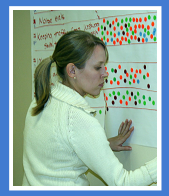




Town of Westwood Petition

Norfolk County Commissioners

Canton Street Improvements

November 18, 2009

URBAN ENGINEERS
Formulating Excellence

Presentation Objective

To address the Town of Canton's opposition to petitions by the Town of Westwood for alteration to a county highway.

To accomplish this we will present the following:

- Project Purpose and Need
- Traffic Analysis Model
- Proposed Alterations
  - Geometry
  - Traffic Analysis Results
- Intersection of Canton Street & Westwood Station Blvd
  - Objectives
  - Geometry
  - Traffic Analysis Results
- Summary

Project Purpose and Need

Purpose and Need

- Initial Data Collected
  - Manual Intersection Counts
  - ATR Information
    - Travel Speeds (85th, Max and Average)
  - Travel Time Information
    - Comparison of I-95 to Canton Street
  - Origin and Destination
    - Number of people cutting thru

Purpose and Need

Vehicular Speeds on Canton St.

- North of Downey Street*
  - 85th Percentile = 37 mph
  - Daily Vehicles traveling more than 35mph = 2683
  - Maximum speed recorded = 81mph
- North of Everett Street*
  - 85th Percentile = 40 mph
  - Daily Vehicles traveling more than 45mph = 3059
  - Maximum speed recorded = 63mph

**Detailed information provided on attached CD*

Purpose and Need

Traffic Safety Facts

2007 Data

www.nhtsa.gov NHTSA

DOT HS 810 998

Speeding

Table 1

Speeding-Related Traffic Fatalities by Road Type and Speed Limit, 2007

State	Total Traffic Fatalities	Speeding-Related Fatalities by Road Type and Speed Limit								
			Interstate		Non-Interstate					
		Total	>55 mph	≤55 mph	55 mph	50 mph	45 mph	40 mph	35 mph	<35 mph
MA	417	140	18	5	8	4	8	18	19	55

In Addition, if a vehicle hits a pedestrian:

- at 20 mph 5% will die
- at 30 mph 45% will die
- at 40 mph 85% will die

Purpose and Need

Southbound Cut Through Traffic*					
	2-3	**3-4**	**4-5**	**5-6**	**6-7**
Weekday	31	96	138	112	62
Weekend	78	47	93	77	59

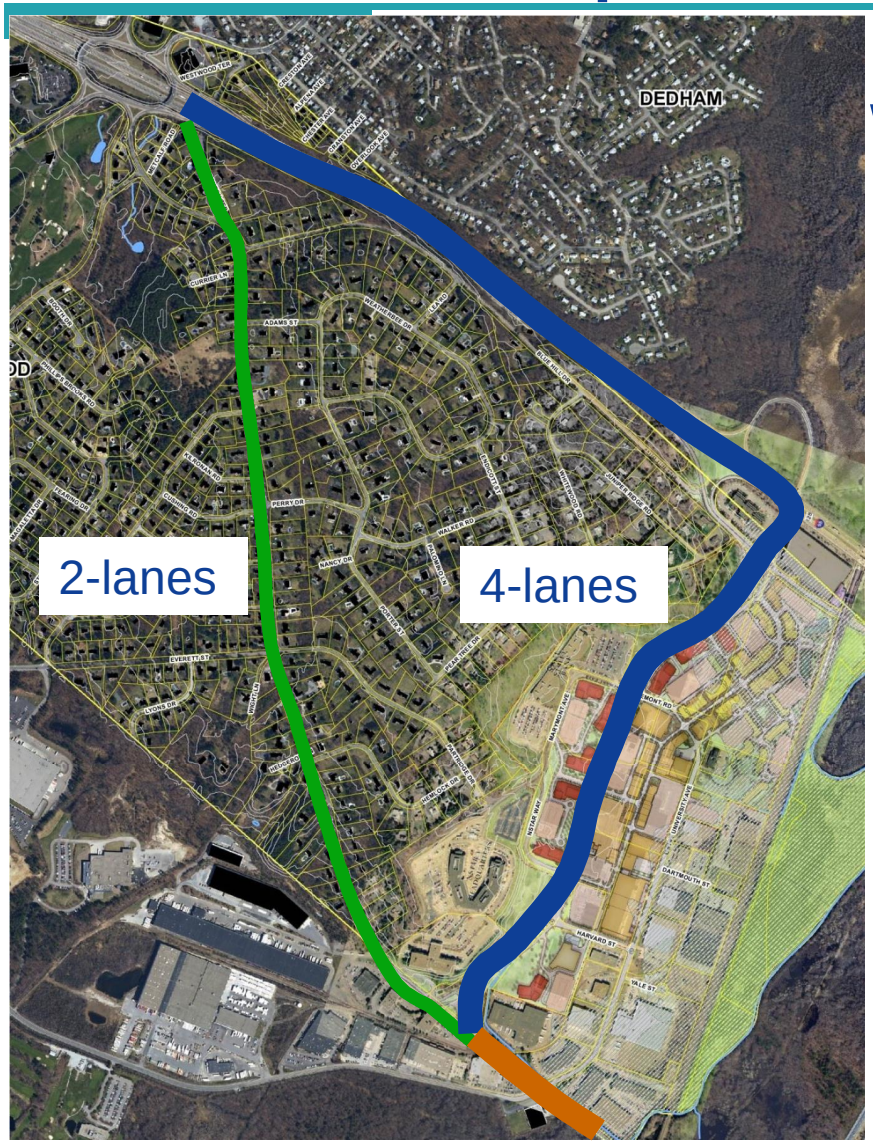
5 hour Weekday Total = 439 Vehicles

5 hour Weekend Total = 354 Vehicles

Southbound Travel Time (seconds)*					
	2-3	**3-4**	**4-5**	**5-6**	**6-7**
Canton St	295	320	351	344	284
I-95	237	329	308	367	249

**Detailed information provided on attached CD*

Purpose and Need



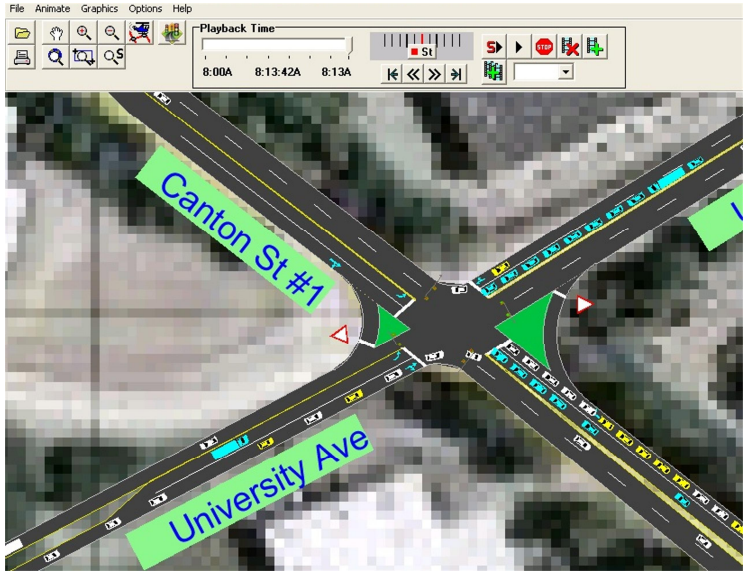
Westwood Station development

- Provides additional route option between Canton and Dedham (WWSB)
- 4 Travel Lanes
- Direct Access to I-95
- Improvements South of WWSB

Traffic Analysis Model

Traffic Analysis

Synchro and SimTraffic Traffic Analysis



Simulation Modeling

Purpose and Need

Additional Data Collected

- Field Signal Timings
- General Observations of Driver Behavior
- Turning Speeds
- Queuing information
- Vehicles Processed on Green
- Sneakers on yellow/red

**Detailed information provided on attached CD*

Simulation Model Calibration

AM Peak Travel Times - Canton/Dedham St (May 2008)			
Direction	**Route Segment**	**Field Travel Times (s)**	**SimTraffic Travel Time (s)**
Southbound (8AM-9AM)	Rotary to Everett St	130	123
	Everett St to University Ave	96	118
	University Ave to I-95 On-Ramp	61	89
	I-95 On-Ramp to Proposed Off-Ramp	16	9
	Total	**303**	**339**
Northbound (8AM-9AM)	Proposed Off-Ramp to I-95 On-Ramp	15	15
	I-95 On-Ramp to University Ave	122	152
	University Ave to Everett Street	94	94
	Everett St to Rotary	204	216*
	Total	**435**	**477**

** Rotary was not simulated. Recorded NB delay at Rotary was added to Simulated travel time*

Simulation Model Calibration

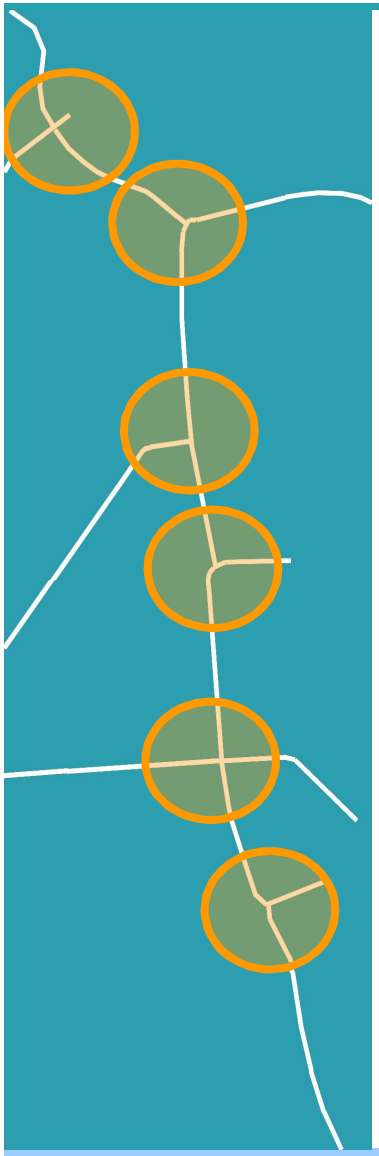
PM Peak Travel Times - Canton/Dedham St (May 2008)			
Direction	**Route Segment**	**Field Travel Times (s)**	**SimTraffic Travel Time (s)**
Southbound (4:45-5:45PM)	Rotary to Everett St	127	131
	Everett St to University Ave	205	230
	University Ave to I-95 On-Ramp	52	63
	I-95 On-Ramp to Proposed Off-Ramp	14	9
	Total	**398**	**433**
Northbound (4:45-5:45PM)	Proposed Off-Ramp to I-95 On-Ramp	14	9
	I-95 On-Ramp to University Ave	90	74
	University Ave to Everett Street	83	91
	Everett St to Rotary	171	177*
	Total	**358**	**351**

** Rotary was not simulated. Recorded NB delay at Rotary was added to Simulated travel time*

Proposed Alterations

- Geometry
- Traffic Analysis Results

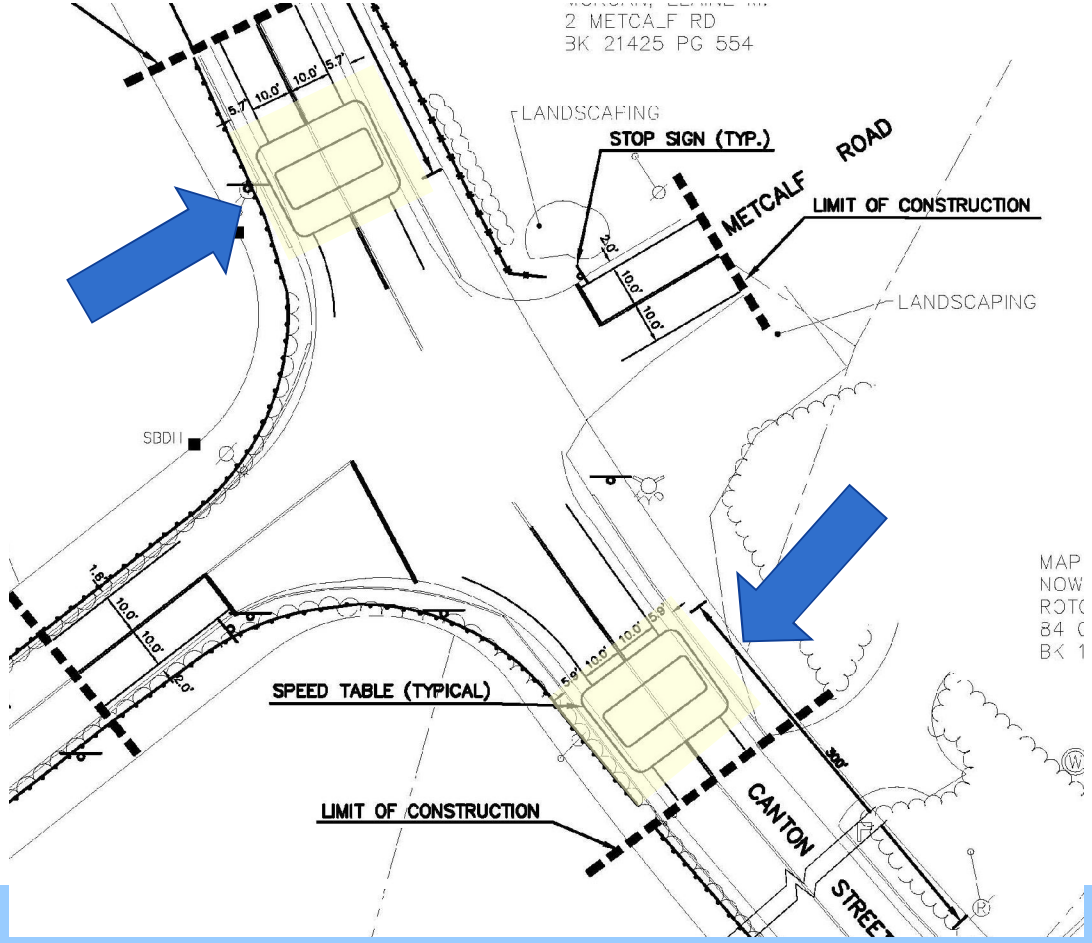
Proposed County Way Alterations



- Canton Street and Downey/Metcalf
- Canton Street and Blue Hill Drive
- Canton Street and Forbes Road
- Canton Street and Perry Drive
- Canton Street and Everett Street
- Canton Street and Hemlock Street
- Everett Street and Forbes Road
- Everett Street and Lyons Drive

Proposed Canton Street Alterations

- Canton Street and Downey
  - Speed Tables



Proposed Canton Street Alterations

- Canton Street and Downey

- **Speed Tables (22ft):**
  - Wider than speed humps
  - Typically 22-32 feet
  - Reduction of approximately 7mph (18%) in the 85% speeds*

** From "Traffic Calming, State of the Practice", ITE 1999*

Proposed Canton Street Alterations

- Canton Street and Downey

Proposed Change – Speed Tables Result in:

- Reduction in approach speeds
- Reduction in side-street delay
- Reduction in northbound delay (left turns)
- Increase in southbound delay

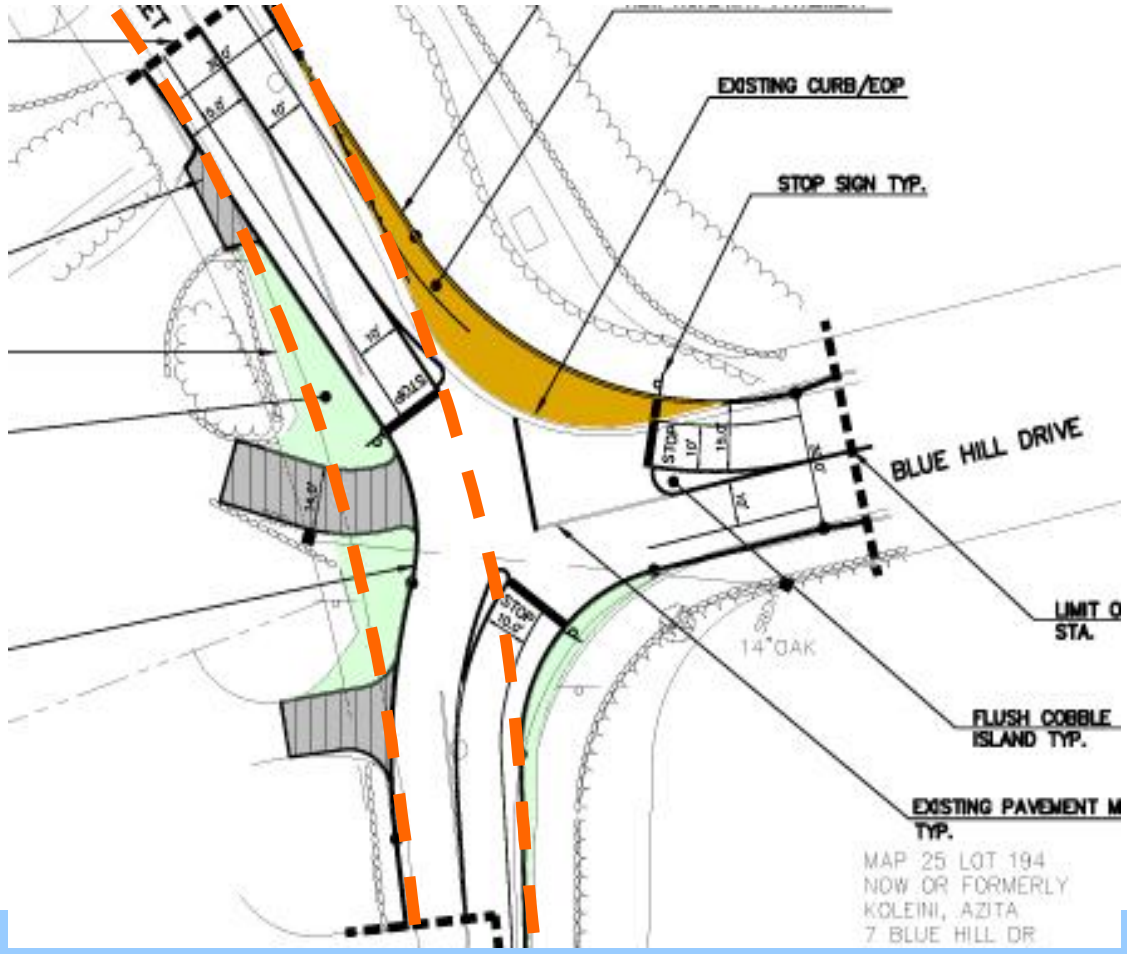
Approach Delay - seconds/vehicle* AM(PM)				
	EB	**WB**	**NB**	**SB**
Without TC	13.2 (12.7)	7.6 (19.9)	4.1 (3.6)	0.9 (1.3)
With TC	7.4 (11.8)	5.2 (5.3)	1.8 (2.4)	1.2 (1.9)

**Detailed information provided on attached CD*

Proposed Canton Street Alterations

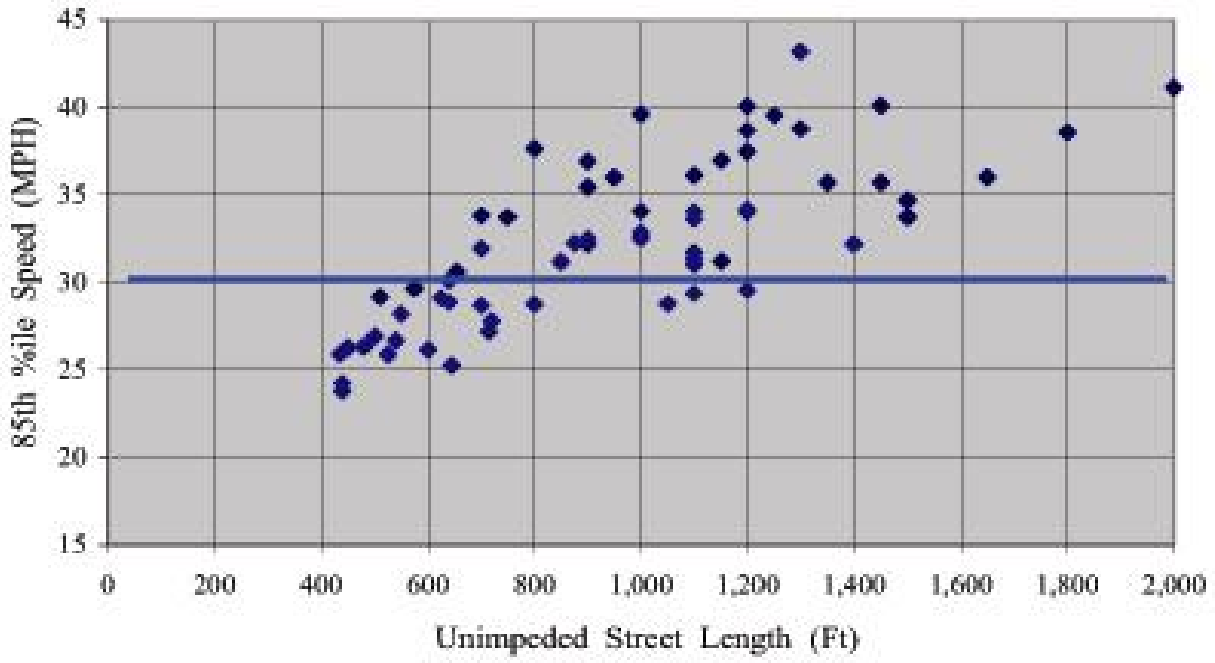
- Canton Street and Blue Hill Dr.

  Realigned Intersection



Proposed Canton Street Alterations

- **REALIGNED INTERSECTIONS:**
  - Reduce Speeds
  - interrupt long straight sections of road
  - Canton, Everett, and Forbes currently have straightaways over 2000’ long
  - Proposed Intersection realignments are 1,000’ apart with medians in between



From “Low Speed Design Criteria for Residential Streets”, Ballard and Haldeman

Proposed Canton Street Alterations

- Canton Street and Blue Hill Drive

REALIGNED INTERSECTION EXAMPLE

Proposed Canton Street Alterations

- Canton Street and Blue Hill Drive

  Proposed Change – Realigned Intersection Results in:

  •Reduction in approach speeds

  •Reduction in side-street delay

  •Increase in northbound delay

  •Increase in southbound delay

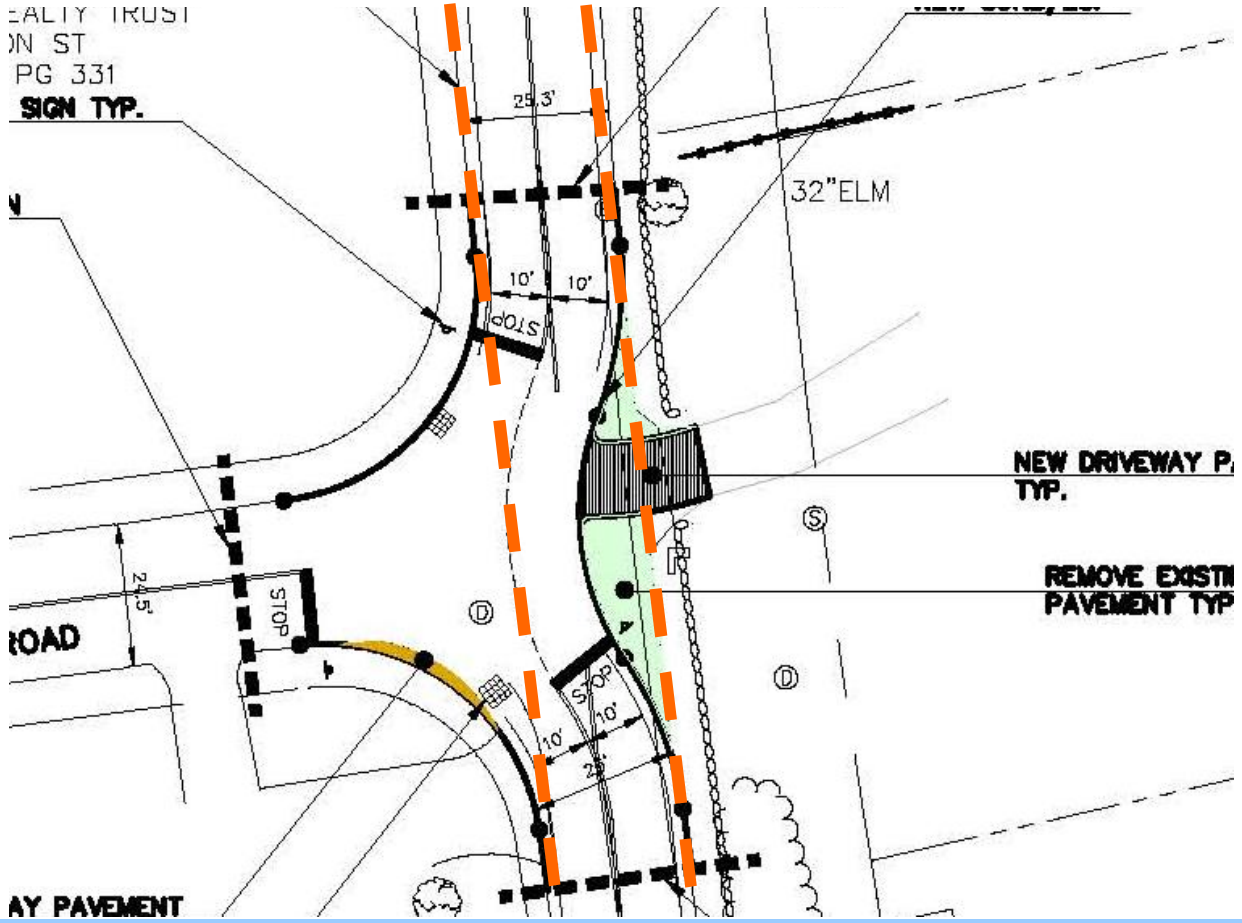
Approach Delay - seconds/vehicle* AM(PM)				
	EB	**WB**	**NB**	**SB**
Without TC	-	17.2 (13.5)	3.0 (2.2)	1.1 (2.6)
With TC	-	6.0 (6.8)	13.6 (10.2)	4.0 (12.3)

**Detailed information provided on attached CD*

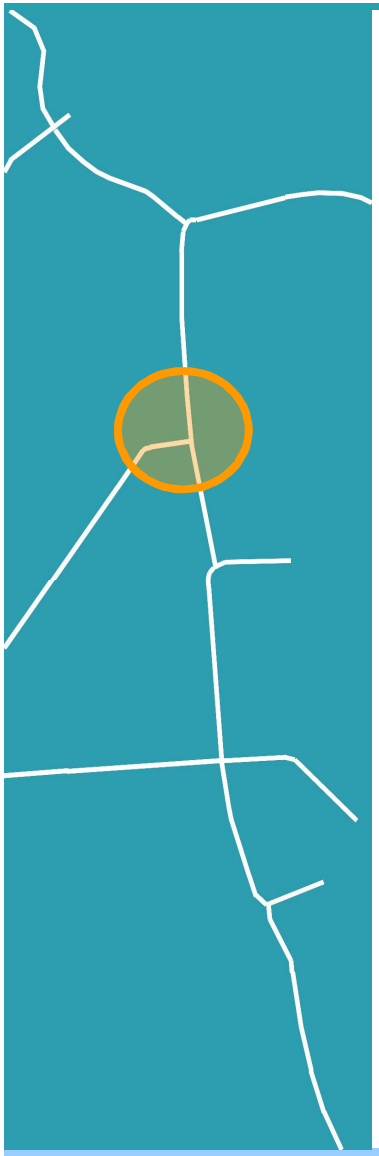
Proposed Canton Street Alterations

- Canton Street and Forbes Road

  Realigned Intersection



Proposed Canton Street Alterations



- Canton Street and Forbes Road

  Proposed Change – Realigned Intersection Results in:

  •Reduction in approach speeds

  •Reduction in side-street delay

  •Increase in northbound delay

  •Increase in southbound delay

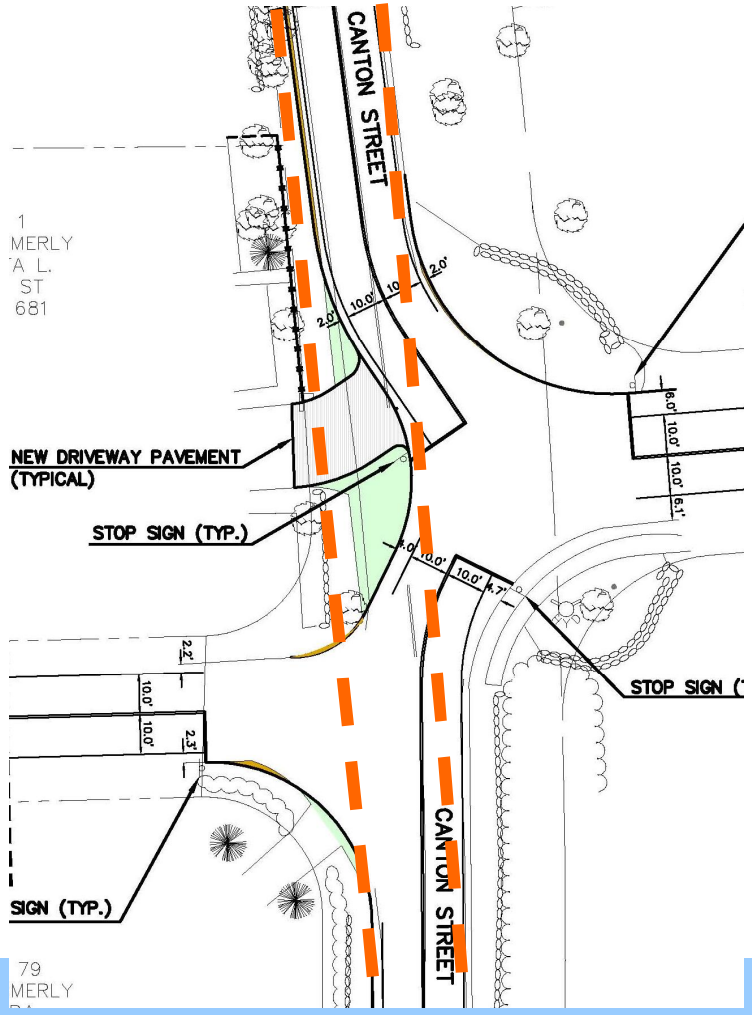
Approach Delay - seconds/vehicle* AM(PM)				
	EB	**WB**	**NB**	**SB**
Without TC	13.7 (14.3)	-	3.0 (2.2)	1.1 (2.6)
With TC	5.2 (5.1)	-	13.7 (11.4)	9.4 (11.2)

**Detailed information provided on attached CD*

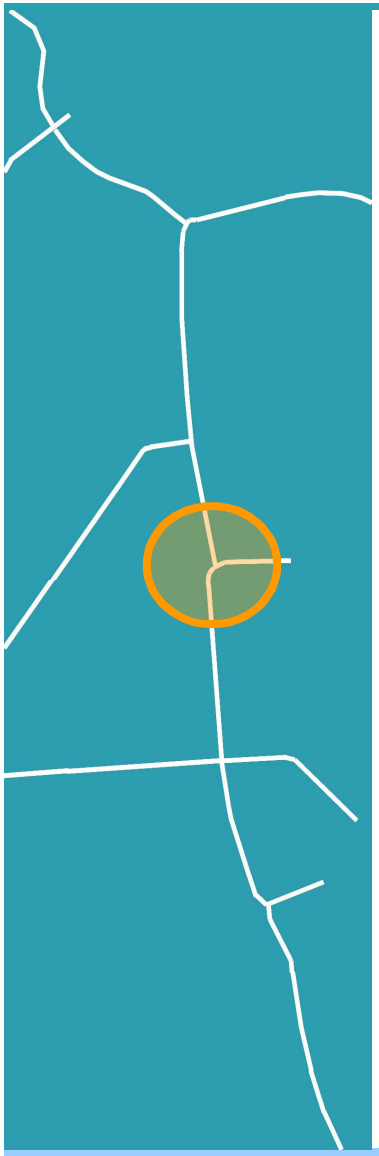
Proposed Canton Street Alterations

- Canton Street and Perry Drive

  Realigned Intersection



Proposed Canton Street Alterations



- Canton Street and Perry Drive

  Proposed Change – Realigned Intersection Results in:

  •Reduction in approach speeds

  •Reduction in side-street delay

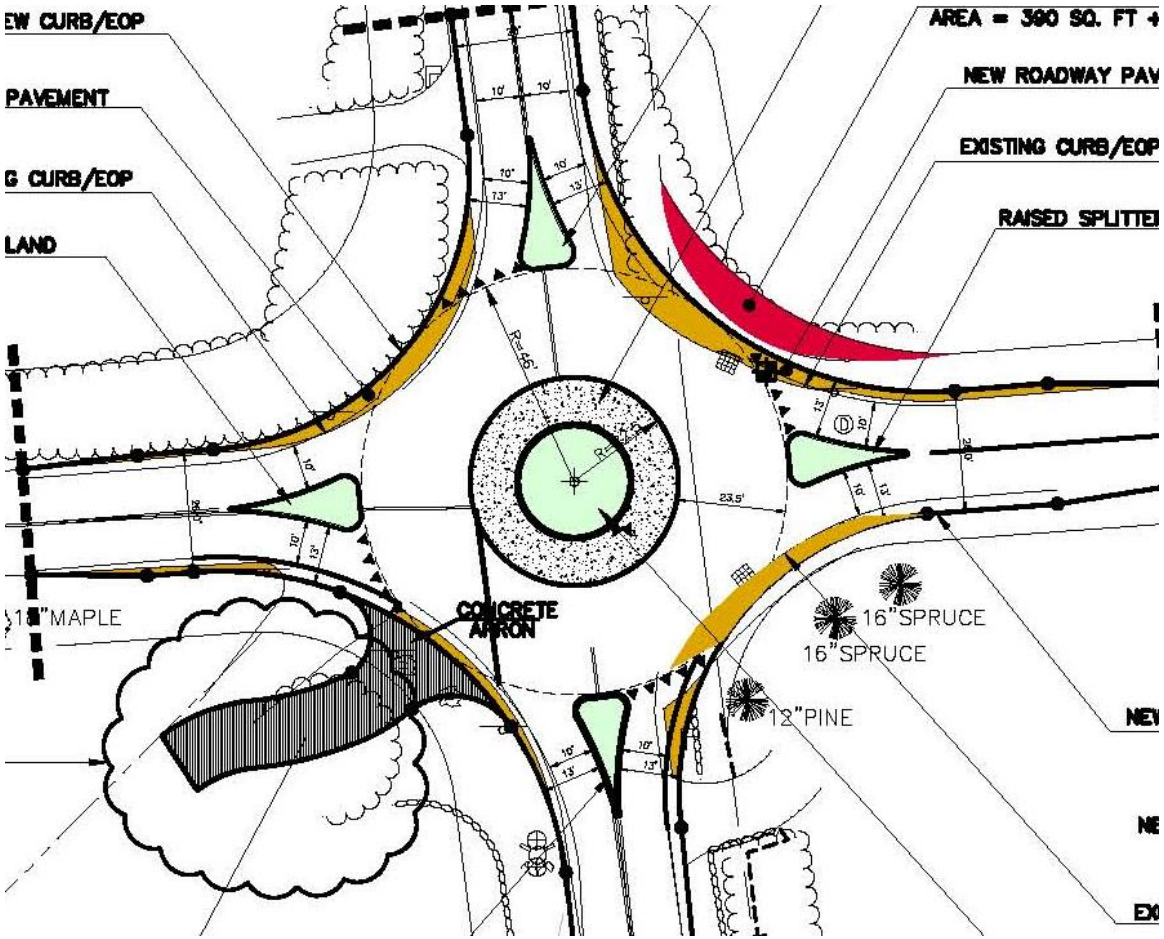
  •Increase in northbound delay

  •Increase in southbound delay

Approach Delay - seconds/vehicle* AM(PM)				
	EB	**WB**	**NB**	**SB**
Without TC	-	10.2 (8.4)	2.2 (1.8)	1.7 (1.7)
With TC	-	4.8 (4.4)	11.6 (9.5)	8.2 (9.3)

Proposed Canton Street Alterations

- Canton Street and Everett Street Roundabout

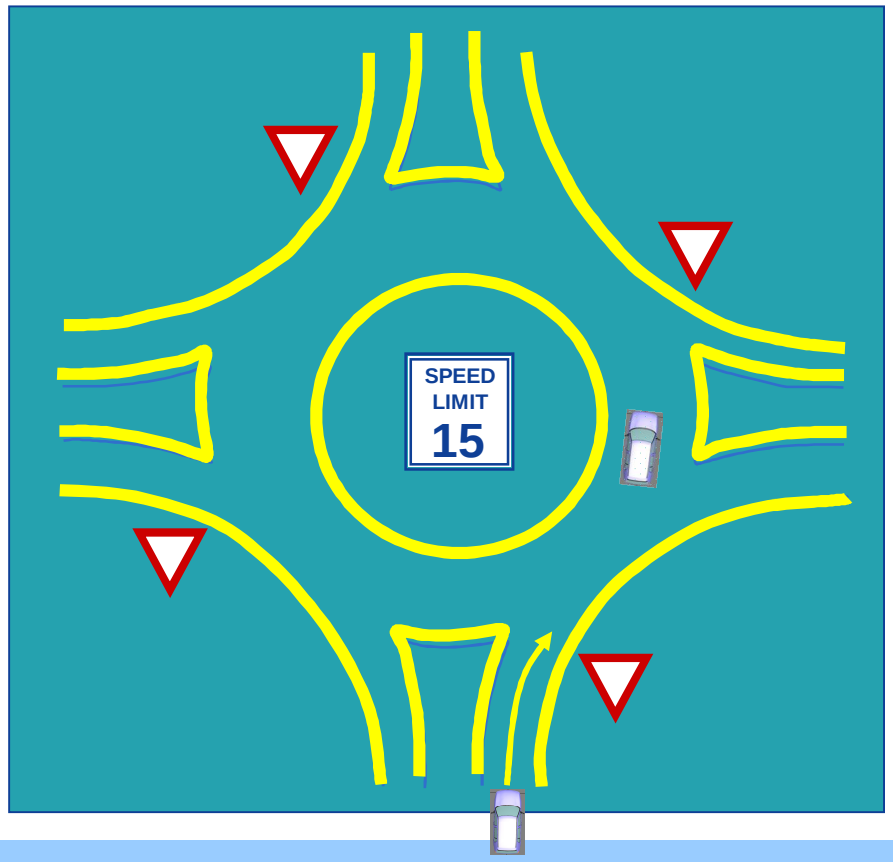


Proposed Canton Street Alterations

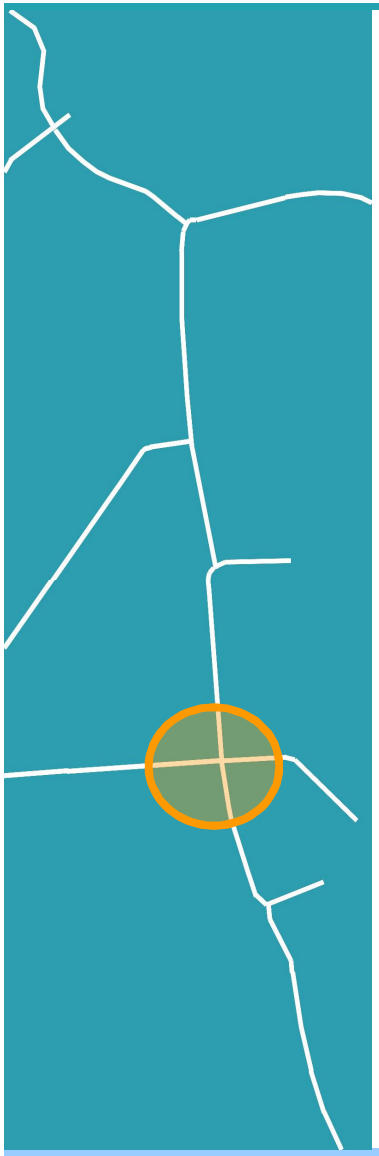
What is a Modern Roundabout?

A roundabout is a form of intersection control, generally circular in shape with specific design and operations characteristics

- Yield on Entry
- Deflection on Entry
- Splitter islands
- Central Island
- Slow circulating speeds



Proposed Canton Street Alterations

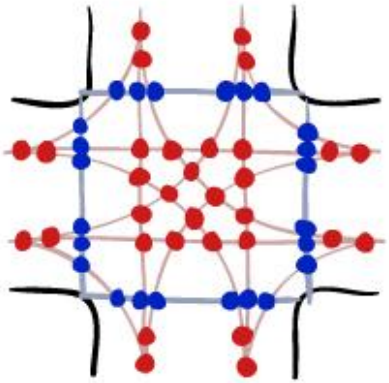


- Canton Street and Everett Street

A 2001 Study by the Insurance Institute for Highway Safety showed that roundabouts:

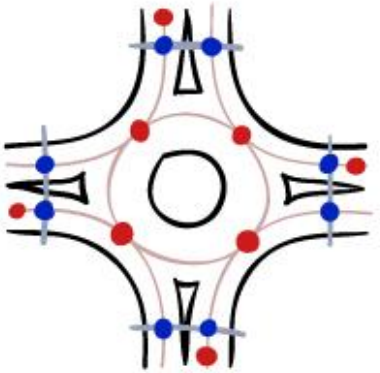
- Reduced crashes by up to 40%
- Reduced injury crashes by up to 80%
- Reduced fatal or incapacitating crashes by 90%

Typical Intersection



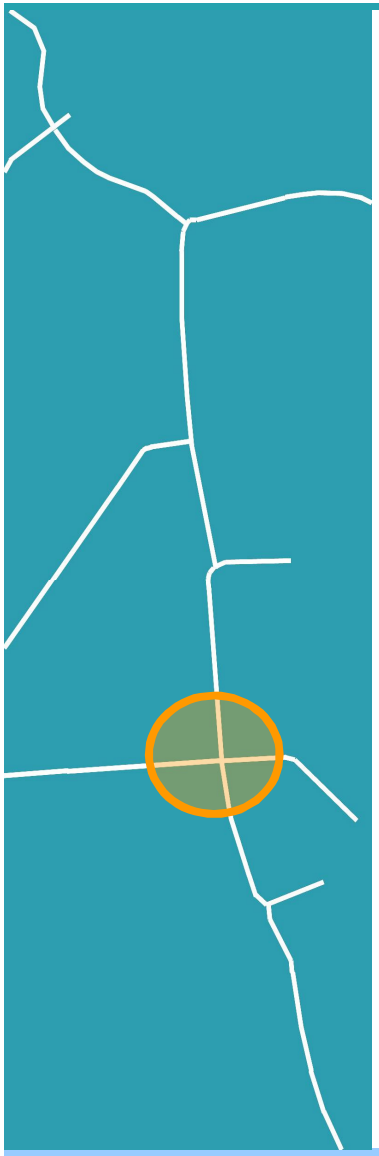
32 Vehicle to Vehicle Conflict
24 Vehicle to Pedestrian Conflicts

Typical Roundabout



8 Vehicle to Vehicle Conflict
8 Vehicle to Pedestrian Conflicts

Proposed Canton Street Alterations



- Canton Street and Everett Street

  Proposed Change – Roundabout Results in:

  •Reduction in approach speeds

  •Reduction in side-street delay

  •Increase in main-street delay

  •Delay on all approaches <10 seconds

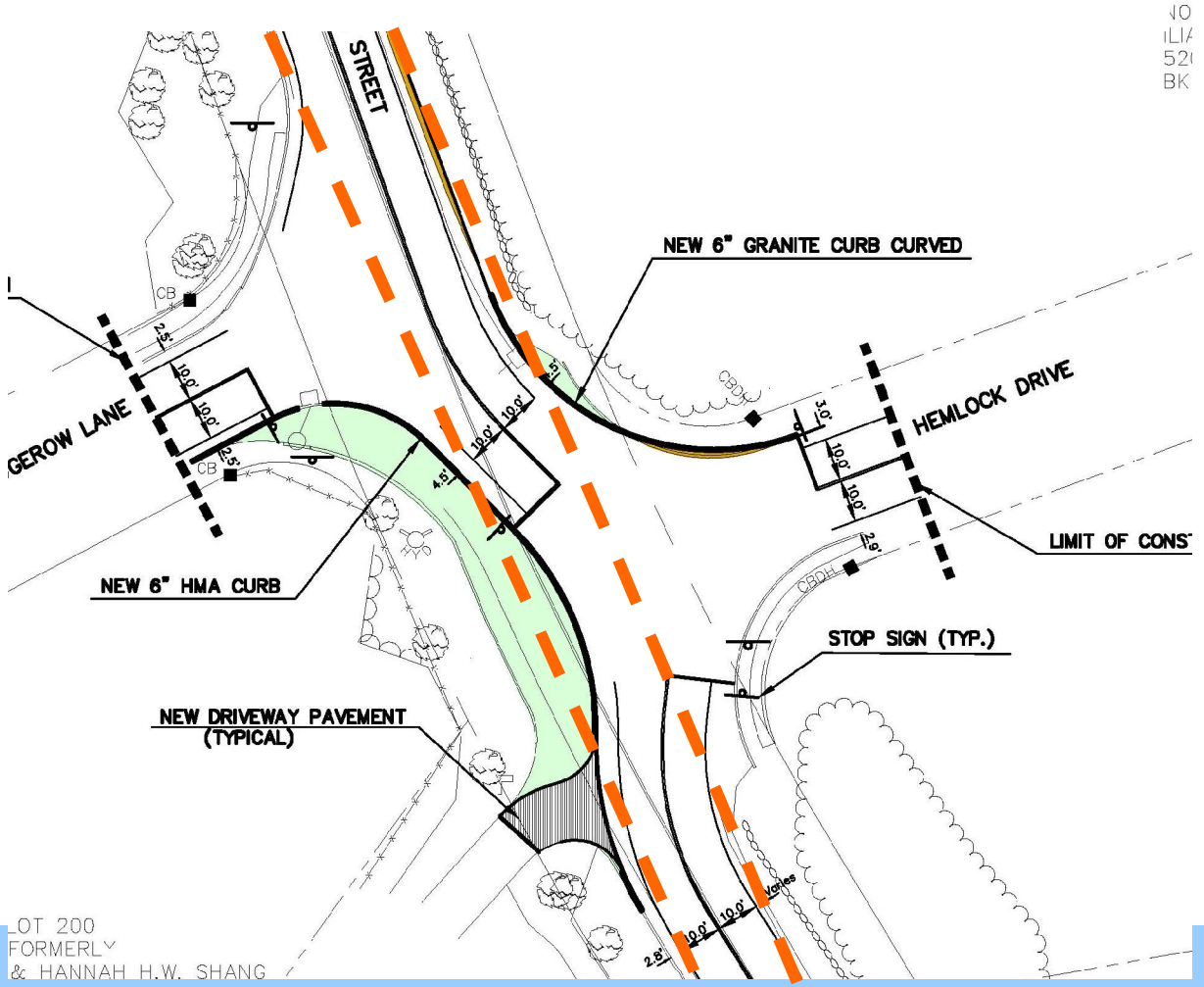
Approach Delay - seconds/vehicle* AM(PM)				
	EB	**WB**	**NB**	**SB**
Without TC	10.2 (12.6)	6.7 (8.1)	2.2 (2.7)	2.0 (3.0)
With TC	4.5 (4.2)	4.3 (3.9)	6.7 (6.2)	5.2 (6.1)

**Detailed information provided on attached CD*

Proposed Canton Street Alterations

- Canton Street and Hemlock Street

  Realigned Intersection



Proposed Canton Street Alterations

- Canton Street and Hemlock Street

  Proposed Change – Realigned Intersection Results in:

  •Reduction in approach speeds

  •Reduction in AM side-street delay

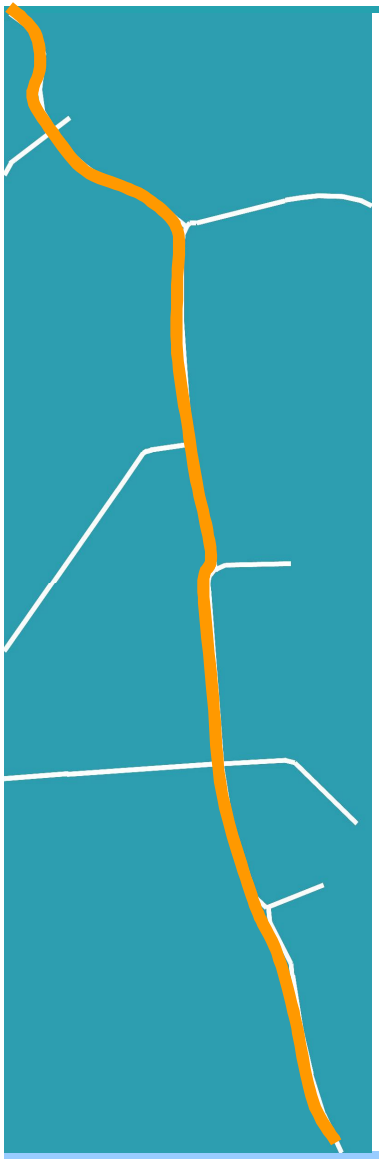
  •Increase in northbound delay

  •Increase in southbound delay

Approach Delay - seconds/vehicle* AM(PM)				
	EB	**WB**	**NB**	**SB**
Without TC	-	8.3 (6.8)	2.7 (2.4)	1.0 (1.5)
With TC	-	6.0 (8.5)	13.7 (11.3)	3.4 (3.8)

**Detailed information provided on attached CD*

Proposed Canton Street Alterations



- Canton Street Corridor (Rotary-WWSB)

Proposed Changes Results in:

- Reduction in average travel speeds along the corridor
- Increase in travel time between East Street Rotary and Westwood Station Boulevard

AM Northbound	*Without Traffic Calming*	*With Traffic Calming*
Travel Time (secs)	**189**	**258 (+37%)**
Average Speed (mph)	**34**	**25 (-27%)**

PM Southbound	*Without Traffic Calming*	*With Traffic Calming*
Travel Time (secs)	**204**	**265 (+30%)**
Average Speed (mph)	**32**	**24 (-23%)**

**Detailed information provided on attached CD*

Proposed Canton Street Alterations

AM Northbound Travel Time & Speeds (Rotary-WWSB)

Travel Time (seconds)	*Without Traffic Calming*	*With Traffic Calming*	*Difference*
WWSB – Everett	76	99	23 (+30%)
Everett – Forbes	43	75	32 (+74%)
Forbes – Rotary	70	84	14 (+20%)
Total	189	258	69 (+37%)

Average Speed (mph)	*Without Traffic Calming*	*With Traffic Calming*	*Difference*
WWSB – Everett	33	25	8 (-23%)
Everett – Forbes	33	19	14 (-43%)
Forbes – Rotary	36	30	6 (-17%)
Average	34	25	9 (-27%)

Proposed Canton Street Alterations

PM Northbound Travel Time & Speeds (Rotary-WWSB)

Travel Time (seconds)	*Without Traffic Calming*	*With Traffic Calming*	*Difference*
WWSB – Everett	77	96	19 (+25%)
Everett – Forbes	42	70	28 (+67%)
Forbes – Rotary	67	80	13 (+19%)
Total	186	246	60 (+32%)

Average Speed (mph)	*Without Traffic Calming*	*With Traffic Calming*	*Difference*
WWSB – Everett	33	26	7 (-20%)
Everett – Forbes	34	21	13 (-40%)
Forbes – Rotary	38	32	6 (-16%)
Average	35	26	9 (-24%)

Proposed Canton Street Alterations

AM Southbound Travel Time & Speeds (Rotary-WWSB)

Travel Time (seconds)	*Without Traffic Calming*	*With Traffic Calming*	*Difference*
Rotary – Forbes	65	87	22 (+33%)
Forbes – Everett	42	58	16 (+38%)
Everett – WWSB	79	93	14 (+18%)
Total	186	238	52 (+28%)

Average Speed (mph)	*Without Traffic Calming*	*With Traffic Calming*	*Difference*
Rotary – Forbes	39	29	10 (-25%)
Forbes – Everett	34	25	9 (-28%)
Everett – WWSB	32	27	5 (-15%)
Average	35	27	8 (-22%)

Proposed Canton Street Alterations

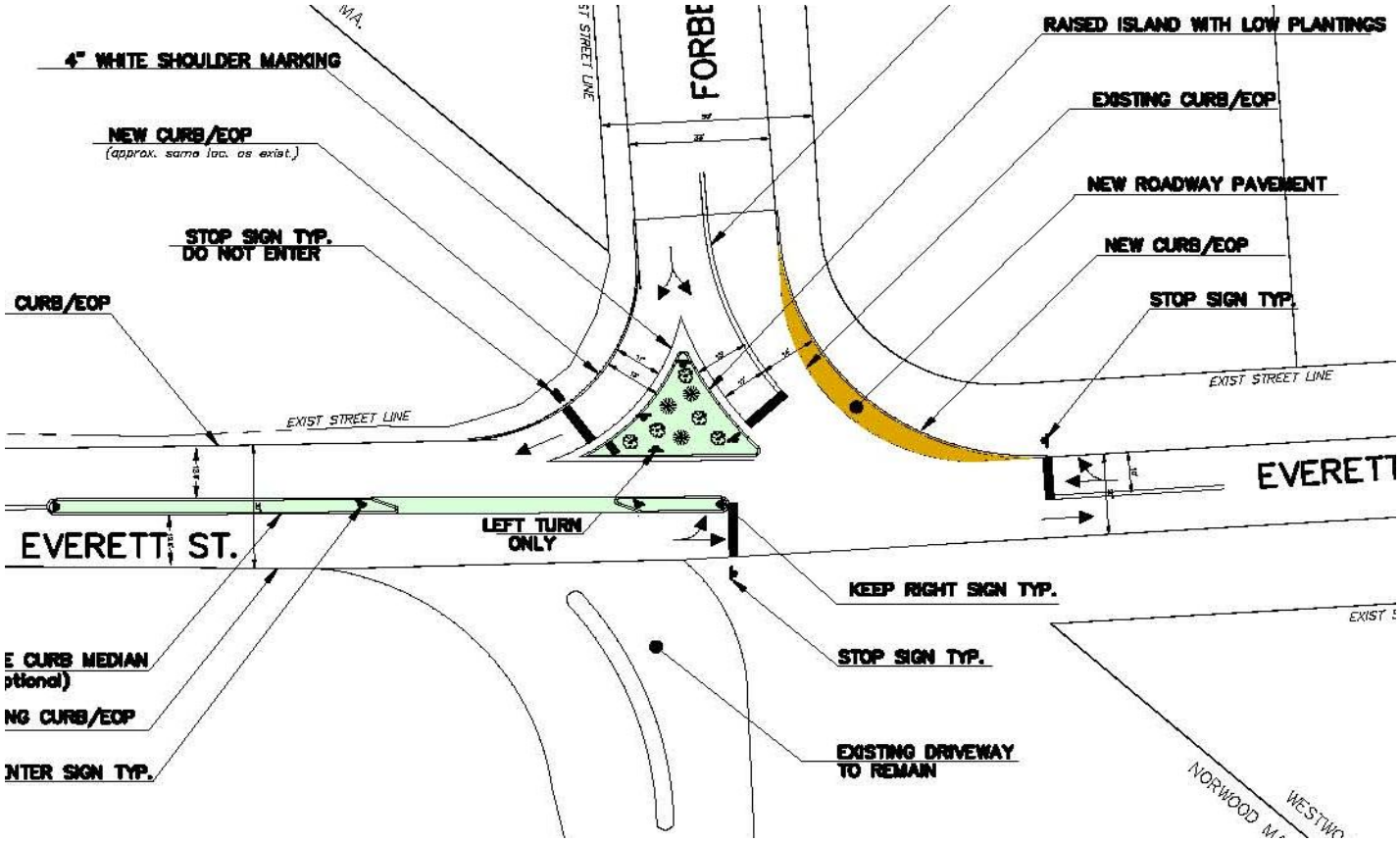
PM Southbound Travel Time & Speeds (Rotary-WWSB)

Travel Time (seconds)	*Without Traffic Calming*	*With Traffic Calming*	*Difference*
Rotary – Forbes	70	99	29 (+41%)
Forbes – Everett	44	61	17 (+39%)
Everett – WWSB	90	105	15 (+17%)
Total	204	265	61 (+30%)

Average Speed (mph)	*Without Traffic Calming*	*With Traffic Calming*	*Difference*
Rotary – Forbes	36	25	11 (-29%)
Forbes – Everett	33	24	9 (-28%)
Everett – WWSB	28	24	4 (-14%)
Average	32	24	8 (-23%)

Proposed Everett Street Alterations

- Forbes Street and Everett Street



Proposed Everett Street Alterations

- Everett Street and Lyons Drive
  - Speed Tables
  - Similar to Canton Street near Downey/Metcalf

Intersection of Canton Street and Westwood Station boulevard

- Objectives
- Geometry
- Analysis

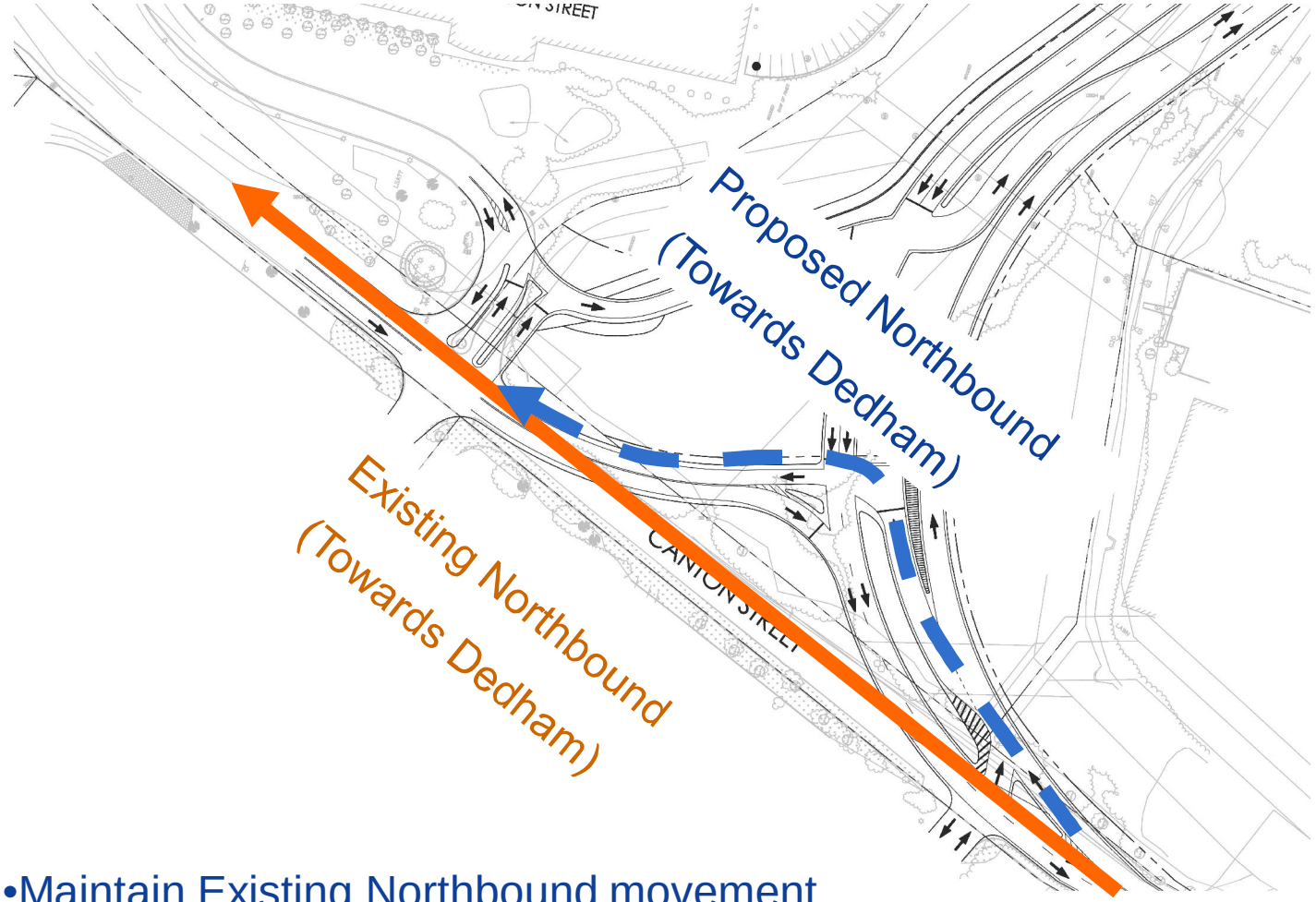
Proposed Canton Street and WWSB

Design Objectives

- Maintain existing northbound and southbound movements
- Prohibit NEW movements to and from Westwood Station
  - No right turn from WWSB onto Canton Street
  - No left turns into WWS from Canton Street
- Restricted access to WWSB for Oceana Way & 690 Canton

Proposed Canton Street and WWSB

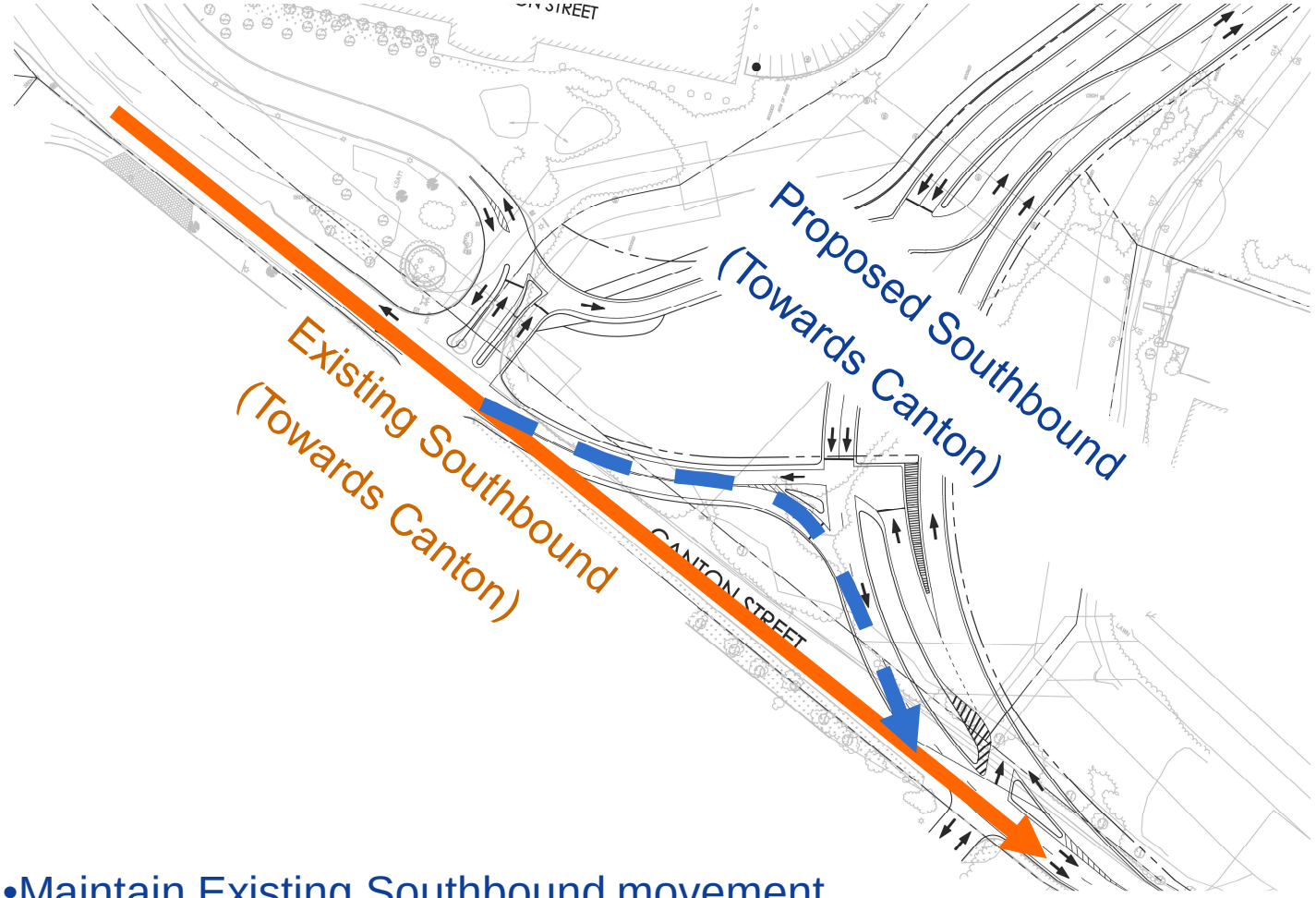
- Design Objectives



•Maintain Existing Northbound movement

Proposed Canton Street and WWSB

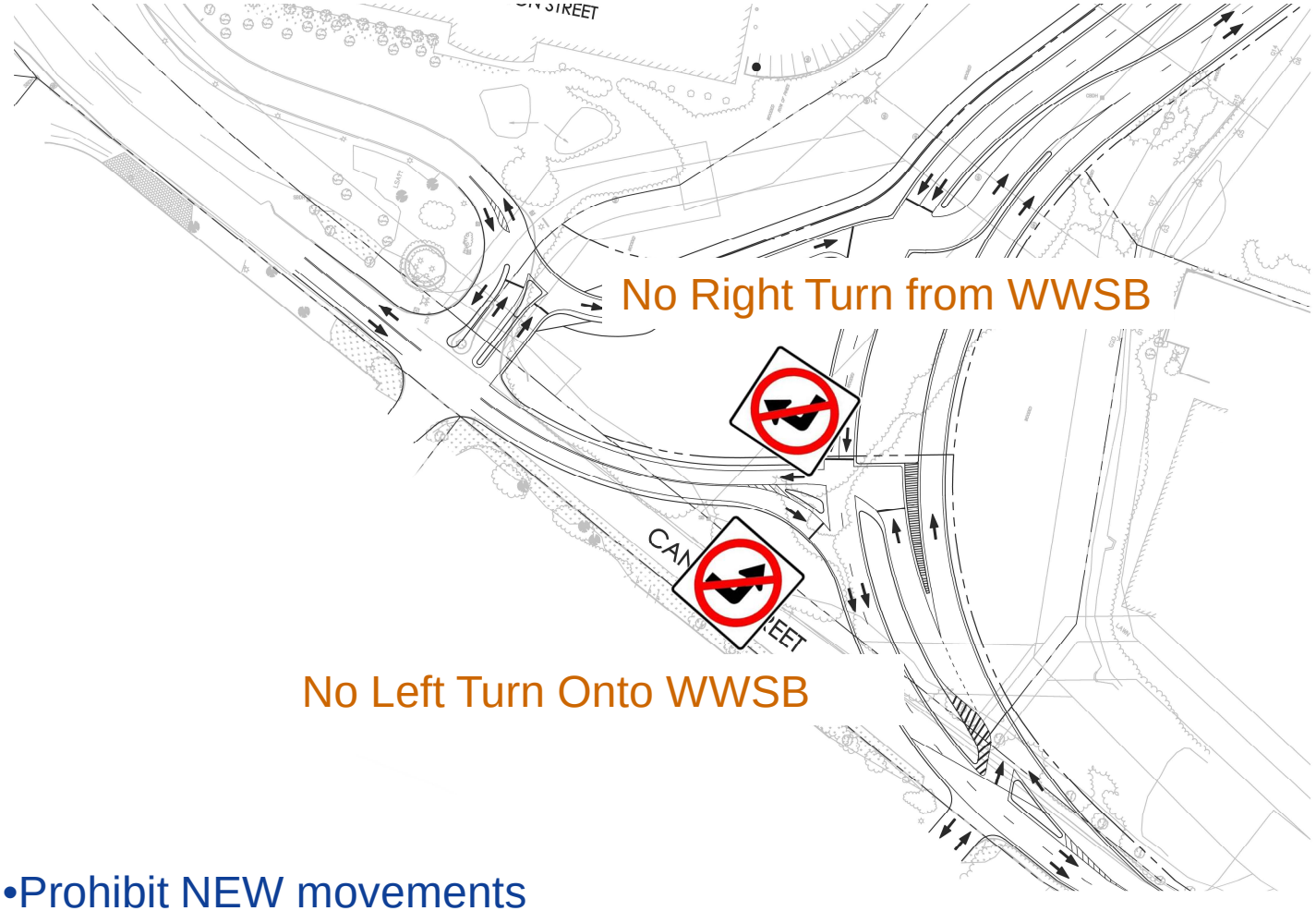
- Design Objectives



•Maintain Existing Southbound movement

Proposed Canton Street and WWSB

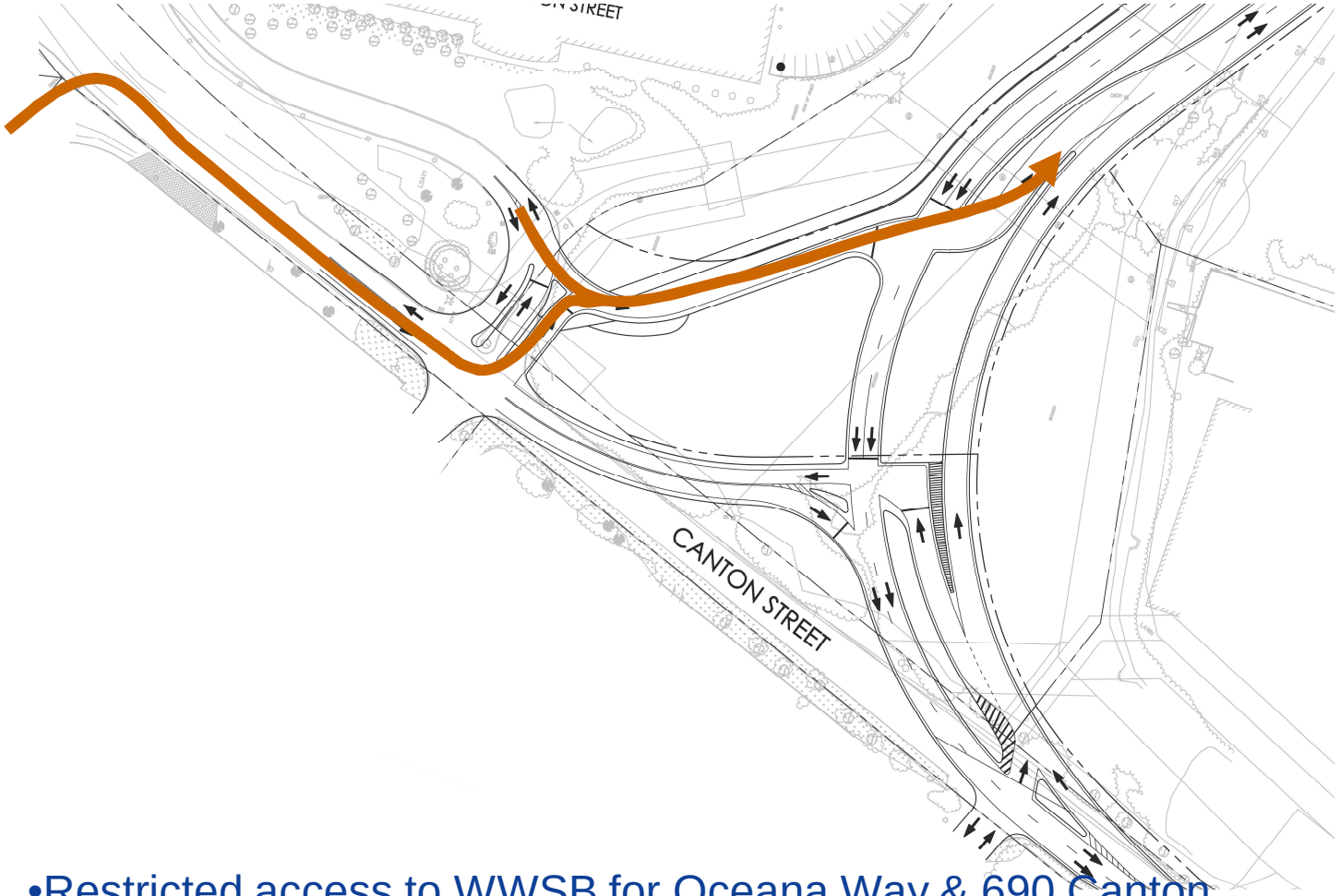
- Design Objectives



•Prohibit NEW movements

Proposed Canton Street and WWSB

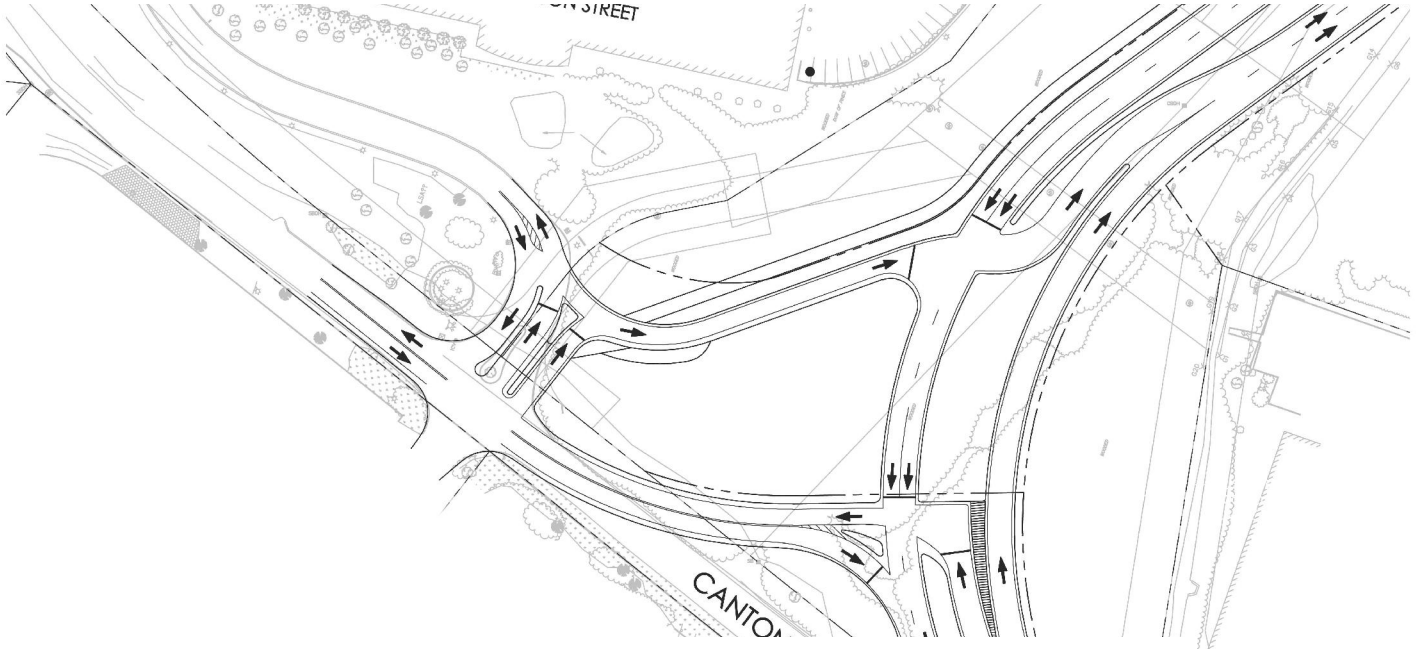
- Design Objectives



•Restricted access to WWSB for Oceana Way & 690 Canton

Proposed Canton Street and WWSB

- Geometric Information



- Design Approved by Mass Highway
- Designed to AASHTO and Mass Highway Standards
- Consensus from Westwood Selectmen
- Consensus from Canton Street Residents

Proposed Canton Street and WWSB

- Intersection Analysis
  - MUTCD Signal Warrant Analysis
    - Based on the 2015 traffic projections a traffic signal is not warranted at this time.
    - Signal warrants will be re-evaluated following construction

Proposed Canton Street and WWSB

- Intersection Analysis – 2015 AM Peak

Synchro 7 - C:\Orla P...tersection Analysis\2015 AM Level 1 TC- West T4.syn

File Edit Transfer Options Optimize Help

41 Canton St #1 #5 & WWSB #4

NODE SETTINGS	
Node #	41
Zone:	B
X East (ft):	3325
Y North (ft):	3953
Z Elevation (ft):	86
Description	
Control Type	Unsig
Max v/c Ratio:	0.58
Intersection Delay (s):	7.2
Intersection LOS:	—
ICU:	0.51
ICU LOS:	A

SIGNING SETTINGS	EBL	EBR	NBL	NBT	SBT	SBR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	0	277	644	287	323	0
Sign Control	Stop	—	—	Free	Free	—
Median Width (ft)	0	—	—	20	24	—
TWLTL Median	☐	—	—	☐	☐	—
Right Turn Channelized	—	Yield	—	None	—	None
Critical Gap, tC (s)	—	6.9	4.1	—	—	—
Follow Up Time, tF (s)	—	3.3	2.2	—	—	—
Volume to Capacity Ratio	—	0.36	0.58	0.18	0.10	—
Control Delay (s)	—	11.7	12.0	0.0	0.0	—
Level of Service	—	B	B	A	A	—
Queue Length 95th (ft)	—	33	78	0	0	—

Proposed Canton Street and WWSB

- Intersection Analysis – 2015 PM Peak

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41 Canton St #1 #5 & WWSB #4

NODE SETTINGS	
Node #	41
Zone:	B
X East (ft):	3325
Y North (ft):	3953
Z Elevation (ft):	86
Description	
Control Type	Unsig
Max v/c Ratio:	0.81
Intersection Delay (s):	11.4
Intersection LOS:	—
ICU:	0.54
ICU LOS:	A

SIGNING SETTINGS	EBL	EBR	NBL	NBT	SBT	SBR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	0	558	444	287	462	0
Sign Control	Stop	—	—	Free	Free	—
Median Width (ft)	0	—	—	20	24	—
TWLTL Median	☐	—	—	☐	☐	—
Right Turn Channelized	—	Yield	—	None	—	None
Critical Gap, tC (s)	—	6.9	4.1	—	—	—
Follow Up Time, tF (s)	—	3.3	2.2	—	—	—
Volume to Capacity Ratio	—	0.81	0.46	0.18	0.15	—
Control Delay (s)	—	26.9	11.2	0.0	0.0	—
Level of Service	—	D	B	A	A	—
Queue Length 95th (ft)	—	172	49	0	0	—

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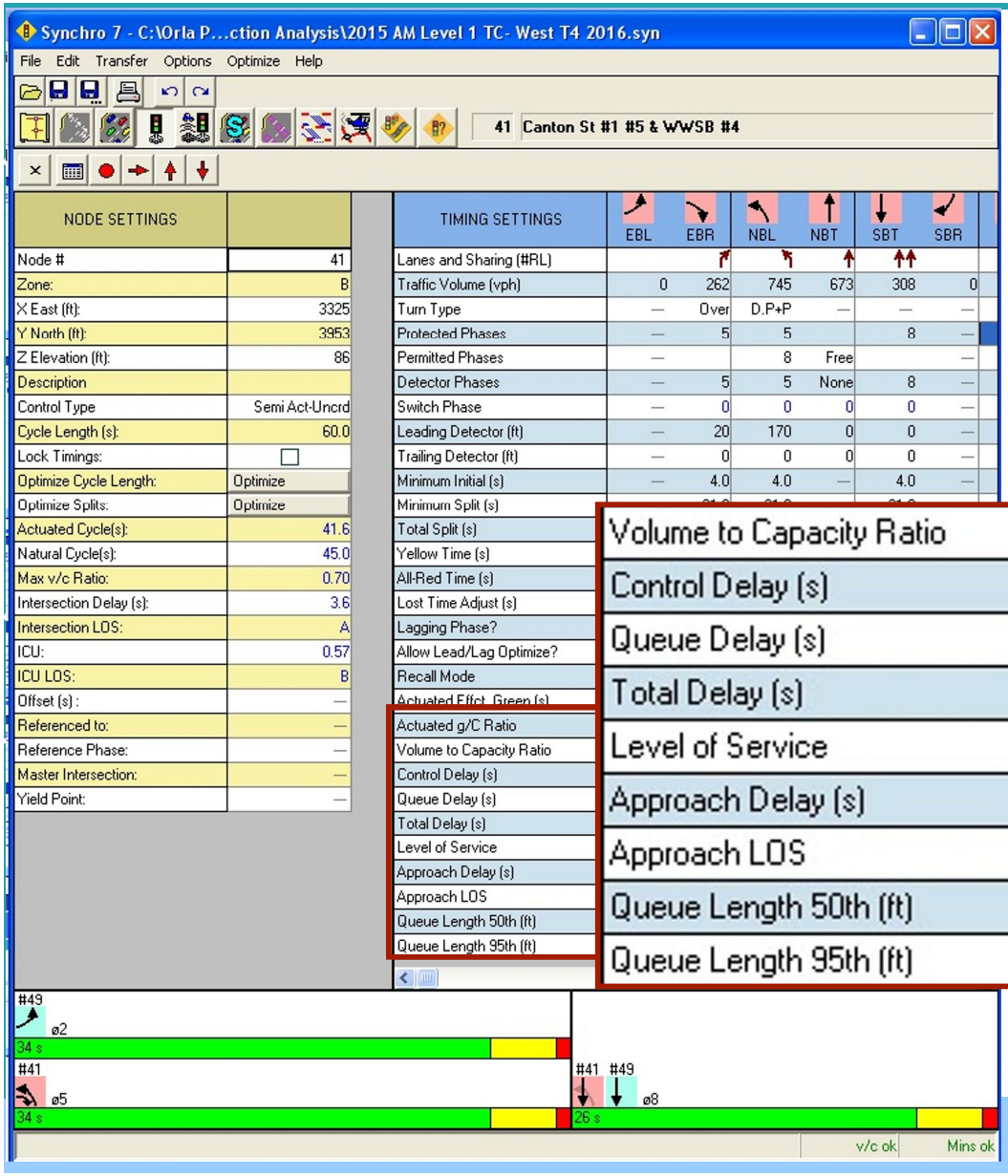
- Intersection Analysis
  - 2016 Build Out Analysis
    - Signalized intersection analysis if intersection meets warrants following construction and build out of the Westwood Station Development

Proposed Canton Street and WWSB

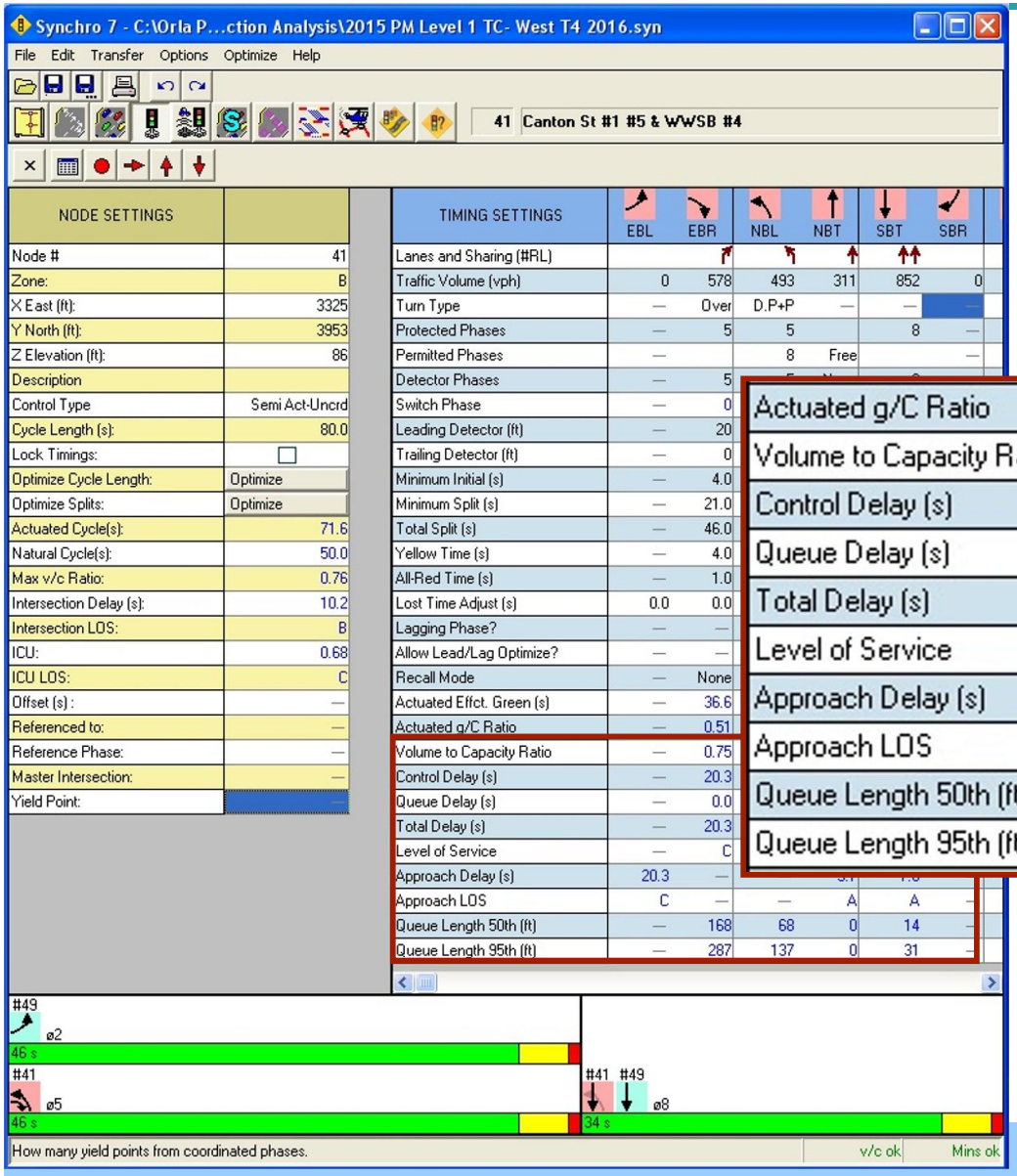


Volume to Capacity Ratio	—	0.29	0.70	0.39	0.42
Control Delay (s)	—	1.5	6.4	0.6	5.5
Queue Delay (s)	—	0.0	0.0	0.0	0.0
Total Delay (s)	—	1.5	6.4	0.6	5.5
Level of Service	—	A	A	A	A
Approach Delay (s)	1.5	—	—	3.6	5.5
Approach LOS	A	—	—	A	A
Queue Length 50th (ft)	—	0	0	0	5
Queue Length 95th (ft)	—	15	73	0	8

- Intersection Analysis

2016 Build Out Analysis – AM Peak

Proposed Canton Street and WWSB



Actuated g/C Ratio	—	0.51	0.85	1.00	0.34
Volume to Capacity Ratio	—	0.75	0.53	0.19	0.76
Control Delay (s)	—	20.3	9.1	0.2	7.6
Queue Delay (s)	—	0.0	0.0	0.0	0.0
Total Delay (s)	—	20.3	9.1	0.2	7.6
Level of Service	—	C	A	A	A
Approach Delay (s)	20.3	—	—	5.7	7.6
Approach LOS	C	—	—	A	A
Queue Length 50th (ft)	—	168	68	0	14
Queue Length 95th (ft)	—	287	137	0	31

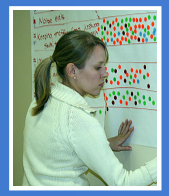
- Intersection Analysis

2016 Build Out Analysis – PM Peak

Summary

In response to the Town of Canton's opposition to petitions by the Town of Westwood for alteration to a county highway, we have:

- Established the Project Purpose and Need is to improve safety by slowing travel speeds and discouraging I-95 cut-thru traffic.
- Provided designs completed to a level necessary to convey intent and establish feasibility
- Provided detailed traffic analysis showing potential impact of proposed designs
- Answered concerns related to intersection operations and the ability of local traffic to continue to use Canton Street


Town of Westwood Petition

Norfolk County Commissioners

Canton Street Improvements

URBAN ENGINEERS
Formulating Excellence