	47.0		14.7	52.3	69.4
Actuated g/C Ratio	0.11	0.09	0.21	0.09	0.09	0.21	0.09	0.46		0.14	0.51	0.68
v/c Ratio	0.52	0.16	0.15	0.26	0.11	0.55	0.26	0.50		0.45	0.41	0.17
Control Delay	54.1	55.0	0.7	52.4	51.5	28.1	52.4	21.1		47.1	16.6	1.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	54.1	55.0	0.7	52.4	51.5	28.1	52.4	21.1		47.1	16.6	1.7
LOS	D	D	A	D	D	C	D	C		D	B	A
Approach Delay		39.9			35.6			23.1			19.2	
Approach LOS		D			D			C			B	
Queue Length 50th (ft)	58	17	0	28	13	96	29	219		76	168	0
Queue Length 95th (ft)	#161	50	0	58	39	160	60	285		129	227	28
Internal Link Dist (ft)		224			165			902			489	
Turn Bay Length (ft)							425			400		
Base Capacity (vph)	351	347	539	782	636	520	426	3087		782	3631	1135
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.52	0.07	0.14	0.10	0.03	0.42	0.19	0.38		0.28	0.29	0.17

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 102.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.55
Intersection Signal Delay: 24.0 Intersection LOS: C
Intersection Capacity Utilization 55.6% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: Lowell Rd/3A & Walmart Blvd

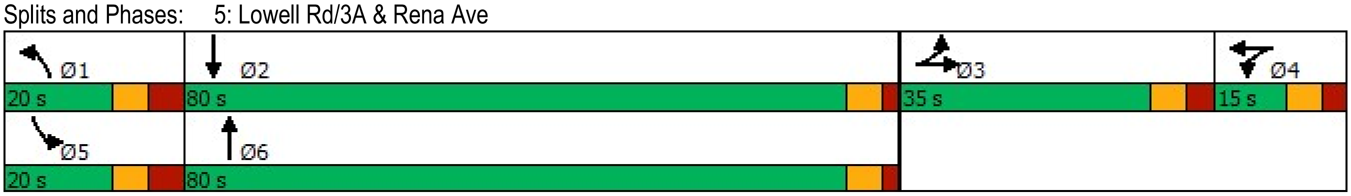


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	1	24	3	1	1	23	1061	10	31	1085	9
Future Volume (vph)	93	1	24	3	1	1	23	1061	10	31	1085	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12	12	12	12	12	12	12
Storage Length (ft)	200		200	0		0	350		0	425		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.91	0.91
Frt		0.856			0.973			0.999			0.999	
Flt Protected	0.950				0.971		0.950			0.950		
Satd. Flow (prot)	3335	1595	0	0	1995	0	1770	3536	0	1770	5039	0
Flt Permitted	0.950				0.971		0.950			0.950		
Satd. Flow (perm)	3335	1595	0	0	1995	0	1770	3536	0	1770	5039	0
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		26						1			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		301			325			1749			982	
Travel Time (s)		6.8			7.4			39.8			22.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	100%
Adj. Flow (vph)	101	1	26	3	1	1	25	1153	11	34	1179	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	101	27	0	0	5	0	25	1164	0	34	1189	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)		24			24			36			36	
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	0.85	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
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases												
Detector Phase	3	3		4	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	12.0		12.0	12.0		13.0	16.0		13.0	16.0	
Total Split (s)	35.0	35.0		15.0	15.0		20.0	80.0		20.0	80.0	
Total Split (%)	23.3%	23.3%		10.0%	10.0%		13.3%	53.3%		13.3%	53.3%	
Maximum Green (s)	28.0	28.0		8.0	8.0		12.0	74.0		12.0	74.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		4.0	2.0		4.0	2.0	
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0			7.0		8.0	6.0		8.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)	9.8	9.8			7.3		8.3	44.5		8.8	48.1	
Actuated g/C Ratio	0.12	0.12			0.09		0.10	0.56		0.11	0.61	
v/c Ratio	0.25	0.12			0.03		0.14	0.59		0.17	0.39	
Control Delay	39.5	19.0			45.6		43.6	15.3		42.7	10.5	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	39.5	19.0			45.6		43.6	15.3		42.7	10.5	
LOS	D	B			D		D	B		D	B	
Approach Delay		35.2			45.6			15.9			11.4	
Approach LOS		D			D			B			B	
Queue Length 50th (ft)	22	0			2		11	205		15	64	
Queue Length 95th (ft)	67	30			18		48	416		59	247	
Internal Link Dist (ft)		221			245			1669			902	
Turn Bay Length (ft)	200						350			425		
Base Capacity (vph)	1271	624			217		289	3155		289	4496	
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	0.08	0.04			0.02		0.09	0.37		0.12	0.26	

Intersection Summary	
Area Type: Other	
Cycle Length: 150	
Actuated Cycle Length: 79.5	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.59	
Intersection Signal Delay: 14.8	Intersection LOS: B
Intersection Capacity Utilization 44.6%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Lowell Rd/3A & Rena Ave



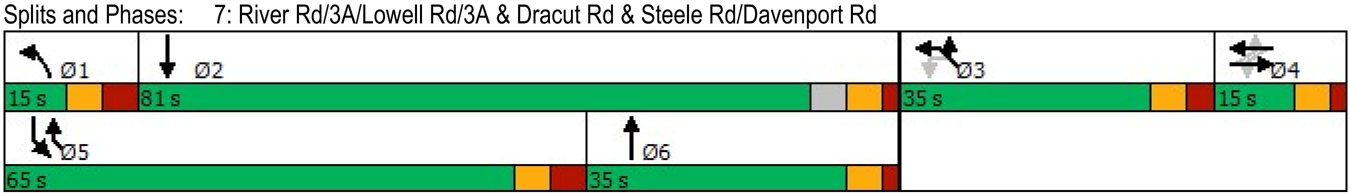
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	5	0	0	0	422	144	315	2	5	2	653
Future Volume (vph)	5	0	0	0	422	144	315	2	5	2	653
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50			240		820		0		120	0
Storage Lanes	1			2		0		0		1	1
Taper Length (ft)	25			25		25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt							0.999				0.850
Flt Protected	0.950					0.950				0.950	
Satd. Flow (prot)	1770	1863	1863	1863	3438	3433	1808	0	0	1770	1583
Flt Permitted						0.950				0.950	
Satd. Flow (perm)	1863	1863	1863	1863	3438	3433	1808	0	0	1770	1583
Right Turn on Red								Yes			
Satd. Flow (RTOR)											
Link Speed (mph)		30	30		30		30			30	
Link Distance (ft)		386	220		910		1749			960	
Travel Time (s)		8.8	5.0		20.7		39.8			21.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	5%	2%	5%	2%	2%	2%	2%
Adj. Flow (vph)	5	0	0	0	459	157	342	2	5	2	710
Shared Lane Traffic (%)											
Lane Group Flow (vph)	5	0	0	0	459	157	344	0	0	7	710
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Left	Left	Left	Left	Right	Left	Left	Right
Median Width(ft)		12	12		36		36			12	
Link Offset(ft)		0	0		0		0			0	
Crosswalk Width(ft)		16	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
Turning Speed (mph)	15			15		15		9	15	15	9
Turn Type	Perm			Prot	NA	Prot	NA		Perm	Prot	pt+ov
Protected Phases		4	4	1	6	5	2			3	3 5
Permitted Phases	4								3		
Detector Phase	4	4	4	1	6	5	2		3	3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	13.0	16.0	18.0	16.0		17.0	17.0	
Total Split (s)	15.0	15.0	15.0	15.0	35.0	65.0	81.0		35.0	35.0	
Total Split (%)	10.0%	10.0%	10.0%	10.0%	23.3%	43.3%	54.0%		23.3%	23.3%	
Maximum Green (s)	9.0	9.0	9.0	7.0	29.0	57.0	75.0		28.0	28.0	
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)	2.0	2.0	2.0	4.0	2.0	4.0	2.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0	6.0	8.0	6.0	8.0	6.0			7.0	
Lead/Lag	Lag	Lag	Lag	Lead	Lag	Lead	Lag		Lead	Lead	
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0		4.0	4.0	
Recall Mode	None	None	None	None	Min	None	Min		None	None	

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR	NWL2	NWL	NWR
Act Effct Green (s)	6.3				20.5	32.5	61.4			27.6	67.6
Actuated g/C Ratio	0.06				0.20	0.31	0.59			0.26	0.65
v/c Ratio	0.05				0.68	0.15	0.32			0.01	0.69
Control Delay	58.6				46.6	27.2	11.9			39.5	17.0
Queue Delay	0.0				0.0	0.0	0.0			0.0	0.0
Total Delay	58.6				46.6	27.2	11.9			39.5	17.0
LOS	E				D	C	B			D	B
Approach Delay		58.6			46.6		16.7			17.2	
Approach LOS		E			D		B			B	
Queue Length 50th (ft)	3				133	37	103			3	251
Queue Length 95th (ft)	20				283	76	199			20	440
Internal Link Dist (ft)		306	140		830		1669			880	
Turn Bay Length (ft)	50					820				120	
Base Capacity (vph)	168				1001	1966	1454			498	1388
Starvation Cap Reductn	0				0	0	0			0	0
Spillback Cap Reductn	0				0	0	0			0	0
Storage Cap Reductn	0				0	0	0			0	0
Reduced v/c Ratio	0.03				0.46	0.08	0.24			0.01	0.51

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 104.6
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 25.2 Intersection LOS: C
Intersection Capacity Utilization 72.1% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 7: River Rd/3A/Lowell Rd/3A & Dracut Rd & Steele Rd/Davenport Rd

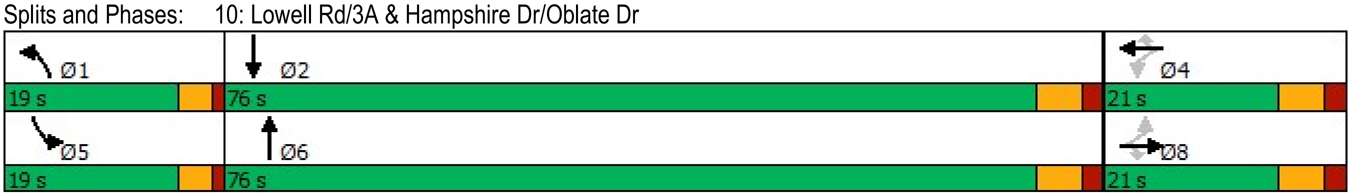


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	1	70	6	0	2	25	1004	11	3	1031	34
Future Volume (vph)	50	1	70	6	0	2	25	1004	11	3	1031	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	16	12	12	12	12	12	12
Storage Length (ft)	0		150	0		120	270		0	250		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.998			0.995	
Flt Protected		0.953			0.950		0.950			0.950		
Satd. Flow (prot)	0	1775	1794	0	1770	1794	1770	3532	0	1770	3522	0
Flt Permitted		0.725			0.721		0.950			0.950		
Satd. Flow (perm)	0	1350	1794	0	1343	1794	1770	3532	0	1770	3522	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			76			66		2			5	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			436			437			1173	
Travel Time (s)		9.4			9.9			9.9			26.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	1	76	7	0	2	27	1091	12	3	1121	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	55	76	0	7	2	27	1103	0	3	1158	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4		4						
Detector Phase	8	8	8	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0	4.0	15.0		4.0	15.0	
Minimum Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	8.0	28.0		8.0	28.0	
Total Split (s)	21.0	21.0	21.0	21.0	21.0	21.0	19.0	76.0		19.0	76.0	
Total Split (%)	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	16.4%	65.5%		16.4%	65.5%	
Maximum Green (s)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	70.0		15.0	70.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0	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	
Total Lost Time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None	None	None	None	None	None	Min		None	Min	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0		7.0			7.0	
Flash Dont Walk (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0			0	
Act Effct Green (s)		8.6	8.6		7.2	7.2	6.0	41.0		5.1	39.0	
Actuated g/C Ratio		0.15	0.15		0.12	0.12	0.10	0.70		0.09	0.67	
v/c Ratio		0.28	0.23		0.04	0.01	0.15	0.44		0.02	0.49	
Control Delay		31.6	10.4		30.3	0.0	33.4	6.6		34.3	8.7	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		31.6	10.4		30.3	0.0	33.4	6.6		34.3	8.7	
LOS		C	B		C	A	C	A		C	A	
Approach Delay		19.3			23.6			7.2			8.8	
Approach LOS		B			C			A			A	
Queue Length 50th (ft)		15	0		2	0	8	83		1	88	
Queue Length 95th (ft)		62	37		15	0	39	211		10	246	
Internal Link Dist (ft)		332			356			357			1093	
Turn Bay Length (ft)			150			120	270			250		
Base Capacity (vph)		380	560		378	553	498	3392		498	3382	
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		0.14	0.14		0.02	0.00	0.05	0.33		0.01	0.34	

Intersection Summary	
Area Type: Other	
Cycle Length: 116	
Actuated Cycle Length: 58.4	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.49	
Intersection Signal Delay: 8.7	Intersection LOS: A
Intersection Capacity Utilization 52.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Lowell Rd/3A & Hampshire Dr/Oblate Dr



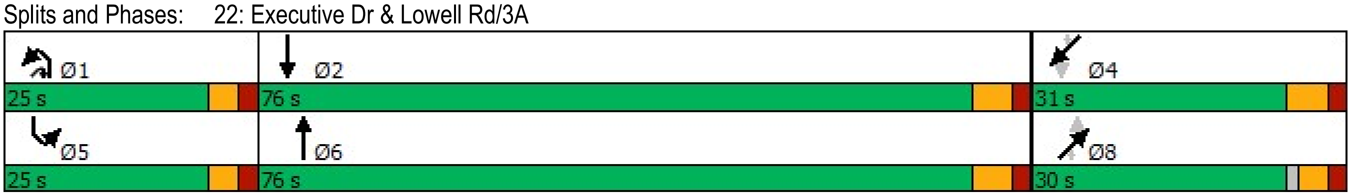
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	63	834	108	72	722	105	128	7	242	235	7	121
Future Volume (vph)	63	834	108	72	722	105	128	7	242	235	7	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	16	12	12	14
Storage Length (ft)	400		0	180		300	0		0	0		0
Storage Lanes	1		0	1		1	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.983			0.981				0.850			0.850
Flt Protected	0.950			0.950				0.955			0.954	
Satd. Flow (prot)	1570	3086	0	1770	3472	0	0	1779	1794	0	1777	1689
Flt Permitted	0.950			0.950				0.456			0.612	
Satd. Flow (perm)	1570	3086	0	1770	3472	0	0	849	1794	0	1140	1689
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			18				156			132
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		669			399			262			149	
Travel Time (s)		15.2			9.1			6.0			3.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	68	907	117	78	785	114	139	8	263	255	8	132
Shared Lane Traffic (%)												
Lane Group Flow (vph)	68	1024	0	78	899	0	0	147	263	0	263	132
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA		Prot	NA		Perm	NA	pm+ov	Perm	NA	Perm
Protected Phases	1	6		5	2			8	1		4	
Permitted Phases							8		8	4		4
Detector Phase	1	6		5	2		8	8	1	4	4	4
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	3.0	3.0	4.0	4.0	4.0
Minimum Split (s)	8.0	31.0		8.0	31.0		30.0	30.0	8.0	31.0	31.0	31.0
Total Split (s)	25.0	76.0		25.0	76.0		30.0	30.0	25.0	31.0	31.0	31.0
Total Split (%)	18.9%	57.6%		18.9%	57.6%		22.7%	22.7%	18.9%	23.5%	23.5%	23.5%
Maximum Green (s)	20.0	70.0		20.0	70.0		25.0	25.0	20.0	25.0	25.0	25.0
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		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	6.0		5.0	6.0			5.0	5.0		6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag				Lead			
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	2.0

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		18.0			18.0		18.0	18.0		18.0	18.0	18.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	8.6	41.0		8.7	38.3			26.7	40.4		25.7	25.7
Actuated g/C Ratio	0.10	0.46		0.10	0.43			0.30	0.45		0.29	0.29
v/c Ratio	0.46	0.73		0.46	0.60			0.59	0.30		0.81	0.23
Control Delay	52.2	23.4		51.1	20.8			43.3	9.0		55.0	7.2
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	52.2	23.4		51.1	20.8			43.3	9.0		55.0	7.2
LOS	D	C		D	C			D	A		D	A
Approach Delay		25.2			23.3			21.3			39.0	
Approach LOS		C			C			C			D	
Queue Length 50th (ft)	38	245		43	192			72	36		141	0
Queue Length 95th (ft)	92	343		101	270			#201	109		#367	49
Internal Link Dist (ft)		589			319			182			69	
Turn Bay Length (ft)	400			180								
Base Capacity (vph)	358	2448		403	2754			251	1109		324	576
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	0.19	0.42		0.19	0.33			0.59	0.24		0.81	0.23

Intersection Summary

Area Type: Other
Cycle Length: 132
Actuated Cycle Length: 90.1
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 25.9 Intersection LOS: C
Intersection Capacity Utilization 65.8% 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: 22: Executive Dr & Lowell Rd/3A



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	1473	1169	0
Future Volume (vph)	0	0	0	1473	1169	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12
Storage Length (ft)	0	0	0			400
Storage Lanes	0	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Flt Protected						
Satd. Flow (prot)	0	2111	0	1863	1863	1863
Fl						
Sa						
Li						
Li						
Tr						
Pe						
Ac						
Sh						
La						
Er						
La						
M						
Li						
Cr						
Tv						
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Free			Free	Free	

NOT PART OF STUDY

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	
Intersection Capacity Utilization 80.9%	ICU Level of Service D
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	3	60	7	2	11	167	833	3	12	1102	17
Future Volume (vph)	50	3	60	7	2	11	167	833	3	12	1102	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	14	14	12	12	12	12	12	12
Storage Length (ft)	0		120	0		0	250		400	220		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850		0.998	
Flt Protected		0.955			0.962		0.950			0.950		
Satd. Flow (prot)	0	1779	1583	0	1560	1325	1719	1810	1538	1719	1806	0
Flt Permitted		0.730			0.730		0.108			0.278		
Satd. Flow (perm)	0	1360	1583	0	1184	1325	195	1810	1538	503	1806	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			65			21			62		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		271			227			1282			634	
Travel Time (s)		6.2			5.2			29.1			14.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	30%	5%	30%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	54	3	65	8	2	12	182	905	3	13	1198	18
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	57	65	0	10	12	182	905	3	13	1216	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.92	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Detector Phase	4	4	4	8	8	1	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	31.0	31.0	11.0	31.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	116.0	116.0	16.0	126.0	
Total Split (%)	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	73.4%	73.4%	10.1%	79.7%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	110.0	110.0	10.0	120.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag						Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.0	1.5	1.5	1.5	1.0	1.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	
Walk Time (s)								7.0	7.0		7.0	
Flash Dont Walk (s)								18.0	18.0		18.0	
Pedestrian Calls (#/hr)								0	0		0	
Act Effct Green (s)		8.9	8.9		8.9	19.9	136.2	130.5	130.5	128.0	123.0	
Actuated g/C Ratio		0.06	0.06		0.06	0.13	0.86	0.83	0.83	0.81	0.78	
v/c Ratio		0.75	0.43		0.15	0.06	0.74	0.61	0.00	0.03	0.86	
Control Delay		121.0	23.9		75.4	11.1	27.4	7.6	0.0	2.0	21.0	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	29.6	
Total Delay		121.0	23.9		75.4	11.1	27.4	7.6	0.0	2.0	50.6	
LOS		F	C		E	B	C	A	A	A	D	
Approach Delay		69.3			40.3			10.9			50.1	
Approach LOS		E			D			B			D	
Queue Length 50th (ft)		59	0		10	0	23	340	0	2	786	
Queue Length 95th (ft)		#130	51		32	13	102	445	0	4	1158	
Internal Link Dist (ft)		191			147			1202			554	
Turn Bay Length (ft)			120				250		400	220		
Base Capacity (vph)		86	161		74	226	265	1494	1280	500	1406	
Starvation Cap Reductn		0	0		0	0	0	0	0	0	254	
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	0.40		0.14	0.05	0.69	0.61	0.00	0.03	1.06	

Intersection Summary

Area Type: Other

Cycle Length: 158

Actuated Cycle Length: 158

Offset: 45 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

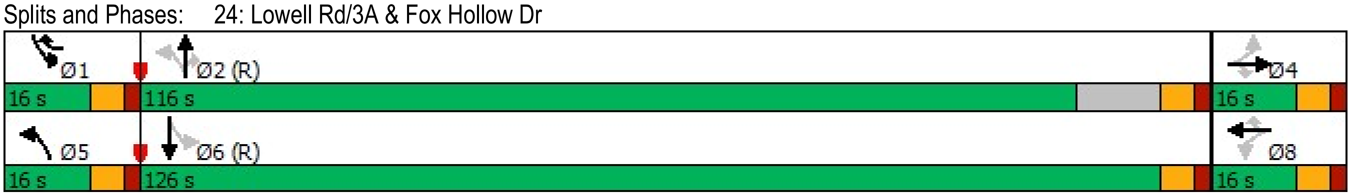
Intersection Signal Delay: 33.6 Intersection LOS: C

Intersection Capacity Utilization 92.9% ICU Level of Service F

Analysis Period (min) 15

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

Splits and Phases: 24: Lowell Rd/3A & Fox Hollow Dr



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	122	156	1036	144	94	808
Future Volume (vph)	122	156	1036	144	94	808
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12
Storage Length (ft)	0	100		0	160	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.983			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1743	1831	0	1388	1462
Flt Permitted	0.950				0.032	
Satd. Flow (perm)	1719	1743	1831	0	47	1462
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		112	9			
Link Speed (mph)	30		30			30
Link Distance (ft)	345		634			526
Travel Time (s)	7.8		14.4			12.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	2%	2%	30%	30%
Adj. Flow (vph)	133	170	1126	157	102	878
Shared Lane Traffic (%)						
Lane Group Flow (vph)	133	170	1283	0	102	878
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pm+ov	NA		pm+pt	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4			2	
Detector Phase	4	5	6		5	2
Switch Phase						
Minimum Initial (s)	5.0	3.0	10.0		3.0	10.0
Minimum Split (s)	11.0	9.0	31.0		9.0	16.0
Total Split (s)	36.0	16.0	116.0		16.0	116.0
Total Split (%)	21.4%	9.5%	69.0%		9.5%	69.0%
Maximum Green (s)	30.0	10.0	110.0		10.0	110.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5		1.5	1.5

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)			7.0			
Flash Dont Walk (s)			18.0			
Pedestrian Calls (#/hr)			0			
Act Effct Green (s)	16.9	35.8	120.2		139.1	139.1
Actuated g/C Ratio	0.10	0.21	0.72		0.83	0.83
v/c Ratio	0.77	0.37	0.98		0.72	0.73
Control Delay	100.5	20.6	43.6		69.9	11.4
Queue Delay	0.0	0.0	40.5		0.0	0.0
Total Delay	100.5	20.6	84.1		69.9	11.4
LOS	F	C	F		E	B
Approach Delay	55.7		84.1			17.5
Approach LOS	E		F			B
Queue Length 50th (ft)	145	52	1263		69	350
Queue Length 95th (ft)	216	116	#1822		141	637
Internal Link Dist (ft)	265		554			446
Turn Bay Length (ft)		100			160	
Base Capacity (vph)	306	464	1312		146	1210
Starvation Cap Reductn	0	0	209		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.43	0.37	1.16		0.70	0.73

Intersection Summary

Area Type: Other

Cycle Length: 168

Actuated Cycle Length: 168

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

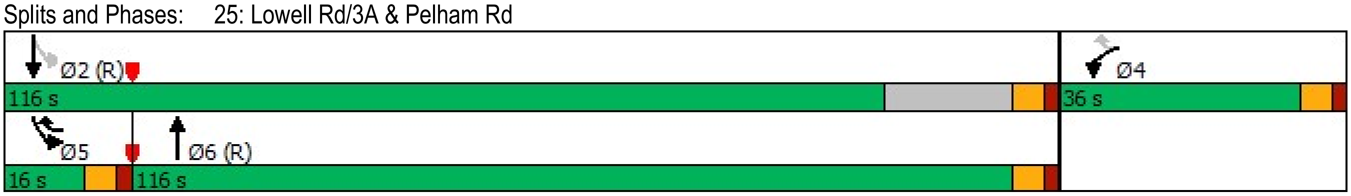
Intersection Signal Delay: 55.3 Intersection LOS: E

Intersection Capacity Utilization 90.2% ICU Level of Service E

Analysis Period (min) 15

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

Splits and Phases: 25: Lowell Rd/3A & Pelham Rd



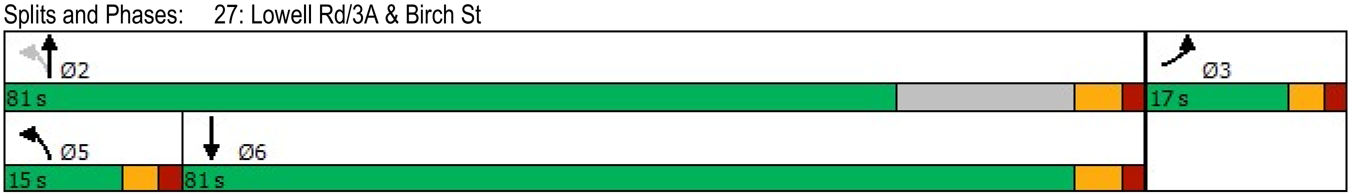
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	58	35	91	711	697	12
Future Volume (vph)	58	35	91	711	697	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	12	12	12	12	12
Storage Length (ft)	0	0	150			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.949				0.998	
Flt Protected	0.970		0.950			
Satd. Flow (prot)	1888	0	1570	1652	1806	0
Flt Permitted	0.970		0.195			
Satd. Flow (perm)	1888	0	322	1652	1806	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	21				2	
Link Speed (mph)	30			30	30	
Link Distance (ft)	442			1237	1199	
Travel Time (s)	10.0			28.1	27.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	15%	15%	5%	5%
Adj. Flow (vph)	63	38	99	773	758	13
Shared Lane Traffic (%)						
Lane Group Flow (vph)	101	0	99	773	771	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	3		5	2	6	
Permitted Phases			2			
Detector Phase	3		5	2	6	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	17.0		10.0	11.0	11.0	
Total Split (s)	17.0		15.0	81.0	81.0	
Total Split (%)	15.0%		13.3%	71.7%	71.7%	
Maximum Green (s)	12.0		10.0	75.0	75.0	
Yellow Time (s)	3.0		3.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	5.0		5.0	6.0	6.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0		2.0	2.0	2.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Recall Mode	None		None	Min	Min	
Walk Time (s)	7.0					
Flash Dont Walk (s)	5.0					
Pedestrian Calls (#/hr)	0					
Act Effct Green (s)	7.6		47.2	48.0	38.5	
Actuated g/C Ratio	0.12		0.76	0.77	0.62	
v/c Ratio	0.41		0.25	0.61	0.69	
Control Delay	30.1		4.3	7.3	16.5	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	30.1		4.3	7.3	16.5	
LOS	C		A	A	B	
Approach Delay	30.1			7.0	16.5	
Approach LOS	C			A	B	
Queue Length 50th (ft)	28		8	123	227	
Queue Length 95th (ft)	89		22	263	444	
Internal Link Dist (ft)	362			1157	1119	
Turn Bay Length (ft)			150			
Base Capacity (vph)	408		459	1652	1750	
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	0.25		0.22	0.47	0.44	

Intersection Summary

Area Type: Other
Cycle Length: 113
Actuated Cycle Length: 62.4
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 12.5 Intersection LOS: B
Intersection Capacity Utilization 61.1% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 27: Lowell Rd/3A & Birch St



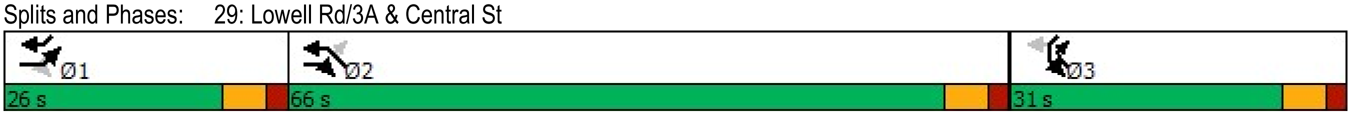
Lane Group	EBL	EBR	NWL	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	177	633	757	83	200	64
Future Volume (vph)	177	633	757	83	200	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	11	11
Storage Length (ft)	300	0	0	80	0	120
Storage Lanes	1	1	1	1	1	1
Taper Length (ft)	25		25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		0.850
Flt Protected	0.950		0.950		0.950	
Satd. Flow (prot)	1770	1583	1770	1689	1711	1531
Flt Permitted	0.950		0.950		0.950	
Satd. Flow (perm)	1770	1583	1770	1689	1711	1531
Right Turn on Red		Yes		Yes		Yes
Satd. Flow (RTOR)		271		52		70
Link Speed (mph)	30		30		30	
Link Distance (ft)	636		905		654	
Travel Time (s)	14.5		20.6		14.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	192	688	823	90	217	70
Shared Lane Traffic (%)						
Lane Group Flow (vph)	192	688	823	90	217	70
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	12		12		11	
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	0.92	1.04	1.04
Turning Speed (mph)	15	9	15	9	15	9
Turn Type	Prot	pm+ov	Prot	pm+ov	Prot	pm+ov
Protected Phases	1	2	2	3	3	1
Permitted Phases		1		2		3
Detector Phase	1	2	2	3	3	1
Switch Phase						
Minimum Initial (s)	8.0	10.0	10.0	8.0	8.0	8.0
Minimum Split (s)	14.0	31.0	31.0	31.0	31.0	14.0
Total Split (s)	26.0	66.0	66.0	31.0	31.0	26.0
Total Split (%)	21.1%	53.7%	53.7%	25.2%	25.2%	21.1%
Maximum Green (s)	20.0	60.0	60.0	25.0	25.0	20.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag			Lead
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	2.5	2.5	2.0	2.0	1.5
Recall Mode	None	Min	Min	None	None	None

Lane Group	EBL	EBR	NWL	NWR	SWL	SWR
Walk Time (s)		7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		18.0	18.0	18.0	18.0	
Pedestrian Calls (#/hr)		0	0	0	0	
Act Effct Green (s)	15.3	78.5	57.1	81.3	18.0	39.4
Actuated g/C Ratio	0.14	0.72	0.52	0.75	0.17	0.36
v/c Ratio	0.77	0.57	0.89	0.07	0.77	0.12
Control Delay	68.0	6.3	37.6	2.2	62.8	5.8
Queue Delay	0.0	0.5	0.0	0.0	0.0	0.0
Total Delay	68.0	6.8	37.6	2.2	62.8	5.8
LOS	E	A	D	A	E	A
Approach Delay	20.2		34.1		48.9	
Approach LOS	C		C		D	
Queue Length 50th (ft)	136	107	499	6	152	0
Queue Length 95th (ft)	228	228	#890	20	245	29
Internal Link Dist (ft)	556		825		574	
Turn Bay Length (ft)	300			80		120
Base Capacity (vph)	332	1267	996	1387	401	668
Starvation Cap Reductn	0	239	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	0.58	0.67	0.83	0.06	0.54	0.10

Intersection Summary

Area Type: Other
Cycle Length: 123
Actuated Cycle Length: 108.8
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 30.2 Intersection LOS: C
Intersection Capacity Utilization 77.8% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 29: Lowell Rd/3A & Central St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	316	0	4	554	235	1	0	1	292	1	3
Future Volume (vph)	1	316	0	4	554	235	1	0	1	292	1	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	16	12
Storage Length (ft)	0		0	0		200	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.932			0.999	
Flt Protected								0.976			0.953	
Satd. Flow (prot)	0	1810	0	0	1863	1583	0	1694	0	0	2010	0
Flt Permitted		0.999			0.998						0.728	
Satd. Flow (perm)	0	1808	0	0	1859	1583	0	1736	0	0	1535	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						175		80				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		888			636			108			794	
Travel Time (s)		20.2			14.5			2.5			18.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1	343	0	4	602	255	1	0	1	317	1	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	344	0	0	606	255	0	2	0	0	321	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			3			4	
Permitted Phases	2			6		6	3			4		
Detector Phase	2	2		6	6	6	3	3		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	5.0	5.0		10.0	10.0	
Minimum Split (s)	31.0	31.0		16.0	16.0	16.0	21.0	21.0		31.0	31.0	
Total Split (s)	51.0	51.0		51.0	51.0	51.0	21.0	21.0		51.0	51.0	
Total Split (%)	41.5%	41.5%		41.5%	41.5%	41.5%	17.1%	17.1%		41.5%	41.5%	
Maximum Green (s)	45.0	45.0		45.0	45.0	45.0	15.0	15.0		45.0	45.0	
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)	2.0	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	
Total Lost Time (s)		6.0			6.0	6.0		6.0			6.0	
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	2.0	2.0		3.0	3.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	
Walk Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	8.0	8.0					8.0	8.0		8.0	8.0	
Pedestrian Calls (#/hr)	0	0					0	0		0	0	
Act Effct Green (s)		32.3			32.3	32.3		5.4			21.8	
Actuated g/C Ratio		0.47			0.47	0.47		0.08			0.32	
v/c Ratio		0.40			0.69	0.30		0.01			0.66	
Control Delay		15.1			20.8	5.9		0.0			29.7	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		15.1			20.8	5.9		0.0			29.7	
LOS		B			C	A		A			C	
Approach Delay		15.1			16.4						29.7	
Approach LOS		B			B						C	
Queue Length 50th (ft)		80			170	16		0			108	
Queue Length 95th (ft)		228			458	81		0			271	
Internal Link Dist (ft)		808			556			28			714	
Turn Bay Length (ft)						200						
Base Capacity (vph)		1273			1309	1166		473			1080	
Starvation Cap Reductn		0			8	0		0			0	
Spillback Cap Reductn		0			0	0		0			0	
Storage Cap Reductn		0			0	0		0			0	
Reduced v/c Ratio		0.27			0.47	0.22		0.00			0.30	

Intersection Summary

Area Type: Other

Cycle Length: 123

Actuated Cycle Length: 68.6

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

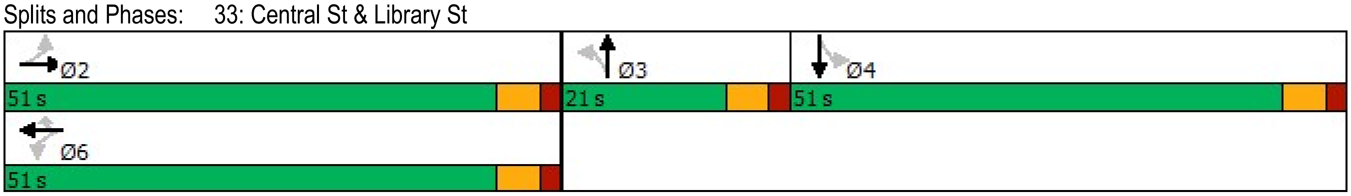
Maximum v/c Ratio: 0.69

Intersection Signal Delay: 18.9 Intersection LOS: B

Intersection Capacity Utilization 65.1% ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 33: Central St & Library St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	514	5	7	15	269	0	8	4	61	6	5
Future Volume (vph)	108	514	5	7	15	269	0	8	4	61	6	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	16	16	12	16	12	12	16	12
Storage Length (ft)	0		0	0		250	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850		0.958			0.991	
Flt Protected		0.991			0.984						0.959	
Satd. Flow (prot)	0	2041	0	0	2036	1759	0	2022	0	0	1958	0
Flt Permitted		0.991			0.984						0.959	
Satd. Flow (perm)	0	2041	0	0	2036	1759	0	2022	0	0	1958	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		439			888			261			628	
Travel Time (s)		10.0			20.2			5.9			14.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	5	5	0	0	0	0	0	0
Adj. Flow (vph)	117	559	5	8	16	292	0	9	4	66	7	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	681	0	0	24	292	0	13	0	0	78	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	0.85	1.00	1.00	0.87	0.87	1.00	0.85	1.00	1.00	0.85	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 63.3% ICU Level of Service B

Analysis Period (min) 15

Lane Group	EBL	EBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	0	0	0	964	0	1481
Future Volume (vph)	0	0	0	964	0	1481
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	0.88
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	0	0	3539	0	2787
Fl						
S						
Li						
Li						
T						
P						
A						
S						
L						
E						
L						
M						
Li						
C						
T						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Free			Free	Free	

NOT PART OF STUDY

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 55.1%	ICU Level of Service B
Analysis Period (min) 15	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	20	352	12	38	232	8	131	451	32	2	568	7
Future Volume (vph)	20	352	12	38	232	8	131	451	32	2	568	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	175		0	0		0	200		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995			0.995			0.993			0.998	
Flt Protected	0.950			0.950				0.989		0.950		
Satd. Flow (prot)	1770	1853	0	1770	1853	0	0	1829	0	1770	1859	0
Flt Permitted	0.480			0.275				0.580		0.387		
Satd. Flow (perm)	894	1853	0	512	1853	0	0	1073	0	721	1859	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			2			4			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		342			444			371			1247	
Travel Time (s)		7.8			10.1			8.4			28.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	383	13	41	252	9	142	490	35	2	617	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	396	0	41	261	0	0	667	0	2	625	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
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			1			6	
Permitted Phases	4			8			1			6		
Detector Phase	4	4		8	8		1	1		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	31.0	31.0		31.0	31.0		31.0	31.0		31.0	31.0	
Total Split (s)	46.0	46.0		46.0	46.0		46.0	46.0		46.0	46.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	40.0	40.0		40.0	40.0		40.0	40.0		40.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		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-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Flash Dont Walk (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	26.2	26.2		26.2	26.2			53.8		53.8	53.8	
Actuated g/C Ratio	0.28	0.28		0.28	0.28			0.58		0.58	0.58	
v/c Ratio	0.09	0.75		0.28	0.49			1.06		0.00	0.58	
Control Delay	21.6	38.1		28.1	29.1			76.6		11.0	16.3	
Queue Delay	0.0	0.0		0.0	0.0			15.1		0.0	0.0	
Total Delay	21.6	38.1		28.1	29.1			91.7		11.0	16.3	
LOS	C	D		C	C			F		B	B	
Approach Delay		37.2			29.0			91.7			16.2	
Approach LOS		D			C			F			B	
Queue Length 50th (ft)	9	208		19	125			~432		0	211	
Queue Length 95th (ft)	24	268		42	170			#715		4	398	
Internal Link Dist (ft)		262			364			291			1167	
Turn Bay Length (ft)				175						200		
Base Capacity (vph)	388	806		222	806			628		421	1086	
Starvation Cap Reductn	0	0		0	0			55		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	0.06	0.49		0.18	0.32			1.16		0.00	0.58	

Intersection Summary

Area Type: Other

Cycle Length: 92

Actuated Cycle Length: 92

Offset: 0 (0%), Referenced to phase 1:NETL and 6:SWTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 47.5 Intersection LOS: D

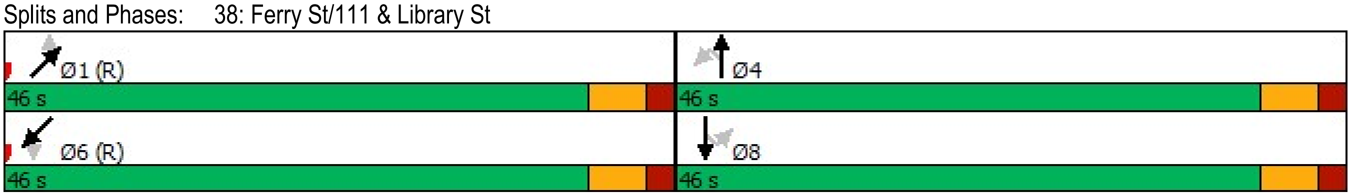
Intersection Capacity Utilization 109.8% ICU Level of Service H

Analysis Period (min) 15

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

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

Splits and Phases: 38: Ferry St/111 & Library St



Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NWR	NWR2	NET	NER
Lane Configurations												
Traffic Volume (vph)	28	13	5	15	1	1	10	27	470	10	417	16
Future Volume (vph)	28	13	5	15	1	1	10	27	470	10	417	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12	16	12	12	12	12	12
Storage Length (ft)	0		0			0		0	0			0
Storage Lanes	0		0			0		0	1			0
Taper Length (ft)	25					25						
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.956					0.907		0.865		0.995	
Flt Protected		0.977					0.998					
Satd. Flow (prot)	0	1915	0	0	0	0	1856	0	1611	0	1853	0
Flt Permitted		0.832					0.984					
Satd. Flow (perm)	0	1631	0	0	0	0	1830	0	1611	0	1853	0
Right Turn on Red				Yes				Yes		Yes		
Satd. Flow (RTOR)		10					29		86			
Link Speed (mph)		30					30				30	
Link Distance (ft)		286					634				617	
Travel Time (s)		6.5					14.4				14.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	30	14	5	16	1	1	11	29	511	11	453	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	65	0	0	0	0	42	0	522	0	470	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Right	Left	Left	Left	Right	Right	Right	Left	Right
Median Width(ft)		0					0				12	
Link Offset(ft)		0					0				0	
Crosswalk Width(ft)		16					16				16	
Two way Left Turn Lane												
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	9	15	15		9	9	9		9
Turn Type	Perm	NA			Perm	Perm	NA		Over		NA	
Protected Phases		8					4		1		2	
Permitted Phases	8				4	4						
Detector Phase	8	8			4	4	4		1		2	
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0	5.0	5.0		10.0		10.0	
Minimum Split (s)	22.0	22.0			12.0	12.0	12.0		16.0		17.0	
Total Split (s)	22.0	22.0			27.0	27.0	27.0		56.0		57.0	
Total Split (%)	15.7%	15.7%			19.3%	19.3%	19.3%		40.0%		40.7%	
Maximum Green (s)	15.0	15.0			20.0	20.0	20.0		50.0		50.0	
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0		4.0		4.0	
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0		2.0		3.0	
Lost Time Adjust (s)		0.0					0.0		0.0		0.0	
Total Lost Time (s)		7.0					7.0		6.0		7.0	
Lead/Lag									Lead		Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0		4.0	

Lane Group	SWL	SWT	SWR
Lane Configurations			
Traffic Volume (vph)	286	377	1
Future Volume (vph)	286	377	1
Ideal Flow (vphpl)	1900	1900	1900
Lane Width (ft)	12	12	12
Storage Length (ft)	0		150
Storage Lanes	1		0
Taper Length (ft)	25		
Lane Util. Factor	1.00	1.00	1.00
Frt			
Flt Protected	0.950		
Satd. Flow (prot)	1770	1810	0
Flt Permitted	0.950		
Satd. Flow (perm)	1770	1810	0
Right Turn on Red			Yes
Satd. Flow (RTOR)			
Link Speed (mph)		30	
Link Distance (ft)		845	
Travel Time (s)		19.2	
Peak Hour Factor	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%
Adj. Flow (vph)	311	410	1
Shared Lane Traffic (%)			
Lane Group Flow (vph)	311	411	0
Enter Blocked Intersection	No	No	No
Lane Alignment	Left	Left	Right
Median Width(ft)		12	
Link Offset(ft)		0	
Crosswalk Width(ft)		16	
Two way Left Turn Lane			
Headway Factor	1.00	1.00	1.00
Turning Speed (mph)	15		9
Turn Type	Prot	NA	
Protected Phases	1	6	
Permitted Phases			
Detector Phase	1	6	
Switch Phase			
Minimum Initial (s)	10.0	10.0	
Minimum Split (s)	16.0	16.0	
Total Split (s)	56.0	105.0	
Total Split (%)	40.0%	75.0%	
Maximum Green (s)	50.0	99.0	
Yellow Time (s)	4.0	4.0	
All-Red Time (s)	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	
Total Lost Time (s)	6.0	6.0	
Lead/Lag	Lead		
Lead-Lag Optimize?			
Vehicle Extension (s)	3.0	3.0	

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NWR	NWR2	NET	NER
Recall Mode	None	None			None	None	None		None		Min	
Walk Time (s)	7.0	7.0										
Flash Dont Walk (s)	8.0	8.0										
Pedestrian Calls (#/hr)	0	0										
Act Effct Green (s)		10.1					10.0		46.6		65.9	
Actuated g/C Ratio		0.07					0.07		0.33		0.47	
v/c Ratio		0.52					0.27		0.88		0.54	
Control Delay		66.4					31.6		52.8		32.9	
Queue Delay		0.0					0.0		25.9		0.8	
Total Delay		66.4					31.6		78.8		33.7	
LOS		E					C		E		C	
Approach Delay		66.4					31.6				33.7	
Approach LOS		E					C				C	
Queue Length 50th (ft)		49					11		379		316	
Queue Length 95th (ft)		97					49		498		500	
Internal Link Dist (ft)		206					554				537	
Turn Bay Length (ft)												
Base Capacity (vph)		241					286		649		871	
Starvation Cap Reductn		0					0		141		165	
Spillback Cap Reductn		0					0		0		0	
Storage Cap Reductn		0					0		0		0	
Reduced v/c Ratio		0.27					0.15		1.03		0.67	

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 6:SWT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

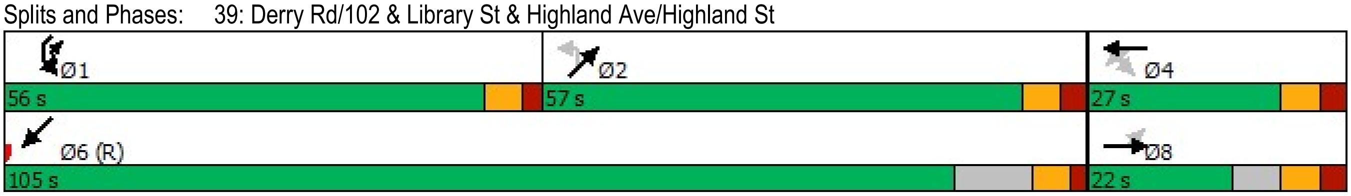
Maximum v/c Ratio: 0.88

Intersection Signal Delay: 41.9 Intersection LOS: D

Intersection Capacity Utilization 79.4% ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 39: Derry Rd/102 & Library St & Highland Ave/Highland St



Lane Group	SWL	SWT	SWR
Recall Mode	None	C-Min	
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
Act Effct Green (s)	46.6	120.7	
Actuated g/C Ratio	0.33	0.86	
v/c Ratio	0.53	0.26	
Control Delay	40.1	2.9	
Queue Delay	0.0	0.0	
Total Delay	40.1	2.9	
LOS	D	A	
Approach Delay		19.0	
Approach LOS		B	
Queue Length 50th (ft)	225	63	
Queue Length 95th (ft)	293	109	
Internal Link Dist (ft)		765	
Turn Bay Length (ft)			
Base Capacity (vph)	653	1560	
Starvation Cap Reductn	0	0	
Spillback Cap Reductn	0	0	
Storage Cap Reductn	0	0	
Reduced v/c Ratio	0.48	0.26	

Intersection Summary

Lane Group	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	64	490	425	31	128	219	734	11	0	566	0
Future Volume (vph)	64	490	425	31	128	219	734	11	0	566	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	12	13	12	12	12	12	12
Storage Length (ft)	150	300	0	0		0		0	0		0
Storage Lanes	1	1	1	1		1		0	0		0
Taper Length (ft)	25		25			25			25		
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850		0.850			0.998				
Flt Protected	0.950		0.950			0.950					
Satd. Flow (prot)	1719	2707	1719	1641	0	1829	1859	0	0	3539	0
Flt Permitted	0.950		0.133			0.950					
Satd. Flow (perm)	1719	2707	241	1641	0	1829	1859	0	0	3539	0
Right Turn on Red		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		67		111			1				
Link Speed (mph)	30		30				30			30	
Link Distance (ft)	617		345				426			371	
Travel Time (s)	14.0		7.8				9.7			8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	70	533	462	34	139	238	798	12	0	615	0
Shared Lane Traffic (%)											
Lane Group Flow (vph)	70	533	462	173	0	238	810	0	0	615	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12		12				13			13	
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	0.92	1.00	0.96	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	9	15		9	15		9
Turn Type	Prot	pt+ov	Perm	Prot		Prot	NA			NA	
Protected Phases	4	4 5		3		5	2			6	
Permitted Phases			3								
Detector Phase	4	4 5	3	3		5	2			6	
Switch Phase											
Minimum Initial (s)	8.0		5.0	5.0		10.0	10.0			10.0	
Minimum Split (s)	24.5		24.5	24.5		24.5	24.5			24.5	
Total Split (s)	46.5		36.5	36.5		46.5	66.5			33.5	
Total Split (%)	28.5%		22.4%	22.4%		28.5%	40.8%			20.6%	
Maximum Green (s)	40.0		30.0	30.0		40.0	60.0			27.0	
Yellow Time (s)	4.0		4.0	4.0		4.0	4.0			4.0	
All-Red Time (s)	2.5		2.5	2.5		2.5	2.5			2.5	
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.5		6.5	6.5		6.5	6.5			6.5	
Lead/Lag	Lag		Lead	Lead		Lead				Lag	
Lead-Lag Optimize?											
Vehicle Extension (s)	1.5		1.5	1.5		1.5	1.5			1.5	

Lane Group	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Recall Mode	None		None	None		Min	C-Min			C-Min	
Walk Time (s)	7.0		7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	11.0		11.0	11.0		11.0	11.0			11.0	
Pedestrian Calls (#/hr)	0		0	0		0	0			0	
Act Effct Green (s)	28.3	62.7	30.0	30.0		27.9	85.2			50.8	
Actuated g/C Ratio	0.17	0.38	0.18	0.18		0.17	0.52			0.31	
v/c Ratio	0.23	0.49	10.50	0.44		0.76	0.83			0.56	
Control Delay	58.8	33.3	4325.5	25.6		79.3	42.6			51.4	
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0			4.5	
Total Delay	58.8	33.3	4325.5	25.6		79.3	42.6			55.9	
LOS	E	C	F	C		E	D			E	
Approach Delay	36.3		3154.0				50.9			55.9	
Approach LOS	D		F				D			E	
Queue Length 50th (ft)	65	211	~939	57		245	724			291	
Queue Length 95th (ft)	113	231	#1170	137		321	#1038			406	
Internal Link Dist (ft)	537		265				346			291	
Turn Bay Length (ft)	150	300									
Base Capacity (vph)	421	1278	44	392		448	972			1102	
Starvation Cap Reductn	0	0	0	0		0	0			403	
Spillback Cap Reductn	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.17	0.42	10.50	0.44		0.53	0.83			0.88	

Intersection Summary

Area Type: Other

Cycle Length: 163

Actuated Cycle Length: 163

Offset: 0 (0%), Referenced to phase 2:NET and 6:SWT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 10.50

Intersection Signal Delay: 728.2 Intersection LOS: F

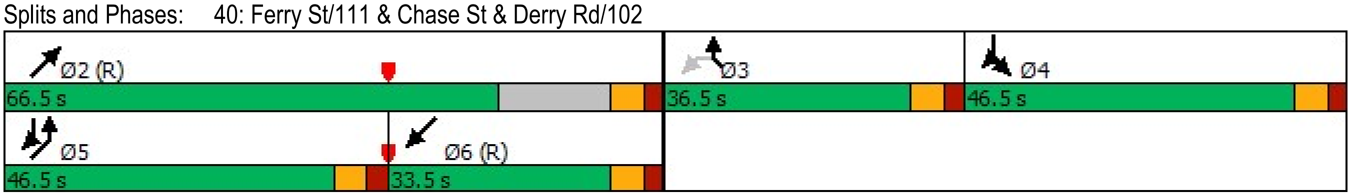
Intersection Capacity Utilization 85.8% ICU Level of Service E

Analysis Period (min) 15

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

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

Splits and Phases: 40: Ferry St/111 & Chase St & Derry Rd/102



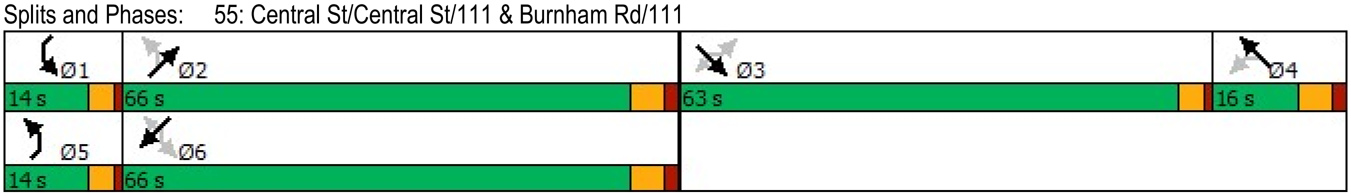
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	380	9	45	27	5	16	26	473	18	23	339	494
Future Volume (vph)	380	9	45	27	5	16	26	473	18	23	339	494
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	16	12	12	12	12	12	12	14
Storage Length (ft)	0		200	0		0	120		0	280		280
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.955			0.994				0.850
Flt Protected		0.953			0.972		0.950			0.950		
Satd. Flow (prot)	0	1775	1794	0	1960	0	1770	1852	0	1770	1863	1689
Flt Permitted		0.574			0.609		0.319			0.112		
Satd. Flow (perm)	0	1069	1794	0	1228	0	594	1852	0	209	1863	1689
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			89		12			1				537
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		882			126			314			2248	
Travel Time (s)		20.0			2.9			7.1			51.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	413	10	49	29	5	17	28	514	20	25	368	537
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	423	49	0	51	0	28	534	0	25	368	537
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		3			4		5	2		1	6	
Permitted Phases	3		3	4			2			6		6
Detector Phase	3	3	3	4	4		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	4.0	4.0		4.0	10.0		4.0	10.0	10.0
Minimum Split (s)	14.0	14.0	14.0	10.0	10.0		8.0	16.0		8.0	16.0	16.0
Total Split (s)	63.0	63.0	63.0	16.0	16.0		14.0	66.0		14.0	66.0	66.0
Total Split (%)	39.6%	39.6%	39.6%	10.1%	10.1%		8.8%	41.5%		8.8%	41.5%	41.5%
Maximum Green (s)	59.0	59.0	59.0	10.0	10.0		10.0	60.0		10.0	60.0	60.0
Yellow Time (s)	3.0	3.0	3.0	4.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0		1.0	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)		4.0	4.0		6.0		4.0	6.0		4.0	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Act Effct Green (s)		61.0	61.0		8.7		48.4	42.8		48.2	42.7	42.7
Actuated g/C Ratio		0.46	0.46		0.07		0.37	0.33		0.37	0.33	0.33
v/c Ratio		0.85	0.06		0.56		0.10	0.88		0.17	0.61	0.59
Control Delay		53.9	0.5		76.3		24.8	59.4		26.6	42.2	5.4
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		53.9	0.5		76.3		24.8	59.4		26.6	42.2	5.4
LOS		D	A		E		C	E		C	D	A
Approach Delay		48.4			76.3			57.7			20.5	
Approach LOS		D			E			E			C	
Queue Length 50th (ft)		366	0		35		15	461		14	283	0
Queue Length 95th (ft)		#688	3		#96		35	618		32	391	77
Internal Link Dist (ft)		802			46			234			2168	
Turn Bay Length (ft)			200				120			280		280
Base Capacity (vph)		496	881		107		319	876		202	880	1081
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		0.85	0.06		0.48		0.09	0.61		0.12	0.42	0.50

Intersection Summary

Area Type: Other
Cycle Length: 159
Actuated Cycle Length: 131.3
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 38.8 Intersection LOS: D
Intersection Capacity Utilization 62.5% ICU Level of Service B
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 55: Central St/Central St/111 & Burnham Rd/111



Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	63	14	719	69	171	295	79	26	190	259	25	44
Future Volume (vph)	63	14	719	69	171	295	79	26	190	259	25	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	12	12	12	16	12	12	16	12
Storage Length (ft)		300		300	300		300		140		300	
Storage Lanes		1		1	1		2		1		0	
Taper Length (ft)		25			25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850			0.850	0.850		0.968		
Flt Protected		0.950			0.950				0.950			
Satd. Flow (prot)	0	1770	1810	1689	1719	1810	1538	1794	1570	1755	0	0
Flt Permitted		0.267			0.267				0.447			
Satd. Flow (perm)	0	497	1810	1689	483	1810	1538	1794	739	1755	0	0
Right Turn on Red				Yes				Yes				Yes
Satd. Flow (RTOR)				121				121		4		
Link Speed (mph)			30			30				30		
Link Distance (ft)			2248			4120				755		
Travel Time (s)			51.1			93.6				17.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	2%	5%	5%	5%	2%	15%	5%	2%	5%
Adj. Flow (vph)	68	15	782	75	186	321	86	28	207	282	27	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	83	782	75	186	321	86	28	207	357	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right	Left	Left	Right	Right
Median Width(ft)			12			12				12		
Link Offset(ft)			0			0				0		
Crosswalk Width(ft)			16			16				16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.85	1.00	1.00	0.85	1.00
Turning Speed (mph)	15	15		9	15		9	9	15		9	9
Turn Type	custom	Prot	NA	Free	custom	NA	Perm	Free	pm+pt	NA		
Protected Phases		1	6			2			7	4		
Permitted Phases	1			Free	5		2	Free	4			
Detector Phase	1	1	6		5	2	2		7	4		
Switch Phase												
Minimum Initial (s)	4.0	4.0	15.0		4.0	15.0	15.0		4.0	10.0		
Minimum Split (s)	8.0	8.0	21.0		8.0	21.0	21.0		8.0	16.0		
Total Split (s)	19.0	19.0	81.0		19.0	81.0	81.0		19.0	51.0		
Total Split (%)	10.1%	10.1%	42.9%		10.1%	42.9%	42.9%		10.1%	27.0%		
Maximum Green (s)	15.0	15.0	75.0		15.0	75.0	75.0		15.0	45.0		
Yellow Time (s)	3.0	3.0	4.0		3.0	4.0	4.0		3.0	4.0		
All-Red Time (s)	1.0	1.0	2.0		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		
Total Lost Time (s)		4.0	6.0		4.0	6.0	6.0		4.0	6.0		
Lead/Lag	Lead	Lead	Lag		Lead	Lag	Lag		Lag			
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	3.0		2.0	3.0	3.0		2.0	3.0		

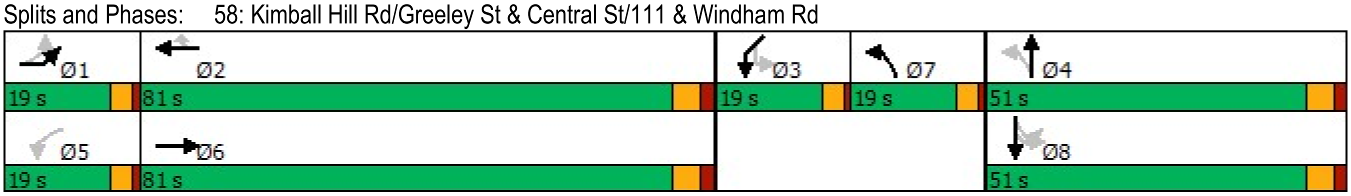
Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Traffic Volume (vph)	4	70	119	61	33	19	32	7
Future Volume (vph)	4	70	119	61	33	19	32	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	12	12	12
Storage Length (ft)		0		0		0	0	
Storage Lanes		0		0		1	0	
Taper Length (ft)		25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.968			0.942		
Flt Protected			0.986			0.972		
Satd. Flow (prot)	0	0	1957	0	0	1706	0	0
Flt Permitted			0.271			0.972		
Satd. Flow (perm)	0	0	538	0	0	1706	0	0
Right Turn on Red				No				No
Satd. Flow (RTOR)								
Link Speed (mph)			30			30		
Link Distance (ft)			869			736		
Travel Time (s)			19.8			16.7		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	4	76	129	66	36	21	35	8
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	275	0	0	100	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right
Median Width(ft)			12			12		
Link Offset(ft)			0			0		
Crosswalk Width(ft)			16			16		
Two way Left Turn Lane								
Headway Factor	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	15	15	9	9
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			8			3		
Permitted Phases	8	8			3			
Detector Phase	8	8	8		3	3		
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0		4.0	4.0		
Minimum Split (s)	16.0	16.0	16.0		8.0	8.0		
Total Split (s)	51.0	51.0	51.0		19.0	19.0		
Total Split (%)	27.0%	27.0%	27.0%		10.1%	10.1%		
Maximum Green (s)	45.0	45.0	45.0		15.0	15.0		
Yellow Time (s)	4.0	4.0	4.0		3.0	3.0		
All-Red Time (s)	2.0	2.0	2.0		1.0	1.0		
Lost Time Adjust (s)			0.0			0.0		
Total Lost Time (s)			6.0			4.0		
Lead/Lag					Lead	Lead		
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0		

Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Recall Mode	None	None	Min		None	Min	Min		None	None		
Act Effct Green (s)		15.0	75.0	187.6	15.0	75.0	75.0	187.6	62.0	45.0		
Actuated g/C Ratio		0.08	0.40	1.00	0.08	0.40	0.40	1.00	0.33	0.24		
v/c Ratio		2.13	1.08	0.04	4.89	0.44	0.14	0.02	0.67	0.84		
Control Delay		612.3	109.1	0.0	1811.9	43.7	37.0	0.0	59.5	85.5		
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay		612.3	109.1	0.0	1811.9	43.7	37.0	0.0	59.5	85.5		
LOS		F	F	A	F	D	D	A	E	F		
Approach Delay			144.9			570.4				76.0		
Approach LOS			F			F				E		
Queue Length 50th (ft)		~163	~1087	0	~429	293	68	0	194	425		
Queue Length 95th (ft)		#291	#1352	0	#609	391	114	0	276	#597		
Internal Link Dist (ft)			2168			4040				675		
Turn Bay Length (ft)		300		300	300		300	300	140			
Base Capacity (vph)		39	723	1689	38	723	615	1794	310	423		
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		2.13	1.08	0.04	4.89	0.44	0.14	0.02	0.67	0.84		

Intersection Summary	
Area Type: Other	
Cycle Length: 189	
Actuated Cycle Length: 187.6	
Natural Cycle: 70	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 4.89	
Intersection Signal Delay: 280.7	Intersection LOS: F
Intersection Capacity Utilization 106.2%	ICU Level of Service G
Analysis Period (min) 15	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 58: Kimball Hill Rd/Greeley St & Central St/111 & Windham Rd



Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Recall Mode	None	None	None		None	None		
Act Effct Green (s)			45.0			13.6		
Actuated g/C Ratio			0.24			0.07		
v/c Ratio			2.13			0.81		
Control Delay			566.4			126.8		
Queue Delay			0.0			0.0		
Total Delay			566.4			126.8		
LOS			F			F		
Approach Delay			566.4			126.8		
Approach LOS			F			F		
Queue Length 50th (ft)			~542			124		
Queue Length 95th (ft)			#748			#224		
Internal Link Dist (ft)			789			656		
Turn Bay Length (ft)								
Base Capacity (vph)			129			136		
Starvation Cap Reductn			0			0		
Spillback Cap Reductn			0			0		
Storage Cap Reductn			0			0		
Reduced v/c Ratio			2.13			0.74		

Intersection Summary

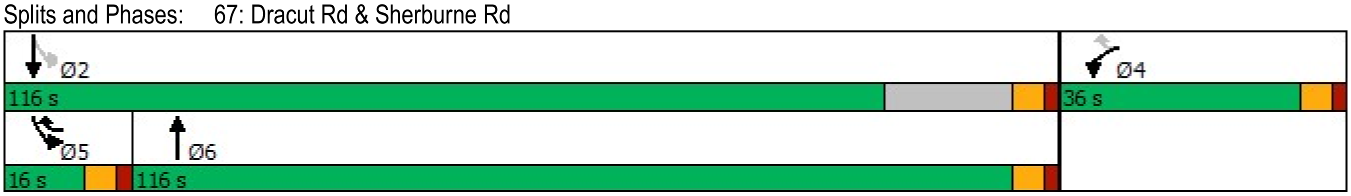
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	82	293	327	102	440	523
Future Volume (vph)	82	293	327	102	440	523
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	150		0	150	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.968			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1538	1764	0	1770	1863
Flt Permitted	0.950				0.268	
Satd. Flow (perm)	1770	1538	1764	0	499	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		318	19			
Link Speed (mph)	30		30			30
Link Distance (ft)	832		787			870
Travel Time (s)	18.9		17.9			19.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	5%	2%	2%	2%
Adj. Flow (vph)	89	318	355	111	478	568
Shared Lane Traffic (%)						
Lane Group Flow (vph)	89	318	466	0	478	568
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pm+ov	NA		pm+pt	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4			2	
Detector Phase	4	5	6		5	2
Switch Phase						
Minimum Initial (s)	5.0	3.0	10.0		3.0	10.0
Minimum Split (s)	11.0	9.0	16.0		9.0	16.0
Total Split (s)	36.0	16.0	116.0		16.0	116.0
Total Split (%)	21.4%	9.5%	69.0%		9.5%	69.0%
Maximum Green (s)	30.0	10.0	110.0		10.0	110.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5		1.5	1.5
Recall Mode	None	None	Min		None	Min

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Act Effct Green (s)	7.2	20.6	19.7		36.5	38.4
Actuated g/C Ratio	0.14	0.39	0.37		0.69	0.73
v/c Ratio	0.37	0.40	0.70		0.80	0.42
Control Delay	28.6	3.6	20.5		20.2	5.7
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	28.6	3.6	20.5		20.2	5.7
LOS	C	A	C		C	A
Approach Delay	9.1		20.5			12.3
Approach LOS	A		C			B
Queue Length 50th (ft)	27	0	121		59	73
Queue Length 95th (ft)	72	44	222		#196	145
Internal Link Dist (ft)	752		707			790
Turn Bay Length (ft)		150			150	
Base Capacity (vph)	1056	792	1764		597	1863
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	0.08	0.40	0.26		0.80	0.30

Intersection Summary

Area Type: Other
Cycle Length: 168
Actuated Cycle Length: 52.9
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 13.6 Intersection LOS: B
Intersection Capacity Utilization 67.3% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 67: Dracut Rd & Sherburne Rd



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	146	125	45	174	327	50
Future Volume (vph)	146	125	45	174	327	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12
Storage Length (ft)		0	180		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.938				0.982	
Flt Protected			0.950		0.958	
Satd. Flow (prot)	1462	0	1770	1652	1732	0
Flt Permitted			0.950		0.958	
Satd. Flow (perm)	1462	0	1770	1652	1732	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1417			420	606	
Travel Time (s)	32.2			9.5	13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	30%	2%	15%	15%	30%
Adj. Flow (vph)	159	136	49	189	355	54
Shared Lane Traffic (%)						
Lane Group Flow (vph)	295	0	49	189	409	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	16	
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	0.85	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 49.8% ICU Level of Service A

Analysis Period (min) 15

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	146	125	125	189	8	295
Future Volume (vph)	146	125	125	189	8	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	16	12
Storage Length (ft)		0	80		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.938				0.869	
Flt Protected			0.950		0.999	
Satd. Flow (prot)	1747	0	1770	2111	1833	0
Flt Permitted			0.950		0.999	
Satd. Flow (perm)	1747	0	1770	2111	1833	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	2748			314	1025	
Travel Time (s)	62.5			7.1	23.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	159	136	136	205	9	321
Shared Lane Traffic (%)						
Lane Group Flow (vph)	295	0	136	205	330	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	16	
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	0.85	0.85	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 50.9% ICU Level of Service A

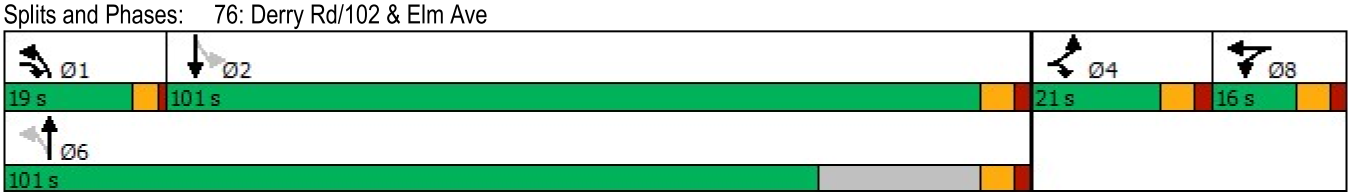
Analysis Period (min) 15

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	64	0	229	0	0	0	273	672	0	0	624	14
Future Volume (vph)	64	0	229	0	0	0	273	672	0	0	624	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	12	12	12	12	12	15	12
Storage Length (ft)	130		0	0		0	465		0	0		0
Storage Lanes	1		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850								0.997	
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	0	1583	0	1863	0	1770	1863	0	0	2043	0
Flt Permitted	0.950						0.206					
Satd. Flow (perm)	1770	0	1583	0	1863	0	384	1863	0	0	2043	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			249								1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		468			79			2433			1216	
Travel Time (s)		10.6			1.8			55.3			27.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	70	0	249	0	0	0	297	730	0	0	678	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	70	0	249	0	0	0	297	730	0	0	693	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	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot		pt+ov				pm+pt	NA			NA	
Protected Phases	4		4 1	8	8		1	6			2	
Permitted Phases	4						6			2		
Detector Phase	4		4 1	8	8		1	6		2	2	
Switch Phase												
Minimum Initial (s)	3.0			5.0	5.0		3.0	10.0		10.0	10.0	
Minimum Split (s)	9.0			11.0	11.0		7.0	16.0		16.0	16.0	
Total Split (s)	21.0			16.0	16.0		19.0	101.0		101.0	101.0	
Total Split (%)	13.4%			10.2%	10.2%		12.1%	64.3%		64.3%	64.3%	
Maximum Green (s)	15.0			10.0	10.0		15.0	95.0		95.0	95.0	
Yellow Time (s)	4.0			4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	2.0			2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0				0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0				6.0		4.0	6.0			6.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5			0.4	0.4		2.0	5.0		5.0	5.0	
Recall Mode	None			None	None		None	Min		Min	Min	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	8.3		21.7				50.2	48.2			34.8	
Actuated g/C Ratio	0.12		0.31				0.73	0.70			0.50	
v/c Ratio	0.33		0.37				0.64	0.56			0.67	
Control Delay	36.1		5.0				11.0	7.0			16.7	
Queue Delay	0.0		0.0				0.0	0.0			0.0	
Total Delay	36.1		5.0				11.0	7.0			16.7	
LOS	D		A				B	A			B	
Approach Delay		11.8						8.2			16.7	
Approach LOS		B						A			B	
Queue Length 50th (ft)	27		0				30	118			195	
Queue Length 95th (ft)	78		52				85	221			364	
Internal Link Dist (ft)		388			1			2353			1136	
Turn Bay Length (ft)	130						465					
Base Capacity (vph)	401		782				594	1863			2043	
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	0.17		0.32				0.50	0.39			0.34	

Intersection Summary	
Area Type: Other	
Cycle Length: 157	
Actuated Cycle Length: 69	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 11.6	Intersection LOS: B
Intersection Capacity Utilization 85.9%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 76: Derry Rd/102 & Elm Ave

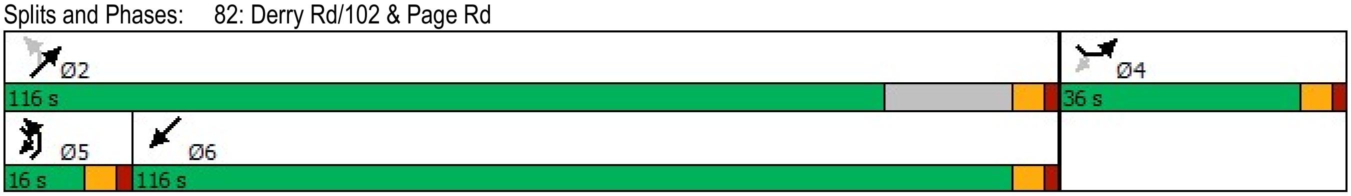


Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	77	39	41	329	434	100
Future Volume (vph)	77	39	41	329	434	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	150	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.975	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1719	1583	1770	1810	1764	0
Flt Permitted	0.950		0.269			
Satd. Flow (perm)	1719	1583	501	1810	1764	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		42			14	
Link Speed (mph)	30			30	30	
Link Distance (ft)	420			2236	3657	
Travel Time (s)	9.5			50.8	83.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	5%	5%	5%
Adj. Flow (vph)	84	42	45	358	472	109
Shared Lane Traffic (%)						
Lane Group Flow (vph)	84	42	45	358	581	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Turn Type	Prot	pm+ov	pm+pt	NA	NA	
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			
Detector Phase	4	5	5	2	6	
Switch Phase						
Minimum Initial (s)	5.0	3.0	3.0	10.0	10.0	
Minimum Split (s)	11.0	9.0	9.0	16.0	16.0	
Total Split (s)	36.0	16.0	16.0	116.0	116.0	
Total Split (%)	21.4%	9.5%	9.5%	69.0%	69.0%	
Maximum Green (s)	30.0	10.0	10.0	110.0	110.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	
Lead/Lag		Lead	Lead		Lag	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	
Recall Mode	None	None	None	Min	Min	

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Act Effct Green (s)	7.4	16.0	36.7	38.7	29.8	
Actuated g/C Ratio	0.14	0.30	0.69	0.72	0.56	
v/c Ratio	0.35	0.08	0.09	0.27	0.59	
Control Delay	29.2	6.3	4.0	4.7	14.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	29.2	6.3	4.0	4.7	14.9	
LOS	C	A	A	A	B	
Approach Delay	21.5			4.6	14.9	
Approach LOS	C			A	B	
Queue Length 50th (ft)	25	0	4	41	144	
Queue Length 95th (ft)	74	19	14	83	284	
Internal Link Dist (ft)	340			2156	3577	
Turn Bay Length (ft)		150	150			
Base Capacity (vph)	1036	647	599	1810	1764	
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	0.08	0.06	0.08	0.20	0.33	

Intersection Summary	
Area Type: Other	
Cycle Length: 168	
Actuated Cycle Length: 53.4	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.59	
Intersection Signal Delay: 11.9	Intersection LOS: B
Intersection Capacity Utilization 48.3%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 82: Derry Rd/102 & Page Rd



A.5 Future 2045 Model - AM Peak (51 pages)

Reference Table – Table 6 # to # in SYNCRHO Reports

Table 6 #	# in SYNCHRO Reports	Intersection / Direction TOWARD
1	**40**	111-102-3A (Ferry & Chase)
2	**38**	Library & Ferry
3	**39**	Library and Highland
4	**55**	Burnham and Central
5	**58**	Central-Kimball-Greeley (Rt.111 & Greeley)
6	**76**	Derry and 102 (Route 102 & Elm Ave)
7	**82**	NH 102/Page Rd
8	**34**	NH 3A Central St/Chase St
9	**33**	Central and Library
10	**29**	Lowell and Central
11	**25**	Lowell and Pelham
12	**22**	Lowell and Executive
13	**10**	Lowell-Hampshire-Oblate
14	**1**	Lowell & Wason
16	**4**	NH 3A Lowell Rd/Walmart Blvd
17	**5**	NH 3A Lowell Rd/Rena Ave
18	**7**	NH 3A Lowell Rd/Dracut Rd/Steele Rd
19	**67**	Dracut Rd/Sherburne Rd
20	**70**	Kimball Hill Rd/Bush Hill Rd
21	**73**	Central St/Belknap Rd
22	**24**	Lowell & Fox Hollow Dr
23	**27**	Lowell & Birch St
15_com	**2**	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined
15M	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section
15N	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section
15S	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	24	253	432	67	45	181	879	178	22	848	29
Future Volume (vph)	36	24	253	432	67	45	181	879	178	22	848	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	14	12	12	12	12	12	12
Storage Length (ft)	0		0	0		200	650		350	200		0
Storage Lanes	0		1	1		1	1		2	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.971		0.950	0.965		0.950			0.950		
Satd. Flow (prot)	0	1419	1408	1633	1659	1641	1719	3438	2707	1570	3139	1404
Flt Permitted		0.971		0.950	0.965		0.950			0.950		
Satd. Flow (perm)	0	1419	1408	1633	1659	1641	1719	3438	2707	1570	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			275			145			193			211
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		573			432			1014			1071	
Travel Time (s)		13.0			9.8			23.0			24.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	30%	30%	5%	5%	5%	5%	5%	5%	15%	15%	15%
Adj. Flow (vph)	39	26	275	470	73	49	197	955	193	24	922	32
Shared Lane Traffic (%)				43%								
Lane Group Flow (vph)	0	65	275	268	275	49	197	955	193	24	922	32
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	0.85	1.00	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Split	NA	pm+ov	Split	NA	pt+ov	Prot	NA	pt+ov	Prot	NA	Perm
Protected Phases	3	3	1	4	4	4 5	1	6	6 4	5	2	
Permitted Phases			3									2
Detector Phase	3	3	1	4	4	4 5	1	6	6 4	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	13.0	12.0	12.0		13.0	16.0		13.0	16.0	16.0
Total Split (s)	15.0	15.0	30.0	30.0	30.0		30.0	50.0		15.0	35.0	35.0
Total Split (%)	10.0%	10.0%	20.0%	20.0%	20.0%		20.0%	33.3%		10.0%	23.3%	23.3%
Maximum Green (s)	9.0	9.0	22.0	23.0	23.0		22.0	44.0		7.0	29.0	29.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	4.0	3.0	3.0		4.0	2.0		4.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.0	8.0	7.0	7.0		8.0	6.0		8.0	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0

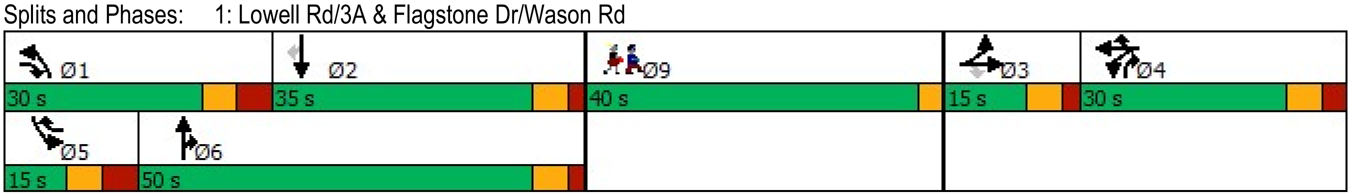
Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link 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)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	40.0
Total Split (s)	40.0
Total Split (%)	27%
Maximum Green (s)	37.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		8.7	25.2	23.0	23.0	37.6	18.5	44.4	69.7	6.5	29.5	29.5
Actuated g/C Ratio		0.08	0.24	0.22	0.22	0.35	0.17	0.42	0.65	0.06	0.28	0.28
v/c Ratio		0.56	0.51	0.76	0.77	0.07	0.66	0.67	0.11	0.25	1.06	0.06
Control Delay		67.6	5.4	55.5	56.0	0.2	52.7	29.0	0.7	55.7	86.8	0.2
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		67.6	5.4	55.5	56.0	0.2	52.7	29.0	0.7	55.7	86.8	0.2
LOS		E	A	E	E	A	D	C	A	E	F	A
Approach Delay		17.3			51.2			28.4			83.2	
Approach LOS		B			D			C			F	
Queue Length 50th (ft)		45	0	189	194	0	130	290	0	16	~372	0
Queue Length 95th (ft)		#102	32	#324	#332	0	204	364	6	44	#522	0
Internal Link Dist (ft)		493			352			934			991	
Turn Bay Length (ft)						200	650		350	200		
Base Capacity (vph)		120	579	352	357	677	354	1455	1853	102	868	540
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.54	0.47	0.76	0.77	0.07	0.56	0.66	0.10	0.24	1.06	0.06

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 106.8
Natural Cycle: 145
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.06
Intersection Signal Delay: 47.9 Intersection LOS: D
Intersection Capacity Utilization 71.4% ICU Level of Service C
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: Lowell Rd/3A & Flagstone Dr/Wason Rd



Lane Group	Ø9
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	30.0
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	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	NEL	NER
Lane Configurations									
Traffic Volume (vph)	0	0	689	235	244	0	1113	825	566
Future Volume (vph)	0	0	689	235	244	0	1113	825	566
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	14	12
Storage Length (ft)	0	0	470			450		0	0
Storage Lanes	0	0	2			1		2	1
Taper Length (ft)	25		25					25	
Lane Util. Factor	1.00	1.00	0.94	0.95	0.95	1.00	1.00	0.97	1.00
Frt							0.850		0.850
Flt Protected			0.950					0.950	
Satd. Flow (prot)	0	0	4848	3139	3438	0	1538	3557	1538
Flt Permitted			0.950					0.950	
Satd. Flow (perm)	0	0	4848	3139	3438	0	1538	3557	1538
Right Turn on Red							Yes		Yes
Satd. Flow (RTOR)							805		479
Link Speed (mph)	55			30	30			42	
Link Distance (ft)	1050			613	1014			974	
Travel Time (s)	13.0			13.9	23.0			15.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	15%	5%	2%	5%	5%	5%
Adj. Flow (vph)	0	0	749	255	265	0	1210	897	615
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	0	749	255	265	0	1210	897	615
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right	Right	Left	Right
Median Width(ft)	0			36	36			28	
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	0.92	1.00
Turning Speed (mph)	15	9	15			9	9	15	9
Turn Type			Prot	NA	NA		Free	Prot	Free
Protected Phases			1	6	2			3	
Permitted Phases							Free		Free
Detector Phase			1	6	2			3	
Switch Phase									
Minimum Initial (s)			7.0	10.0	10.0			10.0	
Minimum Split (s)			14.0	17.0	17.0			19.0	
Total Split (s)			30.0	70.0	40.0			40.0	
Total Split (%)			27.3%	63.6%	36.4%			36.4%	
Maximum Green (s)			23.0	63.0	33.0			31.0	
Yellow Time (s)			4.0	4.0	4.0			4.0	
All-Red Time (s)			3.0	3.0	3.0			5.0	
Lost Time Adjust (s)			0.0	0.0	0.0			0.0	
Total Lost Time (s)			7.0	7.0	7.0			9.0	
Lead/Lag			Lead		Lag				
Lead-Lag Optimize?									
Vehicle Extension (s)			4.0	4.0	4.0			4.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	NEL	NER
Recall Mode			None	Min	Min			None	
Act Effct Green (s)			19.7	39.8	13.0		84.1	28.1	84.1
Actuated g/C Ratio			0.23	0.47	0.15		1.00	0.33	1.00
v/c Ratio			0.66	0.17	0.50		0.79	0.76	0.40
Control Delay			32.9	13.3	37.1		4.1	30.2	0.8
Queue Delay			0.0	0.0	0.0		0.0	0.0	0.0
Total Delay			32.9	13.3	37.1		4.1	30.2	0.8
LOS			C	B	D		A	C	A
Approach Delay				27.9	10.1			18.2	
Approach LOS				C	B			B	
Queue Length 50th (ft)			132	41	71		0	215	0
Queue Length 95th (ft)			181	64	113		0	314	0
Internal Link Dist (ft)	970			533	934			894	
Turn Bay Length (ft)			470				450		
Base Capacity (vph)			1341	2379	1365		1538	1326	1538
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			0.56	0.11	0.19		0.79	0.68	0.40

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 84.1
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 17.6 Intersection LOS: B
Intersection Capacity Utilization 64.1% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: Circumferential Hwy/Sagamore Br & Lowell Rd/3A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	11	45	22	9	92	54	757	24	95	720	68
Future Volume (vph)	92	11	45	22	9	92	54	757	24	95	720	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	425		0	400		0
Storage Lanes	2		1	2		1	3		0	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.91	0.91	0.97	0.91	1.00
Frt			0.850			0.850		0.995				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3335	1863	1583	3335	1863	1538	3433	4920	0	3335	4940	1538
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3335	1863	1583	3335	1863	1538	3433	4920	0	3335	4940	1538
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			109			109		5				119
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		304			245			982			569	
Travel Time (s)		6.9			5.6			22.3			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	5%	2%	5%	2%	5%	2%	5%	5%	5%
Adj. Flow (vph)	100	12	49	24	10	100	59	823	26	103	783	74
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	12	49	24	10	100	59	849	0	103	783	74
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)		24			24			24			24	
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
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	3	8	1	7	4	5	1	6		5	2	3
Permitted Phases			8			4						2
Detector Phase	3	8	1	7	4	5	1	6		5	2	3
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	5.0
Minimum Split (s)	13.0	12.0	13.0	13.0	12.0	13.0	13.0	16.0		13.0	16.0	13.0
Total Split (s)	15.0	15.0	20.0	20.0	20.0	20.0	20.0	55.0		20.0	55.0	15.0
Total Split (%)	13.6%	13.6%	18.2%	18.2%	18.2%	18.2%	18.2%	50.0%		18.2%	50.0%	13.6%
Maximum Green (s)	7.0	8.0	12.0	12.0	13.0	12.0	12.0	49.0		12.0	49.0	7.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	4.0	3.0	4.0	4.0	3.0	4.0	4.0	2.0		4.0	2.0	4.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	8.0	7.0	8.0	8.0	7.0	8.0	8.0	6.0		8.0	6.0	8.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0		4.0	6.0	4.0
Recall Mode	None	None	None	None	None	None	None	Min		None	Min	None

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	7.5	8.0	16.6	7.4	7.5	11.2	8.1	29.2		9.0	36.4	46.4
Actuated g/C Ratio	0.11	0.12	0.25	0.11	0.11	0.17	0.12	0.44		0.13	0.54	0.69
v/c Ratio	0.27	0.05	0.10	0.06	0.05	0.29	0.14	0.39		0.23	0.29	0.07
Control Delay	35.3	35.3	0.4	34.3	34.9	7.5	33.0	14.8		32.3	13.0	0.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	35.3	35.3	0.4	34.3	34.9	7.5	33.0	14.8		32.3	13.0	0.7
LOS	D	D	A	C	C	A	C	B		C	B	A
Approach Delay		24.7			14.4			15.9			14.1	
Approach LOS		C			B			B			B	
Queue Length 50th (ft)	18	4	0	4	4	0	10	81		18	72	0
Queue Length 95th (ft)	57	25	0	20	22	33	37	165		56	147	6
Internal Link Dist (ft)		224			165			902			489	
Turn Bay Length (ft)							425			400		
Base Capacity (vph)	375	238	580	638	386	429	657	3743		638	3757	1102
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.27	0.05	0.08	0.04	0.03	0.23	0.09	0.23		0.16	0.21	0.07

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 66.9

Natural Cycle: 55

Control Type: Actuated-Uncoordinated

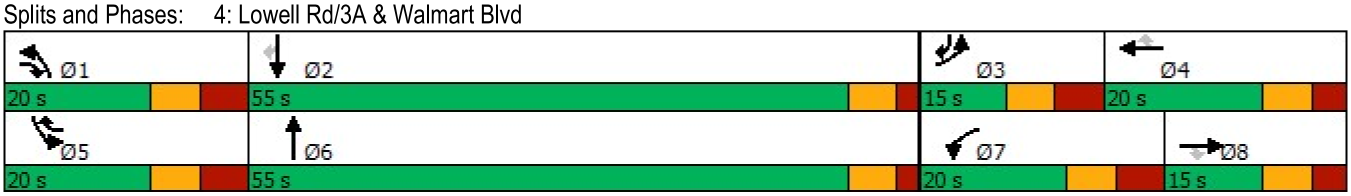
Maximum v/c Ratio: 0.39

Intersection Signal Delay: 15.7 Intersection LOS: B

Intersection Capacity Utilization 46.1% ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: Lowell Rd/3A & Walmart Blvd

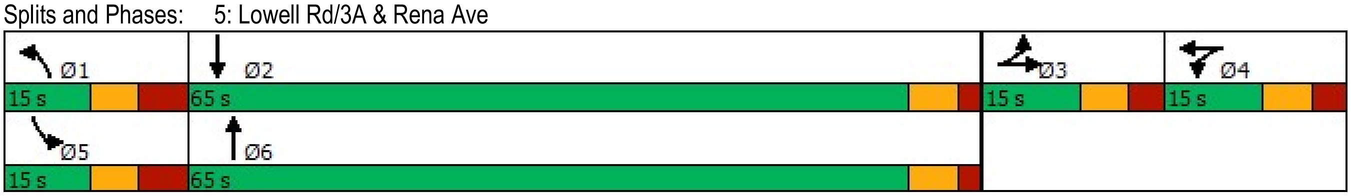


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	0	2	2	0	12	19	838	2	4	695	62
Future Volume (vph)	8	0	2	2	0	12	19	838	2	4	695	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12	12	12	12	12	12	12
Storage Length (ft)	200		200	0		0	350		0	425		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.91	0.91
Frt		0.850			0.883						0.988	
Flt Protected	0.950				0.993		0.950			0.950		
Satd. Flow (prot)	2694	1583	0	0	1805	0	1770	3438	0	1570	4892	0
Flt Permitted	0.950				0.993		0.950			0.950		
Satd. Flow (perm)	2694	1583	0	0	1805	0	1770	3438	0	1570	4892	0
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		354									20	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		301			325			1749			982	
Travel Time (s)		6.8			7.4			39.8			22.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	2%	2%	2%	2%	5%	2%	5%	2%	15%	5%	2%
Adj. Flow (vph)	9	0	2	2	0	13	21	911	2	4	755	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	9	2	0	0	15	0	21	913	0	4	822	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)		24			24			36			36	
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	0.85	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
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases												
Detector Phase	3	3		4	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	12.0		12.0	12.0		13.0	16.0		13.0	16.0	
Total Split (s)	15.0	15.0		15.0	15.0		15.0	65.0		15.0	65.0	
Total Split (%)	13.6%	13.6%		13.6%	13.6%		13.6%	59.1%		13.6%	59.1%	
Maximum Green (s)	8.0	8.0		8.0	8.0		7.0	59.0		7.0	59.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		4.0	2.0		4.0	2.0	
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0			7.0		8.0	6.0		8.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)	7.7	7.7			8.0		7.8	42.8		7.7	42.8	
Actuated g/C Ratio	0.16	0.16			0.17		0.16	0.89		0.16	0.89	
v/c Ratio	0.02	0.00			0.05		0.07	0.30		0.02	0.19	
Control Delay	27.4	0.0			27.1		27.6	5.7		28.5	4.6	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	27.4	0.0			27.1		27.6	5.7		28.5	4.6	
LOS	C	A			C		C	A		C	A	
Approach Delay		22.4			27.1			6.2			4.8	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)	1	0			3		4	0		1	0	
Queue Length 95th (ft)	10	0			28		35	264		13	139	
Internal Link Dist (ft)		221			245			1669			902	
Turn Bay Length (ft)	200						350			425		
Base Capacity (vph)	518	590			347		297	3190		264	4541	
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	0.02	0.00			0.04		0.07	0.29		0.02	0.18	

Intersection Summary	
Area Type: Other	
Cycle Length: 110	
Actuated Cycle Length: 48.1	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.30	
Intersection Signal Delay: 5.8	Intersection LOS: A
Intersection Capacity Utilization 38.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Lowell Rd/3A & Rena Ave



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR	NWL2	NWL	NWR
Lane Configurations											
Traffic Volume (vph)	0	0	0	0	391	63	572	6	8	0	699
Future Volume (vph)	0	0	0	0	391	63	572	6	8	0	699
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50			240		820		0		120	0
Storage Lanes	1			2		0		0		1	1
Taper Length (ft)	25			25		25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.97	1.00	1.00	1.00	1.00	1.00
Frt							0.998				0.850
Flt Protected						0.950				0.950	
Satd. Flow (prot)	1863	1863	1863	1863	3438	3335	1806	0	0	1770	1538
Flt Permitted						0.950				0.950	
Satd. Flow (perm)	1863	1863	1863	1863	3438	3335	1806	0	0	1770	1538
Right Turn on Red								Yes			
Satd. Flow (RTOR)							1				
Link Speed (mph)		30	30		30		30			30	
Link Distance (ft)		386	220		910		1749			960	
Travel Time (s)		8.8	5.0		20.7		39.8			21.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	5%	5%	5%	2%	2%	2%	5%
Adj. Flow (vph)	0	0	0	0	425	68	622	7	9	0	760
Shared Lane Traffic (%)											
Lane Group Flow (vph)	0	0	0	0	425	68	629	0	0	9	760
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Left	Left	Left	Left	Right	Left	Left	Right
Median Width(ft)		12	12		36		36			12	
Link Offset(ft)		0	0		0		0			0	
Crosswalk Width(ft)		16	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
Turning Speed (mph)	15			15		15		9	15	15	9
Turn Type	Perm			Prot	NA	Prot	NA		Perm	Prot	pt+ov
Protected Phases		4	4	1	6	5	2			3	3 5
Permitted Phases	4								3		
Detector Phase	4	4	4	1	6	5	2		3	3	3 5
Switch Phase											
Minimum Initial (s)	5.0	5.0	5.0	5.0	10.0	10.0	10.0		10.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	13.0	16.0	18.0	16.0		17.0	17.0	
Total Split (s)	11.0	11.0	11.0	15.0	19.0	35.0	39.0		45.0	45.0	
Total Split (%)	10.0%	10.0%	10.0%	13.6%	17.3%	31.8%	35.5%		40.9%	40.9%	
Maximum Green (s)	5.0	5.0	5.0	7.0	13.0	27.0	33.0		38.0	38.0	
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)	2.0	2.0	2.0	4.0	2.0	4.0	2.0		3.0	3.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	
Total Lost Time (s)	6.0	6.0	6.0	8.0	6.0	8.0	6.0			7.0	
Lead/Lag	Lag	Lag	Lag	Lead	Lag	Lead	Lag		Lead	Lead	
Lead-Lag Optimize?											
Vehicle Extension (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0		4.0	4.0	
Recall Mode	None	None	None	None	Min	None	Min		None	None	

Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT	SBR	NWL2	NWL	NWR
Act Effct Green (s)					13.2	19.3	40.6			33.6	61.1
Actuated g/C Ratio					0.15	0.22	0.46			0.38	0.70
v/c Ratio					0.82	0.09	0.75			0.01	0.71
Control Delay					52.5	28.0	26.6			18.0	11.9
Queue Delay					0.0	0.0	0.0			0.0	0.0
Total Delay					52.5	28.0	26.6			18.0	11.9
LOS					D	C	C			B	B
Approach Delay					52.5		26.7			12.0	
Approach LOS					D		C			B	
Queue Length 50th (ft)					125	15	296			3	209
Queue Length 95th (ft)					#237	33	438			14	327
Internal Link Dist (ft)		306	140		830		1669			880	
Turn Bay Length (ft)						820				120	
Base Capacity (vph)					518	1043	839			779	1193
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					0.82	0.07	0.75			0.01	0.64

Intersection Summary

Area Type: Other

Cycle Length: 110

Actuated Cycle Length: 87.4

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.82

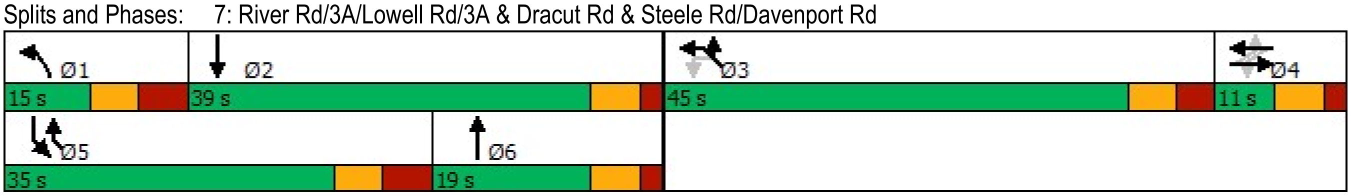
Intersection Signal Delay: 26.5 Intersection LOS: C

Intersection Capacity Utilization 64.9% 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: 7: River Rd/3A/Lowell Rd/3A & Dracut Rd & Steele Rd/Davenport Rd

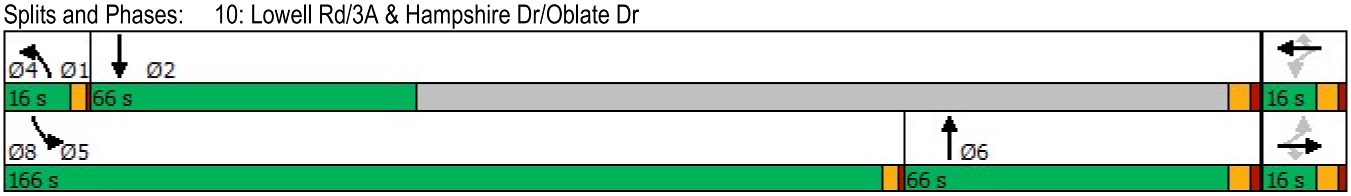


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	0	15	4	0	2	88	950	3	2	989	70
Future Volume (vph)	18	0	15	4	0	2	88	950	3	2	989	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	16	12	12	12	12	12	12
Storage Length (ft)	0		150	0		120	270		0	250		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850					0.990	
Flt Protected		0.950			0.950		0.950			0.950		
Satd. Flow (prot)	0	1770	1794	0	1770	1794	1719	3438	0	1770	3504	0
Flt Permitted		0.889			0.889		0.950			0.950		
Satd. Flow (perm)	0	1656	1794	0	1656	1794	1719	3438	0	1770	3504	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			48			48					14	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			436			437			1173	
Travel Time (s)		9.4			9.9			9.9			26.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	20	0	16	4	0	2	96	1033	3	2	1075	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	20	16	0	4	2	96	1036	0	2	1151	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4		4						
Detector Phase	8	8	8	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0	4.0	15.0		4.0	15.0	
Minimum Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	8.0	28.0		8.0	28.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	66.0		166.0	66.0	
Total Split (%)	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	26.6%		66.9%	26.6%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	12.0	60.0		162.0	60.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0	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	
Total Lost Time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0		2.0	3.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None	None	None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0		7.0			7.0	
Flash Dont Walk (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0			0	
Act Effct Green (s)		6.8	6.8		6.2	6.2	12.1	61.7		4.7	44.9	
Actuated g/C Ratio		0.09	0.09		0.08	0.08	0.16	0.82		0.06	0.60	
v/c Ratio		0.13	0.08		0.03	0.01	0.35	0.37		0.02	0.55	
Control Delay		33.6	1.4		32.5	0.0	32.3	4.1		34.5	11.3	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		33.6	1.4		32.5	0.0	32.3	4.1		34.5	11.3	
LOS		C	A		C	A	C	A		C	B	
Approach Delay		19.3			21.7			6.5			11.4	
Approach LOS		B			C			A			B	
Queue Length 50th (ft)		8	0		2	0	36	69		1	177	
Queue Length 95th (ft)		30	3		11	0	90	166		8	246	
Internal Link Dist (ft)		332			356			357			1093	
Turn Bay Length (ft)			150			120	270			250		
Base Capacity (vph)		221	281		221	281	276	3037		1770	3504	
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	0.06		0.02	0.01	0.35	0.34		0.00	0.33	

Intersection Summary	
Area Type: Other	
Cycle Length: 248	
Actuated Cycle Length: 75.1	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.55	
Intersection Signal Delay: 9.1	Intersection LOS: A
Intersection Capacity Utilization 55.4%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 10: Lowell Rd/3A & Hampshire Dr/Oblate Dr



Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	231	442	254	192	786	142	31	8	84	277	23	137
Future Volume (vph)	231	442	254	192	786	142	31	8	84	277	23	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	16	12	12	14
Storage Length (ft)	400		0	180		300	0		0	0		0
Storage Lanes	1		0	1		1	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.945			0.977				0.850			0.850
Flt Protected	0.950			0.950				0.962			0.956	
Satd. Flow (prot)	1719	3249	0	1770	3458	0	0	1741	1743	0	1781	1689
Flt Permitted	0.950			0.950				0.568			0.711	
Satd. Flow (perm)	1719	3249	0	1770	3458	0	0	1028	1743	0	1324	1689
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		157			28				91			149
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		669			399			262			149	
Travel Time (s)		15.2			9.1			6.0			3.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	5%	5%	5%	2%	2%	2%
Adj. Flow (vph)	251	480	276	209	854	154	34	9	91	301	25	149
Shared Lane Traffic (%)												
Lane Group Flow (vph)	251	756	0	209	1008	0	0	43	91	0	326	149
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA		Prot	NA		Perm	NA	pm+ov	Perm	NA	Perm
Protected Phases	1	6		5	2			8	1		4	
Permitted Phases							8		8	4		4
Detector Phase	1	6		5	2		8	8	1	4	4	4
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	3.0	3.0	4.0	4.0	4.0
Minimum Split (s)	8.0	31.0		8.0	31.0		25.0	25.0	8.0	26.0	26.0	26.0
Total Split (s)	20.0	66.0		20.0	66.0		25.0	25.0	20.0	26.0	26.0	26.0
Total Split (%)	17.9%	58.9%		17.9%	58.9%		22.3%	22.3%	17.9%	23.2%	23.2%	23.2%
Maximum Green (s)	15.0	60.0		15.0	60.0		20.0	20.0	15.0	20.0	20.0	20.0
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		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	6.0		5.0	6.0			5.0	5.0		6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag				Lead			
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	2.0

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		11.0			11.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	15.1	36.0		13.9	34.8			21.2	41.3		20.2	20.2
Actuated g/C Ratio	0.17	0.41		0.16	0.40			0.24	0.47		0.23	0.23
v/c Ratio	0.85	0.53		0.74	0.72			0.17	0.10		1.07	0.30
Control Delay	62.7	16.1		53.5	24.4			31.4	4.2		106.2	7.4
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	62.7	16.1		53.5	24.4			31.4	4.2		106.2	7.4
LOS	E	B		D	C			C	A		F	A
Approach Delay		27.7			29.4			12.9			75.2	
Approach LOS		C			C			B			E	
Queue Length 50th (ft)	133	126		107	232			19	0		~197	0
Queue Length 95th (ft)	#314	175		#242	297			54	29		#425	51
Internal Link Dist (ft)		589			319			182			69	
Turn Bay Length (ft)	400			180								
Base Capacity (vph)	297	2301		306	2406			249	873		306	504
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	0.85	0.33		0.68	0.42			0.17	0.10		1.07	0.30

Intersection Summary

Area Type: Other

Cycle Length: 112

Actuated Cycle Length: 87.2

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.07

Intersection Signal Delay: 35.7 Intersection LOS: D

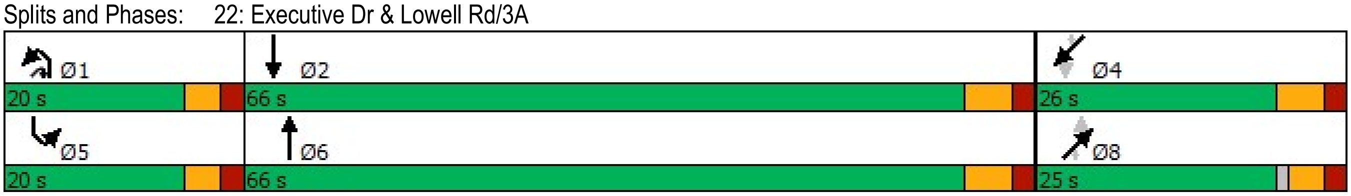
Intersection Capacity Utilization 76.4% ICU Level of Service D

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: 22: Executive Dr & Lowell Rd/3A



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	724	892	0
Future Volume (vph)	0	0	0	724	892	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12
Storage Length (ft)	0	0	0			400
Storage Lanes	0	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Fl						
Sa						
Fl						
Sa						
Li						
Li						
Tr						
Pe						
Ac						
Sh						
La						
Er						
La						
M						
Li						
Cr						
Two way Left Turn Lane						
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Free			Free	Free	

NOT PART OF STUDY

Intersection Summary		
Area Type:	Other	
Control Type: Unsignalized		
Intersection Capacity Utilization 50.3%		ICU Level of Service A
Analysis Period (min) 15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	1	38	9	4	13	29	975	3	9	845	3
Future Volume (vph)	38	1	38	9	4	13	29	975	3	9	845	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	14	14	12	12	12	12	12	12
Storage Length (ft)	0		120	0		0	250		400	220		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850			
Flt Protected		0.953			0.966		0.950			0.950		
Satd. Flow (prot)	0	1724	1538	0	1919	1689	1770	1863	1583	1570	1652	0
Flt Permitted		0.721			0.762		0.258			0.200		
Satd. Flow (perm)	0	1305	1538	0	1514	1689	481	1863	1583	330	1652	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			66			22			66			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		271			227			1282			634	
Travel Time (s)		6.2			5.2			29.1			14.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	15%	15%	15%
Adj. Flow (vph)	41	1	41	10	4	14	32	1060	3	10	918	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	42	41	0	14	14	32	1060	3	10	921	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.92	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Detector Phase	4	4	4	8	8	1	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	31.0	31.0	11.0	31.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	13.0	16.0	106.0	106.0	13.0	116.0	
Total Split (%)	10.8%	10.8%	10.8%	10.8%	10.8%	8.8%	10.8%	71.6%	71.6%	8.8%	78.4%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	7.0	10.0	100.0	100.0	7.0	110.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag						Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.0	1.5	1.5	1.5	1.0	1.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	
Walk Time (s)								7.0	7.0		7.0	
Flash Dont Walk (s)								18.0	18.0		18.0	
Pedestrian Calls (#/hr)								0	0		0	
Act Effct Green (s)		8.9	8.9		8.9	17.7	125.7	123.9	123.9	125.7	123.9	
Actuated g/C Ratio		0.06	0.06		0.06	0.12	0.85	0.84	0.84	0.85	0.84	
v/c Ratio		0.54	0.27		0.15	0.06	0.07	0.68	0.00	0.03	0.67	
Control Delay		90.6	8.7		67.7	12.3	2.3	9.9	0.0	2.2	10.0	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	2.0	
Total Delay		90.6	8.7		67.7	12.3	2.3	9.9	0.0	2.2	12.0	
LOS		F	A		E	B	A	A	A	A	B	
Approach Delay		50.1			40.0			9.7			11.9	
Approach LOS		D			D			A			B	
Queue Length 50th (ft)		40	0		13	0	3	440	0	1	373	
Queue Length 95th (ft)		82	16		37	15	10	702	0	4	611	
Internal Link Dist (ft)		191			147			1202			554	
Turn Bay Length (ft)			120				250		400	220		
Base Capacity (vph)		95	173		110	244	505	1563	1339	341	1382	
Starvation Cap Reductn		0	0		0	0	0	0	0	0	302	
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		0.44	0.24		0.13	0.06	0.06	0.68	0.00	0.03	0.85	

Intersection Summary

Area Type: Other

Cycle Length: 148

Actuated Cycle Length: 148

Offset: 45 (30%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 75

Control Type: Actuated-Coordinated

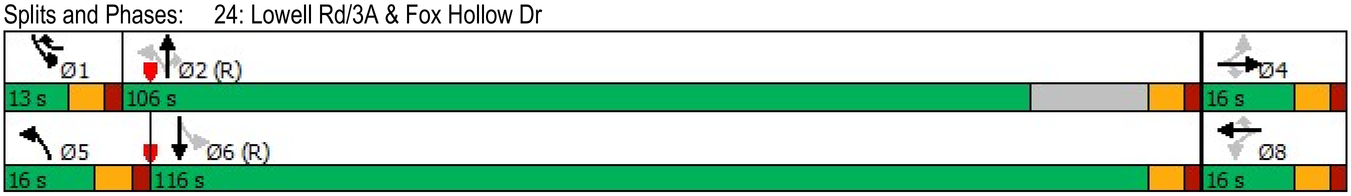
Maximum v/c Ratio: 0.68

Intersection Signal Delay: 12.6 Intersection LOS: B

Intersection Capacity Utilization 74.6% ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 24: Lowell Rd/3A & Fox Hollow Dr



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	202	77	585	89	109	868
Future Volume (vph)	202	77	585	89	109	868
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12
Storage Length (ft)	0	100		0	160	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.982			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1743	1777	0	1388	1462
Flt Permitted	0.950				0.266	
Satd. Flow (perm)	1719	1743	1777	0	389	1462
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		61	11			
Link Speed (mph)	30		30			30
Link Distance (ft)	345		634			526
Travel Time (s)	7.8		14.4			12.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	30%	30%
Adj. Flow (vph)	220	84	636	97	118	943
Shared Lane Traffic (%)						
Lane Group Flow (vph)	220	84	733	0	118	943
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pm+ov	NA		pm+pt	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4			2	
Detector Phase	4	5	6		5	2
Switch Phase						
Minimum Initial (s)	5.0	3.0	10.0		3.0	10.0
Minimum Split (s)	11.0	9.0	31.0		9.0	16.0
Total Split (s)	31.0	13.0	106.0		13.0	106.0
Total Split (%)	20.7%	8.7%	70.7%		8.7%	70.7%
Maximum Green (s)	25.0	7.0	100.0		7.0	100.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5		1.5	1.5

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)			7.0			
Flash Dont Walk (s)			18.0			
Pedestrian Calls (#/hr)			0			
Act Effct Green (s)	23.4	36.8	101.2		114.6	114.6
Actuated g/C Ratio	0.16	0.25	0.67		0.76	0.76
v/c Ratio	0.82	0.18	0.61		0.34	0.84
Control Delay	84.5	14.9	17.2		8.0	22.1
Queue Delay	0.0	0.0	2.4		0.0	0.0
Total Delay	84.5	14.9	19.6		8.0	22.1
LOS	F	B	B		A	C
Approach Delay	65.3		19.6			20.6
Approach LOS	E		B			C
Queue Length 50th (ft)	211	17	366		27	547
Queue Length 95th (ft)	293	58	594		54	#1112
Internal Link Dist (ft)	265		554			446
Turn Bay Length (ft)		100			160	
Base Capacity (vph)	303	479	1230		349	1131
Starvation Cap Reductn	0	0	353		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.73	0.18	0.84		0.34	0.83

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 26.7 Intersection LOS: C

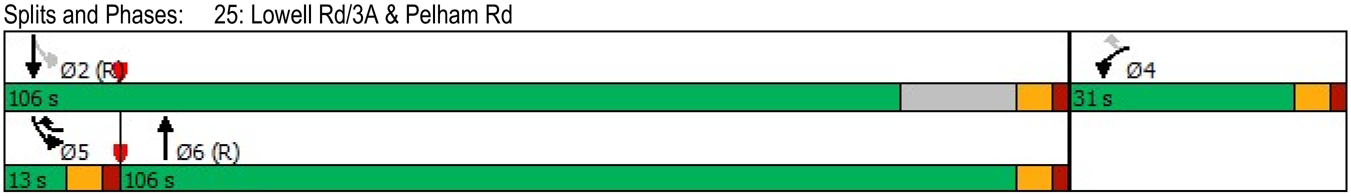
Intersection Capacity Utilization 68.4% ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 25: Lowell Rd/3A & Pelham Rd



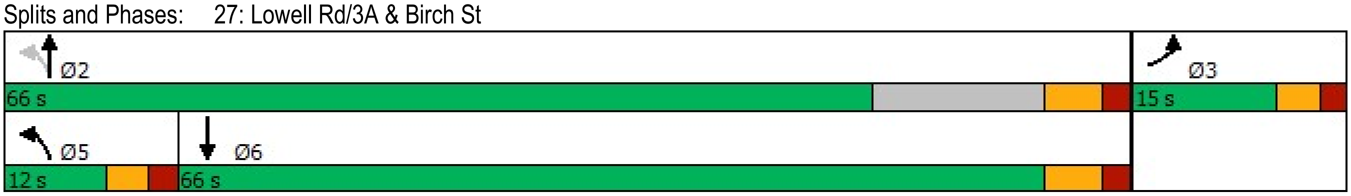
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	35	32	31	559	717	10
Future Volume (vph)	35	32	31	559	717	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	12	12	12	12	12
Storage Length (ft)	0	0	150			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.935				0.998	
Flt Protected	0.975		0.950			
Satd. Flow (prot)	1870	0	1719	1810	1806	0
Flt Permitted	0.975		0.236			
Satd. Flow (perm)	1870	0	427	1810	1806	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	35				2	
Link Speed (mph)	30			30	30	
Link Distance (ft)	442			1237	1199	
Travel Time (s)	10.0			28.1	27.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	38	35	34	608	779	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	73	0	34	608	790	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	3		5	2	6	
Permitted Phases			2			
Detector Phase	3		5	2	6	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	15.0		10.0	11.0	11.0	
Total Split (s)	15.0		12.0	66.0	66.0	
Total Split (%)	16.1%		12.9%	71.0%	71.0%	
Maximum Green (s)	10.0		7.0	60.0	60.0	
Yellow Time (s)	3.0		3.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	5.0		5.0	6.0	6.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0		2.0	2.0	2.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Recall Mode	None		None	Min	Min	
Walk Time (s)	7.0					
Flash Dont Walk (s)	3.0					
Pedestrian Calls (#/hr)	0					
Act Effct Green (s)	6.7		43.4	46.2	42.7	
Actuated g/C Ratio	0.12		0.79	0.84	0.78	
v/c Ratio	0.28		0.07	0.40	0.56	
Control Delay	21.6		2.5	3.7	9.4	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	21.6		2.5	3.7	9.4	
LOS	C		A	A	A	
Approach Delay	21.6			3.7	9.4	
Approach LOS	C			A	A	
Queue Length 50th (ft)	13		2	69	105	
Queue Length 95th (ft)	57		8	138	395	
Internal Link Dist (ft)	362			1157	1119	
Turn Bay Length (ft)			150			
Base Capacity (vph)	416		525	1763	1679	
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		0.06	0.34	0.47	

Intersection Summary

Area Type: Other
Cycle Length: 93
Actuated Cycle Length: 55
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.56
Intersection Signal Delay: 7.5 Intersection LOS: A
Intersection Capacity Utilization 51.7% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 27: Lowell Rd/3A & Birch St

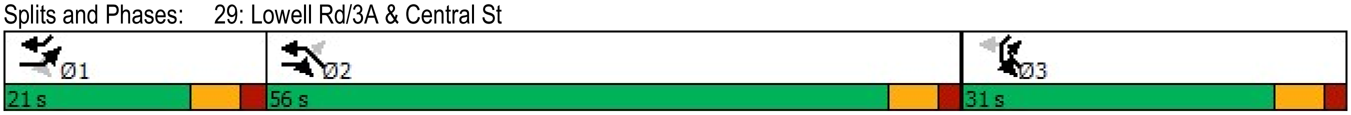


Lane Group	EBL	EBR	NWL	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	67	716	485	123	139	101
Future Volume (vph)	67	716	485	123	139	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	11	11
Storage Length (ft)	300	0	0	80	0	120
Storage Lanes	1	1	1	1	1	1
Taper Length (ft)	25		25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		0.850
Flt Protected	0.950		0.950		0.950	
Satd. Flow (prot)	1770	1583	1719	1641	1711	1531
Flt Permitted	0.950		0.950		0.950	
Satd. Flow (perm)	1770	1583	1719	1641	1711	1531
Right Turn on Red		Yes		Yes		Yes
Satd. Flow (RTOR)		471		134		110
Link Speed (mph)	30		30		30	
Link Distance (ft)	636		905		654	
Travel Time (s)	14.5		20.6		14.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	5%	2%	2%
Adj. Flow (vph)	73	778	527	134	151	110
Shared Lane Traffic (%)						
Lane Group Flow (vph)	73	778	527	134	151	110
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	12		12		11	
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	0.92	1.04	1.04
Turning Speed (mph)	15	9	15	9	15	9
Turn Type	Prot	pm+ov	Prot	pm+ov	Prot	pm+ov
Protected Phases	1	2	2	3	3	1
Permitted Phases		1		2		3
Detector Phase	1	2	2	3	3	1
Switch Phase						
Minimum Initial (s)	8.0	10.0	10.0	8.0	8.0	8.0
Minimum Split (s)	14.0	31.0	31.0	31.0	31.0	14.0
Total Split (s)	21.0	56.0	56.0	31.0	31.0	21.0
Total Split (%)	19.4%	51.9%	51.9%	28.7%	28.7%	19.4%
Maximum Green (s)	15.0	50.0	50.0	25.0	25.0	15.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag			Lead
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	2.5	2.5	2.0	2.0	1.5

Lane Group	EBL	EBR	NWL	NWR	SWL	SWR
Recall Mode	None	Min	Min	None	None	None
Walk Time (s)		7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		18.0	18.0	18.0	18.0	
Pedestrian Calls (#/hr)		0	0	0	0	
Act Effct Green (s)	9.5	45.8	34.7	55.7	12.2	28.3
Actuated g/C Ratio	0.13	0.64	0.49	0.78	0.17	0.40
v/c Ratio	0.31	0.66	0.63	0.10	0.52	0.16
Control Delay	38.9	5.4	18.5	0.8	38.6	5.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	38.9	5.4	18.5	0.8	38.6	5.2
LOS	D	A	B	A	D	A
Approach Delay	8.3		14.9		24.5	
Approach LOS	A		B		C	
Queue Length 50th (ft)	30	46	166	0	62	0
Queue Length 95th (ft)	86	151	324	12	147	35
Internal Link Dist (ft)	556		825		574	
Turn Bay Length (ft)	300			80		120
Base Capacity (vph)	409	1438	1239	1507	660	814
Starvation Cap Reductn	0	35	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.55	0.43	0.09	0.23	0.14

Intersection Summary	
Area Type: Other	
Cycle Length: 108	
Actuated Cycle Length: 71.2	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.66	
Intersection Signal Delay: 13.2	Intersection LOS: B
Intersection Capacity Utilization 56.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 29: Lowell Rd/3A & Central St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	325	0	2	272	299	1	1	1	388	9	1
Future Volume (vph)	1	325	0	2	272	299	1	1	1	388	9	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	16	12
Storage Length (ft)	0		0	0		200	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.955				
Flt Protected								0.984			0.954	
Satd. Flow (prot)	0	1863	0	0	1863	1583	0	1750	0	0	2014	0
Flt Permitted		0.999			0.997						0.730	
Satd. Flow (perm)	0	1861	0	0	1857	1583	0	1779	0	0	1541	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						325		1				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		888			636			108			794	
Travel Time (s)		20.2			14.5			2.5			18.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	353	0	2	296	325	1	1	1	422	10	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	354	0	0	298	325	0	3	0	0	433	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			3			4	
Permitted Phases	2			6		6	3			4		
Detector Phase	2	2		6	6	6	3	3		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	5.0	5.0		10.0	10.0	
Minimum Split (s)	31.0	31.0		16.0	16.0	16.0	16.0	16.0		31.0	31.0	
Total Split (s)	46.0	46.0		46.0	46.0	46.0	16.0	16.0		31.0	31.0	
Total Split (%)	49.5%	49.5%		49.5%	49.5%	49.5%	17.2%	17.2%		33.3%	33.3%	
Maximum Green (s)	40.0	40.0		40.0	40.0	40.0	10.0	10.0		25.0	25.0	
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)	2.0	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	
Total Lost Time (s)		6.0			6.0	6.0		6.0			6.0	
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	2.0	2.0		3.0	3.0	
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Walk Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	3.0	3.0					3.0	3.0		3.0	3.0	
Pedestrian Calls (#/hr)	0	0					0	0		0	0	
Act Effct Green (s)		15.8			15.8	15.8		5.1			25.6	
Actuated g/C Ratio		0.29			0.29	0.29		0.09			0.46	
v/c Ratio		0.67			0.56	0.48		0.02			0.61	
Control Delay		24.4			21.5	4.9		25.7			19.3	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		24.4			21.5	4.9		25.7			19.3	
LOS		C			C	A		C			B	
Approach Delay		24.4			12.8			25.7			19.3	
Approach LOS		C			B			C			B	
Queue Length 50th (ft)		94			76	0		1			88	
Queue Length 95th (ft)		208			172	50		9			#329	
Internal Link Dist (ft)		808			556			28			714	
Turn Bay Length (ft)						200						
Base Capacity (vph)		1375			1372	1254		329			712	
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		0.26			0.22	0.26		0.01			0.61	

Intersection Summary

Area Type: Other

Cycle Length: 93

Actuated Cycle Length: 55.4

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.67

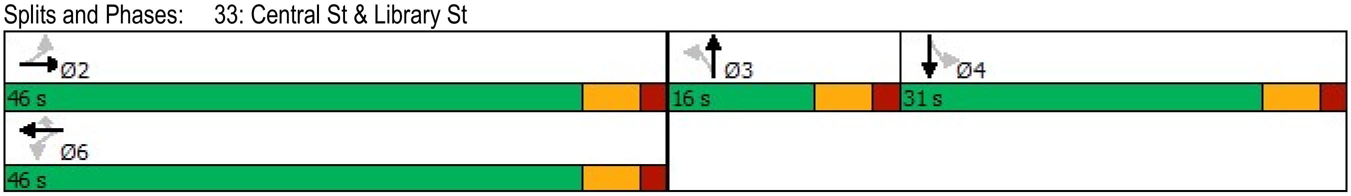
Intersection Signal Delay: 17.7 Intersection LOS: B

Intersection Capacity Utilization 56.6% ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 33: Central St & Library St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	299	1	3	8	191	0	3	3	61	2	4
Future Volume (vph)	18	299	1	3	8	191	0	3	3	61	2	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	16	16	12	16	12	12	16	12
Storage Length (ft)	0		0	0		250	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.932			0.992	
Flt Protected		0.997			0.988						0.956	
Satd. Flow (prot)	0	2072	0	0	2086	1743	0	1730	0	0	1793	0
Flt Permitted		0.997			0.988						0.956	
Satd. Flow (perm)	0	2072	0	0	2086	1743	0	1730	0	0	1793	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		439			888			261			628	
Travel Time (s)		10.0			20.2			5.9			14.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	30%	2%	2%	2%	2%	5%	2%	2%	30%	15%	2%	2%
Adj. Flow (vph)	20	325	1	3	9	208	0	3	3	66	2	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	346	0	0	12	208	0	6	0	0	72	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	0.85	1.00	1.00	0.85	0.85	1.00	0.85	1.00	1.00	0.85	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 42.0%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	0	0	0	977	0	1335
Future Volume (vph)	0	0	0	977	0	1335
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	0.88
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	0	0	3539	0	2787
Fl						
S						
Li						
Li						
T						
P						
A						
S						
L						
E						
L						
M						
Li						
C						
T						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Free			Free	Free	

NOT PART OF STUDY

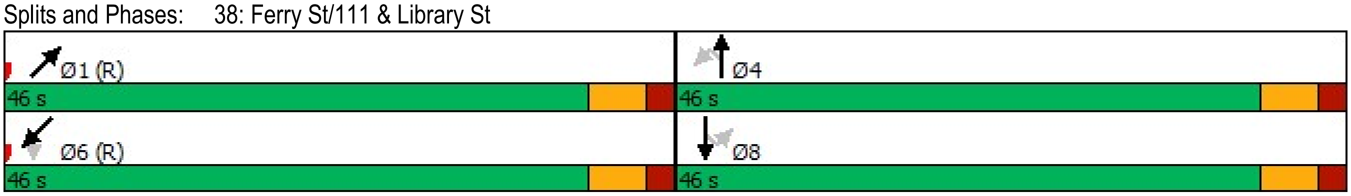
Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 50.0%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	63	254	4	24	371	3	0	489	13	1	283	11
Future Volume (vph)	63	254	4	24	371	3	0	489	13	1	283	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	175		0	0		0	200		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.998			0.999			0.997			0.994	
Flt Protected	0.950			0.950						0.950		
Satd. Flow (prot)	1770	1859	0	1770	1861	0	0	1857	0	1770	1852	0
Flt Permitted	0.262			0.451						0.369		
Satd. Flow (perm)	488	1859	0	840	1861	0	0	1857	0	687	1852	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1			1			2			3	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		342			444			371			1247	
Travel Time (s)		7.8			10.1			8.4			28.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	276	4	26	403	3	0	532	14	1	308	12
Shared Lane Traffic (%)												
Lane Group Flow (vph)	68	280	0	26	406	0	0	546	0	1	320	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
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			1			6	
Permitted Phases	4			8						6		
Detector Phase	4	4		8	8			1		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0			10.0		10.0	10.0	
Minimum Split (s)	31.0	31.0		31.0	31.0			31.0		31.0	31.0	
Total Split (s)	46.0	46.0		46.0	46.0			46.0		46.0	46.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%			50.0%		50.0%	50.0%	
Maximum Green (s)	40.0	40.0		40.0	40.0			40.0		40.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0			2.0		2.0	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-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Recall Mode	None	None		None	None			C-Min		C-Min	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Flash Dont Walk (s)	18.0	18.0		18.0	18.0			18.0		18.0	18.0	
Pedestrian Calls (#/hr)	0	0		0	0			0		0	0	
Act Effct Green (s)	26.3	26.3		26.3	26.3			53.7		53.7	53.7	
Actuated g/C Ratio	0.29	0.29		0.29	0.29			0.58		0.58	0.58	
v/c Ratio	0.49	0.53		0.11	0.76			0.50		0.00	0.30	
Control Delay	37.7	30.1		22.2	39.0			14.8		11.0	11.8	
Queue Delay	0.0	0.0		0.0	0.1			2.7		0.0	0.0	
Total Delay	37.7	30.1		22.2	39.1			17.4		11.0	11.8	
LOS	D	C		C	D			B		B	B	
Approach Delay		31.6			38.1			17.4			11.8	
Approach LOS		C			D			B			B	
Queue Length 50th (ft)	33	137		11	216			171		0	85	
Queue Length 95th (ft)	68	183		27	277			326		3	171	
Internal Link Dist (ft)		262			364			291			1167	
Turn Bay Length (ft)				175						200		
Base Capacity (vph)	212	808		365	809			1084		400	1082	
Starvation Cap Reductn	0	0		0	38			406		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	0.32	0.35		0.07	0.53			0.81		0.00	0.30	

Intersection Summary	
Area Type: Other	
Cycle Length: 92	
Actuated Cycle Length: 92	
Offset: 0 (0%), Referenced to phase 1:NET and 6:SWTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 24.7	Intersection LOS: C
Intersection Capacity Utilization 69.6%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 38: Ferry St/111 & Library St



Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NWR	NWR2	NEL	NET
Lane Configurations												
Traffic Volume (vph)	8	6	8	7	2	24	13	50	365	6	1	653
Future Volume (vph)	8	6	8	7	2	24	13	50	365	6	1	653
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12	16	12	12	12	12	12
Storage Length (ft)	0		0			0		0	0		0	
Storage Lanes	0		0			0		0	1		0	
Taper Length (ft)	25					25					25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.930					0.924		0.865			0.980
Flt Protected		0.987					0.986					
Satd. Flow (prot)	0	1882	0	0	0	0	1868	0	1611	0	0	1825
Flt Permitted		0.820					0.890					
Satd. Flow (perm)	0	1564	0	0	0	0	1686	0	1611	0	0	1825
Right Turn on Red				Yes				Yes		Yes		
Satd. Flow (RTOR)		8					39		86			
Link Speed (mph)		30					30					30
Link Distance (ft)		286					634					617
Travel Time (s)		6.5					14.4					14.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	9	7	9	8	2	26	14	54	397	7	1	710
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	33	0	0	0	0	96	0	404	0	0	832
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Right	Left	Left	Left	Right	Right	Right	Left	Left
Median Width(ft)		0					0					12
Link Offset(ft)		0					0					0
Crosswalk Width(ft)		16					16					16
Two way Left Turn Lane												
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	9	15	15		9	9	9	15	
Turn Type	Perm	NA			Perm	Perm	NA		Over		Perm	NA
Protected Phases		8					4		1			2
Permitted Phases	8				4	4					2	
Detector Phase	8	8			4	4	4		1		2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0	5.0	5.0		10.0		10.0	10.0
Minimum Split (s)	22.0	22.0			12.0	12.0	12.0		16.0		17.0	17.0
Total Split (s)	22.0	22.0			27.0	27.0	27.0		56.0		57.0	57.0
Total Split (%)	15.7%	15.7%			19.3%	19.3%	19.3%		40.0%		40.7%	40.7%
Maximum Green (s)	15.0	15.0			20.0	20.0	20.0		50.0		50.0	50.0
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0		4.0		4.0	4.0
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0		2.0		3.0	3.0
Lost Time Adjust (s)		0.0					0.0		0.0			0.0
Total Lost Time (s)		7.0					7.0		6.0			7.0
Lead/Lag									Lead		Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0		4.0	4.0

Lane Group	NER	SWL	SWT
Lane Configurations			
Traffic Volume (vph)	111	355	573
Future Volume (vph)	111	355	573
Ideal Flow (vphpl)	1900	1900	1900
Lane Width (ft)	12	12	12
Storage Length (ft)	0	0	
Storage Lanes	0	1	
Taper Length (ft)		25	
Lane Util. Factor	1.00	1.00	1.00
Frt			
Flt Protected		0.950	
Satd. Flow (prot)	0	1719	1810
Flt Permitted		0.950	
Satd. Flow (perm)	0	1719	1810
Right Turn on Red			
Satd. Flow (RTOR)			
Link Speed (mph)			30
Link Distance (ft)			845
Travel Time (s)			19.2
Peak Hour Factor	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	5%
Adj. Flow (vph)	121	386	623
Shared Lane Traffic (%)			
Lane Group Flow (vph)	0	386	623
Enter Blocked Intersection	No	No	No
Lane Alignment	Right	Left	Left
Median Width(ft)			12
Link Offset(ft)			0
Crosswalk Width(ft)			16
Two way Left Turn Lane			
Headway Factor	1.00	1.00	1.00
Turning Speed (mph)	9	15	
Turn Type		Prot	NA
Protected Phases		1	6
Permitted Phases			
Detector Phase		1	6
Switch Phase			
Minimum Initial (s)		10.0	10.0
Minimum Split (s)		16.0	16.0
Total Split (s)		56.0	105.0
Total Split (%)		40.0%	75.0%
Maximum Green (s)		50.0	99.0
Yellow Time (s)		4.0	4.0
All-Red Time (s)		2.0	2.0
Lost Time Adjust (s)		0.0	0.0
Total Lost Time (s)		6.0	6.0
Lead/Lag		Lead	
Lead-Lag Optimize?			
Vehicle Extension (s)		3.0	3.0

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NWR	NWR2	NEL	NET
Recall Mode	None	None			None	None	None		None		Min	Min
Walk Time (s)	7.0	7.0										
Flash Dont Walk (s)	8.0	8.0										
Pedestrian Calls (#/hr)	0	0										
Act Effct Green (s)		10.3					10.3		39.1			70.6
Actuated g/C Ratio		0.07					0.07		0.28			0.50
v/c Ratio		0.27					0.60		0.79			0.91
Control Delay		53.4					52.8		47.1			47.7
Queue Delay		0.0					0.0		1.5			46.4
Total Delay		53.4					52.8		48.6			94.1
LOS		D					D		D			F
Approach Delay		53.4					52.8					94.1
Approach LOS		D					D					F
Queue Length 50th (ft)		22					51		274			676
Queue Length 95th (ft)		56					108		363			#1153
Internal Link Dist (ft)		206					554					537
Turn Bay Length (ft)												
Base Capacity (vph)		230					274		630			919
Starvation Cap Reductn		0					0		95			162
Spillback Cap Reductn		0					0		0			0
Storage Cap Reductn		0					0		0			0
Reduced v/c Ratio		0.14					0.35		0.76			1.10

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 6:SWT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.91

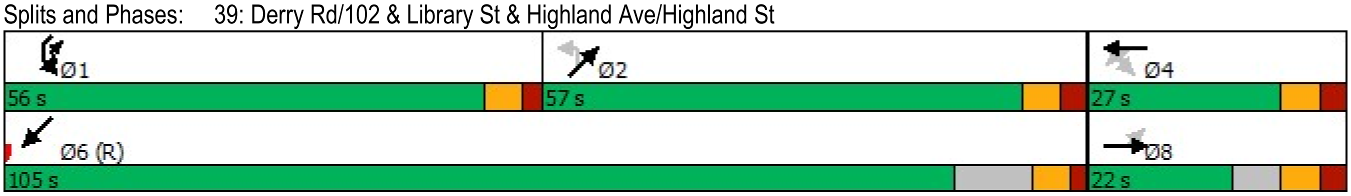
Intersection Signal Delay: 54.9 Intersection LOS: D

Intersection Capacity Utilization 95.0% ICU Level of Service F

Analysis Period (min) 15

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

Splits and Phases: 39: Derry Rd/102 & Library St & Highland Ave/Highland St



Lane Group	NER	SWL	SWT
Recall Mode		None	C-Min
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
Act Effct Green (s)		39.1	116.7
Actuated g/C Ratio		0.28	0.83
v/c Ratio		0.80	0.41
Control Delay		59.3	4.2
Queue Delay		0.0	0.0
Total Delay		59.3	4.2
LOS		E	A
Approach Delay			25.3
Approach LOS			C
Queue Length 50th (ft)		327	114
Queue Length 95th (ft)		406	199
Internal Link Dist (ft)			765
Turn Bay Length (ft)			
Base Capacity (vph)		613	1508
Starvation Cap Reductn		0	0
Spillback Cap Reductn		0	0
Storage Cap Reductn		0	0
Reduced v/c Ratio		0.63	0.41

Intersection Summary

Lane Group	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	73	668	218	14	17	422	546	9	0	449	0
Future Volume (vph)	73	668	218	14	17	422	546	9	0	449	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	12	13	12	12	12	12	12
Storage Length (ft)	150	300	0	0		0		0	0		0
Storage Lanes	1	1	1	1		1		0	0		0
Taper Length (ft)	25		25			25			25		
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850		0.850			0.998				
Flt Protected	0.950		0.950			0.950					
Satd. Flow (prot)	1719	2707	1719	1641	0	1776	1806	0	0	3438	0
Flt Permitted	0.950		0.180			0.950					
Satd. Flow (perm)	1719	2707	326	1641	0	1776	1806	0	0	3438	0
Right Turn on Red		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		118		128			1				
Link Speed (mph)	30		30				30			30	
Link Distance (ft)	617		345				426			371	
Travel Time (s)	14.0		7.8				9.7			8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	2%	5%	2%
Adj. Flow (vph)	79	726	237	15	18	459	593	10	0	488	0
Shared Lane Traffic (%)											
Lane Group Flow (vph)	79	726	237	33	0	459	603	0	0	488	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12		12				13			13	
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	0.92	1.00	0.96	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	9	15		9	15		9
Turn Type	Prot	pt+ov	Perm	Prot		Prot	NA			NA	
Protected Phases	4	4 5		3		5	2			6	
Permitted Phases			3								
Detector Phase	4	4 5	3	3		5	2			6	
Switch Phase											
Minimum Initial (s)	8.0		5.0	5.0		10.0	10.0			10.0	
Minimum Split (s)	24.5		24.5	24.5		24.5	24.5			24.5	
Total Split (s)	46.5		26.5	26.5		36.5	66.5			31.5	
Total Split (%)	33.0%		18.8%	18.8%		25.9%	47.2%			22.3%	
Maximum Green (s)	40.0		20.0	20.0		30.0	60.0			25.0	
Yellow Time (s)	4.0		4.0	4.0		4.0	4.0			4.0	
All-Red Time (s)	2.5		2.5	2.5		2.5	2.5			2.5	
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.5		6.5	6.5		6.5	6.5			6.5	
Lead/Lag	Lag		Lead	Lead		Lead				Lag	
Lead-Lag Optimize?											
Vehicle Extension (s)	1.5		1.5	1.5		1.5	1.5			1.5	

Lane Group	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Recall Mode	None		None	None		Min	C-Min			C-Min	
Walk Time (s)	7.0		7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	11.0		11.0	11.0		11.0	11.0			11.0	
Pedestrian Calls (#/hr)	0		0	0		0	0			0	
Act Effct Green (s)	27.4	76.5	22.2	22.2		42.6	71.9			22.8	
Actuated g/C Ratio	0.19	0.54	0.16	0.16		0.30	0.51			0.16	
v/c Ratio	0.24	0.48	4.65	0.09		0.86	0.66			0.88	
Control Delay	47.4	17.5	1706.2	0.5		63.4	30.7			75.2	
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0			1.1	
Total Delay	47.4	17.5	1706.2	0.5		63.4	30.7			76.3	
LOS	D	B	F	A		E	C			E	
Approach Delay	20.4		1497.7				44.8			76.3	
Approach LOS	C		F				D			E	
Queue Length 50th (ft)	62	188	~405	0		394	384			230	
Queue Length 95th (ft)	101	244	#554	0		#706	601			295	
Internal Link Dist (ft)	537		265				346			291	
Turn Bay Length (ft)	150	300									
Base Capacity (vph)	487	1506	51	366		536	920			609	
Starvation Cap Reductn	0	0	0	0		0	0			27	
Spillback Cap Reductn	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.16	0.48	4.65	0.09		0.86	0.66			0.84	

Intersection Summary

Area Type: Other

Cycle Length: 141

Actuated Cycle Length: 141

Offset: 0 (0%), Referenced to phase 2:NET and 6:SWT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 4.65

Intersection Signal Delay: 192.6 Intersection LOS: F

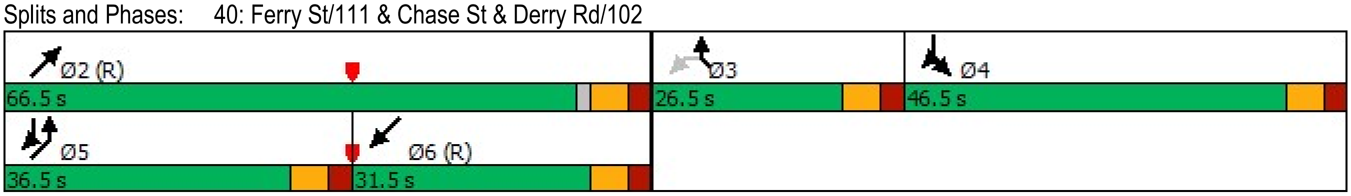
Intersection Capacity Utilization 76.2% ICU Level of Service D

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: 40: Ferry St/111 & Chase St & Derry Rd/102



Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	470	4	37	16	6	14	13	186	14	17	429	452
Future Volume (vph)	470	4	37	16	6	14	13	186	14	17	429	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	16	12	12	12	12	12	12	14
Storage Length (ft)	0		200	0		0	120		0	280		280
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.948			0.990				0.850
Flt Protected		0.953			0.979		0.950			0.950		
Satd. Flow (prot)	0	1775	1794	0	1959	0	1770	1844	0	1770	1863	1689
Flt Permitted		0.438			0.700		0.203			0.547		
Satd. Flow (perm)	0	816	1794	0	1401	0	378	1844	0	1019	1863	1689
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			111		15			3				491
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		882			126			314			2248	
Travel Time (s)		20.0			2.9			7.1			51.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	511	4	40	17	7	15	14	202	15	18	466	491
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	515	40	0	39	0	14	217	0	18	466	491
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		3			4		5	2		1	6	
Permitted Phases	3		3	4			2			6		6
Detector Phase	3	3	3	4	4		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	4.0	4.0		4.0	10.0		4.0	10.0	10.0
Minimum Split (s)	14.0	14.0	14.0	10.0	10.0		8.0	16.0		8.0	16.0	16.0
Total Split (s)	49.0	49.0	49.0	14.0	14.0		14.0	51.0		14.0	51.0	51.0
Total Split (%)	38.3%	38.3%	38.3%	10.9%	10.9%		10.9%	39.8%		10.9%	39.8%	39.8%
Maximum Green (s)	45.0	45.0	45.0	8.0	8.0		10.0	45.0		10.0	45.0	45.0
Yellow Time (s)	3.0	3.0	3.0	4.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0		1.0	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)		4.0	4.0		6.0		4.0	6.0		4.0	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Act Effct Green (s)		46.9	46.9		7.0		37.1	33.0		37.0	32.9	32.9
Actuated g/C Ratio		0.47	0.47		0.07		0.37	0.33		0.37	0.33	0.33
v/c Ratio		1.36	0.04		0.35		0.07	0.36		0.04	0.77	0.56
Control Delay		205.0	0.1		45.7		19.8	28.2		19.5	40.6	5.1
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		205.0	0.1		45.7		19.8	28.2		19.5	40.6	5.1
LOS		F	A		D		B	C		B	D	A
Approach Delay		190.2			45.7			27.7			22.3	
Approach LOS		F			D			C			C	
Queue Length 50th (ft)		~453	0		15		6	105		8	269	0
Queue Length 95th (ft)		#831	0		57		18	189		22	442	70
Internal Link Dist (ft)		802			46			234			2168	
Turn Bay Length (ft)			200				120			280		280
Base Capacity (vph)		379	893		129		287	859		464	866	1048
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		1.36	0.04		0.30		0.05	0.25		0.04	0.54	0.47

Intersection Summary

Area Type: Other

Cycle Length: 128

Actuated Cycle Length: 100.8

Natural Cycle: 150

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.36

Intersection Signal Delay: 75.3 Intersection LOS: E

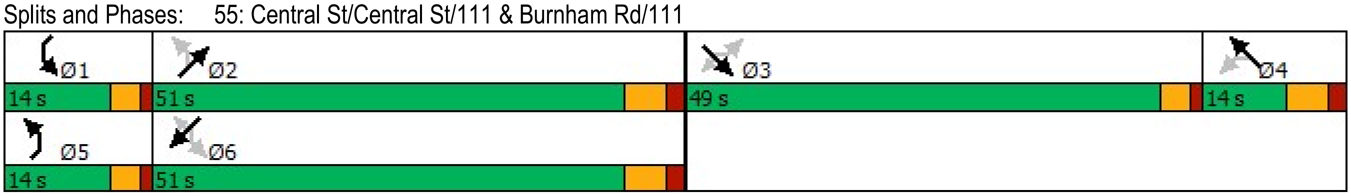
Intersection Capacity Utilization 63.8% ICU Level of Service B

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: 55: Central St/Central St/111 & Burnham Rd/111



Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	35	22	607	15	11	268	134	28	164	165	3	6
Future Volume (vph)	35	22	607	15	11	268	134	28	164	165	3	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	12	12	12	16	12	12	16	12
Storage Length (ft)		300		300	300		300		140		300	
Storage Lanes		1		1	1		2		1		0	
Taper Length (ft)		25			25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850			0.850	0.850		0.992		
Flt Protected		0.950			0.950				0.950			
Satd. Flow (prot)	0	1719	1652	1641	1770	1810	1538	1743	1719	1846	0	0
Flt Permitted		0.265			0.833				0.407			
Satd. Flow (perm)	0	480	1652	1641	1552	1810	1538	1743	736	1846	0	0
Right Turn on Red				Yes				Yes				Yes
Satd. Flow (RTOR)				132				132		1		
Link Speed (mph)			30			30				30		
Link Distance (ft)			2248			4120				755		
Travel Time (s)			51.1			93.6				17.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	15%	5%	2%	5%	5%	5%	5%	2%	2%	5%
Adj. Flow (vph)	38	24	660	16	12	291	146	30	178	179	3	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	62	660	16	12	291	146	30	178	189	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right	Left	Left	Right	Right
Median Width(ft)			12			12				12		
Link Offset(ft)			0			0				0		
Crosswalk Width(ft)			16			16				16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.85	1.00	1.00	0.85	1.00
Turning Speed (mph)	15	15		9	15		9	9	15		9	9
Turn Type	custom	Prot	NA	Free	custom	NA	Perm	Free	pm+pt	NA		
Protected Phases		1	6			2			7	4		
Permitted Phases	1			Free	5		2	Free	4			
Detector Phase	1	1	6		5	2	2		7	4		
Switch Phase												
Minimum Initial (s)	4.0	4.0	15.0		4.0	15.0	15.0		4.0	10.0		
Minimum Split (s)	8.0	8.0	21.0		8.0	21.0	21.0		8.0	16.0		
Total Split (s)	19.0	19.0	66.0		19.0	66.0	66.0		19.0	51.0		
Total Split (%)	10.9%	10.9%	37.9%		10.9%	37.9%	37.9%		10.9%	29.3%		
Maximum Green (s)	15.0	15.0	60.0		15.0	60.0	60.0		15.0	45.0		
Yellow Time (s)	3.0	3.0	4.0		3.0	4.0	4.0		3.0	4.0		
All-Red Time (s)	1.0	1.0	2.0		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		
Total Lost Time (s)		4.0	6.0		4.0	6.0	6.0		4.0	6.0		
Lead/Lag	Lead	Lead	Lag		Lead	Lag	Lag		Lag			
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	3.0		2.0	3.0	3.0		2.0	3.0		

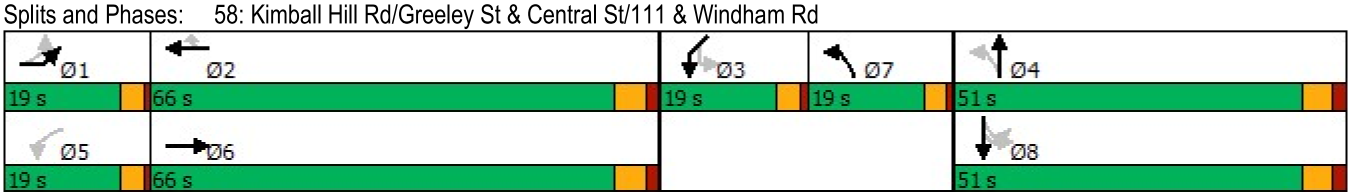
Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Traffic Volume (vph)	8	110	178	78	40	39	14	15
Future Volume (vph)	8	110	178	78	40	39	14	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	12	12	12
Storage Length (ft)		0		0		0	0	
Storage Lanes		0		0		1	0	
Taper Length (ft)		25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.972			0.964		
Flt Protected			0.984			0.965		
Satd. Flow (prot)	0	0	1961	0	0	1733	0	0
Flt Permitted			0.685			0.965		
Satd. Flow (perm)	0	0	1365	0	0	1733	0	0
Right Turn on Red				No				No
Satd. Flow (RTOR)								
Link Speed (mph)			30			30		
Link Distance (ft)			869			736		
Travel Time (s)			19.8			16.7		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	9	120	193	85	43	42	15	16
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	407	0	0	116	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right
Median Width(ft)			12			12		
Link Offset(ft)			0			0		
Crosswalk Width(ft)			16			16		
Two way Left Turn Lane								
Headway Factor	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	15	15	9	9
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			8			3		
Permitted Phases	8	8			3			
Detector Phase	8	8	8		3	3		
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0		4.0	4.0		
Minimum Split (s)	16.0	16.0	16.0		8.0	8.0		
Total Split (s)	51.0	51.0	51.0		19.0	19.0		
Total Split (%)	29.3%	29.3%	29.3%		10.9%	10.9%		
Maximum Green (s)	45.0	45.0	45.0		15.0	15.0		
Yellow Time (s)	4.0	4.0	4.0		3.0	3.0		
All-Red Time (s)	2.0	2.0	2.0		1.0	1.0		
Lost Time Adjust (s)			0.0			0.0		
Total Lost Time (s)			6.0			4.0		
Lead/Lag					Lead	Lead		
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0		

Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Recall Mode	None	None	Min		None	Min	Min		None	None		
Act Effct Green (s)		15.1	60.3	158.7	8.7	47.5	47.5	158.7	60.5	45.2		
Actuated g/C Ratio		0.10	0.38	1.00	0.05	0.30	0.30	1.00	0.38	0.28		
v/c Ratio		1.38	1.05	0.01	0.14	0.54	0.32	0.02	0.49	0.36		
Control Delay		312.9	97.1	0.0	77.0	50.5	45.2	0.0	38.2	49.4		
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay		312.9	97.1	0.0	77.0	50.5	45.2	0.0	38.2	49.4		
LOS		F	F	A	E	D	D	A	D	D		
Approach Delay			113.1			46.4				44.0		
Approach LOS			F			D				D		
Queue Length 50th (ft)		~81	~711	0	12	259	121	0	114	151		
Queue Length 95th (ft)		#209	#1139	0	37	357	185	0	207	261		
Internal Link Dist (ft)			2168			4040				675		
Turn Bay Length (ft)		300		300	300		300	300	140			
Base Capacity (vph)		45	627	1641	147	688	584	1743	380	526		
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		1.38	1.05	0.01	0.08	0.42	0.25	0.02	0.47	0.36		

Intersection Summary

Area Type: Other
Cycle Length: 174
Actuated Cycle Length: 158.7
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.38
Intersection Signal Delay: 85.4 Intersection LOS: F
Intersection Capacity Utilization 93.0% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 58: Kimball Hill Rd/Greeley St & Central St/111 & Windham Rd



Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Recall Mode	None	None	None		None	None		
Act Effct Green (s)			45.2			13.4		
Actuated g/C Ratio			0.28			0.08		
v/c Ratio			1.05			0.79		
Control Delay			112.1			106.5		
Queue Delay			0.0			0.0		
Total Delay			112.1			106.5		
LOS			F			F		
Approach Delay			112.1			106.5		
Approach LOS			F			F		
Queue Length 50th (ft)			~437			116		
Queue Length 95th (ft)			#769			#242		
Internal Link Dist (ft)			789			656		
Turn Bay Length (ft)								
Base Capacity (vph)			389			164		
Starvation Cap Reductn			0			0		
Spillback Cap Reductn			0			0		
Storage Cap Reductn			0			0		
Reduced v/c Ratio			1.05			0.71		

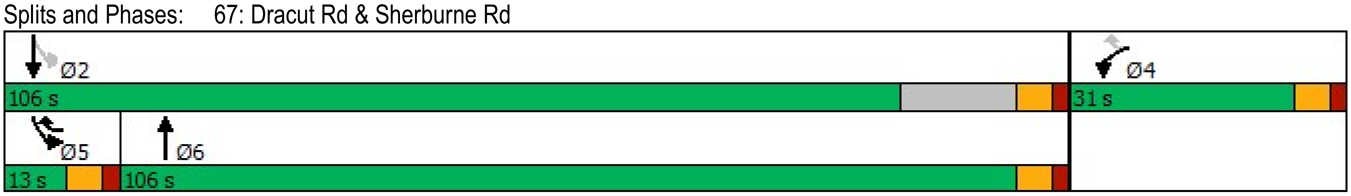
Intersection Summary

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	85	309	316	48	159	134
Future Volume (vph)	85	309	316	48	159	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	150		0	150	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.982			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1570	1538	1777	0	1570	1863
Flt Permitted	0.950				0.323	
Satd. Flow (perm)	1570	1538	1777	0	534	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		336	11			
Link Speed (mph)	30		30			30
Link Distance (ft)	832		787			870
Travel Time (s)	18.9		17.9			19.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	5%	5%	5%	15%	2%
Adj. Flow (vph)	92	336	343	52	173	146
Shared Lane Traffic (%)						
Lane Group Flow (vph)	92	336	395	0	173	146
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pm+ov	NA		pm+pt	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4			2	
Detector Phase	4	5	6		5	2
Switch Phase						
Minimum Initial (s)	5.0	3.0	10.0		3.0	10.0
Minimum Split (s)	11.0	9.0	16.0		9.0	16.0
Total Split (s)	31.0	13.0	106.0		13.0	106.0
Total Split (%)	20.7%	8.7%	70.7%		8.7%	70.7%
Maximum Green (s)	25.0	7.0	100.0		7.0	100.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5		1.5	1.5
Recall Mode	None	None	Min		None	Min

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Act Effct Green (s)	7.1	17.0	15.7		29.2	31.2
Actuated g/C Ratio	0.16	0.37	0.35		0.64	0.69
v/c Ratio	0.38	0.43	0.64		0.34	0.11
Control Delay	24.8	3.6	18.3		6.4	4.6
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	24.8	3.6	18.3		6.4	4.6
LOS	C	A	B		A	A
Approach Delay	8.2		18.3			5.5
Approach LOS	A		B			A
Queue Length 50th (ft)	23	0	88		17	14
Queue Length 95th (ft)	65	42	172		42	35
Internal Link Dist (ft)	752		707			790
Turn Bay Length (ft)		150			150	
Base Capacity (vph)	916	794	1777		512	1863
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	0.10	0.42	0.22		0.34	0.08

Intersection Summary	
Area Type: Other	
Cycle Length: 150	
Actuated Cycle Length: 45.5	
Natural Cycle: 45	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 10.9	Intersection LOS: B
Intersection Capacity Utilization 48.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 67: Dracut Rd & Sherburne Rd



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	104	205	68	133	96	24
Future Volume (vph)	104	205	68	133	96	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12
Storage Length (ft)		0	180		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.910				0.973	
Flt Protected			0.950		0.962	
Satd. Flow (prot)	1549	0	1719	1652	1708	0
Flt Permitted			0.950		0.962	
Satd. Flow (perm)	1549	0	1719	1652	1708	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1417			420	606	
Travel Time (s)	32.2			9.5	13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	15%	5%	15%	15%	30%
Adj. Flow (vph)	113	223	74	145	104	26
Shared Lane Traffic (%)						
Lane Group Flow (vph)	336	0	74	145	130	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	16	
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	0.85	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 38.6%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	59	2	261	236	8	187
Future Volume (vph)	59	2	261	236	8	187
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	16	12
Storage Length (ft)		0	80		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.996				0.871	
Flt Protected			0.950		0.998	
Satd. Flow (prot)	1639	0	1719	1872	1775	0
Flt Permitted			0.950		0.998	
Satd. Flow (perm)	1639	0	1719	1872	1775	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	2748			314	1025	
Travel Time (s)	62.5			7.1	23.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	30%	5%	15%	15%	5%
Adj. Flow (vph)	64	2	284	257	9	203
Shared Lane Traffic (%)						
Lane Group Flow (vph)	66	0	284	257	212	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	16	
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	0.85	0.85	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

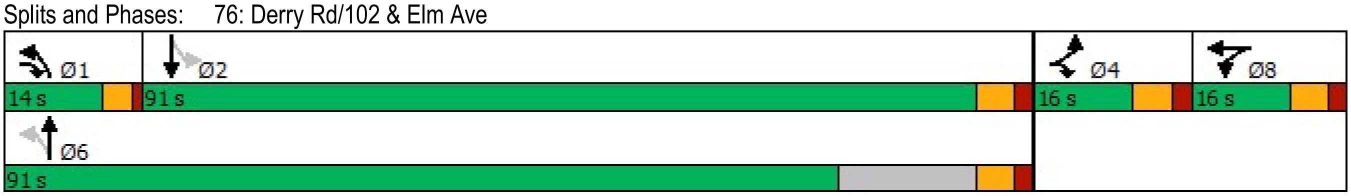
Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 39.8%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	0	292	1	0	0	143	646	0	0	781	12
Future Volume (vph)	41	0	292	1	0	0	143	646	0	0	781	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	12	12	12	12	12	15	12
Storage Length (ft)	130		0	0		0	465		0	0		0
Storage Lanes	1		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850								0.998	
Flt Protected	0.950				0.950		0.950					
Satd. Flow (prot)	1719	0	1538	0	1770	0	1770	1863	0	0	1986	0
Flt Permitted	0.950				0.950		0.122					
Satd. Flow (perm)	1719	0	1538	0	1770	0	227	1863	0	0	1986	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			275								1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		468			79			2433			1216	
Travel Time (s)		10.6			1.8			55.3			27.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	5%	2%	2%	2%	2%	2%	2%	2%	5%	5%
Adj. Flow (vph)	45	0	317	1	0	0	155	702	0	0	849	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	45	0	317	0	1	0	155	702	0	0	862	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	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot		pt+ov	Split	NA		pm+pt	NA			NA	
Protected Phases	4		4 1	8	8		1	6			2	
Permitted Phases	4						6			2		
Detector Phase	4		4 1	8	8		1	6		2	2	
Switch Phase												
Minimum Initial (s)	3.0			5.0	5.0		3.0	10.0		10.0	10.0	
Minimum Split (s)	9.0			11.0	11.0		7.0	16.0		16.0	16.0	
Total Split (s)	16.0			16.0	16.0		14.0	91.0		91.0	91.0	
Total Split (%)	11.7%			11.7%	11.7%		10.2%	66.4%		66.4%	66.4%	
Maximum Green (s)	10.0			10.0	10.0		10.0	85.0		85.0	85.0	
Yellow Time (s)	4.0			4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	2.0			2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0				0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0				6.0		4.0	6.0			6.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5			0.4	0.4		2.0	5.0		5.0	5.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None			None	None		None	Min		Min	Min	
Act Effct Green (s)	7.8		18.2		5.4		59.3	57.1			45.9	
Actuated g/C Ratio	0.10		0.23		0.07		0.75	0.72			0.58	
v/c Ratio	0.27		0.56		0.01		0.51	0.52			0.75	
Control Delay	45.2		10.9		49.0		10.1	6.7			17.3	
Queue Delay	0.0		0.0		0.0		0.0	0.0			0.0	
Total Delay	45.2		10.9		49.0		10.1	6.7			17.3	
LOS	D		B		D		B	A			B	
Approach Delay		15.2			49.0			7.4			17.3	
Approach LOS		B			D			A			B	
Queue Length 50th (ft)	19		14		0		13	104			247	
Queue Length 95th (ft)	75		107		7		56	289			585	
Internal Link Dist (ft)		388			1			2353			1136	
Turn Bay Length (ft)	130						465					
Base Capacity (vph)	235		585		242		380	1787			1860	
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	0.19		0.54		0.00		0.41	0.39			0.46	

Intersection Summary	
Area Type: Other	
Cycle Length: 137	
Actuated Cycle Length: 79.3	
Natural Cycle: 75	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.75	
Intersection Signal Delay: 12.9	Intersection LOS: B
Intersection Capacity Utilization 95.0%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 76: Derry Rd/102 & Elm Ave

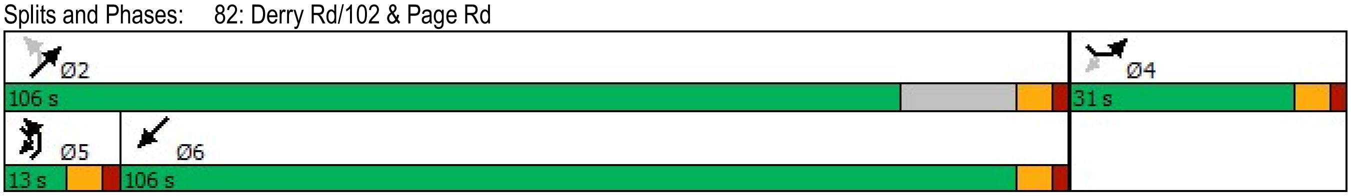


Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	102	71	27	444	486	52
Future Volume (vph)	102	71	27	444	486	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	150	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.987	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1719	1583	1770	1652	1770	0
Flt Permitted	0.950		0.256			
Satd. Flow (perm)	1719	1583	477	1652	1770	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		77			8	
Link Speed (mph)	30			30	30	
Link Distance (ft)	420			2236	3657	
Travel Time (s)	9.5			50.8	83.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	15%	5%	15%
Adj. Flow (vph)	111	77	29	483	528	57
Shared Lane Traffic (%)						
Lane Group Flow (vph)	111	77	29	483	585	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Turn Type	Prot	pm+ov	pm+pt	NA	NA	
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			
Detector Phase	4	5	5	2	6	
Switch Phase						
Minimum Initial (s)	5.0	3.0	3.0	10.0	10.0	
Minimum Split (s)	11.0	9.0	9.0	16.0	16.0	
Total Split (s)	31.0	13.0	13.0	106.0	106.0	
Total Split (%)	20.7%	8.7%	8.7%	70.7%	70.7%	
Maximum Green (s)	25.0	7.0	7.0	100.0	100.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	
Lead/Lag		Lead	Lead		Lag	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	
Recall Mode	None	None	None	Min	Min	

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Act Effct Green (s)	8.1	19.3	37.0	37.0	28.3	
Actuated g/C Ratio	0.14	0.34	0.64	0.64	0.49	
v/c Ratio	0.46	0.13	0.07	0.45	0.67	
Control Delay	31.3	5.4	4.2	6.8	16.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	31.3	5.4	4.2	6.8	16.7	
LOS	C	A	A	A	B	
Approach Delay	20.7			6.7	16.7	
Approach LOS	C			A	B	
Queue Length 50th (ft)	34	0	3	66	148	
Queue Length 95th (ft)	93	27	11	138	287	
Internal Link Dist (ft)	340			2156	3577	
Turn Bay Length (ft)		150	150			
Base Capacity (vph)	768	640	468	1652	1770	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.14	0.12	0.06	0.29	0.33	

Intersection Summary	
Area Type: Other	
Cycle Length: 150	
Actuated Cycle Length: 57.5	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 13.3	Intersection LOS: B
Intersection Capacity Utilization 44.4%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 82: Derry Rd/102 & Page Rd



A.6 Future 2045 Model - PM Peak (53 pages)

Reference Table – Table 6 # to # in SYNCRHO Reports

Table 6 #	# in SYNCHRO Reports	Intersection / Direction TOWARD
1	**40**	111-102-3A (Ferry & Chase)
2	**38**	Library & Ferry
3	**39**	Library and Highland
4	**55**	Burnham and Central
5	**58**	Central-Kimball-Greeley (Rt.111 & Greeley)
6	**76**	Derry and 102 (Route 102 & Elm Ave)
7	**82**	NH 102/Page Rd
8	**34**	NH 3A Central St/Chase St
9	**33**	Central and Library
10	**29**	Lowell and Central
11	**25**	Lowell and Pelham
12	**22**	Lowell and Executive
13	**10**	Lowell-Hampshire-Oblate
14	**1**	Lowell & Wason
16	**4**	NH 3A Lowell Rd/Walmart Blvd
17	**5**	NH 3A Lowell Rd/Rena Ave
18	**7**	NH 3A Lowell Rd/Dracut Rd/Steele Rd
19	**67**	Dracut Rd/Sherburne Rd
20	**70**	Kimball Hill Rd/Bush Hill Rd
21	**73**	Central St/Belknap Rd
22	**24**	Lowell & Fox Hollow Dr
23	**27**	Lowell & Birch St
15_com	**2**	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined
15M	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section
15N	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section
15S	-	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	76	297	314	34	38	209	875	529	60	942	32
Future Volume (vph)	48	76	297	314	34	38	209	875	529	60	942	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	14	12	12	12	12	12	12
Storage Length (ft)	0		0	0		200	650		350	200		0
Storage Lanes	0		1	1		1	1		2	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.88	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.981		0.950	0.961		0.950			0.950		
Satd. Flow (prot)	0	1621	1592	1491	1508	1498	1719	3438	2707	1570	3139	1404
Flt Permitted		0.981		0.950	0.961		0.950			0.950		
Satd. Flow (perm)	0	1621	1592	1491	1508	1498	1719	3438	2707	1570	3139	1404
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			323			115			575			167
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		573			432			1014			1071	
Travel Time (s)		13.0			9.8			23.0			24.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	15%	15%	15%	5%	5%	5%	15%	15%	15%
Adj. Flow (vph)	52	83	323	341	37	41	227	951	575	65	1024	35
Shared Lane Traffic (%)				45%								
Lane Group Flow (vph)	0	135	323	188	190	41	227	951	575	65	1024	35
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	0.85	1.00	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Split	NA	pm+ov	Split	NA	pt+ov	Prot	NA	pt+ov	Prot	NA	Perm
Protected Phases	3	3	1	4	4	4 5	1	6	6 4	5	2	
Permitted Phases			3									2
Detector Phase	3	3	1	4	4	4 5	1	6	6 4	5	2	2
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	10.0		5.0	10.0	10.0
Minimum Split (s)	11.0	11.0	13.0	12.0	12.0		13.0	16.0		13.0	16.0	16.0
Total Split (s)	40.0	40.0	30.0	30.0	30.0		30.0	65.0		15.0	50.0	50.0
Total Split (%)	21.1%	21.1%	15.8%	15.8%	15.8%		15.8%	34.2%		7.9%	26.3%	26.3%
Maximum Green (s)	34.0	34.0	22.0	23.0	23.0		22.0	59.0		7.0	44.0	44.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	4.0	3.0	3.0		4.0	2.0		4.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.0	8.0	7.0	7.0		8.0	6.0		8.0	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0

Lane Group	Ø9
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
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)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	5.0
Minimum Split (s)	40.0
Total Split (s)	40.0
Total Split (%)	21%
Maximum Green (s)	37.0
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)		16.2	36.2	23.0	23.0	38.0	22.0	59.0	83.1	7.0	44.0	44.0
Actuated g/C Ratio		0.12	0.27	0.17	0.17	0.29	0.17	0.45	0.63	0.05	0.33	0.33
v/c Ratio		0.68	0.48	0.73	0.73	0.08	0.79	0.62	0.30	0.78	0.98	0.06
Control Delay		72.9	4.4	69.4	69.1	0.3	74.1	30.7	0.9	114.7	67.4	0.2
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		72.9	4.4	69.4	69.1	0.3	74.1	30.7	0.9	114.7	67.4	0.2
LOS		E	A	E	E	A	E	C	A	F	E	A
Approach Delay		24.6			62.5			26.5			68.1	
Approach LOS		C			E			C			E	
Queue Length 50th (ft)		113	0	162	164	0	189	322	0	56	456	0
Queue Length 95th (ft)		184	40	#291	#292	0	#339	426	14	#149	#651	0
Internal Link Dist (ft)		493			352			934			991	
Turn Bay Length (ft)						200	650		350	200		
Base Capacity (vph)		416	670	259	262	512	286	1534	1913	83	1044	578
Starvation Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.32	0.48	0.73	0.73	0.08	0.79	0.62	0.30	0.78	0.98	0.06

Intersection Summary

Area Type: Other

Cycle Length: 190

Actuated Cycle Length: 132.3

Natural Cycle: 145

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 42.8 Intersection LOS: D

Intersection Capacity Utilization 71.5% 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: Lowell Rd/3A & Flagstone Dr/Wason Rd

Lane Group	Ø9
Recall Mode	None
Walk Time (s)	7.0
Flash Dont Walk (s)	30.0
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

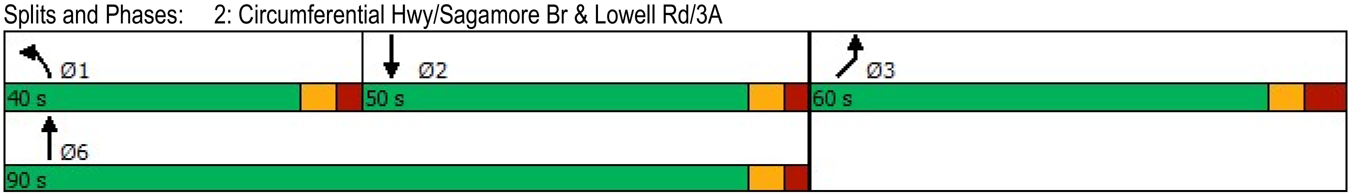
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	NEL	NER
Lane Configurations									
Traffic Volume (vph)	0	0	941	530	751	0	1445	1316	771
Future Volume (vph)	0	0	941	530	751	0	1445	1316	771
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	14	12
Storage Length (ft)	0	0	470			450		0	0
Storage Lanes	0	0	2			1		2	1
Taper Length (ft)	25		25					25	
Lane Util. Factor	1.00	1.00	0.94	0.95	0.95	1.00	1.00	0.97	1.00
Frt							0.850		0.850
Flt Protected			0.950					0.950	
Satd. Flow (prot)	0	0	4848	3139	3539	0	1538	3557	1583
Flt Permitted			0.950					0.950	
Satd. Flow (perm)	0	0	4848	3139	3539	0	1538	3557	1583
Right Turn on Red							Yes		Yes
Satd. Flow (RTOR)							808		300
Link Speed (mph)	55			30	30			42	
Link Distance (ft)	1050			613	1014			974	
Travel Time (s)	13.0			13.9	23.0			15.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	15%	2%	2%	5%	5%	2%
Adj. Flow (vph)	0	0	1023	576	816	0	1571	1430	838
Shared Lane Traffic (%)									
Lane Group Flow (vph)	0	0	1023	576	816	0	1571	1430	838
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right	Right	Left	Right
Median Width(ft)	0			36	36			28	
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	0.92	1.00
Turning Speed (mph)	15	9	15			9	9	15	9
Turn Type			Prot	NA	NA		Free	Prot	Free
Protected Phases			1	6	2			3	
Permitted Phases							Free		Free
Detector Phase			1	6	2			3	
Switch Phase									
Minimum Initial (s)			7.0	10.0	10.0			10.0	
Minimum Split (s)			14.0	17.0	17.0			19.0	
Total Split (s)			40.0	90.0	50.0			60.0	
Total Split (%)			26.7%	60.0%	33.3%			40.0%	
Maximum Green (s)			33.0	83.0	43.0			51.0	
Yellow Time (s)			4.0	4.0	4.0			4.0	
All-Red Time (s)			3.0	3.0	3.0			5.0	
Lost Time Adjust (s)			0.0	0.0	0.0			0.0	
Total Lost Time (s)			7.0	7.0	7.0			9.0	
Lead/Lag			Lead		Lag				
Lead-Lag Optimize?									
Vehicle Extension (s)			4.0	4.0	4.0			4.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR	SBR2	NEL	NER
Recall Mode			None	Min	Min			None	
Act Effct Green (s)			33.0	79.9	39.9		147.0	51.0	147.0
Actuated g/C Ratio			0.22	0.54	0.27		1.00	0.35	1.00
v/c Ratio			0.94	0.34	0.85		1.02	1.16	0.53
Control Delay			72.2	19.3	60.1		31.9	123.3	1.3
Queue Delay			0.0	0.0	0.0		0.0	0.0	0.0
Total Delay			72.2	19.3	60.1		31.9	123.3	1.3
LOS			E	B	E		C	F	A
Approach Delay				53.1	41.5			78.2	
Approach LOS				D	D			E	
Queue Length 50th (ft)			354	157	391		~67	~862	0
Queue Length 95th (ft)			#445	197	473		#331	#1001	0
Internal Link Dist (ft)	970			533	934			894	
Turn Bay Length (ft)			470				450		
Base Capacity (vph)			1089	1773	1035		1538	1235	1583
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			0.94	0.32	0.79		1.02	1.16	0.53

Intersection Summary	
Area Type: Other	
Cycle Length: 150	
Actuated Cycle Length: 147	
Natural Cycle: 140	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.16	
Intersection Signal Delay: 57.8	Intersection LOS: E
Intersection Capacity Utilization 95.4%	ICU Level of Service F
Analysis Period (min) 15	

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

Splits and Phases: 2: Circumferential Hwy/Sagamore Br & Lowell Rd/3A



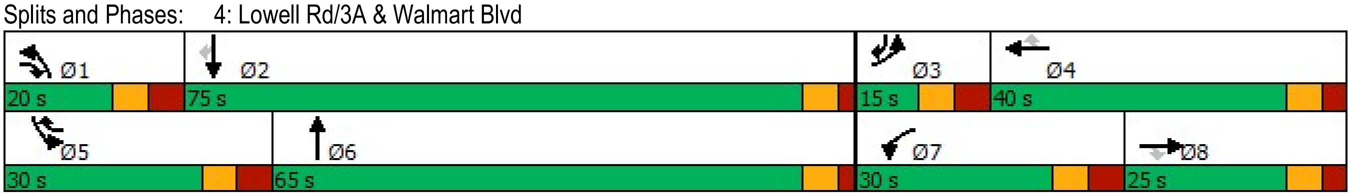
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	167	23	70	73	17	196	76	985	55	200	965	176
Future Volume (vph)	167	23	70	73	17	196	76	985	55	200	965	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	425		0	400		0
Storage Lanes	2		1	2		1	3		0	2		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	0.97	1.00	1.00	0.97	0.91	0.91	0.97	0.91	1.00
Frt			0.850			0.850		0.992				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3335	1863	1583	3433	1863	1583	3433	5045	0	3433	5085	1583
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3335	1863	1583	3433	1863	1583	3433	5045	0	3433	5085	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			196			80		7				191
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		304			245			982			569	
Travel Time (s)		6.9			5.6			22.3			12.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	182	25	76	79	18	213	83	1071	60	217	1049	191
Shared Lane Traffic (%)												
Lane Group Flow (vph)	182	25	76	79	18	213	83	1131	0	217	1049	191
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)		24			24			24			24	
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
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov
Protected Phases	3	8	1	7	4	5	1	6		5	2	3
Permitted Phases			8			4						2
Detector Phase	3	8	1	7	4	5	1	6		5	2	3
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0		5.0	10.0	5.0
Minimum Split (s)	13.0	12.0	13.0	13.0	12.0	13.0	13.0	16.0		13.0	16.0	13.0
Total Split (s)	15.0	25.0	20.0	30.0	40.0	30.0	20.0	65.0		30.0	75.0	15.0
Total Split (%)	10.0%	16.7%	13.3%	20.0%	26.7%	20.0%	13.3%	43.3%		20.0%	50.0%	10.0%
Maximum Green (s)	7.0	18.0	12.0	22.0	33.0	22.0	12.0	59.0		22.0	69.0	7.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	4.0	3.0	4.0	4.0	3.0	4.0	4.0	2.0		4.0	2.0	4.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	8.0	7.0	8.0	8.0	7.0	8.0	8.0	6.0		8.0	6.0	8.0
Lead/Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0		4.0	6.0	4.0
Recall Mode	None	None	None	None	None	None	None	Min		None	Min	None

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	10.8	8.8	22.0	9.2	9.4	21.0	9.4	45.5		14.4	50.5	67.6
Actuated g/C Ratio	0.11	0.09	0.22	0.09	0.09	0.21	0.09	0.45		0.14	0.50	0.67
v/c Ratio	0.51	0.15	0.15	0.25	0.10	0.54	0.26	0.50		0.44	0.41	0.17
Control Delay	52.8	53.9	0.6	51.4	50.6	27.2	51.3	21.0		46.3	16.8	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay	52.8	53.9	0.6	51.4	50.6	27.2	51.3	21.0		46.3	16.8	1.8
LOS	D	D	A	D	D	C	D	C		D	B	A
Approach Delay		38.9			34.8			23.1			19.2	
Approach LOS		D			C			C			B	
Queue Length 50th (ft)	55	17	0	27	12	89	28	209		72	165	0
Queue Length 95th (ft)	#159	50	0	58	38	155	60	275		126	224	28
Internal Link Dist (ft)		224			165			902			489	
Turn Bay Length (ft)							425			400		
Base Capacity (vph)	357	353	545	797	648	527	434	3143		797	3690	1126
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	0
Reduced v/c Ratio	0.51	0.07	0.14	0.10	0.03	0.40	0.19	0.36		0.27	0.28	0.17

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 100.6
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.54
Intersection Signal Delay: 23.8 Intersection LOS: C
Intersection Capacity Utilization 54.9% 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: 4: Lowell Rd/3A & Walmart Blvd

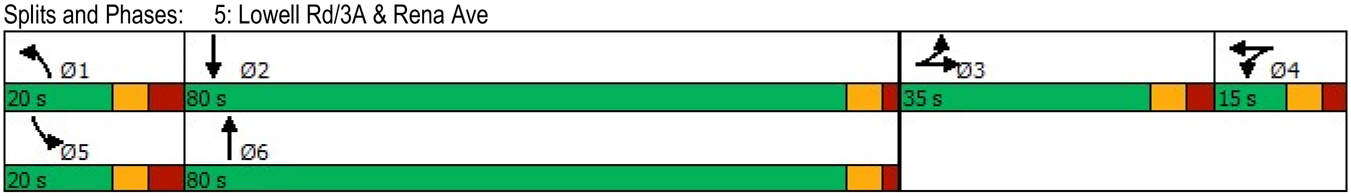


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	1	24	3	1	16	23	1033	10	30	1072	9
Future Volume (vph)	92	1	24	3	1	16	23	1033	10	30	1072	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12	12	12	12	12	12	12
Storage Length (ft)	200		200	0		0	350		0	425		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.91	0.91
Frt		0.856			0.891			0.999			0.999	
Flt Protected	0.950				0.993		0.950			0.950		
Satd. Flow (prot)	3335	1595	0	0	1868	0	1770	3536	0	1770	5039	0
Flt Permitted	0.950				0.993		0.950			0.950		
Satd. Flow (perm)	3335	1595	0	0	1868	0	1770	3536	0	1770	5039	0
Right Turn on Red			Yes			No			Yes			Yes
Satd. Flow (RTOR)		26						1			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		301			325			1749			982	
Travel Time (s)		6.8			7.4			39.8			22.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	100%
Adj. Flow (vph)	100	1	26	3	1	17	25	1123	11	33	1165	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	27	0	0	21	0	25	1134	0	33	1175	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)		24			24			36			36	
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	0.85	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
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases												
Detector Phase	3	3		4	4		1	6		5	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	10.0		5.0	10.0	
Minimum Split (s)	12.0	12.0		12.0	12.0		13.0	16.0		13.0	16.0	
Total Split (s)	35.0	35.0		15.0	15.0		20.0	80.0		20.0	80.0	
Total Split (%)	23.3%	23.3%		10.0%	10.0%		13.3%	53.3%		13.3%	53.3%	
Maximum Green (s)	28.0	28.0		8.0	8.0		12.0	74.0		12.0	74.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	3.0	3.0		3.0	3.0		4.0	2.0		4.0	2.0	
Lost Time Adjust (s)	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	7.0	7.0			7.0		8.0	6.0		8.0	6.0	
Lead/Lag	Lead	Lead		Lag	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)	10.0	10.0			7.9		8.5	46.4		8.9	46.7	
Actuated g/C Ratio	0.12	0.12			0.09		0.10	0.55		0.11	0.56	
v/c Ratio	0.25	0.13			0.12		0.14	0.58		0.18	0.42	
Control Delay	42.8	20.0			48.4		47.0	16.9		46.3	13.7	
Queue Delay	0.0	0.0			0.0		0.0	0.0		0.0	0.0	
Total Delay	42.8	20.0			48.4		47.0	16.9		46.3	13.7	
LOS	D	B			D		D	B		D	B	
Approach Delay		37.9			48.4			17.6			14.6	
Approach LOS		D			D			B			B	
Queue Length 50th (ft)	24	0			10		12	200		16	126	
Queue Length 95th (ft)	65	30			43		47	402		58	245	
Internal Link Dist (ft)		221			245			1669			902	
Turn Bay Length (ft)	200						350			425		
Base Capacity (vph)	1222	601			195		277	2986		277	4256	
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	0.08	0.04			0.11		0.09	0.38		0.12	0.28	

Intersection Summary	
Area Type: Other	
Cycle Length: 150	
Actuated Cycle Length: 84.1	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 17.4	Intersection LOS: B
Intersection Capacity Utilization 49.0%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Lowell Rd/3A & Rena Ave



Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBL2	SBL	SBT	SBR	NWL2	NWL
Lane Configurations												
Traffic Volume (vph)	4	0	1	0	0	541	1	197	395	2	5	2
Future Volume (vph)	4	0	1	0	0	541	1	197	395	2	5	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50		0		240			820		0		120
Storage Lanes	1		0		2			0		0		1
Taper Length (ft)	25				25			25				25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00
Frt		0.850							0.999			
Flt Protected	0.950							0.950				0.950
Satd. Flow (prot)	1770	1583	0	1863	1863	3438	0	3433	1808	0	0	1770
Flt Permitted								0.070				0.950
Satd. Flow (perm)	1863	1583	0	1863	1863	3438	0	253	1808	0	0	1770
Right Turn on Red										Yes		
Satd. Flow (RTOR)												
Link Speed (mph)		30		30		30			30			30
Link Distance (ft)		386		220		910			1749			960
Travel Time (s)		8.8		5.0		20.7			39.8			21.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	5%	2%	2%	5%	2%	2%	2%
Adj. Flow (vph)	4	0	1	0	0	588	1	214	429	2	5	2
Shared Lane Traffic (%)												
Lane Group Flow (vph)	4	1	0	0	0	588	0	215	431	0	0	7
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Left	Left	Left	Left	Right	Left	Left
Median Width(ft)		12		12		36			36			12
Link Offset(ft)		0		0		0			0			0
Crosswalk Width(ft)		16		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		15	15		9	15	15
Turn Type	Perm	NA			Prot	NA	custom	Prot	NA		Perm	Prot
Protected Phases		4		4	1	6		5	2			3
Permitted Phases	4						5				3	
Detector Phase	4	4		4	1	6	5	5	2		3	3
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	10.0	10.0	10.0	10.0		10.0	10.0
Minimum Split (s)	11.0	11.0		11.0	13.0	16.0	18.0	18.0	16.0		17.0	17.0
Total Split (s)	15.0	15.0		15.0	15.0	35.0	65.0	65.0	81.0		35.0	35.0
Total Split (%)	10.0%	10.0%		10.0%	10.0%	23.3%	43.3%	43.3%	54.0%		23.3%	23.3%
Maximum Green (s)	9.0	9.0		9.0	7.0	29.0	57.0	57.0	75.0		28.0	28.0
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0		2.0	4.0	2.0	4.0	4.0	2.0		3.0	3.0
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0			0.0
Total Lost Time (s)	6.0	6.0		6.0	8.0	6.0		8.0	6.0			7.0
Lead/Lag	Lag	Lag		Lag	Lead	Lag	Lead	Lead	Lag		Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	4.0	4.0	4.0	4.0		4.0	4.0
Recall Mode	None	None		None	None	Min	None	None	Min		None	None

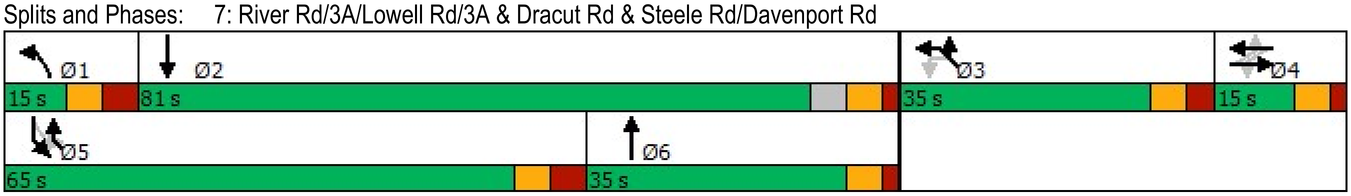
Lane Group	NWR
Lane Configurations	
Traffic Volume (vph)	634
Future Volume (vph)	634
Ideal Flow (vphpl)	1900
Storage Length (ft)	0
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1583
Flt Permitted	
Satd. Flow (perm)	1583
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Heavy Vehicles (%)	2%
Adj. Flow (vph)	689
Shared Lane Traffic (%)	
Lane Group Flow (vph)	689
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Turn Type	pt+ov
Protected Phases	3 5
Permitted Phases	
Detector Phase	3 5
Switch Phase	
Minimum Initial (s)	
Minimum Split (s)	
Total Split (s)	
Total Split (%)	
Maximum Green (s)	
Yellow Time (s)	
All-Red Time (s)	
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	
Recall Mode	

Lane Group	EBL	EBT	EBR	WBT	NBL	NBT	SBL2	SBL	SBT	SBR	NWL2	NWL
Act Effct Green (s)	6.0	6.0				27.8		57.1	93.0			27.6
Actuated g/C Ratio	0.04	0.04				0.20		0.42	0.68			0.20
v/c Ratio	0.05	0.01				0.84		2.03	0.35			0.02
Control Delay	66.2	65.0				63.7		522.0	10.5			46.3
Queue Delay	0.0	0.0				0.0		0.0	0.0			0.0
Total Delay	66.2	65.0				63.7		522.0	10.5			46.3
LOS	E	E				E		F	B			D
Approach Delay		66.0				63.7			180.7			16.8
Approach LOS		E				E			F			B
Queue Length 50th (ft)	3	1				259		~151	138			5
Queue Length 95th (ft)	17	8				#391		#215	257			20
Internal Link Dist (ft)		306		140		830			1669			880
Turn Bay Length (ft)	50							820				120
Base Capacity (vph)	123	105				734		106	1235			365
Starvation Cap Reductn	0	0				0		0	0			0
Spillback Cap Reductn	0	0				0		0	0			0
Storage Cap Reductn	0	0				0		0	0			0
Reduced v/c Ratio	0.03	0.01				0.80		2.03	0.35			0.02

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 136
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 2.03
Intersection Signal Delay: 85.9 Intersection LOS: F
Intersection Capacity Utilization 89.2% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: River Rd/3A/Lowell Rd/3A & Dracut Rd & Steele Rd/Davenport Rd



Lane Group	NWR
Act Effct Green (s)	91.4
Actuated g/C Ratio	0.67
v/c Ratio	0.65
Control Delay	16.5
Queue Delay	0.0
Total Delay	16.5
LOS	B
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	306
Queue Length 95th (ft)	418
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	1052
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.65

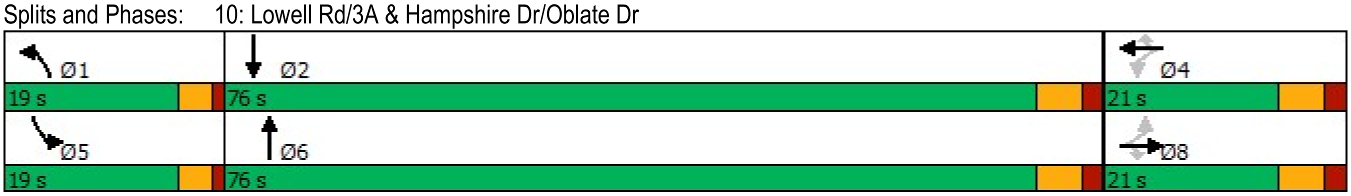
Intersection Summary

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	1	69	6	0	2	25	1004	11	3	1088	32
Future Volume (vph)	55	1	69	6	0	2	25	1004	11	3	1088	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	16	12	12	12	12	12	12
Storage Length (ft)	0		150	0		120	270		0	250		0
Storage Lanes	0		1	0		1	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.998			0.996	
Flt Protected		0.953			0.950		0.950			0.950		
Satd. Flow (prot)	0	1775	1794	0	1770	1794	1770	3532	0	1770	3525	0
Flt Permitted		0.725			0.717		0.950			0.950		
Satd. Flow (perm)	0	1350	1794	0	1336	1794	1770	3532	0	1770	3525	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			75			66		2			5	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		412			436			437			1173	
Travel Time (s)		9.4			9.9			9.9			26.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	1	75	7	0	2	27	1091	12	3	1183	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	61	75	0	7	2	27	1103	0	3	1218	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4		4						
Detector Phase	8	8	8	4	4	4	1	6		5	2	
Switch Phase												
Minimum Initial (s)	3.0	3.0	3.0	3.0	3.0	3.0	4.0	15.0		4.0	15.0	
Minimum Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	8.0	28.0		8.0	28.0	
Total Split (s)	21.0	21.0	21.0	21.0	21.0	21.0	19.0	76.0		19.0	76.0	
Total Split (%)	18.1%	18.1%	18.1%	18.1%	18.1%	18.1%	16.4%	65.5%		16.4%	65.5%	
Maximum Green (s)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	70.0		15.0	70.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	3.0	4.0		3.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	1.0	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	
Total Lost Time (s)		6.0	6.0		6.0	6.0	4.0	6.0		4.0	6.0	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0		2.0	3.0	
Recall Mode	None	None	None	None	None	None	None	Min		None	Min	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0		7.0			7.0	
Flash Dont Walk (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0			0	
Act Effct Green (s)		9.1	9.1		7.4	7.4	6.1	44.2		5.2	42.1	
Actuated g/C Ratio		0.15	0.15		0.12	0.12	0.10	0.71		0.08	0.68	
v/c Ratio		0.31	0.23		0.04	0.01	0.16	0.44		0.02	0.51	
Control Delay		34.1	10.8		32.7	0.0	36.1	6.5		37.7	8.9	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		34.1	10.8		32.7	0.0	36.1	6.5		37.7	8.9	
LOS		C	B		C	A	D	A		D	A	
Approach Delay		21.3			25.4			7.2			8.9	
Approach LOS		C			C			A			A	
Queue Length 50th (ft)		19	0		2	0	9	85		1	99	
Queue Length 95th (ft)		71	39		16	0	41	217		11	273	
Internal Link Dist (ft)		332			356			357			1093	
Turn Bay Length (ft)			150			120	270			250		
Base Capacity (vph)		362	536		358	530	475	3304		475	3298	
Starvation Cap Reductn		0	0		0	0	0	0		0	0	
Spillback Cap Reductn		0	0		0	0	0	0		0	0	
Storage Cap Reductn		0	0		0	0	0	0		0	0	
Reduced v/c Ratio		0.17	0.14		0.02	0.00	0.06	0.33		0.01	0.37	

Intersection Summary	
Area Type: Other	
Cycle Length: 116	
Actuated Cycle Length: 62	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.51	
Intersection Signal Delay: 8.9	Intersection LOS: A
Intersection Capacity Utilization 53.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 10: Lowell Rd/3A & Hampshire Dr/Oblate Dr



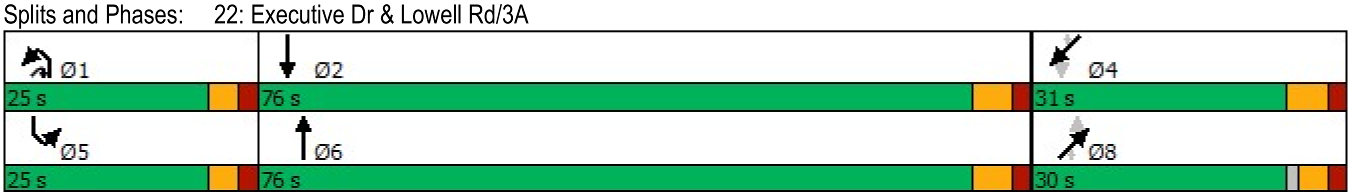
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	63	834	132	80	722	105	128	8	274	276	8	142
Future Volume (vph)	63	834	132	80	722	105	128	8	274	276	8	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	16	12	12	14
Storage Length (ft)	400		0	180		300	0		0	0		0
Storage Lanes	1		0	1		1	0		1	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980			0.981				0.850			0.850
Flt Protected	0.950			0.950				0.955			0.954	
Satd. Flow (prot)	1570	3076	0	1770	3472	0	0	1779	1794	0	1777	1689
Flt Permitted	0.950			0.950				0.380			0.605	
Satd. Flow (perm)	1570	3076	0	1770	3472	0	0	708	1794	0	1127	1689
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			18				156			154
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		669			399			262			149	
Travel Time (s)		15.2			9.1			6.0			3.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	15%	15%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	68	907	143	87	785	114	139	9	298	300	9	154
Shared Lane Traffic (%)												
Lane Group Flow (vph)	68	1050	0	87	899	0	0	148	298	0	309	154
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA		Prot	NA		Perm	NA	pm+ov	Perm	NA	Perm
Protected Phases	1	6		5	2			8	1		4	
Permitted Phases							8		8	4		4
Detector Phase	1	6		5	2		8	8	1	4	4	4
Switch Phase												
Minimum Initial (s)	3.0	8.0		3.0	8.0		3.0	3.0	3.0	4.0	4.0	4.0
Minimum Split (s)	8.0	31.0		8.0	31.0		30.0	30.0	8.0	31.0	31.0	31.0
Total Split (s)	25.0	76.0		25.0	76.0		30.0	30.0	25.0	31.0	31.0	31.0
Total Split (%)	18.9%	57.6%		18.9%	57.6%		22.7%	22.7%	18.9%	23.5%	23.5%	23.5%
Maximum Green (s)	20.0	70.0		20.0	70.0		25.0	25.0	20.0	25.0	25.0	25.0
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	3.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0		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	6.0		5.0	6.0			5.0	5.0		6.0	6.0
Lead/Lag	Lead	Lag		Lead	Lag				Lead			
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	3.0		2.0	3.0		2.0	2.0	2.0	2.0	2.0	2.0

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Recall Mode	None	Min		None	Min		None	None	None	None	None	None
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	7.0
Flash Dont Walk (s)		18.0			18.0		18.0	18.0		18.0	18.0	18.0
Pedestrian Calls (#/hr)		0			0		0	0		0	0	0
Act Effct Green (s)	8.7	42.8		9.3	40.5			26.8	40.7		25.8	25.8
Actuated g/C Ratio	0.09	0.46		0.10	0.44			0.29	0.44		0.28	0.28
v/c Ratio	0.46	0.73		0.49	0.59			0.72	0.34		0.98	0.27
Control Delay	54.0	23.6		53.0	20.3			56.9	11.0		85.8	7.2
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0		0.0	0.0
Total Delay	54.0	23.6		53.0	20.3			56.9	11.0		85.8	7.2
LOS	D	C		D	C			E	B		F	A
Approach Delay		25.5			23.2			26.2			59.7	
Approach LOS		C			C			C			E	
Queue Length 50th (ft)	38	257		49	193			79	50		~186	0
Queue Length 95th (ft)	95	361		113	270			#240	141		#468	54
Internal Link Dist (ft)		589			319			182			69	
Turn Bay Length (ft)	400			180								
Base Capacity (vph)	350	2385		394	2691			205	1087		314	581
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	0.19	0.44		0.22	0.33			0.72	0.27		0.98	0.27

Intersection Summary

Area Type: Other
Cycle Length: 132
Actuated Cycle Length: 92.6
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 30.1 Intersection LOS: C
Intersection Capacity Utilization 70.1% ICU Level of Service C
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: 22: Executive Dr & Lowell Rd/3A



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	0	0	1455	1134	0
Future Volume (vph)	0	0	0	1455	1134	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12
Storage Length (ft)	0	0	0			400
Storage Lanes	0	1	0			1
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						
Fl						
Sa						
Fl						
Sa						
Li						
Li						
Tr						
Pe						
Ac						
Sh						
La						
Er						
La						
M						
Li						
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Free			Free	Free	

NOT PART OF STUDY

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 79.9%	ICU Level of Service D
Analysis Period (min) 15	

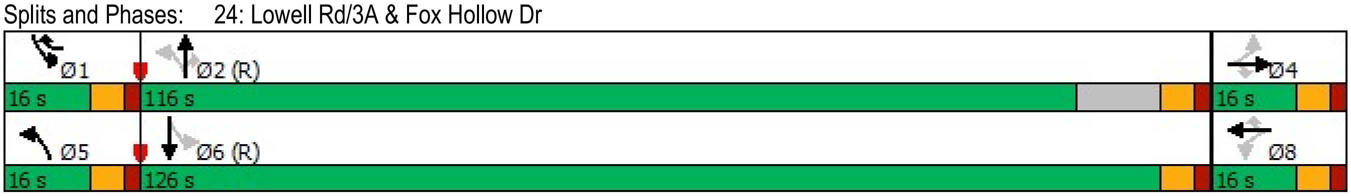
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	3	58	7	2	11	234	761	3	12	1069	7
Future Volume (vph)	56	3	58	7	2	11	234	761	3	12	1069	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	14	14	12	12	12	12	12	12
Storage Length (ft)	0		120	0		0	250		400	220		0
Storage Lanes	0		1	0		1	1		1	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850			0.850		0.999	
Flt Protected		0.955			0.962		0.950			0.950		
Satd. Flow (prot)	0	1779	1583	0	1560	1325	1719	1810	1538	1719	1808	0
Flt Permitted		0.729			0.726		0.114			0.318		
Satd. Flow (perm)	0	1358	1583	0	1177	1325	206	1810	1538	575	1808	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			63			21			62		1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		271			227			1282			634	
Travel Time (s)		6.2			5.2			29.1			14.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	30%	5%	30%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	61	3	63	8	2	12	254	827	3	13	1162	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	64	63	0	10	12	254	827	3	13	1170	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	0.92	0.92	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA	pm+ov	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		
Detector Phase	4	4	4	8	8	1	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	31.0	31.0	11.0	31.0	
Total Split (s)	16.0	16.0	16.0	16.0	16.0	16.0	16.0	116.0	116.0	16.0	126.0	
Total Split (%)	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	73.4%	73.4%	10.1%	79.7%	
Maximum Green (s)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	110.0	110.0	10.0	120.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)		6.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0	6.0	
Lead/Lag						Lead	Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	1.0	1.5	1.5	1.5	1.0	1.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	
Walk Time (s)								7.0	7.0		7.0	
Flash Dont Walk (s)								18.0	18.0		18.0	
Pedestrian Calls (#/hr)								0	0		0	
Act Effct Green (s)		9.4	9.4		9.4	20.4	136.0	130.0	130.0	125.3	120.3	
Actuated g/C Ratio		0.06	0.06		0.06	0.13	0.86	0.82	0.82	0.79	0.76	
v/c Ratio		0.80	0.41		0.14	0.06	0.92	0.56	0.00	0.03	0.85	
Control Delay		128.6	23.6		74.9	11.1	54.6	6.9	0.0	2.1	20.7	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	31.0	
Total Delay		128.6	23.6		74.9	11.1	54.6	6.9	0.0	2.1	51.7	
LOS		F	C		E	B	D	A	A	A	D	
Approach Delay		76.5			40.1			18.0			51.1	
Approach LOS		E			D			B			D	
Queue Length 50th (ft)		66	0		10	0	84	286	0	2	738	
Queue Length 95th (ft)		#152	51		32	13	#148	374	0	4	1015	
Internal Link Dist (ft)		191			147			1202			554	
Turn Bay Length (ft)			120				250		400	220		
Base Capacity (vph)		85	159		74	230	276	1489	1276	546	1380	
Starvation Cap Reductn		0	0		0	0	0	0	0	0	274	
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		0.75	0.40		0.14	0.05	0.92	0.56	0.00	0.02	1.06	

Intersection Summary

Area Type: Other
Cycle Length: 158
Actuated Cycle Length: 158
Offset: 45 (28%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 37.5 Intersection LOS: D
Intersection Capacity Utilization 94.6% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 24: Lowell Rd/3A & Fox Hollow Dr



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	130	186	1036	167	94	802
Future Volume (vph)	130	186	1036	167	94	802
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12
Storage Length (ft)	0	100		0	160	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.981			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1719	1743	1827	0	1388	1462
Flt Permitted	0.950				0.032	
Satd. Flow (perm)	1719	1743	1827	0	47	1462
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		112	10			
Link Speed (mph)	30		30			30
Link Distance (ft)	345		634			526
Travel Time (s)	7.8		14.4			12.0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	2%	2%	30%	30%
Adj. Flow (vph)	141	202	1126	182	102	872
Shared Lane Traffic (%)						
Lane Group Flow (vph)	141	202	1308	0	102	872
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pm+ov	NA		pm+pt	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4			2	
Detector Phase	4	5	6		5	2
Switch Phase						
Minimum Initial (s)	5.0	3.0	10.0		3.0	10.0
Minimum Split (s)	11.0	9.0	31.0		9.0	16.0
Total Split (s)	36.0	16.0	116.0		16.0	116.0
Total Split (%)	21.4%	9.5%	69.0%		9.5%	69.0%
Maximum Green (s)	30.0	10.0	110.0		10.0	110.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5		1.5	1.5

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Recall Mode	None	None	C-Min		None	C-Min
Walk Time (s)			7.0			
Flash Dont Walk (s)			18.0			
Pedestrian Calls (#/hr)			0			
Act Effct Green (s)	17.7	36.4	119.6		138.3	138.3
Actuated g/C Ratio	0.11	0.22	0.71		0.82	0.82
v/c Ratio	0.78	0.43	1.00		0.73	0.72
Control Delay	100.1	26.0	50.3		71.2	11.7
Queue Delay	0.0	0.0	35.3		0.0	0.0
Total Delay	100.1	26.0	85.5		71.2	11.7
LOS	F	C	F		E	B
Approach Delay	56.5		85.5			18.0
Approach LOS	E		F			B
Queue Length 50th (ft)	154	83	~1506		69	356
Queue Length 95th (ft)	226	155	#1882		#143	645
Internal Link Dist (ft)	265		554			446
Turn Bay Length (ft)		100			160	
Base Capacity (vph)	306	470	1303		144	1203
Starvation Cap Reductn	0	0	194		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.46	0.43	1.18		0.71	0.72

Intersection Summary

Area Type: Other

Cycle Length: 168

Actuated Cycle Length: 168

Offset: 0 (0%), Referenced to phase 2:SBTL and 6:NBT, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 56.7 Intersection LOS: E

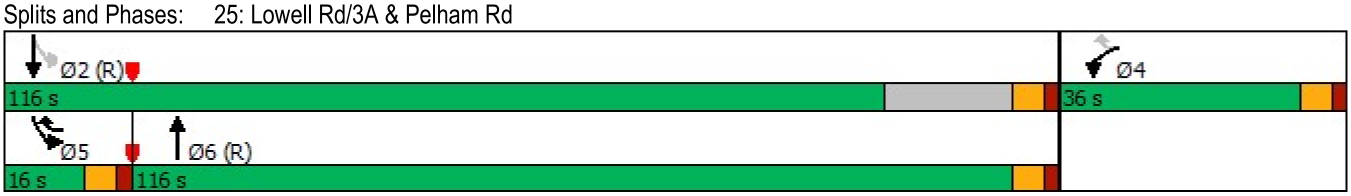
Intersection Capacity Utilization 92.1% ICU Level of Service F

Analysis Period (min) 15

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

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

Splits and Phases: 25: Lowell Rd/3A & Pelham Rd

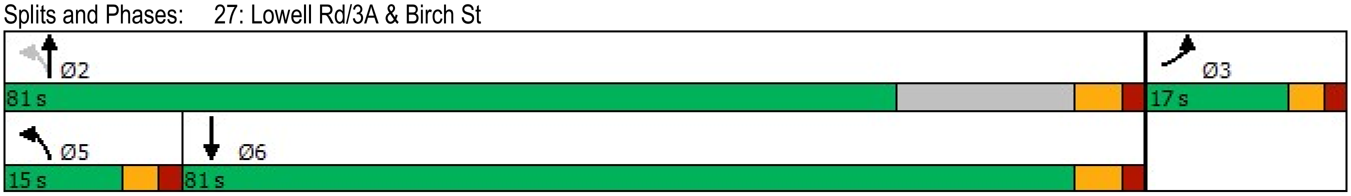


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	58	32	91	598	678	11
Future Volume (vph)	58	32	91	598	678	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	12	12	12	12	12
Storage Length (ft)	0	0	150			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.952				0.998	
Flt Protected	0.969		0.950			
Satd. Flow (prot)	1892	0	1570	1652	1806	0
Flt Permitted	0.969		0.202			
Satd. Flow (perm)	1892	0	334	1652	1806	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	20				2	
Link Speed (mph)	30			30	30	
Link Distance (ft)	442			1237	1199	
Travel Time (s)	10.0			28.1	27.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	15%	15%	5%	5%
Adj. Flow (vph)	63	35	99	650	737	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	98	0	99	650	749	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	16			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Turn Type	Prot		pm+pt	NA	NA	
Protected Phases	3		5	2	6	
Permitted Phases			2			
Detector Phase	3		5	2	6	
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	
Minimum Split (s)	17.0		10.0	11.0	11.0	
Total Split (s)	17.0		15.0	81.0	81.0	
Total Split (%)	15.0%		13.3%	71.7%	71.7%	
Maximum Green (s)	12.0		10.0	75.0	75.0	
Yellow Time (s)	3.0		3.0	4.0	4.0	
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	5.0		5.0	6.0	6.0	
Lead/Lag			Lead		Lag	
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0		2.0	2.0	2.0	

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Recall Mode	None		None	Min	Min	
Walk Time (s)	7.0					
Flash Dont Walk (s)	5.0					
Pedestrian Calls (#/hr)	0					
Act Effct Green (s)	7.5		45.9	46.7	37.0	
Actuated g/C Ratio	0.12		0.75	0.77	0.61	
v/c Ratio	0.39		0.24	0.51	0.68	
Control Delay	29.3		4.2	5.9	16.4	
Queue Delay	0.0		0.0	0.0	0.0	
Total Delay	29.3		4.2	5.9	16.4	
LOS	C		A	A	B	
Approach Delay	29.3			5.7	16.4	
Approach LOS	C			A	B	
Queue Length 50th (ft)	26		8	89	216	
Queue Length 95th (ft)	85		22	187	421	
Internal Link Dist (ft)	362			1157	1119	
Turn Bay Length (ft)			150			
Base Capacity (vph)	416		470	1652	1764	
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	0.24		0.21	0.39	0.42	

Intersection Summary	
Area Type: Other	
Cycle Length: 113	
Actuated Cycle Length: 60.9	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 12.2	Intersection LOS: B
Intersection Capacity Utilization 59.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 27: Lowell Rd/3A & Birch St



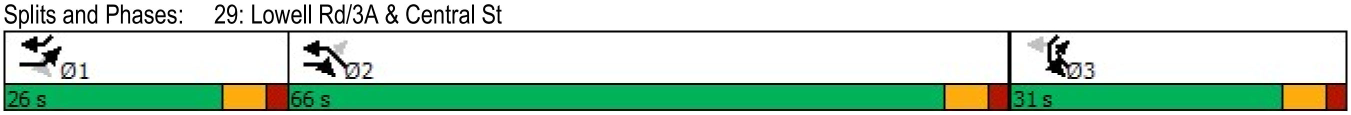
Lane Group	EBL	EBR	NWL	NWR	SWL	SWR
Lane Configurations						
Traffic Volume (vph)	117	645	745	86	184	94
Future Volume (vph)	117	645	745	86	184	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	11	11
Storage Length (ft)	300	0	0	80	0	120
Storage Lanes	1	1	1	1	1	1
Taper Length (ft)	25		25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850		0.850		0.850
Flt Protected	0.950		0.950		0.950	
Satd. Flow (prot)	1770	1583	1770	1689	1711	1531
Flt Permitted	0.950		0.950		0.950	
Satd. Flow (perm)	1770	1583	1770	1689	1711	1531
Right Turn on Red		Yes		Yes		Yes
Satd. Flow (RTOR)		303		54		102
Link Speed (mph)	30		30		30	
Link Distance (ft)	636		905		654	
Travel Time (s)	14.5		20.6		14.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	127	701	810	93	200	102
Shared Lane Traffic (%)						
Lane Group Flow (vph)	127	701	810	93	200	102
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	12		12		11	
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	0.92	1.04	1.04
Turning Speed (mph)	15	9	15	9	15	9
Turn Type	Prot	pm+ov	Prot	pm+ov	Prot	pm+ov
Protected Phases	1	2	2	3	3	1
Permitted Phases		1		2		3
Detector Phase	1	2	2	3	3	1
Switch Phase						
Minimum Initial (s)	8.0	10.0	10.0	8.0	8.0	8.0
Minimum Split (s)	14.0	31.0	31.0	31.0	31.0	14.0
Total Split (s)	26.0	66.0	66.0	31.0	31.0	26.0
Total Split (%)	21.1%	53.7%	53.7%	25.2%	25.2%	21.1%
Maximum Green (s)	20.0	60.0	60.0	25.0	25.0	20.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lag			Lead
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	2.5	2.5	2.0	2.0	1.5
Recall Mode	None	Min	Min	None	None	None

Lane Group	EBL	EBR	NWL	NWR	SWL	SWR
Walk Time (s)		7.0	7.0	7.0	7.0	
Flash Dont Walk (s)		18.0	18.0	18.0	18.0	
Pedestrian Calls (#/hr)		0	0	0	0	
Act Effct Green (s)	11.9	73.4	55.3	78.1	16.6	34.7
Actuated g/C Ratio	0.12	0.72	0.54	0.76	0.16	0.34
v/c Ratio	0.62	0.57	0.85	0.07	0.72	0.17
Control Delay	59.2	6.0	31.4	1.8	57.4	5.4
Queue Delay	0.0	0.4	0.0	0.0	0.0	0.0
Total Delay	59.2	6.4	31.4	1.8	57.4	5.4
LOS	E	A	C	A	E	A
Approach Delay	14.5		28.4		39.8	
Approach LOS	B		C		D	
Queue Length 50th (ft)	84	90	417	5	131	0
Queue Length 95th (ft)	156	223	#843	19	221	35
Internal Link Dist (ft)	556		825		574	
Turn Bay Length (ft)	300			80		120
Base Capacity (vph)	355	1299	1065	1445	429	707
Starvation Cap Reductn	0	217	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	0.36	0.65	0.76	0.06	0.47	0.14

Intersection Summary	
Area Type: Other	
Cycle Length: 123	
Actuated Cycle Length: 102.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 24.4	Intersection LOS: C
Intersection Capacity Utilization 73.1%	ICU Level of Service D
Analysis Period (min) 15	

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

Splits and Phases: 29: Lowell Rd/3A & Central St

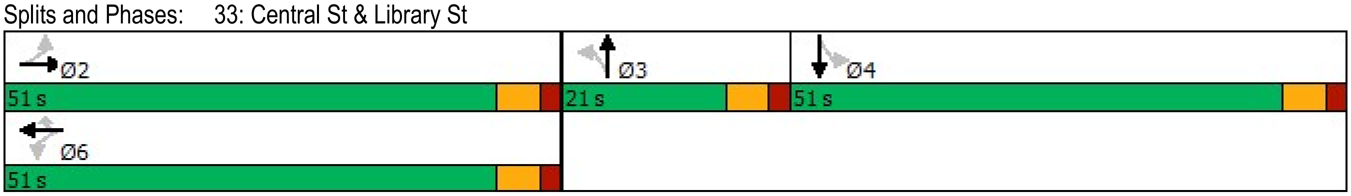


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	259	0	4	501	295	1	0	1	298	1	3
Future Volume (vph)	1	259	0	4	501	295	1	0	1	298	1	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	16	12
Storage Length (ft)	0		0	0		200	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.932			0.999	
Flt Protected								0.976			0.953	
Satd. Flow (prot)	0	1810	0	0	1863	1583	0	1694	0	0	2010	0
Flt Permitted		0.999			0.998						0.728	
Satd. Flow (perm)	0	1808	0	0	1859	1583	0	1736	0	0	1535	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						243		80				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		888			636			108			794	
Travel Time (s)		20.2			14.5			2.5			18.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1	282	0	4	545	321	1	0	1	324	1	3
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	283	0	0	549	321	0	2	0	0	328	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.85	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			3			4	
Permitted Phases	2			6		6	3			4		
Detector Phase	2	2		6	6	6	3	3		4	4	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0	10.0	5.0	5.0		10.0	10.0	
Minimum Split (s)	31.0	31.0		16.0	16.0	16.0	21.0	21.0		31.0	31.0	
Total Split (s)	51.0	51.0		51.0	51.0	51.0	21.0	21.0		51.0	51.0	
Total Split (%)	41.5%	41.5%		41.5%	41.5%	41.5%	17.1%	17.1%		41.5%	41.5%	
Maximum Green (s)	45.0	45.0		45.0	45.0	45.0	15.0	15.0		45.0	45.0	
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)	2.0	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	
Total Lost Time (s)		6.0			6.0	6.0		6.0			6.0	
Lead/Lag							Lead	Lead		Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	2.0	2.0		3.0	3.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Recall Mode	Min	Min		Min	Min	Min	None	None		None	None	
Walk Time (s)	7.0	7.0					7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	8.0	8.0					8.0	8.0		8.0	8.0	
Pedestrian Calls (#/hr)	0	0					0	0		0	0	
Act Effct Green (s)		28.7			28.7	28.7		5.5			21.8	
Actuated g/C Ratio		0.44			0.44	0.44		0.08			0.33	
v/c Ratio		0.36			0.67	0.39		0.01			0.64	
Control Delay		15.1			20.7	5.6		0.0			27.3	
Queue Delay		0.0			0.0	0.0		0.0			0.0	
Total Delay		15.1			20.7	5.6		0.0			27.3	
LOS		B			C	A		A			C	
Approach Delay		15.1			15.2						27.3	
Approach LOS		B			B						C	
Queue Length 50th (ft)		64			148	16		0			98	
Queue Length 95th (ft)		187			406	88		0			278	
Internal Link Dist (ft)		808			556			28			714	
Turn Bay Length (ft)						200						
Base Capacity (vph)		1331			1369	1230		502			1130	
Starvation Cap Reductn		0			9	0		0			0	
Spillback Cap Reductn		0			0	0		0			0	
Storage Cap Reductn		0			0	0		0			0	
Reduced v/c Ratio		0.21			0.40	0.26		0.00			0.29	

Intersection Summary	
Area Type: Other	
Cycle Length: 123	
Actuated Cycle Length: 65.2	
Natural Cycle: 85	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 17.8	Intersection LOS: B
Intersection Capacity Utilization 62.6%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 33: Central St & Library St



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	209	482	5	7	15	237	0	9	4	61	6	5
Future Volume (vph)	209	482	5	7	15	237	0	9	4	61	6	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	16	16	12	16	12	12	16	12
Storage Length (ft)	0		0	0		250	0		0	0		0
Storage Lanes	0		0	0		1	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850		0.961			0.991	
Flt Protected		0.985			0.984						0.959	
Satd. Flow (prot)	0	2036	0	0	2036	1759	0	2029	0	0	1958	0
Flt Permitted		0.985			0.984						0.959	
Satd. Flow (perm)	0	2036	0	0	2036	1759	0	2029	0	0	1958	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		439			888			261			628	
Travel Time (s)		10.0			20.2			5.9			14.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	5	5	0	0	0	0	0	0
Adj. Flow (vph)	227	524	5	8	16	258	0	10	4	66	7	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	756	0	0	24	258	0	14	0	0	78	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	0.85	1.00	1.00	0.87	0.87	1.00	0.85	1.00	1.00	0.85	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 65.2%	ICU Level of Service C
Analysis Period (min) 15	

Lane Group	EBL	EBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	0	0	0	905	0	1483
Future Volume (vph)	0	0	0	905	0	1483
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	0.88
Frt						0.850
Flt Protected						
Satd. Flow (prot)	0	0	0	3539	0	2787
Fl						
Sa						
Li						
Li						
Tr						
Pe						
Ad						
Sh						
La						
En						
La						
Me						
Li						
Cr						
Tw						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Sign Control	Free			Free	Free	

NOT PART OF STUDY

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 55.2%	ICU Level of Service B
Analysis Period (min) 15	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	138	350	11	38	244	4	72	450	32	2	523	6
Future Volume (vph)	138	350	11	38	244	4	72	450	32	2	523	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	175		0	0		0	200		0
Storage Lanes	1		0	1		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995			0.998			0.992			0.998	
Flt Protected	0.950			0.950				0.994		0.950		
Satd. Flow (prot)	1770	1853	0	1770	1859	0	0	1837	0	1770	1859	0
Flt Permitted	0.472			0.288				0.801		0.405		
Satd. Flow (perm)	879	1853	0	536	1859	0	0	1480	0	754	1859	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			1			4			1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		342			444			371			1247	
Travel Time (s)		7.8			10.1			8.4			28.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	150	380	12	41	265	4	78	489	35	2	568	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	150	392	0	41	269	0	0	602	0	2	575	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
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			1			6	
Permitted Phases	4			8			1			6		
Detector Phase	4	4		8	8		1	1		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	31.0	31.0		31.0	31.0		31.0	31.0		31.0	31.0	
Total Split (s)	46.0	46.0		46.0	46.0		46.0	46.0		46.0	46.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	40.0	40.0		40.0	40.0		40.0	40.0		40.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		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-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		C-Min	C-Min		C-Min	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Flash Dont Walk (s)	18.0	18.0		18.0	18.0		18.0	18.0		18.0	18.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	26.7	26.7		26.7	26.7			53.3		53.3	53.3	
Actuated g/C Ratio	0.29	0.29		0.29	0.29			0.58		0.58	0.58	
v/c Ratio	0.59	0.73		0.26	0.50			0.70		0.00	0.53	
Control Delay	36.2	36.6		26.8	29.0			21.6		11.5	15.7	
Queue Delay	0.0	0.0		0.0	0.0			7.0		0.0	0.0	
Total Delay	36.2	36.6		26.8	29.0			28.6		11.5	15.7	
LOS	D	D		C	C			C		B	B	
Approach Delay		36.5			28.7			28.6			15.7	
Approach LOS		D			C			C			B	
Queue Length 50th (ft)	74	203		18	129			230		0	189	
Queue Length 95th (ft)	120	260		40	172			#509		4	360	
Internal Link Dist (ft)		262			364			291			1167	
Turn Bay Length (ft)				175						200		
Base Capacity (vph)	382	806		233	808			859		437	1077	
Starvation Cap Reductn	0	0		0	0			210		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	0.39	0.49		0.18	0.33			0.93		0.00	0.53	

Intersection Summary

Area Type: Other

Cycle Length: 92

Actuated Cycle Length: 92

Offset: 0 (0%), Referenced to phase 1:NETL and 6:SWTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.73

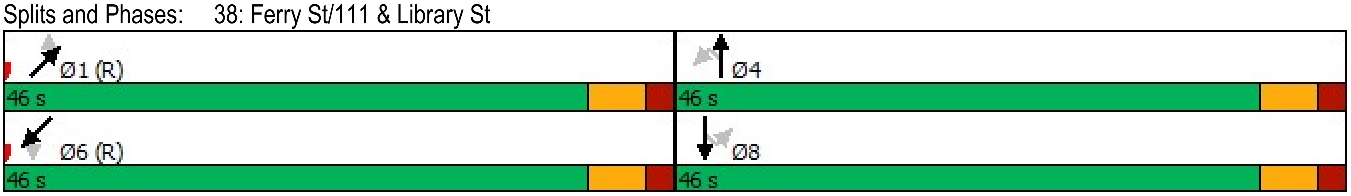
Intersection Signal Delay: 27.1 Intersection LOS: C

Intersection Capacity Utilization 104.9% ICU Level of Service G

Analysis Period (min) 15

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

Splits and Phases: 38: Ferry St/111 & Library St



Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NWR	NWR2	NET	NER
Lane Configurations												
Traffic Volume (vph)	28	14	21	17	1	1	11	27	449	10	586	8
Future Volume (vph)	28	14	21	17	1	1	11	27	449	10	586	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	16	12	12	12	12	16	12	12	12	12	12
Storage Length (ft)	0		0			0		0	0			0
Storage Lanes	0		0			0		0	1			0
Taper Length (ft)	25					25						
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.936					0.909		0.865		0.998	
Flt Protected		0.983					0.998					
Satd. Flow (prot)	0	1887	0	0	0	0	1860	0	1611	0	1859	0
Flt Permitted		0.867					0.987					
Satd. Flow (perm)	0	1664	0	0	0	0	1840	0	1611	0	1859	0
Right Turn on Red				Yes				Yes		Yes		
Satd. Flow (RTOR)		8					29		86			
Link Speed (mph)		30					30				30	
Link Distance (ft)		286					634				617	
Travel Time (s)		6.5					14.4				14.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	30	15	23	18	1	1	12	29	488	11	637	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	86	0	0	0	0	43	0	499	0	646	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Right	Left	Left	Left	Right	Right	Right	Left	Right
Median Width(ft)		0					0				12	
Link Offset(ft)		0					0				0	
Crosswalk Width(ft)		16					16				16	
Two way Left Turn Lane												
Headway Factor	1.00	0.85	1.00	1.00	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	9	15	15		9	9	9		9
Turn Type	Perm	NA			Perm	Perm	NA		Over		NA	
Protected Phases		8					4		1		2	
Permitted Phases	8				4	4						
Detector Phase	8	8			4	4	4		1		2	
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0	5.0	5.0		10.0		10.0	
Minimum Split (s)	22.0	22.0			12.0	12.0	12.0		16.0		17.0	
Total Split (s)	22.0	22.0			27.0	27.0	27.0		56.0		57.0	
Total Split (%)	15.7%	15.7%			19.3%	19.3%	19.3%		40.0%		40.7%	
Maximum Green (s)	15.0	15.0			20.0	20.0	20.0		50.0		50.0	
Yellow Time (s)	4.0	4.0			4.0	4.0	4.0		4.0		4.0	
All-Red Time (s)	3.0	3.0			3.0	3.0	3.0		2.0		3.0	
Lost Time Adjust (s)		0.0					0.0		0.0		0.0	
Total Lost Time (s)		7.0					7.0		6.0		7.0	
Lead/Lag									Lead		Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0		4.0	

Lane Group	SWL	SWT
Lane Configurations		
Traffic Volume (vph)	287	403
Future Volume (vph)	287	403
Ideal Flow (vphpl)	1900	1900
Lane Width (ft)	12	12
Storage Length (ft)	0	
Storage Lanes	1	
Taper Length (ft)	25	
Lane Util. Factor	1.00	1.00
Frt		
Flt Protected	0.950	
Satd. Flow (prot)	1770	1810
Flt Permitted	0.950	
Satd. Flow (perm)	1770	1810
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)		30
Link Distance (ft)		845
Travel Time (s)		19.2
Peak Hour Factor	0.92	0.92
Heavy Vehicles (%)	2%	5%
Adj. Flow (vph)	312	438
Shared Lane Traffic (%)		
Lane Group Flow (vph)	312	438
Enter Blocked Intersection	No	No
Lane Alignment	Left	Left
Median Width(ft)		12
Link Offset(ft)		0
Crosswalk Width(ft)		16
Two way Left Turn Lane		
Headway Factor	1.00	1.00
Turning Speed (mph)	15	
Turn Type	Prot	NA
Protected Phases	1	6
Permitted Phases		
Detector Phase	1	6
Switch Phase		
Minimum Initial (s)	10.0	10.0
Minimum Split (s)	16.0	16.0
Total Split (s)	56.0	105.0
Total Split (%)	40.0%	75.0%
Maximum Green (s)	50.0	99.0
Yellow Time (s)	4.0	4.0
All-Red Time (s)	2.0	2.0
Lost Time Adjust (s)	0.0	0.0
Total Lost Time (s)	6.0	6.0
Lead/Lag	Lead	
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	3.0

Lane Group	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NWR	NWR2	NET	NER
Recall Mode	None	None			None	None	None		None		Min	
Walk Time (s)	7.0	7.0										
Flash Dont Walk (s)	8.0	8.0										
Pedestrian Calls (#/hr)	0	0										
Act Effct Green (s)		11.9					11.9		44.3		63.8	
Actuated g/C Ratio		0.08					0.08		0.32		0.46	
v/c Ratio		0.58					0.24		0.88		0.76	
Control Delay		70.7					30.1		53.9		41.2	
Queue Delay		0.0					0.0		13.6		5.7	
Total Delay		70.7					30.1		67.5		46.9	
LOS		E					C		E		D	
Approach Delay		70.7					30.1				46.9	
Approach LOS		E					C				D	
Queue Length 50th (ft)		69					12		361		493	
Queue Length 95th (ft)		124					50		477		#832	
Internal Link Dist (ft)		206					554				537	
Turn Bay Length (ft)												
Base Capacity (vph)		244					287		639		847	
Starvation Cap Reductn		0					0		127		148	
Spillback Cap Reductn		0					0		0		0	
Storage Cap Reductn		0					0		0		0	
Reduced v/c Ratio		0.35					0.15		0.97		0.92	

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 0 (0%), Referenced to phase 6:SWT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 42.6 Intersection LOS: D

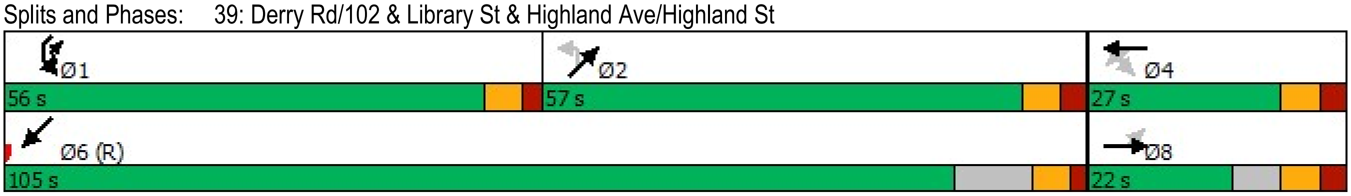
Intersection Capacity Utilization 87.7% ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 39: Derry Rd/102 & Library St & Highland Ave/Highland St



Lane Group	SWL	SWT
Recall Mode	None	C-Min
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)	44.3	115.1
Actuated g/C Ratio	0.32	0.82
v/c Ratio	0.56	0.29
Control Delay	42.6	3.7
Queue Delay	0.0	0.0
Total Delay	42.6	3.7
LOS	D	A
Approach Delay		19.9
Approach LOS		B
Queue Length 50th (ft)	232	76
Queue Length 95th (ft)	302	131
Internal Link Dist (ft)		765
Turn Bay Length (ft)		
Base Capacity (vph)	642	1488
Starvation Cap Reductn	0	0
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.49	0.29

Intersection Summary

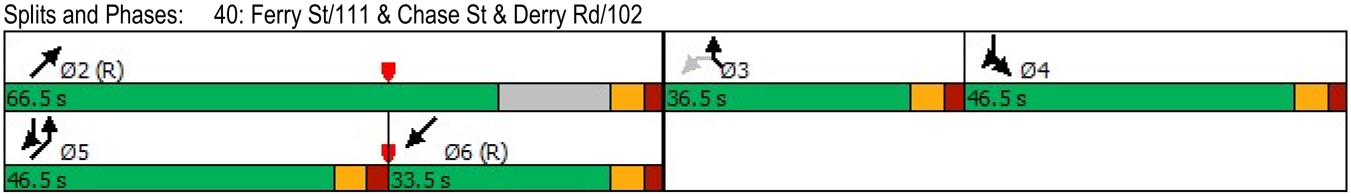
Lane Group	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Traffic Volume (vph)	63	514	364	29	128	234	660	11	0	605	0
Future Volume (vph)	63	514	364	29	128	234	660	11	0	605	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	12	13	12	12	12	12	12
Storage Length (ft)	150	300	0	0		0		0	0		0
Storage Lanes	1	1	1	1		1		0	0		0
Taper Length (ft)	25		25			25			25		
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt		0.850		0.850			0.998				
Flt Protected	0.950		0.950			0.950					
Satd. Flow (prot)	1719	2707	1719	1641	0	1829	1859	0	0	3539	0
Flt Permitted	0.950		0.133			0.950					
Satd. Flow (perm)	1719	2707	241	1641	0	1829	1859	0	0	3539	0
Right Turn on Red		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		67		118			1				
Link Speed (mph)	30		30				30			30	
Link Distance (ft)	617		345				426			371	
Travel Time (s)	14.0		7.8				9.7			8.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	68	559	396	32	139	254	717	12	0	658	0
Shared Lane Traffic (%)											
Lane Group Flow (vph)	68	559	396	171	0	254	729	0	0	658	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)	12		12				13			13	
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	0.92	1.00	0.96	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	9	15		9	15		9
Turn Type	Prot	pt+ov	Perm	Prot		Prot	NA			NA	
Protected Phases	4	4 5		3		5	2			6	
Permitted Phases			3								
Detector Phase	4	4 5	3	3		5	2			6	
Switch Phase											
Minimum Initial (s)	8.0		5.0	5.0		10.0	10.0			10.0	
Minimum Split (s)	24.5		24.5	24.5		24.5	24.5			24.5	
Total Split (s)	46.5		36.5	36.5		46.5	66.5			33.5	
Total Split (%)	28.5%		22.4%	22.4%		28.5%	40.8%			20.6%	
Maximum Green (s)	40.0		30.0	30.0		40.0	60.0			27.0	
Yellow Time (s)	4.0		4.0	4.0		4.0	4.0			4.0	
All-Red Time (s)	2.5		2.5	2.5		2.5	2.5			2.5	
Lost Time Adjust (s)	0.0		0.0	0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.5		6.5	6.5		6.5	6.5			6.5	
Lead/Lag	Lag		Lead	Lead		Lead				Lag	
Lead-Lag Optimize?											
Vehicle Extension (s)	1.5		1.5	1.5		1.5	1.5			1.5	

Lane Group	SBL	SBR	NWL	NWR	NWR2	NEL	NET	NER	SWL	SWT	SWR
Recall Mode	None		None	None		Min	C-Min			C-Min	
Walk Time (s)	7.0		7.0	7.0		7.0	7.0			7.0	
Flash Dont Walk (s)	11.0		11.0	11.0		11.0	11.0			11.0	
Pedestrian Calls (#/hr)	0		0	0		0	0			0	
Act Effct Green (s)	29.6	65.9	30.0	30.0		29.8	83.9			47.6	
Actuated g/C Ratio	0.18	0.40	0.18	0.18		0.18	0.51			0.29	
v/c Ratio	0.22	0.49	9.00	0.43		0.76	0.76			0.64	
Control Delay	57.4	31.9	3652.2	23.1		77.3	38.9			55.0	
Queue Delay	0.0	0.0	0.0	0.0		0.0	0.0			9.9	
Total Delay	57.4	31.9	3652.2	23.1		77.3	38.9			64.9	
LOS	E	C	F	C		E	D			E	
Approach Delay	34.6		2557.7				48.8			64.9	
Approach LOS	C		F				D			E	
Queue Length 50th (ft)	63	219	~792	48		260	612			325	
Queue Length 95th (ft)	109	237	#1013	126		339	840			#485	
Internal Link Dist (ft)	537		265				346			291	
Turn Bay Length (ft)	150	300									
Base Capacity (vph)	421	1295	44	398		448	957			1034	
Starvation Cap Reductn	0	0	0	0		0	0			345	
Spillback Cap Reductn	0	0	0	0		0	0			0	
Storage Cap Reductn	0	0	0	0		0	0			0	
Reduced v/c Ratio	0.16	0.43	9.00	0.43		0.57	0.76			0.96	

Intersection Summary

Area Type: Other
Cycle Length: 163
Actuated Cycle Length: 163
Offset: 0 (0%), Referenced to phase 2:NET and 6:SWT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 9.00
Intersection Signal Delay: 551.2 Intersection LOS: F
Intersection Capacity Utilization 78.5% 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: 40: Ferry St/111 & Chase St & Derry Rd/102



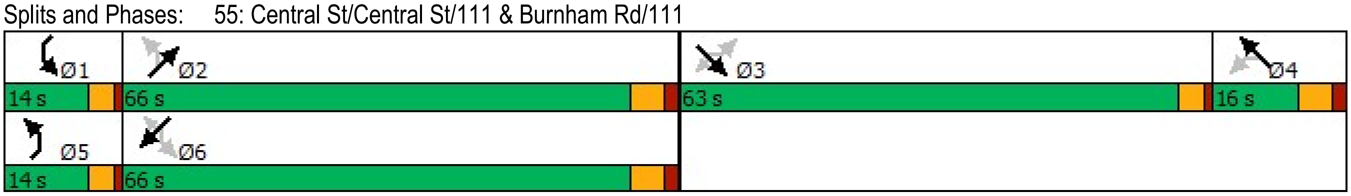
Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Traffic Volume (vph)	376	9	45	27	5	16	27	504	18	23	378	466
Future Volume (vph)	376	9	45	27	5	16	27	504	18	23	378	466
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	16	12	12	12	12	12	12	14
Storage Length (ft)	0		200	0		0	120		0	280		280
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.955			0.995				0.850
Flt Protected		0.953			0.972		0.950			0.950		
Satd. Flow (prot)	0	1775	1794	0	1960	0	1770	1853	0	1770	1863	1689
Flt Permitted		0.575			0.611		0.279			0.094		
Satd. Flow (perm)	0	1071	1794	0	1232	0	520	1853	0	175	1863	1689
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			89		12			1				507
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		882			126			314			2248	
Travel Time (s)		20.0			2.9			7.1			51.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	409	10	49	29	5	17	29	548	20	25	411	507
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	419	49	0	51	0	29	568	0	25	411	507
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	0.92
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases		3			4		5	2		1	6	
Permitted Phases	3		3	4			2			6		6
Detector Phase	3	3	3	4	4		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	4.0	4.0		4.0	10.0		4.0	10.0	10.0
Minimum Split (s)	14.0	14.0	14.0	10.0	10.0		8.0	16.0		8.0	16.0	16.0
Total Split (s)	63.0	63.0	63.0	16.0	16.0		14.0	66.0		14.0	66.0	66.0
Total Split (%)	39.6%	39.6%	39.6%	10.1%	10.1%		8.8%	41.5%		8.8%	41.5%	41.5%
Maximum Green (s)	59.0	59.0	59.0	10.0	10.0		10.0	60.0		10.0	60.0	60.0
Yellow Time (s)	3.0	3.0	3.0	4.0	4.0		3.0	4.0		3.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	2.0	2.0		1.0	2.0		1.0	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)		4.0	4.0		6.0		4.0	6.0		4.0	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	3.0		2.0	3.0	3.0
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min

Lane Group	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Act Effct Green (s)		61.0	61.0		8.6		51.3	45.7		51.0	45.6	45.6
Actuated g/C Ratio		0.45	0.45		0.06		0.38	0.34		0.38	0.34	0.34
v/c Ratio		0.86	0.06		0.57		0.11	0.90		0.19	0.65	0.56
Control Delay		56.5	0.5		78.0		24.6	60.8		26.6	43.2	5.1
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		56.5	0.5		78.0		24.6	60.8		26.6	43.2	5.1
LOS		E	A		E		C	E		C	D	A
Approach Delay		50.7			78.0			59.0			22.3	
Approach LOS		D			E			E			C	
Queue Length 50th (ft)		379	0		36		16	503		14	326	0
Queue Length 95th (ft)		#678	3		#96		36	672		32	446	76
Internal Link Dist (ft)		802			46			234			2168	
Turn Bay Length (ft)			200				120			280		280
Base Capacity (vph)		486	864		106		302	857		191	861	1053
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		0.86	0.06		0.48		0.10	0.66		0.13	0.48	0.48

Intersection Summary

Area Type: Other
Cycle Length: 159
Actuated Cycle Length: 134.1
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 40.8 Intersection LOS: D
Intersection Capacity Utilization 63.9% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 55: Central St/Central St/111 & Burnham Rd/111



Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Lane Configurations												
Traffic Volume (vph)	67	25	769	85	171	295	90	26	219	264	25	32
Future Volume (vph)	67	25	769	85	171	295	90	26	219	264	25	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	14	12	12	12	16	12	12	16	12
Storage Length (ft)		300		300	300		300		140		300	
Storage Lanes		1		1	1		2		1		0	
Taper Length (ft)		25			25				25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt				0.850			0.850	0.850		0.973		
Flt Protected		0.950			0.950				0.950			
Satd. Flow (prot)	0	1770	1810	1689	1719	1810	1538	1794	1570	1765	0	0
Flt Permitted		0.267			0.267				0.427			
Satd. Flow (perm)	0	497	1810	1689	483	1810	1538	1794	705	1765	0	0
Right Turn on Red				Yes				Yes				Yes
Satd. Flow (RTOR)				121				121		3		
Link Speed (mph)			30			30				30		
Link Distance (ft)			2248			4120				755		
Travel Time (s)			51.1			93.6				17.2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	2%	5%	5%	5%	2%	15%	5%	2%	5%
Adj. Flow (vph)	73	27	836	92	186	321	98	28	238	287	27	35
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	100	836	92	186	321	98	28	238	349	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right	Left	Left	Right	Right
Median Width(ft)			12			12				12		
Link Offset(ft)			0			0				0		
Crosswalk Width(ft)			16			16				16		
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	0.92	1.00	1.00	1.00	0.85	1.00	1.00	0.85	1.00
Turning Speed (mph)	15	15		9	15		9	9	15		9	9
Turn Type	custom	Prot	NA	Free	custom	NA	Perm	Free	pm+pt	NA		
Protected Phases		1	6			2			7	4		
Permitted Phases	1			Free	5		2	Free	4			
Detector Phase	1	1	6		5	2	2		7	4		
Switch Phase												
Minimum Initial (s)	4.0	4.0	15.0		4.0	15.0	15.0		4.0	10.0		
Minimum Split (s)	8.0	8.0	21.0		8.0	21.0	21.0		8.0	16.0		
Total Split (s)	19.0	19.0	81.0		19.0	81.0	81.0		19.0	51.0		
Total Split (%)	10.1%	10.1%	42.9%		10.1%	42.9%	42.9%		10.1%	27.0%		
Maximum Green (s)	15.0	15.0	75.0		15.0	75.0	75.0		15.0	45.0		
Yellow Time (s)	3.0	3.0	4.0		3.0	4.0	4.0		3.0	4.0		
All-Red Time (s)	1.0	1.0	2.0		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		
Total Lost Time (s)		4.0	6.0		4.0	6.0	6.0		4.0	6.0		
Lead/Lag	Lead	Lead	Lag		Lead	Lag	Lag		Lag			
Lead-Lag Optimize?												
Vehicle Extension (s)	2.0	2.0	3.0		2.0	3.0	3.0		2.0	3.0		

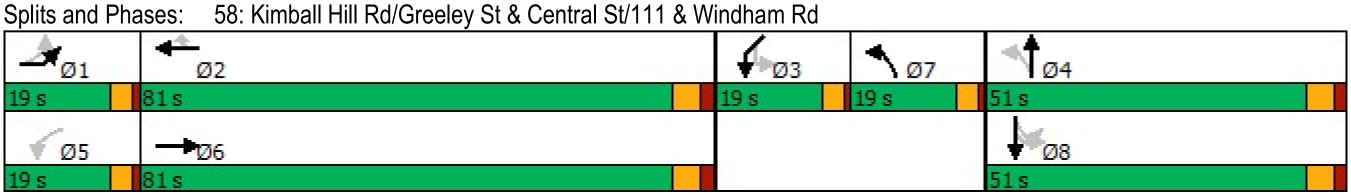
Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Lane Configurations								
Traffic Volume (vph)	4	75	135	59	33	19	53	43
Future Volume (vph)	4	75	135	59	33	19	53	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	16	12	12	12	12	12
Storage Length (ft)		0		0		0	0	
Storage Lanes		0		0		1	0	
Taper Length (ft)		25				25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.971			0.912		
Flt Protected			0.986			0.983		
Satd. Flow (prot)	0	0	1963	0	0	1670	0	0
Flt Permitted			0.283			0.983		
Satd. Flow (perm)	0	0	564	0	0	1670	0	0
Right Turn on Red				No				No
Satd. Flow (RTOR)								
Link Speed (mph)			30			30		
Link Distance (ft)			869			736		
Travel Time (s)			19.8			16.7		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	5%	5%	5%	2%	2%	2%	2%
Adj. Flow (vph)	4	82	147	64	36	21	58	47
Shared Lane Traffic (%)								
Lane Group Flow (vph)	0	0	297	0	0	162	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Left	Right	Right
Median Width(ft)			12			12		
Link Offset(ft)			0			0		
Crosswalk Width(ft)			16			16		
Two way Left Turn Lane								
Headway Factor	1.00	1.00	0.85	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15		9	15	15	9	9
Turn Type	Perm	Perm	NA		Perm	Prot		
Protected Phases			8			3		
Permitted Phases	8	8			3			
Detector Phase	8	8	8		3	3		
Switch Phase								
Minimum Initial (s)	10.0	10.0	10.0		4.0	4.0		
Minimum Split (s)	16.0	16.0	16.0		8.0	8.0		
Total Split (s)	51.0	51.0	51.0		19.0	19.0		
Total Split (%)	27.0%	27.0%	27.0%		10.1%	10.1%		
Maximum Green (s)	45.0	45.0	45.0		15.0	15.0		
Yellow Time (s)	4.0	4.0	4.0		3.0	3.0		
All-Red Time (s)	2.0	2.0	2.0		1.0	1.0		
Lost Time Adjust (s)			0.0			0.0		
Total Lost Time (s)			6.0			4.0		
Lead/Lag					Lead	Lead		
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0		2.0	2.0		

Lane Group	EBL2	EBL	EBT	EBR	WBL	WBT	WBR	WBR2	NBL	NBT	NBR	NBR2
Recall Mode	None	None	Min		None	Min	Min		None	None		
Act Effct Green (s)		15.0	75.0	189.0	15.0	75.0	75.0	189.0	62.0	45.0		
Actuated g/C Ratio		0.08	0.40	1.00	0.08	0.40	0.40	1.00	0.33	0.24		
v/c Ratio		2.56	1.16	0.05	4.89	0.45	0.16	0.02	0.80	0.83		
Control Delay		800.2	137.8	0.1	1823.6	44.3	37.7	0.0	70.7	84.6		
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay		800.2	137.8	0.1	1823.6	44.3	37.7	0.0	70.7	84.6		
LOS		F	F	A	F	D	D	A	E	F		
Approach Delay			189.9			564.1				79.0		
Approach LOS			F			F				E		
Queue Length 50th (ft)		~206	~1226	0	~429	293	79	0	228	413		
Queue Length 95th (ft)		#348	#1493	0	#609	391	127	0	#341	#572		
Internal Link Dist (ft)			2168			4040				675		
Turn Bay Length (ft)		300		300	300		300	300	140			
Base Capacity (vph)		39	718	1689	38	718	610	1794	299	422		
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		2.56	1.16	0.05	4.89	0.45	0.16	0.02	0.80	0.83		

Intersection Summary

Area Type: Other
Cycle Length: 189
Actuated Cycle Length: 189
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 4.89
Intersection Signal Delay: 300.0 Intersection LOS: F
Intersection Capacity Utilization 112.8% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 58: Kimball Hill Rd/Greeley St & Central St/111 & Windham Rd



Lane Group	SBL2	SBL	SBT	SBR	SWL2	SWL	SWR	SWR2
Recall Mode	None	None	None		None	None		
Act Effct Green (s)			45.0			15.0		
Actuated g/C Ratio			0.24			0.08		
v/c Ratio			2.22			1.23		
Control Delay			600.4			217.3		
Queue Delay			0.0			0.0		
Total Delay			600.4			217.3		
LOS			F			F		
Approach Delay			600.4			217.3		
Approach LOS			F			F		
Queue Length 50th (ft)			~591			~246		
Queue Length 95th (ft)			#802			#416		
Internal Link Dist (ft)			789			656		
Turn Bay Length (ft)								
Base Capacity (vph)			134			132		
Starvation Cap Reductn			0			0		
Spillback Cap Reductn			0			0		
Storage Cap Reductn			0			0		
Reduced v/c Ratio			2.22			1.23		

Intersection Summary

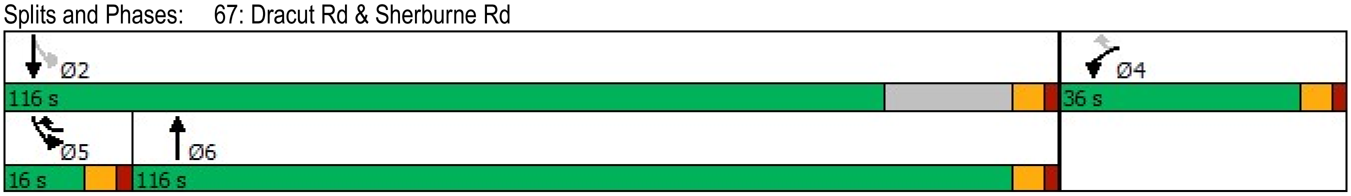
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	81	295	312	100	404	528
Future Volume (vph)	81	295	312	100	404	528
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	150		0	150	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.967			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1538	1762	0	1770	1863
Flt Permitted	0.950				0.277	
Satd. Flow (perm)	1770	1538	1762	0	516	1863
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		321	20			
Link Speed (mph)	30		30			30
Link Distance (ft)	832		787			870
Travel Time (s)	18.9		17.9			19.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	5%	5%	2%	2%	2%
Adj. Flow (vph)	88	321	339	109	439	574
Shared Lane Traffic (%)						
Lane Group Flow (vph)	88	321	448	0	439	574
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	Prot	pm+ov	NA		pm+pt	NA
Protected Phases	4	5	6		5	2
Permitted Phases		4			2	
Detector Phase	4	5	6		5	2
Switch Phase						
Minimum Initial (s)	5.0	3.0	10.0		3.0	10.0
Minimum Split (s)	11.0	9.0	16.0		9.0	16.0
Total Split (s)	36.0	16.0	116.0		16.0	116.0
Total Split (%)	21.4%	9.5%	69.0%		9.5%	69.0%
Maximum Green (s)	30.0	10.0	110.0		10.0	110.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0		6.0	6.0
Lead/Lag		Lead	Lag		Lead	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5		1.5	1.5
Recall Mode	None	None	Min		None	Min

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Act Effct Green (s)	7.1	20.5	18.7		35.5	37.3
Actuated g/C Ratio	0.14	0.40	0.36		0.69	0.72
v/c Ratio	0.37	0.40	0.69		0.72	0.43
Control Delay	27.9	3.5	20.5		14.6	5.8
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	27.9	3.5	20.5		14.6	5.8
LOS	C	A	C		B	A
Approach Delay	8.8		20.5			9.6
Approach LOS	A		C			A
Queue Length 50th (ft)	26	0	114		52	74
Queue Length 95th (ft)	70	43	211		#152	146
Internal Link Dist (ft)	752		707			790
Turn Bay Length (ft)		150			150	
Base Capacity (vph)	1078	803	1762		608	1863
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	0.08	0.40	0.25		0.72	0.31

Intersection Summary

Area Type: Other
Cycle Length: 168
Actuated Cycle Length: 51.8
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 12.0 Intersection LOS: B
Intersection Capacity Utilization 64.4% 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: 67: Dracut Rd & Sherburne Rd



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	148	126	40	156	330	39
Future Volume (vph)	148	126	40	156	330	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	16	12
Storage Length (ft)		0	180		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.938				0.986	
Flt Protected			0.950		0.957	
Satd. Flow (prot)	1462	0	1770	1652	1743	0
Flt Permitted			0.950		0.957	
Satd. Flow (perm)	1462	0	1770	1652	1743	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	1417			420	606	
Travel Time (s)	32.2			9.5	13.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	15%	30%	2%	15%	15%	30%
Adj. Flow (vph)	161	137	43	170	359	42
Shared Lane Traffic (%)						
Lane Group Flow (vph)	298	0	43	170	401	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	16	
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	0.85	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 49.5%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	239	1	133	252	9	338
Future Volume (vph)	239	1	133	252	9	338
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	16	16	12
Storage Length (ft)		0	80		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.999				0.869	
Flt Protected			0.950		0.999	
Satd. Flow (prot)	1861	0	1770	2111	1833	0
Flt Permitted			0.950		0.999	
Satd. Flow (perm)	1861	0	1770	2111	1833	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	2748			314	1025	
Travel Time (s)	62.5			7.1	23.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	260	1	145	274	10	367
Shared Lane Traffic (%)						
Lane Group Flow (vph)	261	0	145	274	377	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	16	
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	0.85	0.85	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type: Other	
Control Type: Unsignalized	
Intersection Capacity Utilization 51.4%	ICU Level of Service A
Analysis Period (min) 15	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	0	223	0	0	0	291	703	0	0	637	13
Future Volume (vph)	66	0	223	0	0	0	291	703	0	0	637	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	14	12	12	12	12	12	12	12	12	15	12
Storage Length (ft)	130		0	0		0	465		0	0		0
Storage Lanes	1		1	0		0	1		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850								0.997	
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	0	1583	0	1863	0	1770	1863	0	0	2043	0
Flt Permitted	0.950						0.199					
Satd. Flow (perm)	1770	0	1583	0	1863	0	371	1863	0	0	2043	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			242								1	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		468			79			2433			1216	
Travel Time (s)		10.6			1.8			55.3			27.6	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	72	0	242	0	0	0	316	764	0	0	692	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	72	0	242	0	0	0	316	764	0	0	706	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	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot		pt+ov				pm+pt	NA			NA	
Protected Phases	4		4 1	8	8		1	6			2	
Permitted Phases	4						6			2		
Detector Phase	4		4 1	8	8		1	6		2	2	
Switch Phase												
Minimum Initial (s)	3.0			5.0	5.0		3.0	10.0		10.0	10.0	
Minimum Split (s)	9.0			11.0	11.0		7.0	16.0		16.0	16.0	
Total Split (s)	21.0			16.0	16.0		19.0	101.0		101.0	101.0	
Total Split (%)	13.4%			10.2%	10.2%		12.1%	64.3%		64.3%	64.3%	
Maximum Green (s)	15.0			10.0	10.0		15.0	95.0		95.0	95.0	
Yellow Time (s)	4.0			4.0	4.0		3.0	4.0		4.0	4.0	
All-Red Time (s)	2.0			2.0	2.0		1.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.0				0.0		0.0	0.0			0.0	
Total Lost Time (s)	6.0				6.0		4.0	6.0			6.0	
Lead/Lag							Lead			Lag	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	2.5			0.4	0.4		2.0	5.0		5.0	5.0	
Recall Mode	None			None	None		None	Min		Min	Min	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Act Effct Green (s)	8.5		22.3				51.6	49.5			35.8	
Actuated g/C Ratio	0.12		0.32				0.73	0.70			0.51	
v/c Ratio	0.34		0.36				0.69	0.58			0.68	
Control Delay	37.0		5.0				13.5	7.3			17.1	
Queue Delay	0.0		0.0				0.0	0.0			0.0	
Total Delay	37.0		5.0				13.5	7.3			17.1	
LOS	D		A				B	A			B	
Approach Delay		12.4						9.1			17.1	
Approach LOS		B						A			B	
Queue Length 50th (ft)	28		0				33	129			205	
Queue Length 95th (ft)	81		52				109	243			382	
Internal Link Dist (ft)		388			1			2353			1136	
Turn Bay Length (ft)	130						465					
Base Capacity (vph)	392		769				581	1863			2043	
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	0.18		0.31				0.54	0.41			0.35	

Intersection Summary

Area Type: Other

Cycle Length: 157

Actuated Cycle Length: 70.6

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

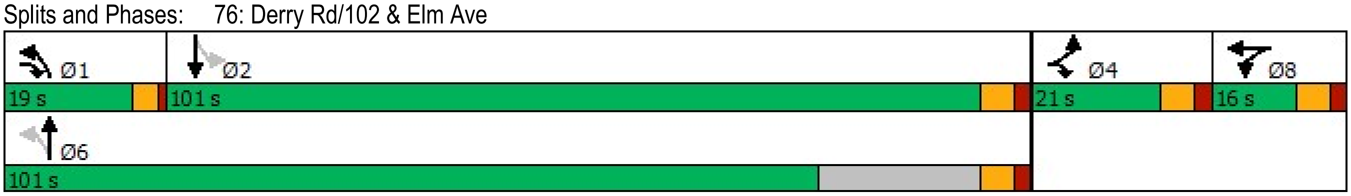
Maximum v/c Ratio: 0.69

Intersection Signal Delay: 12.3 Intersection LOS: B

Intersection Capacity Utilization 88.3% ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 76: Derry Rd/102 & Elm Ave

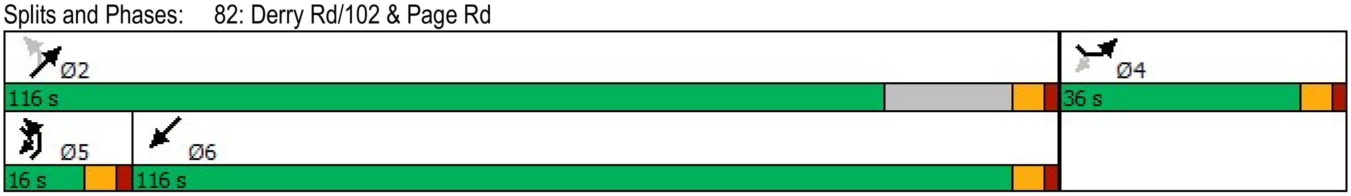


Lane Group	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Volume (vph)	79	41	46	328	422	103
Future Volume (vph)	79	41	46	328	422	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	150	150			0
Storage Lanes	1	1	1			0
Taper Length (ft)	25		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850			0.974	
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1719	1583	1770	1810	1762	0
Flt Permitted	0.950		0.274			
Satd. Flow (perm)	1719	1583	510	1810	1762	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		45			15	
Link Speed (mph)	30			30	30	
Link Distance (ft)	420			2236	3657	
Travel Time (s)	9.5			50.8	83.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	5%	2%	2%	5%	5%	5%
Adj. Flow (vph)	86	45	50	357	459	112
Shared Lane Traffic (%)						
Lane Group Flow (vph)	86	45	50	357	571	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15			9
Turn Type	Prot	pm+ov	pm+pt	NA	NA	
Protected Phases	4	5	5	2	6	
Permitted Phases		4	2			
Detector Phase	4	5	5	2	6	
Switch Phase						
Minimum Initial (s)	5.0	3.0	3.0	10.0	10.0	
Minimum Split (s)	11.0	9.0	9.0	16.0	16.0	
Total Split (s)	36.0	16.0	16.0	116.0	116.0	
Total Split (%)	21.4%	9.5%	9.5%	69.0%	69.0%	
Maximum Green (s)	30.0	10.0	10.0	110.0	110.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	
Lead/Lag		Lead	Lead		Lag	
Lead-Lag Optimize?						
Vehicle Extension (s)	1.5	1.5	1.5	1.5	1.5	
Recall Mode	None	None	None	Min	Min	

Lane Group	SEL	SER	NEL	NET	SWT	SWR
Act Effct Green (s)	7.4	16.2	36.6	38.6	29.6	
Actuated g/C Ratio	0.14	0.30	0.69	0.72	0.56	
v/c Ratio	0.36	0.09	0.10	0.27	0.58	
Control Delay	29.2	6.0	4.0	4.7	15.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	29.2	6.0	4.0	4.7	15.0	
LOS	C	A	A	A	B	
Approach Delay	21.3			4.6	15.0	
Approach LOS	C			A	B	
Queue Length 50th (ft)	26	0	5	41	141	
Queue Length 95th (ft)	76	20	15	84	280	
Internal Link Dist (ft)	340			2156	3577	
Turn Bay Length (ft)		150	150			
Base Capacity (vph)	1039	650	604	1810	1762	
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	0.08	0.07	0.08	0.20	0.32	

Intersection Summary	
Area Type: Other	
Cycle Length: 168	
Actuated Cycle Length: 53.3	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.58	
Intersection Signal Delay: 11.9	Intersection LOS: B
Intersection Capacity Utilization 51.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 82: Derry Rd/102 & Page Rd



Appendix B – Traffic Count Data

B.1 Existing (2022) Intersection Turning Movement Counts

B.2 Future 2030 Projected Intersection Turning Movement Counts

B.3 Future 2045 Projected Intersection Turning Movement Counts

B.4 Segment Traffic Counts – Existing and Projected

B.1 Existing (2022) Intersection Turning Movement Counts

HUD#	Intersection	Traffic Count Date	Turning Movement Count (AM PEAK)											
			NR	NT	NL	ER	ET	EL	SR	ST	SL	WR	WT	WL
1	111-102-3A (Ferry & Chase)	05/04/22 & 05/10/22	17	13	243	9	480	403	697	73	0	0	480	0
2	Library & Ferry	05/04/22 & 05/10/22	8	277	10	13	410	0	3	378	25	12	373	2
3	Library and Highland	05/04/22 & 05/10/22	**See Special Intersection Table**											
4	Burnham and Central	05/04/22 & 05/10/22	14	6	16	14	269	13	34	4	390	513	368	17
5	Central-Kimball-Greeley (Rt.111 & Greeley)	8/9/2022	**See Special Intersection Table**											
6	Derry and 102 (Route 102 & Elm Ave)	05/04/22 & 05/10/22	0	660	133	268	0	44	11	800	0	0	0	1
7	NH 102/Page Rd	08/09/22	0	435	34	68	0	95	47	504	0	0	0	0
8	NH 3A Central St/Chase St	08/18/22	3	2	0	1	259	18	4	2	62	227	8	3
9	Central and Library	05/04/22 & 05/10/22	1	1	1	0	290	1	1	9	408	239	347	2
10	Lowell and Central	05/04/22 & 05/10/22	0	0	0	0	607	128	125	0	199	109	463	0
11	Lowell and Pelham	05/04/22 & 05/10/22	85	555	0	0	0	0	0	868	72	74	0	202
12	Lowell and Executive	05/04/22 & 05/10/22	74	442	110	84	4	31	142	786	83	106	19	158
13	Lowell-Hampshire-Oblate	05/04/22 & 05/10/22	3	750	86	13	0	6	36	989	2	2	0	4
14	Lowell & Wason	05/04/22 & 05/10/22	178	716	171	208	24	36	28	848	22	45	59	432
[15N]	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section	08/16/22	0	948	0	0	0	0	1103	285	0	0	0	0
[15M]	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section	08/30/22	0	189	689	0	0	735	0	0	0	0	0	0
[15S]	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section	08/16/22	0	854	0	638	0	0	0	277	0	0	0	0
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	-	**See Special Intersection Table**											
16	NH 3A Lowell Rd/Walmart Blvd	08/02/22	23	766	59	44	11	90	84	697	94	91	9	21
17	NH 3A Lowell Rd/Rena Ave	08/04/22	3	821	17	1	0	5	55	655	7	23	0	6
18	NH 3A Lowell Rd/Dracut Rd/Steele Rd	08/10/22	**See Special Intersection Table**											
19	Dracut Rd/Sherburne Rd	07/21/22	49	237	0	0	0	0	0	178	214	285	0	88
20	Kimball Hill Rd/Bush Hill Rd	08/03/22	23	0	87	133	164	0	0	0	0	0	170	54
21	Central St/Belknap Rd	09/01/22	201	0	9	2	142	0	0	0	0	0	226	174
22	Lowell and Fox (11/21 & 11/23)	11/21/22 &11/23/22	6	930	39	31	1	35	3	644	17	25	4	17
23	Lowell and Birch (11/21 & 11/23)	11/21/22 &11/23/22	0	534	32	32	0	38	12	736	0	0	0	0

Red font = Adjustment made

HUD#	Intersection	Traffic Count Date	Truck TMC (AM PEAK)											
			NR	NT	NL	ER	ET	EL	SR	ST	SL	WR	WT	WL
1	111-102-3A (Ferry & Chase)	5/10/22	0.6	0.4	9	0.3	17	14	32	3.1	0	0	17	0
2	Library & Ferry	5/10/22	0.1	4.3	0.1	0.2	6.3	0	0	0.9	0.1	0.2	6.3	0
3	Library and Highland	5/10/22	**See Special Intersection Table**											
4	Burnham and Central	5/10/22	0.2	0.1	0.2	0.2	4.6	0.2	0.7	0.1	6.8	10	7.3	0.5
5	Central-Kimball-Greeley (Rt.111 & Greeley)	8/9/2022	**See Special Intersection Table**											
6	Derry and 102 (Route 102 & Elm Ave)	5/10/22	0	14	2.6	7.7	0	1.3	0.2	17	0	0	0	0
7	NH 102/Page Rd	08/09/22	0	34	0	0	0	4	7	28	0	0	0	0
8	NH 3A Central St/Chase St	08/18/22	1	0	0	0	0	13	0	0	9	9	0	0
9	Central and Library	5/10/22	0	0	0	0	3.5	0	0	0.1	3.4	0	4.5	0
10	Lowell and Central	5/10/22	-	-	-	0	8.6	1.9	2.3	0	3.7	2.4	10	0
11	Lowell and Pelham	5/10/22	2.1	14	0	-	-	-	0	376	32	4.1	0	10
12	Lowell and Executive	5/10/22	4.8	30	6.5	0	0.2	1.8	2	11	1.1	0.4	0.1	0.5
13	Lowell-Hampshire-Oblate	5/10/22	0	29	3.3	0	0	0	0.3	8.7	0	0	0	0
14	Lowell & Wason	5/10/22	4.9	18	4.3	66	5.9	9.8	3.3	92	2.2	2.1	2.9	21
[15N]	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section	08/16/22	0	55	0	0	0	0	35	14	0	0	0	0
[15M]	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section	08/30/22	0	22	27	0	0	30	0	23	0	0	0	0
[15S]	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section	08/16/22	0	30	0	25	0	0	0	12	0	0	0	0
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	-	**See Special Intersection Table**											
16	NH 3A Lowell Rd/Walmart Blvd	08/02/22	0	27	1	0	0	6	3	21	2	3	0	1
17	NH 3A Lowell Rd/Rena Ave	08/04/22	0	29	0	0	0	1	1	28	1	1	0	0
18	NH 3A Lowell Rd/Dracut Rd/Steele Rd	08/10/22	**See Special Intersection Table**											
19	Dracut Rd/Sherburne Rd	07/21/22	2	5	0	0	0	0	0	2	20	8	0	12
20	Kimball Hill Rd/Bush Hill Rd	08/03/22	4	0	8	10	6	0	0	0	0	0	9	0
21	Central St/Belknap Rd	09/01/22	9	0	1	2	15	0	0	0	0	0	17	4
22	Lowell and Fox (11/21 & 11/23)	11/21/22 &11/23/22	0	13	1	2.1	0	2.4	0.1	38	0.6	0.5	0.1	0.4
23	Lowell and Birch (11/21 & 11/23)	11/21/22 &11/23/22	0	24	1.6	1	0	1.5	0.8	32	0	-	-	-

Red font = Adjustment made

HUD#	Intersection	Traffic Count Date	Turning Movement Count (AM PEAK - Special Intersections)																			
3	Library and Highland	05/04/22 & 05/10/22	D-NR	D-NT	D-NL	L-NR	L-NT	L-NL	ER-D	ER-L	ET	EL	SR	ST-D	ST-L	SL	WR	WT	WL-D	WL-L		
	D = Derry St; L = Library St		10	570	1	6	357	0	6	4	10	10	0	576	361	0	52	13	2	2		
5	Central-Kimball-Greeley (Rt.111 & Greeley)	08/09/22	H->111E	NR-Win	NT-G	NL-111W	ER-K	ET-111W	EL-Win	EL-G	SR-111W	ST-K	SL-111E	SL-Win	Win-R->G	Win-T->111W	Win-L->K	Win-L->111E	Bypass->Win	111W-R->G	111W-T	111W-L->K
	111E/W = Route 111 Eastbound or Westbound; H = Hamblett Ave; G = Greeley St; K = Kimball Hill Rd; Win = Windham Rd		11	3	102	149	26	478	28	26	72	63	94	10	15	32	16	40	28	124	267	137
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	08/16/22 & 08/30/22	NR	NT	NL-Hwy	ER(no sig)	ET	EL-L	EL-Hwy	SR-Hwy(no sig)	ST	SL	WR	WT	WL							
	L = Lowell Rd; Hwy = Circumferential Highway Ramp; no sig = movement not signalized		-	189	689	638	-	735	0	1103	285	-	-	-	-							
18	NH 3A Lowell Rd/Dracut Rd/ Steele Rd	08/10/22	NR-Dav	NR-Dra	NT-3A/N	NL-Ste	ER-3A/S	ER-Dra	ET-Dav	EL-3A/N	SR-Ste	ST-3A/S	SL-Dra	SL-Dav	WR-Dav	WT-3A/N	WL-3A/S	WL-Ste	DavR-3A/N	DavT-Ste	DavL-Dra	DavL-3A/S
	Dav = Davenport Rd; Dra = Dracut Rd; Ste = Steele Rd; 3A/N = Lowell Rd/3A NB; 3A/S = Lowell Rd/3A SB; Direction Assignment = NB from 3A/S, EB from Steele Rd, SB from 3A/N, WB from Dracut Rd, Davenport Rd as "Dra"		-	-	222	0	2	2	0	7	24	352	346	0	0	572	8	0	1	0	1	0

Red font = Adjustment made

HUD#	Intersection	Traffic Count Date	Truck TMC (AM PEAK - Special Intersections)																			
3	Library and Highland	5/10/22	**D-NR**	**D-NT**	**D-NL**	**L-NR**	**L-NT**	**L-NL**	**ER-D**	**ER-L**	**ET**	**EL**	**SR**	**ST-D**	**ST-L**	**SL**	**WR**	**WT**	**WL-D**	**WL-L**		
	D = Derry St; L = Library St		0.3	9.9	0.0	0.2	6.2	0.0	2.9	1.8	6.1	4.7	0.0	11.7	7.3	0.0	7.3	1.8	0.2	0.2		
5	Central-Kimball-Greeley (Rt.111 & Greeley)	5/10/22	**H->111E**	**NR-Win**	**NT-G**	**NL-111W**	**ER-K**	**ET-111W**	**EL-Win**	**EL-G**	**SR-111W**	**ST-K**	**SL-111E**	**SL-Win**	**Win-R->G**	**Win-T->111W**	**Win-L->K**	**Win-L->111E**	**Bypass->Win**	**111W-R->G**	**111W-T**	**111W-L->K**
	111E/W = Route 111 Eastbound or Westbound; H = Hamblett Ave; G = Greeley St; K = Kimball Hill Rd; Win = Windham Rd		0.3	0.0	2.3	5.0	0.9	36.0	1.1	0.9	2.2	2.3	3.7	0.4	0.1	0.2	0.1	0.2	0.6	5.5	18.0	0.5
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	08/16/22 & 08/30/22	**NR**	**NT**	**NL-Hwy**	**ER(no sig)**	**ET**	**EL-L**	**EL-Hwy**	**SR-Hwy(no sig)**	**ST**	**SL**	**WR**	**WT**	**WL**							
	L = Lowell Rd; Hwy = Circumferential Highway Ramp; no sig = movement not signalized		-	21.5	27	25	-	30	0	34.5	13.5	-	-	-	-							
18	NH 3A Lowell Rd/Dracut Rd/ Steele Rd	08/10/22	**NR-Dav**	**NR-Dra**	**NT-3A/N**	**NL-Ste**	**ER-3A/S**	**ER-Dra**	**ET-Dav**	**EL-3A/N**	**SR-Ste**	**ST-3A/S**	**SL-Dra**	**SL-Dav**	**WR-Dav**	**WT-3A/N**	**WL-3A/S**	**WL-Ste**	**DavR-3A/N**	**DavT-Ste**	**DavL-Dra**	**DavL-3A/S**
	Dav = Davenport Rd; Dra = Dracut Rd; Ste = Steele Rd; 3A/N = Lowell Rd/3A NB; 3A/S = Lowell Rd/3A SB; Direction Assignment = NB from 3A/S, EB from Steele Rd, SB from 3A/N, WB from Dracut Rd, Davenport Rd as "Dra"		-	-	11	0	0	0	0	0	0	15	22	0	0	21	0	0	0	0	0	0

Red font = Adjustment made

HUD#	Intersection	Traffic Count Date	Turning Movement Count (PM PEAK)											
			NR	NT	NL	ER	ET	EL	SR	ST	SL	WR	WT	WL
1	111-102-3A (Ferry & Chase)	05/04/22 & 05/10/22	128	35	349	11	547	368	541	65	0	0	547	0
2	Library & Ferry	05/04/22 & 05/10/22	15	384	20	32	386	0	4	289	39	8	571	6
3	Library and Highland	05/04/22 & 05/10/22	**See Special Intersection Table**											
4	Burnham and Central	05/04/22 & 05/10/22	16	5	27	18	401	25	44	9	447	513	350	23
5	Central-Kimball-Greeley (Rt.111 & Greeley)	8/9/2022	**See Special Intersection Table**											
6	Derry and 102 (Route 102 & Elm Ave)	05/04/22 & 05/10/22	0	728	251	186	0	63	14	644	0	0	0	0
7	NH 102/Page Rd	08/09/22	0	365	47	49	0	74	92	469	0	0	0	0
8	NH 3A Central St/Chase St	08/18/22	4	10	0	5	503	209	5	6	61	265	15	7
9	Central and Library	05/04/22 & 05/10/22	1	0	1	0	320	1	3	1	340	227	563	4
10	Lowell and Central	05/04/22 & 05/10/22	0	0	0	0	650	199	76	0	190	145	718	0
11	Lowell and Pelham	05/04/22 & 05/10/22	94	1036	0	0	0	0	0	802	94	119	0	118
12	Lowell and Executive	05/04/22 & 05/10/22	32	834	63	140	3	128	105	722	36	49	3	74
13	Lowell-Hampshire-Oblate	05/04/22 & 05/10/22	11	1004	23	67	1	19	18	915	3	2	0	6
14	Lowell & Wason	05/04/22 & 05/10/22	529	875	143	292	72	47	32	836	60	38	32	314
[15N]	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section	08/16/22	0	1832	0	0	0	0	1117	472	0	0	0	0
[15M]	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section	08/30/22	0	520	941	0	0	1316	0	456	0	0	0	0
[15S]	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section	08/16/22	0	1365	0	962	0	0	0	445	0	0	0	0
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	-	**See Special Intersection Table**											
16	NH 3A Lowell Rd/Walmart Blvd	08/02/22	54	1013	76	74	23	184	179	1000	199	195	17	72
17	NH 3A Lowell Rd/Rena Ave	08/04/22	14	1034	22	22	1	85	5	1077	64	32	1	7
18	NH 3A Lowell Rd/Dracut Rd/Steele Rd	08/10/22	**See Special Intersection Table**											
19	Dracut Rd/Sherburne Rd	07/21/22	103	358	0	0	0	0	0	452	332	299	0	85
20	Kimball Hill Rd/Bush Hill Rd	08/03/22	41	0	289	114	183	0	0	0	0	0	221	40
21	Central St/Belknap Rd	09/01/22	231	0	8	1	185	0	0	0	0	0	190	141
22	Lowell and Fox (11/21 & 11/23)	11/21/22 &11/23/22	6	796	71	71	4	50	16	1049	23	22	3	13
23	Lowell and Birch (11/21 & 11/23)	11/21/22 &11/23/22	0	790	97	45	0	58	14	722	0	0	0	0

Red font = Adjustment made

HUD#	Intersection	Traffic Count Date	Truck TMC (PM PEAK)											
			NR	NT	NL	ER	ET	EL	SR	ST	SL	WR	WT	WL
1	111-102-3A (Ferry & Chase)	5/10/22	6.3	2.7	16	0.2	6.9	3.7	34	4.1	0	0	6.9	0
2	Library & Ferry	5/10/22	0.1	1.4	0.1	0.1	0.9	0	0	0	0	0	0.5	0
3	Library and Highland	5/10/22	See Special Intersection Table											
4	Burnham and Central	5/10/22	0.1	0.1	0.3	0.1	2.2	0.2	0.5	0.1	4.9	7.6	6	0.4
5	Central-Kimball-Greeley (Rt.111 & Greeley)	8/9/2022	See Special Intersection Table											
6	Derry and 102 (Route 102 & Elm Ave)	5/10/22	0	6.4	2.1	3.2	0	1.3	0.3	12	0	0	0	0
7	NH 102/Page Rd	08/09/22	0	25	0	0	0	2.9	5.1	21	0	0	0	0
8	NH 3A Central St/Chase St	08/18/22	0	0	0	0	11	4	0	0	2	15	1	0
9	Central and Library	5/10/22	0	0	0	0	11	0	0	0	1	0	1.5	0
10	Lowell and Central	5/10/22	-	-	-	0	3.8	1.2	1.6	0	3.4	1.2	6.3	0
11	Lowell and Pelham	5/10/22	1	11	0	-	-	-	0	211	19	2.9	0	3.1
12	Lowell and Executive	5/10/22	1.6	81	5.7	0	0.1	2.4	1	7.3	0.2	0.1	0	0.4
13	Lowell-Hampshire-Oblate	5/10/22	0.2	16	0.4	0	0	0	0.2	7.3	0	0	0	0
14	Lowell & Wason	5/10/22	14	24	4.3	41	9.7	6.4	2.9	84	7.2	2.9	3.4	26
[15N]	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section	08/16/22	0	56	0	0	0	0	23	9	0	0	0	0
[15M]	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section	08/30/22	0	22	32	0	0	66	0	15	0	0	0	0
[15S]	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section	08/16/22	0	27	0	10	0	0	0	8	0	0	0	0
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	-	See Special Intersection Table											
16	NH 3A Lowell Rd/Walmart Blvd	08/02/22	1	17	1	1	0	4	2	10	2	3	0	0
17	NH 3A Lowell Rd/Rena Ave	08/04/22	0	17	0	0	0	2	1	8	0	0	0	0
18	NH 3A Lowell Rd/Dracut Rd/Steele Rd	08/10/22	See Special Intersection Table											
19	Dracut Rd/Sherburne Rd	07/21/22	5	4	0	0	0	0	0	1	4	10	0	1
20	Kimball Hill Rd/Bush Hill Rd	08/03/22	13	0	25	31	19	0	0	0	0	0	28	0
21	Central St/Belknap Rd	09/01/22	0	0	0	0	2	0	0	0	0	0	2	0
22	Lowell and Fox (11/21 & 11/23)	11/21/22 &11/23/22	0.1	20	2.2	0.8	0	0.6	0.2	27	0.7	11	1.9	7
23	Lowell and Birch (11/21 & 11/23)	11/21/22 &11/23/22	0	94	12	3.1	0	3.4	0.8	42	0	-	-	-

Red font = Adjustment made

HUD#	Intersection	Traffic Count Date	Turning Movement Count (PM PEAK - Special Intersections)																			
3	Library and Highland	05/04/22 & 05/10/22	**D-NR**	**D-NT**	**D-NL**	**L-NR**	**L-NT**	**L-NL**	**ER-D**	**ER-L**	**ET**	**EL**	**SR**	**ST-D**	**ST-L**	**SL**	**WR**	**WT**	**WL-D**	**WL-L**		
	D = Derry St; L = Library St		16	665	0	10	449	0	16	11	13	28	2	446	302	0	27	15	1	1		
5	Central-Kimball-Greeley (Rt.111 & Greeley)	08/09/22	**H->111E**	**NR-Win**	**NT-G**	**NL-111W**	**ER-K**	**ET-111W**	**EL-Win**	**EL-G**	**SR-111W**	**ST-K**	**SL-111E**	**SL-Win**	**Win-R->G**	**Win-T->111W**	**Win-L->K**	**Win-L->111E**	**Bypass->Win**	**111W-R->G**	**111W-T**	**111W-L->K**
	111E/W = Route 111 Eastbound or Westbound; H = Hamblett Ave; G = Greeley St; K = Kimball Hill Rd; Win = Windham Rd		63	25	146	190	60	613	26	77	50	49	59	3	7	32	19	33	26	65	295	171
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	08/16/22 & 08/30/22	**NR**	**NT**	**NL-Hwy**	**ER(no sig)**	**ET**	**EL-L**	**EL-Hwy**	**SR-Hwy(no sig)**	**ST**	**SL**	**WR**	**WT**	**WL**							
	L = Lowell Rd; Hwy = Circumferential Highway Ramp; no sig = movement not signalized		-	520	941	962	-	1316	0	1117	472	-	-	-	-							
18	NH 3A Lowell Rd/Dracut Rd/ Steele Rd	08/10/22	**NR-Dav**	**NR-Dra**	**NT-3A/N**	**NL-Ste**	**ER-3A/S**	**ER-Dra**	**ET-Dav**	**EL-3A/N**	**SR-Ste**	**ST-3A/S**	**SL-Dra**	**SL-Dav**	**WR-Dav**	**WT-3A/N**	**WL-3A/S**	**WL-Ste**	**DavR-3A/N**	**DavT-Ste**	**DavL-Dra**	**DavL-3A/S**
	Dav = Davenport Rd; Dra = Dracut Rd; Ste = Steele Rd; 3A/N = Lowell Rd/3A NB; 3A/S = Lowell Rd/3A SB; Direction Assignment = NB from 3A/S, EB from Steele Rd, SB from 3A/N, WB from Dracut Rd, Davenport Rd as "Dra"		-	-	413	0	4	8	0	22	24	355	761	1	1	634	5	2	0	0	0	0

Red font = Adjustment made

HUD#	Intersection	Traffic Count Date	Truck TMC (PM PEAK - Special Intersections)																			
3	Library and Highland	5/10/22	**D-NR**	**D-NT**	**D-NL**	**L-NR**	**L-NT**	**L-NL**	**ER-D**	**ER-L**	**ET**	**EL**	**SR**	**ST-D**	**ST-L**	**SL**	**WR**	**WT**	**WL-D**	**WL-L**		
	D = Derry St; L = Library St		0.2	5.5	0.0	0.1	3.7	0.0	2.1	1.4	2.8	3.6	0.0	9.8	6.2	0.0	0.8	0.7	0.0	0.0		
5	Central-Kimball-Greeley (Rt.111 & Greeley)	5/10/22	**H->111E**	**NR-Win**	**NT-G**	**NL-111W**	**ER-K**	**ET-111W**	**EL-Win**	**EL-G**	**SR-111W**	**ST-K**	**SL-111E**	**SL-Win**	**Win-R->G**	**Win-T->111W**	**Win-L->K**	**Win-L->111E**	**Bypass->Win**	**111W-R->G**	**111W-T**	**111W-L->K**
	111E/W = Route 111 Eastbound or Westbound; H = Hamblett Ave; G = Greeley St; K = Kimball Hill Rd; Win = Windham Rd		2.0	0.5	5.5	17.5	0.6	25.5	0.3	0.7	2.1	2.0	1.7	0.2	0.1	0.5	0.3	0.5	0.4	2.0	19.5	8.0
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	08/16/22 & 08/30/22	**NR**	**NT**	**NL-Hwy**	**ER(no sig)**	**ET**	**EL-L**	**EL-Hwy**	**SR-Hwy(no sig)**	**ST**	**SL**	**WR**	**WT**	**WL**							
	L = Lowell Rd; Hwy = Circumferential Highway Ramp; no sig = movement not signalized		-	22	32	10	-	66	0	23	9	-	-	-	-							
18	NH 3A Lowell Rd/Dracut Rd/ Steele Rd	08/10/22	**NR-Dav**	**NR-Dra**	**NT-3A/N**	**NL-Ste**	**ER-3A/S**	**ER-Dra**	**ET-Dav**	**EL-3A/N**	**SR-Ste**	**ST-3A/S**	**SL-Dra**	**SL-Dav**	**WR-Dav**	**WT-3A/N**	**WL-3A/S**	**WL-Ste**	**DavR-3A/N**	**DavT-Ste**	**DavL-Dra**	**DavL-3A/S**
	Dav = Davenport Rd; Dra = Dracut Rd; Ste = Steele Rd; 3A/N = Lowell Rd/3A NB; 3A/S = Lowell Rd/3A SB; Direction Assignment = NB from 3A/S, EB from Steele Rd, SB from 3A/N, WB from Dracut Rd, Davenport Rd as "Dra"		-	-	9	0	0	0	0	0	0	10	13	0	0	12	0	0	0	0	0	0

Red font = Adjustment made

B.2 Future 2030 Projected Intersection Turning Movement Counts

HUD#	Intersection	Projected for	Turning Movement Count (AM PEAK)											
			NR	NT	NL	ER	ET	EL	SR	ST	SL	WR	WT	WL
1	111-102-3A (Ferry & Chase)	2030	17	14	217	9	531	420	649	72	0	0	487	0
2	Library & Ferry	2030	5	268	53	13	457	0	3	361	24	11	318	0
3	Library and Highland	2030	**See Special Intersection Table**											
4	Burnham and Central	2030	14	6	16	14	233	13	36	4	435	462	408	17
5	Central-Kimball-Greeley (Rt.111 & Greeley)	2030	**See Special Intersection Table**											
6	Derry and 102 (Route 102 & Elm Ave)	2030	0	641	156	291	0	42	12	774	0	0	0	1
7	NH 102/Page Rd	2030	0	449	26	67	0	101	51	489	0	0	0	0
8	NH 3A Central St/Chase St	2030	3	2	0	0	294	18	4	2	61	194	8	3
9	Central and Library	2030	1	1	1	0	325	1	1	9	382	295	282	2
10	Lowell and Central	2030	0	0	0	0	697	69	92	0	150	128	495	0
11	Lowell and Pelham	2030	87	591	0	0	0	0	0	868	78	77	0	202
12	Lowell and Executive	2030	217	442	224	84	7	31	142	786	169	130	22	211
13	Lowell-Hampshire-Oblate	2030	3	911	89	15	0	17	64	989	2	2	0	4
14	Lowell & Wason	2030	178	859	186	246	24	36	29	848	22	45	64	432
[15N]	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section	2030	0	1203	0	0	0	0	1120	279	0	0	0	0
[15M]	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section	2030	0	234	689	10	0	830	0	0	0	0	0	0
[15S]	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section	2030	0	843	0	603	0	0	0	323	0	0	0	0
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	2030	**See Special Intersection Table**											
16	NH 3A Lowell Rd/Walmart Blvd	2030	25	744	55	45	11	94	71	718	99	96	9	23
17	NH 3A Lowell Rd/Rena Ave	2030	0	831	19	2	0	8	63	698	0	0	0	3
18	NH 3A Lowell Rd/Dracut Rd/Steele Rd	2030	**See Special Intersection Table**											
19	Dracut Rd/Sherburne Rd	2030	49	307	0	0	0	0	0	155	185	269	0	86
20	Kimball Hill Rd/Bush Hill Rd	2030	24	0	93	206	104	0	0	0	0	0	136	69
21	Central St/Belknap Rd	2030	196	0	8	2	96	0	0	0	0	0	233	218
22	Lowell and Fox (11/21 & 11/23)	2030	0	1011	32	38	0	34	3	813	0	0	4	0
23	Lowell and Birch (11/21 & 11/23)	2030	0	594	32	32	0	35	10	680	0	0	0	0

HUD#	Intersection	Projected for	Turning Movement Count (AM PEAK - Special Intersections)																			
3	Library and Highland	2030	D-NR	D-NT	D-NL	L-NR	L-NT	L-NL	ER-D	ER-L	ET	EL	SR	ST-D	ST-L	SL	WR	WT	WL-D	WL-L		
	D = Derry St; L = Library St		88	619	6	6	376	0	7	6	6	8	0	596	355	0	50	13	12	2		
5	Central-Kimball-Greeley (Rt.111 & Greeley)	2030	H->111E	NR-Win	NT-G	NL-111W	ER-K	ET-111W	EL-Win	EL-G	SR-111W	ST-K	SL-111E	SL-Win	Win-R->G	Win-T->111W	Win-L->K	Win-L->111E	Bypass->Win	111W-R->G	111W-T	111W-L->K
	111E/W = Route 111 Eastbound or Westbound; H = Hamblett Ave; G = Greeley St; K = Kimball Hill Rd; Win = Windham Rd		6	3	155	143	41	590	20	1	86	168	108	8	15	6	36	40	28	133	270	44
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	2030	NR	NT	NL-Hwy	ER(no sig)	ET	EL-L	EL-Hwy	SR-Hwy(no sig)	ST	SL	WR	WT	WL							
	L = Lowell Rd; Hwy = Circumferential Highway Ramp; no sig = movement not signalized		-	234	689	603	-	830	0	1120	279	-	-	-	-							
18	NH 3A Lowell Rd/Dracut Rd/ Steele Rd	2030	NR-Dav	NR-Dra	NT-3A/N	NL-Ste	ER-3A/S	ER-Dra	ET-Dav	EL-3A/N	SR-Ste	ST-3A/S	SL-Dra	SL-Dav	WR-Dav	WT-3A/N	WL-3A/S	WL-Ste	DavR-3A/N	DavT-Ste	DavL-Dra	DavL-3A/S
	Dav = Davenport Rd; Dra = Dracut Rd; Ste = Steele Rd; 3A/N = Lowell Rd/3A NB; 3A/S = Lowell Rd/3A SB; Direction Assignment = NB from 3A/S, EB from Steele Rd, SB from 3A/N, WB from Dracut Rd, Davenport Rd as "Dra"		-	-	285	0	0	0	0	0	5	404	83	0	0	666	8	0	0	0	0	0

HUD#	Intersection	Projected for	Turning Movement Count (PM PEAK)											
			NR	NT	NL	ER	ET	EL	SR	ST	SL	WR	WT	WL
1	111-102-3A (Ferry & Chase)	2030	128	31	425	11	734	219	490	64	0	0	566	0
2	Library & Ferry	2030	12	352	20	32	451	131	8	232	38	7	568	2
3	Library and Highland	2030	See Special Intersection Table											
4	Burnham and Central	2030	16	5	27	18	473	26	45	9	380	494	339	23
5	Central-Kimball-Greeley (Rt.111 & Greeley)	2030	See Special Intersection Table											
6	Derry and 102 (Route 102 & Elm Ave)	2030	0	672	273	229	0	64	14	624	0	0	0	0
7	NH 102/Page Rd	2030	0	329	41	39	0	77	100	434	0	0	0	0
8	NH 3A Central St/Chase St	2030	4	8	0	5	514	208	5	6	61	269	15	7
9	Central and Library	2030	1	0	1	0	316	1	3	1	292	235	554	4
10	Lowell and Central	2030	0	0	0	0	633	177	64	0	200	83	757	0
11	Lowell and Pelham	2030	144	1036	0	0	0	0	0	808	94	156	0	122
12	Lowell and Executive	2030	108	834	63	242	7	128	105	722	72	121	7	235
13	Lowell-Hampshire-Oblate	2030	11	1004	25	70	1	50	34	1031	3	2	0	6
14	Lowell & Wason	2030	529	875	196	324	73	48	32	939	60	38	32	314
[15N]	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section	2030	0	1517	0	0	0	0	1365	703	0	0	0	0
[15M]	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section	2030	0	531	941	0	0	1316	0	494	0	0	0	0
[15S]	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section	2030	0	1357	0	885	0	0	0	503	0	0	0	0
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	2030	See Special Intersection Table											
16	NH 3A Lowell Rd/Walmart Blvd	2030	54	1013	76	74	23	184	179	1000	199	195	17	72
17	NH 3A Lowell Rd/Rena Ave	2030	14	1034	22	22	1	85	5	1077	64	32	1	7
18	NH 3A Lowell Rd/Dracut Rd/Steele Rd	2030	See Special Intersection Table											
19	Dracut Rd/Sherburne Rd	2030	102	327	0	0	0	0	0	523	440	293	0	82
20	Kimball Hill Rd/Bush Hill Rd	2030	50	0	327	125	146	0	0	0	0	0	174	45
21	Central St/Belknap Rd	2030	295	0	8	1	211	0	0	0	0	0	189	125
22	Lowell and Fox (11/21 & 11/23)	2030	3	833	167	60	3	50	17	1102	12	11	2	7
23	Lowell and Birch (11/21 & 11/23)	2030	0	711	91	35	0	58	12	697	0	0	0	0

HUD#	Intersection	Projected for	Turning Movement Count (PM PEAK - Special Intersections)																			
3	Library and Highland	2030	**D-NR**	**D-NT**	**D-NL**	**L-NR**	**L-NT**	**L-NL**	**ER-D**	**ER-L**	**ET**	**EL**	**SR**	**ST-D**	**ST-L**	**SL**	**WR**	**WT**	**WL-D**	**WL-L**		
	D = Derry St; L = Library St		16	417	0	10	470	0	15	5	13	28	1	377	286	0	27	10	1	1		
5	Central-Kimball-Greeley (Rt.111 & Greeley)	2030	**H->111E**	**NR-Win**	**NT-G**	**NL-111W**	**ER-K**	**ET-111W**	**EL-Win**	**EL-G**	**SR-111W**	**ST-K**	**SL-111E**	**SL-Win**	**Win-R->G**	**Win-T->111W**	**Win-L->K**	**Win-L->111E**	**Bypass->Win**	**111W-R->G**	**111W-T**	**111W-L->K**
	111E/W = Route 111 Eastbound or Westbound; H = Hamblett Ave; G = Greeley St; K = Kimball Hill Rd; Win = Windham Rd		44	25	259	190	69	719	14	63	61	119	70	4	7	32	19	33	26	79	295	171
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	2030	**NR**	**NT**	**NL-Hwy**	**ER(no sig)**	**ET**	**EL-L**	**EL-Hwy**	**SR-Hwy(no sig)**	**ST**	**SL**	**WR**	**WT**	**WL**							
	L = Lowell Rd; Hwy = Circumferential Highway Ramp; no sig = movement not signalized		-	531	941	885	-	1316	0	1365	703	-	-	-	-							
18	NH 3A Lowell Rd/Dracut Rd/ Steele Rd	2030	**NR-Dav**	**NR-Dra**	**NT-3A/N**	**NL-Ste**	**ER-3A/S**	**ER-Dra**	**ET-Dav**	**EL-3A/N**	**SR-Ste**	**ST-3A/S**	**SL-Dra**	**SL-Dav**	**WR-Dav**	**WT-3A/N**	**WL-3A/S**	**WL-Ste**	**DavR-3A/N**	**DavT-Ste**	**DavL-Dra**	**DavL-3A/S**
	Dav = Davenport Rd; Dra = Dracut Rd; Ste = Steele Rd; 3A/N = Lowell Rd/3A NB; 3A/S = Lowell Rd/3A SB; Direction Assignment = NB from 3A/S, EB from Steele Rd, SB from 3A/N, WB from Dracut Rd, Davenport Rd as "Dra"		-	-	422	0	0	0	0	5	2	315	144	0	0	653	5	2	0	0	0	0

B.3 Future 2045 Projected Intersection Turning Movement Counts

HUD#	Intersection	Projected for	Turning Movement Count (AM PEAK)											
			NR	NT	NL	ER	ET	EL	SR	ST	SL	WR	WT	WL
1	111-102-3A (Ferry & Chase)	2045	17	14	218	9	546	422	668	73	0	0	449	0
2	Library & Ferry	2045	4	254	63	13	489	0	3	371	24	11	283	1
3	Library and Highland	2045	**See Special Intersection Table**											
4	Burnham and Central	2045	14	6	16	14	186	13	37	4	470	452	429	17
5	Central-Kimball-Greeley (Rt.111 & Greeley)	2045	**See Special Intersection Table**											
6	Derry and 102 (Route 102 & Elm Ave)	2045	0	646	143	292	0	41	12	781	0	0	0	1
7	NH 102/Page Rd	2045	0	444	27	71	0	102	52	486	0	0	0	0
8	NH 3A Central St/Chase St	2045	3	3	0	1	299	18	4	2	61	191	8	3
9	Central and Library	2045	1	1	1	0	325	1	1	9	388	299	272	2
10	Lowell and Central	2045	0	0	0	0	716	67	101	0	139	123	485	0
11	Lowell and Pelham	2045	89	585	0	0	0	0	0	868	109	77	0	202
12	Lowell and Executive	2045	254	442	231	84	8	31	142	786	192	137	23	227
13	Lowell-Hampshire-Oblate	2045	3	950	88	15	0	18	70	989	2	2	0	4
14	Lowell & Wason	2045	178	879	181	253	24	36	29	848	22	45	67	432
[15N]	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section	2045	0	1236	0	0	0	0	1113	244	0	0	0	0
[15M]	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section	2045	0	235	689	49	0	825	0	0	0	0	0	0
[15S]	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section	2045	0	848	0	566	0	0	0	355	0	0	0	0
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	2045	**See Special Intersection Table**											
16	NH 3A Lowell Rd/Walmart Blvd	2045	24	757	54	45	11	92	68	720	95	92	9	22
17	NH 3A Lowell Rd/Rena Ave	2045	2	838	19	2	0	8	62	695	4	12	0	2
18	NH 3A Lowell Rd/Dracut Rd/Steele Rd	2045	**See Special Intersection Table**											
19	Dracut Rd/Sherburne Rd	2045	48	316	0	0	0	0	0	134	159	309	0	85
20	Kimball Hill Rd/Bush Hill Rd	2045	24	0	96	205	104	0	0	0	0	0	133	68
21	Central St/Belknap Rd	2045	187	0	8	2	59	0	0	0	0	0	236	261
22	Lowell and Fox (11/21 & 11/23)	2045	3	975	29	38	1	38	3	845	9	13	4	9
23	Lowell and Birch (11/21 & 11/23)	2045	0	559	31	32	0	35	10	717	0	0	0	0

HUD#	Intersection	Projected for	Turning Movement Count (AM PEAK - Special Intersections)																			
3	Library and Highland	2045	D-NR	D-NT	D-NL	L-NR	L-NT	L-NL	ER-D	ER-L	ET	EL	SR	ST-D	ST-L	SL	WR	WT	WL-D	WL-L		
	D = Derry St; L = Library St		111	653	1	6	365	0	7	8	6	8	0	573	355	0	50	13	24	2		
5	Central-Kimball-Greeley (Rt.111 & Greeley)	2045	H->111E	NR-Win	NT-G	NL-111W	ER-K	ET-111W	EL-Win	EL-G	SR-111W	ST-K	SL-111E	SL-Win	Win-R->G	Win-T->111W	Win-L->K	Win-L->111E	Bypass->Win	111W-R->G	111W-T	111W-L->K
	111E/W = Route 111 Eastbound or Westbound; H = Hamblett Ave; G = Greeley St; K = Kimball Hill Rd; Win = Windham Rd		6	3	165	164	35	607	22	15	78	178	110	8	15	14	39	40	28	134	268	11
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	2045	NR	NT	NL-Hwy	ER(no sig)	ET	EL-L	EL-Hwy	SR-Hwy(no sig)	ST	SL	WR	WT	WL							
	L = Lowell Rd; Hwy = Circumferential Highway Ramp; no sig = movement not signalized		-	235	689	566	-	825	0	1113	244	-	-	-	-							
18	NH 3A Lowell Rd/Dracut Rd/ Steele Rd	2045	NR-Dav	NR-Dra	NT-3A/N	NL-Ste	ER-3A/S	ER-Dra	ET-Dav	EL-3A/N	SR-Ste	ST-3A/S	SL-Dra	SL-Dav	WR-Dav	WT-3A/N	WL-3A/S	WL-Ste	DavR-3A/N	DavT-Ste	DavL-Dra	DavL-3A/S
	Dav = Davenport Rd; Dra = Dracut Rd; Ste = Steele Rd; 3A/N = Lowell Rd/3A NB; 3A/S = Lowell Rd/3A SB; Direction Assignment = NB from 3A/S, EB from Steele Rd, SB from 3A/N, WB from Dracut Rd, Davenport Rd as "Dra"		-	-	391	0	2	0	0	8	6	572	63	0	0	699	8	0	0	0	0	0

HUD#	Intersection	Projected for	Turning Movement Count (PM PEAK)											
			NR	NT	NL	ER	ET	EL	SR	ST	SL	WR	WT	WL
1	111-102-3A (Ferry & Chase)	2045	128	29	364	11	660	234	514	63	0	0	605	0
2	Library & Ferry	2045	11	350	138	32	450	72	4	244	38	6	523	2
3	Library and Highland	2045	See Special Intersection Table											
4	Burnham and Central	2045	16	5	27	18	504	27	45	9	376	466	378	23
5	Central-Kimball-Greeley (Rt.111 & Greeley)	2045	See Special Intersection Table											
6	Derry and 102 (Route 102 & Elm Ave)	2045	0	703	291	223	0	66	13	637	0	0	0	0
7	NH 102/Page Rd	2045	0	328	46	41	0	79	103	422	0	0	0	0
8	NH 3A Central St/Chase St	2045	4	9	0	5	482	209	5	6	61	237	15	7
9	Central and Library	2045	1	0	1	0	259	1	3	1	298	295	501	4
10	Lowell and Central	2045	0	0	0	0	645	117	94	0	184	86	745	0
11	Lowell and Pelham	2045	167	1036	0	0	0	0	0	802	94	186	0	130
12	Lowell and Executive	2045	132	834	63	274	8	128	105	722	80	142	8	276
13	Lowell-Hampshire-Oblate	2045	11	1004	25	69	1	55	32	1088	3	2	0	6
14	Lowell & Wason	2045	529	875	209	297	76	48	32	942	60	38	34	314
[15N]	NH 3A Lowell Rd/Sagamore Bridge Rd - Northern Section	2045	0	1504	0	0	0	0	1445	751	0	0	0	0
[15M]	NH 3A Lowell Rd/Sagamore Bridge Rd - Middle Section	2045	0	530	941	48	0	1316	0	485	0	0	0	0
[15S]	NH 3A Lowell Rd/Sagamore Bridge Rd - Southern Section	2045	0	1324	0	771	0	0	0	602	0	0	0	0
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	2045	See Special Intersection Table											
16	NH 3A Lowell Rd/Walmart Blvd	2045	55	985	76	70	23	167	176	965	200	196	17	73
17	NH 3A Lowell Rd/Rena Ave	2045	10	1033	23	24	1	92	9	1072	30	16	1	3
18	NH 3A Lowell Rd/Dracut Rd/Steele Rd	2045	See Special Intersection Table											
19	Dracut Rd/Sherburne Rd	2045	100	312	0	0	0	0	0	528	404	295	0	81
20	Kimball Hill Rd/Bush Hill Rd	2045	39	0	330	126	148	0	0	0	0	0	156	40
21	Central St/Belknap Rd	2045	338	0	9	1	239	0	0	0	0	0	252	133
22	Lowell and Fox (11/21 & 11/23)	2045	3	761	234	58	3	56	7	1069	12	11	2	7
23	Lowell and Birch (11/21 & 11/23)	2045	0	598	91	32	0	58	11	678	0	0	0	0

HUD#	Intersection	Projected for	Turning Movement Count (PM PEAK - Special Intersections)																			
3	Library and Highland	2045	**D-NR**	**D-NT**	**D-NL**	**L-NR**	**L-NT**	**L-NL**	**ER-D**	**ER-L**	**ET**	**EL**	**SR**	**ST-D**	**ST-L**	**SL**	**WR**	**WT**	**WL-D**	**WL-L**		
	D = Derry St; L = Library St		8	586	0	10	495	0	17	21	14	28	0	403	287	0	27	11	1	1		
5	Central-Kimball-Greeley (Rt.111 & Greeley)	2045	**H->111E**	**NR-Win**	**NT-G**	**NL-111W**	**ER-K**	**ET-111W**	**EL-Win**	**EL-G**	**SR-111W**	**ST-K**	**SL-111E**	**SL-Win**	**Win-R->G**	**Win-T->111W**	**Win-L->K**	**Win-L->111E**	**Bypass->Win**	**111W-R->G**	**111W-T**	**111W-L->K**
	111E/W = Route 111 Eastbound or Westbound; H = Hamblett Ave; G = Greeley St; K = Kimball Hill Rd; Win = Windham Rd		32	25	264	219	85	769	25	67	59	135	75	4	12	53	43	33	26	90	295	171
15	NH 3A Lowell Rd/Sagamore Bridge Rd - Combined	2045	**NR**	**NT**	**NL-Hwy**	**ER(no sig)**	**ET**	**EL-L**	**EL-Hwy**	**SR-Hwy(no sig)**	**ST**	**SL**	**WR**	**WT**	**WL**							
	L = Lowell Rd; Hwy = Circumferential Highway Ramp; no sig = movement not signalized		-	530	941	771	-	1316	0	1445	751	-	-	-	-							
18	NH 3A Lowell Rd/Dracut Rd/ Steele Rd	2045	**NR-Dav**	**NR-Dra**	**NT-3A/N**	**NL-Ste**	**ER-3A/S**	**ER-Dra**	**ET-Dav**	**EL-3A/N**	**SR-Ste**	**ST-3A/S**	**SL-Dra**	**SL-Dav**	**WR-Dav**	**WT-3A/N**	**WL-3A/S**	**WL-Ste**	**DavR-3A/N**	**DavT-Ste**	**DavL-Dra**	**DavL-3A/S**
	Dav = Davenport Rd; Dra = Dracut Rd; Ste = Steele Rd; 3A/N = Lowell Rd/3A NB; 3A/S = Lowell Rd/3A SB; Direction Assignment = NB from 3A/S, EB from Steele Rd, SB from 3A/N, WB from Dracut Rd, Davenport Rd as "Dra"		-	-	541	0	0	1	0	4	2	395	197	0	0	634	5	2	0	0	0	0

B.4 Segment Traffic Counts – Existing and Projected

Segment #	Description	2022 Traffic Count	Projected 2030 (Calibrated)	Projected 2045 (Calibrated)	Modeled Count 2020 (Not Used)	Modeled Count 2030 (Not Used)	Modeled Count 2045 (Not Used)
A	NH 3A (Central St) west of Library St	9,894	11,924	12,262	14,421	16,451	16,788
B	NH 3A (Central St) east of Library St	19,912	22,739	23,650	20,711	23,538	24,450
C	Lowell Road south of Central St	21,915	24,358	25,027	15,883	18,326	18,995
D	Lowell Road south of Pelham Road	24,233	26,669	26,878	18,865	21,301	21,509
E	Lowell Road south of Wason Road	39,160	49,695	52,284	34,754	45,288	47,877
F	Lowell Road south of Rena Avenue	25,864	32,550	34,867	30,189	36,875	39,191
G	River Road at Mass State Line	7,194	8,387	9,469	8,803	9,996	11,078
H	NH 102 at Litchfield Town Line	14,208	15,154	15,614	14,310	15,256	15,716
I	NH 102 north of Easy Street	16,733	17,215	17,712	15,083	15,565	16,062
J	NH 102/3A north of Ledge Road	24,648	25,370	26,045	18,176	18,897	19,573
K	NH 111 (Ferry Street) east of Library Street	13,534	14,492	14,737	14,702	15,659	15,904
L	NH 111 (Burnham Road) north of Central Street	11,720	11,996	12,408	14,694	14,970	15,382
M	NH 111 (Central Street) west of Kimball Hill Road	20,816	22,084	22,932	21,991	23,258	24,107
N	Belknap Road south of Central Street	4,879	5,582	5,844	5,620	6,323	6,585
O	Kimball Hill Road south of NH 111	7,299	8,421	8,822	9,396	10,519	10,919
P	Dracut Road at Mass State Line	9,578	9,749	9,834	9,023	9,194	9,279
Q	Wason Road east of NH 3A	8,744	9,032	9,214	8,634	8,922	9,104
R	Bush Hill Road north of Wason Road	6,579	8,249	8,788	8,665	10,335	10,874

METROPOLITAN PLANNING ORGANIZATION

Hudson Townwide Traffic Study

2022-2023

Summary

Hudson Board of Selectmen Meeting

July 25th 2023

Hudson Townwide Traffic Study

METROPOLITAN PLANNING ORGANIZATION

Tonight's Discussion

- Project Purpose
- Scope of work
- Methodology
- Findings
  - LOS for Intersections
  - LOS for Road Segments
  - Problem Areas
- Conclusions

Hudson Townwide Traffic Study

METROPOLITAN PLANNING ORGANIZATION

Project Purpose

- Study the long-term impacts of planned and potential future development on the town's arterial highway network and potential spillover onto local streets
- Report on the existing (2022) road capacity (level of service) and forecast of future conditions in 2030 and 2045
- Funded by NRPC's Unified Planning Work Program (UPWP) under the Special Projects category

Hudson Townwide Traffic Study

Scope of Work

- Existing Conditions Analysis (23 intersections & 18 road segments)
  - Data Collection
  - Intersection & Road Segment Level of Service Analysis
- Future Conditions Analysis (2030 & 2045 scenarios)
- Existing & Future Conditions Mapping
- Other Considerations
  - Hudson Master Plan – 2020 update
  - Hudson Logistics Center and other foreseeable developments
  - Hudson Boulevard
  - Other local studies

Hudson Townwide Traffic Study

Methodology

- Data Collection
  - Automatic Traffic Recorder Counts (for road segments)
  - Turning Movement Counts (for intersections)
  - Hudson's GridSmart Traffic Detection System (for intersections)
- Existing Conditions Analysis
  - **Arterial/Road Segment Level of Service:** volume-to-capacity ratios (total volume/total capacity)
  - **Intersection Level of Service:** SYNCHRO software based on the Highway Capacity Manual (HCM) methodology
- Future Conditions Analysis
  - **TransCAD Regional Traffic Model:** Model run for 2030 & 2045; based on current regional land use growth projection & planned infrastructure projects.

Hudson Townwide Traffic Study

Findings – Intersection Level of Service (LOS)

- A qualitative measure used to relate the quality of motor vehicle traffic service.

LOS for Signalized Intersections

LOS	Intersection Delay (seconds)
A	≤10
B	10 to 20
C*	*20 to 35*
D	35 to 55
E	55 to 80
F	>80

LOS for Unsignalized/ Stop-Controlled Intersections

LOS	Intersection Delay (seconds)
A	≤10
B	10 to 15
C*	*15 to 25*
D	25 to 35
E	35 to 50
F	>50

Source: Highway Capacity Manual

**** LOS C is the target LOS for intersections***

METROPOLITAN PLANNING ORGANIZATION

Hudson Townwide Traffic Study

METROPOLITAN PLANNING ORGANIZATION

Findings – LOS for Intersections

#	Intersection	AM Peak 2022 LOS	AM Peak 2030 LOS	AM Peak 2045 LOS	PM Peak 2022 LOS	PM Peak 2030 LOS	PM Peak 2045 LOS
1	111-102-3A (Ferry & Chase)	F	F	F	F	F	F
2	Library St & Ferry St	C	C	C	C	D	C
3	Library St & Highland St	C	D	D	D	D	D
4	Burnham Rd & Central St	D	E	E	D	D	D
5	Central-Kimball-Greeley (Rt.111 & Greeley)	F	F	F	F	F	F
6	NH102 & Elm Ave	B	B	B	B	B	B
7	NH 102 & Page Rd#	A*	B	B	A*	B	B
8	Central St & Chase St	A*	A*	A*	A*	A*	A*
9	Central St & Library St	B	B	B	C	B	B
10	Lowell Rd & Central Rd	B	B	B	C	C	C
11	Lowell Rd & Pelham Rd	C	C	C	D	E	E
12	Lowell Rd & Executive Dr	C	C	D	B	C	C
13	Lowell Rd-Hampshire Dr-Oblate Dr	A	A	A	A	A	A
14	Lowell Rd & Wason Rd#	D	D	D	D	D	D
15	Lowell Rd & Sagamore Bridge Rd#	B	B	B	E	D	E
16	Lowell Rd & Walmart Blvd#	C	B	B	C	C	C
17	Lowell Rd & Rena Ave#	A	A	A	B	B	B
18	Lowell Rd/Dracut Rd/Steele Rd#	C	C	C	F	C	F
19	Dracut Rd & Sherburne Rd#	A*	B	B	F*	B	B
20	Kimball Hill Rd & Bush Hill Rd	A*	A*	A*	A*	A*	A*
21	Central St & Belknap Rd	A*	A*	A*	A*	A*	A*
22	Lowell Rd & Fox Hollow Dr	B	A	B	C	C	D
23	Lowell Rd & Birch St	A	A	A	B	B	B

* Unsignalized intersection in various configurations.

Blue LOS indicates an improvement In LOS and Red LOS indicates a decline in LOS

\# Improvement made to the intersection in 2030 and 2045

NRPC

Value yesterday. Enhance tomorrow. Plan today

Hudson Townwide Traffic Study

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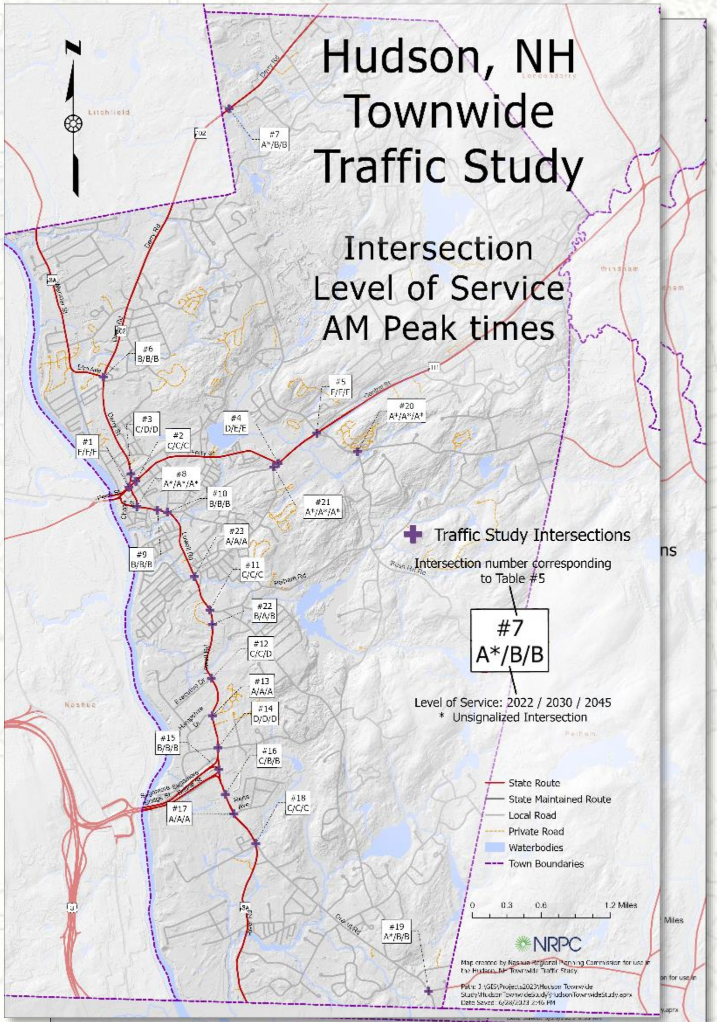
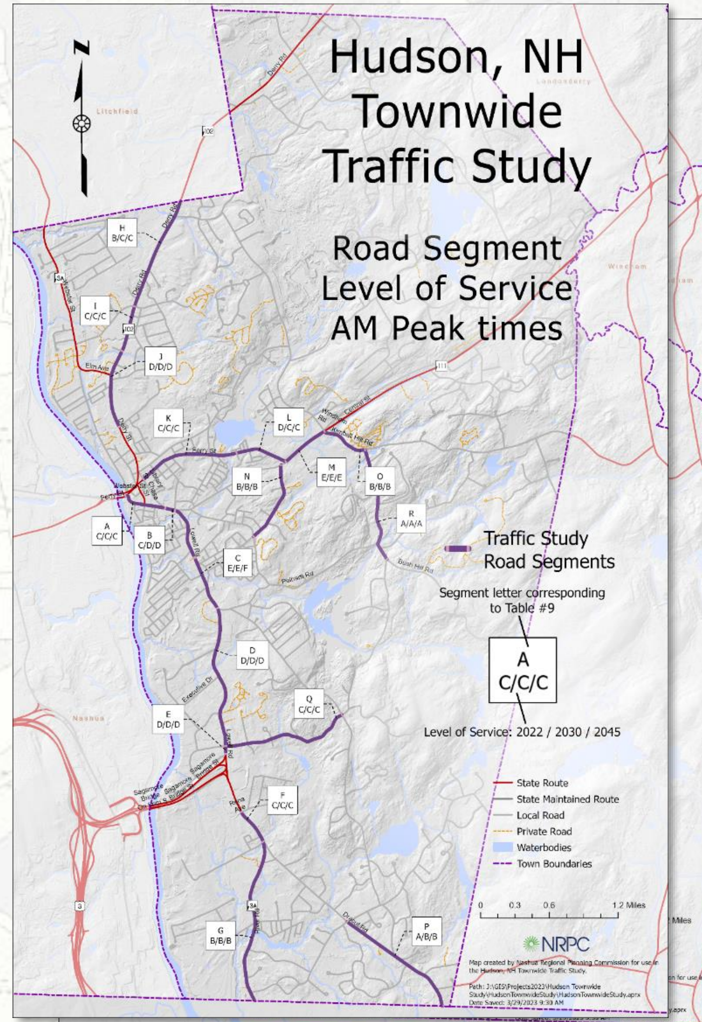
Findings – Maps





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Hudson Townwide Traffic Study

METROPOLITAN PLANNING ORGANIZATION

Findings – Road Segment Level of Service (LOS)

- A qualitative measure used to relate the quality of motor vehicle traffic service.

Single-Lane Arterials Uninterrupted Flow

	Ave Speed = 50		Ave Speed = 40		Ave Speed = 30	
LOS	V/C	VPL/Hr	V/C	VPL/Hr	V/C	VPL/Hr
A	0.30	480	0.30	420	0.30	360
B	0.40	640	0.40	560	0.40	480
C	0.60	960	0.60	840	0.60	720
D	0.80	1280	0.80	1120	0.80	960
E	1.00	1600	1.00	1400	1.00	1200
F	>1	>1600	>1	>1400	>1	>1200

Signalized Arterials

	<2 signal int/mi.		2-4 signal int/mi.		>4 signal int/mi.	
LOS	V/C	VPL/Hr	V/C	VPL/Hr	V/C	VPL/Hr
A	..	..	..	..	..	..
B	0.40	420	0.40	360	..	..
C	0.60	630	0.60	540	0.60	450
D	0.80	840	0.80	720	0.80	600
E	1.00	1050	1.00	900	1.00	750
F	>1	>1050	>1	>900	>1	>750

Hudson Townwide Traffic Study

METROPOLITAN PLANNING ORGANIZATION

Findings – LOS for Road Segments

#	Segment	AM Peak						PM Peak					
		2022		2030		2045		2022		20330		2045	
		V/C	LOS	V/C	V/C	LOS	V/C	V/C	LOS	V/C	LOS	LOS	V/C
A	NH 3A (Central St) west of Library St	0.4	C	0.5	C	0.5	C	0.6	D	0.7	D	0.7	D
B	NH 3A (Central St) east of Library St	0.5	C	0.6	D	0.6	D	0.7	D	0.8	D	0.8	E
C	Lowell Rd south of Central St	0.9	E	1.0	E	1.0	F	1.1	F	1.2	F	1.3	F
D	Lowell Rd south of Pelham Rd	0.7	D	0.7	D	0.7	D	0.8	D	0.9	D	0.9	E
E	Lowell Rd south of Wason Rd#	0.6	D	0.7	D	0.8	D	0.8	E	1.0	E	1.0	F
F	Lowell Rd south of Rena Ave#	0.5	C	0.5	C	0.5	C	0.7	D	0.6	D	0.7	D
G	River Rd at Mass State Line	0.2	B	0.3	B	0.3	B	0.3	B	0.4	B	0.4	C
H	NH 102 at Litchfield Town Line#	0.3	B	0.5	C	0.5	C	0.4	B	0.6	C	0.6	C
I	NH 102 north of Easy St	0.5	C	0.5	C	0.6	C	0.7	D	0.7	D	0.7	D
J	NH 102/3A north of Ledge Rd	0.7	D	0.7	D	0.7	D	0.9	E	0.9	E	0.9	E
K	NH 111 (Ferry St) east of Library St	0.4	C	0.5	C	0.5	C	0.5	C	0.5	C	0.5	C
L	NH 111 (Burnham Rd) north of Central St	0.5	D	0.5	C	0.5	C	0.6	D	0.6	D	0.6	C
M	NH 111 (Central St) west of Kimball Hill Rd	0.8	E	0.9	E	0.9	E	0.9	E	1.0	F	1.0	F
N	Belknap Rd south of Central St	0.2	B	0.2	B	0.2	B	0.2	B	0.3	B	0.3	B
O	Kimball Hill Rd south of NH 111	0.3	B	0.4	B	0.4	B	0.4	B	0.4	C	0.4	C
P	Dracut Rd at Mass State Line#	0.2	A	0.2	B	0.2	B	0.3	B	0.4	C	0.4	C
Q	Wason Rd east of NH 3A	0.4	C	0.4	C	0.4	C	1.0	E	1.0	E	1.0	F
R	Bush Hill Rd north of Wason Rd	0.2	A	0.2	A	0.2	A	0.3	A	0.4	B	0.4	B

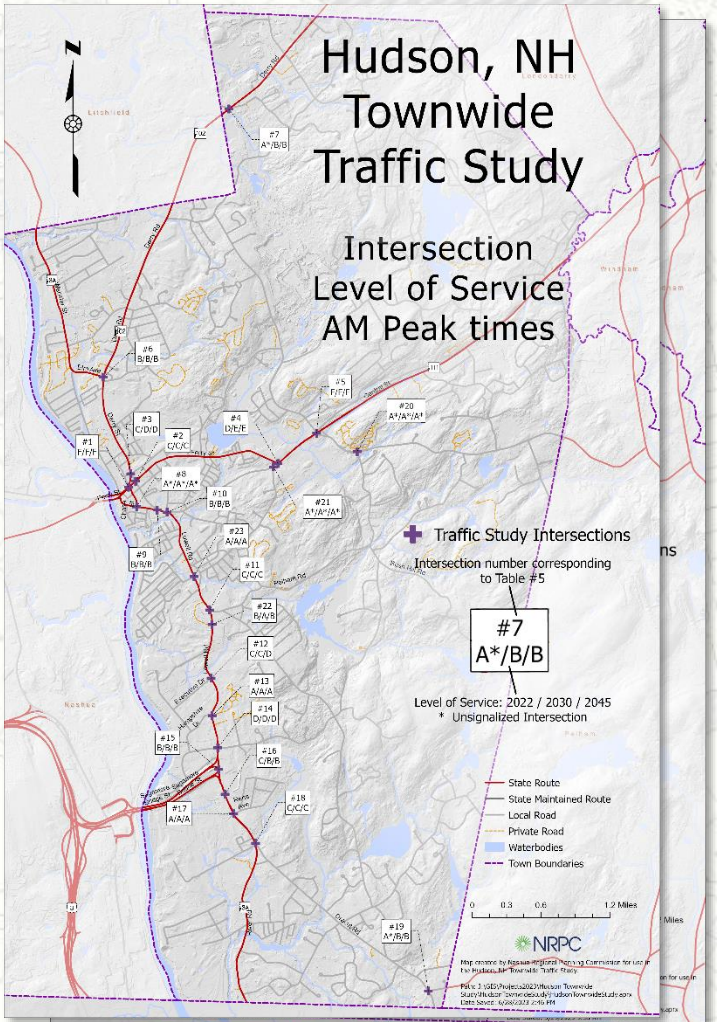
Blue LOS indicates an improvement In LOS and Red LOS indicates a decline in LOS

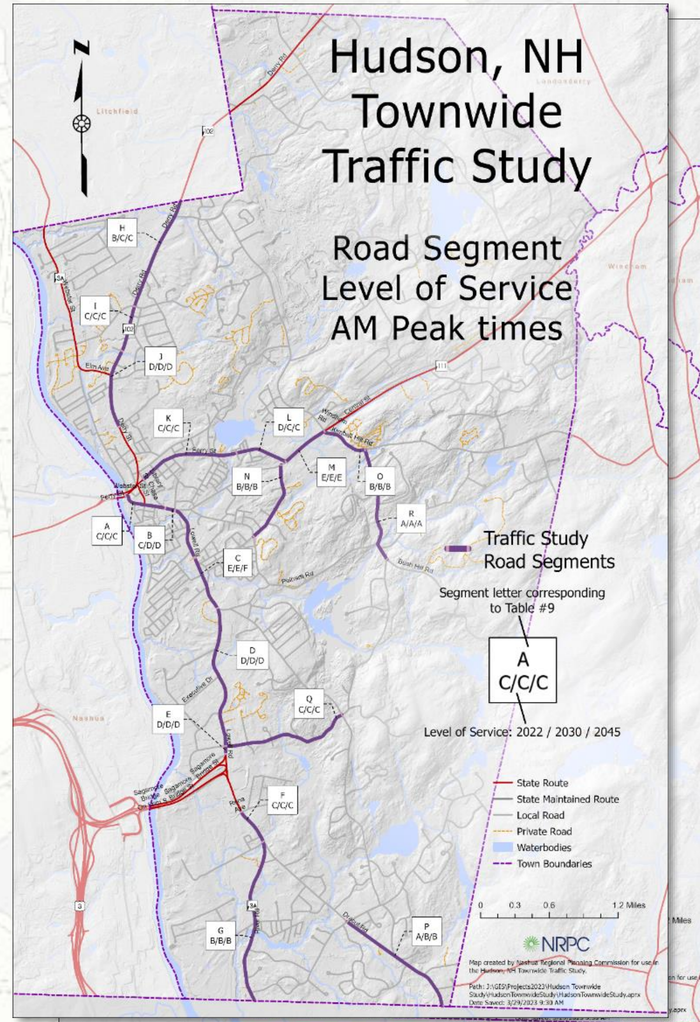
Improvement made to the intersection in 2030 and 2045

Hudson Townwide Traffic Study

METROPOLITAN PLANNING ORGANIZATION

Findings – Maps





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METROPOLITAN PLANNING ORGANIZATION

Conclusions

- LOS C is the target LOS for most intersections and roadways
- There are areas in Hudson where the intersection and road segment LOS is currently below LOS C or will be in the future
- Problematic intersections/segments & possible mitigation strategies
  - Examples…

Conclusions – Intersection Example

- Ferry St/Chase St (NH111/NH102/NH3A)
  - LOS F, all analysis years, AM & PM
- Mitigation Strategies
  - Further optimization of traffic signal timing for future traffic patterns
  - Coordinate with the City of Nashua to optimize traffic flow on the Taylor Falls Bridge
  - Reconfigure the intersections to improve traffic flow
  - Update GridSmart cameras to accommodate the unique geometry of this intersection.

Hudson Townwide Traffic Study

METROPOLITAN PLANNING ORGANIZATION

Conclusions – Road Segment Example

- Lowell Road south of Central Street (b/t Central St & Pelham Rd)
  - LOS E (2022, 2030) LOS F (2045) AM Peak Periods
  - LOS F (2022, 2030 & 2045) PM Peak Periods
- Mitigation Strategies
  - TDM measures that reduce traffic volume in general
  - Explore potential alternative corridors such as the Hudson Boulevard concept

Hudson Townwide Traffic Study

METROPOLITAN PLANNING ORGANIZATION

Discussion

Caleb Cheng
Nashua Regional Planning Commissi...
Regional Planner

calebc@nashuarpc.org

Ned Connell
Nashua Regional Planning Commissi...

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Agenda 7-25-23

TOWN OF HUDSON

Police Department

Partners with the Community

1 Constitution Drive, Hudson, New Hampshire 03051
Voice/TTY (603) 886-6011/Crime Line (603) 594-1150/Fax (603) 594-1162

8A

RECEIVED
JUL 19 2023
TOWN OF HUDSON
SELECTMENS OFFICE

Tad K. Dionne
Chief of Police

Captain David A. Cayot
Special Investigations Bureau

Captain Steven C. McElhinney
Administrative Bureau

Captain Patrick M. McStravick
Operations Bureau

To: The Board of Selectmen
Steve Malizia, Town Administrator

From: Tad K. Dionne, Chief of Police TD

Date: 20 July 2023

Re: Agenda Item – Acceptance

Scope:

The Police Department is requesting to meet at the next scheduled Board of Selectmen meeting on Tuesday, 25 July 2023 to request approval to accept the awarded Highway Safety Project #24-092 titled "Hudson Highway Safety Grant" beginning October 1, 2023 and ending September 30, 2024. The specific project titles are Speed Enforcement Patrols for $2,400.00, DUI Enforcement for $1,600.00, Distracted Driving for $1,600.00, Join the NH Clique for $850.00, Drive Sober or Get Pulled Over for $1,700.00 and U Drive, U Text, U Pay for $850.00. The total price limitation for this agreement is $9,000.00 to cover the cost of overtime.

Motion:

To authorize the Hudson Police Department to accept the "Hudson Highway Safety Grant" which was awarded by the New Hampshire Highway Safety Agency in the amount of $9,000.00.

EXHIBIT A

OHS Grant Award		
Project Titles	Federal Budget	Minimum Match Required
SPEED ENFORCEMENT PATROLS	$2,400.00	$600.00
DUI ENFORCEMENT	$1,600.00	$400.00
DISTRACTED DRIVING	$1,600.00	$400.00
PEDESTRIAN BICYCLE	$0.00	$0.00
JOIN THE NH CLIQUE	$850.00	$212.50
DRIVE SOBER OR GET PULLED OVER	$1,700.00	$425.00
U DRIVE, U TEXT, U PAY	$850.00	$212.50
E-CRASH EQUIPMENT (MDT)	$0.00	$0.00
E-CRASH EQUIPMENT (Printers/Scanners/Receivers/ Software)	$0.00	$0.00
SPEED EQUIPMENT	$0.00	$0.00
C.A.R. EQUIPMENT	$0.00	$0.00
C.A.R. TRAINING	$0.00	$0.00
EMERGENCY MEDICAL SERVICES (Fire Extrication Equipment)	$0.00	$0.00
Community Outreach & Betterment (COB) Grant	$0.00	$0.00
Total Total amount Federal funds obligated to the subrecipient, (2 CFR § 200.331(a)(1)(vii) **Project Costs: 80% Federal Funds, 20% Applicant Share (Minimum Match Required).**	$ 9,000.00	$2,250.00

Awarding Agency: Office of Highway Safety (OHS)	
Federal Awarding Agency: National Highway Traffic Safety Administration (NHTSA), US DOT NHTSA Region 1 55 Broadway, RTV-8E Cambridge, MA 02142	
Budget period (new) –	**10/01/2023 to 09/30/2024**
Is This a Research and Development Project: NO	

EXHIBIT B

GRANT REQUIREMENTS AND INFORMATION

- Officers funded during these overtime enforcement grants shall be dedicated in total to traffic law enforcement, except in the case of a criminal offense committed in the officer's presence, in the case of response to an officer in distress, or in the case of a riot where all available personnel must divert their attention.
- Officers may pull over drivers for any driving offense during patrols. This includes, but is not limited to, suspected drunk driving, speeding, school bus violations, CPS violations, traffic light/stop sign running, and distracted driving.
- Nothing in this grant shall be interpreted as a requirement, formal or informal that a law enforcement officer issue a specified or predetermined number of summons in pursuance of the department's obligation associated with the grant.
- If an officer makes an arrest during the patrol shift, but does not complete the arrest before the shift is scheduled to end, the officer can continue working under the grant to complete that arrest even if the time exceeds the scheduled patrol shift; however, the total request for reimbursement must not exceed the approved budget in the Grant Agreement.
- An officer who stops working a Highway Safety grant to assist with a Non-Highway Safety Grant related issue (i.e. crash, domestic dispute, criminal complaint, etc.), must not count such hours as hours worked on a Highway Safety Grant.
- Full-time officers will be reimbursed at an overtime rate of pay as established by the department and/or municipality for hours worked during the enforcement patrols. Part-time officers will be reimbursed at their normal hourly rate of pay.
- The Patrol Activity Report (HS-200) must be signed and dated by an authorized signatory (Police Chief or designee). Individuals working the enforcement patrol may not sign off on the Patrol Activity Report for themselves and if the Chief Law Enforcement Officer (CLEO) works an overtime enforcement patrol, they must comply with 29 CFR Part 541 as it relates to "exempt employees". This will require that the CLEO provide a waiver of 29 CFR, Part 541 from their governing body with any reimbursement requests in which the CLEO has worked. Additionally, the CLEO may not sign off on their own HS200 or that of a spouse, child or sibling who may work an enforcement patrol.
- If weather impedes a particular enforcement detail, this should be noted on the Patrol Activity Report (HS-200).
- Command staff may participate in and be compensated for enforcement details if acting in a traffic enforcement role rather than acting exclusively in a supervisory role overseeing officers engaged in traffic enforcement.
- Failure to comply with reporting requirements may result in non-reimbursement of funds or suspension of grant award.
- Non-participation or non-compliance with the performance measures may result in grant agreement suspension, termination and/non-reimbursement of expenses.

Reimbursement Schedule and Required Paperwork

- Reimbursements are due no later than 15 days after the close of the quarter. Due dates are as follows:
    1. **January 15th** for October-December (Quarter 1)
    2. **April 15th** for January-March (Quarter 2)
    3. **July 15th** for April-June (Quarter 3)
    4. **October 15th** for July-September (Quarter 4)
- See link for all the required forms - https://www.nh.gov/hsafety/publications/index.htm
- Over-Time enforcement patrol reimbursements shall include the following:
    1. Reimbursement Request Cover Letter (HS-1);
    2. Overtime Payroll Reimbursement Form (HS-20) for each project;
    3. Match Tracking Form (HS-22) for each project;
    4. Quarterly Summary Report (HS-100 QSR) for each project;
    5. Patrol Activity Reports (HS-200) for each project; and
    6. Updated Grant Application/Performance Tracking Tool (App/PTT)
- Equipment reimbursements shall include the following:
    1. Reimbursement Request Cover Letter (HS-1). **Note:** if submitting equipment reimbursement along with overtime enforcement patrol reimbursements only one (1) Reimbursement Request Cover Letter (HS-1) shall be submitted.
    2. Copy of the detailed equipment invoice (with all Serial #'s);
    3. Match Tracking Form (HS-22);
    4. Copy of Cancelled Check; and
    5. Final Equipment Report (HS-8E) (with all Serial #'s)

- Over-Time COB Grant reimbursements shall include the following:
    1. Reimbursement Request Cover Letter (HS-1);
    2. COB Grant Activity Overtime Payroll Reimbursement Form (HS-20) found within COB Grant Excel Workbook;
    3. COB Grant Activity Match Tracking Form (HS-22) found within COB Grant Excel Workbook;
    4. COB Grant Excel Workbook File updated with quarterly COB activity and related expenses.
    5. Copies of all COB Grant related invoices and/or receipts.

- If no enforcement patrols took place during the quarter you are required to submit the Reimbursement Cover Letter (HS-1) indicating that you are not seeking reimbursement by placing $0 in the projects where you were awarded funding.
- Failure to file required reports by the submission due dates can result in grant termination or denial of future grants.
- All publications, public information, or publicity released in conjunction with this project shall state "This project is being supported in part through a grant from the NH Office of Highway Safety, with Federal funds provided by the National Highway Traffic Safety Administration" or related social media tag provided by our office.
- Grant agreements shall terminate in the event funds are exhausted and/or not made available by the federal government for this program. If the grantee makes obligations in anticipation of receiving funds under this grant, the grantee does so at their peril and the State of New Hampshire will be under no obligation to make payments for such performance.

SPECIAL PROVISION-NH OFFICE OF HIGHWAY SAFETY

(A) In the event of any conflict or ambiguity between the provisions of the Subrecipient's application and the provisions of the Office of Highway Safety Grant Agreement, including applicable EXHIBITS A and B, the provisions of the Grant Agreement shall govern.

(B) The New Hampshire Office of Highway Safety (OHS) will review all reports and certifications received to ensure compliance. If findings specific to Highway Safety Programs are detected within an agency's Single Audit, appropriate action shall be taken to ensure that identified sub recipient risks are being timely and appropriately corrected.

CASH MANAGEMENT

Cash draw-downs will be initiated only when actually needed for disbursement (i.e., as close as possible to the time of making disbursements). Cash disbursements and balances will be reported in a timely manner as required by NHTSA. 2 CFR Part 200.305.

For subrecipients, recipients must establish reasonable procedures to ensure the receipt of reports on subrecipients' cash balances and cash disbursements in sufficient time to enable them to prepare complete and accurate cash transactions reports to the awarding agency. Recipients must monitor cash draw-downs by their subrecipients to assure that they conform substantially to the same standards of timing and amount as apply to advances to the recipients. 2 CFR 200.305.

Failure to adhere to these provisions may result in the termination of draw-down privileges.

OFFICE OF MANAGEMENT AND BUDGET GRANT CONDITIONS

The following documents issued by the Office of Management and Budget (OMB) apply to all Federal grants regardless of the Federal Department making them available:

- **Audit Requirement of Federal Funds:** (2 CFR § 200.332(a)(5)) 2 CFR part 200, subpart F (formerly known as OMB Circular A-133) – These requirements apply to each non-profit organization, each institution of higher education, and local governments as a whole when they or one of their departments receives federal funds. Any non-profit organization, institution of higher education, or local government spending more than $750,000 in federal funds from all sources within a 12-month period must have an audit performed on the use of the funds. OGR defines the 12-month period as July 1 to June 30. The following link provides the full text of this basic federal grant requirement: https://www.nhtsa.gov/highway-safety-grants-program/resources-guide.
- **Cost Principles for Federal Grants to State and Local Governments**
    - 2 CFR 200 subpart E – These requirements apply only to state and local government subrecipients. These regulations list and define general categories of costs that are both allowable and unallowable. Examples include the following:
    - The cost of alcoholic beverages is unallowable.
    - Costs incurred by advisory councils are allowable.

- Audit costs are allowable.
- Compensation costs are allowable so long as they are consistent with that paid for similar work in other activities of the local government.
- Entertainment costs are unallowable.
- Equipment costs are allowable with the prior approval of the HSO. Equipment having a useful life of more than one year or a current per-unit fair market value of $5,000 or more must be tracked. When replacing equipment purchased with federal funds, the equipment to be replaced may be used as a trade-in or can be sold with the proceeds used to offset the cost of the replacement equipment. In addition, during the period of the contract with HSO, insurance on the equipment is allowable.
- Travel costs are allowable if pre-approved by the HSO and so long as they are consistent with those normally allowed in like circumstances for non-federally funded activities.

- **Cost Principles for Federal Grants to *Non-Profit Organizations and Institutions of Higher Education*** - These requirements apply to only the non-profit and higher education sub recipients. These document list and define general categories of costs that are allowable and unallowable. The link below provides the full text of these two basic federal grant requirements.
  - eCFR :: 2 CFR Part 200 Subpart E -- Cost Principles

I sign these Grant Requirements based on personal knowledge, after appropriate inquiry, and I understand that the Government will rely on these representations in reimbursing grant funds.

Authorized Contract Signatory: Digitally signed by Tad K. Dionne Date: 2023.07.19 13:32:27 -04'00' **Date:** 07/19/2023

Signors Printed Name: Tad K. Dionne **Signors Title:** Chief of Police

Project Titles, PSP & Task, ALN, and FAIN Numbers (FFY24)
SPEED ENFORCEMENT PATROLS **PSP & Task** 24-02-04 FAST Act 402/Bil/Sup **ASSISTANCE LISTING NUMBER:** 20.600 **FAIN Number** (Subaward): 69A37521300004020NH0, 69A37522300004020NH0, 69A37523300004020NH0, 69A3752400004020NH0, 69A3752230SUP4020NH0, 69A3752330SUP4020NH0
SPEED EQUIPMENT **PSP & Task** 24-02-04 FAST Act 402/Bil/Sup **ASSISTANCE LISTING NUMBER:** 20.600 **FAIN Number** (Subaward): 69A37521300004020NH0, 69A37522300004020NH0, 69A37523300004020NH0, 69A3752400004020NH0, 69A3752230SUP4020NH0, 69A3752330SUP4020NH0
DUI ENFORCEMENT **PSP & Task** 24-07-04 FAST Act 402/Bil/Sup **ASSISTANCE LISTING NUMBER:** 20.600 **FAIN Number** (Subaward): 69A37521300004020NH0, 69A37522300004020NH0, 69A37523300004020NH0, 69A3752400004020NH0, 69A3752230SUP4020NH0, 69A3752330SUP4020NH0
DISTRACTED DRIVING **PSP & Task** 24-04-04 FAST Act 402/Bil/Sup **ASSISTANCE LISTING NUMBER:** 20.600 **FAIN Number** (Subaward): 69A37521300004020NH0, 69A37522300004020NH0, 69A37523300004020NH0, 69A3752400004020NH0, 69A3752230SUP4020NH0, 69A3752330SUP4020NH0
PEDESTRIAN BICYCLE **PSP &Task** 24-06-04 FAST Act 402/Bil/Sup **ASSISTANCE LISTING NUMBER:** 20.600 **FAIN Number** (Subaward): 69A37521300004020NH0, 69A37522300004020NH0, 69A37523300004020NH0, 69A3752400004020NH0, 69A3752230SUP4020NH0, 69A3752330SUP4020NH0
JOIN THE NH CLIQUE **PSP & Task** 24-01-04 FAST Act 402/Bil/Sup **ASSISTANCE LISTING NUMBER:** 20.600 **FAIN Number** (Subaward): 69A37521300004020NH0, 69A37522300004020NH0, 69A37523300004020NH0, 69A3752400004020NH0, 69A3752230SUP4020NH0, 69A3752330SUP4020NH0
DRIVE SOBER OR GET PULLED OVER **PSP & Task** 24-07-11 FAST Act 402/Bil/Sup **ASSISTANCE LISTING NUMBER:** 20.600 **FAIN Number** (Subaward): 69A37521300004020NH0, 69A37522300004020NH0, 69A37523300004020NH0, 69A3752400004020NH0, 69A3752230SUP4020NH0, 69A3752330SUP4020NH0
U DRIVE, U TEXT, U PAY **PSP & Task** 24-04-11 FAST Act 402/Bil/Sup **ASSISTANCE LISTING NUMBER:** 20.600 **FAIN Number** (Subaward): 69A37521300004020NH0, 69A37522300004020NH0, 69A37523300004020NH0, 69A3752400004020NH0, 69A3752230SUP4020NH0, 69A3752330SUP4020NH0
E-CRASH EQUIPMENT (MDT) **PSP & Task** 24-03-06 FAST Act 402/Bil/Sup **ASSISTANCE LISTING NUMBER:** 20.600 **FAIN Number** (Subaward): 69A37521300004020NH0, 69A37522300004020NH0, 69A37523300004020NH0, 69A3752400004020NH0, 69A3752230SUP4020NH0, 69A3752330SUP4020NH0
E-CRASH EQUIPMENT (Printers/Scanners/Receivers/C.A.R. Equipment/C.A.R. Training) **PSP & Task** 24-03-06 FAST Act 402/Bil/Sup **ASSISTANCE LISTING NUMBER:** 20.600 **FAIN Number** (Subaward): 69A37521300004020NH0, 69A37522300004020NH0, 69A37523300004020NH0, 69A3752400004020NH0, 69A3752230SUP4020NH0, 69A3752330SUP4020NH0
EMERGENCY MEDICAL SERVICES (Fire Extrication Equipment) **PSP & Task** 24-10-03 FAST Act 402/Bil/Sup **ASSISTANCE LISTING NUMBER:** 20.600 **FAIN Number** (Subaward): 69A37521300004020NH0, 69A37522300004020NH0, 69A37523300004020NH0, 69A3752400004020NH0, 69A3752230SUP4020NH0, 69A3752330SUP4020NH0
COMMUNITY OUTREACH & BETTERMENT (COB) GRANT **PSP & Task** 24-09-03 FAST Act 402/Bil/Sup **ASSISTANCE LISTING NUMBER:** 20.600 **FAIN Number (Subaward):** 69A37521300004020NH0, 69A37522300004020NH0, 69A37523300004020NH0, 69A3752400004020NH0, 69A3752230SUP4020NH0, 69A3752330SUP4020NH0

EXHIBIT B

Scope of Work

SPEED ENFORCEMENT

For additional grant requirements please familiarize yourself with the section of the grant agreement titled, "Grant Requirements and Information".

- The locations as well as time and days of the Speed overtime enforcement patrols should support the problem statement identified in your grant application.

- Speed enforcement patrols should be no more than **4-hours** in duration. These hours shall be run consecutively without interruption.

- If the last stop of a grant-funded patrol results in an arrest that requires the patrol to exceed 4-hours, OHS will consider payment, after review of the dispatch log and Patrol Activity Report (HS-200). The dispatch log must show the arrest as the last stop of the patrol as well as showing the time the arrest was cleared.

- The OHS has an expectation that Departments will have a minimum of three documented stops/contacts per hour. Documented stops/contacts are defined as any grant-funded patrol officer contact with motorists, pedestrians, and/or bicyclists, during the grant-funded patrol periods. Contacts are required to be supported by written or electronic records maintained at the police department. These records must be maintained in a manner that guarantees their accountability during a monitoring review. If fewer than three stops/contacts per hour are made during a grant-funded patrol, an explanation must be provided on note section of the HS-200/Patrol Activity Report.

- To maximize grant funding, patrols must consist of **one grant-funded officer per cruiser**; however, multiple cruisers may be out at one time.

- All vehicles stopped should be visually checked for violations of the Child Passenger Restraint law. The total number of visual checks and any action taken should be noted on the HS-200 Patrol Activity Report.

- The NHOHS Highway Safety Commander may, and in their prolonged absence, the NHOHS program manager may, in consultation and conjunction with the Chief of Police, at their discretion, authorize adjustments in the duration of patrols and focus efforts in both location and area of enforcement, to help maximize the potential for success in meeting objectives and achieving overall goals.

Grantee Initials: TD	Grantee Initials: ______	Grantee Initials: ______
Date: 07/19/2023	Date: ____________	Date: ____________

EXHIBIT B

Scope of Work

Impaired Driving Enforcement (DUI)

For additional grant requirements please familiarize yourself with the section of the grant agreement titled, "Grant Requirements and Information".

- The locations as well as time and days of the Impaired Driving enforcement overtime patrols shall support the problem statement identified in your grant application.

- DUI enforcement patrols, including DUI saturation patrols, can be a minimum of **4-hours** or a maximum of **6-hours** in duration. These hours shall be run consecutively without interruption.

- With **written,** pre-approval, from the Office of Highway Safety, departments may conduct 6-hour Sobriety Check Points.

- If the last stop of a grant-funded patrol results in an arrest that requires the patrol to exceed 4-hours, OHS will consider payment, after review of the dispatch log and Patrol Activity Report (HS-200). The dispatch log must show the arrest as the last stop of the patrol as well as showing the time the arrest was cleared.

- The OHS has an expectation that Departments will have a minimum of three documented stops/contacts per hour. Documented stops/contacts are defined as any grant-funded patrol officer contact with motorists, pedestrians, and/or bicyclists, during the grant-funded patrol period. Contacts are required to be supported by written or electronic records maintained at the police department. These records must be maintained in a manner that guarantees their accountability during a monitoring review. If fewer than three stops/contacts per hour are made during a grant-funded patrol, an explanation must be provided on note section of the HS-200/Patrol Activity Report.

- To maximize grant funding, patrols must consist of **one grant-funded officer per cruiser**; however, multiple cruisers may be out at one time.

- All vehicles stopped should be visually checked for violations of the Child Passenger Restraint law. The total number of visual checks and any action taken should be noted on the HS-200 Patrol Activity Report.

- The NHOHS Highway Safety Commander may, and in their prolonged absence, the NHOHS program manager may, in consultation and conjunction with the Chief of Police, at their discretion, authorize adjustments in the duration of patrols and focus efforts in location, to help maximize the potential for success in meeting objectives and achieving overall goals.

Grantee Initials: TD
Date: 07/19/2023

Grantee Initials: ______
Date: ______________

Grantee Initials: ______
Date: ______________

EXHIBIT B

Scope of Work

Distracted Driving Enforcement

Distracted Driving enforcement patrols should focus on enforcing New Hampshire's Hands Free Electronic Device Law as well as other activities that occur behind the wheel that cause the driver to be distracted. **For additional grant requirements please familiarize yourself with the section of the grant agreement titled, "Grant Requirements and Information".**

- The locations, as well as time and days, of the distracted driving enforcement overtime patrols shall support the problem statement identified in your grant application.

- Distracted Driving enforcement patrols should be no more than **4-hours** in duration. These hours shall be run consecutively without interruption.

- If the last stop of a grant-funded patrol results in an arrest that requires the patrol to exceed 4-hours, OHS will consider payment, after review of the dispatch log and Patrol Activity Report (HS-200). The dispatch log must show the arrest as the last stop of the patrol as well as showing the time the arrest was cleared.

- The OHS has an expectation that departments will have a minimum of three documented stops/contacts per hour. Documented stops/contacts are defined as any grant-funded patrol officer contact with motorists, pedestrians, and/or bicyclists, during the grant-funded patrol periods. Contacts are required to be supported by written or electronic records maintained at the police department. These records must be maintained in a manner that guarantees their accountability during a monitoring review. If fewer than three stops/contacts per hour are made during a grant-funded patrol, an explanation must be provided as to why. ***Note:*** When conducting Distracted Driving enforcement patrols using a spotter technique (one officer in a cruiser and one officer outside the cruiser), 3 stops per hour per officer may be difficult to achieve. In this instance, please focus on effective enforcement rather than the stops/hour requirement. Please ensure that the spotter notes this on his/her Patrol Activity Report (HS-200).

- To maximize grant funding, patrols must consist of **one grant-funded officer per cruiser**; however, multiple cruisers may be out at one time. ***Exception:*** Two officers per cruiser when utilizing a spotter (one officer in a cruiser and one officer outside the cruiser), is allowed when a department is conducting strategic Distracted Driving patrols.

- All vehicles stopped should be visually checked for violations of the Child Passenger Restraint law. The total number of visual checks and any action taken should be noted on the HS-200 Patrol Activity Report.

- The NHOHS Highway Safety Commander may, and in their prolonged absence, the NHOHS program manager may, in consultation and conjunction with the Chief of Police, at their discretion, authorize adjustments in the duration of patrols and focus efforts in location, to help maximize the potential for success in meeting objectives and achieving overall goals.

Grantee Initials: TD	Grantee Initials: ______	Grantee Initials: ______
Date: 07/19/2023	Date: ______________	Date: ______________

EXHIBIT B

Scope of Work

High Visibility Mobilizations

Departments have an allowable budget to conduct overtime enforcement during each of the time periods listed below. Unspent funds from a campaign period cannot be rolled over into any other enforcement activity.

Grant-funded overtime enforcement activity shall occur on the required dates and primary enforcement efforts should be project specific; departments are encouraged to use their own internal data to conduct enforcement activity in their community hotspots.

The OHS has an expectation that Departments will have a minimum of three documented stops/contacts per hour. Documented stops/contacts are defined as any grant-funded patrol officer contact with motorists, pedestrians, and/or bicyclists, during the grant-funded patrol periods. Contacts are required to be supported by written or electronic records maintained at the police department. These records must be maintained in a manner that guarantees their accountability during a monitoring review. If fewer than three stops/contacts per hour are made during a grant-funded patrol, an explanation must be provided on note section of the HS-200/Patrol Activity Report.

NOTE: Please e-mail your Field Representatives at HWYSAFETYMAIL@dos.nh.gov, *in advance*, if a mobilization effort will **not** be conducted.

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Join the NH Clique Enforcement Patrols- $850 total: The purpose of this mobilization is to enforce the Child Restraint Law for anyone under 18 years of age, as well as to educate unbelted occupants 18 years and older regarding the importance of wearing seatbelts. Patrols must be conducted during daylight hours at locations such as elementary schools, high schools, shopping centers, and/or locations where drivers and passengers up to the age of 18 are known to frequent. Officers conducting the "Join the NH Clique Patrols", are highly recommended to complete an Online training course; "Child Passenger", sponsored by Police Standards and Training.

- **Required Dates:**
  - One 3-4 hour patrol conducted on kickoff day - ***TBD***
  - The remaining patrol hours shall be conducted between - ***TBD, 3rd Quarter***

****

Drive Sober or Get Pulled Over-$850 each: The purpose of these **two** mobilizations will focus on the apprehension of the impaired driver. **Unspent funds from the first DSOGPO campaign may be rolled over to the second DSOGPO campaign.**

- **$850- Required Dates** of the **first** mobilization:
  - One 3-4 hour patrol conducted on kickoff day - ***TBD***
  - The remaining patrol hours shall be conducted between - ***TBD, 1st Quarter***
- **$850- Required Dates** of the **second** mobilization:
  - One 3-4 hour patrol conducted on kickoff day - ***TBD***
  - The remaining patrol hours shall be conducted between - ***TBD, 4th Quarter***

****

U Drive, U Text, U Pay-$850 total: The purpose of this mobilization is to enforce New Hampshire's Hands Free Electronic Device Law, as well as other activities that occur behind the wheel that cause the driver to be distracted.

- **Required Dates:**
  - One 3-4 hour patrol conducted on kickoff day - ***TBD***
  - The remaining patrol hours shall be conducted between - ***TBD, 3rd Quarter***

****

Grantee Initials: TD	Grantee Initials: ______	Grantee Initials: ______
Date: 07/19/2023	Date: ____________	Date: ____________

8B

Hudson Community Power

Electric Aggregation Plan

Last updated: 10-July-2023

Approved by Hudson Board of Selectmen: <TBD>

Table of Contents

Version History

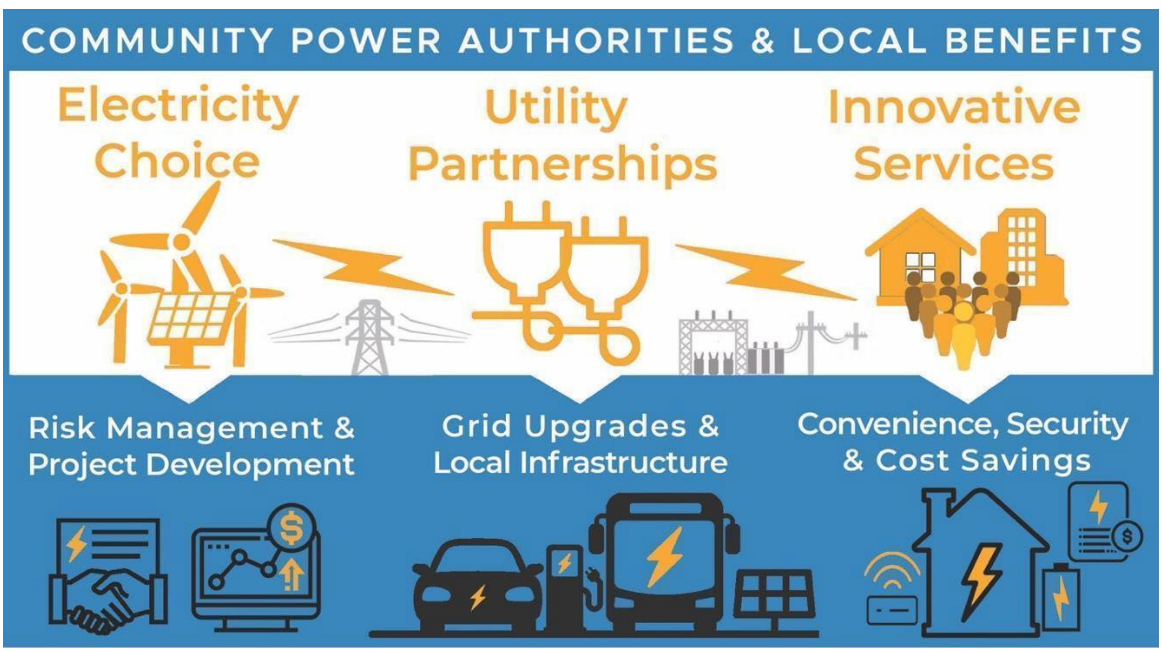
Version	Date	Notes
1.0	January 8, 2023	Original draft; approved at Town Meeting on March 28, 2023
1.1	July 10, 2023	Prepare document for submission to the PUC. Bring document up to date; change forward-looking statements (such as references to the upcoming Town Meeting, etc.) to indicate the events have taken place; update the table showing members of CPCNH's BOD; fixed broken internal & external links; cleanup of grammar, typos, formatting & pagination. **No changes to the intent of the plan or process to be followed are made.** Approved by the Hudson BOS on July ??, 2023

INTRODUCTION TO COMMUNITY POWER

New Hampshire's updated Community Power law (RSA 53-E, as amended by SB 286 - Chapter 316, NH Laws of 2019, effective October 1, 2019, and HB 315, Chapter 229, NH Laws of 2021, effective October 24, 2021) is a bipartisan policy designed to further democratize, evolve, and enhance the economic efficiency of our electric power industry. The Legislature's intent in enacting RSA 53-E was to "*encourage voluntary, cost effective and innovative solutions to local needs with careful consideration of local conditions and opportunities.*" To achieve this goal, RSA 53-E authorizes local governments (cities, towns, and counties) to launch Community Power programs that:

- Provide electricity supply service to residents and businesses, who are notified and enrolled on an "opt-in" customer choice or "opt-out" default service basis — and may thereafter leave or rejoin the program by switching suppliers (in advance of their next billing cycle date);
- Procure a reliable supply of "all-requirements" electricity, inclusive of Renewable Portfolio Standard requirements, with the option to participate directly in the ISO New England wholesale market as a load-serving entity on behalf of participating customers;
- Offer a range of innovative services, products, new Net Energy Metering supply rates, and local programs to participating customers;
- Allow for establishing a joint powers agency with other Community Power programs to share services, contract for energy project developments, and facilitate related energy initiatives; and
- Work collaboratively with distribution utilities, regulators, policymakers and innovative energy businesses to help modernize our electrical grid and market infrastructure.

These authorities and local benefits are depicted in the graphic below:



Distribution utilities will continue to deliver power to all customers, regardless of whether they are supplied electricity by new Community Power programs or Competitive Electric Power Suppliers (or have chosen to switch back to utility-provided default service).

OVERVIEW OF HUDSON COMMUNITY POWER

Hudson Community Power is a program authorized under RSA 53-E to provide electricity supply service for the town's residents, businesses, and other types of customers. The program will only launch if it is able to initially offer residential default rates that are lower than or competitive with those offered by Eversource. Thereafter, the program will:

- Serve as the default electricity supplier for all customers on a default "opt-out" basis;
- Offer innovative services and generation rates to customers on an "opt-in" or "opt-up" basis (such as 100% renewable premium products, time-varying rates and Net Energy Metering generation credits for customers with solar photovoltaics) as these options become available;
- Operate on a competitive basis, in that customers may choose to switch between Hudson Community Power, service provided by Competitive Electric Power Suppliers, and utility-provided default service; and
- Be self-funded through revenues generated by participating customers (the town will not use taxes to cover program expenses).

Eversource will continue to own and operate the distribution grid and be responsible for delivering power to all customers within the town. Customers will be charged for utility delivery services at rates set by the Public Utilities Commission.

The Board of Selectmen, in coordination with advisory support from the Hudson Electric Aggregation Committee (HEAC) will be authorized to arrange and contract for the necessary services and power supplies to implement and operate the program and continue to provide oversight over the program thereafter.

Customer Notification and Enrollment Process

Prior to launch of Hudson Community Power, all eligible customers will be mailed notifications and provided the opportunity to "opt-out" or "opt-in" to the program, depending on whether they currently take service from a Competitive Electric Power Supplier or are on default service provided by Eversource:

- Customers already served by Competitive Electric Power Suppliers will be notified and may request to "opt-in" to the program; and
- Customers currently on default service provided by Eversource will be notified, provided the opportunity to decline participation, and thereafter transferred to Hudson Community Power if they do not "opt-out".

Notifications to customers on utility-provided default service will include the initial fixed rate for the program's default service compared with the Eversource rate, be mailed to customers at least 30 days in advance of program launch and provide instructions for customers to decline participation (for example, by return postcard, calling a phone number or using a web portal).

After the launch of Hudson Community Power, any new customers that move to the town will be transferred onto default service provided by the program, unless they choose to take service from Eversource or a Competitive Electric Power Supplier.

All customers on Hudson Community Power default service will remain free to switch back to Eversource or to take service from a Competitive Electric Power Supplier.

Customer Accounts and Electricity Usage Estimates

The tables below show the total number and annual electricity usage of customers within Hudson's territory who would initially receive either "opt-out" or "opt-in" notifications:

	Utility Default Supply Customers (Eligible for Opt-Out Notifications & Automatic Enrollment)		Competitive Supply Customers (Eligible for Opt-In Notifications & Voluntary Enrollment)	
	Customer Accounts	**Annual Usage (MWh)**	**Customer Accounts**	**Annual Usage (MWh)**
LPBS (GV)	0	0	39	74,709
Residential (R)	8,964	70,620	1,680	13,798
General Service (G)	14,947	28,459	6,116	20,856
ST Lighting (OL)	151	289	0	0
Total	**24,062**	**99,368**	**7,835**	**109,363**

Aggregated data shown was provided by Eversource for the 12 months ending November 2022.

Membership in the Community Power Coalition of New Hampshire

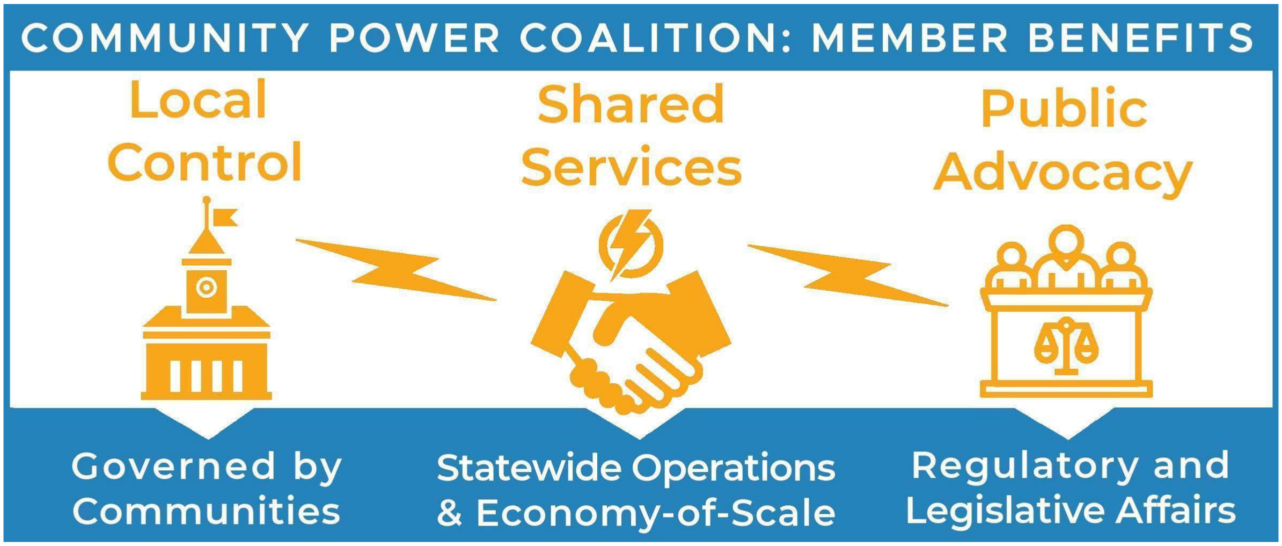
Hudson is a member of the Community Power Coalition of New Hampshire ("the Coalition"), a joint powers agency authorized under RSA 53-A ("*Agreements Between Governments: Joint Exercise of Powers"*) that operates on a not-for-profit basis.

The Coalition was created so that towns, cities, and counties across New Hampshire could:

1. Access the resources and support required to streamline the process of establishing an Electric Aggregation Committee, drafting an Electric Aggregation Plan and approving a new Community Power program.
2. Jointly solicit and contract for third-party services and staff support to launch and operate Community Power programs, without requiring any upfront costs or imposing any financial liabilities on participating communities.
3. Participate in joint power solicitations and local project development opportunities.
4. Share knowledge and collaborate regionally on clean energy and resilient infrastructure development at the community-level throughout the state.
5. Speak with one voice at the Legislature and Public Utilities Commission on public advocacy issues related to energy and Community Power.

The Coalition's joint powers agency governance model and competitive business model have been designed in accordance with energy industry best practices to ensure that participating Community Power programs benefit from transparent governance and high-quality services —so that all communities are able to take full advantage of their local control authorities under RSA 53-E and achieve the full scope of their local energy policy goals.

The Coalition is governed "*for communities, by communities*" under a voluntary and flexible membership structure, offers competitive electricity service on a statewide basis, and strengthens the ability of communities to coordinate effectively on public advocacy issues.



Key aspects of the Coalition's design, governance, services and start-up process are summarized in:

- The appendix (Attachment 2: The Community Power Coalition of New Hampshire) which provides an overview of the communities, volunteers and experts involved in the process of designing the power agency.
- The chapter "OVERVIEW OF COMMUNITY POWER COALITION OF NEW HAMPSHIRE", which provides context regarding the purpose of joint action power agencies, highlights the importance of joint public advocacy (and summarizes the Coalition's successful engagements at the Legislature and Public Utilities Commission on Community Power and public advocacy issues to-date), and summarizes key features of the Coalition's business model and services.
- The chapter "Hudson Community Power Objectives and Requirements", which explains how the Coalition's joint action governance and business model should enable Hudson to achieve the full scope of our policy goals, delineates what our goals are over the short-to-long term, and summarizes the program's near-term operational requirements as a power enterprise.
- The remainder of this chapter, which summarizes the town's anticipated role in the Coalition's governance and implementation process through the launch of Hudson Community Power.

Purpose of this Electric Aggregation Plan

The Electric Aggregation Committee was tasked by the Board of Selectmen to prepare this Electric Aggregation Plan, which sets forth Hudson's policy goals for our Community Power program, summarizes program governance and implementation processes, and commits Hudson Community Power to comply with applicable statutes and regulations in terms of:

- Providing universal access, reliability, and equitable treatment of all classes of customers subject to any differences arising from varying opportunities, tariffs, and arrangements between different electric distribution utilities in their respective franchise territories; and
- Meeting, at a minimum, the basic environmental and service standards established by the Public Utilities Commission and other applicable agencies and laws and rules concerning the provision of service under Community Power.

This plan does not otherwise commit Hudson to any defined course of action, including participation in the Coalition for the purposes of launching the program, and does not impose any financial commitment on the town.

The Board of Selectmen retains the power to contract for all required program services and electricity supplies, to set rates, and to pursue related projects independently of the Coalition.

Approval Process for Hudson Community Power

This Electric Aggregation Plan was developed by the Electric Aggregation Committee with due input from the public, as required under RSA 53-E. Public hearings were held on November 15, 2022 and January 17, 2023. Refer to Attachment 7: Hudson's Public Planning Process for additional information.

The Electric Aggregation Committee has determined that this Electric Aggregation Plan satisfies applicable statutory requirements and is in the best, long-term interest of the town and its residents, businesses, and other ratepayers.

The voters approved Warrant Article 20 on March 28, 2023, authorizing the Board of Selectmen to arrange and contract for the necessary professional services and power supplies to launch Hudson Community Power.

Implementation Process for the Coalition & Hudson Community Power

The town became a member of the Coalition by unanimous vote of the Hudson Board of Selectmen approving the Joint Powers Agreement for adoption and upon the Coalition Board of Directors approving Hudson's membership.

The Coalition's Joint Powers Agreement includes the Articles of Agreement and Bylaws of the nonprofit. It establishes the general purpose, authorities, structure, Board of Directors, committees, cost-sharing principles, liability protections, and other aspects of the organization.

The Coalition was incorporated on October 1, 2021 by the following founding local government Members: the cities of Lebanon, Nashua and Dover; the towns of Hanover, Harrisville, Exeter, Rye, Warner, Walpole, Plainfield, Newmarket, Enfield and Durham; and Cheshire County.

This plan assumes, but does not require, the town to participate fully in the Coalition for the purposes of implementing and operating Hudson Community Power.

Town Participation in Joint Powers Agency Governance

The Coalition's initial Board of Directors was constituted of representatives appointed by the governing bodies of each founding member.

The Board of Selectmen appointed primary and alternate representatives of Hudson Community Power to serve on the Coalition's Board of Directors. The town's representatives helped to directly oversee the Coalition's initial startup and implementation activities, including the:

- Adoption of Board policies and the election of officers;
- Hiring of expert staff to provide qualified management and oversight;
- Solicitation and contracting of third-party service vendors to launch and operate Community Power programs; and
- Appointment of Board members and other community representatives to committees.

Hudson and all members were directly represented on the Coalition's Board until more than twenty-one (21) members had joined, at which point directors are elected by vote of the member's representatives at annual meetings (with a Board size of between 11 and 21 representatives, at the members' direction). The membership of CPCNH exceeded the 21-member count in early 2023. A new Board consisting of 20 members was elected at the annual membership meeting on April 21, 2023.

Additionally, to exercise more regular oversight over specific aspects of the joint powers agency, the Coalition will have six standing committees: Executive, Finance, Audit, Regulatory and Legislative Affairs, Risk Management and Governance. The Board may also establish ad-hoc committees, and each direct project that members choose to pursue in the future will be overseen by a committee specific to that project.

All meetings of the Coalition will comply with New Hampshire's Right-to-Know Law (RSA 91-A), the purpose of which is to "*ensure both the greatest possible public access to the actions, discussions and records of all public bodies, and their accountability to the people*", based on the recognition that "*openness in the conduct of public business is essential to a democratic society*."

Development of Member Cost Sharing Agreement and Services for Hudson Community Power

Under the terms of New Hampshire's Community Power law (RSA 53-E):

- Community Power programs must be self-funded, with ongoing costs paid for using the revenues generated by participating customers.
- Municipalities are only allowed to incur incidental costs associated with implementing Community Power programs, such as the costs necessary to comply with the Community Power law, up to the time that the program starts to produce revenue from participating customers.

Membership in the Coalition, and the implementation of Hudson Community Power, will not require any upfront cost for the town other than such incidental expenses (i.e., the staff time, counsel review of agreements, and other costs required to comply with the Community Power law).

To provide the services, credit support and electricity supply required to launch and operate Hudson Community Power:

- The Coalition will administer competitive solicitations on behalf of all participating Community Power programs to contract with qualified vendors and credit-worthy suppliers.
- Vendors are expected to fund and self-manage the upfront cost of launching Community Power programs, under at-risk and performance-based contract structures with payments contingent upon successful launch.

- Program implementation costs for Hudson, along with ongoing operational and power procurement expenses, will be factored into the customer rates and be recovered from the revenues received from participating customers after the launch of Hudson Community Power.

Similar solicitations and at-risk, performance-based contract structures have been used to successfully launch and operate new joint powers agencies in other Community Power markets.

Hudson's representatives on the Coalition's Board of Directors are participating in the solicitation of services, agency startup activities and the development of a cost-sharing agreement with other founding members.

The Coalition's Joint Powers Agreement provides certain requirements regarding how costs will be tracked and shared across participating Community Power programs, which will guide the development of the Coalition cost-sharing agreement:

- Costs will be tracked in three distinct categories: direct project costs, member services, and general and administrative costs (which are overhead costs that are not associated with any specific project or member service);
- Member cost-sharing agreements will be the same in all material respects: general and administrative costs will be allocated based on each Community Power program's share of total electricity usage each year, while each member will choose and separately pay for the costs of specific services and projects (under terms that reflect a fair allocation across all the members that chose the same services and projects); and
- The debts, liabilities and obligations of the Coalition, and of other participating Community Power programs, will be non-recourse to Hudson (unless expressly agreed to by the Board of Selectmen under Hudson's Cost Sharing Agreement or a Project Contract).

To proceed with launching and operating Hudson Community Power through the Coalition:

- The Board of Selectmen would review and approve execution of the Coalition's Cost Sharing Agreement and Member Services Contract, along with the Data Security and Privacy Policy and the Energy Portfolio Risk Management, Retail Rates, and Financial Reserves policies approved by the Coalition's Board of Directors.
- The Coalition would provide the services and credit support necessary to launch and operate Hudson Community Power (along with the programs of other municipalities across the state) and would provide all-requirements electricity to customers participating in the programs.
    - Confidential customer data would be handled in accordance with the Data Security and Privacy Policy.
    - Power procurement and energy portfolio risk management, rate setting, and the accrual of financial reserves for the program would be carried out in accordance with the Coalition's Energy Portfolio Risk Management, Retail Rates, and Financial Reserves policies.
    - The Coalition would collect revenues from program customers on the Town's behalf and would recover expenses incurred on behalf of Hudson Community Power in accordance with the Cost Sharing Agreement.

Governance of the power agency would be carried out pursuant to the Coalition's Joint Powers Agreement. The Board of Directors and committees of Member Representatives — the Executive

Committee, Finance Committee, Risk Management Committee, Member Outreach and Engagement Committee[1], Regulatory and Legislative Affairs Committee, etc. — would continue to meet regularly and carry out their responsibilities to provide oversight and direction, supported by a qualified CEO and staff experts hired to provide day-to-day oversight and management of the agency's service providers, operations, planning, and program development activities.

The Coalition intends to contract for all the services required to launch and operate member Community Power programs, which is expected to enable access to advanced services and expertise at least cost for Hudson Community Power. However, note that:

- The town will be under no obligation to rely on the services provided through the Coalition until the Board of Selectmen executes the Coalition's cost-sharing agreement and chooses which services will be provided through the Coalition.
- At that time, the Board of Selectmen may decide to rely on the Coalition for all or a subset of the services required to launch and operate Hudson Community Power.
- Alternatively, the Board of Selectmen could decide to withdraw from the Coalition entirely, prior to the point at which power procurement is authorized on behalf of Hudson Community Power, and launch Hudson Community Power independently without any cost or continuing financial obligations to the Coalition.
- Lastly, after Hudson Community Power launches, the town could still decide to procure certain services independently or to withdraw from the Coalition at a future date, subject to the terms, conditions and any continuing obligations specified in the cost-sharing agreement approved by the Board of Selectmen.

Decisions made by the Board of Selectmen regarding how to best implement and operate Hudson Community Power, including the execution of the Coalition cost-sharing agreement and selection of services provided through the Coalition, will be made at duly noticed public meetings.

Coalition Engagement on Rule Making at the Public Utility Commission

Hudson Community Power will launch after administrative rules governing Community Power are adopted by the Public Utilities Commission. Rules are expected to require submission of Hudson's Electric Aggregation Plan to the Commission in order to:

- Provide formal notice that the town is planning to launch a Community Power program;
- Authorize the town to request access to additional customer data from Eversource that will be needed for the implementation and administration of Hudson Community Power.

Over the course of 2020 to 2022, members of the Coalition have actively participated in the informal rule drafting process by providing initial and subsequent sets of draft rules for review and refinement, arranging and facilitating bilateral meetings with utilities and other stakeholders, and leading stakeholder workshop discussions and editing sessions at the request of Public Utilities Commission staff.

On December 1, 2021, the Coalition submitted a petition for rulemaking to implement RSA 53-E for Community Power Aggregations, which was filed on behalf of the Coalition's Members and other stakeholders that had been invited to join the petition. The Commission approved the petition in

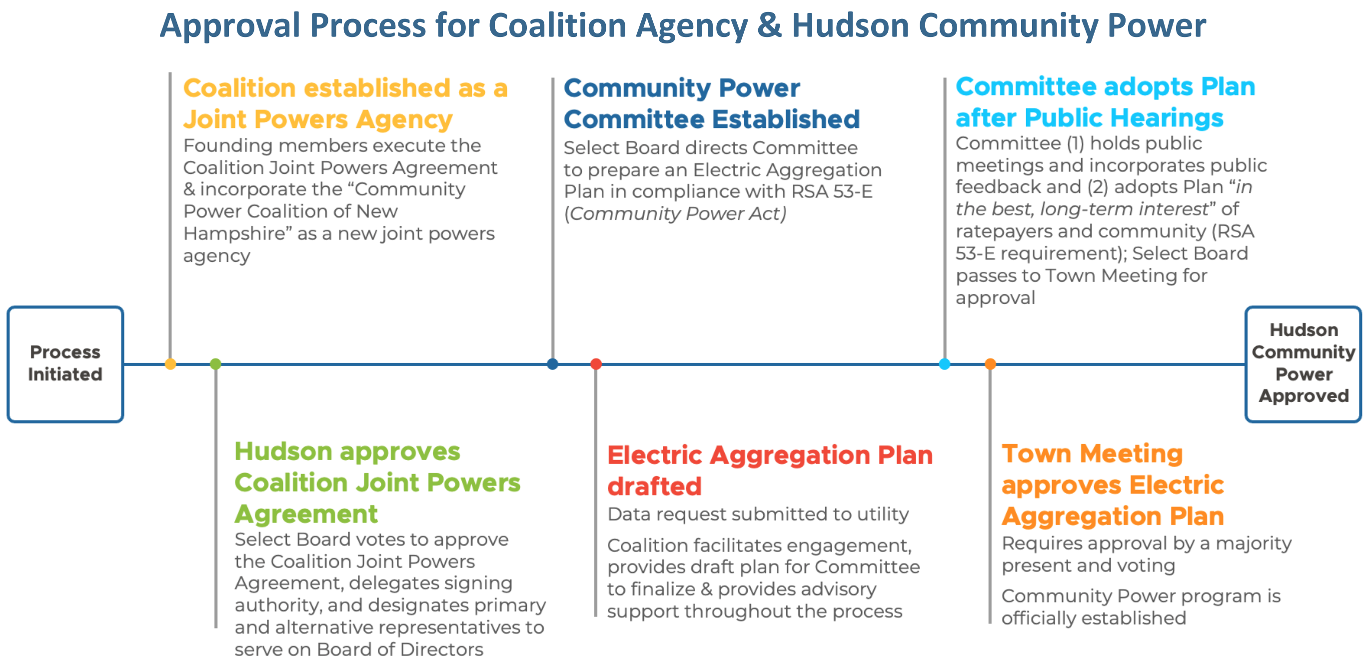
[1] Formerly 'Member Operations and Engagement Committee'

Docket DE 21-142[2] and issued an Initial Proposal on February 3, 2022, putting forward the Coalition's recommended rules for public review and comment. Hudson Community Power and the Coalition actively participated in the review and public comment process proceeding the Commission's issuance of a Final Proposal for CPA Administrative Rules. Hudson Community Power will continue to coordinate with the Coalition to engage in the Commission's rule development process.

Coalition & Hudson Community Power Implementation Milestone Charts

The milestone charts below show the anticipated approval, formation and launch processes for Hudson Community Power and the Coalition power agency, as described in the sections above.

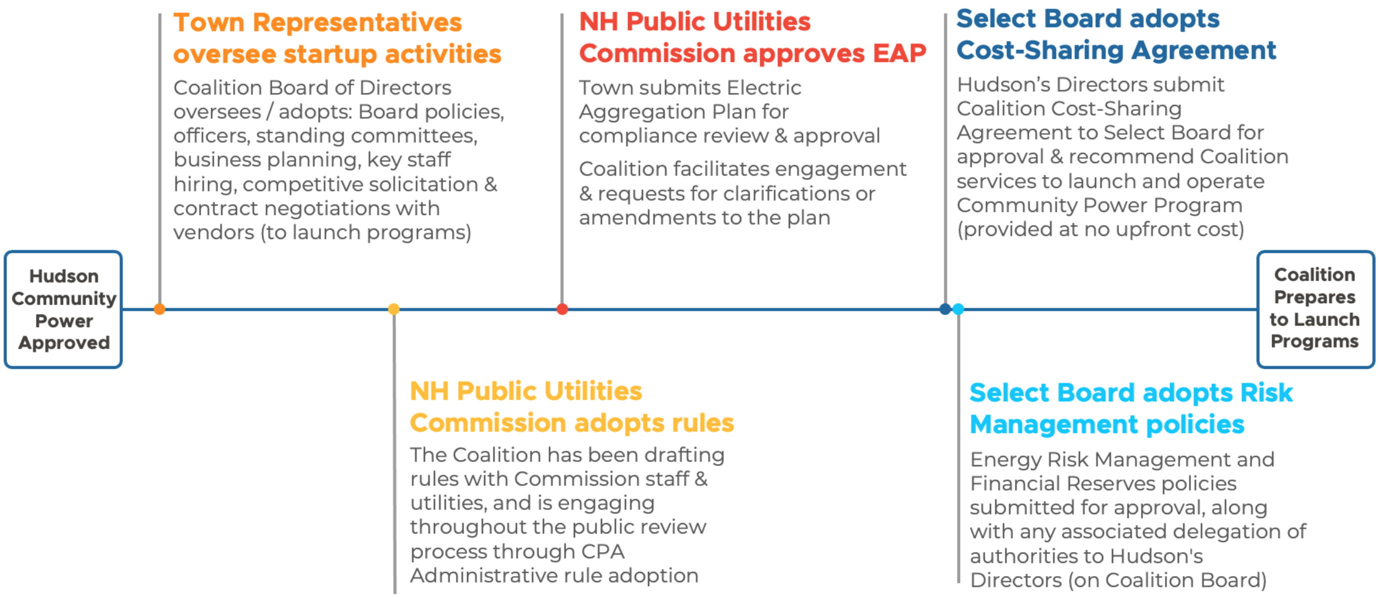
The first chart below summarizes the different categories of activities required to approve Hudson Community Power and join the Coalition as a member to create the joint powers agency:



Hudson's directors on the Coalition Board are overseeing startup activities, including engagement at the Public Utilities Commission to finalize the administrative rules governing the Community Power market, and will bring forward the Coalition's cost-sharing agreement along with Energy Risk Management and Financial Reserve policies for approval by the Board of Selectmen:

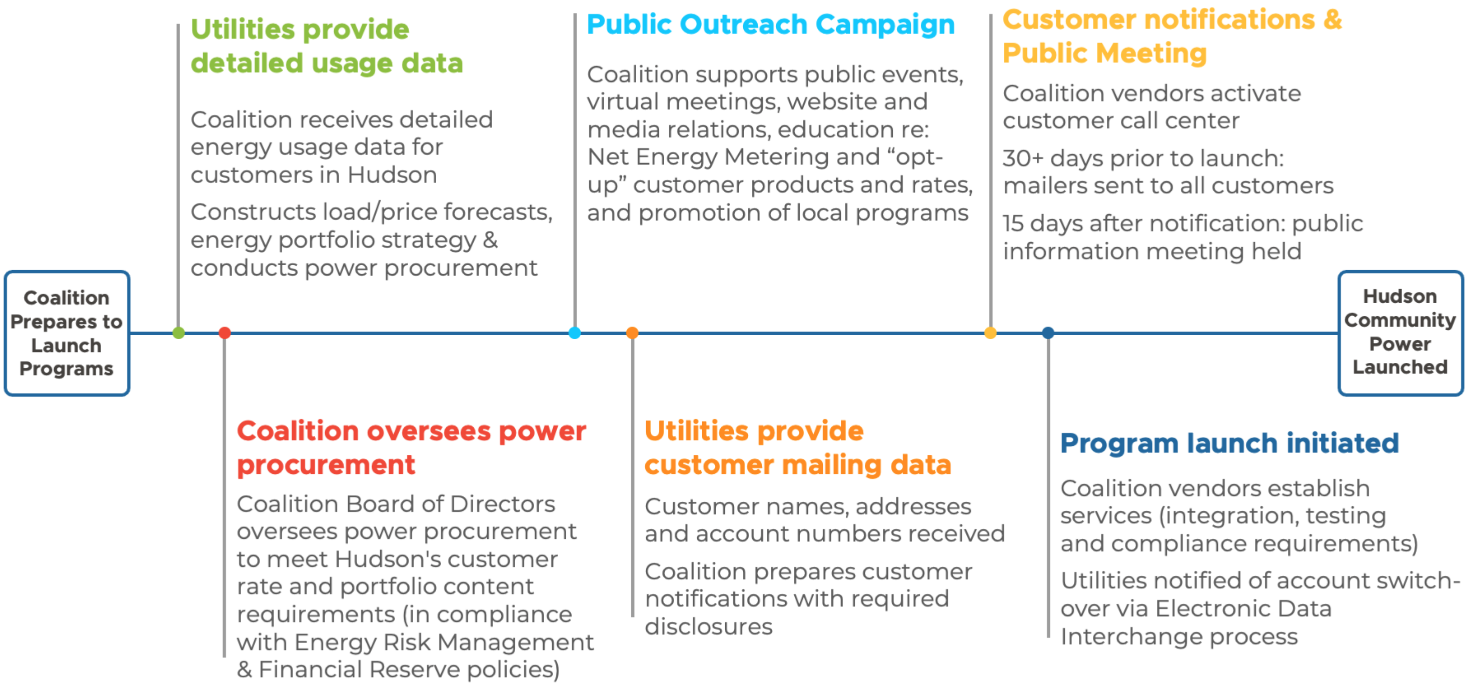
[2] See: https://www.puc.nh.gov/Regulatory/Docketbk/2021/21-142/LETTERS-MEMOS-TARIFFS/21-142_2022-03-14_CPCNH_COMMENTS.PDF

Coalition Startup, Rule Making and Risk Management Policy Approval Process



After the Public Utility Commission adopts rules and opens the market, the Coalition will be allowed to launch Hudson Community Power (and the programs of other participating municipalities). The milestones below summarize the process by which the Coalition will structure and conduct data collection, forecasting, power procurement solicitations and rate setting exercises — in compliance with the Energy Risk Management and Financial Reserve policies adopted by the Town, and with oversight provided by Hudson's representatives on the Coalition's Board of Directors — and the local outreach, customer notification mailings and public meeting process that culminates in the launch of Hudson Community Power:

Hudson Community Power Launch Process



OVERVIEW OF COMMUNITY POWER COALITION OF NEW HAMPSHIRE

Hudson is a member of the Community Power Coalition of New Hampshire, a nonprofit joint powers agency authorized under RSA 53-A.

Joint powers agencies are governed by communities, operated on a not-for-profit basis and allow Community Power programs to voluntarily join forces to take advantage of economies of scale and shared services to boost operational efficiencies.

The public power industry has created over seventy joint powers agencies in the last fifty years, and several hundred local governments operate Community Power programs through joint powers agencies or comparable collaborative governance structures in Massachusetts, New York, Ohio, Illinois and California.

The experience of these markets demonstrates that the economics of joint purchasing can enable access to advanced services and expertise for participating Community Power programs, which helps keep power rates competitive and supports long-term financial stability.

The Coalition was incorporated on October 1, 2021 by the following founding local government Members: the cities of Lebanon, Nashua and Dover; the towns of Hanover, Harrisville, Exeter, Rye, Warner, Walpole, Plainfield, Newmarket, Enfield and Durham; and Cheshire County. Following incorporation, the city of Portsmouth and the towns of Hudson, New London, Pembroke, Webster, and Peterborough joined the Coalition's membership.

The 20 city and town members of the Coalition represent more than 270,000 residents, or ~20% of the population of New Hampshire. To put the anticipated electricity usage of all Coalition Members Community Power programs in context, at full enrollment of all eligible customers, the Coalition would be larger in size than the default service load of Unitil, Liberty Utilities, and the New Hampshire Electric Coop on an individual basis, and smaller than Eversource (New Hampshire's largest investor-owned distribution utility).

Hudson anticipates relying upon the Coalition's member services to launch and operate Hudson Community Power, but approval of this plan does not commit the town to doing so. The Board of Selectmen retains the authority to contract for any and all required program services and electricity supplies, and to pursue projects independently of the Coalition.

Based on the design and projected size of the Coalition, the Electric Aggregation Committee anticipates that participation will result in cost savings, lower staff requirements and enhanced quality of services for Hudson Community Power and other member programs.

Operating Hudson Community Power through the Coalition is expected to provide a number of distinct benefits in terms of transparency, scope and cost of services, regulatory and policy engagement, local program options, quality of energy risk management advice, the accrual of financial reserves sufficient to ensure long-term financial stability, and opportunities to develop new energy projects. These benefits are summarized in the "Regulatory and Policy Advocacy" and "Coalition Member Services" sections below.

Regulatory and Policy Advocacy

Changes in law and regulations that adversely impact Community Power programs will be a non-trivial source of risk for Hudson Community Power.

Additionally, extending and maintaining the full range of benefits that Hudson Community Power could create for customers will require informed participation and advocacy on energy issues at the Legislature and Public Utilities Commission.

Coordination with other municipalities and Community Power initiatives on matters of common interest through the Coalition have already produced meaningful results in these areas. For example, over the last year, the communities involved in the formation of the Coalition have:

- Participated in the Community Power informal rule drafting process, including by providing the initial and subsequent draft rules for discussion, arranging bilateral meetings with utilities and other stakeholders, and leading significant portions of the subsequent stakeholder workshops at the request of Public Utilities Commission staff.
- Intervened in regulatory proceedings to represent the interests of customers and Community Power programs, such as by advocating for expanded data access in the Commission's Statewide Data Platform docket (DE 19-197), under which a settlement agreement with the utilities was negotiated and recently submitted to the Public Utilities Commission. (If adopted, the settlement would create a "Statewide Data Platform" to enable data access for customers and Community Power programs, which would be overseen by a Governance Council that includes Coalition representatives.)
- Testified in legislative hearings — and organized hundreds of people, elected officials and civic organizations to register in support of the Coalition's position on key legislation — in order to successfully negotiate critical amendments to two bills recently signed into law:
    - House Bill 315, which clarifies and expands key Community Power authorities; and
    - Senate Bill 91, which expands battery storage options for customers as well as Net Energy Metering for communities and established a committee to study the creation of a new market that would expand the ability of Community Power programs to buy from in-state generators and battery storage projects (under 5 megawatts in size).

Hudson Community Power will continue and expand on these activities through the Coalition.

Coalition Member Services

The Coalition's business model has been designed to provide Community Power programs with:

- **Innovative local programs and customer services**: new rates, technologies and services for customers that lower electricity supply costs and risk for the program in aggregate, along with the electricity bills of participating customers from a "full bill" perspective (i.e., inclusive of transmission and distribution charges).
- **Energy Risk Management & Financial Reserve Policies, Procedures and Practices*:*** expert guidance on energy risk management, procurement of a diversified portfolio of energy contracts, rate setting, and financial reserves — sufficient to ensure the stability and operational continuity of Community Power programs over the long-term (as technologies, market dynamics, risk factors, consumer preferences and energy policies continue to evolve).

- **Development of Renewable and Battery Storage Projects:** joint contracting opportunities for the construction of new renewable and battery storage projects financed under long-term contracts — to diversify program energy portfolios, provide a physical hedge against wholesale market price fluctuations, enhance the resiliency of our electrical grid, and stimulate local construction and economic development.

The Coalition intends to contract with qualified vendors and credit-worthy suppliers to provide the services, credit support and electricity required to launch and operate Community Power programs. These third parties are expected to fund the upfront cost of implementing Community Power programs, the expense of which would be amortized and recovered for a specified term, along with ongoing operating costs, in customer rates.

The extent of services offered by the Coalition is expected to thereafter expand over time, in response to new market opportunities and ongoing regulatory rule reforms, and to meet the local objectives of participating Community Power programs. The Coalition also plans to hire a small number of qualified staff to ensure effective oversight of operations, as well as enhanced transparency and expert management as the Coalition's business operations evolve.

The proceeding sections explain how the above categories of member services are interrelated in ways that combine to ensure Hudson Community Power remains operationally stable, competitive and able to achieve the full range of our local policy goals over the long-term.

Innovative Local Programs & Customer Services

Cost-effective local programs provide new retail products and services that enable customers to:

- Intelligently moderate their use of electricity from the grid during times of high wholesale power prices and when the physical grid is constrained (at-risk of not being able to deliver enough power to meet all customers' usage requirements during the hours of "peak demand");
- Increase their use of electricity from the grid when wholesale prices are relatively low and the physical grid is not constrained.

Examples of innovative retail products and services that enable customers to do so include time-based rate options, individual and group net metering, targeted efficiency, distributed generation and energy storage programs, electric vehicle charging rates, and other offerings that empower customers directly and enable the services of third-party energy companies that are helping customers adopt and use new technologies.

Programs that enable the intelligent use of electricity will help Hudson Community Power to:

- Lower electricity supply costs and risk for the program in aggregate, along with the electricity bills of participating customers from a "full bill" perspective (inclusive of transmission and distribution charges);
- Strengthen customer relationships and local brand recognition; and
- Protect against customer attrition (the risk that customers opt-out of the program by choosing an alternative supplier) and potentially grow the program's customer base over time.

Local programs, in order to be cost-effective, need to be designed in ways that relate to and actively help manage the various sources of cost and risk involved in operating a competitive power agency.

As explained in the section below, the Coalition will adopt a structured approach to monitoring, analyzing and actively managing energy cost and risk — both to enable the design of cost-effective local programs, and provide additional benefits such as long-term financial stability.

Energy Risk Management & Financial Reserve Policies, Procedures and Practices

Hudson Community Power's ability to maintain competitive rates, as market prices and Eversource default rates change over time, is a primary goal for the program. Competitive rates will significantly reduce the risk that customers opt out of Hudson Community Power and allow the program to achieve our medium- to long-term goals.

To that end, working with the other members of the Coalition, Hudson Community Power will adopt Energy Risk Management and Financial Reserve policies. The purpose of these policies is to:

- Ensure that Hudson Community Power allocates customer revenues in ways that balance our community's goals and objectives over the short-to-long term; and
- Define how the Coalition will conduct energy risk management, procurement and market operations on behalf of Hudson Community Power (so that the agency remains in compliance with our adopted policies).

Combined with the operational procedures and practices of the Coalition's business model, these policies are designed to ensure that Hudson Community Power and all participating members of the Coalition will be able to:

- Foresee, forecast and adequately plan for adverse contingencies (such as power supply shocks, economic downturns and changes in policy and regulations);
- Structure and manage a diversified portfolio (or "book") of physical and financial energy contracts in order to (1) hedge price risk in an optimal fashion by assessing the cost of entering into forward contracts against the risk of wholesale market price exposure, (2) transact quickly to take advantage of changing market conditions and (3) incorporate energy contracts from a variety of preferred sources (e.g., renewables and battery storage assets, local generators, customer-generators and demand response programs, etc.);
- Maintain competitive rates, and additionally set aside funds to accrue financial reserves, while also implementing local programs (designed in ways that lower portfolio costs and risk factors);
- Draw on financial reserves or credit support sufficient to maintain (1) rate stability for participating customers and (2) adequate cash flow for the Coalition's operations over the course of any adverse events and periods.

As Hudson Community Power accrues financial reserves, the Coalition will be able to facilitate additional ways to lower costs, create new value, and further enhance the financial stability of the program. As one example, the accrual of sufficient reserves will allow Hudson Community Power to begin self-providing the collateral required for wholesale power market transactions and power purchase agreements. This will lower the capital costs and risk premiums otherwise embedded into the price of power contracts negotiated by the Coalition. Similarly, the Coalition also intends to facilitate pooled power procurement across participating Community Power programs, and to explore opportunities to jointly satisfy collateral obligations within these arrangements.

Lastly, as explained further in the section below, the combination of the Coalition's approach to energy portfolio risk management and the accrual of sufficient financial reserves by participating members is what will enable Hudson Community Power to enter into long-term contracts — in order to construct new renewable and battery storage projects.

Development of Renewable and Battery Storage Projects

As Hudson Community Power and other participating Community Power programs demonstrate the ability to accrue reserves sufficient to ensure our collective financial stability — and maintain or grow our customer base by offering competitive rates and innovative services over time — the Coalition will be able to facilitate new project developments for Hudson Community Power and other Community Power programs that elect to jointly participate in long-term contracting solicitations. As context:

- Project developers and financiers require long-term power purchase agreements (typically 10 years or longer in duration) to justify the upfront cost of constructing renewables and battery storage facilities;
- Consequently, project financiers will not execute long-term contracts with a Community Power program if they do not believe that the program is likely to remain a stable, credit-worthy counterparty (i.e., unlikely to default on payment obligations over the contract term).

Achieving the ability to execute long-term contracts and build new renewables and battery storage projects is a priority for Hudson Community Power and the other Community Power programs joining together to create the Coalition. This objective is an important policy goal for our program and will additionally diversify the energy supply portfolio managed by the Coalition.

Portfolio diversification helps to stabilize operating margins by intelligently hedging Hudson Community Power's exposure to wholesale market dynamics and price fluctuations. The objective is to enter into contracts that help to manage risk and maximize revenues for the program from a total portfolio management perspective, in order to further strengthen our program's financial performance and stability over the long-term. As context:

- When bidding on joint project development solicitations, developers will submit different combinations of technologies, project locations, prices, term lengths and contractual clauses with operational and financial implications.
- Selecting which contracts to enter into — and effectively negotiating contract terms and prices — requires analyzing the different contracts being offered, individually and in combinations, and simulating the impact that the new contracts would have on Hudson Community Power's cashflow, total portfolio costs and risk profile over the length of the contract.
- This exercise, which is a key component of the Coalition's broader "portfolio strategy" analysis, is referred to as "contract valuation" or "deal valuation". These simulations will allow the Coalition to quantify the value of the contract (from a portfolio risk management perspective), compare the value against the price being offered by developers, negotiate for better terms and prices as necessary, and enter into contracts on behalf of Hudson Community Power that are likely to cost less than the value created at the program portfolio level.

As described in the preceding section "*Energy Risk Management & Financial Reserve Policies, Procedures and Practices*", the Coalition's business model has been designed to actively manage a diversified portfolio of energy contracts at launch — which entails:

- Understanding and analyzing energy cost and risk factors on a continuous basis;
- Conducting contract valuation simulations;

- Negotiating contract terms and prices with a variety of counterparties to construct a portfolio of energy contracts that, in aggregate, is designed to optimally hedge price risk; and
- Thereafter, actively and continuously managing the “book” of contracts in response to market dynamics, price movements and opportunities.

In these ways, the Coalition’s business model provides the foundational capabilities required to support joint project development solicitations for Hudson Community Power and other participating programs — inclusive of long-term contract valuation simulations, counterparty negotiation, and active management of the contract and overall portfolio thereafter.

Hudson Community Power Objectives and Requirements

Hudson Community Power affords the town the capacity and flexibility to achieve our objectives pertaining to energy, economic development, and infrastructure.

Our objectives will need to be pursued through a combination of direct program activities and informed public advocacy at the Legislature and Public Utilities Commission. This will require enhanced coordination with other communities as well as advanced operational services, dedicated expertise, innovation and sustained initiative carried out over a period of multiple years.

Simultaneously, maintaining competitive rates compared to Eversource's default service rates — as market prices, energy technologies and policies change over time — will require nimble decision-making and the ability to evolve business operations in response to changing market conditions in order to actively manage risk, minimize costs and maximize the creation of customer value.

The structure of the Coalition — the combination of the joint powers agency's community governance model, competitive business model and coordinated approach to engaging in public advocacy — has been designed to enable and streamline these activities for Hudson Community Power at an advantageous, cost-effective economy-of-scale.

Participation in the Coalition is therefore expected to strengthen the capacity and financial performance of Hudson Community Power, such that the program is able to operate continuously as a self-supporting, competitive enterprise for the foreseeable future, and will therefore be able to work towards achieving the full scope of our objectives over the long-term.

Hudson Community Power Objectives

To achieve our goals, Hudson Community Power will be guided by the following objectives:

- **Competitive Rates:** provide residential default rates that are lower than or competitive with those offered by Eversource;
- **Expanded Choices and Enhanced Customer Focus:** offer optional products, such as supply options with higher and lower levels of renewable energy and time-varying rates that enable the intelligent use of customer energy technologies to reduce energy expenditures and carbon emissions on a voluntary basis;
- **Fiscal Stability & Financial Reserves:** maintain a reserve fund to ensure that the program remains able to offer competitive rates as market prices fluctuate over time;
- **Consumer Protections:** ensure that the contracts entered into on behalf of customers are fair and represent the interests of Hudson and its residents;
- **Public Advocacy:** represent the interests of Hudson and the program's customers at the Legislature, Public Utility Commission and other relevant agencies on matters pertaining to Community Power and towards creating a more modern electric grid;
- **Cleaner, Local Power:** prioritize the development of cost-effective projects to supply an affordable energy portfolio that prioritizes the use of in-state and local renewable energy;
- **Community Resilience:** support local contractor training and education programs to lower barriers to the installation of new clean energy technologies, and support projects such as back-

up power supplies, electric vehicle charging networks and community microgrids on critical facilities;

- **Regional Collaborations:** collaborate with municipalities, other Community Power programs and government agencies to jointly develop cost-effective local renewable generation and storage projects, electric vehicle transit fleets and charging corridors, and other clean energy infrastructure developments;

Through strategies and initiatives like these, enabled by the scope and scale of service provided through the Coalition, Hudson Community Power intends to:

- Reduce fossil fuel consumption overall while enhancing the reliability of our electricity grid;
- Create savings and new value for customers; and
- Attract and support local businesses.

These objectives are essential to our continued success as a vital, sustainable community.

Near-Term Operational Requirements

While many of the broader benefits Hudson Community Power intends to create for customers and the town will be developed over time, the program's immediate objective is to offer competitive default supply rates compared to Eversource while accruing a reserve fund sufficient to ensure long-term financial stability, and additionally offering voluntary products that retail customers may opt-up to receive as well as Net Energy Metering supply rates that allow customer generators to participate in the program.

Hudson Community Power will need to balance customer rate levels, renewable power content and the accrual of program reserves to meet these objectives.

Performance Relative to Utility Default Service and Net Energy Metering Generation Rates

Compensation to customer generators under Net Energy Metering generation rates, the timing of the program's rate setting decisions and, to a certain degree, the procurement of electricity will need to take into account Eversource's tariffs, processes and timing in regard to these activities.

Refer to <u>Attachment 3: New Hampshire's Renewable Portfolio Standard</u>, <u>Attachment 4: Utility Default Procurement Cycles and Rate Setting</u>, <u>Attachment 5: Overview of Utility Net Energy Metering Tariffs</u> and the section "<u>Net Metering and Group Net Metering Policies</u>" for additional documentation and discussion of these factors.

Customer Rates and Products

The table below provides an illustrative example of a default service product and optional rates that could be offered to customers:

	Granite Basic (automatic enrollment)	**OPTIONAL PRODUCTS**		
		Granite Plus (opt-up +)	**Clean 50%** (opt-up +)	**Clean 100%** (opt-up +)
Attributes	Meets Renewable Portfolio Standard (23.4% for 2023)	~33% renewable Or Carbon Free	~50% Renewable Or Carbon Free	100% Renewable Or Carbon Free
Price	Must be below default utility rate at launch	Below default utility rate	Competitive with default utility rate	Possibly exceeds default utility rate[3]

The products that Hudson Community Power initially offers to customers, and the rates charged for each product, will be refined and finalized in advance of program launch. The price points shown are aspirational. However, ***Hudson Community Power will not launch unless the default service offering (e.g., Granite Basic) can beat the default utility rate.***

Renewable Portfolio Standard Requirements

New Hampshire's Renewable Portfolio Standard (RPS) requires all electricity suppliers to obtain RECs for four distinct "classes" of renewables, each distinguishing between different technologies and dependent upon the year that the generators came online.

For 2023, Eversource is required to include 23.4% renewable energy in their energy supply. This minimum compliance requirement will increase incrementally to 25.2% by 2025 and remain fixed thereafter, absent an increase in the RPS.

Hudson Community Power will seek to procure voluntary renewables in excess of the RPS minimum requirements[4] from "Class I" resources (as defined in Attachment 3: New Hampshire's Renewable Portfolio Standard). Additionally, the program could prioritize including as much renewable energy sourced from generating resources located in New Hampshire and New England as possible.

The chart below shows in shades of blue the different classes and quantities of renewable power required under the RPS between 2023 and 2025, along with, for the sake of illustration and in green,

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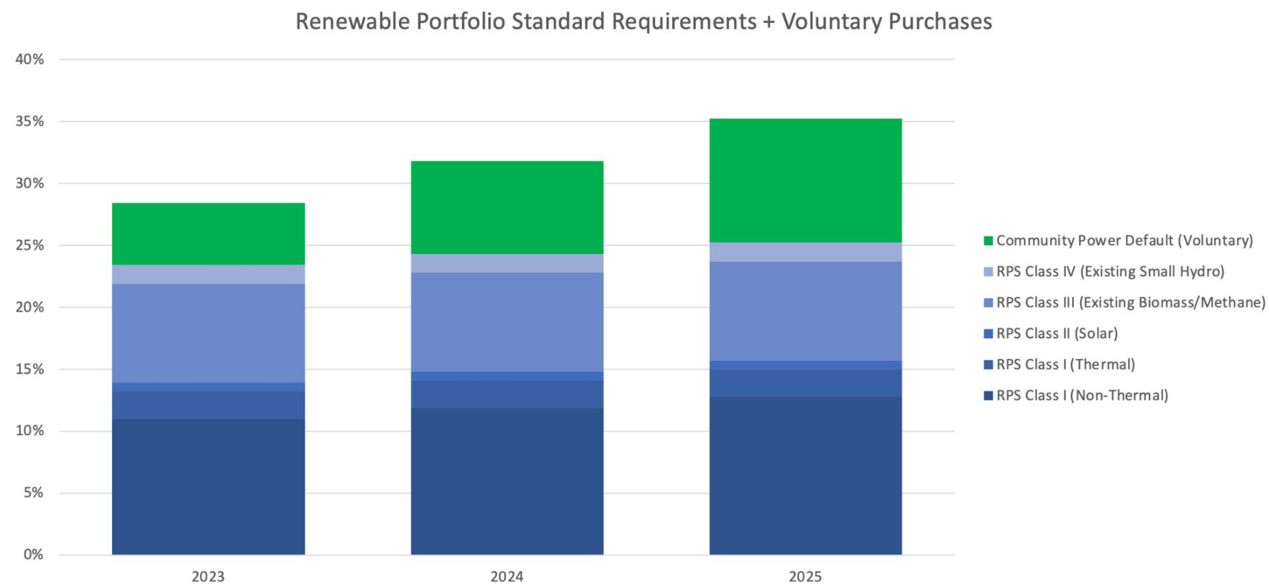
3 Example of 100% renewable energy product that is less expensive than utility default: Cambridge's 100% Renewable Energy Option Now More Affordable than Eversource Basic Service, **July 12, 2022.** ***It should also be noted that all CPCNH products for the launch of the initial wave of municipalities in the Spring of 2023 had rates that were less expensive than the utility default.***

4 The RPS requirements as defined by the PUC can be found at: https://www.puc.nh.gov/Sustainable Energy/Renewable_Portfolio_Standard_Program.htm

Hudson Community Power’s additional voluntary purchases (assuming the default product from the table in the proceeding section and exceeding the RPS requirements by an increase of 2% each year):



Energy Risk Management and Financial Reserve Policies Compliance

Hudson Community Power’s power procurement, budgeting and rate-setting will be carried out in accordance with the Energy Risk Management and Financial Reserve policies that will be adopted by the Board of Selectmen. If Hudson Community Power elects to partner with the Coalition for the provision of services, these policies will be developed by the Coalition for review and approval by the Hudson Board of Selectmen.

This decision-making framework is intended to guide the program to allocate revenues in a manner that appropriately balances our competing priorities — to ensure that Hudson Community Power will remain stable, and able to work towards achieving all of our policy goals, over the long-term.

ELECTRIC AGGREGATION PLAN STATUTORY REQUIREMENTS

The following requirements for this Electric Aggregation Plan, in compliance with RSA 53-E:6, are addressed below:

A. Organizational structure of the program;
B. Methods of entering into and terminating agreements;
C. Operation and funding;
D. Rate setting, costs, and customer enrollment process;
E. Rights and responsibilities of program participants;
F. Net metering and group net metering policies;
G. Ensuring discounts for Electric Assistance Program participants; and,
H. Termination of program.

Organizational Structure of the Program

Upon approval of this plan, Hudson Community Power will be authorized to provide electricity and other related services to participating residents, businesses, and other customers in the town.

The Board of Selectmen will oversee the program and has overall governance authority. Decisions regarding Hudson Community Power, such as amending and modifying program goals or this Electric Aggregation Plan (in accordance with RSA 53-E:7, IX), adoption of Energy Portfolio Risk Management, Retail Rates and Financial Reserve policies (to govern the program's power procurement and rate-setting decisions), will be made at duly noticed public meetings.

The Board of Selectmen has appointed a primary and alternate representative to participate in the Community Power Coalition of New Hampshire and to serve on the agency's initial Board of Directors and may delegate certain decision-making authorities to them to carry out their responsibilities at the Board of Selectmen's direction.

In general, Hudson's representatives will be expected to help oversee the start-up and operation of the agency, provide input regarding the Coalition's public advocacy on matters of policy and regulation, provide direction to the Coalition's vendors and/or staff as the agency's operations and customer services evolve over time, and report back regularly regarding the performance of Hudson Community Power and on any matter that warrants attention or requires action by the Board of Selectmen.

Additionally, the Electric Aggregation Committee may continue to hold meetings for the purpose of (1) providing community input and advisory support regarding the program and (2) facilitating public education and engagement in our community.

Methods of Entering Into and Terminating Agreements

This Electric Aggregation Plan authorizes the Board of Selectmen to negotiate, enter into, modify, enforce, and terminate agreements as necessary for the implementation and operation of Hudson Community Power.

Operation and Funding

Hudson Community Power will contract with qualified vendors and credit-worthy suppliers to provide the services, credit support and electricity required to launch and operate the program.

This plan assumes, but does not require, Hudson to participate fully in the Coalition and thereby contract for operational services jointly with other participating Community Power programs.

The Coalition's third-party contractors will be expected to fund the upfront cost of implementing Hudson Community Power, the expense of which will be amortized and recovered in the program's rates and charges to participating customers. The program may also seek opportunities to apply for grant funding, either independently or through the Coalition.

Services provided by third-party entities required to launch and operate the program may include portfolio risk management advisory services, wholesale Load Serving Entity (LSE) services, financial services, electronic data interchange (EDI) services with the utility, and customer notification, data management, billing, and relationship management (e.g., call center, website, etc.) services. Additional information on how Hudson Community Power will implement Load Serving Entity (LSE) services is found in Attachment 9: How Load Serving Entity Services will be Implemented.

Additional support services such as management and planning, budgeting and rate setting, local project development support, regulatory compliance, and legislative and regulatory engagement services (on matters that could impact the program and participating customers) will be addressed through a combination of Coalition staff support and third-party services.

Hudson Community Power will provide "all-requirements" electricity supply for its customers, inclusive of all of the electrical energy, capacity, reserves, ancillary services, transmission services, transmission and distribution losses, congestion management, and other such services or products necessary to provide firm power supply to participants and meet the requirements of New Hampshire's Renewable Portfolio Standard. (Refer to Attachment 3: New Hampshire's Renewable Portfolio Standard for details regarding the requirements of Renewable Portfolio Standard statute, RSA 362-F.)

If a single supplier is relied upon to provide all-requirements electricity on behalf of Hudson Community Power, then (1) the supply contract will be executed or guaranteed by entities that possess at least a BBB- or equivalent investment-grade rating issued by a nationally recognized statistical rating organization (NRSRO), and (2) the supplier will be required to use proper standards of management and operations, maintain sufficient insurance, and meet appropriate performance requirements for the duration of the supply contract. Alternatively, if a portfolio of contracts with multiple entities is structured to diversify counterparty credit risk exposure, and actively managed to provide for all-requirements electricity on behalf of Hudson Community Power, then counterparty credit requirements and monitoring, hedging transaction authorities, residual ISO-NE market exposure limits, and reporting requirements will be carried out in accordance with Energy Portfolio Risk Management, Rates, and Financial Reserves policies that would be established prior to commencing procurement and implementing the program.

Additionally, RSA 53-E provides Community Power programs with authorities pertaining to meter ownership, meter reading, billing, and other related services. These authorities provide Hudson Community Power with the practical ability to help customers adopt and use innovative technologies (for example, building management systems, smart thermostats, backup battery storage systems, controllable electric vehicle chargers, etc.) in ways that save money, enhance grid resiliency and decarbonize our power supply.

However, the implementation of these authorities is expected to take some time, as it requires action by the Public Utilities Commission to adopt enabling rules and coordination with Eversource to adapt existing meter and billing system processes. ***As a result, the capabilities and technologies mentioned in the previous paragraph will not be part of the initial focus of Hudson Community Power.***

Rate Setting, Costs, Enrollment Process, and Options

Customers who choose not to participate in Hudson Community Power shall not be responsible for any costs associated with the program, apart from incidental costs incurred by the town prior to the point at which the program starts producing revenue from participating customers (for example, contract review by an attorney, but not any operational or capitalized costs of the program).

Rate Setting and Costs

Hudson Community Power will only launch if it is able to offer residential default rates that are initially lower than or competitive with those offered by Eversource; thereafter, the program will strive to maintain competitive rates for all default service customers, as well as customers who opt-in or opt-up to receive optional retail products, while working to achieve the program's objectives (as set forth in this Electric Aggregation Plan and modified from time to time at the direction of the Board of Selectmen).

The Board of Selectmen will adopt Energy Risk Management and Financial Reserve policies to govern the program's power procurement and rate-setting decisions. Rates will be set at a level such that revenues from participating customers are projected to meet or exceed the ongoing operating and capital costs of the program.

To ensure the financial stability of Hudson Community Power, a portion of revenues will be deposited in a financial reserve account. In general, the fund will be restricted for uses such as:

- **In the near-term**, maintain competitive customer rates in the context of price fluctuations in the electricity market and other factors;
- **In the medium-term**, as collateral for power purchase agreements (including for the development of new renewable and battery storage projects), and for additional credit enhancements and purposes that lower the program's cost of service; and
- **Over the long-term**, may also be used to directly fund other program financial requirements, or to augment the financing for development of new projects and programs in the later years of the program, subject to the Board of Selectmen's approval.

As required by law, the program will ensure the equitable treatment of all classes of customers, subject to any differences arising from varying opportunities, tariffs, and arrangements between different electric distribution utilities in their respective franchise territories.

In other words, customers will be treated the same based on their circumstances. For example, any customers that opt-in after being offered the opportunity to participate during the initial enrollment period may be offered rates that reflect how market prices have changed in the intervening period.

Changes to the program's default service rates shall be set and publicly noticed at least 30 days in advance of any rate change. In the event that Hudson Community Power elects to partner with the Coalition for the provision of service, the Coalition will coordinate with Hudson's Board of Selectmen and Electric Aggregation Committee in such notices.

Enrollment Process and Options

Hudson Community Power intends to launch on an opt-out basis, providing an alternative default service to the utility provided default service rate. After approval of this Electric Aggregation Plan and before the launch of Hudson Community Power, all customers in the town will be sent notifications regarding the program and offered the opportunity to participate:

- **Customers currently on default service provided by Eversource** will be sent "opt-out" notifications — describing the program, its implications for the town, the rights and responsibilities of customers, and program rates and charges — with instructions on how to decline participation, and thereafter be transferred to Hudson Community Power if they do not opt-out of the program prior to launch.
- **Customers already served by Competitive Electric Power Suppliers** will receive "opt-in" notifications describing the program and may request to opt-in to the program.

If the electric distribution utilities have not fully implemented Public Utilities Commission rules and procedures governing Community Power Aggregation service, certain groups of customers on default service provided by the utilities may need to be offered service on an opt-in basis, and/or offered service on an opt-out basis at a future date. For example, if the utilities are unable to reliably provide the data on customer-generators necessary to offer Net Energy Metering (NEM) rates and terms, then the program may initially choose to not enroll customer-generators on an opt-out basis, as doing so could risk negatively impacting NEM customer billing and crediting procedures.

For details on how net metering customers can participate in Hudson Community Power, see Attachment 5: Overview of Utility Net Energy Metering Tariffs and Attachment 6: Hudson Community Power Net Metering, Group Net Metering and Low-Moderate Income Solar Project Opportunities.

Customers will be notified through a mailing, which will be posted not less than 30 days prior to the enrollment of any customers. All information will be repeated and posted at the town's Community Power website. A public information meeting will be held within 15 days of the notification to answer program questions or provide clarification.

Optional products, such as increased renewable power content in excess of the Renewable Portfolio Standard (RPS) content of the program's default product and other energy services, may be offered on an opt-in basis.

After launch and in accordance with any applicable rules and procedures established by the Public Utilities Commission, new customers will be provided with the default service rates of Eversource and Hudson Community Power and will be transferred onto Hudson Community Power's default service unless they choose to be served by Eversource or a Competitive Electric Power Supplier.

Customers that request to opt-in to the program may do so subject to the terms of Hudson Community Power.

Residents, businesses, and other electricity customers may opt-out of participating in Hudson Community Power default service at any time, by submitting adequate notice in advance of the next regular meter reading by Eversource (in the same manner as if they were on utility provided default service or as approved by the Public Utilities Commission).

Customers that have opted-in to an optional product offered by Hudson Community Power may switch back to Eversource or take service from a Competitive Electric Power Supplier subject to any terms and conditions of the optional product.

Rights and Responsibilities of Program Participants

All participants will have available to them the customer protection provisions of the law and regulations of New Hampshire, including the right to question billing and service quality practices.

Customers will be able to ask questions of and register complaints with the town, Eversource and the Public Utilities Commission.

Hudson Community Power shall maintain the confidentiality of individual customer data in compliance with its obligations as a service provider under RSA 363:38 (privacy policies for individual customer data; duties and responsibilities of service providers) and other applicable statutes and Public Utilities Commission rules. Individual customer data includes information that singly or in combination can identify that specific customer including the individual customers' name, service address, billing address, telephone number, account number, payment information, and electricity consumption. Such individual customer data will not be subject to public disclosure under RSA 91-A (access to governmental records and meetings). Suppliers and vendors for Hudson Community Power will be contractually required to maintain the confidentiality of individual customer data pursuant to RSA 363:38, V(b). Attachment 10: Customer Data Protection Plan, details the reasonable security procedures and practices that the Town and Hudson Community Power will employ to protect individual customer data from unauthorized access, use, destruction, modification, or disclosure.

Aggregate or anonymized data that does not compromise confidentiality of individual customers may be released at the discretion of Hudson Community Power and as required by law or regulation.

Participants will continue to be responsible for paying their bills. Failure to do so may result in a customer being transferred from Hudson Community Power back to Eversource (the regulated distribution utility and provider of last resort) for default energy service, payment collections and utility shut offs under procedures subject to oversight by the Public Utilities Commission.

Net Metering and Group Net Metering Policies

Under the net metering process, customers who install renewable generation or qualifying combined heat and power systems up to 1,000 kilowatts in size are eligible to receive credit or compensation for any electricity generated onsite in excess of their onsite usage.

Any surplus generation produced by these systems flows back into the distribution grid and offsets the electricity that would otherwise have to be purchased from the regional wholesale market to serve other customers.

Currently, customer-generators are charged their full retail rate for electricity supplied by Eversource and receive credits for electricity they export to the grid based on Eversource's Net Energy Metering (NEM) tariffs.

Hudson Community Power intends to provide new rates and terms that compensate participating customer-generators for the electricity supply component of their net metered surplus generation.

Customer-generators will continue to receive any non-supply related components (e.g., transmission and distribution credits) directly from Eversource, as specified under the terms of their applicable net energy metering tariff.

For group net metering where the host customer-generator is on default service, to the extent Hudson Community Power's supply rates are lower than Eversource's default service rate or if the host is located outside of Hudson, it may be most advantageous for the host to remain an Eversource default service customer, while the other group members are free to switch to Hudson Community Power for their supply and continue to receive on-bill credits for their participation in the group.

Hudson Community Power's exact terms, conditions, and rates for compensating and crediting different types of NEM customer generators in the town will be set at duly noticed public meetings and fully disclosed to all prospective NEM customers through the program's enrollment notification process and thereafter.

Certain aspects of administering net energy metering require coordination between Eversource and Hudson Community Power. The enabling services and strategies that Hudson Community Power may pursue, in order to benefit and encourage customers to adopt distributed generation, include but are not limited to:

- Dual-billing customer-generators separately for supply services;
- Offering time-varying rates and alternative credit mechanisms to compensate customers for surplus generation;
- Streamlining the establishment of new Group Net Metering and Low-Moderate Income Solar Project groups;
- Facilitating interval meter and Renewable Energy Certificate (REC) meter installations for customer-generators; and
- Engaging at the Legislature and Public Utilities Commission to advocate for upgrades and reforms to metering and billing infrastructure and business processes to enable Net Energy Metering and other innovative services to benefit customer-generators.

For additional details regarding these enabling services and strategies, refer to:

- <u>Attachment 5: Overview of Utility Net Energy Metering Tariffs</u> provides an overview of Eversource's net energy metering tariffs in use today, including the "standard" and "alternative" tariffs for individual customer-generators as well as Group Net Metering and Low-Moderate Income Solar Project options, and tables showing the number of customer-generators on net metered service in each utility territory;

- Attachment 6: Hudson Community Power Net Metering, Group Net Metering and Low-Moderate Income Solar Project Opportunities provides an in-depth discussion regarding operational and strategic opportunities to enhance net metering and group net metering through Hudson Community Power.

Ensuring Discounts for Electric Assistance Program Participants

Income eligible households can qualify for discounts on their electric bills under the Electric Assistance Program. Hudson Community Power will support income eligible customers who enroll in the Electric Assistance Program to receive their discount.

Electric Assistance Program discounts are funded by all ratepayers as part of the System Benefits Charge, which is charged to all customers and collected by the distribution utilities.

At present, the Public Utilities Commission and utilities only support provision of the discount to individual customers when the customer's electricity supply charges are billed through the distribution utility.

Hudson Community Power consequently plans to rely on Eversource to bill all customer accounts enrolled in the Electric Assistance Program, which may include Eversource bills with a line-item for Hudson Community Power provision of energy supply. This represents no change in the provision or funding of this program.

This arrangement may be revisited if, at some point in future, the Public Utilities Commission enables Community Power programs to provide Electric Assistance Program customers with their discount directly.

Termination of the Program

There is no planned termination date for Hudson Community Power.

Hudson Community Power may be terminated by majority approval of the voters at a Town meeting. If so terminated, Hudson Community Power would cease operations after satisfying any obligations contractually entered into prior to termination, and after meeting any advance notification period or other applicable requirements in statute or regulation, at which point participating customers would either be transferred to default service provided by Eversource or to a Competitive Electric Power Supplier of their choosing.

Hudson Community Power will provide as much advance notice as possible regarding the potential or planned termination of the program to participating customers, the Coalition, the Public Utilities Commission and Eversource.

Upon termination, the balance of any funds accrued in the program's financial reserve fund and other accounts, if any, would be available for distribution or application as directed by the Board of Selectmen and in accordance with any applicable law and regulation.

Attachments

Attachment 1: Legislative Background and Local Control Authorities

In 1996, New Hampshire led the nation in being the first state to pass an Electric Utility Restructuring Act (RSA 374-F), the purpose of which is excerpted in full below:

I. The most compelling reason to restructure the New Hampshire electric utility industry is to reduce costs for all consumers of electricity by harnessing the power of competitive markets. The overall public policy goal of restructuring is to develop a more efficient industry structure and regulatory framework that results in a more productive economy by reducing costs to consumers while maintaining safe and reliable electric service with minimum adverse impacts on the environment. Increased customer choice and the development of competitive markets for wholesale and retail electricity services are key elements in a restructured industry that will require unbundling of prices and services and at least functional separation of centralized generation services from transmission and distribution services.

II. A transition to competitive markets for electricity is consistent with the directives of part II, article 83 of the New Hampshire constitution which reads in part: "Free and fair competition in the trades and industries is an inherent and essential right of the people and should be protected against all monopolies and conspiracies which tend to hinder or destroy it." Competitive markets should provide electricity suppliers with incentives to operate efficiently and cleanly, open markets for new and improved technologies, provide electricity buyers and sellers with appropriate price signals, and improve public confidence in the electric utility industry.

III. The following interdependent policy principles are intended to guide the New Hampshire public utilities commission in implementing a statewide electric utility industry restructuring plan, in establishing interim stranded cost recovery charges, in approving each utility's compliance filing, in streamlining administrative processes to make regulation more efficient, and in regulating a restructured electric utility industry. In addition, these interdependent principles are intended to guide the New Hampshire general court and the department of environmental services and other state agencies in promoting and regulating a restructured electric utility industry.

Prior to this point, state regulators set retail customer rates to allow electric utilities to recover profits and prudently earned costs for "vertically integrated" monopoly service — spanning wholesale electricity generation, transmission, local distribution and retail customer services (metering, billing, collections, call center operations and so on).

Restructuring sought to increase competition and technological innovation in the markets for wholesale electricity supply and retail customer services, by requiring electric utilities to divest of their generation portfolios, creating a Federally regulated regional electricity market or "Independent System Operator" (ISO New England is the market operator for New England), and allowing Competitive Electric Power Suppliers (CEPs) to offer electricity supply rates and other services to retail customers.

Customers that did not choose a competitive supplier were left on "default service" provided by the electric utilities — afterwards referred to as "electric distribution companies" — which continue to be regulated by the Public Utilities Commission. The distribution utilities periodically hold auctions for competitive suppliers to bid against one another for the right to supply electricity to default service customers in large groups to competitive suppliers. (Refer to Attachment 4: Utility Default Procurement Cycles and Rate Setting for additional details on this process.)

Status of the Competitive Market

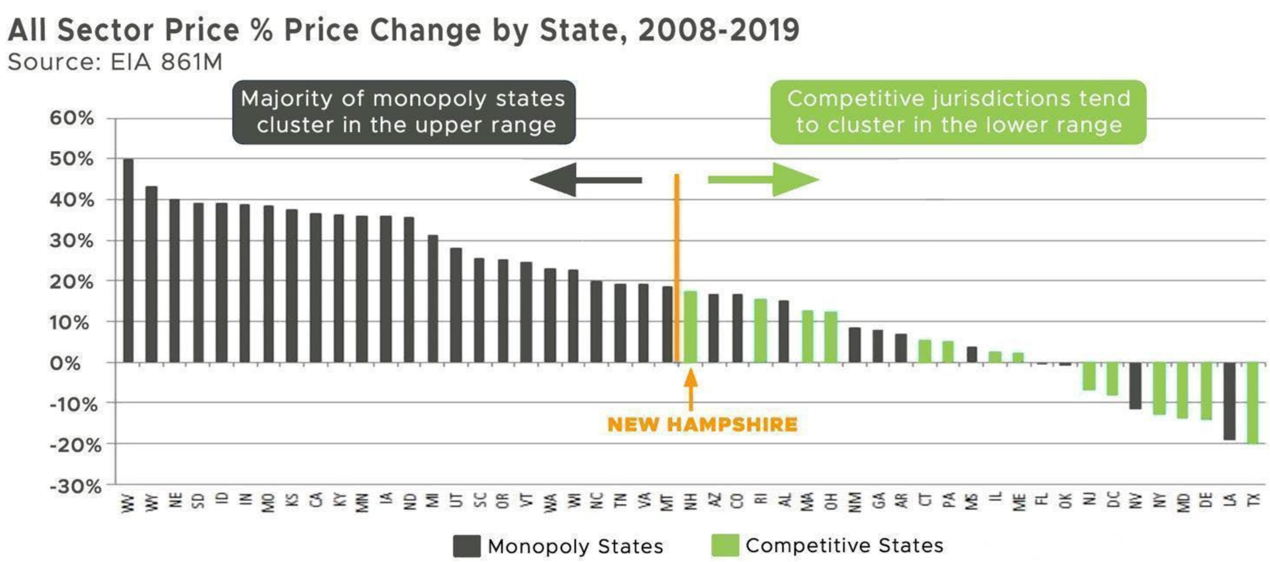
Nearly a quarter century has passed, and New Hampshire's competitive market has seen little growth since 2013. Four out of five customers remain on default service provided by the distribution utilities, and the customers that are on competitive supply only account for about half of total electricity usage.

Regulated distribution utilities continue to provide services that are not natural monopolies, and could therefore be available by competitive means, such as: default electricity supply, metering, meter data management, billing and other retail customer services (such as demand response and energy storage for smaller customers).

The continued reliance on utilities to provide these customer-facing services has necessitated state regulation over many aspects of the retail customer market. Utility regulation relies on administrative regulatory proceedings, which are necessarily more slow-moving and unable to respond to changing customer technologies and wholesale market dynamics (such as the increased price volatility caused by higher levels of renewable generation) compared to the nimbler, market-based framework envisioned under the Electric Utility Restructuring Act.

Residential customers, in particular, are not offered many rate options or clean technology innovations today: out of the 29 competitive suppliers currently offering service in New Hampshire, only nine offer service to residential customers (and only four serve customers in every distribution utility territory).

As a consequence, New Hampshire has fallen behind every other state with a restructured electricity market in terms of price competition:



Credit: *Retail Energy Supply Association, 2020.*

The Community Power Act

In order to support the growth of competitive market services in alignment with The Electric Utility Restructuring Act, RSA 53-E (as modified by Senate Bill 286 and House Bill 315) authorizes towns, cities and counties to launch Community Power programs that replace distribution utilities as default suppliers of electricity to retail customers. The purpose of RSA 53-E is excerpted below:

> *"The general court finds it to be in the public interest to allow municipalities and counties to aggregate retail electric customers, as necessary, to provide such customers access to competitive markets for supplies of electricity and related energy services. The general court finds that aggregation may provide small customers with similar opportunities to those available to larger customers in obtaining lower electric costs, reliable service, and secure energy supplies. The purpose of aggregation shall be to encourage voluntary, cost effective and innovative solutions to local needs with careful consideration of local conditions and opportunities."*

To achieve this purpose, RSA 53-E:3 allows Community Power programs to enter into agreements and provide for:

> *"the supply of electric power and capacity; demand side management; conservation; meter reading with commission approval for meters owned or controlled by the electric distribution utilities or used for load settlement; customer service for aggregation provided services; other related services; and the operation of energy efficiency and clean energy districts adopted by a municipality pursuant to RSA 53-F and as approved by the municipality's governing body."*

RSA 53-E further provides Community Power programs with authorities and regulatory pathways to offer more advanced meters for customers, and to provide for alternative customer billing options. Both metering and billing services are important means by which Community Power programs will be able to better engage customers and offer more innovative services that lower the energy expenditures and carbon emissions for individual customers and communities.

To enable all municipalities to work together to achieve this purpose, RSA 53-E:3 provides that "*such agreements may be entered into and such services may be provided by a single municipality or county, or by a group of such entities operating jointly pursuant to RSA 53-A."*

To ensure that utilities are fairly compensated for their continuing role in owning and operating the distribution grid, RSA 53-E:4(III) stipulates that:

> *"Transmission and distribution services shall remain with the transmission and distribution utilities and who shall be paid for such services according to rate schedules approved by the applicable regulatory authority, which may include optional time varying rates for transmission and distribution services that may be offered by distribution utilities on a pilot or regular basis."*

The law further provides that Community Power programs "*shall not be required to own any utility property or equipment to provide electric power and energy services to its customers*."

Enabling locally controlled Community Power programs, in order to exercise local control over these authorities and bring in third-party competitors to provide more innovative services on a community-wide scale, represents a viable and stable pathway to animate competitive retail markets across New Hampshire — and thus realize a lower-cost, more innovative and sustainable future for both our community and all Granite Staters.

Hudson is committed to using its local control authorities granted under RSA 53-E to accelerate innovation, customer and community choice in electricity supply, the creation of new economic value, and a sustainable and resilient future for our town and customers.

Attachment 2: The Community Power Coalition of New Hampshire

Hudson is a member of the Community Power Coalition of New Hampshire ("CPCNH" or "the Coalition"), a nonprofit joint powers agency authorized under RSA 53-A and governed by participating communities under the terms of the Joint Powers Agreement.

The Coalition was incorporated as a governmental instrumentality and non-profit on October 1st, 2021, to provide for the launch and operation of Community Power Aggregation (CPA) programs on behalf of our Members throughout the state. CPCNH intends to launch power supply services in April to May 2023.

CPCNH will be funded through customer revenues, with no taxpayer subsidies. By law, each member's CPA program is funded through program revenues; CPCNH's budget is completely separate from the general funds of participating local governments. CPCNH's participating local governments will share the administrative and general costs of CPCNH on a pro-rata basis, and to elect to share costs, on an individual basis, for operational services, pooled power purchases, and energy project development contracts.

CPCNH also engages at the Legislature and Public Utilities Commission on behalf of its members on matters related to energy and Community Power.

CPCNH will benefit Member communities by providing for the supply of cleaner and more locally produced electricity, innovative retail distributed energy and demand flexibility programs, policy engagement and public advocacy, competitive rates for residents, businesses, and municipal facility customers, and economic investment through the development of local programs, projects, and energy infrastructure.

Most, if not all, members anticipate relying on CPCNH as an energy services provider, for the provision of all-requirements electricity and retail customer services on behalf of their CPA programs, which will operate across all four distribution company service territories in the state: Eversource, Unitil, Liberty Utilities and the New Hampshire Electric Co-Op.

Governance Structure

CPCNH is governed in accordance with our Joint Powers Agreement, and overseen by a Board of Directors composed of the representatives appointed by participating local governments. CPCNH's Board and committee meetings are subject to New Hampshire's Right to Know Law and open to the public.

The Board is elected by vote at the Annual Meeting of the Members, which is held every April, and will be composed of between eleven and twenty-one Directors elected from amongst the member representatives.

The current Board of Directors is shown below along with the officers.:

CPCNH Board of Directors

Member	Officer	Director
City of Lebanon	Chair	Clifton Below
City of Portsmouth	Vice Chair	Kevin Charette
Town of Enfield	Treasurer	Kimberly Quirk
Town of Plainfield	Secretary	Evan Oxenham

Member	Officer	Director
Town of Randolph		Kathleen Kelley
Town of Warner		Clyde Carson
Town of Harrisville		Andrea Hodson
Town of Rye		Lisa Sweet
Town of Pembroke		Matthew Miller
Town of Peterborough		Bruce Tucker
City of Nashua		Doria Brown
Cheshire County		Terry Clark
Town of Walpole		Paul Looney
Town of Newmarket		Joe Lamattina
City of Dover		Jackson Kaspari
Town of Hanover		April Salas
Town of New London		Jamie Hess
Town of Exeter		Nick Devonshire
Town of Webster		David Hemenway
Town of Durham		Steve Holmgren

CPCNH also conducts its business through the committees, each of which is composed of Member representatives drawn from across the state:

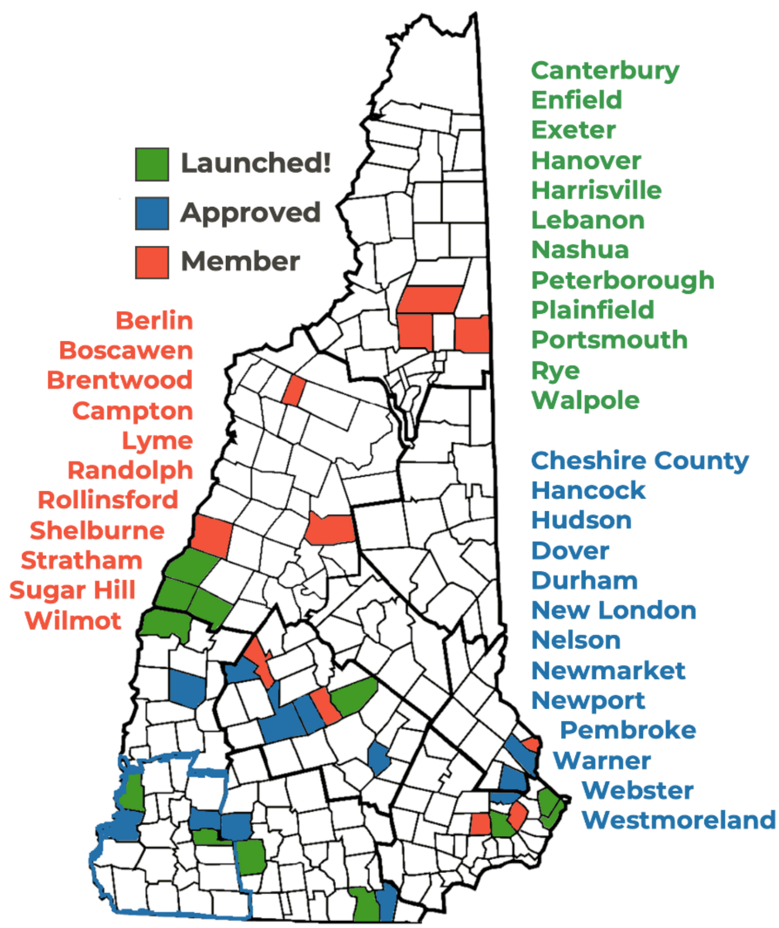
1. **Executive Committee**: bi-weekly and as-needed meetings of CPCNH's Chair, immediate past-chair, Vice Chair, Treasurer, and Secretary. Authorized to act on behalf of the Board, on most matters, in instances where decisions may not wait until the next meeting of the Board.
2. **Finance Committee**: bi-weekly and as-needed meetings of 3 members. Responsible for advising the Treasurer and the Board as to the investments, budget, and general fiscal policy of CPCNH.
3. **Member Outreach & Engagement Committee**: monthly and as-needed meetings of 8 members representing Dover, Durham, Hanover, Pembroke, Rye and Walpole, with additional advisors based in Peterborough and Hanover. Responsible for (1) assisting Members' Electric Aggregation Committees through the Electric Aggregation Plan drafting and local approval process, and (2) recruiting new CPCNH Members by engaging with interested communities.
4. **Risk Management Committee**: monthly and as-needed meetings of 8 members. Responsible for overseeing CPCNH's competitive solicitation for services and credit support, for overseeing energy portfolio risk management procurement decisions, and for understanding and advising upon enterprise risk factors and mitigating strategies more broadly.
5. **Regulatory and Legislative Affairs Committee**: as-needed meetings of 4 members. Responsible for monitoring and advising CPCNH and its Members regarding regulatory and legislative engagement, and for appointing representatives of the Corporation to serve on statutory commissions, study commissions, and other boards and commissions created by the state legislature.

6. **CEO and Staff Search Committee**: as-needed meetings of 4 members. Responsible for developing a solicitation and hiring process for Board review and approval in preparation for hiring a CEO and key staff.
7. **Audit**: Responsible for overseeing the quality and integrity of the Corporation's accounting, auditing and reporting practices, shall cause an independent financial report of the accounts and records of the Corporation to be made by a certified public accountant each fiscal year, which shall be provided to Directors and to Members.
8. **Governance:** Responsible for assisting the Members in recruitment of Board Directors; determine eligibility of nominees for consideration of Directorship; monitor the effective functioning of the Board and committees; conduct regular Board orientations and evaluations; periodically review and recommend amendments to this Agreement; and advise the Board and Members, through the Annual Meeting, on governance issues.

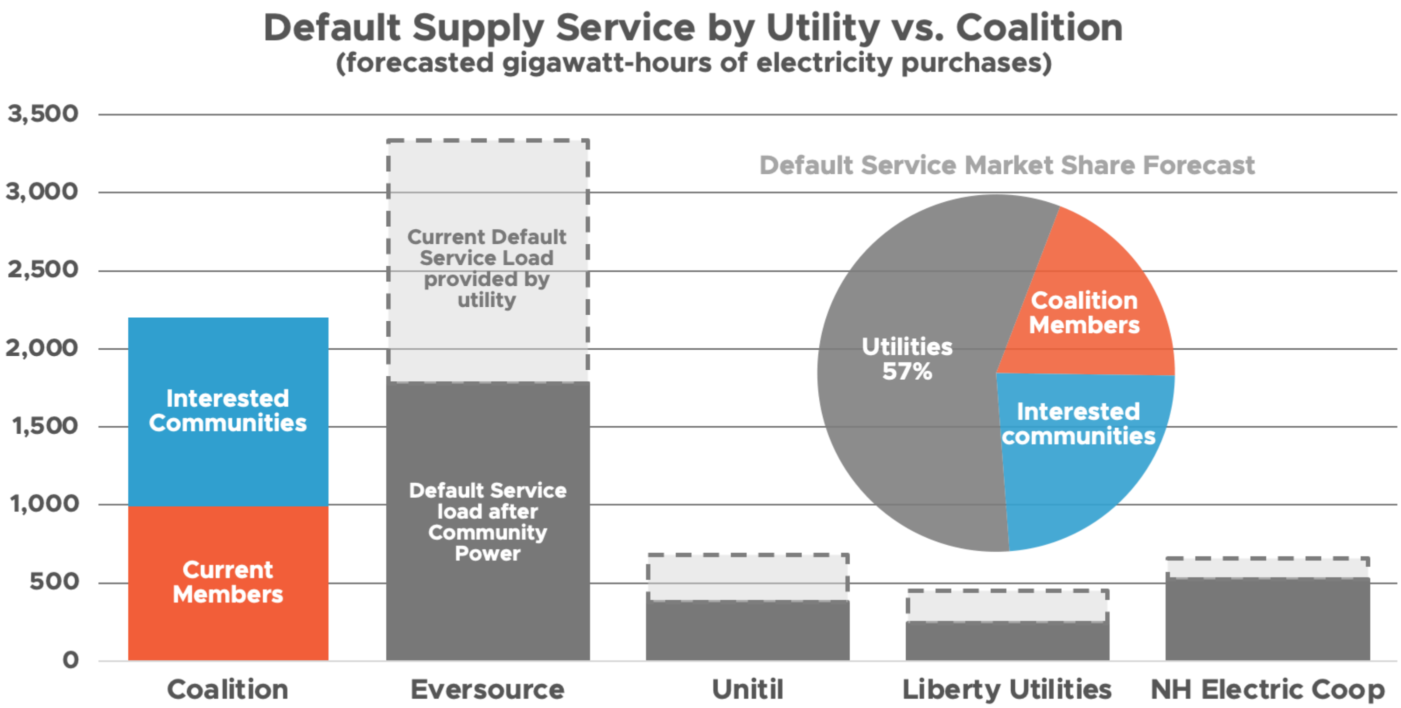
Member Service Territory

CPCNH's thirty-five current municipal members, which represent approximately 21% of New Hampshire's population, intend to launch CPA programs in the next one to two years.

- The first wave of CPA programs have launched in April and May of 2023, with service expansion to additional member territories thereafter (likely Q2 2024).
- At this point, CPCNH may serve ~110,000 customer accounts, provide ~900,000 MWh of electricity, and produce revenues of up to ~$365 million per year (assuming full Member participation and retail pricing based on default utility rates in the current year).
- Over 30 additional local governments have expressed interest in joining CPCNH, which would increase representation to ~50% of New Hampshire's population.
- CPCNH subsequently expects relatively robust member recruitment, and the launch of dozens of new CPA programs in the next two to three years.



Consequently, as shown in the graph on the next page, CPCNH is positioned to become the largest default supplier of electricity in New Hampshire:



Organizational Capacity

The Coalition's Board, committees, and executive team bring a great breadth and depth of experience to the organization with professional backgrounds that support CPCNH's mission.

CPCNH is also supported by outside General Counsel (Michael Postar of DWGP, P.C. with NH advice from Eli Emerson of Primer Piper, P.C.) and two professional consultants (Henry Herndon, of Herndon Enterprises, for member services, and Samuel Golding of Community Choice Partners, for technical advice and support).

Most recently, CPCNH has concluded a competitive solicitation for services and credit support and has executed contracts for $750,000 in startup funding, $9.5 million in credit support, and ~$8 million to ~$9 million in professional services to operate the power agency and expand CPCNH's membership over the next three years:

1. Ascend Analytics: energy portfolio risk management and procurement services, credit support (three lines of credit providing $6 million for LSE and wholesale requirements, $2.5 million for Ascend's invoices, and $1 million for non-Ascend third-party invoices), and overall implementation management and oversight (CPCNH's critical path analysis is online here; refer to pp. 37-54).
2. Calpine Energy Solutions, for $750,000 in startup funding and retail customer services: for Load Serving Entity (LSE) services, utility electronic data interchange (EDI), retail data management, and call center operations.
3. River City Bank, for secure revenue "lockbox" account administration and various commercial banking services.
4. Clean Energy New Hampshire for member and community relations, media strategy and engagement, and related administrative services.

CPCNH's committee award reports and winning response materials are online here.

CPCNH is in the process of contracting for accounting services, to implement an accounting system and controls for CPCNH.

Staffing Strategy

CPCNH contracted with True Search for Executive Search Services to support hiring a CEO. The search was successful, and Brian Callnan was hired as CEO on May 22, 2023. The Board will support the CEO in filling key functional roles with highly qualified staff in managerial positions to provide oversight and initiative that guides the evolution of the agency.

The CEO will recommend prioritizing staff capacity in the follow areas of expertise:

- Financial Management: Treasury support, budgeting, cash flow analysis, rate setting, financial controls and compliance, and reserve management.
- Retail Services: retail customer products and services, key account management and retention, and local programs.
- Energy Portfolio Management: contract valuation, procurement, power purchase agreements, portfolio strategy, and energy risk management analytics and reporting.
- Information Technology: enterprise data management and analytics.
- Regulatory and Legislative Affairs: engagement with the Legislature, NH Department of Energy, Office of the Public Advocate, Public Utility Commission, distribution utilities, and other stakeholders on energy policy and market issues impacting CPAs.

Regulatory and Legislative Engagement

CPCNH carries out public information campaigns and routinely engages at the Legislature and Public Utilities Commission, often alongside the NH Office of Consumer Advocate, to advance consumer interests and protect and expand the authorities of our Members. Board Chair Clifton Below, Assistant Mayor of the City of Lebanon, often leads the agency's regulatory and legislative engagement activities. Recent initiatives include:

- Authoring the Community Power Aggregation Act, Senate Bill 286 (2019).
- Leading the informal rule drafting process for CPA administrative rules at the Public Utilities Commission by providing initial and subsequent draft rules for discussion, arranging bilateral meetings with utilities and other stakeholders, and helping to lead stakeholder workshops at the request of Commission staff.
- Negotiating amendments to House Bill 315 (2021), which would have substantially changed and weakened CPA authorities as-introduced, to instead clarify and expand key CPA authorities — including by authorizing a Purchase of Receivables program. (Refer to CPCNH.)
- Drafting the CPA administrative rules and leading a public stakeholder process to negotiate final rule language which was adopted by the Commission (docket DRM 21-135).
- Intervening to advocate for the creation of a Statewide Data Platform to enable Green Button access to electricity and natural gas retail customer data, and to negotiate a settlement — recently adopted by the Commission — under which the platform would be governed by a

Governance Council of representatives that includes Chair Below on behalf of CPAs and municipalities across the state (docket DE 19-197).

- Advancing legislation, through multiple legislative sessions, that would properly credit CPAs sourcing power from Distributed Energy Resources under 5 MW and for reducing costs from energy charges, transmission charges, and capacity charges (SB 321, 2022).
- Engaging on CPCNH's behalf in Docket IR 22-053 regarding the evaluation of default utility procurement requirements and the potential impact due to CPAs, among other matters.

Purpose, Mission, Values & Power Enterprise Objectives

CPCNH is guided by the requirements and processes provided for under our Joint Powers Agreement, the decisions of our Members and Board of Directors, and the considerations that operating a competitive power enterprise entails.

Purpose of CPCNH

The overarching objective of CPCNH is provided for in the Joint Powers Agreement:

The purpose of CPCNH is to promote the common good and general welfare by supporting the economic vitality and prosperity of local communities by enabling municipalities and counties to support and jointly exercise authorities granted to them pursuant to NH RSA 33-B, NH RSA 53-E, NH RSA 53-F, and NH RSA 374-D, all in accordance with NH RSA 53-A; to assist member municipalities and counties in complying with the provisions of NH RSA 53-E in developing and implementing Electric Aggregation Plans and Programs known as Community Power Aggregations ("CPAs"); to provide supportive services and technical assistance to community power aggregations serving member towns, cities, counties, unincorporated places, and village districts; and to support and promote public education and civic engagement by the residents and businesses of member communities in developing and implementing energy and climate policies and actions and the role of CPAs in advancing such policies and actions for the common good.

Mission and Values

CPCNH's Board of Directors has subsequently adopted the mission and values below:

Our mission is to foster resilient New Hampshire communities by empowering them to realize their energy goals. CPCNH will create value for our Community Power member municipalities by jointly contracting for services, developing projects and programs together, educating and engaging the public, and advocating for communities and customers at the Legislature and Public Utilities Commission.

In carrying out its activities, CPCNH is guided by the following values:

1. *Embody an inspiring vision for New Hampshire's energy future.*
2. *Support communities to reduce energy costs and pursue economic vitality by harnessing the power of competitive markets and innovation.*
3. *Support communities to implement successful energy and climate policies and to promote the transition to a carbon neutral energy system.*
4. *Balance the interests of member communities who are diverse in demographics, geography and their energy goals.*

5. *Use our shared expertise, leadership and skills to educate, empower and build the capacities of our members.*
6. *Help communities demystify the power sector to make informed decisions.*
7. *Facilitate collaboration and teamwork by championing diversity, equity and inclusion of people and communities of all kinds.*

Power Enterprise Objectives

CPCNH's immediate objectives in implementing CPA supply service in April to May 2023 were summarized in the Coalition's prior solicitation for services and credit support:

While many of the broader benefits that CPCNH intends to create will be developed over time, the agency's immediate objectives are to:

1. *Procure a reliable supply of all-requirements electricity, inclusive of Renewable Portfolio Standard requirements, and satisfy all load-serving entity obligations on behalf of participating customers.*
2. *Launch with default supply rates that "meet or beat" utility default service rates and maintain competitive default supply rates thereafter.*
3. *Accrue reserve funds sufficient to ensure Members' long-term financial stability.*
4. *Offer voluntary products that retail customers may opt-up to receive as well as Net Energy Metering supply rates that allow customer-generators to participate in the program.*
5. *Ensure individual customers have excellent customer service experience every time they interact with CPCNH regarding their electric service and all account transactions.*
6. *Guarantee that individual customer data is secure and protected against third party attacks, data breaches and inappropriate use.*

Coalition Energy Portfolio Risk Management, Rates, and Reserves Policies

The Coalition's Members expect the agency to balance customer rate levels, renewable power content, and the accrual of program reserves on behalf of Member programs to meet their local policy objectives. The Board of Directors is incorporating these considerations and trade-offs regarding the prudent allocation of revenues into Energy Portfolio Risk Management, Rates, and Reserves policies, summarized as follows:

- **Energy Portfolio Risk Management Policy**: defines the risks associated with the procurement of the power supply, identifies those responsible for administering the various elements of the risk management policy (from procurement through daily operations and oversight), and sets policy parameters for managing, monitoring, and reporting on the risks associated with procuring and hedging the power supply portfolio. The policy will define the requirements and limits within which Members delegate their procurement authority to CPCNH.
- **Rates Policy**: ensures rates are set in a timely fashion to recover capital and operating costs of Member programs and that public notice and customer communication activities remain in compliance with statutory and Member Electricity Aggregation Plan requirements.
- **Financial Reserves Policy:** sets appropriate target levels (e.g., minimum and maximum

contributions) to ensure CPCNH satisfies working capital requirements, procures energy at competitive rates, adheres to contractual covenants, covers unanticipated expenditures, supports rate stability, and progresses towards obtaining an investment grade credit rating. Member contributions to reserves will be tracked, and provided back to Members, pursuant to any contractual obligations, if and when they choose to cease participating in the Coalition.

Member Cost Sharing Agreement

The Coalition's Joint Powers Agreement provides certain requirements regarding how costs will be tracked and shared across participating Community Power programs, which must be formalized in a Cost Sharing Agreement executed with each Member before the Coalition may provide services for their Community Power program, as follows:

- Costs will be tracked in three distinct categories: direct project costs, member services, and general and administrative costs (which are overhead costs that are not associated with any specific project or member service).
- Member cost-sharing agreements will be the same in all material respects: general and administrative costs will be allocated based on each Community Power program's share of total electricity usage each year, while each member will choose and separately pay for the costs of specific services and projects (under terms that reflect a fair allocation across all the members that chose the same services and projects).
- The debts, liabilities and obligations of the Coalition, and of other participating Community Power programs, will be non-recourse to Member communities (unless expressly agreed to by the Member under their Cost Sharing Agreement or a Project Contract).

Attachment 3: New Hampshire’s Renewable Portfolio Standard

New Hampshire’s Electric Renewable Portfolio Standard (“RPS”) statute, RSA 362-F, established the renewable energy policy for the State.

The RPS statute requires each electricity provider, including Eversource and Hudson Community Power, to meet a certain percentage of customer load by purchasing, generating or otherwise acquiring Renewable Energy Certificates (“RECs”):

- One REC represents the renewable attributes of one megawatt-hour of electricity, or the equivalent amount of useful thermal energy.
- RECs are generated by certified renewable energy facilities for power that is physically delivered into the New England wholesale electricity market operated by ISO-New England (which means the power can come from within New England, New York or eastern Canada).
- The New England Power Pool Generation Information System (NEPOOL GIS) issues and tracks RECs for the region.
- RECs are generally used for compliance in the same year as the renewable power was generated, though suppliers may “bank” RECs for up to two years to meet up to 30% of compliance requirements.

There are four distinct “classes” of renewable certificates under the RPS, each distinguishing between different technologies and dependent upon the year that the generators came online:

1. Class I is divided between thermal and non-thermal renewables:
    - Class I non-thermal electricity, from generators that came online after January 1, 2006: wind, solar, small hydroelectric, methane (biologically derived such as from anerobic digestion of organic materials), biomass, hydrogen (from methane or biomass), ocean thermal, current, tidal or wave energy and also biodiesel (if produced in state).
    - Class I thermal energy, from generators that came online after January 1, 2013 (and are producing thermal energy, rather than electricity): geothermal, solar thermal, biomass and methane.
2. Class II: solar generation that came online after January 1, 2006
3. Class III: biomass & methane that came online before January 1, 2006
4. Class IV: small hydroelectric that came online before January 1, 2006

Electricity suppliers must obtain RECs for each of the four classes of renewables as a set percentage of their retail electric load, which increase on an annual basis (until plateauing after 2025, unless the RPS is raised in future):

Compliance Year	Total RPS Requirement	Class I Non-Thermal	Class I Thermal	Class II Solar	Class III Biomass & Methane	Class IV Small Hydro
2020	**20.70%**	8.90%	1.60%	0.70%	8.00%	1.50%
2021	**21.60%**	9.60%	1.80%	0.70%	8.00%	1.50%
2022	**22.50%**	10.30%	2.00%	0.70%	8.00%	1.50%
2023	**23.40%**	11.00%	2.20%	0.70%	8.00%	1.50%
2024	**24.30%**	11.90%	2.20%	0.70%	8.00%	1.50%
2025 onwards	**25.20%**	12.80%	2.20%	0.70%	8.00%	1.50%

Note the following flexibilities in meeting Class I requirements:

- Class I non-thermal requirements may be met with Class I thermal biomass and methane resources;
- Class I requirements may also be met with Class III (biomass & methane, thermal and non-thermal) or Class IV (small hydroelectric, non-thermal) resources that have been restored through significant investment or have otherwise begun generating in excess of historic baselines; and
- Solar that came online after January 1, 2006 may be used to satisfy Class II or Class I requirements.

Additionally, net metered customers (primarily customers with solar photovoltaics) that meet certain registration and administrative requirements can track and sell their RECs (which are accounted for in NEPOOL's Generation Information System). Not all customers do, however, and the REC production from such customer generators are estimated by the Public Utilities Commission each year and applied to lower the Class I and Class II procurement requirements of the utilities and other suppliers. The impact of Community Power Aggregation on net metered customers is discussed in more detail in Attachment 5.

If the electricity providers are not able to meet the RPS requirements by purchasing or acquiring renewable energy certificates, they must pay alternative compliance payments (ACPs). The funds are used for a variety of renewable programs in New Hampshire.

The result is that these alternative compliance payment prices essentially act as a price ceiling for the REC market in New Hampshire. The ACPs for RECs by class in recent years are:

For example, Eversource, Unitil and the New Hampshire Electric Cooperative have recently made alternative compliance payments instead of purchasing certain categories of RECs:

For additional information on the Renewable Portfolio Standard, refer to:

- New Hampshire's RPS statute (RSA 362-F)
- New Hampshire Department of Energy Renewable Portfolio Standard
- New Hampshire Renewable Energy Fund Annual Reports

Attachment 4: Utility Default Procurement Cycles and Rate Setting

Hudson Community Power has a goal of maintaining competitive default rates compared to Eversource, while also offering voluntary products that retail customers may opt-in to receive.

The timing of the program's rate setting decisions and, to a certain degree, the procurement of electricity will need to consider when Eversource conducts these same activities (particularly for the program's default electricity product).

As context, Eversource, Liberty Utilities and Unitil all issue requests for proposals (RFPs) twice annually for competitive suppliers to assume load-serving entity obligations and supply default customers with electricity for 6-month "strip" periods, with suppliers bidding to serve individual "tranches" or segments of customers by class.

The procurement schedules, tranches and rate practices for each distribution utility are:

- **Eversource** (Public Service Company of New Hampshire): issues RFPs in May and November with bids due in early June and December for suppliers to begin serving customers in August and February, offering four ~100 MW tranches to serve small customers and a single tranche to serve large customers (five tranches in total). Retail rates are fixed over the 6-month period for small customers and vary by month for large customers.
- **Liberty Utilities**: follows the same supplier RFP schedule and retail pricing as Eversource but (1) solicits supply for small customers in a single 6-month block tranche and for large customers in two, consecutive three-month block tranches (3 tranches total), and (2) allows bidders to include and price RPS compliance obligations separately (as an additional product).
- **Unitil**: issues RFPs in March and August for delivery beginning in June and December, offering tranches of residential, small commercial, outdoor lighting and large customers classes (four tranches). The large customer RFP is structured in a distinct fashion, in that it passes through market costs for energy and so suppliers compete to price capacity, congestions, ancillary services, etc. for the large customer tranche over the 6-month term; retail rates reflect these load-serving entity costs along with the pass-through of real time locational marginal market prices (which are load-weighted by the entire class' hourly load shape i.e., not the individual large customer's usage profile). Retail rates for the residential, small commercial, and outdoor lighting classes are fixed over the 6-month term, though customers have the option to choose variable monthly pricing if the election is made prior to the start of the next 6-month term.

Supplier bids are priced in dollars per megawatt-hour ($/MWh) on a monthly basis and generally exclude Renewable Portfolio Standard (RPS) compliance obligations (called "Renewable Energy Certificates" or "RECs"), though Liberty Utilities allows RECs to be bid as a separate product. Distribution utilities typically procure most or all of their supply of RECs through competitive solicitations held separately from the auctions for default electricity service.

New Hampshire's RPS requires all electricity suppliers to procure or otherwise obtain RECs for four distinct "classes" of renewables, each distinguishing between different technologies and dependent upon the year that the generators came online.

For 2022, Eversource is required to include 22.5% renewable energy in their energy supply. This minimum compliance requirement will increase incrementally to 25.2% by 2025 and remain fixed thereafter, absent an increase in the RPS.

Refer to Attachment 3: New Hampshire's Renewable Portfolio Standard for further details on the RPS.

Attachment 5: Overview of Utility Net Energy Metering Tariffs

Discussion of Utility Net Metering, Group Net Metering and Low-Moderate Income Solar Project Tariffs

Under the net metering process, customers who install renewable generation or qualifying combined heat and power systems up to 1,000 kilowatts in size are eligible to receive credit or compensation for any electricity generated onsite in excess of their onsite usage.

Any surplus generation produced by these systems flows back into the distribution grid and offsets the electricity that would otherwise have to be purchased from the regional wholesale market to serve other customers.

The credits and compensation customer-generators receive for electricity exported to the grid are defined under Net Energy Metering (NEM) tariffs offered by Eversource, Liberty Utilities, Unitil and the New Hampshire Electric Co-op (NHEC). Note that:

- NHEC is member-owned cooperative and as such, its rules and regulations are approved by its Board of Directors and are not subject to regulation by the Public Utilities Commission. Additional information regarding NHEC's Net Energy Metering tariffs may be found online under their "Terms and Conditions".
- The Public Utilities Commission regulates the distribution utilities' Net Energy Metering (NEM) tariffs in accordance with PUC Rule 900 and RSA 362-A:9 (refer to RSA 362-A:9, XIV specifically for Group Net Metering statutes).

The remainder of this chapter concerns NEM tariffs regulated by the Public Utilities Commission. Note that:

- NEM tariffs offered by the utilities underwent a significant change several years ago;
- Customer-generators that installed systems before September 2017 may still take service under the "NEM 1.0" tariff ("standard" or "traditional" NEM); whereas
- Systems installed after August 2017 must take service under the "NEM 2.0" tariff ("alternative NEM")
- NEM 1.0 customers are allowed to switch to taking service under the NEM 2.0 tariff but cannot subsequently opt-back to NEM 1.0 (with limited exceptions, e.g., participation in certain pilot programs).

Under both tariffs, customer-generators are charged the full retail rate for electricity supplied by Eversource and receive credits for electricity they export to the grid for some (but not all) components of their full retail rate. Refer to the next subsection for tables comparing NEM 1.0 to 2.0 tariffs.

To appropriately measure and credit customer-generators taking service under a NEM tariff, the utility installs a bi-directional net meter that records each kilowatt-hour (kWh) supplied to the customer from the grid and also each kWh that flows back into the grid. This data is recorded and collected on a monthly billing-cycle basis.

For NEM 1.0 tariff systems (installed before September 2017), any kWh exported to the grid are netted against kWh consumed. If there is a net surplus of kWh at the end of the monthly billing period (i.e., more power was exported to the grid by the customer-generator than was consumed) those surplus or negative kWh are carried forward and can be used to offset future kWh consumption (so the customer only pays for their "net" energy consumption).

For NEM 2.0 tariff systems (installed after August 2017), all customer-generators receive a monetary credit for each kWh that is exported valued at 100% of their default electricity supply rate component for the month. Smaller systems (up to 100 kilowatts in size) additionally receive credits for 100% of the transmission component and 25% of the distribution component of their retail rate. (Larger systems, up to 1,000 kilowatts in size, only receive full credit for the electricity supply rate component.)

Note that most customer-generators in Hudson Community Power are expected to be taking service under NEM 2.0 tariffs going forward.

Any credits that accumulate over time are tracked and used to offset the customer-generator's future electricity bills. Customers may also request to cash-out their surplus credit once a year, after their March billing cycle, if the balance exceeds $100 (or any balance in the event of moving or service disconnection). NEM 1.0 surplus balances are tracked as kWh credits and are converted to dollars at wholesale avoided costs, while NEM 2.0 surplus balances are tracked as monetary credits directly (in dollars). Note that these cash-outs are treated as taxable income by the Internal Revenue Service (IRS). Payments of $600 or more remitted to the customer are accompanied by a 1099 form for the IRS. Utilities may also issue IRS Form 1099s for smaller amounts.

Alternatively, Group Net Metering is a process that allows any customer-generator to share the proceeds of their surplus generation credits to directly offset the electricity bills of other customers, which is financially more advantageous and can increase the effective value of the system. All the members in the group need to be within the same distribution utility service territory but may be served by different suppliers. The credits are calculated based on the host site's NEM tariff and retail rate, and payments are credited to offset the electricity bills of each member directly by the utility (assuming the utility is billing the customers for supply). These allocations are governed by a Group Net Metering Agreement between the host customer-generator and group members, which is part of the registration process overseen by the Public Utilities Commission.

Note that larger systems (up to 1,000 kilowatts in size) actually have to register as group hosts in order to qualify for net metering in the event that the customer-generator exports more than 80 percent of the power produced onsite to the distribution grid. Additionally, if the electricity exported from larger systems exceeds the total electricity usage of the group on an annual basis, the credit for the residual amount (e.g., electricity exported in excess of the group's total usage) is re-calculated based on their utility's avoided cost of electricity supply. This rate is lower than the NEM credit based on the customer-generator's retail rate, and results in a downward payment adjustment issued by the utility to the host customer. Residential systems under 15 kilowatts, however, are not subject to this adjustment.

Most recently, a Low-Moderate Income (LMI) Community Solar Project option has been implemented under Group Net Metering. The program currently provides an incentive of 3 cents per kWh (dropping down to 2.5 cents after July 2021) in addition to the host site's NEM credits, and solar systems may be either rooftop or ground-mounted systems. To qualify, groups must include at least five residential customers, a majority of which are at or below 300 percent of the federal poverty guidelines, and non-residential customers cannot account for more than 15 percent of the total projected load in the group.

Lastly, all group hosts (except for residential systems under 15 kilowatts) must file an annual report with the Public Utilities Commission and their utility that includes the annual load of the host and members, annual total and net surplus generation of the host site system, and additional information for Low-Moderate Income Community Solar Projects.

In addition to NEM credits, all customer-generators have the option of selling the Renewable Energy Certificates (RECs) produced by their systems. This can provide an additional revenue stream to customer-generators, but requires a separate REC meter, registration and ongoing reporting requirement.

Alternatively, the Public Utilities Commission estimates the RECs that could be produced by all customer-generators who do not separately meter and sell their RECs and lowers the Renewable Portfolio Standard procurement requirements for all load-serving entities by an equivalent amount.

Comparison of Utility "Standard" and "Alternative" Net Energy Metering Tariffs

The tables below compare the two tariff structures, which offer different credits to customers depending on the size of their installed system:

Net Energy Metering (NEM) Credit on Net Monthly Exports to Grid

<table>
<tr><th></th><th>NEM 1.0
"Standard NEM"
Offered prior to 9/1/2017</th><th>NEM 2.0
"Alternative NEM"
Effective 9/1/2017</th></tr>
<tr><td>Large Systems
100 Kilowatts to 1 Megawatt</td><td colspan="2">Full credit (at the customer's retail rate) for electricity supply <u>only</u></td></tr>
<tr><td>Small Systems
≤ 100 Kilowatts</td><td>Full credit for electricity supply, distribution, transmission, System Benefits, Stranded Cost & Storm Recovery charges</td><td>Full credit for electricity supply and transmission; 25% credit for distribution & no credit for other charges</td></tr>
</table>

As shown in the table above, levels of compensation for small customer-generators (with systems up to 100 kilowatts) were lowered, such that these customers no longer receive full compensation on their distribution rate component or several other small charges (e.g., the System Benefits, Stranded Cost and Storm Recovery charges).

Additionally, the NEM 2.0 tariff modified the type of credit, and the ways credits for surplus generation are tracked and refunded, for both small and large customer generators:

- Under NEM 1.0, any surplus generation would be tracked as a kilowatt-hour (kWh) credit, which was carried forward to offset the customer's consumption (and bill) in future months. For any kWh credits remaining on an annual basis (at the end of March each year), such customers have the option of either continuing to bank their credits to offset future usage, or to convert the kWh credit into a monetary credit, at a rate set by the Public Utilities Commission (typically ~3-4 cents per kilowatt-hour) and to apply the amount to their account or receive a check for the amount owed.

- Under NEM 2.0, kWh credits are automatically converted into a monetary credit every month, valued at the customer's retail rate for that specific month. Customers have the option of either carrying the credit forward to offset their electricity bill in future months or may receive the refund directly as a check.

The crediting mechanism under NEM 1.0 was relatively more advantageous for customers in one respect. Solar systems generate more power in the spring and summer months relative to other seasons; consequently, the credits that customer-generators would accrue during the summer months would offset their consumption in the winter months on a one-to-one, kWh per kWh basis. This is advantageous because winter supply rates are above summer rates on average.

In another respect, NEM 2.0 offers an advantage to customers that accrue surplus credits over the course of the year, because the surplus is calculated based on components of the customer's retail rate — which is higher than the ~3-4 cents per kilowatt-hour value that is applied to convert NEM 1.0 kWh credits into a monetary credit whenever customers elect to cash-out their surplus.

These changes are summarized in the table below, and apply to all customer-generators regardless of system size:

NEM 1.0 *"Standard NEM"* *Offered prior to 9/1/2017*	**NEM 2.0** *"Alternative NEM"* *Effective 9/1/2017*
kWh credit carried forward. May be refunded at a rate calculated by the Public Utilities Commission (typically ~3-4¢ per kWh).	kWh converted to monetary credit automatically each month. Monetary credit carried forward as a bill credit or refundable.

Additional details may be found in the Eversource, Liberty Utilities and Unitil tariffs and the Public Utilities Commission website:

- Eversource Tariffs
- Unitil Tariffs
- Liberty Utilities Tariffs
- PUC overview of Net Metering
- PUC graphic explanation of NEM 1.0 vs. NEM 2.0.

Net Energy Metering Systems by Utility Territory

According to the most recent Energy Information Agency (EIA) Form 861m data, there are about 11,000 customer-generators taking service under Net Energy Metering tariffs in New Hampshire, with a cumulative installed capacity of approximately 140 megawatts (in terms of nameplate capacity in alternating current, or "AC"). Estimated numbers of customer-generators and installed capacity by technology are summarized below:

- Solar photovoltaics: ~120 megawatts (MW) and 10,760 customer-generators; note that:
    - Group Net Metering accounts for an additional ~1.5 MW serving 56 customers; and
    - Sixteen residential customers, in addition to solar photovoltaics, also have battery storage systems with a cumulative capacity of 175 kilowatts (an average size of ~11 kilowatts per customer).
- Onsite wind: 412 kilowatts (kW) and 72 customer-generators.
- "Other" technologies (presumably, small hydro or qualifying combined heat and power systems, or "CHP"): ~17.5 megawatts (MW) and 55 customer-generators.

The table below provides the number of customer-generators in each distribution utility territory:

Number of Net Metered Customer-Generators by Technology

	Customer-Generators by Technology				Subsets of Solar PV Customers	
	Total	**Wind**	**Other (CHP or Hydro)**	**Solar PV**	**Group Net Metering**	**Battery Storage**
Eversource	7,949	37	52	7,860	21	0
Unitil	1,066	3	1	1,062	0	0
Liberty Utilities	724	1	0	723	22	16
NHEC	1,204	31	2	1,171	13	0
Total	10,943	72	55	10,816	56	16

The number of customer-generators by customer class with onsite solar photovoltaic systems, total installed capacity, and average solar system size in each utility territory are provided for reference in the tables below.

Note that these tables do not include Group Net Metered systems and participating customers within groups and reflect only installed solar photovoltaic system capacity (i.e., exclusive of onsite battery storage capacity).

Net Metered Solar Photovoltaic Systems: Number of Customer-Generators

	Residential	Commercial	Industrial	Total Customer-Generators
Eversource	7,195	630	35	7,860
Unitil	973	61	6	1040
Liberty Utilities	633	77	0	710
NH Electric Coop	1,065	81	4	1,150
Total	**9,866**	**849**	**45**	**10,760**

Net Metered Solar Photovoltaic Systems: Total Installed Capacity (MW-AC)

	Residential	Commercial	Industrial	Total Installed Capacity (MW-AC)
Eversource	54.15	29.66	5.09	88.91
Unitil	7.40	2.30	0.73	10.43
Liberty Utilities	4.78	5.12	0.00	9.90
NH Electric Coop	7.61	2.46	0.60	10.66
Total	73.94	39.54	6.42	119.90

Net Metered Solar Photovoltaic Systems: Average System Size (kW-AC)

	Residential	Commercial	Industrial	Average System Size (kW-AC)
Eversource	7.5	47.1	145.5	66.7
Unitil	7.6	37.8	121.2	55.5
Liberty Utilities	7.6	66.5	N/A	24.7

NH Electric Coop	7.1	30.3	149.0	62.2
Average	**7.5**	**45.4**	**138.6**	**52.3**

Attachment 6: Hudson Community Power Net Metering, Group Net Metering and Low-Moderate Income Solar Project Opportunities

Please refer to Attachment 5: Overview of Utility Net Energy Metering Tariffs as context for this section.

RSA 362-A:9,II grants Community Power programs broad statutory authority to offer customer-generators new supply rates and terms for the generation supply component of Net Energy Metering (NEM). The relevant statutory authority is quoted in full below:

> *"Competitive electricity suppliers registered under RSA 374-F:7 and municipal or county aggregators under RSA 53-E determine the terms, conditions, and prices under which they agree to provide generation supply to and credit, as an offset to supply, or purchase the generation output exported to the distribution grid from eligible customer-generators. The commission may require appropriate disclosure of such terms, conditions, and prices or credits. Such output shall be accounted for as a reduction to the customer-generators' electricity supplier's wholesale load obligation for energy supply as a load service entity, net of any applicable line loss adjustments, as approved by the commission. Nothing in this paragraph shall be construed as limiting or otherwise interfering with the provisions or authority for municipal or county aggregators under RSA 53-E, including, but not limited to, the terms and conditions for net metering."*

Hudson Community Power intends to offer a NEM generation rate and terms to customers with onsite renewable generation eligible for net metering from Eversource. Note that any non-supply related components of the Net Energy Metering tariff (e.g., credits for transmission and distribution) will continue to be provided to customer-generators directly by their utility.

How Hudson Community Power calculates, accounts for, and provides NEM credits to participating customer-generators for the different types of eligible system sizes, customer types and group configurations will have a number of important financial and practical implications for the program and customers in the town.

Hudson Community Power also anticipates encountering practical challenges of an operational nature in administering net metering and group net metering programs. This is partly because net energy metering continues to evolve in response to new policy and regulatory requirements, and the day-to-day processes that govern the coordination between the program, participating customers and Eversource are subject to refinement and change over time.

In particular, Hudson Community Power will be one of the early default aggregation programs to launch in New Hampshire, and the process of transferring significant numbers of NEM customers may cause unanticipated issues due to the metering, billing and data management requirements of this subset of customers. Hudson Community Power will maintain close coordination with Eversource to expeditiously resolve any such issues that may occur.

For example, Hudson Community Power may decide to separately issue supply bills to customers that have installed systems after September 2017.

The advantage in dual-billing this subset of customers stems from what is essentially an accounting irregularity in how utility billing systems currently treats customer-generators taking service under the NEM 1.0 tariff, which applies to systems installed before September 2017, versus the NEM 2.0 tariff, which applies to all systems installed after that date. As context:

- The cumulative surplus generation exports of net metered customer-generators will decrease the amount of electricity that Hudson Community Power will have to purchase from the regional power market to supply other customers in the program. The surplus generation from both NEM 1.0 and NEM 2.0 customer-generators is tracked and netted out from the program's wholesale load obligations by Eversource for this purpose.
- However, for the purpose of netting out of the program's Renewable Portfolio Standard (RPS) compliance requirements, the surplus generation from NEM 1.0 customers is tracked and accounted for differently than it is for NEM 2.0 customers:
    - Surplus generation from NEM 1.0 customers is tracked as a kWh credit that is carried forward to offset the customer's future electricity supply requirements; these kWh credits will be counted as an offset that decreases the total electricity supplied by the program to retail customers in aggregate — which lowers the program's RPS compliance obligation.
    - Surplus generation from NEM 2.0 customers is tracked as a monetary credit that is carried forward to offset the customer's future electricity bills; even though the monetary credit is calculated each month based on every customer's kWh surplus generation, the monetary credit is treated as a re-sale or delivery of power generated by NEM 2.0 customer and provided to other participating customers through the program — it is not treated, in other words, as an offset that decreases the total electricity supplied by program to retail customers in aggregate — and therefore does not lower RPS compliance obligations in the same way.

  The practical consequence of this accounting treatment is that Hudson Community Power would have to purchase Renewable Energy Certificates for the amount of surplus generation supplied by NEM 2.0 customer-generators (but not NEM 1.0 customer-generators) in the same way as if the program had imported that amount of electricity from the regional wholesale market.
- Taking on the responsibility of billing this subset of NEM 2.0 customers directly may allow Hudson Community Power to track and account for the impact of their surplus generation in ways that lower the program's RPS compliance obligations and costs. Specifically, the program could credit customers currently on the utility's NEM 2.0 tariff in the same way that NEM 1.0 customers are credited (i.e., using kWh credits to track surplus generation on the supply portion of the bill). Note that RSA 362-A:9,II explicitly grants Community Power programs the flexibility to offer net metered customers either:
    - A "*credit, as an offset to supply*" for their surplus generation, which is equivalent to the NEM 1.0 tariff accounting; or
    - To "*purchase the generation output exported*", which is equivalent to how the NEM 2.0 tariff tracks surplus generation.

  Exercising the first option listed above, by offering NEM 2.0 customers a kWh credit tracked as an offset to supply, would allow Hudson Community Power to harmonize the accounting treatment of NEM 1.0 and 2.0 surplus generation for the purpose of program RPS compliance reporting. This would lower program rates and is an option that the program may therefore find cost-effective to implement.

Additionally, certain customer-generators currently receiving IRS Form 1099 taxable income from monetary credits paid out by their utility under NEM 2.0 tariff may benefit financially from receiving kWh credits for the supply portion of their monthly surplus generation instead.

While dual billing is typically avoided — as it is less convenient for most customers to receive a separate bill from their utility and supplier — customers with onsite generation systems tend to be highly informed on energy issues and respond positively to more active engagement with both their utility and supplier.

Consequently, dual billing may enhance customer satisfaction, awareness and ongoing participation in the program for customer-generators. Furthermore, dual billing could be done electronically, which is more convenient for the customer and less costly for the program than sending paper bills.

Furthermore, Hudson Community Power may be able to create additional value for customer-generators through a combination of dual billing, assistance with metering upgrades and time-varying rate structures. For example:

- Many customer-generators with solar systems may benefit from local programs that help them reduce their full energy bill costs;
- Providing the customer with a separate supply-only bill would allow Hudson Community Power to also offer a time-varying rate (which may not otherwise be available through Eversource's billing system);
- Upgrading to an interval meter (if the customer does not have one) and installing onsite battery storage, combined with a time-varying rate, may enable the customer-generator to further lower their overall bill by shifting their pattern of electricity usage at times of high-power prices and constrained generation and transmission capacity. This could also help to manage and lower the program's electricity supply costs in aggregate as well, and thus benefits all participating customers.

Similarly, Hudson Community Power may be able to streamline the process and cost of installing REC production meters, registering customer-generators and purchasing their RECs for the onsite power generated to satisfy part of the program's overall RPS compliance requirements. This would allow the program to source RECs locally and would provide an additional source of revenue for customer-generators in the town.

Hudson Community Power also intends to evaluate ways to enhance the value of the NEM credits that customers receive overall, from both the program and Eversource. For example, customer-generators may benefit by becoming hosts in Group Net Metering, including by establishing a Low-Moderate Income Solar Project group. The program may be able to streamline the process required to do so, which entails:

- Matching customers interested in becoming members with prospective group hosts;
- Executing a Group Net Metering Agreement together;
- Registering the group with the Public Utilities Commission and Eversource; and
- Thereafter filing annual compliance reports.

Lastly, NEM tariffs are subject to revision and Hudson Community Power, through the Coalition, intends to work with Eversource, participate in Public Utilities Commission proceedings and engage at the Legislature on issues that impact how the tariffs evolve going forward.

Customers are increasingly adopting new energy technologies and expect to be offered rates and services that provide them with new choices and fair compensation based on their investment; the program's ability to assist customers in these ways is heavily dependent on how state policies and utility regulations evolve over time.

Hudson Community Power will seek to represent the interests of our community and customers in these matters.

Attachment 7: Hudson's Public Planning Process

Hudson EAC

The Hudson Electric Aggregation Committee (HEAC) was formed as a subcommittee of the Hudson Sustainability Committee on 10/14/21. Two Sustainability Committee members (Craig Putnam and Katherine (Kate) Messner) formed the initial membership of HEAC.

The Hudson Board of Selectmen signed the JPA on 11/9/21 and subsequently on 11/29/21 authorized the HEAC to represent Hudson to CPCNH. Craig Putnam was named as Hudson's CPCNH Director member & Kate Messner as the Alternate member. Hudson officially joined CPCNH on 12/16/21. As of the April 2023 annual CPCNH membership meeting, the representatives from Hudson are now referred to as the 'primary' and 'alternate' (Mr. Putnam is no longer serving on the CPCNH Board of Directors but continues to serve on the Member Outreach and Engagement committee).

The Hudson Electric Aggregation Committee has recently (Spring '23) recruited three additional members. The committee meets regularly to evaluate the three candidate power procurement organizations. The plan is to recommend one of the candidates to the Hudson Board of Selectmen at a workshop in October, 2023.

Drafting of the Hudson EAP

The Town brought a warrant article to a vote in March 2023 to authorize the Board of Selectmen to establish Hudson Community Power. The warrant article passed by a robust margin.

The Coalition-supplied template forms the basis for Hudson's Electric Aggregation Plan (EAP).

Since its formation, the Hudson Electric Aggregation Committee has held numerous work sessions on the EAP resulting in this document.

Timeline

The Hudson Electric Aggregation Committee has established a rough timeline for its remaining work, as follows:

- Finalize and submit the EAP to the Public Utilities Commission, et. al. (July '23)
- Solicit information from, and then do due diligence on, candidate power provider and related services organizations (Spring & Summer '23)
- Recommend candidate power provider organization to the BOS (workshop scheduled for October '23)
- Work with BOS to partner with selected candidate power provider organization (October & November '23)
- Work with CPCNH to develop and deliver additional materials for educating Hudson electricity customers about CPA (ongoing)
- Conduct the required information session as part of the enrollment process (Spring '24)
- Request necessary customer datasets from Eversource (Winter & Spring '24)
- Stand up Hudson Community Power (Winter & Spring '24)

Attachment 8: Abbreviations

Acronym	Meaning
AC	Alternating Current (electric current that reverses direction many times a second at regular intervals; the N. American standard for power supply is 60 Hertz)
ACP	Alternative Compliance Payment (under the NH Renewable Portfolio Standard)
BOS	Board of Selectmen
CEPS	Competitive Electric Power Suppliers
CHP	Combined Heat and Power
CPA	Community Power Aggregation
CPCNH	Community Power Coalition of New Hampshire (a.k.a. “The Coalition”)
EAC	Electric Aggregation Committee
EAP	Electric Aggregation Plan
HCP	Hudson Community Power
HEAC	Hudson Electric Aggregation Committee
ICD	Individual Customer Data
ISO-NE	Independent System Operator New England (the wholesale electricity market operator)
KW	Kilowatt (a measure of electrical capacity, equivalent to 1,000 watts of power)
kWh	Kilowatt-hour (a measure of electrical energy, equivalent to using or producing 1,000 watts for 1 hour, and typically used to refer to customer generation or onsite usage)
LSE	Load Serving Entity (see Attachment 10)
MW	Megawatt (a measure of electrical capacity, equivalent to 1,000,000 watts of power)
MWh	Megawatt-hour (a measure of electrical energy, equivalent to using or producing 1,000,000 watts for 1 hour, and typically used in reference to power plants or large aggregations of customers)
NEM	Net Energy Metering (tariffs that provide compensation for customer-generators)
NEPOOL GIS	The New England Power Pool Generation Information System (which issues and tracks Renewable Energy Credits)
NHEC	New Hampshire Electric Co-Op (a member-owned electric distribution cooperative)
NHPUC	New Hampshire Public Utilities Commission (which regulates NH’s investor-owned electric distribution utilities: Eversource, Unitil and Liberty Utilities)
PV	Solar Photovoltaics

REC	Renewable Energy Credit (under the NH Renewable Portfolio Standard)
RPS	New Hampshire’s Renewable Portfolio Standard (authorized under RSA 362-F)
RSA	Revised Statutes Annotated (refers to the codified state law of New Hampshire)

Attachment 9: How Load Serving Entity Services will be Implemented

Hudson Community Power will implement Load Serving Entity (LSE) services, for the purpose of procuring or selling electricity on behalf of customers participating in the aggregation.

This plan assumes, but does not require, that the Town will participate fully in and rely on the services provided through the Community Power Coalition of New Hampshire (CPCNH) for the purposes of implementing and operating Hudson Community Power.

The Role & Responsibility of Load Serving Entities

A Load Serving Entity (LSE) is an entity that has registered with ISO New England (ISO-NE, the nonprofit regional wholesale electricity market operator) as a market participant and assumes responsibility for securing and selling electric energy and related services to serve the demand of retail customers at the distribution level (i.e., homes and businesses).

As context, every retail customer in New Hampshire (and across New England) is assigned to a specific Load Serving Entity at all times:

- Customers on utility default service are periodically re-assigned to whichever Competitive Supplier has won the utility's most recent auction or the utility as LSE.
- Similarly, customers are assigned to a different Load Serving Entity whenever they are transferred to CPA service on an opt-out default basis, choose to opt-in to take service from the CPA, or switch to a Competitive Supplier of their choosing.

Consequently, all Competitive Suppliers and Community Power Aggregators (CPAs) in New Hampshire are required to either:

1. Register as a Load Serving Entity with ISO-NE; or
2. Contract with a third-party that has agreed to be the Load Serving Entity responsible for the Competitive Supplier's or CPA's customers.

To ensure that customers receive firm power supply, there are a variety of services that need to be performed and electrical products that must be procured or otherwise provided. The required products and services are referred to as "all requirements energy" (or alternatively, "full requirements service").

The role of Load Serving Entities is to provide, arrange for, or otherwise pay for the cost of providing all requirements energy to customers. The majority of these requirements are defined by the ISO-NE wholesale market operator, which is subject to Federal oversight, but certain requirements are defined by the state in which the LSE registers to serve customers (Renewable Portfolio Standard requirements, for example).

In New Hampshire, full-requirements energy is defined as the provision or cost of (1) electrical energy, capacity, and reserves (including transmission and distribution losses); (2) ancillary services, congestion management, and transmission services (to the extent not already provided by the customer's utility); (3) the costs associated with complying with New Hampshire's Renewable Portfolio Standard (i.e., the cost of purchasing Renewable Energy Credits or, if an insufficient number of credits is procured, the cost of Alternative Compliance Payments); and (4) other services or products necessary to provide firm power supply to customers (i.e., because the definition and requirements of the above products and services are subject to change over time).

Each of the above products and services is procured, provided, and accounted for in different ways, through market mechanisms and regulated processes that have been designed to accommodate the unique characteristics of the product or service in question.

Given the complex and capital-intensive nature of providing all requirements electricity to customers, Load Serving Entities are subject to significant state and Federal oversight, in terms of registration, reporting, and financial security requirements.

The web pages below provide current information regarding Load Serving Entity registration, financial security, and renewal requirements to operate in ISO-NE and New Hampshire:

- ISO-NE: New Participant Registration Instructions
- NH PUC: Forms for Competitive Electric Power Suppliers and Electric Load Aggregators
- Eversource: Electric Information for Suppliers & Aggregators
- Unitil: Energy Supplier Resources
- Liberty Utilities: Become a Liberty Utilities Approved Supplier
- New Hampshire Electric Cooperative: Supplier Information

Responsibilities of the Community Power Coalition of New Hampshire (CPCNH)

As noted earlier, the Town may decide to contract with CPCNH, as an all-requirements joint powers agency, for the provision of LSE services, all requirements energy supply and all other energy services required to implement and operate Hudson Community Power. The following information is specific to such a possible contractual relationship.

CPCNH Provision of Load Serving Entity Services

In 2022, on behalf of the Town and CPCNH's other Member communities, each of which are in various stages of authorizing Community Power Aggregations, CPCNH conducted a competitive solicitation process to solicit and contract for Comprehensive Services and Credit Support.[5]

As a result of the competitive solicitation process CPCNH selected and has contracted with Calpine Energy Solutions for Retail Data Management, Billing Services, and a number of other retail customer solutions. CPCNH selected and has contracted with Ascend Analytics for Portfolio Risk Management Services, credit support, and certain other services, including running a competitive RFP process to identify the best organization to provide LSE Services. An affiliate of Calpine Energy Solutions was selected as the most advantageous entity to provide LSE Services and CPCNH is in the process of finalizing arrangements and the contract for LSE Services, along with the other firms described in Attachment 2: Community Power Coalition of New Hampshire, Organizational Capacity to provide additional services required to launch and operate CPAs.

[5] CPCNH's Request for Proposals for Comprehensive Services and Credit Support, and additional supporting reference documentation, including the draft Business Plan for CPCNH, are posted online here: https://www.cpcnh.org/solicitations.

Responsibilities of the Town of Hudson

As a result of CPCNH's successful solicitation and contracting strategy, the Town may now contract for and authorize CPCNH to provide comprehensive services and credit support (inclusive of LSE services) to implement and operate Hudson Community Power.

- LSE services may be implemented as follows: CPCNH may contract directly for LSE services with a third-party that is registered or will register with ISO-NE as a market participant and Load Serving Entity, satisfies all applicable financial security and other registration requirements with ISO-NE, the Commission, and NH's distribution utilities, and has contractually agreed to assume responsibility for providing all requirements energy on behalf of Hudson Community Power's customers.

  Typically, such a third-party would additionally provide portfolio management services and credit support and assist CPCNH in structuring and maintaining a portfolio of physical and financial contracts to provide all requirements energy to participating customers. At a certain future point, CPCNH may be positioned to register with NEPOOL and ISO-NE as a market participant and Load Serving Entity directly.[6]

  This implementation option essentially replicates the approach and structure employed by the New Hampshire Electric Cooperative, which actively manages an all-requirements energy portfolio, accrues financial reserves, and provides LSE services for default service customers.

  Additionally, note that the Town of Hanover (whose Member director and alternate director are both members of CPCNH's Risk Management Committee and participated in the proposal evaluations) is already a market participant and Load Serving Entity for the Town's load obligations.

- CPCNH may alternatively contract with one or more Competitive Electric Power Suppliers to provide LSE services and all requirements electricity to customers at a pre-specified rate for a set length of time. Under this arrangement, the Competitive Supplier would either be the designated Load Serving Entity or would contract with a third-party that has agreed to be the Load Serving Entity responsible for the CPA's customers.

  This implementation option would essentially replicate the same approach and structure employed by NH's regulated distribution utilities (Eversource, Unitil and Liberty Utilities), under which customers are periodically re-assigned to whichever Competitive Suppliers have won the utilities' default service solicitations.

- CPCNH may also propose a combination of the above approaches for the Town's consideration.

In the event that the Town does not contract with CPCNH to provide LSE and other services to Hudson Community Power, then the Town may contract to implement LSE services independently, either with a third-party LSE acting as the Town's agent or with a Competitive Electric Power Supplier (CEPS) that contracts to provide LSE services for customers taking service from Hudson Community Power.

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[6] Refer to CPCNH's draft Business Plan for further details, available under RFP Reference Materials online at: https://www.cpcnh.org/solicitations

The Town will ensure that contracts entered into provide for the implementation of LSE services and full requirement energy supply for customers participating in Hudson Community Power.

Attachment 10: Customer Data Protection Plan

Hudson Community Power will protect and maintain the confidentiality of Individual Customer Data in compliance with its obligations as a Service Provider under RSA Chapter 363 (RSA 363:38 and RSA 363.37 ("*privacy policies for individual customer data; duties and responsibilities of service providers* and *definitions"*) and other applicable statutes and Public Utilities Commission rules.

Individual Customer Data (ICD) includes information that is collected over the course of providing energy services to customers participating in Hudson Community Power and that, singly or in combination, can be used to identify specific customers, including: individual customer names, service addresses, billing addresses, telephone numbers, account numbers, electricity consumption data, and payment, financial, banking, and credit information.

As described herein, the Town of Hudson is responsible for ensuring that reasonable security procedures and practices are implemented and maintained to protect the confidentiality of Individual Customer Data from unauthorized access, destruction, modification, disclosure, or use.

This plan assumes, but does not require, that the Town will participate fully in the Community Power Coalition of New Hampshire (CPCNH) for the purposes of implementing and operating Hudson Community Power.

Responsibilities of the Community Power Coalition of New Hampshire (CPCNH)

CPCNH is a Joint Powers Agency authorized under RSA 53-A ("*Agreements Between Governments: Joint Exercise of Powers"*) and RSA 53-E:3 ("*Municipality and County Authorities*"). CPCNH's Joint Powers Agreement expressly authorizes the agency to: [7]

- "*[C]omply with orders, tariffs, and agreements for the establishment and implementation of community power aggregations and other energy related programs*";
- *"Make and enter into contracts*" and "*[m]ake and enter into service agreements relating to the provision of services necessary to plan, implement, operate, and administer CPCNH's affairs*"; and
- "*[D]o all acts permitted… as well as any act necessary, consistent with New Hampshire law to fulfill the purposes*" set forth under the agreement, which include assisting "*member municipalities and counties in complying with the provisions of NH RSA 53-E in developing and implementing … Community Power Aggregations*".

CPCNH has solicited for and contracted with third-parties to provide comprehensive services and credit support to launch Member CPA programs. CPCNH has adopted Energy Portfolio Risk Management, Retail Rates, Financial Reserves, and Data Security and Privacy policies to govern CPA operations.

[7] From Section 2.3, Powers, of the By-Laws of CPCNH, found at pages 21-22 of the JPA, available here: https://www.cpcnh.org/_files/ugd/202f2e_601bfada901c4a89a1c2812a0638090a.pdf, and more specifically §2.3.11, §2.3.6, §2.3.9, and §2.3 introductory paragraph. Similar language in also in the Articles of Agreement.

CPCNH's adopted Data Security and Privacy Policy is linked to below.[8] The policy defines the specific goals, requirements, and controls necessary to safeguard the confidentiality, integrity, and availability of confidential information.

CPCNH's Board has also adopted a Cost Sharing Agreement and Member Services Contract, which Members will execute prior to taking CPA service from CPCNH.

CPCNH Request for Proposals for Comprehensive Services and Credit Support

In April, 2022, CPCNH issued a Request for Proposals for Comprehensive Services and Credit Support and subsequently contracted with qualified third-parties to provide comprehensive services and credit support to enable CPCNH to develop, finance, launch, and operate CPAs.

In November, 2022, CPCNH selected Calpine Energy Solutions, LLC to provide Retail Customer Services, inclusive of services required to ensure the confidentiality of ICD and executed a Master Professional Services Agreement with Calpine Energy Solutions, LLC. Services are inclusive of Member CPA start-up and customer enrollment support services, utility and Electronic Data Interchange (EDI) services, customer information system, customer call center and engagement support services, billing administration, and other services.

For additional information regarding the use of customer data, and expected operational needs of CPCNH, refer to (1) the RFP at pp. 20-23[9] and to (2) the RFP Addendum #2 (issued May 24, 2022), at pp. 11 in response to Question 15.[10] The latter is excerpted below, and provides a concise summary of CPCNH's requirements to ensure the confidentiality of ICD:

> ***Regarding Customer Privacy Compliance:***
>
> *RSA 53-E:4, VI, requires CPAs to maintain the confidentiality of individual customer information in compliance with their obligations as service providers under RSA 363:37 (Definitions) and RSA 363:38 ("Privacy Policies for Individual Customer Data; Duties and Responsibilities of Service Providers"). RSA 53-E:7, X also requires the Public Utilities Commission to adopt Administrative Rules for CPAs governing "access to customer data" and other matters.*

Calpine Energy Solutions, LLC has demonstrate physical and cybersecurity readiness sufficient to ensure customer data is held in strict confidence — e.g., through audits in accordance with the American Institute of Certified Public Accountants Statements on Standards for Attestation Engagements No. 16 (SSAE 16) Service Organizational Controls (SOC) Reports, periodic network vulnerability assessments, etc. — and is contractually required to maintain the confidentiality of individual customer data pursuant to RSA 363:38, V(b) and applicable Public Utilities Commission rules.

Refer to the PUC's Adopted CPA Administrative rules (Chapter Puc 2200), specifically the definitions in Puc 2202.07 ("Confidential customer information") and Puc 2202.02 ("Anonymized"), and Puc 2205.02 ("Application of Puc 2000 to CEPS When Providing Electricity Supply to CPA Customers").

As CPCNH's retail customer services provider, Calpine Energy Solutions, LLC will comply with relevant portions of the PUC's current Administrative Rules for Competitive Electric Power

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[8] CPCNH adopted Data Security and Privacy Policy: https://drive.google.com/file/d/1oU9KvV20zAU85AYKQohifyGudG9bNX_V/view?usp=sharing

[9] https://www.cpcnh.org/_files/ugd/202f2e_e781638c123d4cf3977358f845081313.pdf

[10] Pages 11-12 at https://www.cpcnh.org/_files/ugd/202f2e_8ceed8824453482c902a8a0fa1ab826c.pdf.

Suppliers and Aggregators (Chapter Puc 2000). Refer to Chapter Puc 2000, Puc 2002.09 (definition of "Confidential Customer Information") and Puc 2004.19 ("Protection of Confidential Customer Information"), which is proposed to apply to CEPS providing electricity supply service to CPA customers pursuant to Puc 2205.02 under the PUC's CPA Administrative Rules.

The Request for Proposals and evaluation process was overseen by CPCNH's Risk Management Committee, composed of CPCNH Member municipality representatives, with additional support from (1) independent experts with experience operating Community Power Aggregation Joint Powers Agencies, and (2) CPCNH's General Counsel, DWGP, P.C., a nationally recognized law firm with substantial expertise in the Community Power and broader public power industry.

CPCNH's Risk Management Committee evaluated, ranked, and selected Calpine Energy Solutions, LLC as a vendor with a proven track record of successful qualification for EDI transactions and protection of confidential customer information, including what is characterized as ICD under RSA 363, and other relevant factors.

- Refer to CPCNH's RFP at p.2 for a summary of the substantial domain expertise participating on the Risk Management Committee and proposal evaluation process.
- For example, the committee includes a Member Director who previously worked for Eversource for 26 years, where he was responsible for deploying and/or operating Eversource's Customer Information System and day to day interface with competitive electric suppliers and was most recently the Director of Eversource's Customer Center Operations.

CPCNH Requirements to Access and Use of Individual Customer Data

In CPCNH's capacity as a service provider to the Town, the agency and third parties contracted through CPCNH to provide services to Hudson Community Power will need to access and use ICD for operational needs and for the research, development, and implementation of new rate structures and tariffs, demand response, customer assistance, energy management, or energy efficiency programs on behalf of Hudson Community Power.

Third parties under contract to CPCNH that may require access to ICD on behalf of Hudson Community Power may include CEPS (Competitive Electric Power Suppliers) functioning as Load Serving Entities (LSEs) for the supply of all requirements energy, or other third-party vendors providing Load Serving Entity (LSE) services on behalf of CPCNH, as well as portfolio management, Electronic Data Interchange (EDI), Customer Information System (CIS), billing, accounting, and related services, and other contractors and academic institutions under contract to support the research and development of potential new energy services to offer to customers participating in Hudson Community Power.

Specific types of ICD that Hudson Community Power, CPCNH, and third parties under contract are expected to receive and possess include:

- Name, address, account number, and other information about electric customers within the Town for purposes of sending required notification of Hudson Community Power Commencement of Service and enrollment of customer in Hudson Community Power, consistent with Puc 2204.04, .05, and .06, as adopted by the PUC and the requirements of RSA 53-E:7, III, V, and VI.
- Individual customer information used for operation of Hudson Community Power, such as

that in Puc 2205.13, most of which may be accessed through the EDU EDI.

- Other confidential customer information that may be received or collected directly by Hudson Community Power or CPCNH, or through sources other than the EDI due to customer participation in particular related programs or services, billing operations, other customer services, or that may be volunteered by customers, will likewise only be used for statutorily authorized purposes as ICD.

Ongoing collection and use of individual customer data of the types described in Puc 2205.13 will be used for both:

1. **General operational needs** for retail power supply and related energy services operational needs, such as load and supply forecasting, portfolio management, billing and audit processes, and for research and development of potential new energy services to offer to customer participants; and
2. **Programmatic and customer-specific services and offerings**, such as responding to customer account queries, opt-in rates or demand side management for customers with flexible demand, distributed generation or storage, and interval meters; and other energy services that may be offered including programs for LMI participants that are qualified in the Electric Assistance Program (EAP).

In compliance with RSA 363:38 and RSA 363.37, CPCNH and third parties contracted through CPCNH that require access to ICD to provide services to Hudson Community Power will be contractually required to:

- Implement and maintain reasonable security procedures and practices appropriate to the nature of the ICD.
- Protect ICD from unauthorized access, use, destruction, modification, or disclosure.
- Use ICD solely for primary purposes, such as: complying with the provisions of RSA 53-E:7, II; providing or billing for electrical service; meeting system, grid, or operational needs; researching, developing, and implementing new rate structures and tariffs, demand response, customer assistance, energy management, or energy efficiency programs; and for research and development of potential new energy services to offer to customer participants.
- Collect, store, use, and disclose only as much ICD as is necessary to accomplish the aforementioned primary purposes.
- Not use ICD for a secondary commercial purpose unrelated to the aforementioned primary purposes of the contract without the express consent of the customer.
- Return or permanently delete all ICD after contract termination and deliver a certificate, signed by an authorized representative, stating that all ICD has been returned or permanently deleted and that all materials based on ICD has been destroyed, as appropriate (i.e., except for copies necessary for tax, billing, or other financial purposes).

Additionally, if CPCNH contracts with one or more Competitive Suppliers to provide Load Serving Entity services to participating customers, or brokers to support operations in a capacity that would require access to ICD, then the Competitive Suppliers and/or brokers would additionally be required to comply with the requirements of Puc 2004.19 (*Protection of Confidential Customer Information)*, which are excerpted below in the section "Statutory and Rule Requirements" for reference.

Responsibilities of the Town of Hudson

As noted earlier, the Town may decide to contract with CPCNH, as an all-requirements joint powers agency, for the provision of LSE services, all requirements energy supply and all other energy services required to implement and operate Hudson Community Power. The following information is specific to such a possible contractual relationship.

The Town Manager shall review that CPCNH has adequate policies, procedures and measures in place to protect confidential information and that contractual requirements consistent with the Town's obligations to protect ICD as required under RSA 363.37, RSA 363:38 and RSA 53-E:4, VI, and consistent with PUC rules, including Puc 2004.19 and its non-disclosure restrictions, are incorporated into any contracts with CPCNH, or any other third parties that are authorized to access ICD on behalf of the Town before executing any such contracts.

The Town expects contracts and policies to provide for:

- Third-party security assessment requirements regarding: Information Security Management; Personnel Security; Systems Development and Maintenance; Application Security; System Security; Network Security; Data Security and Integrity; Access Control; and Vulnerability Management.
- Third-party security requirements including: (1) User Account and Access Controls to ensure that only authorized individuals have access to ICD for legitimate primary purposes under RSA 368:38, which may include the need for non-disclosure agreements; (2) Handling of Sensitive Data Protocols to protect confidential customer information from unauthorized access, use, destruction, modification, or disclosure; (3) Breach Reporting, including obligations to report a security breach as defined in RSA 359-C:19, V and required by RSA 359-C:20 and any other applicable laws, rules, or utility requirements for data breach reporting; (4) Plan for deletion and destruction ICD when it is no longer necessary to accomplish primary purposes pursuant to RSA 368:38; and (5) Prohibitions on use of ICD for a secondary commercial purpose not related to the primary purpose of vendor's contract without the express consent of the customer.
- Third-party documentation and reporting requirements regarding, as applicable: Audit Reports (e.g. SSAE 16/SOC Report); Documentation describing Control practices used to review sub-vendors; Maintenance of an Information Security Program; Training Program for Employees on Cyber Awareness; Background checks performed for all employees with access to ICD; Immediate Data Breach reporting to appropriate parties; and any material changes in Data Security practices since prior review and approval.

Lastly, in the event that the Town does not contract with CPCNH to provide energy services to Hudson Community Power, then the Town will develop and adopt policies and contracts that ensure compliance with the Town's obligations as a Service Provider to protect and maintain the confidentiality of ICD under RSA 363:38, RSA 363.37 and other applicable statutes and Public Utilities Commission rules prior to directly collecting, storing, using, or disclosing any ICD or contracting with other Competitive Suppliers, brokers and/or other third-party vendors that require access to ICD.

Additional References: Statutory and Regulatory Requirements

The sections below are provided for additional reference, and summarize the different requirements that apply to (1) Community Power Aggregators and Service Providers, (2) brokers and Competitive Electric Power Suppliers (CEPS) that provide Load Serving Entity services under contract to Community Power Aggregators, and (3) access to ICT through the Multi-Use Energy Data Platform authorized under RSA 378:50-54 (if and when it becomes operational).

Statutory Requirements for Community Power Aggregators & Service Providers

Statutory requirements regarding the use of Individual Customer Data for Community Power Aggregators are summarized below:

- RSA 363:37, I defines Individual Customer Data (ICD) *as "information that is collected as part of providing electric, natural gas, water, or related services to a customer that can identify, singly or in combination, that specific customer, including the name, address, account number, quantity, characteristics, or time of consumption by the customer*."
- RSA 363:38, IV requires Service Providers to "*use reasonable security procedures and practices to protect individual customer data [ICD] from unauthorized access, use, destruction, modification, or disclosure*."
- RSA 53-E:4, VI provides that Community Power Aggregations (CPAs) "*shall be subject to RSA 363:38 as service providers and individual customer data shall be treated as confidential private information* and *shall not be subject to public disclosure under RSA 91-A*".
    - The definition of Service Provider under RSA 363:37, II includes "*an aggregator, as defined by RSA 53-E:2, II…and any other service provider that receives individual customer data [ICD]...*"
    - RSA 53-E:2, II defines an "*aggregator*" in this context as "*any municipality or county that engages in aggregation of electric customers within its boundaries*".
    - RSA 53-E:2, VI further defines "*municipality*" in this context as "*any city, town, unincorporated place, or village district within the state*."
- RSA 363:38, II requires Service Providers to: "*(a) Collect, store, use, and disclose only as much individual customer data [ICD] as is necessary to accomplish primary purposes, and (b) Use individual customer data solely for primary purposes*."
- RSA 363:37, III defines "*[p]rimary purpose*" as "*the main reason for the collection, storage, use, or disclosure of individual customer data [ICD] which is limited to: (a) Providing or billing for electrical or gas service. (b) Meeting system, grid, or operational needs. (c) Researching, developing, and implementing new rate structures and tariffs, demand response, customer assistance, energy management, or energy efficiency programs*."
- RSA 53-E:4, VI further authorizes approved Community Power Aggregations to "*use individual customer data to comply with the provisions of RSA 53-E:7, II and for research*

and development of potential new energy services to offer to customer participants."

- RSA 363:38, V(b) further makes clear that a Service Provider may disclose ICD "*to a third party for system, grid, or operational needs, or the research, development, and implementation of new rate structures and tariffs, demand response, customer assistance, energy management, or energy efficiency programs*" — provided that the Service Provider "*has required by contract that the third party implement and maintain reasonable security procedures and practices appropriate to the nature of the information, to protect the personal information from unauthorized access, use, destruction, modification, or disclosure, and to prohibit the use of the data for a secondary commercial purpose not related to the primary purpose of the contract without the express consent of the customer*."
- RSA 363:38, V(c) provides that *"[n]othing in this section shall preclude a service provider from disclosing electric, natural gas, or water consumption data required under state or federal law, or which is identified as information subject to warrant or subpoena or by an order of the commission*."
- RSA 363:38, V(a) makes clear that ICD may be aggregated and used for "*analysis, reporting, or program management after information that identifies an individual customer has been removed*."

Additional Requirements Specific to Brokers & Competitive Suppliers

Pursuant to Puc 2205.02 under the PUC's CPA Administrative Rules, brokers and Competitive Suppliers that are hired by municipalities to manage and operate Community Power Aggregations and provide Load Serving Entity services to participating customers must comply with the requirements of Puc 2004.19 (*Protection of Confidential Customer Information)*, which is excerpted below for reference along with Puc 2002.09 (*Confidential Customer Information*).

Note that the use of the term "aggregator" throughout Puc 2004.19 below refers to brokers and does not refer to or otherwise apply to Community Power Aggregators.

As context, these requirements are part of the Commission's Chapter Puc 2000 rules ("*Competitive Electric Power Supplier and Aggregator Rules*), which apply to Competitive Suppliers and brokers—referred to as "CEPS" and "aggregators" below, respectively — and are expressly not applicable to "*municipalities or counties providing electricity or aggregating within the boundaries of participating municipalities under RSA 53-E*" (Community Power Aggregators) per Puc 2001.02 (*application of rules).*

> ***Puc 2002.09 "Confidential customer information"*** *means information that is collected as part of providing electric services to a customer that can identify, singly or in combination, that specific customer, and includes the customer name, address, and account number and the quantity, characteristics, or time of consumption by the customer, and also includes specific customer payment, financial, banking, and credit information.*
>
> ***…***

Puc 2004.19 Protection of Confidential Customer Information.

(a) No CEPS or aggregator shall, except as permitted under (c) below or as otherwise required by law, release confidential customer information without express written authorization from the customer.

(b) A CEPS or aggregator shall implement and maintain reasonable security procedures and practices appropriate to the nature of the information, to protect confidential customer information from unauthorized access, use, destruction, modification, or disclosure, and to prohibit the use of the confidential customer information for a secondary commercial purpose not related to the primary purpose of the service provided to the customer, without the express written consent of the customer.

(c) A CEPS or aggregator may disclose to a third party subject to non-disclosure restrictions confidential customer information as necessary for any one or more of the following purposes:

(1) Billing for electric service;

(2) Meeting electric system, electric grid, or other operational needs;

(3) Implementing any one or more of the following programs:

a. Demand response;

b. Customer assistance;

c. Energy management; and

d. Energy efficiency.

(d) For purposes of this section, the term "non-disclosure restrictions" means that the CEPS or aggregator has required by contract that the third party implement and maintain reasonable security procedures and practices appropriate to the nature of the information, to protect the confidential customer information from unauthorized access, use, destruction, modification, or disclosure, and to prohibit the use of the confidential customer information for a secondary commercial purpose not related to the primary purpose of the contract without the express consent of the customer.

(e) A customer granting authorization to release confidential customer information for purposes described in the terms and conditions of service shall satisfy the requirement in (a) above.

(f) A CEPS or aggregator granted agency authority shall be deemed authorized to obtain customer usage information when it has received customer authorization as described in Puc 2004.08 or Puc 2004.09.

(g) In the event of a dispute about the release of confidential customer information, including whether the information is or should be confidential, a CEPS, aggregator, or customer may file a complaint with the commission for resolution.

Additional Requirements for the Multi-Use Energy Data Platform

If and when the Multi-Use Energy Data Platform (Platform) authorized under RSA 378:50-54 becomes operational, Hudson Community Power and any third-parties under contract that require access to ICD sourced from the Platform — such as CPCNH and third-parties contracted through CPCNH — will be required to comply with any Platform User Requirements, Privacy Standards, Annual Attestations, and obligations to report a security breach pursuant to terms of Settlement Agreement conditionally approved by the PUC in DE 19-197 and detailed in Exhibit C of the Agreement found in Exhibit 1B and as may be actually implemented.

Hudson Community Power

Electric Aggregation Plan

Last updated: ~~17-Aug-22~~10-July-2023

Approved by Hudson Board of Selectmen~~OS~~: <TBD>

~~With 9-Jan-23 & 12-Jan-23 Edits~~

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Table of Contents

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Version History

Version	Date	Notes
1.0	January 8, 2023	Original draft; approved at Town Meeting on March 28, 2023
1.1	July ~~9~~10, 2023	Prepare document for submission to the PUC. Bring document up to date; change forward-looking statements (such as references to the upcoming Town Meeting, etc.) to indicate the events have taken place; update the table showing members of CPCNH's BOD; fixed broken internal & external links; cleanup of grammar, typos, formatting & pagination. **No changes to the intent of the plan or process to be followed are made.** Approved by the Hudson BOS on July ??, 2023

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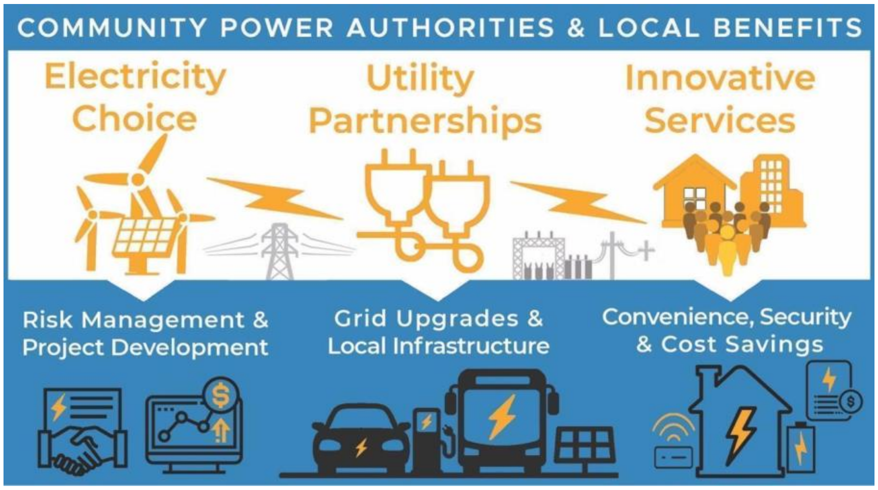
INTRODUCTION TO COMMUNITY POWER

New Hampshire's updated Community Power law (RSA 53-E, as amended by SB 286 - Chapter 316, NH Laws of 2019, effective October 1, 2019, and HB 315, Chapter 229, NH Laws of 2021, effective October 24, 2021) is a bipartisan policy designed to further democratize, evolve, and enhance the economic efficiency of our electric power industry. The Legislature's intent in enacting RSA 53-E was to "*encourage voluntary, cost effective and innovative solutions to local needs with careful consideration of local conditions and opportunities."* To achieve this goal, RSA 53-E authorizes local governments (cities, towns, and counties) to launch Community Power programs that:

- Provide electricity supply service to residents and businesses, who are notified and enrolled on an "opt-in" customer choice or "opt-out" default service basis — and may thereafter leave or rejoin the program by switching suppliers (in advance of their next billing cycle date);
- Procure a reliable supply of "all-requirements" electricity, inclusive of Renewable Portfolio Standard requirements, with the option to participate directly in the ISO New England wholesale market as a load-serving entity on behalf of participating customers;
- Offer a range of innovative services, products, new Net Energy Metering supply rates, and local programs to participating customers;
- Allow for e~~E~~stablishing a joint powers agency with other Community Power programs to share services, contract for energy project developments, and facilitate related energy initiatives; and
- Work collaboratively with distribution utilities, regulators, policymakers and innovative energy businesses to help modernize our electrical grid and market infrastructure.

These authorities and local benefits are depicted in the graphic below:



Distribution utilities will continue to deliver power to all customers, regardless of whether they are supplied electricity by new Community Power programs or Competitive Electric Power Suppliers (or have chosen to switch back to utility-provided default service).

OVERVIEW OF HUDSON COMMUNITY POWER

Hudson Community Power is a program authorized under RSA 53-E to provide electricity supply service for the town's residents, businesses, and other types of customers. The program will only launch if it is able to initially offer residential default rates that are lower than or competitive with those offered by Eversource. Thereafter, the program will:

- Serve as the default electricity supplier for all customers on a default "opt-out" basis;
- Offer innovative services and generation rates to customers on an "opt-in" or "opt-up" basis (such as 100% renewable premium products, time-varying rates and Net Energy Metering generation credits for customers with solar photovoltaics) as these options become available;
- Operate on a competitive basis, in that customers may choose to switch between Hudson Community Power, service provided by Competitive Electric Power Suppliers, and utility-provided default service; and
- Be self-funded through revenues generated by participating customers (the town will not use taxes to cover program expenses).

Eversource will continue to own and operate the distribution grid and be responsible for delivering power to all customers within the town. Customers will be charged for utility delivery services at rates set by the Public Utilities Commission.

The Board of Selectmen, in coordination with advisory support from the Hudson Electric Aggregation Committee (HEAC) will be authorized to arrange and contract for the necessary services and power supplies to implement and operate the program and continue to provide oversight over the program thereafter.

Customer Notification and Enrollment Process

Prior to launch of Hudson Community Power, all eligible customers will be mailed notifications and provided the opportunity to "opt-out" or "opt-in" to the program, depending on whether they currently take service from a Competitive Electric Power Supplier or are on default service provided by Eversource:

- Customers already served by Competitive Electric Power Suppliers will be notified and may request to "opt-in" to the program; and
- Customers currently on default service provided by Eversource will be notified, provided the opportunity to decline participation, and thereafter transferred to Hudson Community Power if they do not "opt-out".

Notifications to customers on utility-provided default service will include the initial fixed rate for the program's default service compared with the Eversource rate, be mailed to customers at least 30 days in advance of program launch and provide instructions for customers to decline participation (for example, by return postcard, calling a phone number or using a web portal).

After the launch of Hudson Community Power, any new customers that move to the town will be transferred onto default service provided by the program, unless they choose to take service from Eversource or a Competitive Electric Power Supplier.

All customers on Hudson Community Power default service will remain free to switch back to Eversource or to take service from a Competitive Electric Power Supplier.

Customer Accounts and Electricity Usage Estimates

The tables below show the total number and annual electricity usage of customers within Hudson's territory who would initially receive either "opt-out" or "opt-in" notifications:

	Utility Default Supply Customers (Eligible for Opt-Out Notifications & Automatic Enrollment)		**Competitive Supply Customers** (Eligible for Opt-In Notifications & Voluntary Enrollment)	
	Customer Accounts	**Annual Usage (MWh)**	**Customer Accounts**	**Annual Usage (MWh)**
LPBS (GV)	0	0	39	74,709
Residential (R)	8,964	70,620	1,680	13,798
General Service~~???~~ (G)	14,947	28,459	6,116	20,856
ST Lighting (OL)	151	289	0	0
Total	**24,062**	**99,368**	**7,835**	**109,363**

Aggregated data shown was provided by Eversource for the 12 months ending November 2022.

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Membership in the Community Power Coalition of New Hampshire

Hudson is a member of the Community Power Coalition of New Hampshire ("the Coalition"), a joint powers agency authorized under RSA 53-A ("*Agreements Between Governments: Joint Exercise of Powers*") that ~~will~~ operates on a not-for-profit basis.

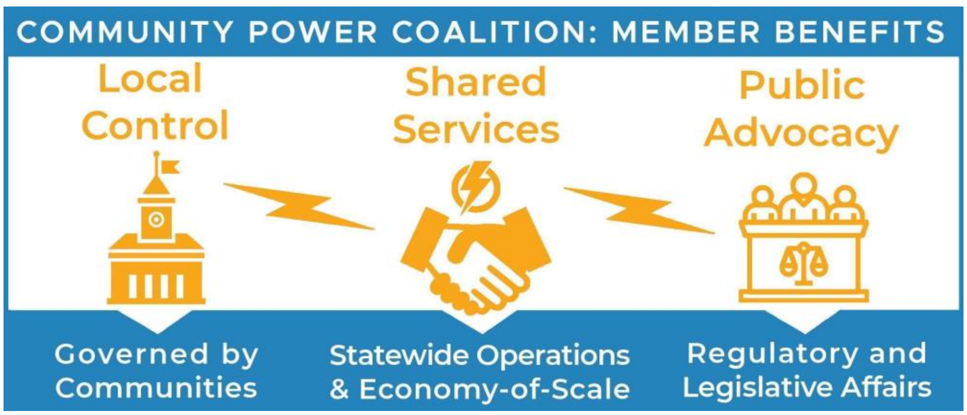
The Coalition was created so that towns, cities, and counties across New Hampshire could:

1. Access the resources and support required to streamline the process of establishing an Electric Aggregation Committee, drafting an Electric Aggregation Plan and approving a new Community Power program.
2. Jointly solicit and contract for third-party services and staff support to launch and operate Community Power programs, without requiring any upfront costs or imposing any financial liabilities on participating communities.
3. Participate in joint power solicitations and local project development opportunities.
4. Share knowledge and collaborate regionally on clean energy and resilient infrastructure development at the community-level throughout the state.

5. Speak with one voice at the Legislature and Public Utilities Commission on public advocacy issues related to energy and Community Power.

The Coalition's joint powers agency governance model and competitive business model have been designed in accordance with energy industry best practices to ensure that participating Community Power programs benefit from transparent governance and high-quality services —so that all communities are able to take full advantage of their local control authorities under RSA 53-E and achieve the full scope of their local energy policy goals.

The Coalition is~~will be~~ governed "*for communities, by communities*" under a voluntary and flexible membership structure, ~~will provide~~offers competitive electricity service on a statewide basis, and ~~will~~ strengthens the ability of communities to coordinate effectively on public advocacy issues.



Key aspects of the Coalition's design, governance, services and start-up process are summarized in:

- The appendix ~~(Attachment 2)~~(Attachment 2: The Community Power Coalition of New Hampshire~~Attachment 2: The Community Power Coalition of New Hampshire~~) which provides an overview of the communities, volunteers and experts involved in the process of designing the power agency.
- The chapter "~~Overview of the Community Power Coalition of New Hampshire~~OVERVIEW OF COMMUNITY POWER COALITION OF NEW HAMPSHIRE", which provides context regarding the purpose of joint action power agencies, highlights the importance of joint public advocacy (and summarizes the Coalition's successful engagements at the Legislature and Public Utilities Commission on Community Power and public advocacy issues to-date), and summarizes key features of the Coalition's business model and services.
- The chapter "~~Hudson Community Power, Objectives and Requirements~~Hudson Community Power Objectives and Requirements", which explains how the Coalition's joint action governance and business model should enable Hudson to achieve the full scope of our policy goals, delineates what our goals are over the short-to-long term, and summarizes the program's near-term operational requirements as a power enterprise.
- The remainder of this chapter, which summarizes the town's anticipated role in the Coalition's governance and implementation process through the launch of Hudson Community Power.

Purpose of this Electric Aggregation Plan

The Electric Aggregation Committee was tasked by the Board of Selectmen to prepare this Electric Aggregation Plan, which sets forth Hudson's policy goals for our Community Power program, summarizes program governance and implementation processes, and commits Hudson Community Power to comply with applicable statutes and regulations in terms of:

- Providing universal access, reliability, and equitable treatment of all classes of customers subject to any differences arising from varying opportunities, tariffs, and arrangements between different electric distribution utilities in their respective franchise territories; and
- Meeting, at a minimum, the basic environmental and service standards established by the Public Utilities Commission and other applicable agencies and laws and rules concerning the provision of service under Community Power.

This plan does not otherwise commit Hudson to any defined course of action, including participation in the Coalition for the purposes of launching the program, and does not impose any financial commitment on the town.

The Board of Selectmen retains the power to contract for all required program services and electricity supplies, to set rates, and to pursue related projects independently of the Coalition.

Approval Process for Hudson Community Power

This Electric Aggregation Plan was developed by the Electric Aggregation Committee with due input from the public, as required under RSA 53-E. Public hearings were held on November 15, 2022 and January 17, 2023. Refer to ~~Attachment 7~~ Attachment 7: Hudson's Public Planning Process for additional information.

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The Electric Aggregation Committee has determined that this Electric Aggregation Plan satisfies applicable statutory requirements and is in the best, long-term interest of the town and its residents, businesses, and other ratepayers.

~~The Board of Selectmen may now submit this Plan for consideration by voters at a Town meeting. Adoption of this Plan by the voters at a Town meeting, by majority approval of those present and voting, establishes Hudson Community Power as an approved aggregation with statutory authorities defined under RSA 53-E:3 (to be exercised with due oversight and local governance, as described herein), and authorizes the Board of Selectmen to arrange and contract for the necessary professional services and power supplies to launch Hudson Community Power.~~ The voters approved Warrant Article 20 on March 28, 2023, authorizing the Board of Selectmen to arrange and contract for the necessary professional services and power supplies to launch Hudson Community Power.

Implementation Process for the Coalition & Hudson Community Power

The town became a member of the Coalition by unanimous vote of the Hudson Board of Selectmen approving the Joint Powers Agreement for adoption and upon the Coalition Board of Directors approving Hudson's membership.

The Coalition's Joint Powers Agreement includes the Articles of Agreement and Bylaws of the nonprofit. It establishes the general purpose, authorities, structure, Board of Directors, committees, cost-sharing principles, liability protections, and other aspects of the organization.

The Coalition was incorporated on October 1, 2021 by the following founding local government Members: the cities of Lebanon, Nashua and Dover; the towns of Hanover, Harrisville, Exeter, Rye, Warner, Walpole, Plainfield, Newmarket, Enfield and Durham; and Cheshire County.

This plan assumes, but does not require, the town to participate fully in the Coalition for the purposes of implementing and operating Hudson Community Power.

Town Participation in Joint Powers Agency Governance

The Coalition's initial Board of Directors ~~is~~was constituted of representatives appointed by the governing bodies of each founding member.

The Board of Selectmen ~~has~~ appointed primary and alternate representatives of Hudson Community Power to serve on the Coalition's Board of Directors. The town's representatives ~~will~~ helped to directly oversee the Coalition's initial startup and implementation activities, including the:

- Adoption of Board policies and the election of officers;
- Hiring of expert staff to provide qualified management and oversight;
- Solicitation and contracting of third-party service vendors to launch and operate Community Power programs; and
- Appointment of Board members and other community representatives to committees.

Hudson and all members ~~will be~~were directly represented on the Coalition's Board until more than twenty-one (21) members had joined, at which point directors ~~will be~~are elected by vote of the member's representatives at annual meetings (with a Board size of between 11 and 21 representatives, at the members' direction). The membership of CPCNH exceeded the 21-member count in early 2023. A new Board consisting of 20 members was elected at the annual membership meeting on April 21, 2023.

Additionally, to exercise more regular oversight over specific aspects of the joint powers agency, the Coalition will have six standing committees: Executive, Finance, Audit, Regulatory and Legislative Affairs, Risk Management and Governance. The Board may also establish ad-hoc committees, and each direct project that members choose to pursue in the future will be overseen by a committee specific to that project.

All meetings of the Coalition will comply with New Hampshire's Right-to-Know Law (RSA 91-A), the purpose of which is to "*ensure both the greatest possible public access to the actions, discussions and records of all public bodies, and their accountability to the people*", based on the recognition that "*openness in the conduct of public business is essential to a democratic society*."

Development of Member Cost Sharing Agreement and Services for Hudson Community Power

Under the terms of New Hampshire's Community Power law (RSA 53-E):

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- Community Power programs must be self-funded, with ongoing costs paid for using the revenues generated by participating customers.
- Municipalities are only allowed to incur incidental costs associated with implementing Community Power programs, such as the costs necessary to comply with the Community Power law, up to the time that the program starts to produce revenue from participating customers.

Membership in the Coalition, and the implementation of Hudson Community Power, will not require any upfront cost for the town other than such incidental expenses (i.e., the staff time, counsel review of agreements, and other costs required to comply with the Community Power law).

To provide the services, credit support and electricity supply required to launch and operate Hudson Community Power:

- The Coalition will administer competitive solicitations on behalf of all participating Community Power programs to contract with qualified vendors and credit-worthy suppliers.
- Vendors are expected to fund and self-manage the upfront cost of launching Community Power programs, under at-risk and performance-based contract structures with payments contingent upon successful launch.
- Program implementation costs for Hudson, along with ongoing operational and power procurement expenses, will be factored into the customer rates and be recovered from the revenues received from participating customers after the launch of Hudson Community Power.

Similar solicitations and at-risk, performance-based contract structures have been used to successfully launch and operate new joint powers agencies in other Community Power markets.

Hudson's representatives on the Coalition's Board of Directors are participating in the solicitation of services, agency startup activities and the development of a cost-sharing agreement with other founding members.

The Coalition's Joint Powers Agreement provides certain requirements regarding how costs will be tracked and shared across participating Community Power programs, which will guide the development of the Coalition cost-sharing agreement:

- Costs will be tracked in three distinct categories: direct project costs, member services, and general and administrative costs (which are overhead costs that are not associated with any specific project or member service);
- Member cost-sharing agreements will be the same in all material respects: general and administrative costs will be allocated based on each Community Power program's share of total electricity usage each year, while each member will choose and separately pay for the costs of specific services and projects (under terms that reflect a fair allocation across all the members that chose the same services and projects); and
- The debts, liabilities and obligations of the Coalition, and of other participating Community Power programs, will be non-recourse to Hudson (unless expressly agreed to by the Board of Selectmen under Hudson's Cost Sharing Agreement or a Project Contract).

To proceed with launching and operating Hudson Community Power through the Coalition:

- The Board of Selectmen would review and approve execution of the Coalition's Cost Sharing Agreement and Member Services Contract, along with the Data Security and Privacy Policy and the Energy Portfolio Risk Management, Retail Rates, and Financial Reserves policies approved by the Coalition's Board of Directors.
- The Coalition would provide the services and credit support necessary to launch and operate Hudson Community Power (along with the programs of other municipalities across the state) and would provide all-requirements electricity to customers participating in the programs.

- Confidential customer data would be handled in accordance with the Data Security and Privacy Policy.
- Power procurement and energy portfolio risk management, rate setting, and the accrual of financial reserves for the program would be carried out in accordance with the Coalition's Energy Portfolio Risk Management, Retail Rates, and Financial Reserves policies.
- The Coalition would collect revenues from program customers on the Town's behalf and would recover expenses incurred on behalf of Hudson Community Power in accordance with the Cost Sharing Agreement.

Governance of the power agency would be carried out pursuant to the Coalition's Joint Powers Agreement. The Board of Directors and committees of Member Representatives — the Executive Committee, Finance Committee, Risk Management Committee, Member Outreach and Engagement Committee[1]~~Member Operations and Engagement Committee~~, Regulatory and Legislative Affairs Committee, etc. — would continue to meet regularly and carry out their responsibilities to provide oversight and direction, supported by a qualified CEO and staff experts hired to provide day-to-day oversight and management of the agency's service providers, operations, planning, and program development activities.

The Coalition intends to contract for all the services required to launch and operate member Community Power programs, which is expected to enable access to advanced services and expertise at least cost for Hudson Community Power. However, note that:

- The town will be under no obligation to rely on the services provided through the Coalition until the Board of Selectmen executes the Coalition's cost-sharing agreement and chooses which services will be provided through the Coalition.
- At that time, the Board of Selectmen may decide to rely on the Coalition for all or a subset of the services required to launch and operate Hudson Community Power.
- Alternatively, the Board of Selectmen could decide to withdraw from the Coalition entirely, prior to the point at which power procurement is authorized on behalf of Hudson Community Power, and launch Hudson Community Power independently without any cost or continuing financial obligations to the Coalition.
- Lastly, after Hudson Community Power launches, the town could still decide to procure certain services independently or to withdraw from the Coalition at a future date, subject to the terms, conditions and any continuing obligations specified in the cost-sharing agreement approved by the Board of Selectmen.

Decisions made by the Board of Selectmen regarding how to best implement and operate Hudson Community Power, including the execution of the Coalition cost-sharing agreement and selection of services provided through the Coalition, will be made at duly noticed public meetings.

Coalition Engagement on Rule Making at the Public Utility Commission

Hudson Community Power will launch after administrative rules governing Community Power are adopted by the Public Utilities Commission. Rules are expected to require submission of Hudson's Electric Aggregation Plan to the Commission in order to:

[1] Formerly 'Member Operations and Engagement Committee'

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- Provide formal notice that the town is planning to launch a Community Power program;
- Authorize the town to request access to additional customer data from Eversource that will be needed for the implementation and administration of Hudson Community Power.

Over the course of 2020 to 2022, members of the Coalition have actively participated in the informal rule drafting process by providing initial and subsequent sets of draft rules for review and refinement, arranging and facilitating bilateral meetings with utilities and other stakeholders, and leading stakeholder workshop discussions and editing sessions at the request of Public Utilities Commission staff.

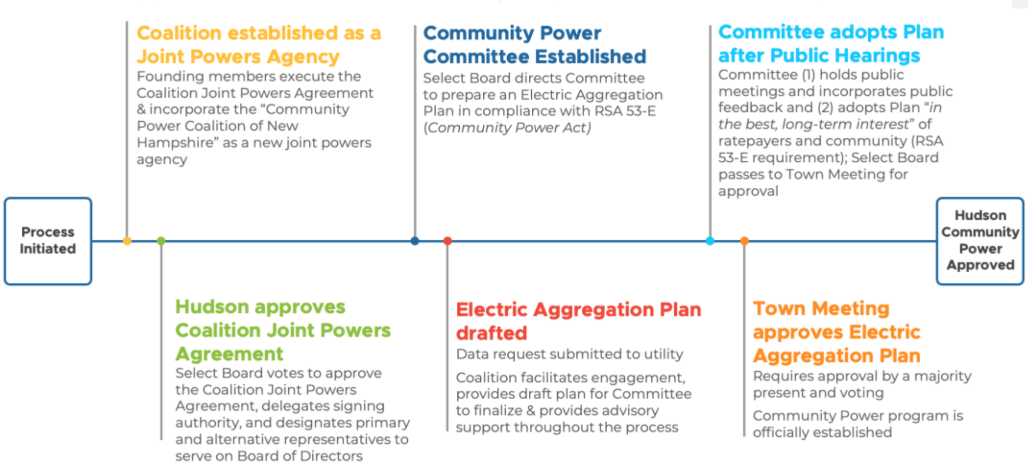
On December 1, 2021, the Coalition submitted a petition for rulemaking to implement RSA 53-E for Community Power Aggregations, which was filed on behalf of the Coalition's Members and other stakeholders that had been invited to join the petition. The Commission approved the petition in Docket DE 21-142[2] and issued an Initial Proposal on February 3, 2022, putting forward the Coalition's recommended rules for public review and comment. Hudson Community Power and the Coalition actively participated in the review and public comment process proceeding the Commission's issuance of a Final Proposal for CPA Administrative Rules. Hudson Community Power will continue to coordinate with the Coalition to engage in the Commission's rule development process.

Coalition & Hudson Community Power Implementation Milestone Charts

The milestone charts below show the anticipated approval, formation and launch processes for Hudson Community Power and the Coalition power agency, as described in the sections above.

The first chart below summarizes the different categories of activities required to approve Hudson Community Power and join the Coalition as a member to create the joint powers agency:

Approval Process for Coalition Agency & Hudson Community Power



[2] See: https://www.puc.nh.gov/Regulatory/Docketbk/2021/21-142/LETTERS-MEMOS-TARIFFS/21-142_2022-03-14_CPCNH_COMMENTS.PDF

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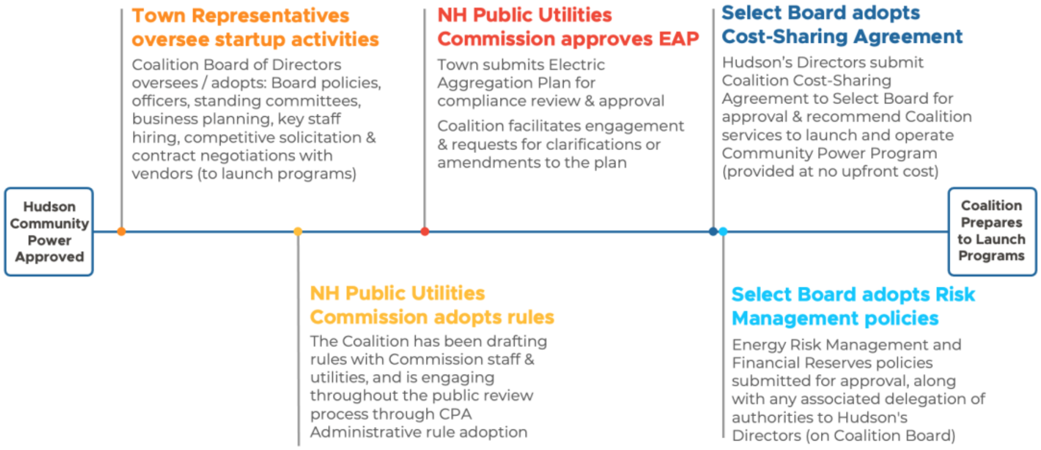
Hudson's directors on the Coalition Board are overseeing startup activities, including engagement at the Public Utilities Commission to finalize the administrative rules governing the Community Power market, and will bring forward the Coalition's cost-sharing agreement along with Energy Risk Management and Financial Reserve policies for approval by the Board of Selectmen:

Coalition Startup, Rule Making and Risk Management Policy Approval Process



After the Public Utility Commission adopts rules and opens the market, the Coalition will be allowed to launch Hudson Community Power (and the programs of other participating municipalities). The milestones below summarize the process by which the Coalition will structure and conduct data collection, forecasting, power procurement solicitations and rate setting exercises — in compliance with the Energy Risk Management and Financial Reserve policies adopted by the Town, and with oversight provided by Hudson's representatives on the Coalition's Board of Directors — and the local outreach, customer notification mailings and public meeting process that culminates in the launch of Hudson Community Power:

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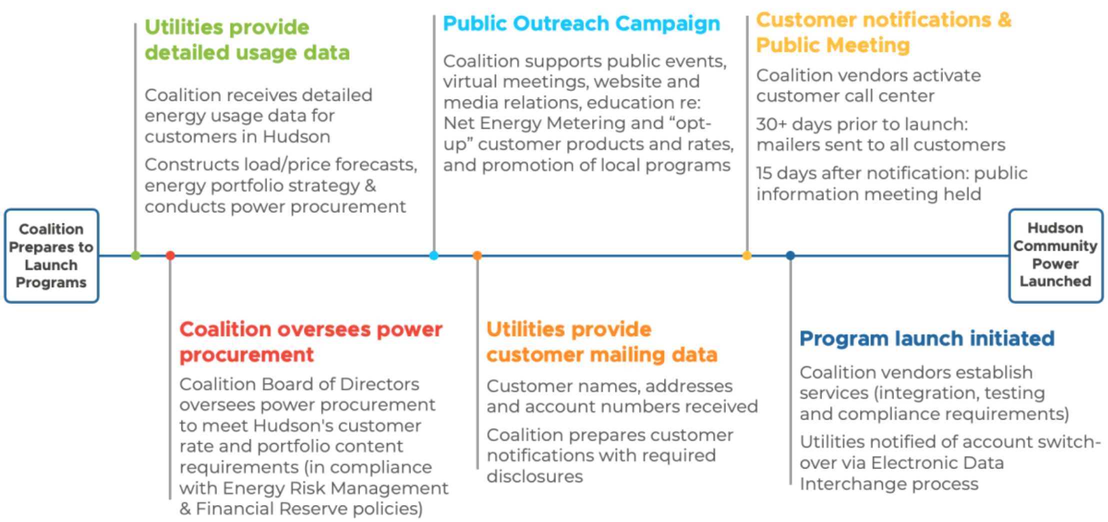
Hudson Community Power Launch Process



OVERVIEW OF COMMUNITY POWER COALITION OF NEW HAMPSHIRE

Hudson is a member of the Community Power Coalition of New Hampshire, a nonprofit joint powers agency authorized under RSA 53-A.

Joint powers agencies are governed by communities, operated on a not-for-profit basis and allow Community Power programs to voluntarily join forces to take advantage of economies of scale and shared services to boost operational efficiencies.

The public power industry has created over seventy joint powers agencies in the last fifty years, and several hundred local governments operate Community Power programs through joint powers agencies or comparable collaborative governance structures in Massachusetts, New York, Ohio, Illinois and California.

The experience of these markets demonstrates that the economics of joint purchasing can enable access to advanced services and expertise for participating Community Power programs, which helps keep power rates competitive and supports long-term financial stability.

The Coalition was incorporated on October 1, 2021 by the following founding local government Members: the cities of Lebanon, Nashua and Dover; the towns of Hanover, Harrisville, Exeter, Rye, Warner, Walpole, Plainfield, Newmarket, Enfield and Durham; and Cheshire County. Following incorporation, the city of Portsmouth and the towns of Hudson, New London, Pembroke, Webster, and Peterborough joined the Coalition's membership.

The 20 city and town members of the Coalition represent more than 270,000 residents, or ~20% of the population of New Hampshire. To put the anticipated electricity usage of all Coalition Members Community Power programs in context, at full enrollment of all eligible customers, the Coalition would be larger in size than the default service load of Unitil, Liberty Utilities, and the New Hampshire Electric Coop on an individual basis, and smaller than Eversource (New Hampshire's largest investor-owned distribution utility).

Hudson anticipates relying upon the Coalition's member services to launch and operate Hudson Community Power, but approval of this plan does not commit the town to doing so. The Board of Selectmen retains the authority to contract for any and all required program services and electricity supplies, and to pursue projects independently of the Coalition.

Based on the design and projected size of the Coalition, the Electric Aggregation Committee anticipates that participation will result in cost savings, lower staff requirements and enhanced quality of services for Hudson Community Power and other member programs.

Operating Hudson Community Power through the Coalition is expected to provide a number of distinct benefits in terms of transparency, scope and cost of services, regulatory and policy engagement, local program options, quality of energy risk management advice, the accrual of financial reserves sufficient to ensure long-term financial stability, and opportunities to develop new energy projects. These benefits are summarized in the "Regulatory and Policy Advocacy" and "Coalition Member Services" sections below.

Regulatory and Policy Advocacy

Changes in law and regulations that adversely impact Community Power programs will be a non-trivial source of risk for Hudson Community Power.

Additionally, extending and maintaining the full range of benefits that Hudson Community Power could create for customers will require informed participation and advocacy on energy issues at the Legislature and Public Utilities Commission.

Coordination with other municipalities and Community Power initiatives on matters of common interest through the Coalition have already produced meaningful results in these areas. For example, over the last year, the communities involved in the formation of the Coalition have:

- Participated in the Community Power informal rule drafting process, including by providing the initial and subsequent draft rules for discussion, arranging bilateral meetings with utilities and other stakeholders, and leading significant portions of the subsequent stakeholder workshops at the request of Public Utilities Commission staff.
- Intervened in regulatory proceedings to represent the interests of customers and Community Power programs, such as by advocating for expanded data access in the Commission's Statewide Data Platform docket (DE 19-197), under which a settlement agreement with the utilities was negotiated and recently submitted to the Public Utilities Commission. (If adopted, the settlement would create a "Statewide Data Platform" to enable~~s~~ data access for customers and Community Power programs, which would be overseen by a Governance Council that includes Coalition representatives.)
- Testified in legislative hearings — and organized hundreds of people, elected officials and civic organizations to register in support of the Coalition's position on key legislation — in order to successfully negotiate critical amendments to two bills recently signed into law:
    - House Bill 315, which clarifies and expands key Community Power authorities; and
    - Senate Bill 91, which expands battery storage options for customers as well as Net Energy Metering for communities and established a committee to study the creation of a new market that would expand the ability of Community Power programs to buy from in-state generators and battery storage projects (under 5 megawatts in size).

Hudson Community Power will continue and expand on these activities through the Coalition.

Coalition Member Services

The Coalition's business model has been designed to provide Community Power programs with:

- **Innovative local programs and customer services**: new rates, technologies and services for customers that lower electricity supply costs and risk for the program in aggregate, along with the electricity bills of participating customers from a "full bill" perspective (i.e., inclusive of transmission and distribution charges).
- **Energy Risk Management & Financial Reserve Policies, Procedures and Practices*:*** expert guidance on energy risk management, procurement of a diversified portfolio of energy contracts, rate setting, and financial reserves — sufficient to ensure the stability and operational continuity of Community Power programs over the long-term (as technologies, market dynamics, risk factors, consumer preferences and energy policies continue to evolve).

- **Development of Renewable and Battery Storage Projects:** joint contracting opportunities for the construction of new renewable and battery storage projects financed under long-term contracts — to diversify program energy portfolios, provide a physical hedge against wholesale market price fluctuations, enhance the resiliency of our electrical grid, and stimulate local construction and economic development.

The Coalition intends to contract with qualified vendors and credit-worthy suppliers to provide the services, credit support and electricity required to launch and operate Community Power programs. These third parties are expected to fund the upfront cost of implementing Community Power programs, the expense of which would be amortized and recovered for a specified term, along with ongoing operating costs, in customer rates.

The extent of services offered by the Coalition is expected to thereafter expand over time, in response to new market opportunities and ongoing regulatory rule reforms, and to meet the local objectives of participating Community Power programs. The Coalition also plans to hire a small number of qualified staff to ensure effective oversight of operations, as well as enhanced transparency and expert management as the Coalition's business operations evolve.

The proceeding sections explain how the above categories of member services are interrelated in ways that combine to ensure Hudson Community Power remains operationally stable, competitive and able to achieve the full range of our local policy goals over the long-term.

Innovative Local Programs & Customer Services

Cost-effective local programs provide new retail products and services that enable customers to:

- Intelligently moderate their use of electricity from the grid during times of high wholesale power prices and when the physical grid is constrained (at-risk of not being able to deliver enough power to meet all customers' usage requirements during the hours of "peak demand");
- Increase their use of electricity from the grid when wholesale prices are relatively low and the physical grid is not constrained.

Examples of innovative retail products and services that enable customers to do so include time-based rate options, individual and group net metering, targeted efficiency, distributed generation and energy storage programs, electric vehicle charging rates, and other offerings that empower customers directly and enable the services of third-party energy companies that are helping customers adopt and use new technologies.

Programs that enable the intelligent use of electricity will help Hudson Community Power to:

- Lower electricity supply costs and risk for the program in aggregate, along with the electricity bills of participating customers from a "full bill" perspective (inclusive of transmission and distribution charges);
- Strengthen customer relationships and local brand recognition; and
- Protect against customer attrition (the risk that customers opt-out of the program by choosing an alternative supplier) and potentially grow the program's customer base over time.

Local programs, in order to be cost-effective, need to be designed in ways that relate to and actively help manage the various sources of cost and risk involved in operating a competitive power agency.

As explained in the section below, the Coalition will adopt a structured approach to monitoring, analyzing and actively managing energy cost and risk — both to enable the design of cost-effective local programs, and provide additional benefits such as long-term financial stability.

Energy Risk Management & Financial Reserve Policies, Procedures and Practices

Hudson Community Power's ability to maintain competitive rates, as market prices and Eversource default rates change over time, is a primary goal for the program. Competitive rates will significantly reduce the risk that customers opt -out of Hudson Community Power and allow the program to achieve our medium- to long-term goals.

To that end, working with the other members of the Coalition, Hudson Community Power will adopt Energy Risk Management and Financial Reserve policies. The purpose of these policies is to:

- Ensure that Hudson Community Power allocates customer revenues in ways that balance our community's goals and objectives over the short-to-long term; and
- Define how the Coalition will conduct energy risk management, procurement and market operations on behalf of Hudson Community Power (so that the agency remains in compliance with our adopted policies).

Combined with the operational procedures and practices of the Coalition's business model, these policies are designed to ensure that Hudson Community Power and all participating members of the Coalition will be able to:

- Foresee, forecast and adequately plan for adverse contingencies (such as power supply shocks, economic downturns and changes in policy and regulations);
- Structure and manage a diversified portfolio (or "book") of physical and financial energy contracts in order to (1) hedge price risk in an optimal fashion by assessing the cost of entering into forward contracts against the risk of wholesale market price exposure, (2) transact quickly to take advantage of changing market conditions and (3) incorporate energy contracts from a variety of preferred sources (e.g., renewables and battery storage assets, local generators, customer-generators and demand response programs, etc.);
- Maintain competitive rates, and additionally set aside funds to accrue financial reserves, while also implementing local programs (designed in ways that lower portfolio costs and risk factors);
- Draw on financial reserves or credit support sufficient to maintain (1) rate stability for participating customers and (2) adequate cash flow for the Coalition's operations over the course of any adverse events and periods.

As Hudson Community Power accrues financial reserves, the Coalition will be able to facilitate additional ways to lower costs, create new value, and further enhance the financial stability of the program. As one example, the accrual of sufficient reserves will allow Hudson Community Power to begin self-providing the collateral required for wholesale power market transactions and power purchase agreements. This will lower the capital costs and risk premiums otherwise embedded into the price of power contracts negotiated by the Coalition. Similarly, the Coalition also intends to facilitate pooled power procurement across participating Community Power programs, and to explore opportunities to jointly satisfy collateral obligations within these arrangements.

Lastly, as explained further in the section below, the combination of the Coalition's approach to energy portfolio risk management and the accrual of sufficient financial reserves by participating members is what will enable Hudson Community Power to enter into long-term contracts — in order to construct new renewable and battery storage projects.

Development of Renewable and Battery Storage Projects

As Hudson Community Power and other participating Community Power programs demonstrate the ability to accrue reserves sufficient to ensure our collective financial stability — and maintain or grow our customer base by offering competitive rates and innovative services over time — the Coalition will be able to facilitate new project developments for Hudson Community Power and other Community Power programs that elect to jointly participate in long-term contracting solicitations. As context:

- Project developers and financiers require long-term power purchase agreements (typically 10 years or longer in duration) to justify the upfront cost of constructing renewables and battery storage facilities;
- Consequently, project financiers will not execute long-term contracts with a Community Power program if they do not believe that the program is likely to remain a stable, credit-worthy counterparty (i.e., unlikely to default on payment obligations over the contract term).

Achieving the ability to execute long-term contracts and build new renewables and battery storage projects is a priority for Hudson Community Power and the other Community Power programs joining together to create the Coalition. This objective is an important policy goal for our program and will additionally diversify the energy supply portfolio managed by the Coalition.

Portfolio diversification helps to stabilize operating margins by intelligently hedging Hudson Community Power's exposure to wholesale market dynamics and price fluctuations. The objective is to enter into contracts that help to manage risk and maximize revenues for the program from a total portfolio management perspective, in order to further strengthen our program's financial performance and stability over the long-term. As context:

- When bidding on joint project development solicitations, developers will submit different combinations of technologies, project locations, prices, term lengths and contractual clauses with operational and financial implications.
- Selecting which contracts to enter into — and effectively negotiating contract terms and prices — requires analyzing the different contracts being offered, individually and in combinations, and simulating the impact that the new contracts would have on Hudson Community Power's cashflow, total portfolio costs and risk profile over the length of the contract.
- This exercise, which is a key component of the Coalition's broader "portfolio strategy" analysis, is referred to as "contract valuation" or "deal valuation". These simulations will allow the Coalition to quantify the value of the contract (from a portfolio risk management perspective), compare the value against the price being offered by developers, negotiate for better terms and prices as necessary, and enter into contracts on behalf of Hudson Community Power that are likely to cost less than the value created at the program portfolio level.

As described in the preceding section "*Energy Risk Management & Financial Reserve Policies, Procedures and Practices*", the Coalition's business model has been designed to actively manage a diversified portfolio of energy contracts at launch — which entails:

- Understanding and analyzing energy cost and risk factors on a continuous basis;
- Conducting contract valuation simulations;

- Negotiating contract terms and prices with a variety of counterparties to construct a portfolio of energy contracts that, in aggregate, is designed to optimally hedge price risk; and
- Thereafter, actively and continuously managing the "book" of contracts in response to market dynamics, price movements and opportunities.

In these ways, the Coalition's business model provides the foundational capabilities required to support joint project development solicitations for Hudson Community Power and other participating programs — inclusive of long-term contract valuation simulations, counterparty negotiation, and active management of the contract and overall portfolio thereafter.

Hudson Community Power Objectives and Requirements

Hudson Community Power affords the town the capacity and flexibility to achieve our objectives pertaining to energy, economic development, and infrastructure.

Our objectives will need to be pursued through a combination of direct program activities and informed public advocacy at the Legislature and Public Utilities Commission. This will require enhanced coordination with other communities as well as advanced operational services, dedicated expertise, innovation and sustained initiative carried out over a period of multiple years.

Simultaneously, maintaining competitive rates compared to Eversource's default service rates — as market prices, energy technologies and policies change over time — will require nimble decision-making and the ability to evolve business operations in response to changing market conditions in order to actively manage risk, minimize costs and maximize the creation of customer value.

The structure of the Coalition — the combination of the joint powers agency's community governance model, competitive business model and coordinated approach to engaging in public advocacy — has been designed to enable and streamline these activities for Hudson Community Power at an advantageous, cost-effective economy-of-scale.

Participation in the Coalition is therefore expected to strengthen the capacity and financial performance of Hudson Community Power, such that the program is able to operate continuously as a self-supporting, competitive enterprise for the foreseeable future, and will therefore be able to work towards achieving the full scope of our objectives over the long-term.

Hudson Community Power Objectives

To achieve our goals, Hudson Community Power will be guided by the following objectives:

- **Competitive Rates:** provide residential default rates that are lower than or competitive with those offered by Eversource;
- **Expanded Choices and Enhanced Customer Focus:** offer optional products, such as supply options with higher and lower levels of renewable energy and time-varying rates that enable the intelligent use of customer energy technologies to reduce energy expenditures and carbon emissions on a voluntary basis;
- **Fiscal Stability & Financial Reserves:** maintain a reserve fund to ensure that the program remains able to offer competitive rates as market prices fluctuate over time;
- **Consumer Protections:** ensure that the contracts entered into on behalf of customers are fair and represent the interests of Hudson and its residents;
- **Public Advocacy:** represent the interests of Hudson and the program's customers at the Legislature, Public Utility Commission and other relevant agencies on matters pertaining to Community Power and towards creating a more modern electric grid;
- **Cleaner, Local Power:** prioritize the development of cost-effective projects to supply an affordable energy portfolio that prioritizes the use of in-state and local renewable energy;
- **Community Resilience:** support local contractor training and education programs to lower barriers to the installation of new clean energy technologies, and support projects such as back-

up power supplies, electric vehicle charging networks and community microgrids on critical facilities;

- **Regional Collaborations:** collaborate with municipalities, other Community Power programs and government agencies to jointly develop cost-effective local renewable generation and storage projects, electric vehicle transit fleets and charging corridors, and other clean energy infrastructure developments;

Through strategies and initiatives like these, enabled by the scope and scale of service provided through the Coalition, Hudson Community Power intends to:

- Reduce fossil fuel consumption overall while enhancing the reliability of our electricity grid;
- Create savings and new value for customers; and
- Attract and support local businesses.

These objectives are essential to our continued success as a vital, sustainable community.

Near-Term Operational Requirements

While many of the broader benefits Hudson Community Power intends to create for customers and the town will be developed over time, the program's immediate objective is to offer competitive default supply rates compared to Eversource while accruing a reserve fund sufficient to ensure long-term financial stability, and additionally offering voluntary products that retail customers may opt-up to receive as well as Net Energy Metering supply rates that allow customer generators to participate in the program.

Hudson Community Power will need to balance customer rate levels, renewable power content and the accrual of program reserves to meet these objectives.

Performance Relative to Utility Default Service and Net Energy Metering Generation Rates

Compensation to customer generators under Net Energy Metering generation rates, the timing of the program's rate setting decisions and, to a certain degree, the procurement of electricity will need to take into account Eversource's tariffs, processes and timing in regard to these activities.

Refer to ~~Attachment 3~~Attachment 3: New Hampshire's Renewable Portfolio Standard, ~~Attachment 4~~Attachment 4: Utility Default Procurement Cycles and Rate Setting, ~~Attachment 5~~ Attachment 5: Overview of Utility Net Energy Metering Tariffs and the section "~~Net Metering and Group Net Metering Policies~~Net Metering and Group Net Metering Policies" for additional documentation and discussion of these factors.

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Customer Rates and Products

The table below provides an illustrative example of a default service product and optional rates that could be offered to customers:

	Granite Basic (automatic enrollment)	**OPTIONAL PRODUCTS**		
		Granite Plus (opt-up +)	**Clean 50%** (opt-up +)	**Clean 100%** (opt-up +)
Attributes	Meets Renewable Portfolio Standard (23.4% for 2023)	~33% renewable Or Carbon Free	~50% Renewable Or Carbon Free	100% Renewable Or Carbon Free
Price	Must be below default utility rate at launch	Below default utility rate	Competitive with default utility rate	Possibly exceeds default utility rate[3]

The products that Hudson Community Power initially offers to customers, and the rates charged for each product, will be refined and finalized in advance of program launch. The price points shown are aspirational. However, ***Hudson Community Power will not launch unless the default service offering (e.g., Granite Basic) can beat the default utility rate.***

Renewable Portfolio Standard Requirements

New Hampshire's Renewable Portfolio Standard (RPS) requires all electricity suppliers to obtain RECs for four distinct "classes" of renewables, each distinguishing between different technologies and dependent upon the year that the generators came online.

For 2023, Eversource is required to include 23.4% renewable energy in their energy supply. This minimum compliance requirement will increase incrementally to 25.2% by 2025 and remain fixed thereafter, absent an increase in the RPS.

Hudson Community Power will seek to procure voluntary renewables in excess of the RPS minimum requirements[4] from "Class I" resources (as defined in ~~Attachment 3~~Attachment 3: New Hampshire's Renewable Portfolio Standard). Additionally, the program could prioritize including as

3 Example of 100% renewable energy product that is less expensive than utility default: Cambridge's 100% Renewable Energy Option Now More Affordable than Eversource Basic Service, July 12, 2022. *It should also be noted that all CPCNH products for the launch of the initial wave of municipalities in the Spring of 2023 had rates that were less expensive than the utility default.*

4 The RPS requirements as defined by the PUC can be found at: https://www.puc.nh.gov/Sustainable Energy/Renewable_Portfolio_Standard_Program.htm

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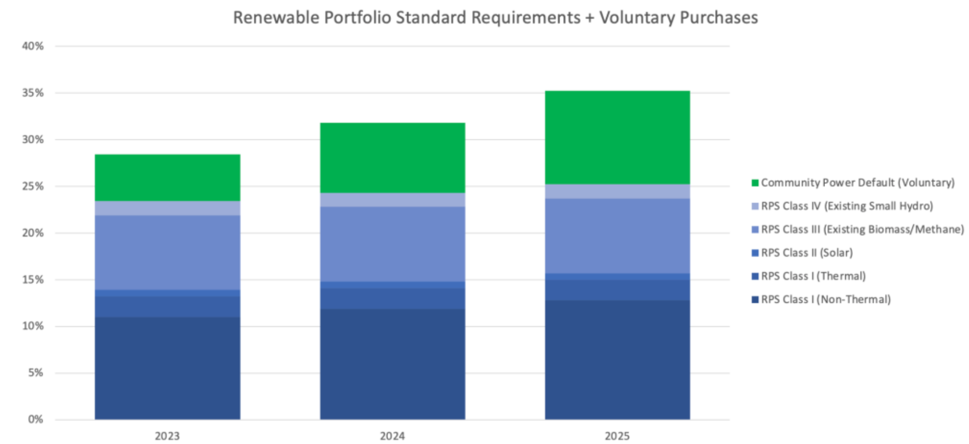
The chart below shows in shades of blue the different classes and quantities of renewable power required under the RPS between 2023 and 2025, along with, for the sake of illustration and in green, Hudson Community Power's additional voluntary purchases (assuming the default product from the table in the proceeding section and exceeding the RPS requirements by an increase of 2% each year):



Energy Risk Management and Financial Reserve Policies Compliance

Hudson Community Power's power procurement, budgeting and rate-setting will be carried out in accordance with the Energy Risk Management and Financial Reserve policies that will be adopted by the Board of Selectmen. If Hudson Community Power elects to partner with the Coalition for the provision of services, these policies will be developed by the Coalition for review and approval by the Hudson Board of Selectmen.

This decision-making framework is intended to guide the program to allocate revenues in a manner that appropriately balances our competing priorities — to ensure that Hudson Community Power will remain stable, and able to work towards achieving all of our policy goals, over the long-term.

ELECTRIC AGGREGATION PLAN STATUTORY REQUIREMENTS

The following requirements for this Electric Aggregation Plan, in compliance with RSA 53-E:6, are addressed below:

A. Organizational structure of the program;
B. Methods of entering into and terminating agreements;
C. Operation and funding;
D. Rate setting, costs, and customer enrollment process;
E. Rights and responsibilities of program participants;
F. Net metering and group net metering policies;
G. Ensuring discounts for Electric Assistance Program participants; and,
H. Termination of program.

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Organizational Structure of the Program

Upon approval of this plan, Hudson Community Power will be authorized to provide electricity and other related services to participating residents, businesses, and other customers in the town.

The Board of Selectmen will oversee the program and has overall governance authority. Decisions regarding Hudson Community Power, such as amending and modifying program goals or this Electric Aggregation Plan (in accordance with RSA 53-E:7, IX), adoption of Energy Portfolio Risk Management, Retail Rates and Financial Reserve policies (to govern the program's power procurement and rate-setting decisions), will be made at duly noticed public meetings.

The Board of Selectmen has appointed a primary and alternate representative to participate in the Community Power Coalition of New Hampshire and to serve on the agency's initial Board of Directors and may delegate certain decision-making authorities to them to carry out their responsibilities at the Board of Selectmen's direction.

In general, Hudson's representatives will be expected to help oversee the start-up and operation of the agency, provide input regarding the Coalition's public advocacy on matters of policy and regulation, provide direction to the Coalition's vendors and/or staff as the agency's operations and customer services evolve over time, and report back regularly regarding the performance of Hudson Community Power and on any matter that warrants attention or requires action by the Board of Selectmen.

Additionally, the Electric Aggregation Committee may continue to hold meetings for the purpose of (1) providing community input and advisory support regarding the program and (2) facilitating public education and engagement in our community.

Methods of Entering Into and Terminating Agreements

This Electric Aggregation Plan authorizes the Board of Selectmen to negotiate, enter into, modify, enforce, and terminate agreements as necessary for the implementation and operation of Hudson Community Power.

Operation and Funding

Hudson Community Power will contract with qualified vendors and credit-worthy suppliers to provide the services, credit support and electricity required to launch and operate the program.

This plan assumes, but does not require, Hudson to participate fully in the Coalition and thereby contract for operational services jointly with other participating Community Power programs.

The Coalition's third-party contractors will be expected to fund the upfront cost of implementing Hudson Community Power, the expense of which will be amortized and recovered in the program's rates and charges to participating customers. The program may also seek opportunities to apply for grant funding, either independently or through the Coalition.

Services provided by third-party entities required to launch and operate the program may include portfolio risk management advisory services, wholesale Load Serving Entity (LSE) services, financial services, electronic data interchange (EDI) services with the utility, and customer notification, data management, billing, and relationship management (e.g., call center, website, etc.) services. Additional information on how Hudson Community Power will implement Load Serving Entity (LSE) services is found in ~~Attachment 9~~Attachment 9: How Load Serving Entity Services will be Implemented~~Attachment 9: How Load Serving Entity Services will be Implemented, *How Load Serving Entity Services will be Implemented*~~.

Additional support services such as management and planning, budgeting and rate setting, local project development support, regulatory compliance, and legislative and regulatory engagement services (on matters that could impact the program and participating customers) will be addressed through a combination of Coalition staff support and third-party services.

Hudson Community Power will provide "all-requirements" electricity supply for its customers, inclusive of all of the electrical energy, capacity, reserves, ancillary services, transmission services, transmission and distribution losses, congestion management, and other such services or products necessary to provide firm power supply to participants and meet the requirements of New Hampshire's Renewable Portfolio Standard. (Refer to ~~Attachment 3~~ Attachment 3: New Hampshire's Renewable Portfolio Standard for details regarding the requirements of Renewable Portfolio Standard statute, RSA 362-F.)

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If a single supplier is relied upon to provide all-requirements electricity on behalf of Hudson Community Power, then (1) the supply contract will be executed or guaranteed by entities that possess at least a BBB- or equivalent investment-grade rating issued by a nationally recognized statistical rating organization (NRSRO), and (2) the supplier will be required to use proper standards of management and operations, maintain sufficient insurance, and meet appropriate performance requirements for the duration of the supply contract. Alternatively, if a portfolio of contracts with multiple entities is structured to diversify counterparty credit risk exposure, and actively managed to provide for all-requirements electricity on behalf of Hudson Community Power, then counterparty credit requirements and monitoring, hedging transaction authorities, residual ISO-NE market exposure limits, and reporting requirements will be carried out in accordance with Energy Portfolio Risk Management, Rates, and Financial Reserves policies that would be established prior to commencing procurement and implementing the program.

Additionally, RSA 53-E provides Community Power programs with authorities pertaining to meter ownership, meter reading, billing, and other related services. These authorities provide Hudson

Community Power with the practical ability to help customers adopt and use innovative technologies (for example, building management systems, smart thermostats, backup battery storage systems, controllable electric vehicle chargers, etc.) in ways that save money, enhance grid resiliency and decarbonize our power supply.

However, the implementation of these authorities is expected to take some time, as it requires action by the Public Utilities Commission to adopt enabling rules and coordination with Eversource to adapt existing meter and billing system processes. ***As a result, the capabilities and technologies mentioned in the previous paragraph will not be part of the initial focus of Hudson Community Power.***

Rate Setting, Costs, Enrollment Process, and Options

Customers who choose not to participate in Hudson Community Power shall not be responsible for any costs associated with the program, apart from incidental costs incurred by the town prior to the point at which the program starts producing revenue from participating customers (for example, contract review by an attorney, but not any operational or capitalized costs of the program).

Rate Setting and Costs

Hudson Community Power will only launch if it is able to offer residential default rates that are initially lower than or competitive with those offered by Eversource; thereafter, the program will strive to maintain competitive rates for all default service customers, as well as customers who opt-in or opt-up to receive optional retail products, while working to achieve the program's objectives (as set forth in this Electric Aggregation Plan and modified from time to time at the direction of the Board of Selectmen).

The Board of Selectmen will adopt Energy Risk Management and Financial Reserve policies to govern the program's power procurement and rate-setting decisions. Rates will be set at a level such that revenues from participating customers are projected to meet or exceed the ongoing operating and capital costs of the program.

To ensure the financial stability of Hudson Community Power, a portion of revenues will be deposited in a financial reserve account. In general, the fund will be restricted for uses such as:

- **In the near-term**, maintain competitive customer rates in the context of price fluctuations in the electricity market and other factors;
- **In the medium-term**, as collateral for power purchase agreements (including for the development of new renewable and battery storage projects), and for additional credit enhancements and purposes that lower the program's cost of service; and
- **Over the long-term**, may also be used to directly fund other program financial requirements, or to augment the financing for development of new projects and programs in the later years of the program, subject to the Board of Selectmen's approval.

As required by law, the program will ensure the equitable treatment of all classes of customers, subject to any differences arising from varying opportunities, tariffs, and arrangements between different electric distribution utilities in their respective franchise territories.

In other words, customers will be treated the same based on their circumstances. For example, any customers that opt-in after being offered the opportunity to participate during the initial enrollment period may be offered rates that reflect how market prices have changed in the intervening period.

Changes to the program's default service rates shall be set and publicly noticed at least 30 days in advance of any rate change. In the event that Hudson Community Power elects to partner with the Coalition for the provision of service, the Coalition will coordinate with Hudson's Board of Selectmen and Electric Aggregation Committee in such notices.

Enrollment Process and Options

Hudson Community Power intends to launch on an opt-out basis, providing an alternative default service to the utility provided default service rate. After approval of this Electric Aggregation Plan and before the launch of Hudson Community Power, all customers in the town will be sent notifications regarding the program and offered the opportunity to participate:

- **Customers currently on default service provided by Eversource** will be sent "opt-out" notifications — describing the program, its implications for the town, the rights and responsibilities of customers, and program rates and charges — with instructions on how to decline participation, and thereafter be transferred to Hudson Community Power if they do not opt-out of the program prior to launch.
- **Customers already served by Competitive Electric Power Suppliers** will receive "opt-in" notifications describing the program and may request to opt-in to the program.

If the electric distribution utilities have not fully implemented Public Utilities Commission rules and procedures governing Community Power Aggregation service, certain groups of customers on default service provided by the utilities may need to be offered service on an opt-in basis, and/or offered service on an opt-out basis at a future date. For example, if the utilities are unable to reliably provide the data on customer-generators necessary to offer Net Energy Metering (NEM) rates and terms, then the program may initially choose to not enroll customer-generators on an opt-out basis, as doing so could risk negatively impacting NEM customer billing and crediting procedures.

For details on how net metering customers can participate in Hudson Community Power, see ~~Attachment 5~~ Attachment 5: Overview of Utility Net Energy Metering Tariffs and ~~Attachment 6~~Attachment 6: Hudson Community Power Net Metering, Group Net Metering and Low-Moderate Income Solar Project Opportunities.

Customers will be notified through a mailing, which will be posted not less than 30 days prior to the enrollment of any customers. All information will be repeated and posted at the town's Community Power website. A public information meeting will be held within 15 days of the notification to answer program questions or provide clarification.

Optional products, such as increased renewable power content in excess of the Renewable Portfolio Standard (RPS) content of the program's default product and other energy services, may be offered on an opt-in basis.

After launch and in accordance with any applicable rules and procedures established by the Public Utilities Commission, new customers will be provided with the default service rates of Eversource and Hudson Community Power and will be transferred onto Hudson Community Power's default service unless they choose to be served by Eversource or a Competitive Electric Power Supplier.

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Customers that request to opt-in to the program may do so subject to the terms of Hudson Community Power.

Residents, businesses, and other electricity customers may opt-out of participating in Hudson Community Power default service at any time, by submitting adequate notice in advance of the next regular meter reading by Eversource (in the same manner as if they were on utility provided default service or as approved by the Public Utilities Commission).

Customers that have opted-in to an optional product offered by Hudson Community Power may switch back to ~~the~~ Eversource or ~~to~~ take service from a Competitive Electric Power Supplier subject to any terms and conditions of the optional product.

Rights and Responsibilities of Program Participants

All participants will have available to them the customer protection provisions of the law and regulations of New Hampshire, including the right to question billing and service quality practices.

Customers will be able to ask questions of and register complaints with the town, Eversource and the Public Utilities Commission.

Hudson Community Power shall maintain the confidentiality of individual customer data in compliance with its obligations as a service provider under RSA 363:38 (privacy policies for individual customer data; duties and responsibilities of service providers) and other applicable statutes and Public Utilities Commission rules. Individual customer data includes information that singly or in combination can identify that specific customer including the individual customers' name, service address, billing address, telephone number, account number, payment information, and electricity consumption. Such individual customer data will not be subject to public disclosure under RSA 91-A (access to governmental records and meetings). Suppliers and vendors for Hudson Community Power will be contractually required to maintain the confidentiality of individual customer data pursuant to RSA 363:38, V(b). ~~Attachment 10, *Customer Data Protection Plan*~~Attachment 10: Customer Data Protection Plan~~Attachment 10: Customer Data Protection Plan~~, details the reasonable security procedures and practices that the Town and Hudson Community Power will employ to protect individual customer data from unauthorized access, use, destruction, modification, or disclosure.

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Aggregate or anonymized data that does not compromise confidentiality of individual customers may be released at the discretion of Hudson Community Power and as required by law or regulation.

Participants will continue to be responsible for paying their bills. Failure to do so may result in a customer being transferred from Hudson Community Power back to Eversource (the regulated distribution utility and provider of last resort) for default energy service, payment collections and utility shut offs under procedures subject to oversight by the Public Utilities Commission.

Net Metering and Group Net Metering Policies

Under the net metering process, customers who install renewable generation or qualifying combined heat and power systems up to 1,000 kilowatts in size are eligible to receive credit or compensation for any electricity generated onsite in excess of their onsite usage.

Any surplus generation produced by these systems flows back into the distribution grid and offsets the electricity that would otherwise have to be purchased from the regional wholesale market to serve other customers.

Currently, customer-generators are charged their full retail rate for electricity supplied by Eversource and receive credits for electricity they export to the grid based on Eversource's Net Energy Metering (NEM) tariffs.

Hudson Community Power intends to provide new rates and terms that compensate participating customer-generators for the electricity supply component of their net metered surplus generation.

Customer-generators will continue to receive any non-supply related components (e.g., transmission and distribution credits) directly from Eversource, as specified under the terms of their applicable net energy metering tariff.

For group net metering where the host customer-generator is on default service, to the extent Hudson Community Power's supply rates are lower than Eversource's default service rate or if the host is located outside of Hudson, it may be most advantageous for the host to remain an Eversource default service customer, while the other group members are free to switch to Hudson Community Power for their supply and continue to receive on-bill credits for their participation in the group.

Hudson Community Power's exact terms, conditions, and rates for compensating and crediting different types of NEM customer generators in the town will be set at duly noticed public meetings and fully disclosed to all prospective NEM customers through the program's enrollment notification process and thereafter.

Certain aspects of administering net energy metering require coordination between Eversource and Hudson Community Power. The enabling services and strategies that Hudson Community Power may pursue, in order to benefit and encourage customers to adopt distributed generation, include but are not limited to:

- Dual-billing customer-generators separately for supply services;
- Offering time-varying rates and alternative credit mechanisms to compensate customers for surplus generation;
- Streamlining the establishment of new Group Net Metering and Low-Moderate Income Solar Project groups;
- Facilitating interval meter and Renewable Energy Certificate (REC) meter installations for customer-generators; and
- Engaging at the Legislature and Public Utilities Commission to advocate for upgrades and reforms to metering and billing infrastructure and business processes to enable Net Energy Metering and other innovative services to benefit customer-generators.

For additional details regarding these enabling services and strategies, refer to:

- ~~Attachment 5~~ Attachment 5: Overview of Utility Net Energy Metering Tariffs provides an overview of Eversource's net energy metering tariffs in use today, including the "standard" and "alternative" tariffs for individual customer-generators as well as Group Net Metering and Low-Moderate Income Solar Project options, and tables showing the number of customer-generators on net metered service in each utility territory;

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- ~~Attachment 6~~ Attachment 6: Hudson Community Power Net Metering, Group Net Metering and Low-Moderate Income Solar Project Opportunities provides an in-depth discussion regarding operational and strategic opportunities to enhance net metering and group net metering through Hudson Community Power.

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Ensuring Discounts for Electric Assistance Program Participants

Income eligible households can qualify for discounts on their electric bills under the Electric Assistance Program. Hudson Community Power will support income eligible customers who enroll in the Electric Assistance Program to receive their discount.

Electric Assistance Program discounts are funded by all ratepayers as part of the System Benefits Charge, which is charged to all customers and collected by the distribution utilities.

At present, the Public Utilities Commission and utilities only support provision of the discount to individual customers when the customer's electricity supply charges are billed through the distribution utility.

Hudson Community Power consequently plans to rely on Eversource to bill all customer accounts enrolled in the Electric Assistance Program, which may include Eversource bills with a line-item for Hudson Community Power provision of energy supply. This represents no change in the provision or funding of this program.

This arrangement may be revisited if, at some point in future, the Public Utilities Commission enables Community Power programs to provide Electric Assistance Program customers with their discount directly.

Termination of the Program

There is no planned termination date for Hudson Community Power.

Hudson Community Power may be terminated by majority approval of the voters at a Town meeting. If so terminated, Hudson Community Power would cease operations after satisfying any obligations contractually entered into prior to termination, and after meeting any advance notification period or other applicable requirements in statute or regulation, at which point participating customers would either be transferred to default service provided by Eversource or to a Competitive Electric Power Supplier of their choosing.

Hudson Community Power will provide as much advance notice as possible regarding the potential or planned termination of the program to participating customers, the Coalition, the Public Utilities Commission and Eversource.

Upon termination, the balance of any funds accrued in the program's financial reserve fund and other accounts, if any, would be available for distribution or application as directed by the Board of Selectmen and in accordance with any applicable law and regulation.

Attachments

Attachment 1: Legislative Background and Local Control Authorities

In 1996, New Hampshire led the nation in being the first state to pass an Electric Utility Restructuring Act (RSA 374-F), the purpose of which is excerpted in full below:

I. *The most compelling reason to restructure the New Hampshire electric utility industry is to reduce costs for all consumers of electricity by harnessing the power of competitive markets. The overall public policy goal of restructuring is to develop a more efficient industry structure and regulatory framework that results in a more productive economy by reducing costs to consumers while maintaining safe and reliable electric service with minimum adverse impacts on the environment. Increased customer choice and the development of competitive markets for wholesale and retail electricity services are key elements in a restructured industry that will require unbundling of prices and services and at least functional separation of centralized generation services from transmission and distribution services.*

II. *A transition to competitive markets for electricity is consistent with the directives of part II, article 83 of the New Hampshire constitution which reads in part: "Free and fair competition in the trades and industries is an inherent and essential right of the people and should be protected against all monopolies and conspiracies which tend to hinder or destroy it." Competitive markets should provide electricity suppliers with incentives to operate efficiently and cleanly, open markets for new and improved technologies, provide electricity buyers and sellers with appropriate price signals, and improve public confidence in the electric utility industry.*

III. *The following interdependent policy principles are intended to guide the New Hampshire public utilities commission in implementing a statewide electric utility industry restructuring plan, in establishing interim stranded cost recovery charges, in approving each utility's compliance filing, in streamlining administrative processes to make regulation more efficient, and in regulating a restructured electric utility industry. In addition, these interdependent principles are intended to guide the New Hampshire general court and the department of environmental services and other state agencies in promoting and regulating a restructured electric utility industry.*

Prior to this point, state regulators set retail customer rates to allow electric utilities to recover profits and prudently earned costs for "vertically integrated" monopoly service — spanning wholesale electricity generation, transmission, local distribution and retail customer services (metering, billing, collections, call center operations and so on).

Restructuring sought to increase competition and technological innovation in the markets for wholesale electricity supply and retail customer services, by requiring electric utilities to divest of their generation portfolios, creating a Federally regulated regional electricity market or "Independent System Operator" (ISO New England is the market operator for New England), and allowing Competitive Electric Power Suppliers (CEPs) to offer electricity supply rates and other services to retail customers.

Customers that did not choose a competitive supplier were left on "default service" provided by the electric utilities — afterwards referred to as "electric distribution companies" — which continue to be regulated by the Public Utilities Commission. The distribution utilities periodically hold auctions for competitive suppliers to bid against one another for the right to supply electricity to default service customers in large groups to competitive suppliers. (Refer to ~~Attachment 4~~ Attachment 4: Utility Default Procurement Cycles and Rate Setting for additional details on this process.)

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Status of the Competitive Market

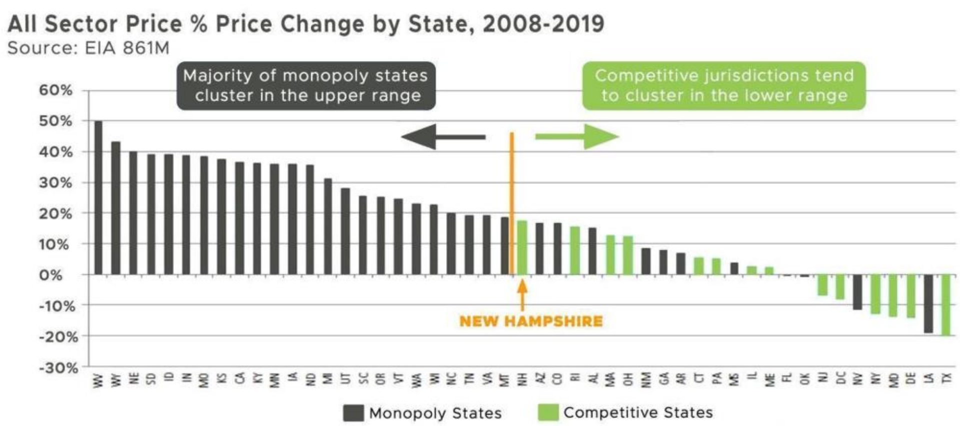
Nearly a quarter century has passed, and New Hampshire's competitive market has seen little growth since 2013. Four out of five customers remain on default service provided by the distribution utilities, and the customers that are on competitive supply only account for about half of total electricity usage.

Regulated distribution utilities continue to provide services that are not natural monopolies, and could therefore be available by competitive means, such as: default electricity supply, metering, meter data management, billing and other retail customer services (such as demand response and energy storage for smaller customers).

The continued reliance on utilities to provide these customer-facing services has necessitated state regulation over many aspects of the retail customer market. Utility regulation relies on administrative regulatory proceedings, which are necessarily more slow-moving and unable to respond to changing customer technologies and wholesale market dynamics (such as the increased price volatility caused by higher levels of renewable generation) compared to the nimbler, market-based framework envisioned under the Electric Utility Restructuring Act.

Residential customers, in particular, are not offered many rate options or clean technology innovations today: out of the 29 competitive suppliers currently offering service in New Hampshire, only nine offer service to residential customers (and only four serve customers in every distribution utility territory).

As a consequence, New Hampshire has fallen behind every other state with a restructured electricity market in terms of price competition:



Credit: *Retail Energy Supply Association, 2020.*

The Community Power Act

In order to support the growth of competitive market services in alignment with The Electric Utility Restructuring Act, RSA 53-E (as modified by Senate Bill 286 and House Bill 315) authorizes towns, cities and counties to launch Community Power programs that replace distribution utilities as default suppliers of electricity to retail customers. The purpose of RSA 53-E is excerpted below:

> *"The general court finds it to be in the public interest to allow municipalities and counties to aggregate retail electric customers, as necessary, to provide such customers access to competitive markets for supplies of electricity and related energy services. The general court finds that aggregation may provide small customers with similar opportunities to those available to larger customers in obtaining lower electric costs, reliable service, and secure energy supplies. The purpose of aggregation shall be to encourage voluntary, cost effective and innovative solutions to local needs with careful consideration of local conditions and opportunities."*

To achieve this purpose, RSA 53-E:3 allows Community Power programs to enter into agreements and provide for:

> *"the supply of electric power and capacity; demand side management; conservation; meter reading with commission approval for meters owned or controlled by the electric distribution utilities or used for load settlement; customer service for aggregation provided services; other related services; and the operation of energy efficiency and clean energy districts adopted by a municipality pursuant to RSA 53-F and as approved by the municipality's governing body."*

RSA 53-E further provides Community Power programs with authorities and regulatory pathways to offer more advanced meters for customers, and to provide for alternative customer billing options. Both metering and billing services are important means by which Community Power programs will be able to better engage customers and offer more innovative services that lower the energy expenditures and carbon emissions for individual customers and communities.

To enable all municipalities to work together to achieve this purpose, RSA 53-E:3 provides that "*such agreements may be entered into and such services may be provided by a single municipality or county, or by a group of such entities operating jointly pursuant to RSA 53-A."*

To ensure that utilities are fairly compensated for their continuing role in owning and operating the distribution grid, RSA 53-E:4(III) stipulates that:

> *"Transmission and distribution services shall remain with the transmission and distribution utilities and who shall be paid for such services according to rate schedules approved by the applicable regulatory authority, which may include optional time varying rates for transmission and distribution services that may be offered by distribution utilities on a pilot or regular basis."*

The law further provides that Community Power programs "*shall not be required to own any utility property or equipment to provide electric power and energy services to its customers*."

Enabling locally controlled Community Power programs, in order to exercise local control over these authorities and bring in third-party competitors to provide more innovative services on a community-wide scale, represents a viable and stable pathway to animate competitive retail markets across New Hampshire — and thus realize a lower-cost, more innovative and sustainable future for both our community and all Granite Staters.

Hudson is committed to using its local control authorities granted under RSA 53-E to accelerate innovation, customer and community choice in electricity supply, the creation of new economic value, and a sustainable and resilient future for our town and customers.

Attachment 2: The Community Power Coalition of New Hampshire

Hudson is a member of the Community Power Coalition of New Hampshire ("CPCNH" or "the Coalition"), a nonprofit joint powers agency authorized under RSA 53-A and governed by participating communities under the terms of the Joint Powers Agreement.

The Coalition was incorporated as a governmental instrumentality and non-profit on October 1st, 2021, to provide for the launch and operation of Community Power Aggregation (CPA) programs on behalf of our Members throughout the state. CPCNH intends to launch power supply services in April to May 2023.

CPCNH will be funded through customer revenues, with no taxpayer subsidies. By law, each member's CPA program is funded through program revenues; CPCNH's budget is completely separate from the general funds of participating local governments. CPCNH's participating local governments will share the administrative and general costs of CPCNH on a pro-rata basis, and to elect to share costs, on an individual basis, for operational services, pooled power purchases, and energy project development contracts.

CPCNH also engages at the Legislature and Public Utilities Commission on behalf of its members on matters related to energy and Community Power.

CPCNH will benefit Member communities by providing for the supply of cleaner and more locally produced electricity, innovative retail distributed energy and demand flexibility programs, policy engagement and public advocacy, competitive rates for residents, businesses, and municipal facility customers, and economic investment through the development of local programs, projects, and energy infrastructure.

Most, if not all, members anticipate relying on CPCNH as an energy services provider, for the provision of all-requirements electricity and retail customer services on behalf of their CPA programs, which will operate across all four distribution company service territories in the state: Eversource, Unitil, Liberty Utilities and the New Hampshire Electric Co-Op.

Governance Structure

CPCNH is governed in accordance with our Joint Powers Agreement, and overseen by a Board of Directors composed of the representatives appointed by participating local governments. CPCNH's Board and committee meetings are subject to New Hampshire's Right to Know Law and open to the public.

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~~Going forward, t~~The Board ~~will be~~is elected by vote at the Annual Meeting of the Members, which is held every April, and will be composed of between eleven and twenty-one Directors elected from amongst the member representatives.

~~At present, t~~The current Board of Directors is shown below along with the officers.~~currently composed of representatives (elected officials, municipal staff and volunteers serving on local energy committees) appointed by each of our local government Members to serve as either a Director or Alternate Director (each member has only one vote)~~:~~:~~

CPCNH Board of Directors

Member	Officer	Director
City of Lebanon	Chair	Clifton Below
-City of Portsmouth	Vice Chair	Kevin Charette
Town of Enfield	Treasurer	Kimberly Quirk
Town of Plainfield	Secretary	Evan Oxenham
Town of Randolph		Kathleen Kelley
Town of Warner		Clyde Carson
Town of Harrisville		Andrea Hodson
Town of Rye		Lisa Sweet
Town of Pembroke		Matthew Miller
Town of Peterborough		Bruce Tucker
City of Nashua		Doria Brown
Cheshire County		Terry Clark
~~City of Nashua~~		~~Doria Brown~~
Town of Walpole		Paul Looney
Town of Newmarket		Joe Lamattina
City of Dover		Jackson Kaspari
Town of Hanover		April Salas
Town of New London		Jamie Hess
Town of Exeter		Nick Devonshire
Town of Webster		David Hemenway
Town of Durham		Steve Holmgren
~~City of Dover~~		~~Christopher Parker~~
~~Town of Brentwood~~		~~Rick Labrecque~~
~~Town of Canterbury~~		~~Kent Russwick~~
~~Town of Durham~~	-	~~Mandy Merrill~~
~~Town of Exeter~~	-	~~Nick Devonshire~~
~~Town of Hancock~~		~~Jim Callihan~~
~~Town of Hanover~~	-	~~April Salas~~
~~Town of Harrisville~~	-	~~Andrea Hodson~~
~~Town of Hudson~~	-	~~Craig Putnam~~
~~Town of New London~~	-	~~Jamie Hess~~
~~Town of Newmarket~~	-	~~Toni Weinstein~~
~~Town of Pembroke~~	-	~~Matthew Miller~~
~~Town of Peterborough~~	-	~~Steve Walker~~
~~Town of Rye~~	-	~~Lisa Sweet~~
~~Town of Shelburne~~		~~Michael Prange~~
~~Town of Sugar Hill~~		~~Jordan Applewhite~~
~~Town of Walpole~~	-	~~Paul Looney~~
~~Town of Warner~~	-	~~Clyde Carson~~
~~Town of Webster~~	-	~~Martin Bender~~
~~Town of Westmoreland~~		~~Mark Terry~~

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Member	Officer	Director
~~Town of Wilmot~~		~~William Chasson~~

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CPCNH also conducts its business through the committees, each of which is composed of Member representatives drawn from across the state:

1. **Executive Committee**: bi-weekly and as-needed meetings of CPCNH's Chair, immediate past-chair, Vice Chair, Treasurer, and Secretary. Authorized to act on behalf of the Board, on most matters, in instances where decisions may not wait until the next meeting of the Board.
2. **Finance Committee**: bi-weekly and as-needed meetings of 3 members. Responsible for advising the Treasurer and the Board as to the investments, budget, and general fiscal policy of CPCNH.
3. **Member Outreach~~perations~~ & Engagement Committee**: monthly and as-needed meetings of 8 members representing Dover, Durham, Hanover, Pembroke, Rye and Walpole, with additional advisors based in Peterborough and Hanover. Responsible for (1) assisting Members' Electric Aggregation Committees through the Electric Aggregation Plan drafting and local approval process, and (2) recruiting new CPCNH Members by engaging with interested communities.
4. **Risk Management Committee**: monthly and as-needed meetings of 8 members. Responsible for overseeing CPCNH's competitive solicitation for services and credit support, for overseeing energy portfolio risk management procurement decisions, and for understanding and advising upon enterprise risk factors and mitigating strategies more broadly.
5. **Regulatory and Legislative Affairs Committee**: as-needed meetings of 4 members. Responsible for monitoring and advising CPCNH and its Members regarding regulatory and legislative engagement, and for appointing representatives of the Corporation to serve on statutory commissions, study commissions, and other boards and commissions created by the state legislature.

6. **CEO and Staff Search Committee**: as-needed meetings of 4 members. Responsible for developing a solicitation and hiring process for Board review and approval in preparation for hiring a CEO and key staff.

~~6.~~7. **Audit**: Responsible for overseeing the quality and integrity of the Corporation's accounting, auditing and reporting practices, shall cause an independent financial report of the accounts and records of the Corporation to be made by a certified public accountant each fiscal year, which shall be provided to Directors and to Members.

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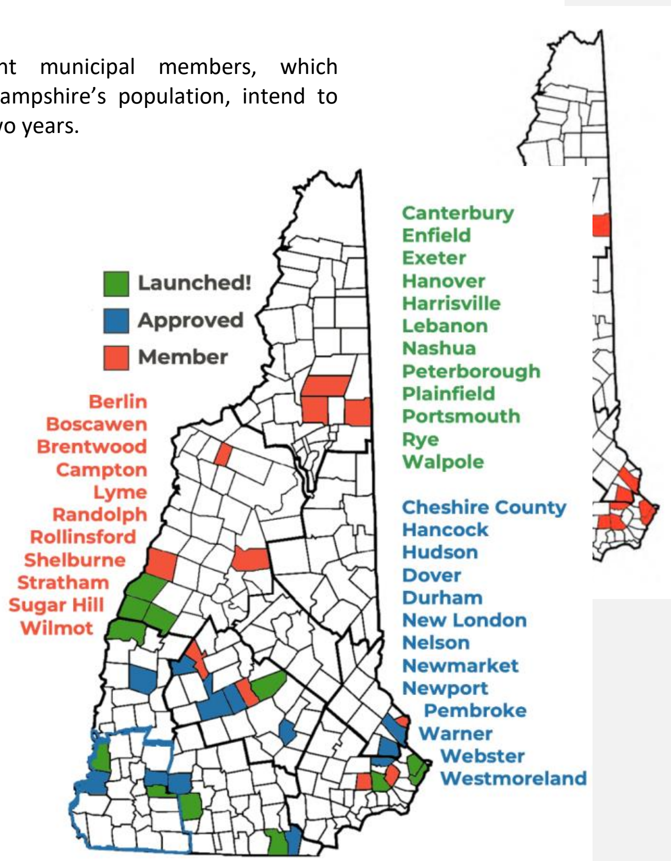
~~7.~~8. ~~Additionally, prior to the launch of CPA programs, the Board will create an **Audit Committee** and~~ **Governance**: ~~**Committee**, as required standing committees per our Joint Powers Agreement.~~ Responsible for assisting the Members in recruitment of Board Directors; determine eligibility of nominees for consideration of Directorship; monitor the effective functioning of the Board and committees; conduct regular Board orientations and evaluations; periodically review and recommend amendments to this Agreement; and advise the Board and Members, through the Annual Meeting, on governance issues.

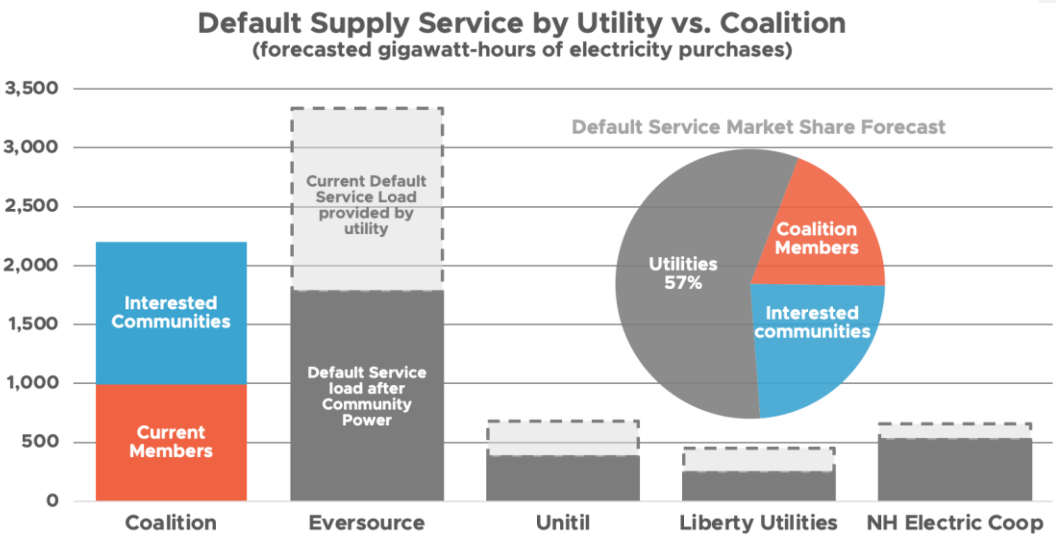
Member Service Territory

CPCNH's ~~twenty-seven~~thirty-five current municipal members, which represent approximately 21% of New Hampshire's population, intend to launch CPA programs in the next one to two years.



- The first wave of CPA programs ~~is slated to launch between~~have launched in April and May of 2023, with service expansion to ~~all current~~additional member territories thereafter (likely Q2 2024).
- At this point, CPCNH may serve ~110,000 customer accounts, provide ~900,000 MWh of electricity, and produce revenues of up to ~$365 million per year (assuming full Member participation and retail pricing based on default utility rates in the current year).
- Over 30 additional local governments have expressed interest in joining CPCNH, which would increase representation to ~50% of New Hampshire's population.
- CPCNH subsequently expects relatively robust member recruitment, and the launch of dozens of new CPA programs in the next two to three years.

Consequently, as shown in the graph on the next page, CPCNH is positioned to become the largest default supplier of electricity in New Hampshire:



Organizational Capacity

The Coalition's Board, committees, and executive team bring a great breadth and depth of experience to the organization with professional backgrounds that support CPCNH's mission.

CPCNH is also supported by outside General Counsel (Michael Postar of DWGP, P.C. with NH advice from Eli Emerson of Primer Piper, P.C.) and two professional consultants (Henry Herndon, of Herndon Enterprises, for member services, and Samuel Golding of Community Choice Partners, for technical advice and support).

Most recently, CPCNH has concluded a competitive solicitation for services and credit support and has executed contracts for $750,000 in startup funding, $9.5 million in credit support, and ~$8 million to ~$9 million in professional services to operate the power agency and expand CPCNH's membership over the next three years:

1. Ascend Analytics: energy portfolio risk management and procurement services, credit support (three lines of credit providing $6 million for LSE and wholesale requirements, $2.5 million for Ascend's invoices, and $1 million for non-Ascend third-party invoices), and overall implementation management and oversight (CPCNH's critical path analysis is online here; refer to pp. 37-54).
2. Calpine Energy Solutions, for $750,000 in startup funding and retail customer services: for Load Serving Entity (LSE) services, utility electronic data interchange (EDI), retail data management, and call center operations.
3. River City Bank, for secure revenue "lockbox" account administration and various commercial banking services.

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4. Clean Energy New Hampshire for member and community relations, media strategy and engagement, and related administrative services.

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CPCNH's committee award reports and winning response materials are online here.

CPCNH is in the process of contracting for accounting services, to implement an accounting system and controls for CPCNH.

Staffing Strategy

CPCNH contracted with True Search for Executive Search Services to support hiring a CEO. The search was successful, and Brian Callnan was ~~and aims to~~ hired as CEO on~~in the first quarter of~~ May 22, 2023. The Board will support the CEO in filling key functional roles with highly qualified staff in managerial positions to provide oversight and initiative that guide~~'~~s the evolution of the agency.

~~CPCNH anticipates that t~~The CEO will recommend prioritizing staff capacity in the follow areas of expertise:

- Financial Management: Treasury support, budgeting, cash flow analysis, rate setting, financial controls and compliance, and reserve management.
- Retail Services: retail customer products and services, key account management and retention, and local programs.
- Energy Portfolio Management: contract valuation, procurement, power purchase agreements, portfolio strategy, and energy risk management analytics and reporting.
- Information Technology: enterprise data management and analytics.
- Regulatory and Legislative Affairs: engagement with the Legislature, NH Department of Energy, Office of the Public Advocate, Public Utility Commission, distribution utilities, and other stakeholders on energy policy and market issues impacting CPAs.

Regulatory and Legislative Engagement

CPCNH carries out public information campaigns and routinely engages at the Legislature and Public Utilities Commission, often alongside the NH Office of Consumer Advocate, to advance consumer interests and protect and expand the authorities of our Members. Board Chair Clifton Below, Assistant Mayor of the City of Lebanon, often leads the agency's regulatory and legislative engagement activities. Recent initiatives include:

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- Authoring the Community Power Aggregation Act, Senate Bill 286 (2019).
- Leading the informal rule drafting process for CPA administrative rules at the Public Utilities Commission by providing initial and subsequent draft rules for discussion, arranging bilateral meetings with utilities and other stakeholders, and helping to lead stakeholder workshops at the request of Commission staff.
- Negotiating amendments to House Bill 315 (2021), which would have substantially changed and weakened CPA authorities as-introduced, to instead clarify and expand key CPA authorities — including by authorizing a Purchase of Receivables program. (Refer to CPCNH.)
- Drafting the CPA administrative rules and leading a public stakeholder process to negotiate final rule language which was adopted by the Commission (docket DRM 21-135).

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- Intervening to advocate for the creation of a Statewide Data Platform to enable Green Button access to electricity and natural gas retail customer data, and to negotiate a settlement — recently adopted by the Commission — under which the platform would be governed by a Governance Council of representatives that includes Chair Below on behalf of CPAs and municipalities across the state (docket DE 19-197).

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- Advancing legislation, through multiple legislative sessions, that would properly credit CPAs sourcing power from Distributed Energy Resources under 5 MW and for reducing costs from energy charges, transmission charges, and capacity charges (SB 321, 2022).

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- Engaging on CPCNH's behalf in Docket IR 22-053 regarding the evaluation of default utility procurement requirements and the potential impact due to CPAs, among other matters.

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Purpose, Mission, Values & Power Enterprise Objectives

CPCNH is guided by the requirements and processes provided for under our Joint Powers Agreement, the decisions of our Members and Board of Directors, and the considerations that operating a competitive power enterprise entails.

Purpose of CPCNH

The overarching objective of CPCNH is provided for in the Joint Powers Agreement:

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The purpose of CPCNH is to promote the common good and general welfare by supporting the economic vitality and prosperity of local communities by enabling municipalities and counties to support and jointly exercise authorities granted to them pursuant to NH RSA 33-B, NH RSA 53-E, NH RSA 53-F, and NH RSA 374-D, all in accordance with NH RSA 53-A; to assist member municipalities and counties in complying with the provisions of NH RSA 53-E in developing and implementing Electric Aggregation Plans and Programs known as Community Power Aggregations ("CPAs"); to provide supportive services and technical assistance to community power aggregations serving member towns, cities, counties, unincorporated places, and village districts; and to support and promote public education and civic engagement by the residents and businesses of member communities in developing and implementing energy and climate policies and actions and the role of CPAs in advancing such policies and actions for the common good.

Mission and Values

CPCNH's Board of Directors has subsequently adopted the mission and values below:

Our mission is to foster resilient New Hampshire communities by empowering them to realize their energy goals. CPCNH will create value for our Community Power member municipalities by jointly contracting for services, developing projects and programs together, educating and engaging the public, and advocating for communities and customers at the Legislature and Public Utilities Commission.

In carrying out its activities, CPCNH is guided by the following values:

1. *Embody an inspiring vision for New Hampshire's energy future.*
2. *Support communities to reduce energy costs and pursue economic vitality by harnessing the power of competitive markets and innovation.*
3. *Support communities to implement successful energy and climate policies and to promote the*

transition to a carbon neutral energy system.

4. *Balance the interests of member communities who are diverse in demographics, geography and their energy goals.*
5. *Use our shared expertise, leadership and skills to educate, empower and build the capacities of our members.*
6. *Help communities demystify the power sector to make informed decisions.*
7. *Facilitate collaboration and teamwork by championing diversity, equity and inclusion of people and communities of all kinds.*

Power Enterprise Objectives

CPCNH's immediate objectives in implementing CPA supply service in April to May 2023 were summarized in the Coalition's prior solicitation for services and credit support:

While many of the broader benefits that CPCNH intends to create will be developed over time, the agency's immediate objectives are to:

1. *Procure a reliable supply of all-requirements electricity, inclusive of Renewable Portfolio Standard requirements, and satisfy all load-serving entity obligations on behalf of participating customers.*
2. *Launch with default supply rates that "meet or beat" utility default service rates and maintain competitive default supply rates thereafter.*
3. *Accrue reserve funds sufficient to ensure Members' long-term financial stability.*
4. *Offer voluntary products that retail customers may opt-up to receive as well as Net Energy Metering supply rates that allow customer-generators to participate in the program.*
5. *Ensure individual customers have excellent customer service experience every time they interact with CPCNH regarding their electric service and all account transactions.*
6. *Guarantee that individual customer data is secure and protected against third party attacks, data breaches and inappropriate use.*

Coalition Energy Portfolio Risk Management, Rates, and Reserves Policies

The Coalition's Members expect the agency to balance customer rate levels, renewable power content, and the accrual of program reserves on behalf of Member programs to meet their local policy objectives. The Board of Directors is incorporating these considerations and trade-offs regarding the prudent allocation of revenues into Energy Portfolio Risk Management, Rates, and Reserves policies, summarized as follows:

- **Energy Portfolio Risk Management Policy**: defines the risks associated with the procurement of the power supply, identifies those responsible for administering the various elements of the risk management policy (from procurement through daily operations and oversight), and sets policy parameters for managing, monitoring, and reporting on the risks associated with procuring and hedging the power supply portfolio. The policy will define the requirements and limits within which Members delegate their procurement authority to CPCNH.
- **Rates Policy**: ensures rates are set in a timely fashion to recover capital and operating costs of

Member programs and that public notice and customer communication activities remain in compliance with statutory and Member Electricity Aggregation Plan requirements.

- **Financial Reserves Policy:** sets appropriate target levels (e.g., minimum and maximum contributions) to ensure CPCNH satisfies working capital requirements, procures energy at competitive rates, adheres to contractual covenants, covers unanticipated expenditures, supports rate stability, and progresses towards obtaining an investment grade credit rating. Member contributions to reserves will be tracked, and provided back to Members, pursuant to any contractual obligations, if and when they choose to cease participating in the Coalition.

Member Cost Sharing Agreement

The Coalition's Joint Powers Agreement provides certain requirements regarding how costs will be tracked and shared across participating Community Power programs, which must be formalized in a Cost Sharing Agreement executed with each Member before the Coalition may provide services for their Community Power program, as follows:

- Costs will be tracked in three distinct categories: direct project costs, member services, and general and administrative costs (which are overhead costs that are not associated with any specific project or member service).
- Member cost-sharing agreements will be the same in all material respects: general and administrative costs will be allocated based on each Community Power program's share of total electricity usage each year, while each member will choose and separately pay for the costs of specific services and projects (under terms that reflect a fair allocation across all the members that chose the same services and projects).
- The debts, liabilities and obligations of the Coalition, and of other participating Community Power programs, will be non-recourse to Member communities (unless expressly agreed to by the Member under their Cost Sharing Agreement or a Project Contract).

Attachment 3: New Hampshire's Renewable Portfolio Standard

New Hampshire's Electric Renewable Portfolio Standard ("RPS") statute, RSA 362-F, established the renewable energy policy for the State.

The RPS statute requires each electricity provider, including Eversource and Hudson Community Power, to meet a certain percentage of customer load by purchasing, generating or otherwise acquiring Renewable Energy Certificates ("RECs"):

- One REC represents the renewable attributes of one megawatt-hour of electricity, or the equivalent amount of useful thermal energy.
- RECs are generated by certified renewable energy facilities for power that is physically delivered into the New England wholesale electricity market operated by ISO-New England (which means the power can come from within New England, New York or eastern Canada).
- The New England Power Pool Generation Information System (NEPOOL GIS) issues and tracks RECs for the region.
- RECs are generally used for compliance in the same year as the renewable power was generated, though suppliers may "bank" RECs for up to two years to meet up to 30% of compliance requirements.

There are four distinct "classes" of renewable certificates under the RPS, each distinguishing between different technologies and dependent upon the year that the generators came online:

1. Class I is divided between thermal and non-thermal renewables:
    - Class I non-thermal electricity, from generators that came online after January 1, 2006: wind, solar, small hydroelectric, methane (biologically derived such as from anerobic digestion of organic materials), biomass, hydrogen (from methane or biomass), ocean thermal, current, tidal or wave energy and also biodiesel (if produced in state).
    - Class I thermal energy, from generators that came online after January 1, 2013 (and are producing thermal energy, rather than electricity): geothermal, solar thermal, biomass and methane.
2. Class II: solar generation that came online after January 1, 2006
3. Class III: biomass & methane that came online before January 1, 2006
4. Class IV: small hydroelectric that came online before January 1, 2006

Electricity suppliers must obtain RECs for each of the four classes of renewables as a set percentage of their retail electric load, which increase on an annual basis (until plateauing after 2025, unless the RPS is raised in future):

Compliance Year	Total RPS Requirement	Class I Non-Thermal	Class I Thermal	Class II Solar	Class III Biomass & Methane	Class IV Small Hydro
2020	**20.70%**	8.90%	1.60%	0.70%	8.00%	1.50%
2021	**21.60%**	9.60%	1.80%	0.70%	8.00%	1.50%
2022	**22.50%**	10.30%	2.00%	0.70%	8.00%	1.50%
2023	**23.40%**	11.00%	2.20%	0.70%	8.00%	1.50%
2024	**24.30%**	11.90%	2.20%	0.70%	8.00%	1.50%
2025 onwards	**25.20%**	12.80%	2.20%	0.70%	8.00%	1.50%

Note the following flexibilities in meeting Class I requirements:

- Class I non-thermal requirements may be met with Class I thermal biomass and methane resources;
- Class I requirements may also be met with Class III (biomass & methane, thermal and non-thermal) or Class IV (small hydroelectric, non-thermal) resources that have been restored through significant investment or have otherwise begun generating in excess of historic baselines; and
- Solar that came online after January 1, 2006 may be used to satisfy Class II or Class I requirements.

Additionally, net metered customers (primarily customers with solar photovoltaics) that meet certain registration and administrative requirements can track and sell their RECs (which are accounted for in NEPOOL's Generation Information System). Not all customers do, however, and the REC production from such customer generators are estimated by the Public Utilities Commission each year and applied to lower the Class I and Class II procurement requirements of the utilities and other suppliers. The impact of Community Power Aggregation on net metered customers is discussed in more detail in Attachment 5.

If the electricity providers are not able to meet the RPS requirements by purchasing or acquiring renewable energy certificates, they must pay alternative compliance payments (ACPs). The funds are used for a variety of renewable programs in New Hampshire.

The result is that these alternative compliance payment prices essentially act as a price ceiling for the REC market in New Hampshire. The ACPs for RECs by class in recent years are:

For example, Eversource, Unitil and the New Hampshire Electric Cooperative have recently made alternative compliance payments instead of purchasing certain categories of RECs:

For additional information on the Renewable Portfolio Standard, refer to:

- New Hampshire's RPS statute (RSA 362-F)
- ~~Public Utilities Commission RPS Website~~New Hampshire Department of Energy Renewable Portfolio Standard
- ~~New Hampshire Renewable Energy Fund Annual Report (1 October 2020)~~New Hampshire Renewable Energy Fund Annual Reports
- ~~UNH Sustainability Institute Study: New Hampshire RPS Retrospective 2007 to 2015~~

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Attachment 4: Utility Default Procurement Cycles and Rate Setting

Hudson Community Power has a goal of maintaining competitive default rates compared to Eversource, while also offering voluntary products that retail customers may opt-in to receive.

The timing of the program's rate setting decisions and, to a certain degree, the procurement of electricity will need to consider when Eversource conducts these same activities (particularly for the program's default electricity product).

As context, Eversource, Liberty Utilities and Unitil all issue requests for proposals (RFPs) twice annually for competitive suppliers to assume load-serving entity obligations and supply default customers with electricity for 6-month "strip" periods, with suppliers bidding to serve individual "tranches" or segments of customers by class.

The procurement schedules, tranches and rate practices for each distribution utility are:

- **Eversource** (Public Service Company of New Hampshire): issues RFPs in May and November with bids due in early June and December for suppliers to begin serving customers in August and February, offering four ~100 MW tranches to serve small customers and a single tranche to serve large customers (five tranches in total). Retail rates are fixed over the 6-month period for small customers and vary by month for large customers.
- **Liberty Utilities**: follows the same supplier RFP schedule and retail pricing as Eversource but (1) solicits supply for small customers in a single 6-month block tranche and for large customers in two, consecutive three-month block tranches (3 tranches total), and (2) allows bidders to include and price RPS compliance obligations separately (as an additional product).
- **Unitil**: issues RFPs in March and August for delivery beginning in June and December, offering tranches of residential, small commercial, outdoor lighting and large customers classes (four tranches). The large customer RFP is structured in a distinct fashion, in that it passes through market costs for energy and so suppliers compete to price capacity, congestions, ancillary services, etc. for the large customer tranche over the 6-month term; retail rates reflect these load-serving entity costs along with the pass-through of real time locational marginal market prices (which are load-weighted by the entire class' hourly load shape i.e., not the individual large customer's usage profile). Retail rates for the residential, small commercial, and outdoor lighting classes are fixed over the 6-month term, though customers have the option to choose variable monthly pricing if the election is made prior to the start of the next 6-month term.

Supplier bids are priced in dollars per megawatt-hour ($/MWh) on a monthly basis and generally exclude Renewable Portfolio Standard (RPS) compliance obligations (called "Renewable Energy Certificates" or "RECs"), though Liberty Utilities allows RECs to be bid as a separate product. Distribution utilities typically procure most or all of their supply of RECs through competitive solicitations held separately from the auctions for default electricity service.

New Hampshire's RPS requires all electricity suppliers to procure or otherwise obtain RECs for four distinct "classes" of renewables, each distinguishing between different technologies and dependent upon the year that the generators came online.

For 2022, Eversource is required to include 22.5% renewable energy in their energy supply. This minimum compliance requirement will increase incrementally to 25.2% by 2025 and remain fixed thereafter, absent an increase in the RPS.

Refer to ~~Attachment 3~~ Attachment 3: New Hampshire's Renewable Portfolio Standard for further details on the RPS.

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Attachment 5: Overview of Utility Net Energy Metering Tariffs

Discussion of Utility Net Metering, Group Net Metering and Low-Moderate Income Solar Project Tariffs

Under the net metering process, customers who install renewable generation or qualifying combined heat and power systems up to 1,000 kilowatts in size are eligible to receive credit or compensation for any electricity generated onsite in excess of their onsite usage.

Any surplus generation produced by these systems flows back into the distribution grid and offsets the electricity that would otherwise have to be purchased from the regional wholesale market to serve other customers.

The credits and compensation customer-generators receive for electricity exported to the grid are defined under Net Energy Metering (NEM) tariffs offered by Eversource, Liberty Utilities, Unitil and the New Hampshire Electric Co-op (NHEC). Note that:

- NHEC is member-owned cooperative and as such, its rules and regulations are approved by its Board of Directors and are not subject to regulation by the Public Utilities Commission. Additional information regarding NHEC's Net Energy Metering tariffs may be found online under their "Terms and Conditions".
- The Public Utilities Commission regulates the distribution utilities' Net Energy Metering (NEM) tariffs in accordance with PUC Rule 900 and RSA 362-A:9 (refer to RSA 362-A:9, XIV specifically for Group Net Metering statutes).

The remainder of this chapter concerns NEM tariffs regulated by the Public Utilities Commission. Note that:

- NEM tariffs offered by the utilities underwent a significant change several years ago;
- Customer-generators that installed systems before September 2017 may still take service under the "NEM 1.0" tariff ("standard" or "traditional" NEM); whereas
- Systems installed after August 2017 must take service under the "NEM 2.0" tariff ("alternative NEM")
- NEM 1.0 customers are allowed to switch to taking service under the NEM 2.0 tariff but cannot subsequently opt-back to NEM 1.0 (with limited exceptions, e.g., participation in certain pilot programs).

Under both tariffs, customer-generators are charged the full retail rate for electricity supplied by Eversource and receive credits for electricity they export to the grid for some (but not all) components of their full retail rate. Refer to the next subsection for tables comparing NEM 1.0 to 2.0 tariffs.

To appropriately measure and credit customer-generators taking service under a NEM tariff, the utility installs a bi-directional net meter that records each kilowatt-hour (kWh) supplied to the customer from the grid and also each kWh that flows back into the grid. This data is recorded and collected on a monthly billing-cycle basis.

For NEM 1.0 tariff systems (installed before September 2017), any kWh exported to the grid are netted against kWh consumed. If there is a net surplus of kWh at the end of the monthly billing period (i.e., more power was exported to the grid by the customer-generator than was consumed) those surplus or negative kWh are carried forward and can be used to offset future kWh consumption (so the customer only pays for their "net" energy consumption).

For NEM 2.0 tariff systems (installed after August 2017), all customer-generators receive a monetary credit for each kWh that is exported valued at 100% of their default electricity supply rate component for the month. Smaller systems (up to 100 kilowatts in size) additionally receive credits for 100% of the transmission component and 25% of the distribution component of their retail rate. (Larger systems, up to 1,000 kilowatts in size, only receive full credit for the electricity supply rate component.)

Note that most customer-generators in Hudson Community Power are expected to be taking service under NEM 2.0 tariffs going forward.

Any credits that accumulate over time are tracked and used to offset the customer-generator's future electricity bills. Customers may also request to cash-out their surplus credit once a year, after their March billing cycle, if the balance exceeds $100 (or any balance in the event of moving or service disconnection). NEM 1.0 surplus balances are tracked as kWh credits and are converted to dollars at wholesale avoided costs, while NEM 2.0 surplus balances are tracked as monetary credits directly (in dollars). Note that these cash-outs are treated as taxable income by the Internal Revenue Service (IRS). Payments of $600 or more remitted to the customer are accompanied by a 1099 form for the IRS. Utilities may also issue IRS Form 1099s for smaller amounts.

Alternatively, Group Net Metering is a process that allows any customer-generator to share the proceeds of their surplus generation credits to directly offset the electricity bills of other customers, which is financially more advantageous and can increase the effective value of the system. All the members in the group need to be within the same distribution utility service territory but may be served by different suppliers. The credits are calculated based on the host site's NEM tariff and retail rate, and payments are credited to offset the electricity bills of each member directly by the utility (assuming the utility is billing the customers for supply). These allocations are governed by a Group Net Metering Agreement between the host customer-generator and group members, which is part of the registration process overseen by the Public Utilities Commission.

Note that larger systems (up to 1,000 kilowatts in size) actually have to register as group hosts in order to qualify for net metering in the event that the customer-generator exports more than 80 percent of the power produced onsite to the distribution grid. Additionally, if the electricity exported from larger systems exceeds the total electricity usage of the group on an annual basis, the credit for the residual amount (e.g., electricity exported in excess of the group's total usage) is re-calculated based on their utility's avoided cost of electricity supply. This rate is lower than the NEM credit based on the customer-generator's retail rate, and results in a downward payment adjustment issued by the utility to the host customer. Residential systems under 15 kilowatts, however, are not subject to this adjustment.

Most recently, a Low-Moderate Income (LMI) Community Solar Project option has been implemented under Group Net Metering. The program currently provides an incentive of 3 cents per kWh (dropping down to 2.5 cents after July 2021) in addition to the host site's NEM credits, and solar systems may be either rooftop or ground-mounted systems. To qualify, groups must include at least five residential customers, a majority of which are at or below 300 percent of the federal poverty guidelines, and non-residential customers cannot account for more than 15 percent of the total projected load in the group.

Lastly, all group hosts (except for residential systems under 15 kilowatts) must file an annual report with the Public Utilities Commission and their utility that includes the annual load of the host and members, annual total and net surplus generation of the host site system, and additional information for Low-Moderate Income Community Solar Projects.

In addition to NEM credits, all customer-generators have the option of selling the Renewable Energy Certificates (RECs) produced by their systems. This can provide an additional revenue stream to customer-generators, but requires a separate REC meter, registration and ongoing reporting requirement.

Alternatively, the Public Utilities Commission estimates the RECs that could be produced by all customer-generators who do not separately meter and sell their RECs and lowers the Renewable Portfolio Standard procurement requirements for all load-serving entities by an equivalent amount.

Comparison of Utility "Standard" and "Alternative" Net Energy Metering Tariffs

The tables below compare the two tariff structures, which offer different credits to customers depending on the size of their installed system:

Net Energy Metering (NEM) Credit on Net Monthly Exports to Grid

	NEM 1.0 *"Standard NEM"* *Offered prior to 9/1/2017*	**NEM 2.0** *"Alternative NEM"* *Effective 9/1/2017*
Large Systems *100 Kilowatts to 1 Megawatt*	Full credit (at the customer's retail rate) for electricity supply only	
Small Systems *≤ 100 Kilowatts*	Full credit for electricity supply, distribution, transmission, System Benefits, Stranded Cost & Storm Recovery charges	Full credit for electricity supply and transmission; 25% credit for distribution & no credit for other charges

As shown in the table above, levels of compensation for small customer-generators (with systems up to 100 kilowatts) were lowered, such that these customers no longer receive full compensation on their distribution rate component or several other small charges (e.g., the System Benefits, Stranded Cost and Storm Recovery charges).

Additionally, the NEM 2.0 tariff modified the type of credit, and the ways credits for surplus generation are tracked and refunded, for both small and large customer generators:

- Under NEM 1.0, any surplus generation would be tracked as a kilowatt-hour (kWh) credit, which was carried forward to offset the customer's consumption (and bill) in future months. For any kWh credits remaining on an annual basis (at the end of March each year), such customers have the option of either continuing to bank their credits to offset future usage, or to convert the kWh credit into a monetary credit, at a rate set by the Public Utilities Commission (typically ~3-4 cents per kilowatt-hour) and to apply the amount to their account or receive a check for the amount owed.

- Under NEM 2.0, kWh credits are automatically converted into a monetary credit every month, valued at the customer's retail rate for that specific month. Customers have the option of either carrying the credit forward to offset their electricity bill in future months or may receive the refund directly as a check.

The crediting mechanism under NEM 1.0 was relatively more advantageous for customers in one respect. Solar systems generate more power in the spring and summer months relative to other seasons; consequently, the credits that customer-generators would accrue during the summer months would offset their consumption in the winter months on a one-to-one, kWh per kWh basis. This is advantageous because winter supply rates are above summer rates on average.

In another respect, NEM 2.0 offers an advantage to customers that accrue surplus credits over the course of the year, because the surplus is calculated based on components of the customer's retail rate — which is higher than the ~3-4 cents per kilowatt-hour value that is applied to convert NEM 1.0 kWh credits into a monetary credit whenever customers elect to cash-out their surplus.

These changes are summarized in the table below, and apply to all customer-generators regardless of system size:

NEM 1.0 *"Standard NEM"* *Offered prior to 9/1/2017*	**NEM 2.0** *"Alternative NEM"* *Effective 9/1/2017*
kWh credit carried forward. May be refunded at a rate calculated by the Public Utilities Commission (typically ~3-4¢ per kWh).	kWh converted to monetary credit automatically each month. Monetary credit carried forward as a bill credit or refundable.

Additional details may be found in the Eversource, Liberty Utilities and Unitil tariffs and the Public Utilities Commission website:

- Eversource Tariffs
- Unitil Tariffs
- Liberty Utilities Tariffs
- PUC overview of Net Metering
- PUC graphic explanation of NEM 1.0 vs. NEM 2.0.

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Net Energy Metering Systems by Utility Territory

According to the most recent Energy Information Agency (EIA) Form 861m data, there are about 11,000 customer-generators taking service under Net Energy Metering tariffs in New Hampshire, with a cumulative installed capacity of approximately 140 megawatts (in terms of nameplate capacity in alternating current, or "AC"). Estimated numbers of customer-generators and installed capacity by technology are summarized below:

- Solar photovoltaics: ~120 megawatts (MW) and 10,760 customer-generators; note that:
    - Group Net Metering accounts for an additional ~1.5 MW serving 56 customers; and
    - Sixteen residential customers, in addition to solar photovoltaics, also have battery storage systems with a cumulative capacity of 175 kilowatts (an average size of ~11 kilowatts per customer).
- Onsite wind: 412 kilowatts (kW) and 72 customer-generators.
- "Other" technologies (presumably, small hydro or qualifying combined heat and power systems, or "CHP"): ~17.5 megawatts (MW) and 55 customer-generators.

The table below provides the number of customer-generators in each distribution utility territory:

Number of Net Metered Customer-Generators by Technology

	Customer-Generators by Technology				Subsets of Solar PV Customers	
	Total	Wind	Other (CHP or Hydro)	Solar PV	Group Net Metering	Battery Storage
Eversource	7,949	37	52	7,860	21	0
Unitil	1,066	3	1	1,062	0	0
Liberty Utilities	724	1	0	723	22	16
NHEC	1,204	31	2	1,171	13	0
Total	10,943	72	55	10,816	56	16

The number of customer-generators by customer class with onsite solar photovoltaic systems, total installed capacity, and average solar system size in each utility territory are provided for reference in the tables below.

Note that these tables do not include Group Net Metered systems and participating customers within groups and reflect only installed solar photovoltaic system capacity (i.e., exclusive of onsite battery storage capacity).

Net Metered Solar Photovoltaic Systems: Number of Customer-Generators

	Residential	Commercial	Industrial	Total Customer-Generators
Eversource	7,195	630	35	7,860
Unitil	973	61	6	1040
Liberty Utilities	633	77	0	710
NH Electric Coop	1,065	81	4	1,150
Total	**9,866**	**849**	**45**	**10,760**

Net Metered Solar Photovoltaic Systems: Total Installed Capacity (MW-AC)

	Residential	Commercial	Industrial	Total Installed Capacity (MW-AC)
Eversource	54.15	29.66	5.09	88.91
Unitil	7.40	2.30	0.73	10.43
Liberty Utilities	4.78	5.12	0.00	9.90
NH Electric Coop	7.61	2.46	0.60	10.66
Total	73.94	39.54	6.42	119.90

Net Metered Solar Photovoltaic Systems: Average System Size (kW-AC)

	Residential	Commercial	Industrial	Average System Size (kW-AC)
Eversource	7.5	47.1	145.5	66.7
Unitil	7.6	37.8	121.2	55.5
Liberty Utilities	7.6	66.5	N/A	24.7

NH Electric Coop	7.1	30.3	149.0	62.2
Average	**7.5**	**45.4**	**138.6**	**52.3**

Attachment 6: Hudson Community Power Net Metering, Group Net Metering and Low-Moderate Income Solar Project Opportunities

Please refer to ~~Attachment 5: Overview of Utility Net Metering Tariffs~~ Attachment 5: Overview of Utility Net Energy Metering Tariffs as context for this section.

RSA 362-A:9,II grants Community Power programs broad statutory authority to offer customer-generators new supply rates and terms for the generation supply component of Net Energy Metering (NEM). The relevant statutory authority is quoted in full below:

> *"Competitive electricity suppliers registered under RSA 374-F:7 and municipal or county aggregators under RSA 53-E determine the terms, conditions, and prices under which they agree to provide generation supply to and credit, as an offset to supply, or purchase the generation output exported to the distribution grid from eligible customer-generators. The commission may require appropriate disclosure of such terms, conditions, and prices or credits. Such output shall be accounted for as a reduction to the customer-generators' electricity supplier's wholesale load obligation for energy supply as a load service entity, net of any applicable line loss adjustments, as approved by the commission. Nothing in this paragraph shall be construed as limiting or otherwise interfering with the provisions or authority for municipal or county aggregators under RSA 53-E, including, but not limited to, the terms and conditions for net metering."*

Hudson Community Power intends to offer a NEM generation rate and terms to customers with onsite renewable generation eligible for net metering from Eversource. Note that any non-supply related components of the Net Energy Metering tariff (e.g., credits for transmission and distribution) will continue to be provided to customer-generators directly by their utility.

How Hudson Community Power calculates, accounts for, and provides NEM credits to participating customer-generators for the different types of eligible system sizes, customer types and group configurations will have a number of important financial and practical implications for the program and customers in the town.

Hudson Community Power also anticipates encountering practical challenges of an operational nature in administering net metering and group net metering programs. This is partly because net energy metering continues to evolve in response to new policy and regulatory requirements, and the day-to-day processes that govern the coordination between the program, participating customers and Eversource are subject to refinement and change over time.

In particular, Hudson Community Power will be one of the early default aggregation programs to launch in New Hampshire, and the process of transferring significant numbers of NEM customers may cause unanticipated issues due to the metering, billing and data management requirements of this subset of customers. Hudson Community Power will maintain close coordination with Eversource to expeditiously resolve any such issues that may occur.

For example, Hudson Community Power may decide to separately issue supply bills to customers that have installed systems after September 2017.

The advantage in dual-billing this subset of customers stems from what is essentially an accounting irregularity in how utility billing systems currently treats customer-generators taking service under

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Formatted: Font: (Default) Calibri, Underline, Font color: Custom Color(RGB(5,99,193)) the NEM 1.0 tariff, which applies to systems installed before September 2017, versus the NEM 2.0 tariff, which applies to all systems installed after that date. As context:

- The cumulative surplus generation exports of net metered customer-generators will decrease the amount of electricity that Hudson Community Power will have to purchase from the regional power market to supply other customers in the program. The surplus generation from both NEM 1.0 and NEM 2.0 customer-generators is tracked and netted out from the program's wholesale load obligations by Eversource for this purpose.
- However, for the purpose of netting out of the program's Renewable Portfolio Standard (RPS) compliance requirements, the surplus generation from NEM 1.0 customers is tracked and accounted for differently than it is for NEM 2.0 customers:
    - Surplus generation from NEM 1.0 customers is tracked as a kWh credit that is carried forward to offset the customer's future electricity supply requirements; these kWh credits will be counted as an offset that decreases the total electricity supplied by the program to retail customers in aggregate — which lowers the program's RPS compliance obligation.
    - Surplus generation from NEM 2.0 customers is tracked as a monetary credit that is carried forward to offset the customer's future electricity bills; even though the monetary credit is calculated each month based on every customer's kWh surplus generation, the monetary credit is treated as a re-sale or delivery of power generated by NEM 2.0 customer and provided to other participating customers through the program — it is not treated, in other words, as an offset that decreases the total electricity supplied by program to retail customers in aggregate — and therefore does not lower RPS compliance obligations in the same way.

  The practical consequence of this accounting treatment is that Hudson Community Power would have to purchase Renewable Energy Certificates for the amount of surplus generation supplied by NEM 2.0 customer-generators (but not NEM 1.0 customer-generators) in the same way as if the program had imported that amount of electricity from the regional wholesale market.
- Taking on the responsibility of billing this subset of NEM 2.0 customers directly may allow Hudson Community Power to track and account for the impact of their surplus generation in ways that lower the program's RPS compliance obligations and costs. Specifically, the program could credit customers currently on the utility's NEM 2.0 tariff in the same way that NEM 1.0 customers are credited (i.e., using kWh credits to track surplus generation on the supply portion of the bill). Note that RSA 362-A:9,II explicitly grants Community Power programs the flexibility to offer net metered customers either:
    - A "*credit, as an offset to supply*" for their surplus generation, which is equivalent to the NEM 1.0 tariff accounting; or
    - To "*purchase the generation output exported*", which is equivalent to how the NEM 2.0 tariff tracks surplus generation.

  Exercising the first option listed above, by offering NEM 2.0 customers a kWh credit tracked as an offset to supply, would allow Hudson Community Power to harmonize the accounting treatment of NEM 1.0 and 2.0 surplus generation for the purpose of program RPS compliance reporting. This would lower program rates and is an option that the program may therefore find cost-effective to implement.

Additionally, certain customer-generators currently receiving IRS Form 1099 taxable income from monetary credits paid out by their utility under NEM 2.0 tariff may benefit financially from receiving kWh credits for the supply portion of their monthly surplus generation instead.

While dual billing is typically avoided — as it is less convenient for most customers to receive a separate bill from their utility and supplier — customers with onsite generation systems tend to be highly informed on energy issues and respond positively to more active engagement with both their utility and supplier.

Consequently, dual billing may enhance customer satisfaction, awareness and ongoing participation in the program for customer-generators. Furthermore, dual billing could be done electronically, which is more convenient for the customer and less costly for the program than sending paper bills.

Furthermore, Hudson Community Power may be able to create additional value for customer-generators through a combination of dual billing, assistance with metering upgrades and time-varying rate structures. For example:

- Many customer-generators with solar systems may benefit from local programs that help them reduce their full energy bill costs;
- Providing the customer with a separate supply-only bill would allow Hudson Community Power to also offer a time-varying rate (which may not otherwise be available through Eversource's billing system);
- Upgrading to an interval meter (if the customer does not have one) and installing onsite battery storage, combined with a time-varying rate, may enable the customer-generator to further lower their overall bill by shifting their pattern of electricity usage at times of high-power prices and constrained generation and transmission capacity. This could also help to manage and lower the program's electricity supply costs in aggregate as well, and thus benefits all participating customers.

Similarly, Hudson Community Power may be able to streamline the process and cost of installing REC production meters, registering customer-generators and purchasing their RECs for the onsite power generated to satisfy part of the program's overall RPS compliance requirements. This would allow the program to source RECs locally and would provide an additional source of revenue for customer-generators in the town.

Hudson Community Power also intends to evaluate ways to enhance the value of the NEM credits that customers receive overall, from both the program and Eversource. For example, customer-generators may benefit by becoming hosts in Group Net Metering, including by establishing a Low-Moderate Income Solar Project group. The program may be able to streamline the process required to do so, which entails:

- Matching customers interested in becoming members with prospective group hosts;
- Executing a Group Net Metering Agreement together;
- Registering the group with the Public Utilities Commission and Eversource; and
- Thereafter filing annual compliance reports.

Lastly, NEM tariffs are subject to revision and Hudson Community Power, through the Coalition, intends to work with Eversource, participate in Public Utilities Commission proceedings and engage at the Legislature on issues that impact how the tariffs evolve going forward.

Customers are increasingly adopting new energy technologies and expect to be offered rates and services that provide them with new choices and fair compensation based on their investment; the program's ability to assist customers in these ways is heavily dependent on how state policies and utility regulations evolve over time.

Hudson Community Power will seek to represent the interests of our community and customers in these matters.

Attachment 7: Hudson's Public Planning Process

Hudson EAC

The Hudson Electric Aggregation Committee (HEAC) was formed as a subcommittee of the Hudson Sustainability Committee on 10/14/21. Two Sustainability Committee members (Craig Putnam and Katherine (Kate) Messner) formed the initial membership of HEAC.

The Hudson Board of Selectmen signed the JPA on 11/9/21 and subsequently on 11/29/21 authorized the HEAC to represent Hudson to CPCNH. Craig Putnam was named as Hudson's CPCNH Director member & Kate Messner as the Alternate member. Hudson officially joined CPCNH on 12/16/21. As of the April 2023 annual CPCNH membership meeting, the representatives from Hudson are now referred to as the 'primary' and 'alternate' (Mr. Putnam is no longer serving on the CPCNH Board of Directors but continues to serve on the Member Outreach and Engagement committee).

The Hudson Electric Aggregation Committee ~~is actively~~ has recently (Spring '23) recruited~~ing~~ three additional members. The committee meets regularly to evaluate the three candidate power procurement organizations. The plan is to recommend one of the candidates to the Hudson Board of Selectmen at a workshop in October, 2023. ~~We are seeking to add approximately two homeowners and two business owners to work together with the two existing members on bringing Electric Aggregation benefits to residents and businesses in Hudson.~~

Drafting of the Hudson EAP

The Town ~~plans to bring~~brought a warrant article to a vote in March 2023 to authorize the Board of Selectmen to establish Hudson Community Power ~~to a vote in spring of 2023~~. The warrant article passed by a robust margin.

The Coalition-supplied template forms the basis for Hudson's Electric Aggregation Plan (EAP).

Since its formation, t~~T~~he Hudson Electric Aggregation Committee has held ~~several~~ numerous work sessions on the EAP ~~during the summer of 2022~~resulting in this document.

Timeline

The Hudson Electric Aggregation Committee has established a rough ~~No dates have been set yet for meeting particular milestones in the EAP approval process. A rough~~ timeline ~~exists though~~for its remaining work, as follows:

- Finalize and s~~Editing and reviewing of initial drafts of the~~ubmit the EAP ~~by HEAC~~ to the Public Utilities Commission, et. al. (~~Sprin~~July~~g~~ '23~~2~~)
- ~~Bring draft of the EAP to the BOS (Summer '22)~~
- ~~Interview candidate power provider organizations; do due diligence on these organizations (started Fall '20 and ongoing)~~
- ~~Work with BOS, etc. to get EAP to a point where the BOS is happy with it (Summer & Fall '22)~~
- ~~Develop materials for educating Hudson voters about CPA (Spring – Fall '22)~~

- ~~Develop and submit warrant article (due to BOS by 11/1/22?)~~
- ~~Conduct at least two public education sessions on CPA (Fall '22 & Winter '23)~~
- ~~Town meeting (March '23)~~
- ~~[The following assumes that the EAP is approved by Hudson voters…]~~
- Solicit information from, and then do due diligence on, candidate power provider and related services organizations (Spring ~~'23~~& Summer '23)
- Recommend candidate power provider organization to the BOS (workshop scheduled for October~~Summer – Fall~~ '23)
- Work with BOS to partner with selected candidate power provider organization (October & November~~Fall~~ '23~~ – Winter '24~~)
- Work with CPCNH to develop and deliver additional materials for educating Hudson electricity customers about CPA (ongoing)
- Conduct the required information session as part of the enrollment process (Spring '24)
- Request necessary customer datasets from Eversource (Winter & Spring '24)
- Stand up Hudson Community Power (Winter & Spring '24)

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Attachment 8: Abbreviations

Acronym	Meaning
AC	Alternating Current (electric current that reverses direction many times a second at regular intervals; the N. American standard for power supply is 60 Hertz)
ACP	Alternative Compliance Payment (under the NH Renewable Portfolio Standard)
BOS	Board of Selectmen
CEPS	Competitive Electric Power Suppliers
CHP	Combined Heat and Power
CPA	Community Power Aggregation
CPCNH	Community Power Coalition of New Hampshire (a.k.a. "The Coalition")
EAC	Electric Aggregation Committee
EAP	Electric Aggregation Plan
HCP	Hudson Community Power
HEAC	Hudson Electric Aggregation Committee
ICD	Individual Customer Data
ISO-NE	Independent System Operator New England (the wholesale electricity market operator)
KW	Kilowatt (a measure of electrical capacity, equivalent to 1,000 watts of power)
kWh	Kilowatt-hour (a measure of electrical energy, equivalent to using or producing 1,000 watts for 1 hour, and typically used to refer to customer generation or onsite usage)
LSE	Load Serving Entity (see Attachment 10)
MW	Megawatt (a measure of electrical capacity, equivalent to 1,000,000 watts of power)
MWh	Megawatt-hour (a measure of electrical energy, equivalent to using or producing 1,000,000 watts for 1 hour, and typically used in reference to power plants or large aggregations of customers)
NEM	Net Energy Metering (tariffs that provide compensation for customer-generators)
NEPOOL GIS	The New England Power Pool Generation Information System (which issues and tracks Renewable Energy Credits)
NHEC	New Hampshire Electric Co-Op (a member-owned electric distribution cooperative)
NHPUC	New Hampshire Public Utilities Commission (which regulates NH's investor-owned electric distribution utilities: Eversource, Unitil and Liberty Utilities)

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PV	Solar Photovoltaics
REC	Renewable Energy Credit (under the NH Renewable Portfolio Standard)
RPS	New Hampshire's Renewable Portfolio Standard (authorized under RSA 362-F)
RSA	Revised Statutes Annotated (refers to the codified state law of New Hampshire)

Attachment 9: How Load Serving Entity Services will be Implemented

Hudson Community Power will implement Load Serving Entity (LSE) services, for the purpose of procuring or selling electricity on behalf of customers participating in the aggregation.

This plan assumes, but does not require, that the Town will participate fully in and rely on the services provided through the Community Power Coalition of New Hampshire (CPCNH) for the purposes of implementing and operating Hudson Community Power.

The Role & Responsibility of Load Serving Entities

A Load Serving Entity (LSE) is an entity that has registered with ISO New England (ISO-NE, the nonprofit regional wholesale electricity market operator) as a market participant and assumes responsibility for securing and selling electric energy and related services to serve the demand of retail customers at the distribution level (i.e., homes and businesses).

As context, every retail customer in New Hampshire (and across New England) is assigned to a specific Load Serving Entity at all times:

- Customers on utility default service are periodically re-assigned to whichever Competitive Supplier has won the utility's most recent auction or the utility as LSE.
- Similarly, customers are assigned to a different Load Serving Entity whenever they are transferred to CPA service on an opt-out default basis, choose to opt-in to take service from the CPA, or switch to a Competitive Supplier of their choosing.

Consequently, all Competitive Suppliers and Community Power Aggregators (CPAs) in New Hampshire are required to either:

1. Register as a Load Serving Entity with ISO-NE; or
2. Contract with a third-party that has agreed to be the Load Serving Entity responsible for the Competitive Supplier's or CPA's customers.

To ensure that customers receive firm power supply, there are a variety of services that need to be performed and electrical products that must be procured or otherwise provided. The required products and services are referred to as "all requirements energy" (or alternatively, "full requirements service").

The role of Load Serving Entities is to provide, arrange for, or otherwise pay for the cost of providing all requirements energy to customers. The majority of these requirements are defined by the ISO-NE wholesale market operator, which is subject to Federal oversight, but certain requirements are defined by the state in which the LSE registers to serve customers (Renewable Portfolio Standard requirements, for example).

In New Hampshire, full-requirements energy is defined as the provision or cost of (1) electrical energy, capacity, and reserves (including transmission and distribution losses); (2) ancillary services, congestion management, and transmission services (to the extent not already provided by the customer's utility); (3) the costs associated with complying with New Hampshire's Renewable Portfolio Standard (i.e., the cost of purchasing Renewable Energy Credits or, if an insufficient number of credits is procured, the cost of Alternative Compliance Payments); and (4) other services or products necessary to provide firm power supply to customers (i.e., because the definition and requirements of the above products and services are subject to change over time).

Each of the above products and services is procured, provided, and accounted for in different ways, through market mechanisms and regulated processes that have been designed to accommodate the unique characteristics of the product or service in question.

Given the complex and capital-intensive nature of providing all requirements electricity to customers, Load Serving Entities are subject to significant state and Federal oversight, in terms of registration, reporting, and financial security requirements.

The web pages below provide current information regarding Load Serving Entity registration, financial security, and renewal requirements to operate in ISO-NE and New Hampshire:

- ISO-NE: New Participant Registration Instructions
- NH PUC: Forms for Competitive Electric Power Suppliers and Electric Load Aggregators
- Eversource: Electric Information for Suppliers & Aggregators
- Unitil: Energy Supplier Resources
- Liberty Utilities: Become a Liberty Utilities Approved Supplier
- New Hampshire Electric Cooperative: Supplier Information

Responsibilities of the Community Power Coalition of New Hampshire (CPCNH)

As noted earlier, the Town may decide to contract with CPCNH, as an all-requirements joint powers agency, for the provision of LSE services, all requirements energy supply and all other energy services required to implement and operate Hudson Community Power. The following information is specific to such a possible contractual relationship.

CPCNH Provision of Load Serving Entity Services

In 2022, on behalf of the Town and CPCNH's other Member communities, each of which are in various stages of authorizing Community Power Aggregations, CPCNH conducted a competitive solicitation process to solicit and contract for Comprehensive Services and Credit Support.[5]

As a result of the competitive solicitation process CPCNH selected and has contracted with Calpine Energy Solutions for Retail Data Management, Billing Services, and a number of other retail customer solutions. CPCNH selected and has contracted with Ascend Analytics for Portfolio Risk Management Services, credit support, and certain other services, including running a competitive RFP process to identify the best organization to provide LSE Services. An affiliate of Calpine Energy Solutions was selected as the most advantageous entity to provide LSE Services and CPCNH is in the process of finalizing arrangements and the contract for LSE Services, along with the other firms described in Attachment 2: Community Power Coalition of New Hampshire, Organizational Capacity to provide additional services required to launch and operate CPAs.

[5] CPCNH's Request for Proposals for Comprehensive Services and Credit Support, and additional supporting reference documentation, including the draft Business Plan for CPCNH, are posted online here: https://www.cpcnh.org/solicitations.

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Responsibilities of the Town of Hudson

As a result of CPCNH's successful solicitation and contracting strategy, the Town may now contract for and authorize CPCNH to provide comprehensive services and credit support (inclusive of LSE services) to implement and operate Hudson Community Power.

- LSE services may be implemented as follows: CPCNH may contract directly for LSE services with a third-party that is registered or will register with ISO-NE as a market participant and Load Serving Entity, satisfies all applicable financial security and other registration requirements with ISO-NE, the Commission, and NH's distribution utilities, and has contractually agreed to assume responsibility for providing all requirements energy on behalf of Hudson Community Power's customers.

  Typically, such a third-party would additionally provide portfolio management services and credit support and assist CPCNH in structuring and maintaining a portfolio of physical and financial contracts to provide all requirements energy to participating customers. At a certain future point, CPCNH may be positioned to register with NEPOOL and ISO-NE as a market participant and Load Serving Entity directly.[6]

  This implementation option essentially replicates the approach and structure employed by the New Hampshire Electric Cooperative, which actively manages an all-requirements energy portfolio, accrues financial reserves, and provides LSE services for default service customers.

  Additionally, note that the Town of Hanover (whose Member director and alternate director are both members of CPCNH's Risk Management Committee and participated in the proposal evaluations) is already a market participant and Load Serving Entity for the Town's load obligations.

- CPCNH may alternatively contract with one or more Competitive Electric Power Suppliers to provide LSE services and all requirements electricity to customers at a pre-specified rate for a set length of time. Under this arrangement, the Competitive Supplier would either be the designated Load Serving Entity or would contract with a third-party that has agreed to be the Load Serving Entity responsible for the CPA's customers.

  This implementation option would essentially replicate the same approach and structure employed by NH's regulated distribution utilities (Eversource, Unitil and Liberty Utilities), under which customers are periodically re-assigned to whichever Competitive Suppliers have won the utilities' default service solicitations.

- CPCNH may also propose a combination of the above approaches for the Town's consideration.

In the event that the Town does not contract with CPCNH to provide LSE and other services to Hudson Community Power, then the Town may contract to implement LSE services independently, either with a third-party LSE acting as the Town's agent or with a Competitive Electric Power Supplier (CEPS) that contracts to provide LSE services for customers taking service from Hudson Community Power.

[6] Refer to CPCNH's draft Business Plan for further details, available under RFP Reference Materials online at: https://www.cpcnh.org/solicitations

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The Town will ensure that contracts entered into provide for the implementation of LSE services and full requirement energy supply for customers participating in Hudson Community Power.

Attachment 10: Customer Data Protection Plan

Hudson Community Power will protect and maintain the confidentiality of Individual Customer Data in compliance with its obligations as a Service Provider under RSA Chapter 363 (-RSA 363:38 and RSA 363.37 ("*privacy policies for individual customer data; duties and responsibilities of service providers* and *definitions"*) and other applicable statutes and Public Utilities Commission rules.

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Individual Customer Data (ICD) includes information that is collected over the course of providing energy services to customers participating in Hudson Community Power and that, singly or in combination, can be used to identify specific customers, including: individual customer names, service addresses, billing addresses, telephone numbers, account numbers, electricity consumption data, and payment, financial, banking, and credit information.

As described herein, the Town of Hudson is responsible for ensuring that reasonable security procedures and practices are implemented and maintained to protect the confidentiality of Individual Customer Data from unauthorized access, destruction, modification, disclosure, or use.

This plan assumes, but does not require, that the Town will participate fully in the Community Power Coalition of New Hampshire (CPCNH) for the purposes of implementing and operating Hudson Community Power.

Responsibilities of the Community Power Coalition of New Hampshire (CPCNH)

CPCNH is a Joint Powers Agency authorized under RSA 53-A ("*Agreements Between Governments: Joint Exercise of Powers"*) and RSA 53-E:3 ("*Municipality and County Authorities*"). CPCNH's Joint Powers Agreement expressly authorizes the agency to: [7]

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- "*[C]omply with orders, tariffs, and agreements for the establishment and implementation of community power aggregations and other energy related programs*";
- *"Make and enter into contracts*" and "*[m]ake and enter into service agreements relating to the provision of services necessary to plan, implement, operate, and administer CPCNH's affairs*"; and
- "*[D]o all acts permitted… as well as any act necessary, consistent with New Hampshire law to fulfill the purposes*" set forth under the agreement, which include assisting "*member municipalities and counties in complying with the provisions of NH RSA 53-E in developing and implementing … Community Power Aggregations*".

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CPCNH has solicited for and contracted with third-parties to provide comprehensive services and credit support to launch Member CPA programs. CPCNH has adopted Energy Portfolio Risk Management, Retail Rates, Financial Reserves, and Data Security and Privacy policies to govern CPA operations.

[7] From Section 2.3, Powers, of the By-Laws of CPCNH, found at pages 21-22 of the JPA, available here: https://www.cpcnh.org/_files/ugd/202f2e_601bfada901c4a89a1c2812a0638090a.pdf, and more specifically §2.3.11, §2.3.6, §2.3.9, and §2.3 introductory paragraph. Similar language in also in the Articles of Agreement.

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CPCNH's adopted Data Security and Privacy Policy is linked to below.[8] The policy defines the specific goals, requirements, and controls necessary to safeguard the confidentiality, integrity, and availability of confidential information.

CPCNH's Board has also adopted a Cost Sharing Agreement and Member Services Contract, which Members will execute prior to taking CPA service from CPCNH.

CPCNH Request for Proposals for Comprehensive Services and Credit Support

In April, 2022, CPCNH issued a Request for Proposals for Comprehensive Services and Credit Support and subsequently contracted with qualified third-parties to provide comprehensive services and credit support to enable CPCNH to develop, finance, launch, and operate CPAs.

In November, 2022, CPCNH selected Calpine Energy Solutions, LLC to provide Retail Customer Services, inclusive of services required to ensure the confidentiality of ICD and executed a Master Professional Services Agreement with Calpine Energy Solutions, LLC. Services are inclusive of Member CPA start-up and customer enrollment support services, utility and Electronic Data Interchange (EDI) services, customer information system, customer call center and engagement support services, billing administration, and other services.

For additional information regarding the use of customer data, and expected operational needs of CPCNH, refer to (1) the RFP at pp. 20-23[9] and to (2) the RFP Addendum #2 (issued May 24, 2022), at pp. 11 in response to Question 15.[10] The latter is excerpted below, and provides a concise summary of CPCNH's requirements to ensure the confidentiality of ICD:

> ***Regarding Customer Privacy Compliance:***
>
> *RSA 53-E:4, VI, requires CPAs to maintain the confidentiality of individual customer information in compliance with their obligations as service providers under RSA 363:37 (Definitions) and RSA 363:38 ("Privacy Policies for Individual Customer Data; Duties and Responsibilities of Service Providers"). RSA 53-E:7, X also requires the Public Utilities Commission to adopt Administrative Rules for CPAs governing "access to customer data" and other matters.*

Calpine Energy Solutions, LLC has demonstrate physical and cybersecurity readiness sufficient to ensure customer data is held in strict confidence — e.g., through audits in accordance with the American Institute of Certified Public Accountants Statements on Standards for Attestation Engagements No. 16 (SSAE 16) Service Organizational Controls (SOC) Reports, periodic network vulnerability assessments, etc. — and is contractually required to maintain the confidentiality of individual customer data pursuant to RSA 363:38, V(b) and applicable Public Utilities Commission rules.

Refer to the PUC's Adopted CPA Administrative rules (Chapter Puc 2200), specifically the definitions in Puc 2202.07 ("Confidential customer information") and Puc 2202.02 ("Anonymized"), and Puc 2205.02 ("Application of Puc 2000 to CEPS When Providing Electricity Supply to CPA Customers").

As CPCNH's retail customer services provider, Calpine Energy Solutions, LLC will comply with relevant portions of the PUC's current Administrative Rules for Competitive Electric Power

[8] CPCNH adopted Data Security and Privacy Policy: https://drive.google.com/file/d/1oU9KvV20zAU85AYKQohifyGudG9bNX_V/view?usp=sharing

[9] https://www.cpcnh.org/_files/ugd/202f2e_e781638c123d4cf3977358f845081313.pdf

[10] Pages 11-12 at https://www.cpcnh.org/_files/ugd/202f2e_8ceed8824453482c902a8a0fa1ab826c.pdf.

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Suppliers and Aggregators (Chapter Puc 2000). Refer to Chapter Puc 2000, Puc 2002.09 (definition of "Confidential Customer Information") and Puc 2004.19 ("Protection of Confidential Customer Information"), which is proposed to apply to CEPS providing electricity supply service to CPA customers pursuant to Puc 2205.02 under the PUC's CPA Administrative Rules.

The Request for Proposals and evaluation process was overseen by CPCNH's Risk Management Committee, composed of CPCNH Member municipality representatives, with additional support from (1) independent experts with experience operating Community Power Aggregation Joint Powers Agencies, and (2) CPCNH's General Counsel, DWGP, P.C., a nationally recognized law firm with substantial expertise in the Community Power and broader public power industry.

CPCNH's Risk Management Committee evaluated, ranked, and selected Calpine Energy Solutions, LLC as a vendor with a proven track record of successful qualification for EDI transactions and protection of confidential customer information, including what is characterized as ICD under RSA 363, and other relevant factors.

- Refer to CPCNH's RFP at p.2 for a summary of the substantial domain expertise participating on the Risk Management Committee and proposal evaluation process.
- For example, the committee includes a Member Director who previously worked for Eversource for 26 years, where he was responsible for deploying and/or operating Eversource's Customer Information System and day to day interface with competitive electric suppliers and was most recently the Director of Eversource's Customer Center Operations.

CPCNH Requirements to Access and Use of Individual Customer Data

In CPCNH's capacity as a service provider to the Town, the agency and third parties contracted through CPCNH to provide services to Hudson Community Power will need to access and use ICD for operational needs and for the research, development, and implementation of new rate structures and tariffs, demand response, customer assistance, energy management, or energy efficiency programs on behalf of Hudson Community Power.

Third parties under contract to CPCNH that may require access to ICD on behalf of Hudson Community Power may include CEPS (Competitive Electric Power Suppliers) functioning as Load Serving Entities (LSEs) for the supply of all requirements energy, or other third-party vendors providing Load Serving Entity (LSE) services on behalf of CPCNH, as well as portfolio management, Electronic Data Interchange (EDI), Customer Information System (CIS), billing, accounting, and related services, and other contractors and academic institutions under contract to support the research and development of potential new energy services to offer to customers participating in Hudson Community Power.

Specific types of ICD that Hudson Community Power, CPCNH, and third parties under contract are expected to receive and possess include:

- Name, address, account number, and other information about electric customers within the Town for purposes of sending required notification of Hudson Community Power Commencement of Service and enrollment of customer in Hudson Community Power, consistent with Puc 2204.04, .05, and .06, as adopted by the PUC and the requirements of RSA 53-E:7, III, V, and VI.
- Individual customer information used for operation of Hudson Community Power, such as

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- Other confidential customer information that may be received or collected directly by Hudson Community Power or CPCNH, or through sources other than the EDI due to customer participation in particular related programs or services, billing operations, other customer services, or that may be volunteered by customers, will likewise only be used for statutorily authorized purposes as ICD.

Ongoing collection and use of individual customer data of the types described in Puc 2205.13 will be used for both:

1. **General operational needs** for retail power supply and related energy services operational needs, such as load and supply forecasting, portfolio management, billing and audit processes, and for research and development of potential new energy services to offer to customer participants; and
2. **Programmatic and customer-specific services and offerings**, such as responding to customer account queries, opt-in rates or demand side management for customers with flexible demand, distributed generation or storage, and interval meters; and other energy services that may be offered including programs for LMI participants that are qualified in the Electric Assistance Program (EAP).

In compliance with RSA 363:38 and RSA 363.37, CPCNH and third parties contracted through CPCNH that require access to ICD to provide services to Hudson Community Power will be contractually required to:

- Implement and maintain reasonable security procedures and practices appropriate to the nature of the ICD.
- Protect ICD from unauthorized access, use, destruction, modification, or disclosure.
- Use ICD solely for primary purposes, such as: complying with the provisions of RSA 53-E:7, II; providing or billing for electrical service; meeting system, grid, or operational needs; researching, developing, and implementing new rate structures and tariffs, demand response, customer assistance, energy management, or energy efficiency programs; and for research and development of potential new energy services to offer to customer participants.
- Collect, store, use, and disclose only as much ICD as is necessary to accomplish the aforementioned primary purposes.
- Not use ICD for a secondary commercial purpose unrelated to the aforementioned primary purposes of the contract without the express consent of the customer.
- Return or permanently delete all ICD after contract termination and deliver a certificate, signed by an authorized representative, stating that all ICD has been returned or permanently deleted and that all materials based on ICD has been destroyed, as appropriate (i.e., except for copies necessary for tax, billing, or other financial purposes).

Additionally, if CPCNH contracts with one or more Competitive Suppliers to provide Load Serving Entity services to participating customers, or brokers to support operations in a capacity that would require access to ICD, then the Competitive Suppliers and/or brokers would additionally be

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Formatted: Font: (Default) Calibri, Font color: Custom Color(RGB(5,99,193)) required to comply with the requirements of Puc 2004.19 (*Protection of Confidential Customer Information)*, which are excerpted below in the section "Statutory and Rule Requirements" for reference.

Responsibilities of the Town of Hudson

As noted earlier, the Town may decide to contract with CPCNH, as an all-requirements joint powers agency, for the provision of LSE services, all requirements energy supply and all other energy services required to implement and operate Hudson Community Power. The following information is specific to such a possible contractual relationship.

The Town Manager shall review that CPCNH has adequate policies, procedures and measures in place to protect confidential information and that contractual requirements consistent with the Town's obligations to protect ICD as required under RSA 363.37, RSA 363:38 and RSA 53-E:4, VI, and consistent with PUC rules, including Puc 2004.19 and its non-disclosure restrictions, are incorporated into any contracts with CPCNH, or any other third parties that are authorized to access ICD on behalf of the Town before executing any such contracts.

The Town expects contracts and policies to provide for:

- Third-party security assessment requirements regarding: Information Security Management; Personnel Security; Systems Development and Maintenance; Application Security; System Security; Network Security; Data Security and Integrity; Access Control; and Vulnerability Management.
- Third-party security requirements including: (1) User Account and Access Controls to ensure that only authorized individuals have access to ICD for legitimate primary purposes under RSA 368:38, which may include the need for non-disclosure agreements; (2) Handling of Sensitive Data Protocols to protect confidential customer information from unauthorized access, use, destruction, modification, or disclosure; (3) Breach Reporting, including obligations to report a security breach as defined in RSA 359-C:19, V and required by RSA 359-C:20 and any other applicable laws, rules, or utility requirements for data breach reporting; (4) Plan for deletion and destruction ICD when it is no longer necessary to accomplish primary purposes pursuant to RSA 368:38; and (5) Prohibitions on use of ICD for a secondary commercial purpose not related to the primary purpose of vendor's contract without the express consent of the customer.
- Third-party documentation and reporting requirements regarding, as applicable: Audit Reports (e.g. SSAE 16/SOC Report); Documentation describing Control practices used to review sub-vendors; Maintenance of an Information Security Program; Training Program for Employees on Cyber Awareness; Background checks performed for all employees with access to ICD; Immediate Data Breach reporting to appropriate parties; and any material changes in Data Security practices since prior review and approval.

Lastly, in the event that the Town does not contract with CPCNH to provide energy services to Hudson Community Power, then the Town will develop and adopt policies and contracts that ensure compliance with the Town's obligations as a Service Provider to protect and maintain the confidentiality of ICD under RSA 363:38, RSA 363.37 and other applicable statutes and Public Utilities Commission rules prior to directly collecting, storing, using, or disclosing any ICD or

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Formatted: Font: (Default) Calibri, Font color: Custom Color(RGB(5,99,193)) contracting with other Competitive Suppliers, brokers and/or other third-party vendors that require access to ICD.

Additional References: Statutory and Regulatory Requirements

The sections below are provided for additional reference, and summarize the different requirements that apply to (1) Community Power Aggregators and Service Providers, (2) brokers and Competitive Electric Power Suppliers (CEPS) that provide Load Serving Entity services under contract to Community Power Aggregators, and (3) access to ICT through the Multi-Use Energy Data Platform authorized under RSA 378:50-54 (if and when it becomes operational).

Statutory Requirements for Community Power Aggregators & Service Providers

Statutory requirements regarding the use of Individual Customer Data for Community Power Aggregators are summarized below:

- RSA 363:37, I defines Individual Customer Data (ICD) *as "information that is collected as part of providing electric, natural gas, water, or related services to a customer that can identify, singly or in combination, that specific customer, including the name, address, account number, quantity, characteristics, or time of consumption by the customer*."
- RSA 363:38, IV requires Service Providers to "*use reasonable security procedures and practices to protect individual customer data [ICD] from unauthorized access, use, destruction, modification, or disclosure*."
- RSA 53-E:4, VI provides that Community Power Aggregations (CPAs) "*shall be subject to RSA 363:38 as service providers and individual customer data shall be treated as confidential private information* and *shall not be subject to public disclosure under RSA 91-A*".
    - The definition of Service Provider under RSA 363:37, II includes "*an aggregator, as defined by RSA 53-E:2, II…and any other service provider that receives individual customer data [ICD]…*"
    - RSA 53-E:2, II defines an "*aggregator*" in this context as "*any municipality or county that engages in aggregation of electric customers within its boundaries*".
    - RSA 53-E:2, VI further defines "*municipality*" in this context as "*any city, town, unincorporated place, or village district within the state*."
- RSA 363:38, II requires Service Providers to: "*(a) Collect, store, use, and disclose only as much individual customer data [ICD] as is necessary to accomplish primary purposes, and (b) Use individual customer data solely for primary purposes*."
- RSA 363:37, III defines "*[p]rimary purpose*" as "*the main reason for the collection, storage, use, or disclosure of individual customer data [ICD] which is limited to: (a) Providing or billing for electrical or gas service. (b) Meeting system, grid, or operational needs. (c) Researching, developing, and implementing new rate structures and tariffs, demand response, customer assistance, energy management, or energy efficiency programs*."
- RSA 53-E:4, VI further authorizes approved Community Power Aggregations to "*use individual customer data to comply with the provisions of RSA 53-E:7, II and for research*

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Formatted: Hyperlink, Font: (Default) Calibri, 12 pt, Font color: Custom Color(RGB(5,99,193)) *and development of potential new energy services to offer to customer participants*."

- RSA 363:38, V(b) further makes clear that a Service Provider may disclose ICD "*to a third party for system, grid, or operational needs, or the research, development, and implementation of new rate structures and tariffs, demand response, customer assistance, energy management, or energy efficiency programs*" — provided that the Service Provider "*has required by contract that the third party implement and maintain reasonable security procedures and practices appropriate to the nature of the information, to protect the personal information from unauthorized access, use, destruction, modification, or disclosure, and to prohibit the use of the data for a secondary commercial purpose not related to the primary purpose of the contract without the express consent of the customer*."

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- RSA 363:38, V(c) provides that *"[n]othing in this section shall preclude a service provider from disclosing electric, natural gas, or water consumption data required under state or federal law, or which is identified as information subject to warrant or subpoena or by an order of the commission*."

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- RSA 363:38, V(a) makes clear that ICD may be aggregated and used for "*analysis, reporting, or program management after information that identifies an individual customer has been removed*."

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Additional Requirements Specific to Brokers & Competitive Suppliers

Pursuant to Puc 2205.02 under the PUC's CPA Administrative Rules, brokers and Competitive Suppliers that are hired by municipalities to manage and operate Community Power Aggregations and provide Load Serving Entity services to participating customers must comply with the requirements of Puc 2004.19 (*Protection of Confidential Customer Information)*, which is excerpted below for reference along with Puc 2002.09 (*Confidential Customer Information*).

Note that the use of the term "aggregator" throughout Puc 2004.19 below refers to brokers and does not refer to or otherwise apply to Community Power Aggregators.

As context, these requirements are part of the Commission's Chapter Puc 2000 rules ("*Competitive Electric Power Supplier and Aggregator Rules*), which apply to Competitive Suppliers and brokers—referred to as "CEPS" and "aggregators" below, respectively — and are expressly not applicable to "*municipalities or counties providing electricity or aggregating within the boundaries of participating municipalities under RSA 53-E*" (Community Power Aggregators) per Puc 2001.02 (*application of rules).*

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> ***Puc 2002.09 "Confidential customer information"*** *means information that is collected as part of providing electric services to a customer that can identify, singly or in combination, that specific customer, and includes the customer name, address, and account number and the quantity, characteristics, or time of consumption by the customer, and also includes specific customer payment, financial, banking, and credit information.*
>
> ***…***

Puc 2004.19 Protection of Confidential Customer Information.

(a) No CEPS or aggregator shall, except as permitted under (c) below or as otherwise required by law, release confidential customer information without express written authorization from the customer.

(b) A CEPS or aggregator shall implement and maintain reasonable security procedures and practices appropriate to the nature of the information, to protect confidential customer information from unauthorized access, use, destruction, modification, or disclosure, and to prohibit the use of the confidential customer information for a secondary commercial purpose not related to the primary purpose of the service provided to the customer, without the express written consent of the customer.

(c) A CEPS or aggregator may disclose to a third party subject to non-disclosure restrictions confidential customer information as necessary for any one or more of the following purposes:

(1) Billing for electric service;

(2) Meeting electric system, electric grid, or other operational needs;

(3) Implementing any one or more of the following programs:

- *a. Demand response;*
- *b. Customer assistance;*
- *c. Energy management; and*
- *d. Energy efficiency.*

(d) For purposes of this section, the term "non-disclosure restrictions" means that the CEPS or aggregator has required by contract that the third party implement and maintain reasonable security procedures and practices appropriate to the nature of the information, to protect the confidential customer information from unauthorized access, use, destruction, modification, or disclosure, and to prohibit the use of the confidential customer information for a secondary commercial purpose not related to the primary purpose of the contract without the express consent of the customer.

(e) A customer granting authorization to release confidential customer information for purposes described in the terms and conditions of service shall satisfy the requirement in (a) above.

(f) A CEPS or aggregator granted agency authority shall be deemed authorized to obtain customer usage information when it has received customer authorization as described in Puc 2004.08 or Puc 2004.09.

(g) In the event of a dispute about the release of confidential customer information, including whether the information is or should be confidential, a CEPS, aggregator, or customer may file a complaint with the commission for resolution.

Additional Requirements for the Multi-Use Energy Data Platform

If and when the Multi-Use Energy Data Platform (Platform) authorized under RSA 378:50-54 becomes operational, Hudson Community Power and any third-parties under contract that require access to ICD sourced from the Platform — such as CPCNH and third-parties contracted through CPCNH — will be required to comply with any Platform User Requirements, Privacy Standards, Annual Attestations, and obligations to report a security breach pursuant to terms of Settlement Agreement conditionally approved by the PUC in DE 19-197 and detailed in Exhibit C of the Agreement found in Exhibit 1B and as may be actually implemented.

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TOWN OF HUDSON

FIRE DEPARTMENT

39 FERRY STREET, HUDSON, NEW HAMPSHIRE 03051

8C

Emergency 911
Business 603-886-6021
Fax 603-594-1164

Scott J. Tice
Chief of Department

TO: Marilyn McGrath
Chairperson, Board of Selectmen

FR: Scott J. Tice
Fire Chief

DT: June 5, 2023

RE: June 13, 2023 BOS Public Agenda

Please place the following item on the above-indicated agenda from the Fire Department.

I've attached a letter of resignation from Firefighter/AEMT Benjamin Savage effective August 10, 2023.

Firefighter Savage joined the department in October of 2018. Throughout his tenure with us he has taken an active role in mentoring and volunteering at various events. Over the past year he has served as an Advisor in our Explorer program. We thank him for his service and appreciate his contributions throughout the past four years.

We ask the Board of Selectman to accept his letter of resignation and we wish him all the best in his future endeavors.

Motion:
To accept the letter of resignation from Firefighter/AEMT Benjamin Savage effective August 10, 2023 with the Board's thanks and appreciation.

Agenda 7-25-2

TOWN OF HUDSON

Cable Utility Committee

Michael O'Keefe, Chairman   Robert Guessferd, Selectmen Liaison

8D

12 School Street • Hudson, New Hampshire 03051 • Tel: 603-578-3959 •

RECEIVED
JUL 18 2023
TOWN OF HUDSON
SELECTMENS OFFICE

To: Board of Selectmen

From: James S. McIntosh
Director of Community Media

Date: July 18, 2023

Re: HCTV Camera Operator Hire

I, James McIntosh, the Director of Community Media, am requesting that the Board of Selectmen consider adjusting the hourly compensation for the HCTV part-time Videographer position from $15 per hour to $15.50 per hour. This will reflect an approximately 3% increase

I would like to request this adjustment in compensation for this position in order to encourage good applicants to put in for hiring for this position which will help HCTV to maintain a competitive edge in the local entry position hiring market.

Thank you for your consideration and support.

James McIntosh
Director of Community Media

Agenda 7-25-23

TOWN OF HUDSON
Office of the Town Administrator
12 School Street
Hudson, New Hampshire 03051

Stephen A. Malizia, Town Administrator – smalizia@hudsonnh.gov – Tel: 603-886-6024 Fax: 603-598-6481

8E

To: Board of Selectmen

From: Steve Malizia, Town Administrator

Date: July 12, 2023

Re: Updating Limits for Purchase, Contracts, Bids, under Town Code Chapters 98-5, 98-6 and 98-7

At their meeting on July 11, 2023 the Board of Selectmen held a Public Hearing to take public comment on an amendments to Town Code Chapters 98-5, 98-6 and 98-7, Purchasing and Contracts. The amendments would increase the limits stated in the chapters from $10,000 to $20,000 and $25,000 to $50,000. Should the Board of Selectmen vote to amend the Town Code Chapters 98-5, *Selectmen action required for purchases and contracts over $25,000*, 98-6, *Rules and regulations for purchases and contracts under $25,000* and 98-7, *Bidding procedures*, the following motion would be appropriate.

Motion: To amend Town Code Chapters 98-5, Selectmen action required for purchase and contracts over $25,000, 98-6, Rules and regulations for purchases on contracts under $25,000 and 98-7, Bidding Procedures, by increasing the limits stated in the Chapter from $10,000 to $20,000 and from $25,000 to $50,000 and by adding 98-7 B (3) All departments shall complete the "Request for Proposal/Bid Checklist" which will be submitted and filed with the bid award package.

Should you have any questions or need additional information, please feel free to contact me. Thank you.

Town of Hudson, NH
Thursday, June 22, 2023

Chapter 98. Purchasing and Contracts

[HISTORY: Adopted by the Town Council of the Town of Hudson as indicated in article histories. Amendments noted where applicable.]

GENERAL REFERENCES
Costs for visits — See Ch. **141**.

Article I. General Purchasing Regulations

[Adopted under Article 5.14 of the Charter of the Town of Hudson,[1] continued by motion of the Board of Selectmen 7-1-1992; amended 2-23-1993; 3-3-1999; 10-28-2003 by the Board of Selectmen.]

[1] *Editor's Note: Pursuant to Res. No. R92-71, adopted 6-8-1992, effective 7-1-1992, repealed the Hudson Town Charter.*

§ 98-1. Policy stated.

It shall be the policy of the Town of Hudson, New Hampshire, as adopted by the Board of Selectmen that:

A. The Administrative Code shall establish purchasing and contract procedures, including the assignment of all responsibilities for such purchases, to the Board or Selectman or its designee, or such purchasing agent as established by the legislative body, and the combination purchasing of similar articles by different departments.

B. The Board of Selectman (BOS) shall establish from time to time dollar limits for purchases and contracts, which must be by competitive bid, and shall establish the bidding procedures. No competitive bids shall be required when purchasing through the State of New Hampshire bid prices.

C. Requirements for bids may be waived in specific instances by a majority vote of the BOS in attendance at a duly advertised meeting. The BOS shall establish dollar amounts for purchases or contracts, beyond which no purchase shall be made or contracts entered into without the affirmative vote of a majority of the BOS in attendance at a duly advertised meeting. Once the BOS has voted to make a purchase or enter into a contract, the Chairman shall carry out the vote of the BOS and enter into such transaction on behalf of the Town.

D. The purchase of, or the contract for the provision of, all materials, supplies, and contractual services utilized by any agency of the Town of Hudson shall be pursued in accordance with the provisions of this article and other such rules and regulations, as may be promulgated by the Finance Director with the approval of the Board of Selectmen.

E. In no instance shall such rules and regulations promulgated by the Finance Director, with the approval of the BOS, contradict any provision of this article. The provisions of these rules do not apply to the acquisition or disposition of real property or improvements, nor does it apply to appurtenant structures valued over $10,000.

§ 98-2. Purchasing agent.

The Finance Director of the Town shall serve as the Board of Selectmen's designee as Purchasing Agent.

§ 98-3. Powers and duties of the purchasing agent.

The Finance Director shall direct the operation of the Town's purchasing system as follows:

A. With the approval of the BOS, the Finance Director shall establish, and amend when necessary, all rules and regulations allowed by this article and necessary to the effective operation of the purchasing system.

B. The Finance Director shall approve and/or negotiate all purchases and contracts made by the Town. All such approvals or negotiations are subject to the review and/or approval of the BOS unless otherwise provided for in this article.

C. The Finance Director shall prescribe and maintain such forms as he/she shall find reasonable and necessary to fulfill the purpose of this article.

D. The Finance Director shall prepare and adopt a standard purchasing nomenclature for using agencies and suppliers.

E. When deemed necessary or desirable, the Finance Director shall combine requirements of using agencies to effect delivery, unit cost or other procurement factors that are in the best interests of the Town.

F. When deemed necessary or desirable, the Finance Director, with the approval of the BOS, shall have the authority to join with other units of government in cooperative purchasing plans to effect delivery, unit cost or other procurement factors that are in the best interests of the Town.

G. With the approval of the BOS, the Finance Director shall implement the conditions and terms under which services, materials, and supplies may be acquired from federal, state, school, and other government agencies or associated organizations and to negotiate the prices of such purchases.

H. The Finance Director shall maintain such stores of materials and supplies as he/she deems necessary to support the individual and/or aggregate requirements of the using agencies. The distribution of items from such stores shall be executed only upon the approval of the Finance Director according to rules and regulations promulgated by the Finance Director.

I. With the approval of the BOS and in cooperation with using agencies, the Finance Director may declare any operating equipment, materials and supplies surplus. After reasonable public notice, the Finance Director, with the approval of the BOS, may dispose of any item declared to be surplus in a manner that encourages the most desirable financial arrangement for the Town and provides for equal opportunity for participation by the public.

§ 98-4. Conflict of interest.

Any purchase order or contract within the purview of this article in which the Finance Director, or any officer or employee of the Town, is financially interested directly or indirectly shall be void; except that, before the execution of a purchase order or contact, the BOS shall have the authority to waive compliance with this provision when it finds such action to be in the best interest of the Town.

§ 98-5. Selectmen action required for purchases and contracts

over ~~$25,000.~~ 50,000

A. A majority vote of the Board of Selectmen in attendance at a duly advertised meeting is required to approve any purchases or contracts of ~~$25,000~~ $50,000 or more. In support of the consideration of such action, the Finance Director must provide the following information:

(1) The department or project budget to which the purchase or contract would be charged;

(2) Confirmation that the budget impact of the proposed purchase or contract does not give rise to the Town authorizing an appropriation not budgeted at the annual budget, unless voted by a majority of the BOS after a public hearing, conducted by the BOS, held to discuss an appropriation transfer, and/or that no money shall be drawn from the Treasury of the Town, nor shall any obligation for the expenditure of money be incurred except pursuant to a budget appropriation.

(3) Confirmation that advertising and competitive bidding procedures were followed as provided for in Subsection A(4) below.

(4) A recommendation for award of purchase or contract to the lowest bidder in accordance with the best interest of the Town.

B. The BOS may reject any or all bids on the recommendation of the Finance Director or for other stated cause. Upon approval by the BOS for a purchase or contact of ~~$25,000~~ 50,000 or more, the Chairman is authorized to execute such contractual instruments as may be required to complete the transaction.

§ 98-6. Rules and regulations for purchases and contacts under ~~$25,000~~. 50,000

A. For purchases and contracts less than ~~$25,000~~ 50,000, the Finance Director shall establish rules and regulations that assure the following:

(1) Competition;

(2) Equal opportunity as required by applicable federal, state, and Town laws;

(3) Contractual protection of the Town;

(4) Award of purchases and contacts to the lowest bidder in accordance with the best interest of the Town; and

(5) Compliance with the provisions of § 98-5A(2).

B. Approval requirements. The Board of Selectmen shall from time to time establish the approval requirements for all purchases and contracts less than ~~$25,000~~. 50,000

§ 98-7. Bidding procedures.

For all planned purchases and contracts of goods and services estimated to total ~~$10,000~~ 20,000 or more, the following shall be required.

A. A description in the form of specifications, proposed scope of services, or other such documentation shall be developed that allows prospective bidders to make a responsive bid in accordance with the best interests of the Town. Such specifications, proposed scope of services or other such documentation shall be reviewed for compliance with all relevant Town policies

and procedures by the Finance Director, and by the Town Administrator for all purchases and contracts estimated to total ~~$25,000~~ or more.
50,000

B. Solicitation of bids. Bids shall be solicited as follows:

(1) At least four qualified bidders shall receive direct solicitations in writing to bid on the basis of documentation as described in § 98-7A. If fewer than four qualified bidders are solicited to bid, the reasons shall be documented and placed in the files of the Town. Such solicitations shall be mailed at least 14 days prior to the bid opening date as described below.

(2) The Town's desire to receive bids shall be published in at least one general circulation news publication that serves the Nashua Standard Metropolitan Statistical Area. Such advertisement shall briefly describe the service, material, supply, or equipment to be purchased, the method of obtaining the complete description of the desired service, material, supply, or equipment, the form in which the bid is to be delivered to the Town, the time, date and location of receipt of the bid, and the time, date, and location for opening and announcement of bids. Such advertisement shall appear at least 14 calendar days before the planned date of receipt of bids.

(3)

50,000

C. Determination of successful bidder. For any purchase or contact of ~~$25,000~~ or more, the Finance Director shall submit a recommendation to the Board of Selectmen, as described in § 98-5, no more than 30 days after the opening and/or announcement of bids. For purchases of 24,000 ~~$10,000~~ but less than ~~$25,000~~, the Finance Director shall submit a recommendation for approval by a majority of the BOS. 50,000

D. Disqualified bidders. The Town of Hudson BOS shall review and consider the past course of dealings that the municipality has had, if any, with a prospective bidder, respondent, contractor, or employee in evaluating a response to any Town solicitation for bids, proposals, work, or employment.

§ 98-8. Contracting authority.

A. Subject to other provisions of this article and consistent with other applicable provisions of the laws of the state of New Hampshire and the Town of Hudson, the BOS is authorized to execute such contractual instruments as may be required to complete the purchase of any operating equipment, material, supply, service, or improvement to real property on behalf of all agencies of the Town of Hudson.

B. The BOS may assign contracting authority, i.e., signature privilege, to the Chairman of the Planning Board for Land Use Fees called "Agency Fees," listed as 1260, 1270, and other land use fees that may be agreed to by the Planning Board and with the signature of the developer to pay for 100% of any improvement, without Town matching funds, connected with any Planning Board approved development. All purchases of goods and/or services must comply with all of the policies and regulations of the Town of Hudson and this Purchasing Policy. No expenditure of Agency Fee monies that would hold the Town of Hudson liable for reimbursement or matching funds, and therefore impact the tax rate for the Town of Hudson, may be made without the express authorization of the Hoard of Selectmen in compliance with this Purchasing Policy.

C. Each land use board may accept and use gifts, grants, or contributions for the exercise of its functions, in accordance with the purchasing policy procedures established herein.

Article II. (Reserved)

[1] *Editor's Note: Former Article II, American-Made Products Policy, adopted 2-13-1990 by Res. No. R90-5A, as amended, was deleted at the town's request with Supplement No. 9.*

§ 98-9. through § 98-12. (Reserved)

Article III. Sand, Gravel, Stone and Bituminous Products

[Adopted 4-23-1991 by Res. No. R91-26]

§ 98-10. Contract for purchases; procedure.

After the effective date of this article, all purchases of sand, gravel, stone and bituminous products shall be contracted for at the beginning of each year for a one-year period only via the sealed bid procedure known as a "purchase agreement," which shall be drafted by the Town Legal Officer. This article shall become effective 30 days after passage, as follows:

A. Year No. 1 shall begin 30 days after passage and continue through June 30, 1992.

B. Year No. 2 shall begin on July 1, 1992, and continue through June 30, 1993.

C. All future years shall begin on July 1 and end on June 30 of the following year.

D. At least five bidders shall be sent invitations for sealed bids. If fewer than three bids are received, a permanent record of that bid process shall be filed in the Administrative Office of Hudson, with a copy to each Selectman.[1]

[1] *Editor's Note: Pursuant to Res. No. R92-71, adopted 6-8-1992, effective 7-1-1992, this subsection has been revised to change "Councillor" to "Selectman."*

E. Sealed bid procedure shall follow all current and future rules of procurement now in force in the state statutes.

F. All awards shall be made after review and approval of the Board of Selectmen, by resolution, duly adopted.[2]

[2] *Editor's Note: Pursuant to Res. No. R92-71, adopted 6-8-1992, effective 7-1-1992, this subsection has been revised to change "Council" to "Board of Selectmen."*

§ 98-11. Exceptions.

Only in rare and unusual cases shall this article be violated (i.e., violent acts of nature, which would result in an immediate safety health hazard to residents).

Attachment "A"

§98-7. Bidding procedures.

B. Solicitation of Bids. Bids shall be solicited as follows:

(3) All departments shall complete the "Request for Proposal/Bid Checklist" which will be submitted and filed with the bid award package.

Attachment "B"

TOWN OF HUDSON

12 School Street • Hudson, New Hampshire 03051 • Tel: 603-886-6000 • Fax: 603-598-6481

Request for Proposal/Bid Checklist

Department:____

Project Name: ______________________________________

Date: ____

Budget: ____

Was this Project Advertised: _____Yes ☐ No ☐

Where: ____

Was it delivered to four vendors/contractors: Yes ☐ _____ No ☐

If No, reason why: __________________________________

____

____

If Yes, list of vendors/contractors delivered to:

1.) ____

2.) ____

3.) ____

4.) ____

Selected Contractor / Vendor:___________________________

Award Amount:_____________________________________

Agenda
7-25-23

TOWN OF HUDSON
Office of the Town Administrator
12 School Street
Hudson, New Hampshire 03051

8F

Stephen A. Malizia, Town Administrator – smalizia@hudsonnh.gov – Tel: 603-886-6024 Fax: 603-598-6481

To: Board of Selectmen

From: Steve Malizia, Town Administrator

Date: July 18, 2023

Re: Town of Hudson Firefighters IAFF Local 3154 Union Successor Contract

The Hudson Firefighters IAFF Local 3154 Union has submitted a request to negotiate a successor contract. I am requesting that the Board of Selectmen appoint the Selectman member of the negotiating team. Per Town Code Chapter 75, Negotiating Team for Labor Contracts, a member of the Board of Selectmen shall serve as a liaison to the negotiation team for the Town. The Board will need to appoint a member to serve on the negotiating team for the Firefighters IAFF Local 3154 Union successor contract. As Selectman Morin is the liaison to the Fire Department, it would be appropriate to appoint him as the Selectman member of that negotiating team. Should the Board of Selectmen approve this appointment, the following motion is appropriate:

Motion: To appoint Selectman Morin to the negotiating team for the Town of Hudson Firefighters IAFF Local 3154 Union successor contract.

Should you have any questions or need additional information, please feel free to contact me. Thank you.

Agenda 7-25-23

TOWN OF HUDSON
Office of the Town Administrator
12 School Street
Hudson, New Hampshire 03051

8G

Stephen A. Malizia, Town Administrator – smalizia@hudsonnh.gov – Tel: 603-886-6024 Fax: 603-598-6481

To: Board of Selectmen

From: Steve Malizia, Town Administrator

Date: July 18, 2023

Re: Town of Hudson Public Works Department Successor Contract

In anticipation of a request to negotiate a successor contract from the Hudson Public Works Department Union, I am requesting that the Board of Selectmen appoint the Selectman member of the negotiating team. Per Town Code Chapter 75, Negotiating Team for Labor Contracts, a member of the Board of Selectmen shall serve as a liaison to the negotiation team for the Town. The Board will need to appoint a member to serve on the negotiating team for the Public Works Union successor contract. As Selectman Morin is the liaison to the Public Works Department, it would be appropriate to appoint him as the Selectman member of that negotiating team. Should the Board of Selectmen approve this appointment, the following motion is appropriate:

Motion: To appoint Selectman Morin to the negotiating team for the Town of Hudson Public Works Department Union successor contract.

Should you have any questions or need additional information, please feel free to contact me. Thank you.