



*I-95 Traffic Operations and Traffic Management On-Call
Technical Memorandum*

Calibrate and Implement Signal Timing

June 28, 2007

**Prepared for
South Central Regional Council of Governments**

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Overview

Traffic signal timing plans were developed for 39 intersections that were identified by SCRCOG, the City of New Haven and the Consultant as listed in Table 1 and shown in Figure 1. Four timing plans were developed for 35 of the intersections. A single emergency timing plan was developed for four of the intersections. The timing plans for 21 of the intersections were input to the central traffic control computer located in the City of New Haven, and observed and monitored in the field.

Network Development and Calibration

The SYNCHRO traffic simulation network for the study area was developed and calibrated using traffic and roadway data from an earlier (Phase 1) study supplemented by additional data provided by SCRCOG and the City of New Haven. In addition, field observations were conducted during the study to observe queuing, conflicts, signal timing operations and other pertinent traffic operational conditions, and were used to help refine the calibrated network for existing conditions.

Six sub-area networks were developed: Three were implemented, and three are to be implemented at a later date.

- **Ikea Area:** This sub-area includes six signalized intersections controlled by the Naztec type signal controller. Four timing plans were developed. Two of the plans - weekday AM peak, and weekday PM peak / Saturday-Sunday midday – were successfully implemented and monitored on June 28th, 2007. The other two plans are for the same time periods for the future condition when diversion due to I-95 reconstruction is projected to occur. These plans were entered and stored into the system. In addition, at one location (the intersection at Ikea driveway), a fifth plan was implemented and monitored for Saturday-Sunday midday. Existing and proposed plans are presented in Tables 2A and 2B, respectively.
- **Grand Avenue:** This sub-area includes four signalized intersections controlled by the Naztec type signal controller. One timing plan was developed for emergency situations when incidents on southbound I-91 are projected to cause traffic to be diverted to this corridor. The plan was entered and stored into the system. It was tested and adjusted during the midday period on June 27th, 2007. Existing and proposed plans are presented in Tables 3A and 3B, respectively.
- **Lower State Street and Water Street.** This sub-area includes eleven signalized intersections controlled by the Transcore type signal controller. Four timing plans were developed. Two of the plans – weekday AM peak and weekday PM peak – were entered and stored into the system. They were partially tested, but infrastructure issues with the City’s central computer system prevented the plans from running live for more than a few hours. These two plans will be monitored when infrastructure issues are cleared up, expected to occur during the first or second week in July, 2007. The other two plans are for the same time periods for the future condition when diversion

due to I-95 reconstruction is projected to occur. These plans were entered and stored into the system. Existing and proposed plans are presented in Tables 4A and 4B, respectively.

- **Upper State Street and Middletown Avenue.** This sub-area includes nine intersections. Four plans were developed for the future condition – weekday AM peak, weekday PM peak, daily midday, and all other times. These plans will be implemented when new signal hardware comes online, projected to occur about 2009. It was assumed that the future hardware would include signal equipment not currently present, such as controllers capable of coordinated operation, loop detectors and pedestrian signals, per Design Report for Zone 5d, Computerized Signal System Phase 3, issued by Wilbur Smith Associates in November, 1999. Existing and proposed plans are presented in Tables 5A and 5B, respectively.
- **Forbes Avenue.** This sub-area includes five signalized intersections. Four of the signals are currently under ConnDOT’s jurisdiction. One is an isolated intersection under the jurisdiction of the city of New Haven. Four timing plans were developed for the future condition – weekday AM peak, weekday PM peak, weekday midday, and all other times. Existing and proposed plans are presented in Tables 6A and 6B, respectively.
- **Middletown Avenue and Foxon Boulevard.** This sub-area includes four intersections. Signal control is currently under ConnDOT’s jurisdiction. Four plans were developed for the future condition – weekday AM peak, weekday PM peak, daily midday, and all other times. Existing and proposed plans are presented in Tables 7A and 7B, respectively.

Figures 2 through 7 show the SYNCHRO traffic networks for the four sub-areas.

**TABLE 1
SUMMARY OF STUDY INTERSECTIONS**

No.	Corridor	Major Street	Minor Street	Jurisdiction	System	Contoller Type	Deliverable	No. of Timing Plans	Studied during Phase 1?
1	Ikea	Sargent Dr	Brewery St	New Haven	Naztec	Naztec 2070 TS-0	Implement and Monitor	3	No
2	Ikea	Long Wharf Dr	Canal Dock Rd	New Haven	Naztec	Naztec 2070 TS-1	Implement and Monitor	4	No
3	Ikea	Sargent Dr	Canal Dock Rd	New Haven	Naztec	Naztec 2070 TS-1	Implement and Monitor	4	No
4	Ikea	Sargent Dr	I-95 SB Off Ramp Exit 46	New Haven	Naztec	Naztec 2070 TS-1	Implement and Monitor	4	No
5	Ikea	Sargent Dr	Church St Extension	New Haven	Naztec	Naztec 2070 TS-1	Implement and Monitor	4	No
6	Ikea	Sargent Dr	I-95 SB On Ramp Exit 46	New Haven	Naztec	Naztec 2070 TS-1	Implement and Monitor	4	No
7	Grand Ave	E Grand Ave	Quinnipiac Ave	New Haven	Naztec	Naztec 2070 TS-1	Implement	1 (Emergency)	Yes
8	Grand Ave	Grand Ave	Front St	New Haven	Naztec	Naztec 2070 TS-1	Implement	1 (Emergency)	Yes
9	Grand Ave	Grand Ave	Clinton Ave	New Haven	Naztec	Naztec 2070 TS-1	Implement	1 (Emergency)	No
10	Grand Ave	Grand Ave	Ferry St	New Haven	Naztec	Naztec 2070 TS-1	Implement	1 (Emergency)	Yes
11	US1	Water St	Chestnut St	New Haven	Transcore	Naztec, TCT TS-1	Implement and Monitor	4	No
12	US1	Water St	Brewery St	New Haven	Transcore	Naztec, TCT TS-1	Implement and Monitor	4	Yes
13	US1	Water St	Olive St	New Haven	Transcore	Naztec, TCT TS-1	Implement and Monitor	4	Yes
14	US1	State St	Water St	New Haven	Transcore	Naztec, TCT TS-1	Implement and Monitor	4	Yes
15	Lower State St	NB State St	Fair St	New Haven	Transcore	Naztec, TCT TS-1	Implement and Monitor	4	Yes
16	Lower State St	SB State St	George St/Fair St	New Haven	Transcore	Naztec, TCT TS-1	Implement and Monitor	4	Yes
17	Lower State St	State St	Chapel St	New Haven	Transcore	Naztec, TCT TS-1	Implement and Monitor	4	Yes
18	Lower State St	State St	Court St	New Haven	Transcore	Naztec, TCT TS-1	Implement and Monitor	4	No
19	Lower State St	State St	Elm St/Grand Ave	New Haven	Transcore	Naztec, TCT TS-1	Implement and Monitor	4	Yes
20	Lower State St	State St	Grove St/Olive St	New Haven	Transcore	Naztec, TCT TS-1	Implement and Monitor	4	Yes
21	Lower State St	State St	Audubon St	New Haven	Transcore	Naztec, TCT TS-1	Implement and Monitor	4	Yes
22	Upper State St	State St	Humphery St	New Haven	Isolated	NA	Timing Only	4	Yes
23	Upper State St	State St	Edwards St	New Haven	Isolated	NA	Timing Only	4	Yes
24	Upper State St	State St	East St/Mechanic St	New Haven	Isolated	NA	Timing Only	4	Yes
25	Upper State St	State St	I-91 NB Off Ramp Exit 5/James St	New Haven	Isolated	NA	Timing Only	4	Yes
26	Upper State St	State St	Blatchley Ave/Willow St	New Haven	Isolated	NA	Timing Only	4	Yes
27	Upper State St	State St	Ferry St/May St	New Haven	Isolated	NA	Timing Only	4	Yes
28	Upper State St	Middletown Ave	Ferry St	New Haven	Isolated	NA	Timing Only	4	Yes
29	Upper State St	Middletown Ave	I-91 SB Off Ramp Exit 7	New Haven	Isolated	NA	Timing Only	4	No
30	Upper State St	Middletown Ave	Clinton Ave	New Haven	Isolated	NA	Timing Only	4	No
31	US1	Forbes Ave	Townsend Ave	ConnDOT	NA	NA	Timing Only	4	Yes
32	US1	Forbes Ave	Woodward Ave	ConnDOT	NA	NA	Timing Only	4	Yes
33	US1	Forbes Ave	Fulton St	ConnDOT	NA	NA	Timing Only	4	No
34	US1	Forbes Ave	Stiles St/Wheeler St	ConnDOT	NA	NA	Timing Only	4	No
35	US1	Water St	East St	New Haven	Isolated	NA	Timing Only	4	Yes
36	Middletown/Foxon	Middletown Ave	I-91 SB Ramp Exit 8	ConnDOT	NA	NA	Timing Only	1 (Emergency)	Yes
37	Middletown/Foxon	Middletown Ave	Foxon Blvd/I-91 NB Off Ramp Exit 8	ConnDOT	NA	NA	Timing Only	1 (Emergency)	Yes
38	Middletown/Foxon	Foxon Blvd	Shopping Center	ConnDOT	NA	NA	Timing Only	1 (Emergency)	No
39	Middletown/Foxon	Foxon Blvd	Quinnipiac Ave	ConnDOT	NA	NA	Timing Only	1 (Emergency)	Yes



**TABLE 2A
IKEA AREA (NAZTEC SIGNALS)
EXISTING TIMING**

MAIN ST	CROSS ST	SPLIT TABLE NO.	TIME	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	CYCLE	OFFSET
Long Wharf Dr	Canal Dock Rd	Split 1	0600-0900 M-F 1100-1700 S-S	11	28	22	19	0	0	0	0	80	31
		Split 3	1500-1900 M-F	11	32	22	25	0	0	0	0	90	52
Sargent Dr	Canal Dock Rd	Split 1	0600-0900 M-F 1100-1700 S-S	8	15	22	0	8	15	16	19	80	1
		Split 3	1500-1900 M-F	8	24	22	0	8	24	19	17	90	1
Sargent Dr	I-95 SB Off	Split 1	0600-0900 M-F 1100-1700 S-S	0	27	28	20	0	0	0	0	85	31
		Split 3	1500-1900 M-F	0	47	28	15	0	0	0	0	90	78
Sargent Dr	Church St Ext/ I-95 SB On-Ramp	Split 1	0600-0900 M-F 1100-1700 S-S	0	25	24	10	9	12	0	0	80	63
		Split 3	1500-1900 M-F	0	19	24	22	9	16	0	0	90	42
Sargent Dr	Brewery St	Split 1	0600-0900 M-F 1100-1700 S-S	0	24	23	20	13	0	0	0	80	49
		Split 3	1500-1900 M-F	0	34	23	19	14	0	0	0	90	54

**TABLE 2B
IKEA AREA (NAZTEC SIGNALS)
PROPOSED TIMING**

MAIN ST	CROSS ST	SPLIT TABLE NO.	TIME	Phas 1	Phas 2	Phas 3	Phas 4	Phas 5	Phas 6	Phas 7	Phas 8	CYCLE	OFFSET
Long Wharf Dr	Canal Dock Rd	Split 5	Present 0600-0900 M-F	17	27	22	14	0	0	0	0	80	53
		Split 6	Present 1500-1900 M-F Present 1100-1700 S-S	16	33	22	19	0	0	0	0	90	56
		Split 7	Future 0600-0900 M-F	21	34	22	13	0	0	0	0	90	10
		Split 8	Future 1500-1900 M-F Future 1100-1700 S-S	11	44	22	13	0	0	0	0	90	44
Sargent Dr	Canal Dock Rd / Ikea Driveway	Split 5	Present 0600-0900 M-F	8	22	22	0	8	22	13	15	80	9
		Split 6	Present 1500-1900 M-F Present 1100-1700 S-S	10	34	22	0	10	34	9	15	90	45
		Split 7	Future 0600-0900 M-F	8	25	22	0	8	25	20	15	90	45
		Split 8	Future 1500-1900 M-F	9	32	22	0	9	32	12	15	90	63
		Split 9	Pres & Fut 1100-1700 S-S	9	25	22	0	9	25	9	25	90	36
Sargent Dr	I-95 SB Off	Split 5	Present 0600-0900 M-F	0	30	34	16	0	0	0	0	80	51
		Split 6	Present 1500-1900 M-F Present 1100-1700 S-S	0	36	37	17	0	0	0	0	90	3
		Split 7	Future 0600-0900 M-F	0	36	38	16	0	0	0	0	90	4
		Split 8	Future 1500-1900 M-F Future 1100-1700 S-S	0	40	34	16	0	0	0	0	90	21
Sargent Dr	Church St Ext/ I-95 SB On-Ramp	Split 5	Present 0600-0900 M-F	0	28	24	9	9	10	0	0	80	63
		Split 6	Present 1500-1900 M-F Present 1100-1700 S-S	0	26	24	9	14	17	0	0	90	42
		Split 7	Future 0600-0900 M-F	0	37	24	9	9	11	0	0	90	24
		Split 8	Future 1500-1900 M-F Future 1100-1700 S-S	0	31	24	9	12	14	0	0	90	59
Sargent Dr	Brewery St	Split 5	Present 0600-0900 M-F	0	23	23	19	15	0	0	0	80	41
		Split 6	Present 1500-1900 M-F Present 1100-1700 S-S	0	30	23	22	15	0	0	0	90	89
		Split 7	Future 0600-0900 M-F	0	28	23	21	18	0	0	0	90	1
		Split 8	Future 1500-1900 M-F Future 1100-1700 S-S	0	31	23	21	15	0	0	0	90	16

**TABLE 3A
GRAND AVENUE (NAZTEC SIGNALS)
EXISTING TIMING**

MAIN ST	CROSS ST	SPLIT TABLE NO.	TIME	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	CYCLE	OFFSET
Grand Ave	Quinnipiac Ave	Split 1	0600-0900 M-F	0	23	18	20	0	0	0	29	90	22
		Split 3	1500-1900 M-F	0	32	18	20	0	0	0	20	90	42
Grand Ave	Front St	Split 1	0600-0900 M-F	0	44	18	28	0	0	0	0	90	22
		Split 3	1500-1900 M-F	0	36	18	36	0	0	0	0	90	89
Grand Ave	Clinton Ave	Split 1	0600-0900 M-F	0	48	16	26	0	0	0	26	90	26
		Split 3	1500-1900 M-F	0	46	16	28	0	0	0	28	90	8
Grand Ave	Ferry St	Split 1	0600-0900 M-F	12	29	11	25	13	0	11	25	90	43
		Split 3	1500-1900 M-F	11	26	10	28	15	0	10	28	90	27

**TABLE 3B
GRAND AVENUE (NAZTEC SIGNALS)
PROPOSED TIMING**

MAIN ST	CROSS ST	SPLIT TABLE NO.	TIME	Phas 1	Phas 2	Phas 3	Phas 4	Phas 5	Phas 6	Phas 7	Phas 8	CYCLE	OFFSET
Grand Ave	Quinnipiac Ave	Split 10	Emergency	0	37	18	10	0	0	0	55	120	28
Grand Ave	Front St	Split 10	Emergency	0	58	18	44	0	0	0	0	120	26
Grand Ave	Clinton Ave	Split 10	Emergency	0	75	16	29	0	0	0	26	120	38
Grand Ave	Ferry St	Split 10	Emergency	10	57	10	27	16	0	11	26	120	54

TABLE 4B
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LOWER STATE ST AND WATER ST (TRANSCORE SIGNALS)
PROPOSED TIMING

MAIN ST	CROSS ST	CATEGORY	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	CYCLE	OFFSET	COMMENTS	
Water St	Chestnut St	Movement		EB/WB		SB								Detection at minor movement. Actuated/coordinated operation. Offset reference to beginning of yellow Phase 2.
		Type		Coordinated		Fixed								
		Plan 5 AM Peak Split		33		27						60	7	
		Plan 6 PM Peak Split		33		27						60	18	
		Plan 7 AM Peak Split Future		45		30						75	10	
		Plan 8 PM Peak Split Future		45		30					75	3		
Water St	Brewery St	Movement	WB	EB/WB		NB								No detection. Pre-timed operation. Offset reference to beginning of yellow Phase 2.
		Type	Fixed	Fixed		Fixed								
		Plan 5 AM Peak Split	11	32		17						60	12	
		Plan 6 PM Peak Split	19	25		16						60	34	
		Plan 7 AM Peak Split Future	19	37		19						75	12	
		Plan 8 PM Peak Split Future	23	31		21					75	30		
Water St	Olive St	Movement	EB/WB	SB										No detection. Pre-timed operation. Offset reference to beginning of yellow Phase 1.
		Type	Fixed	Fixed										
		Plan 5 AM Peak Split	36	24								60	35	
		Plan 6 PM Peak Split	32	28								60	22	
		Plan 7 AM Peak Split Future	46	29								75	31	
		Plan 8 PM Peak Split Future	42	33							75	22		
State St	Water St	Movement	NB-L/EB-R	SB	Ped	EB-R/WB	SB-L	NB	Dummy	Dummy				Detection at all minor movements. Actuated/coordinated operation with ped button. Offset reference to beginning of yellow Phases 2 and 6. Unused ped time goes to next phase.
		Type	Actuated	Coord	Ped Button	Actuated	Actuated	Coord						
		Plan 5 AM Peak Split	15	25	23	27	15	25	23	27	90	42		
		Plan 6 PM Peak Split	16	32	23	19	16	32	23	19	90	35		
		Plan 7 AM Peak Split Future	15	25	23	27	13	27	23	27	90	42		
		Plan 8 PM Peak Split Future	16	36	23	15	20	32	23	15	90	39		
SB State St	George St/ Fair St	Movement	NB	EB	Ped									No detection. Coordinated operation with ped button. Offset reference to beginning of yellow Phase 1. Unused ped time goes to coordinated phase.
		Type	Coord	Fixed	Ped Button									
		Plan 5 AM Peak Split	43	31	16							90	33	
		Plan 6 PM Peak Split	40	34	16							90	31	
		Plan 7 AM Peak Split Future	43	31	16							90	33	
		Plan 8 PM Peak Split Future	40	34	16						90	31		
NB State St	Fair St	Movement	SB	EB										No detection. Pre-timed operation. Offset reference to beginning of yellow Phase 1.
		Type	Fixed	Fixed										
		Plan 5 AM Peak Split	38	52								90	39	
		Plan 6 PM Peak Split	35	55								90	37	
		Plan 7 AM Peak Split Future	38	52								90	39	
		Plan 8 PM Peak Split Future	35	55							90	37		
State St	Chapel St	Movement	NB-L	SB	Ped	EB/WB	SB-L	NB	Dummy	Dummy				Detection at major street left turns. Coordinated operation with ped button. Offset reference to beginning of yellow Phase 2. Unused ped time goes to next phase.
		Type	Actuated	Coordinated	Ped Button	Fixed	Actuated	Coordinated						
		Plan 5 AM Peak Split	14	21	25	30	14	21	25	30	90	14		
		Plan 6 PM Peak Split	13	22	25	30	13	22	25	30	90	13		
		Plan 7 AM Peak Split Future	14	19	25	32	14	19	25	32	90	14		
		Plan 8 PM Peak Split Future	13	24	25	28	16	24	25	28	90	16		

TABLE 4B
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TRANSCORE SIGNALS - LOWER STATE ST AND WATER ST
PROPOSED TIMING

MAIN ST	CROSS ST	CATEGORY	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8	CYCLE	OFFSET	COMMENTS	
State St	Court St	Movement		NB/SB	EB/WB	Ped								Detection at minor street. Coordinated operation with ped button. Offset reference to beginning of yellow Phase 2. Unused ped time goes to coordinated phase.
		Type		Coordinated	Actuated	Ped Button								
		Plan 5 AM Peak Split		43	22	25						90	10	
		Plan 6 PM Peak Split		40	25	25						90	9	
		Plan 7 AM Peak Split Future		43	22	25						90	10	
		Plan 8 PM Peak Split Future		40	25	25					90	9		
State St	Elm St	Movement	NB/SB	EB	Ped									No detection. Coordinated operation with ped button. Offset reference to beginning of yellow Phase 2. Unused ped time goes to next phase.
		Type	Fixed	Coordinated	Ped Button									
		Plan 5 AM Peak Split	28	43	19							90	23	
		Plan 6 PM Peak Split	28	43	19							90	25	
		Plan 7 AM Peak Split Future	26	45	19							90	23	
		Plan 8 PM Peak Split Future	28	43	19						90	25		
State St	Grove St/Olive St	Movement	SB	NB-L	Ped	EB/WB	NB	SB-L		EB-WB				No detection. Coordinated operation with ped button. Offset reference to beginning of yellow Phase 2. Unused ped time goes to coordinated phase.
		Type	Fixed	Coordinated	Ped Button	Fixed	Fixed	Fixed		Fixed				
		Plan 5 AM Peak Split	27	18	21	24	27	18		24	90	43		
		Plan 6 PM Peak Split	27	18	21	24	27	18		24	90	5		
		Plan 7 AM Peak Split Future	27	18	21	24	27	18		24	90	43		
		Plan 8 PM Peak Split Future	27	18	21	24	27	18		24	90	5		
State St	Audubon St	Movement		NB/SB	EB/WB									No detection. Pre-timed operation. Offset reference to beginning of yellow Phase 2.
		Type		Fixed	Fixed									
		Plan 5 AM Peak Split		72	18							90	80	
		Plan 6 PM Peak Split		72	18							90	37	
		Plan 7 AM Peak Split Future		72	18							90	80	
		Plan 8 PM Peak Split Future		72	18						90	37		

**TABLE 5A
UPPER STATE ST AND MIDDLETOWN AVE
EXISTING TIMING**

MAIN ST	CROSS ST	CATEGORY	Phase 1	Phase 2	Phase 3	Phase 4	CYCLE	OFFSET	COMMENTS
State St	Humphrey St	Movement	State NB/SB	Ped	Humphrey WB	Humphrey EB/WB			No detection. Ped time added to cycle. No coordination.
		Type	Fixed	Ped Button	Fixed	Fixed			
		Split (All Times)	35	18	16	29	80 w/o ped; 98 w/ped	NA	
State St	Edwards St	Movement	State NB/SB	Ped	Edwards EB & State SB-R				Detection at minor movement. Semi actuated. Ped time added to cycle. No corodination.
		Type	Fixed	Ped Button	Actuated				
		Split (All Times)	45	21	30 Max		NA	NA	
State St	East St / Mechanic St	Movement	State EB/WB	Ped	East NB/SB				No detection. Ped time added to cycle. No coordination.
		Type	Fixed	Ped Button	Fixed				
		Split (All Times)	45	20	35		80 w/o ped; 100 w/ped	NA	
State St	James St / I-91 Exit 5 NB Off Ramp	Movement	State EB/WB	James NB / Driveway SB	Ramp EB				Detection at NB & SB movements. Semi actuated. No corodination.
		Type	Fixed	Actuated	Fixed				
		Split (All Times)	22	11	22		NA	NA	
State St	Blatchley Ave / Willow St	Movement	State EB/WB	Ped	Blatchley/Willow NB/SB				No detection. Ped time added to cycle. No coordination.
		Type	Fixed	Ped Button	Fixed				
		Split (All Times)	45	20	35		80 w/o ped; 100 w/ped	NA	
State St	Ferry St / May St	Movement	State EB/WB	State WB/Ferry NB-R	Ferry NB	Ped			No detection. Ped time added to cycle. No coordination.
		Type	Fixed	Fixed	Fixed	Ped Button			
		Split (All Times)	35	15	30	19	80 w/o ped; 99 w/ped	NA	
Middletown Ave	Ferry St	Movement	Middletown WB/Ferry NB-R	Ferry NB/SB-R	Ferry SB/Middletown WB-R				No detection. No ped signals.
		Type	Fixed	Fixed	Fixed				
		Split (All Times)	29	23	38		90	Unknown	
Middletown Ave	I-91 Exit 7 SB Off-Ramp	Movement	Middletown EB/WB	Ramp NB					No detection. No ped signals.
		Type	Fixed	Fixed					
		Split (All Times)	45	15			60	Unknown	
Middletown Ave	Clinton St	Movement	Middletown EB/WB	Clinton NB/SB					No detection. No ped signals.
		Type	Fixed	Fixed					
		Split (All Times)	45	15			60	Unknown	

TABLE 5B
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UPPER STATE ST AND MIDDLETOWN AVE
PROPOSED TIMING

MAIN ST	CROSS ST	CATEGORY	Phase 1	Phase 2	Phase 3	Phase 4	CYCLE	OFFSET	COMMENTS
State St	Humphrey St	Movement	State NB/SB	Ped	Humphrey WB	Humphrey EB/WB			Install left turn lanes at both State St approaches and EB Humphrey St approach. New loop detectors at Humphrey St approaches. New pedestrian signals. Coordinated operation. Unused time goes to next phase. Offset reference to beginning of yellow Phase 1.
		Type	Coordinated	Ped Button	Actuated	Actuated			
		Weekday AM Peak Split	36	18	24	12	90	42	
		Weekday PM Peak Split	40	18	18	24	100	21	
		Daily Midday Split	32	18	16	14	80	58	
		All Other Times	22	18	14	16	70	24	
State St	Edwards St	Movement	State NB/SB	Ped	Edwards EB & State SB-R				New loop detectors at Edwards St approaches. New pedestrian signals. Coordinated operation. Unused time goes to next phase. Offset reference to beginning of yellow Phase 1.
		Type	Coordinated	Ped Button	Actuated				
		Weekday AM Peak Split	40	21	29		90	38	
		Weekday PM Peak Split	48	21	31		100	50	
		Daily Midday Split	31	21	28		80	34	
		All Other Times	26	21	23		70	1	
State St	East St / Mechanic St	Movement	State EB/WB	Ped	East NB/SB				New loop detectors at East St and Mechanic St approaches. New pedestrian signals. Coordinated operation. Unused time goes to next phase. Offset reference to beginning of yellow Phase 1.
		Type	Coordinated	Ped Button	Actuated				
		Weekday AM Peak Split	61	20	9		90	22	
		Weekday PM Peak Split	59	20	21		100	54	
		Daily Midday Split	47	20	13		80	31	
		All Other Times	31	20	19		70	64	
State St	James St / I-91 Exit 5 NB Off Ramp	Movement	State EB/WB	Ped	James NB / Driveway SB	Ramp EB			New loop detectors at James St, driveway and ramp approaches. New pedestrian signals. Coordinated operation. Unused time goes to next phase. Offset reference to beginning of yellow Phase 1.
		Type	Coordinated	Ped Button	Actuated	Actuated			
		Weekday AM Peak Split	28	20	10	32	90	58	
		Weekday PM Peak Split	24	20	16	40	100	89	
		Daily Midday Split	23	20	11	26	80	64	
		All Other Times	17	20	14	19	70	28	
State St	Blatchley Ave / Willow St	Movement	State EB/WB	Ped	Blatchley NB / Willow EB				Remove all RTOR prohibitions. New loop detectors at Willow St and Blatchley Ave approaches. New pedestrian signals. Coordinated operation. Unused time goes to next phase. Offset reference to beginning of yellow Phase 1.
		Type	Coordinated	Ped Button	Actuated				
		Weekday AM Peak Split	47	20	23		90	52	
		Weekday PM Peak Split	51	20	29		100	82	
		Daily Midday Split	35	20	25		80	61	
		All Other Times	28	20	22		70	55	
State St	Ferry St / May St	Movement	State EB/WB	State WB / Ferry NB-R	Ferry NB	Ped			Remove all RTOR prohibitions on NB Ferry St. New loop detectors at Feery St approach. New pedestrian signals. Coordinated operation. Unused time goes to next phase. Offset reference to beginning of yellow Phase 1.
		Type	Coordinated	Fixed	Actuated	Ped Button			
		Weekday AM Peak Split	20	11	40	19	90	0	
		Weekday PM Peak Split	33	13	35	19	100	0	
		Daily Midday Split	21	11	29	19	80	0	
		All Other Times	18	9	24	19	70	0	
Middletown Ave	Ferry St	Movement	Middletown WB/Ferry NB-R	Ferry NB/SB-R	Ferry SB/Middletown WB-R				
		Type							
		Weekday AM Peak Split	19	14	38	19	90	72	
		Weekday PM Peak Split	26	21	34	19	100	84	
		Daily Midday Split	19	15	27	19	80	76	
		All Other Times	16	13	22	19	70	58	

TABLE 5B
PAGE 2 OF 2
UPPER STATE ST AND MIDDLETOWN AVE
PROPOSED TIMING

MAIN ST	CROSS ST	CATEGORY	Phase 1	Phase 2	Phase 3	Phase 4	CYCLE	OFFSET	COMMENTS
Middletown Ave	I-91 Exit 7 SB Off-Ramp	Movement	Middletown EB/WB	Ped	Ramp NB				New loop detectors at ramp approach. New pedestrian signals. Coordinated operation. Unused time goes to next phase. Offset reference to beginning of yellow Phase 1.
		Type	Coordinated	Ped Button	Actuated				
		Weekday AM Peak Split	50	20	20		90	44	
		Weekday PM Peak Split	52	20	28		100	66	
		Daily Midday Split	40	20	20		80	40	
		All Other Times	30	20	20		70	28	
Middletown Ave	Clinton St	Movement	Middletown EB/WB	Ped	Clinton NB/SB				New loop detectors at Clinton St approaches. New pedestrian signals. Coordinated operation. Unused time goes to next phase. Offset reference to beginning of yellow Phase 1.
		Type	Coordinated	Ped Button	Actuated				
		Weekday AM Peak Split	59	20	11		90	1	
		Weekday PM Peak Split	63	20	17		100	9	
		Daily Midday Split	47	13	20		80	12	
		All Other Times	33	17	20		70	0	

**TABLE 6A
FORBES AVE
EXISTING TIMING**

MAIN ST	CROSS ST	CATEGORY	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	CYCLE	OFFSET	COMMENTS
Water St	East St	Movement	EB	EB/WB	SB	NB/SB				Pre-timed operation.
		Type	Fixed	Fixed	Fixed	Fixed				
		All Times	13	36.5	13	41.5		104	Unknown	
Forbes Ave	Stiles St / Wheeler St	Movement	EB/WB	EB/WB		NB/SB				Detection at minor movements. Coordinated operation. Unused time goes to next phase. Actual timings controlled by closed loop LCU.
		Type	Actuated	Coordinated		Actuated				
		Splits	Controlled by LCU	Controlled by LCU		Controlled by LCU		LCU	LCU	
Forbes Ave	Fulton St	Movement		EB/WB		NB/SB				Detection at minor movement. Coordinated operation. Unused time goes to next phase. Actual timings controlled by closed loop LCU.
		Type		Coordinated		Actuated				
		Splits		Controlled by LCU		Controlled by LCU		LCU	LCU	
Forbes Ave	Woodward Ave	Movement		EB/WB	Ped	NB	NB/SB			Detection at minor movements. Coordinated operation. Unused ped time goes to coordinated phase.
		Type		Coordinated	Ped Button	Actuated	Actuated			
		Pattern 1 0600-0900 Daily		27	19	12	22	80	47	
		Pattern 2 All other times		21	19	10	20	70	41	
		Pattern 3 1500-1900 Daily		25	19	9	27	80	30	
		Pattern 4 1900-0600		14	19	7	20	60	23	
Forbes Ave	Townsend Ave	Movement	WB	EB/WB	Ped	SB	NB/SB			Ped time added to cycle. No coordination.
		Type	Fixed	Fixed	Ped Button	Fixed	Fixed			
		All Times	13	27	19	17	19	76 w/o ped; 95 w/ped	NA	

**TABLE 6B
FORBES AVE
PROPOSED TIMING**

MAIN ST	CROSS ST	CATEGORY	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	CYCLE	OFFSET	COMMENTS
Water St	East St	Movement	EB	EB/WB	SB	NB/SB				Pre-timed operation.
		Type	Fixed	Fixed	Fixed	Fixed				
		Weekday AM Peak Split	10	47	13	40		110	NA	
		Weekday PM Peak Split	10	28	16	41		95	NA	
		Weekday Midday Split	10	29	10	31		80	NA	
		All Other Times	11	29	11	29		80	NA	
Forbes Ave	Stiles St / Wheeler St	Movement	EB/WB	EB/WB		NB/SB				Detection at minor movements. Coordinated operation. Unused time goes to next phase.
		Type	Actuated	Coordinated		Actuated				
		Weekday AM Peak Split	11	57		17		85	50	
		Weekday PM Peak Split	13	48		19		80	57	
		Weekday Midday Split	14	41		20		75	7	
		All Other Times	17	25		23		65	10	
Forbes Ave	Fulton St	Movement		EB/WB		NB/SB				Detection at minor movement. Coordinated operation. Unused time goes to next phase.
		Type		Coordinated		Actuated				
		Weekday AM Peak Split		55		30		85	25	
		Weekday PM Peak Split		54		26		80	4	
		Weekday Midday Split		43		32		75	37	
		All Other Times		33		32		65	48	
Forbes Ave	Woodward Ave	Movement		EB/WB	Ped	NB	NB/SB			Detection at minor movements. Coordinated operation. Unused time goes to next phase.
		Type		Coordinated	Ped Button	Actuated	Actuated			
		Weekday AM Peak Split		43	19	10	13	85	64	
		Weekday PM Peak Split		42	19	8	11	80	37	
		Weekday Midday Split		36	19	9	11	75	0	
		All Other Times		24	19	10	12	65	13	
Forbes Ave	Townsend Ave	Movement	WB	EB/WB	Ped	SB	NB/SB			Detection at minor movements. Coordinated operation. Unused time goes to next phase.
		Type	Fixed	Fixed	Ped Button	Fixed	Fixed			
		Weekday AM Peak Split	8	30	19	11	17	85	51	
		Weekday PM Peak Split	8	26	19	13	14	80	52	
		Weekday Midday Split	8	22	19	10	16	75	72	
		All Other Times	8	22	19	8	8	65	8	

**TABLE 7A
FOXON BLVD
EXISTING TIMING**

MAIN ST	CROSS ST	CATEGORY	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	CYCLE	OFFSET	COMMENTS
Middletown Ave	I-91 Exit 8 SB Ramps	Movement		EB/WB		SB						Detection at minor movements. Coordinated operation. Unused time goes to next phase.
		Type		Actuated		Coordinated						
		0630-0900 M-F		25		20			45	41		
		All Other Times		21		19			40	16		
Foxon Blvd	Middletown Ave / I-91 Exit 8 NB Off-Ramp	Movement	EB-L	EB/WB	SB	NB						Detection at minor movements. Coordinated operation. Unused time goes to next phase.
		Type	Actuated	Coordinated	Actuated	Actuated						
		0630-0900 M-F	10	46	7	22			85	22		
		All Other Times	20	28	7	25			80	58		
Foxon Blvd	New Haven Plaza	Movement	WB / NB-R	EB/WB		NB						Detection at minor movements. Coordinated operation. Unused time goes to next phase.
		Type	Actuated	Coordinated		Actuated						
		0630-0900 M-F	14	57		14			85	0		
		All Other Times	16	41		23			80	0		
Foxon Blvd	Quinnipiac Blvd	Movement	EB-L	WB	Ped	NB-L / SB-L	WB-L	EB	NB/SB			Detection at minor movements. Coordinated operation. Unused time goes to next phase.
		Type	Actuated	Coordinated	Ped Button	Actuated	Actuated	Coordinated	Actuated			
		0630-0900 M-F	11	29	14	11	11	29	20	85	55	
		All Other Times	16	28	14	9	16	28	23	90	20	

**TABLE 7B
FOXON BLVD
PROPOSED TIMING**

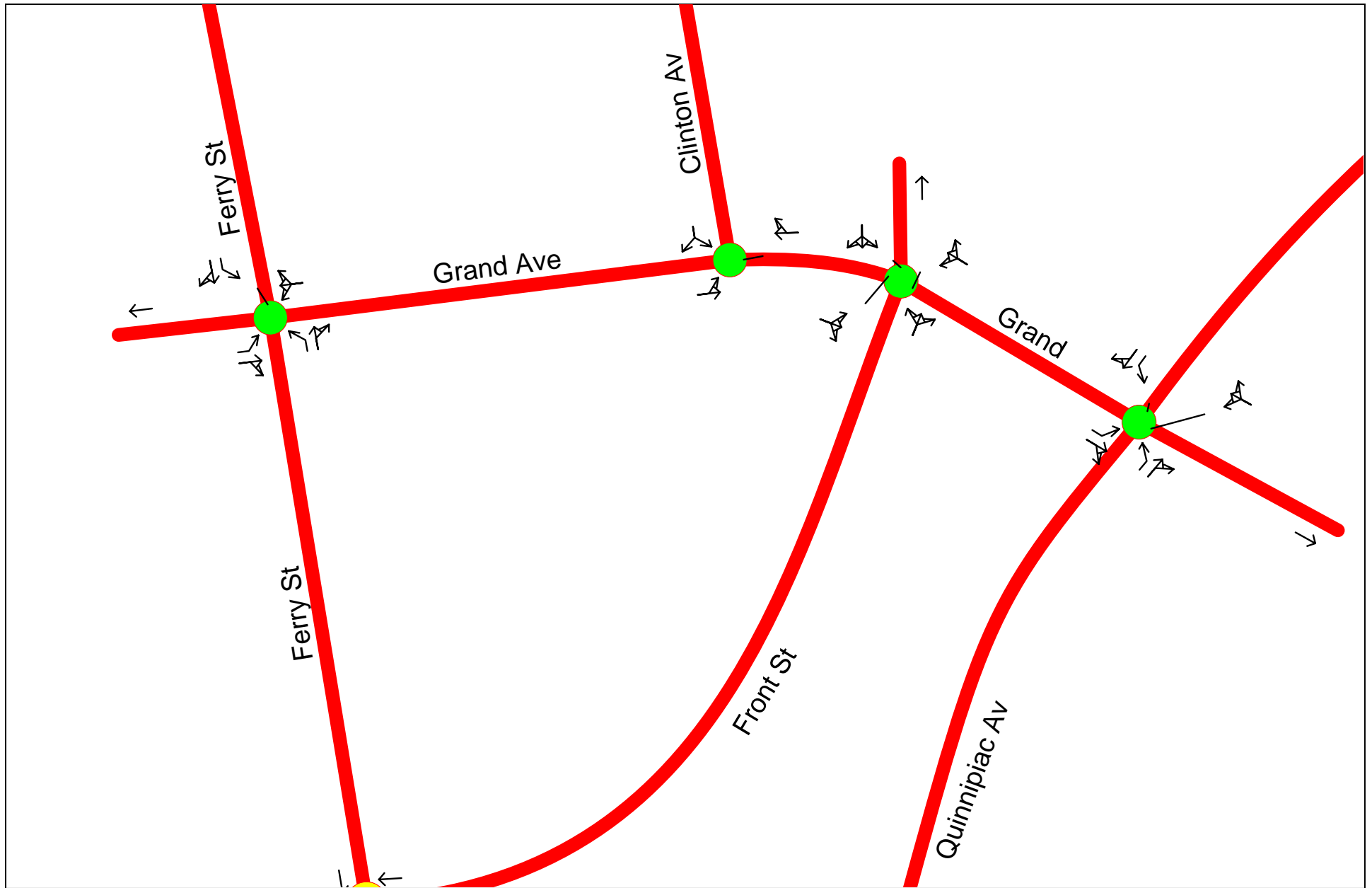
MAIN ST	CROSS ST	CATEGORY	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	CYCLE	OFFSET	COMMENTS
Middletown Ave	I-91 Exit 8 SB Ramps	Movement		EB/WB		SB						Detection at minor movements. Coordinated operation. Unused time goes to next phase.
		Type		Actuated		Coordinated						
		0630-0900 M-F		69		21			90	78		
		1500-1900 M-F		20		25			45	8		
		1500 M-F; 1100-1700 S-S		42		38			80	16		
		All Other Times		36		34		70	12			
Foxon Blvd	Middletown Ave / I-91 Exit 8 NB Off-Ramp	Movement	EB-L	EB/WB	SB	NB						Detection at minor movements. Coordinated operation. Unused time goes to next phase.
		Type	Actuated	Coordinated	Actuated	Actuated						
		0630-0900 M-F	16	47	7	20			90	64		
		1500-1900 M-F	26	30	8	26			90	5		
		1500 M-F; 1100-1700	19	33	8	20			80	56		
		All Other Times	16	23	10	21		70	2			
Foxon Blvd	New Haven Plaza	Movement	WB / NB-R	EB/WB		NB						Detection at minor movements. Coordinated operation. Unused time goes to next phase.
		Type	Actuated	Coordinated		Actuated						
		0630-0900 M-F	13	63		14			90	60		
		1500-1900 M-F	19	53		18			90	13		
		1500 M-F; 1100-1700	20	39		21			80	60		
		All Other Times	20	29		21		70	42			
Foxon Blvd	Quinnipiac Blvd	Movement	EB-L	WB	Ped	NB-L / SB-L	WB-L	EB	NB/SB			Detection at minor movements. Coordinated operation. Unused time goes to next phase.
		Type	Actuated	Coordinated	Ped Button	Actuated	Actuated	Coordinated	Actuated			
		0630-0900 M-F	11	37	14	9	9	39	19	90	0	
		1500-1900 M-F	11	37	14	12	11	37	16	90	42	
		1500 M-F; 1100-1700	9	31	14	9	9	31	17	80	6	
		All Other Times	9	23	14	9	9	23	15	70	68	

Figure 2



Figure 3

Grand Ave



Urbitran

Figure 4

Lower State St / Water St

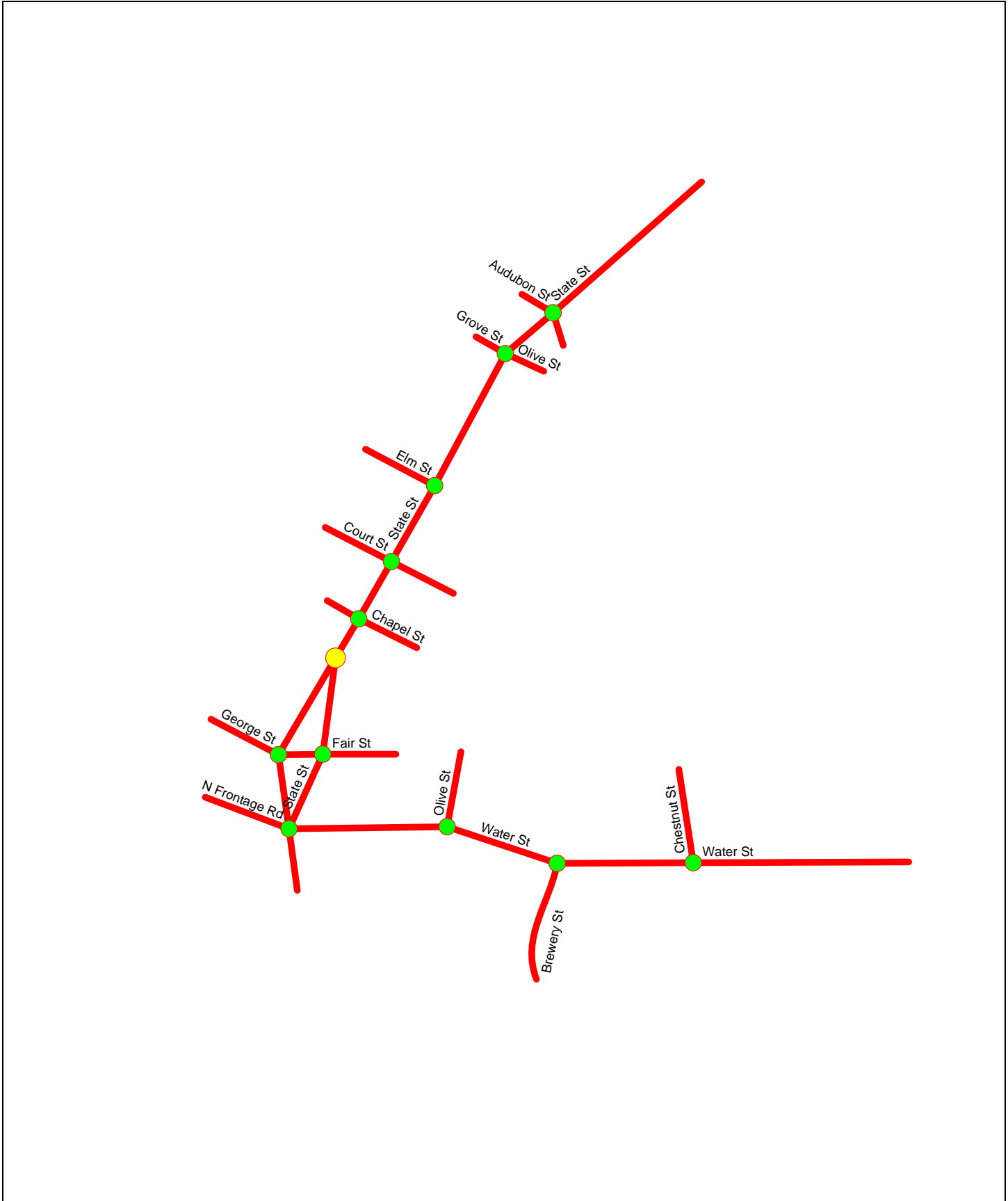


Figure 5

Upper State St - Middletown Ave

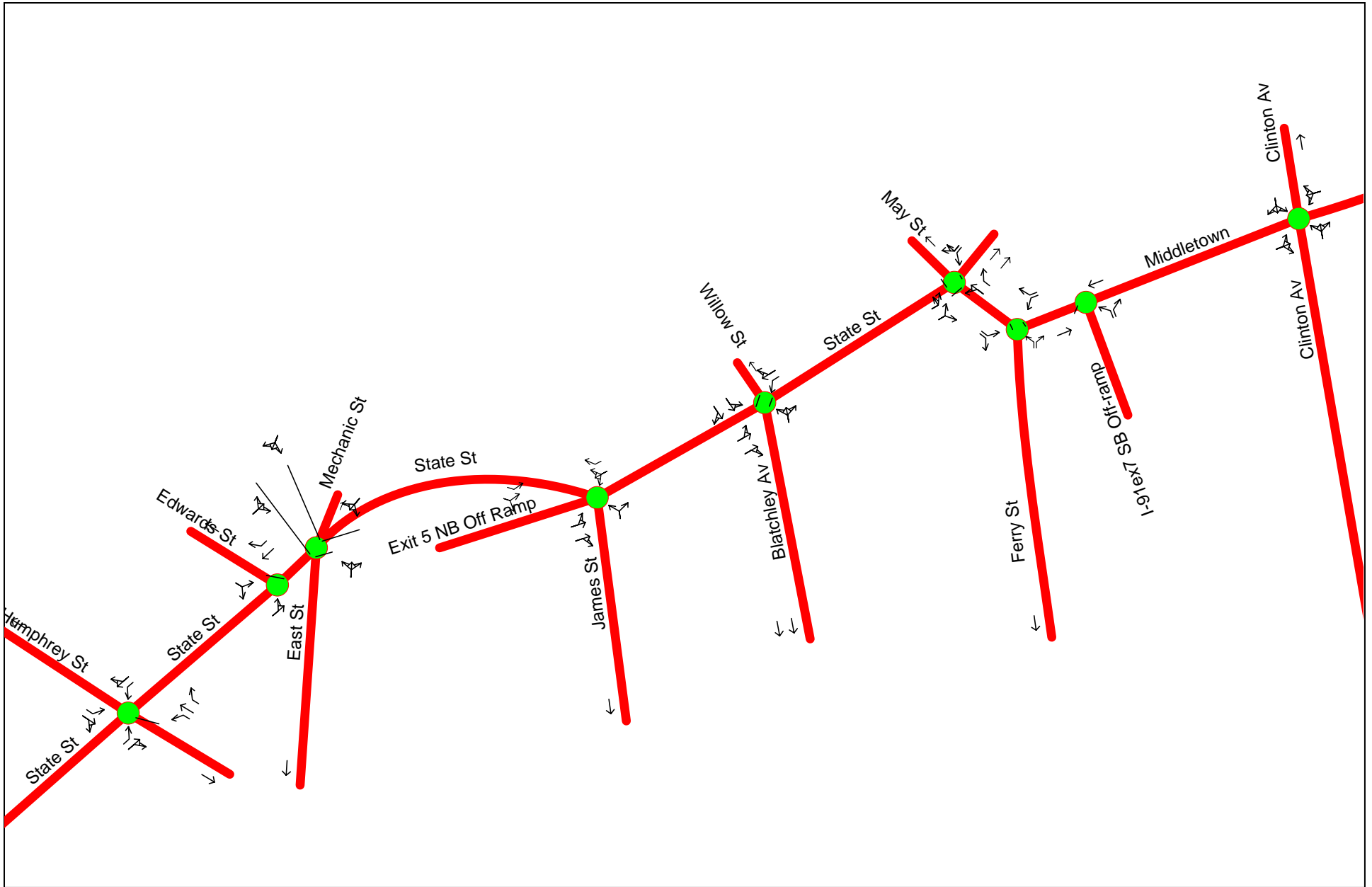


Figure 6

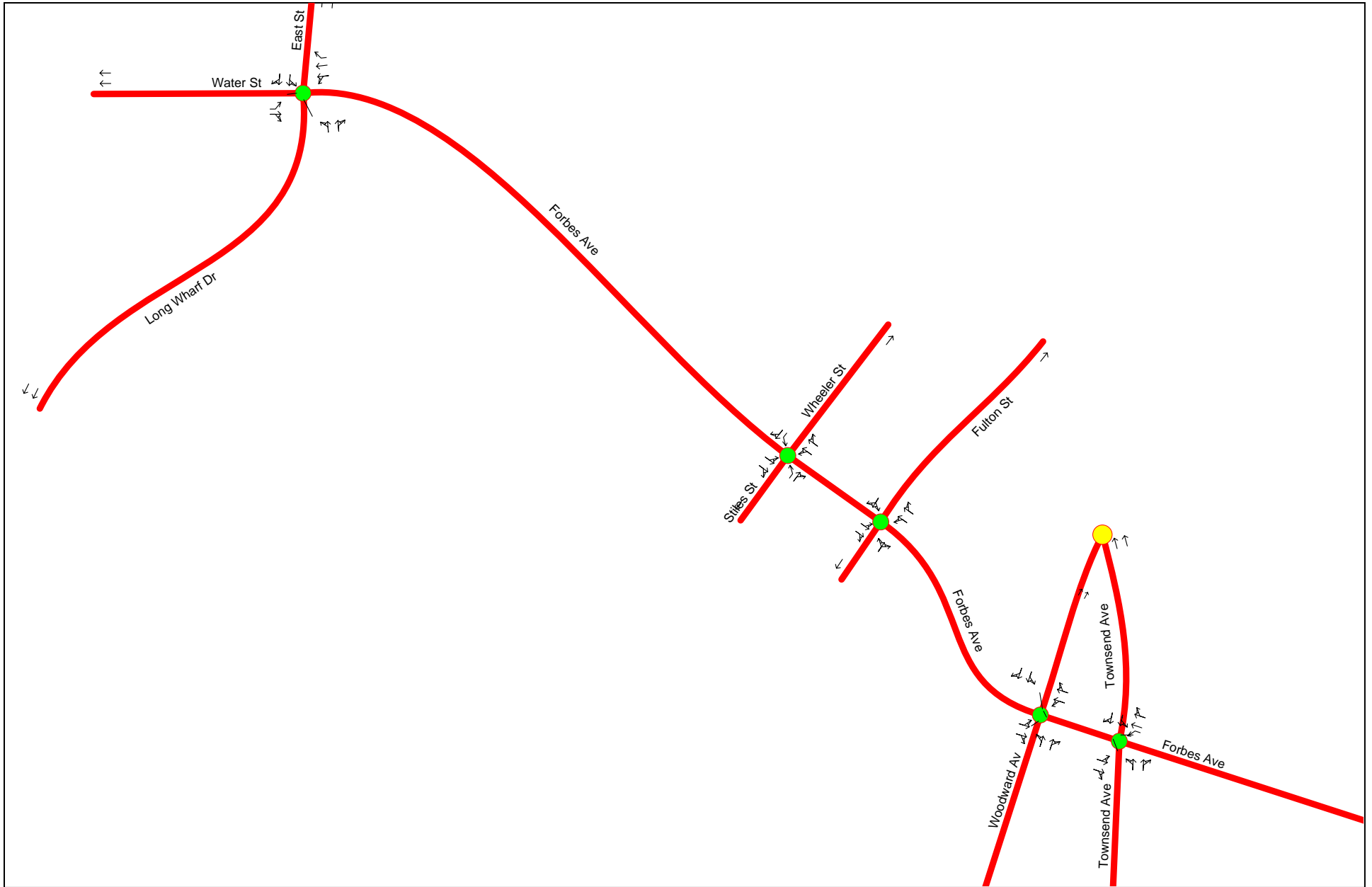
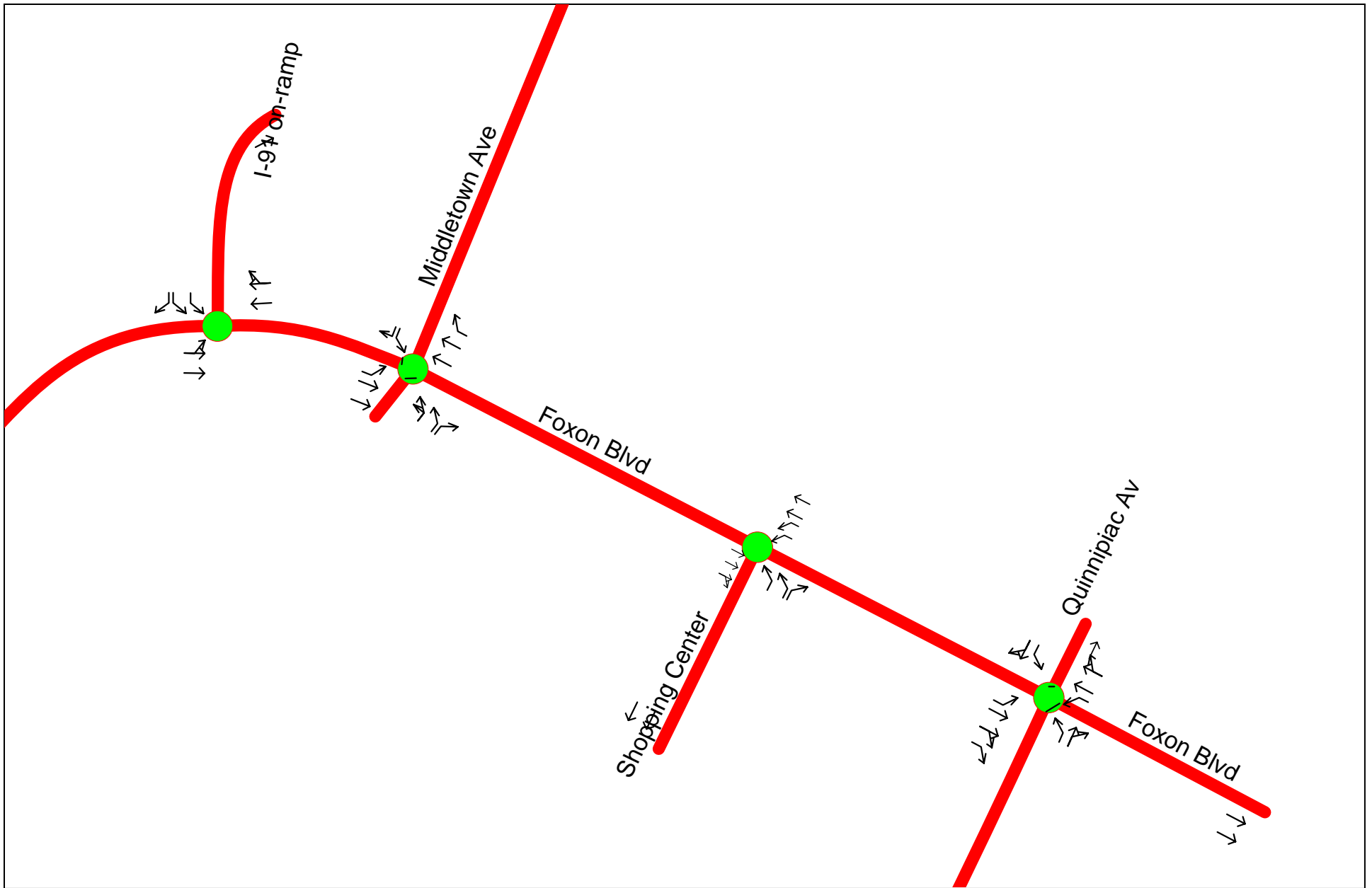


Figure 7

Middletown Ave and Foxon Blvd





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