

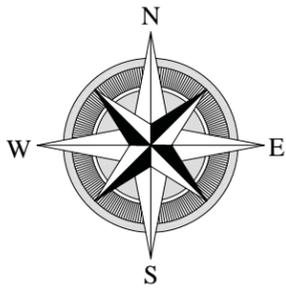
**APPENDIX A**

**List of Participants  
Study Advisory Meetings  
March 14, 2013  
September 5, 2013**

**Study Advisory Meetings**  
**Subarea Priority Roadways Study: Route 3A in Choasset and Scituate**

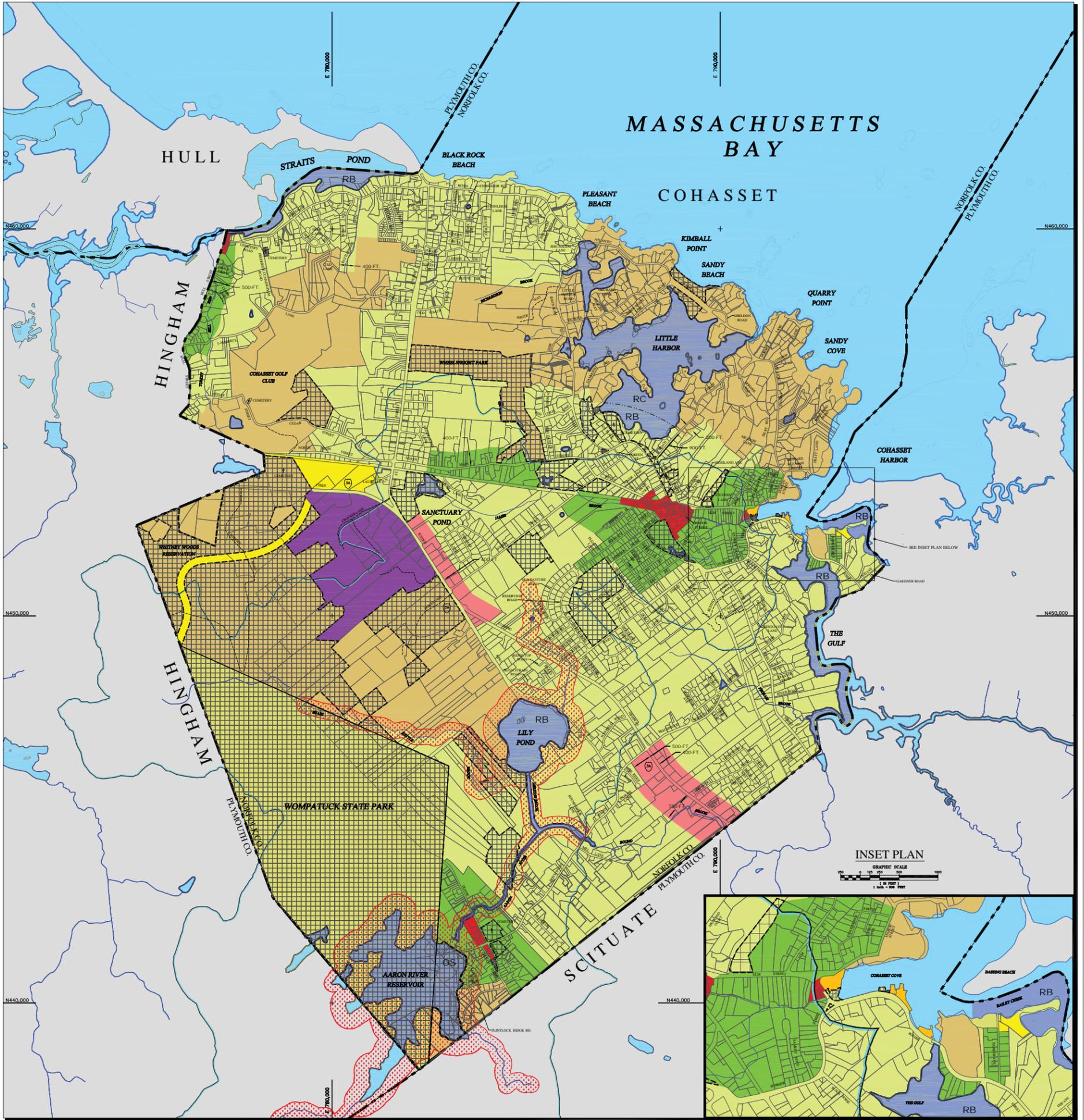
<b>Name</b>	<b>Affiliation</b>	<b>E-mail Address</b>	<b>3/14/2013</b>	<b>9/5/2013</b>
Michael Milanoski	Cohasset Town Manager	<a href="mailto:mmilanoski@townofcohasset.org">mmilanoski@townofcohasset.org</a>	√	√
Brian Joyce	Cohasset Project Management/Planning	<a href="mailto:bjoyce@cohassetma.org">bjoyce@cohassetma.org</a>	√	√
Stuart Ivimey	Cohasset Planning Board	<a href="mailto:stuart.ivimey@verizon.net">stuart.ivimey@verizon.net</a>		√
Clark Brewer	Cohasset Planning Board	<a href="mailto:clarkbrewer@comcast.net">clarkbrewer@comcast.net</a>	√	√
Dave Drinan	Cohasset Planning Board	<a href="mailto:dhdrinan@aol.com">dhdrinan@aol.com</a>		√
Brian Frazier	Cohasset Planning Board	<a href="mailto:brianfrazierdesign@gmail.com">brianfrazierdesign@gmail.com</a>		√
Jo-Ann Pilczak	Cohasset Planning Board Administrator	<a href="mailto:jpilczak@cohassetma.org">jpilczak@cohassetma.org</a>	√	√
Bob Egan	Cohasset Building Commissioner	<a href="mailto:regan@cohassetma.org">regan@cohassetma.org</a>		√
Ian Lyster	Cohasset Planning	<a href="mailto:ilyster@cohassetma.org">ilyster@cohassetma.org</a>		√
Robert Silvia	Cohasset Fire Chief	<a href="mailto:chief@cohassetfire.org">chief@cohassetfire.org</a>	√	√
John Dockray	Cohasset Fire Department	<a href="mailto:jdockray@cohassetfire.org">jdockray@cohassetfire.org</a>		√
Jeff Treanor	Cohasset Police Department	<a href="mailto:jtreaanor@cohassetpolice.com">jtreaanor@cohassetpolice.com</a>	√	√
Laura Harbottle	Scituate Town Planner	<a href="mailto:lhambottle@town.scituate.ma.us">lhambottle@town.scituate.ma.us</a>	√	√
Mark Thompson	Scituate Police Department	<a href="mailto:mthompson@scituatepolice.org">mthompson@scituatepolice.org</a>	√	√
Brian Stewart	Scituate Police Department	<a href="mailto:bstewart@scituatepolice.org">bstewart@scituatepolice.org</a>	√	
Kerri-Anne Hollingshead	MA Rep. Bradley's office	<a href="mailto:kerrianne.hollingshead@mahouse.gov">kerrianne.hollingshead@mahouse.gov</a>		√
Gabe Crocker	Coler & Colantonio Inc.	<a href="mailto:gcrocker@col-col.com">gcrocker@col-col.com</a>	√	
John Morgan	Coler & Colantonio Inc.	<a href="mailto:jmorgan@col-col.com">jmorgan@col-col.com</a>	√	√
Pamela Haznar	MassDOT District 5 Traffic	<a href="mailto:pamela.haznar@state.ma.us">pamela.haznar@state.ma.us</a>		√
Edward Feeney	MassDOT District 5 Traffic	<a href="mailto:edward.feeney@state.ma.us">edward.feeney@state.ma.us</a>	√	√
Barbara Lachance	MassDOT District 5 Traffic	<a href="mailto:Barbara.Lachance@dot.state.ma.us">Barbara.Lachance@dot.state.ma.us</a>	√	
James Greene	MassDOT District 5 Maintenance	<a href="mailto:james.greene@state.ma.us">james.greene@state.ma.us</a>	√	
Timothy Kocahn	MassDOT District 5 Bike & Ped. Coord.	<a href="mailto:timothy.kochan@state.ma.us">timothy.kochan@state.ma.us</a>	√	
Erin Reed	MassDOT Safe Routes to School	<a href="mailto:erin.reed@state.ma.us">erin.reed@state.ma.us</a>	√	√
Barry Keppard	MAPC SSC Coordinator	<a href="mailto:bkeppard@MAPC.ORG">bkeppard@MAPC.ORG</a>	√	
Scott Peterson	CTPS Technical Director	<a href="mailto:speterson@ctps.org">speterson@ctps.org</a>		√
Efi Pagitsas	CTPS Traffic Analysis & Design	<a href="mailto:epagitsas@ctps.org">epagitsas@ctps.org</a>	√	√
Chen-Yuan Wang	CTPS Traffic Analysis & Design	<a href="mailto:cwang@ctps.org">cwang@ctps.org</a>	√	√

**APPENDIX B**  
**Zoning District Map**  
**Town of Cohasset**

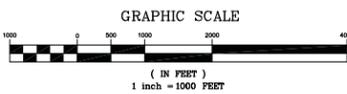


# TOWN OF COHASSET MASSACHUSETTS ZONING DISTRICT MAP

MARCH 2002



INSET PLAN

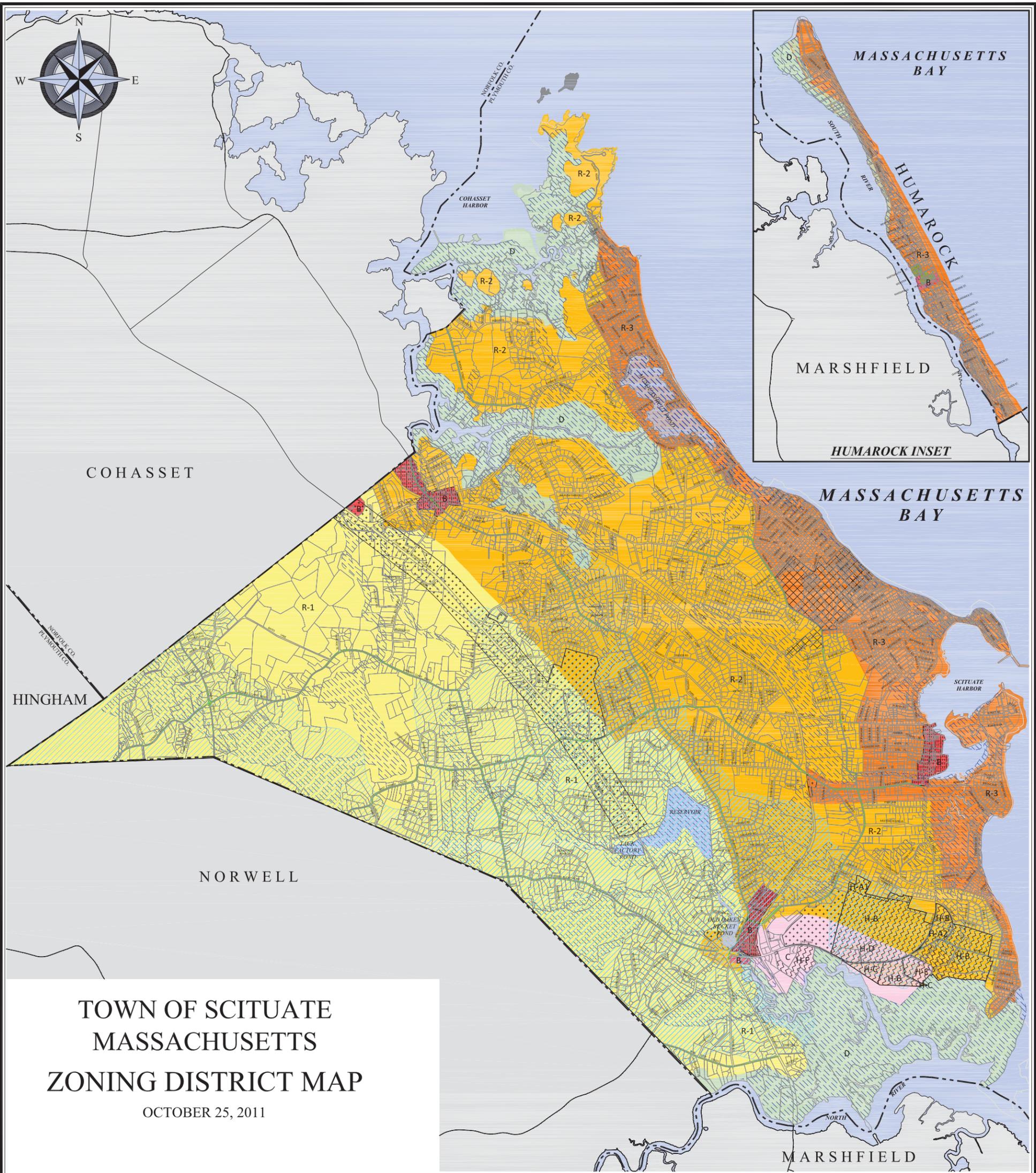


AMORY ENGINEERS, P.C.  
DUXBURY, MASSACHUSETTS

- NOTES:
1. MAP PROJECTION IS NAD 83, MASSACHUSETTS STATE PLANES, MAINLAND ZONE, US FOOT.
  2. CORPORATE BOUNDARIES AND HYDROGRAPHY DOWNLOADED FROM MASS GIS. PLEASE NOTE ONLY MAJOR HYDROGRAPHIC FEATURES ARE SHOWN.
  3. PARCEL & RIGHT-OF-WAY DATA CREATED IN 1995 & PROVIDED BY TOWN OF COHASSET. INFORMATION IS SHOWN FOR REFERENCE PURPOSES ONLY.
  4. STREET NAMES ARE FOR REFERENCE PURPOSES ONLY AND DO NOT REPRESENT AN OFFICIAL MAP FOR DETERMINING THE STATUS OF PUBLIC AND PRIVATE WAYS.
  5. ZONING INFORMATION TAKEN FROM PLAN ENTITLED ZONING DISTRICT MAP OF THE TOWN OF COHASSET, MASSACHUSETTS, DATED OCTOBER 1, 1969 WITH LATEST REVISION IN 1985. PREPARED BY EDWIN A. YOUNG, P.E.
  6. THE WATER RESOURCE DISTRICT, ESTABLISHED AS THE OVERLAY DISTRICT SHOWN ON THIS ZONING MAP, IS BASED ON THE PRIOR OFFICIAL WATER RESOURCE DISTRICT MAP DATED MARCH 2001, WITH MINOR MODIFICATIONS TO THE DISTRICT LINE BY NORFOLK RAM GROUP, LLC ENVIRONMENTAL ENGINEERS OF PLYMOUTH, MA, TO ADJUST PORTIONS OF THE DISTRICT LINE THAT DEFINE THE LILY POND AND AARON RIVER RESERVOIR WATERSHEDS SO AS TO BE CONSISTENT WITH THE THREE METER TOPOGRAPHIC MAPS PUBLISHED BY THE UNITED STATES GEOLOGICAL SURVEY IN 1984.
  7. FOR ADDITIONAL INFORMATION REGARDING ZONE BOUNDARIES THAT DO NOT FOLLOW PHYSICAL FEATURES SUCH AS HYDROGRAPHY OR PROPERTY LINES, PLEASE REFER TO NOTES ON FILE WITH THE TOWN CLERKS OFFICE.

- LEGEND
- HIGHWAY BUSINESS DISTRICT - 10,000 s.f. Minimum Lot Size
  - RESIDENCE A DISTRICT - 18,000 s.f. Minimum Lot Size
  - RESIDENCE B DISTRICT - 35,000 s.f. Minimum Lot Size
  - RESIDENCE C DISTRICT - 60,000 s.f. Minimum Lot Size
  - DOWNTOWN BUSINESS DISTRICT - 5,000 s.f. Minimum Lot Size
  - LIGHT INDUSTRY DISTRICT - 80,000 s.f. Minimum Lot Size
  - WATERFRONT BUSINESS DISTRICT - N/A
  - TECHNOLOGY BUSINESS DISTRICT - 80,000 s.f. Minimum Lot Size
  - OPEN SPACE DISTRICT
  - WATER BODIES (UN-ZONED INLAND AND/OR COASTAL WATER BODIES)
  - WATER BODIES (ZONED INLAND AND/OR TIDAL WATER BODIES)
  - STATE, MUNICIPAL & RESERVATION LAND
  - LIMIT OF HYDROGRAPHIC FEATURE
  - WATER RESOURCE DISTRICT
  - ZONE A - SURFACE WATER PROTECTION AREA

**APPENDIX C**  
**Zoning District Map**  
**Town of Scituate**



# TOWN OF SCITUATE MASSACHUSETTS ZONING DISTRICT MAP

OCTOBER 25, 2011

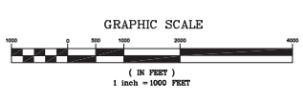
### LEGEND

ZONING DISTRICTS		MINIMUM DIMENSIONAL REQUIREMENTS					
	LOT AREA (UPLAND) (SQ. FT.)	FRONTAGE <sup>2</sup> (FT.)	FRONT <sup>3</sup> (FT.)	SIDE (FT.)	REAR (FT.)	LOT WIDTH (FT.)	
R-1	RESIDENCE R-1	40,000	100	30	15	30	175
R-2	RESIDENCE R-2	20,000	100	30	15	30	125
R-3	RESIDENCE R-3	10,000	100	30	8	20	100
B	BUSINESS <sup>4</sup>	--	60	30	8 <sup>5</sup>	8	--
C	COMMERCIAL <sup>4</sup>	--	60	30	8 <sup>5</sup>	8	--
D	SALTMARSH & TIDELAND CONSERVATION DISTRICT						

OVERLAY DISTRICTS	
[Symbol]	FLOOD PLAIN & WATERSHED PROTECTION DISTRICT
[Symbol]	HUMAROCK VILLAGE RESIDENTIAL OVERLAY DISTRICT
[Symbol]	PLANNED DEVELOPMENT DISTRICT (See Zoning Bylaw for information on subdistricts)
[Symbol]	RESIDENTIAL CLUSTER DISTRICT
[Symbol]	VILLAGE BUSINESS OVERLAY DISTRICT
[Symbol]	WATER RESOURCE PROTECTION DISTRICT
[Symbol]	WIRELESS COMMUNICATION OVERLAY DISTRICT

SCENIC ROAD (Parts of the Driftway were designated as a Scenic Road by Article 23 of the 1985 Annual Town Meeting. All other Scenic Roads were designated by Article 53 of the 1974 Annual Town Meeting.)



AMORY ENGINEERS, P.C.  
DUXBURY, MASSACHUSETTS

- NOTES
- SEE ZONING BYLAW SECTION 610.5, NON-DISTURBANCE BUFFER ZONE, FOR REQUIRED SETBACK, WITHIN WRPD FROM THE HIGH WATER MARK OF TACK FACTORY POND RESERVOIR AND TRIBUTARIES IN THE RESERVOIR WATERSHED.
  - SEE ZONING BYLAW SECTION 610.2, LOT FRONTAGE REQUIREMENTS, FOR ADDITIONAL INFORMATION.
  - SEE ZONING BYLAW SECTION 620.3, SETBACK AND YARD REQUIREMENTS, FOR REQUIRED SETBACKS FROM CHIEF JUSTICE CUSHING HIGHWAY, THE NEW DRIFTWAY, THE DRIFTWAY AND NEW KENT STREET.
  - SEE ZONING BYLAW SECTIONS 610.1, LOT AREA AND WIDTH REQUIREMENTS AND 620.3, SETBACK AND YARD REQUIREMENTS, FOR THE REQUIRED AREA, FRONTAGE, LOT WIDTH AND SETBACKS FOR DWELLINGS IN THE BUSINESS AND COMMERCIAL ZONING DISTRICTS.
  - UNLESS HAVING A PARTY WALL ON THE SAME LOT LINE, PER ZONING BYLAW SECTION 620.3, SETBACKS AND YARD REQUIREMENTS.

## **APPENDIX D**

### **Segment Crash Rate Worksheets**

Worksheet D-1

Route 3A North Section:

MBTA Cohasset Station to Cohasset Plaza Shopping Center

Worksheet D-2

Route 3A Middle Section:

Cohasset Plaza Shopping Center to Beechwood Street

Worksheet D-3

Route 3A South Section:

Beechwood Street to Henry Turner Bailey Road

Worksheet D-4

Route 3A Corridor:

MBTA Cohasset Station to Henry Turner Bailey Road

## SEGMENT CRASH RATE WORKSHEET D-1

CITY/TOWN : Cohasset

COUNT DATE : 4/29-5/1/2013

DISTRICT : 5

~ SEGMENT DATA ~

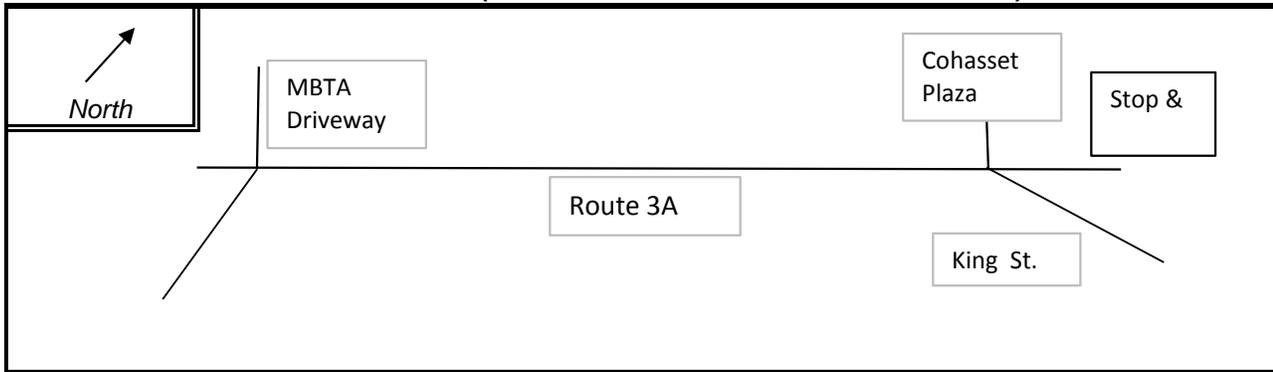
ROADWAY NAME: Route 3A

START POINT: MBTA Station in Cohasset

END POINT: South of Stop&Shop Supermarket

FUNCTIONAL CLASSIFICATION OF ROADWAY: Principal Arterial (Other)

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES ( L ): **1.14**

AVERAGE DAILY TRAFFIC VOLUME ( V ): 19,500

TOTAL # OF CRASHES:

133

# OF YEARS :

5

AVERAGE # OF CRASHES PER YEAR ( A ) :

**26.60**

CRASH RATE CALCULATION :

**3.29**

RATE =

( A \* 1,000,000 )  
 ( L \* V \* 365 )

Comments : 2010 State Average Crash Rate (updated 1/23/2013) for the functional class of Principal Arterial (Other) for urban areas = 3.23 crashes per million vehicle miles traveled

Project: Address Safety, Mobility, and Accessibility for Route 3A in Cohasset and Scituate

## SEGMENT CRASH RATE WORKSHEET D-2

CITY/TOWN : Cohasset

COUNT DATE : 4/29-5/1/2013

DISTRICT : 5

~ SEGMENT DATA ~

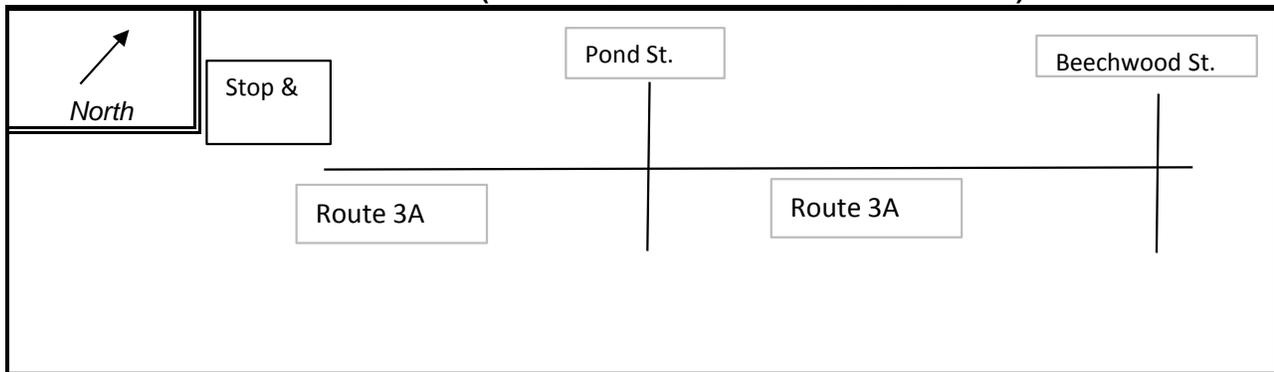
ROADWAY NAME: Route 3A

START POINT: South of Stop&Shop Supermarket

END POINT: North of Beechwood Street

FUNCTIONAL CLASSIFICATION OF ROADWAY: Principal Arterial (Other)

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES ( L ): **1.04**

AVERAGE DAILY TRAFFIC VOLUME ( V ): 18,500

TOTAL # OF CRASHES: **59**

# OF YEARS : **5**

AVERAGE # OF CRASHES PER YEAR ( A ): **11.80**

CRASH RATE CALCULATION : **1.68**

RATE =  $\frac{A * 1,000,000}{L * V * 365}$

Comments : 2010 State Average Crash Rate (updated 1/23/2013) for the functional class of Principal Arterial (Other) for urban areas = 3.23 crashes per million vehicle miles traveled

Project: Address Safety, Mobility, and Accessibility for Route 3A in Cohasset and Scituate

## SEGMENT CRASH RATE WORKSHEET D-3

CITY/TOWN : Cohasset

COUNT DATE : 4/29-5/1/2013

DISTRICT : 5

~ SEGMENT DATA ~

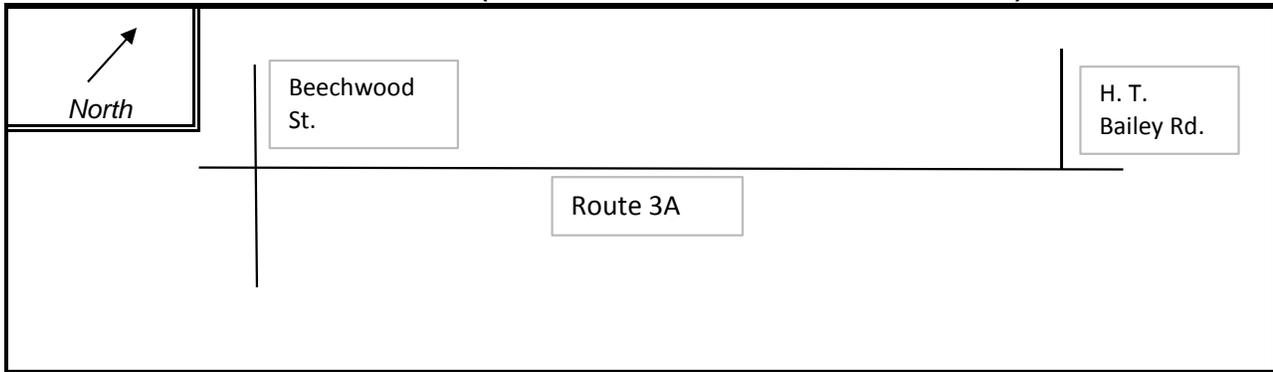
ROADWAY NAME: Route 3A

START POINT: Beechwood Street

END POINT: H. T. Bailey Road in Scituate

FUNCTIONAL CLASSIFICATION OF ROADWAY: Principal Arterial (Other)

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES ( L ): **0.85**

AVERAGE DAILY TRAFFIC VOLUME ( V ): 17,500

TOTAL # OF CRASHES: **133**

# OF YEARS : **5**

AVERAGE # OF CRASHES PER YEAR ( A ): **26.60**

CRASH RATE CALCULATION : **4.89**

RATE =  $\frac{A * 1,000,000}{L * V * 365}$

Comments : 2010 State Average Crash Rate (updated 1/23/2013) for the functional class of Principal Arterial (Other) for urban areas = 3.23 crashes per million vehicle miles traveled

Project: Address Safety, Mobility, and Accessibility for Route 3A in Cohasset and Scituate

## SEGMENT CRASH RATE WORKSHEET D-4

CITY/TOWN : Cohasset

COUNT DATE : 4/29-5/1/2013

DISTRICT : 5

~ SEGMENT DATA ~

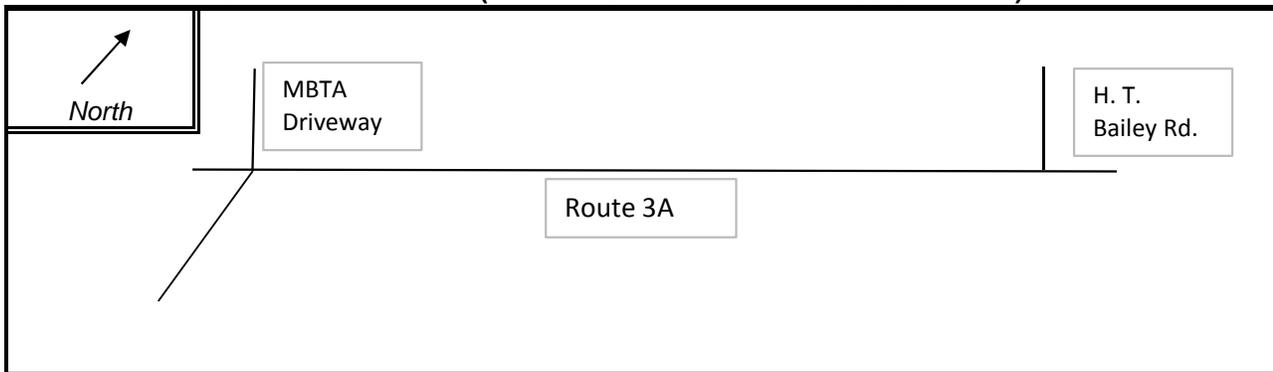
ROADWAY NAME: Route 3A

START POINT: MBTA Station in Cohasset

END POINT: H. T. Bailey Road in Scituate

FUNCTIONAL CLASSIFICATION OF ROADWAY: Principal Arterial (Other)

ROADWAY DIAGRAM (LABEL ROADWAY AND CROSS STREETS)



AVERAGE DAILY TRAFFIC

SEGMENT LENGTH IN MILES ( L ): **3.03**

AVERAGE DAILY TRAFFIC VOLUME ( V ): 18,500

TOTAL # OF CRASHES: **321**

# OF YEARS : **5**

AVERAGE # OF CRASHES PER YEAR ( A ): **64.20**

CRASH RATE CALCULATION : **3.14**

RATE =  $\frac{A * 1,000,000}{L * V * 365}$

Comments : 2010 State Average Crash Rate (updated 1/23/2013) for the functional class of Principal Arterial (Other) for urban areas = 3.23 crashes per million vehicle miles traveled

Project: Address Safety, Mobility, and Accessibility for Route 3A in Cohasset and Scituate

## **APPENDIX E**

### **Intersection Crash Rate Worksheets**

Worksheet E-1

Route 3A at MBTA Station Driveway, Cohasset

Worksheet E -2

Route 3A at King Street, Cohasset

Worksheet E -3

Route 3A at Sohier Street, Cohasset

Worksheet E -4

Route 3A at King Street/Cohasset Plaza, Cohasset

Worksheet E -5

Route 3A at Pond Street, Cohasset

Worksheet E -6

Route 3A at Beechwood Street, Cohasset

Worksheet E -7

Route 3A at Henry Turner Bailey Road, Scituate















## **APPENDIX F**

### **Intersection Crash Statistics**

Table F-1

Route 3A at MBTA Station Driveway, Cohasset

Table F-2

Route 3A at King Street, Cohasset

Table F-3

Route 3A at Sohier Street, Cohasset

Table F-4

Route 3A at King Street/Cohasset Plaza, Cohasset

Table F-5

Route 3A at Pond Street, Cohasset

Table F-6

Route 3A at Beechwood Street, Cohasset

Table F-7

Route 3A at Henry Turner Bailey Road, Scituate

**TABLE F-1**  
**Route 3A at MBTA Station Driveway, Cohasset**  
**MassDOT Crash Data 2008–10 and Cohasset Police Crash Reports 2010–12**

<b>Statistics Period</b>		<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2008–12 Total</b>	<b>Annual Avg.</b>
<b>Total number of crashes</b>		3	2	4	1	4	14	2.8
<b>Severity</b>	Property damage only	3	1	2	1	4	11	2.2
	Non-fatal injury	0	1	2	0	0	3	0.6
	Fatality	0	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0	0.0
<b>Collision type</b>	Single vehicle	2	0	4	0	1	7	1.4
	Rear-end	0	1	0	0	3	4	0.8
	Angle	1	1	0	0	0	2	0.4
	Sideswipe, same direction	0	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	0	0	0	0	0.0
	Head-on	0	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0	0.0
<b>Involved pedestrian(s)</b>		0	0	0	0	0	0	0.0
<b>Involved cyclist(s)</b>		0	0	0	0	0	0	0.0
<b>Occurred during weekday peak periods*</b>		1	1	0	1	1	4	0.8
<b>Wet or icy pavement conditions</b>		1	0	1	0	1	3	0.6
<b>Dark conditions (lit or unlit)</b>		1	0	3	0	0	4	0.8

\* Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

**TABLE F-2**  
**Route 3A at King Street, Cohasset**  
**MassDOT Crash Data 2008–10 and Cohasset Police Crash Reports 2010–12**

<b>Statistics Period</b>		<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2008–12 Total</b>	<b>Annual Avg.</b>
<b>Total number of crashes</b>		4	2	5	2	3	16	3.2
<b>Severity</b>	Property damage only	3	2	3	1	2	11	2.2
	Non-fatal injury	1	0	1	1	0	3	0.6
	Fatality	0	0	0	0	0	0	0.0
	Not reported/unknown	0	0	1	0	0	1	0.2
<b>Collision type</b>	Single vehicle	1	1	1	0	0	3	0.6
	Rear-end	2	1	1	1	0	5	1.0
	Angle	0	0	3	1	3	7	1.4
	Sideswipe, same direction	0	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	0	0	0	0	0.0
	Head-on	1	0	0	0	0	1	0.2
	Rear-to-rear	0	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0	0.0
<b>Involved pedestrian(s)</b>		0	0	0	0	0	0	0.0
<b>Involved cyclist(s)</b>		0	0	0	0	0	0	0.0
<b>Occurred during weekday peak periods*</b>		0	1	3	1	1	6	1.2
<b>Wet or icy pavement conditions</b>		1	1	1	0	0	3	0.6
<b>Dark conditions (lit or unlit)</b>		2	0	1	0	0	3	0.6

\* Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

**TABLE F-3**  
**Route 3A at Sohier Street, Cohasset**  
**MassDOT Crash Data 2008–10 and Cohasset Police Crash Reports 2010–12**

<b>Statistics Period</b>		<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2008–12 Total</b>	<b>Annual Avg.</b>
<b>Total number of crashes</b>		2	5	2	0	1	10	2.0
<b>Severity</b>	Property damage only	1	5	2	0	0	8	1.6
	Non-fatal injury	1	0	0	0	1	2	0.4
	Fatality	0	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0	0.0
<b>Collision type</b>	Single vehicle	0	1	1	0	0	2	0.4
	Rear-end	1	0	0	0	0	1	0.2
	Angle	1	4	1	0	1	7	1.4
	Sideswipe, same direction	0	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	0	0	0	0	0.0
	Head-on	0	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0	0.0
<b>Involved pedestrian(s)</b>		0	0	0	0	0	0	0.0
<b>Involved cyclist(s)</b>		0	1	0	0	0	1	0.2
<b>Occurred during weekday peak periods*</b>		1	1	0	0	0	2	0.4
<b>Wet or icy pavement conditions</b>		0	2	1	0	0	3	0.6
<b>Dark conditions (lit or unlit)</b>		1	1	2	0	0	4	0.8

\* Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

**TABLE F-4**  
**Route 3A at King Street/Cohasset Plaza Driveway, Cohasset**  
**MassDOT Crash Data 2008–10 and Cohasset Police Crash Reports 2010–12**

<b>Statistics Period</b>		<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2008–12 Total</b>	<b>Annual Avg.</b>
<b>Total number of crashes</b>		10	6	11	7	3	37	7.4
<b>Severity</b>	Property damage only	6	5	8	4	1	24	4.8
	Non-fatal injury	4	1	3	3	2	13	2.6
	Fatality	0	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0	0.0
<b>Collision type</b>	Single vehicle	2	2	1	0	0	5	1.0
	Rear-end	5	2	4	3	0	14	2.8
	Angle	2	2	5	3	1	13	2.6
	Sideswipe, same direction	0	0	1	0	0	1	0.2
	Sideswipe, opposite direction	0	0	0	1	1	2	0.4
	Head-on	1	0	0	0	1	2	0.4
	Rear-to-rear	0	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0	0.0
<b>Involved pedestrian(s)</b>		0	0	0	0	0	0	0.0
<b>Involved cyclist(s)</b>		0	0	0	0	0	0	0.0
<b>Occurred during weekday peak periods*</b>		4	1	3	2	2	12	2.4
<b>Wet or icy pavement conditions</b>		2	3	2	2	2	11	2.2
<b>Dark conditions (lit or unlit)</b>		4	0	1	1	1	7	1.4

\* Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

**TABLE F-5**  
**Route 3A at Pond Street, Cohasset**  
**MassDOT Crash Data 2008–10 and Cohasset Police Crash Reports 2010–12**

<b>Statistics Period</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2008–12 Total</b>	<b>Annual Avg.</b>
<b>Total number of crashes</b>	6	7	7	4	9	33	6.6
<b>Severity</b>							
Property damage only	5	6	4	3	6	24	4.8
Non-fatal injury	1	1	2	1	3	8	1.6
Fatality	0	0	0	0	0	0	0.0
Not reported/unknown	0	0	1	0	0	1	0.2
<b>Collision type</b>							
Single vehicle	0	1	1	0	1	3	0.6
Rear-end	6	6	5	4	7	28	5.6
Angle	0	0	1	0	1	2	0.4
Sideswipe, same direction	0	0	0	0	0	0	0.0
Sideswipe, opposite direction	0	0	0	0	0	0	0.0
Head-on	0	0	0	0	0	0	0.0
Rear-to-rear	0	0	0	0	0	0	0.0
Not reported/unknown	0	0	0	0	0	0	0.0
<b>Involved pedestrian(s)</b>	0	0	0	0	0	0	0.0
<b>Involved cyclist(s)</b>	0	0	0	0	0	0	0.0
<b>Occurred during weekday peak periods*</b>	3	5	2	2	2	14	2.8
<b>Wet or icy pavement conditions</b>	1	3	3	2	3	12	2.4
<b>Dark conditions (lit or unlit)</b>	1	0	2	1	1	5	1.0

\* Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

**TABLE F-6**  
**Route 3A at Beechwood Street, Cohasset**  
**MassDOT Crash Data 2008–10 and Cohasset Police Crash Reports 2010–12**

<b>Statistics Period</b>		<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>5-Yr. Total</b>	<b>Annual Avg.</b>
<b>Total number of crashes</b>		11	10	9	14	13	57	11.4
<b>Severity</b>	Property damage only	10	5	7	9	10	41	8.2
	Non-fatal injury	0	4	2	5	3	14	2.8
	Fatality	0	0	0	0	0	0	0.0
	Not reported/unknown	1	1	0	0	0	2	0.4
<b>Collision type</b>	Single vehicle	0	1	1	1	1	4	0.8
	Rear-end	2	1	2	1	2	8	1.6
	Angle	7	8	3	9	8	35	7.0
	Sideswipe, same direction	1	0	0	1	1	3	0.6
	Sideswipe, opposite direction	0	0	1	0	0	1	0.2
	Head-on	1	0	1	1	0	3	0.6
	Rear-to-rear	0	0	0	0	0	0	0.0
	Not reported/unknown	0	0	1	1	1	3	0.6
<b>Involved pedestrian(s)</b>		0	0	0	0	0	0	0.0
<b>Involved cyclist(s)</b>		0	0	0	0	0	0	0.0
<b>Occurred during weekday peak periods*</b>		4	5	2	6	1	18	3.6
<b>Wet or icy pavement conditions</b>		2	4	3	5	4	18	3.6
<b>Dark conditions (lit or unlit)</b>		0	0	2	0	2	4	0.8

\* Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

**TABLE F-7**  
**Route 3A at Henry Turner Bailey Road, Scituate**  
**MassDOT Crash Data 2008–10 and Cohasset Police Crash Reports 2010–12**

<b>Statistics Period</b>		<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2008–12 Total</b>	<b>Annual Avg.</b>
<b>Total number of crashes</b>		7	6	2	2	4	21	4.2
<b>Severity</b>	Property damage only	6	4	2	1	4	17	3.4
	Non-fatal injury	1	2	0	1	0	4	0.8
	Fatality	0	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0	0.0
<b>Collision type</b>	Single vehicle	0	2	0	0	1	3	0.6
	Rear-end	5	0	1	1	2	9	1.8
	Angle	2	4	0	1	1	8	1.6
	Sideswipe, same direction	0	0	0	0	0	0	0.0
	Sideswipe, opposite direction	0	0	1	0	0	1	0.2
	Head-on	0	0	0	0	0	0	0.0
	Rear-to-rear	0	0	0	0	0	0	0.0
	Not reported/unknown	0	0	0	0	0	0	0.0
<b>Involved pedestrian(s)</b>		0	0	0	0	0	0	0.0
<b>Involved cyclist(s)</b>		0	0	0	0	0	0	0.0
<b>Occurred during weekday peak periods*</b>		4	2	1	1	1	9	1.8
<b>Wet or icy pavement conditions</b>		0	1	0	0	1	2	0.4
<b>Dark conditions (lit or unlit)</b>		0	2	0	0	0	2	0.4

\* Peak periods are defined as 7:00–10:00 AM and 3:30–6:30 PM.

## **APPENDIX G**

### **Intersection Collision Diagrams**

Figure G-1

Route 3A at MBTA Station Driveway, Cohasset

Figure G-2

Route 3A at King Street, Cohasset

Figure G-3

Route 3A at Sohier Street, Cohasset

Figure G-4

Route 3A at King Street/Cohasset Plaza, Cohasset

Figure G-5

Route 3A at Pond Street, Cohasset

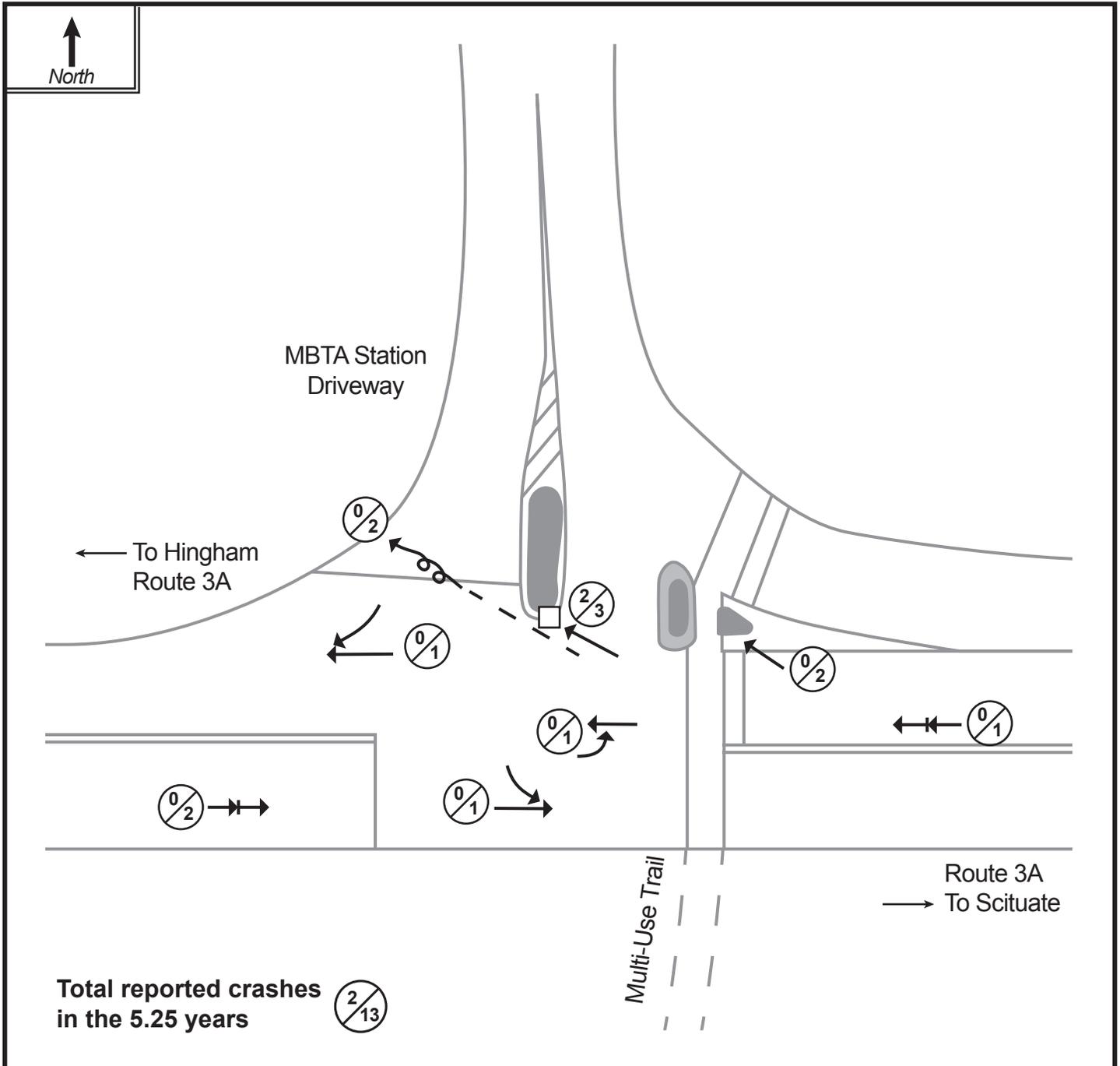
Figure G-6

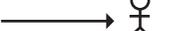
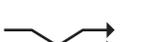
Route 3A at Beechwood Street, Cohasset

Figure G-7

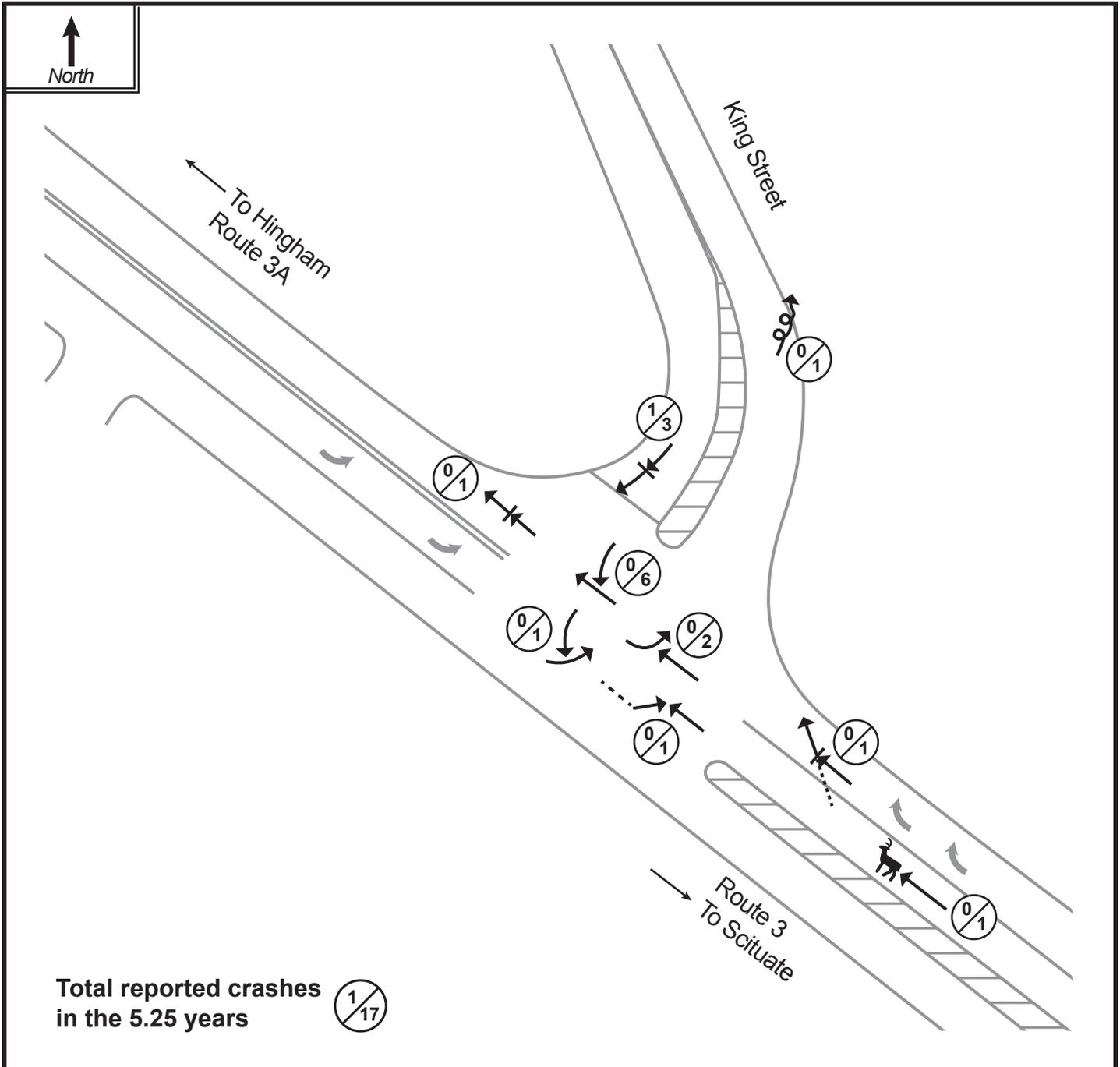
Route 3A at Henry Turner Bailey Road, Scituate

**Figure ; -1**  
**Collision Diagram, Cohasset Police Reports 1/1/2008–3/31/2013**  
**Route 3A @ MBTA Station Driveway, Cohasset**



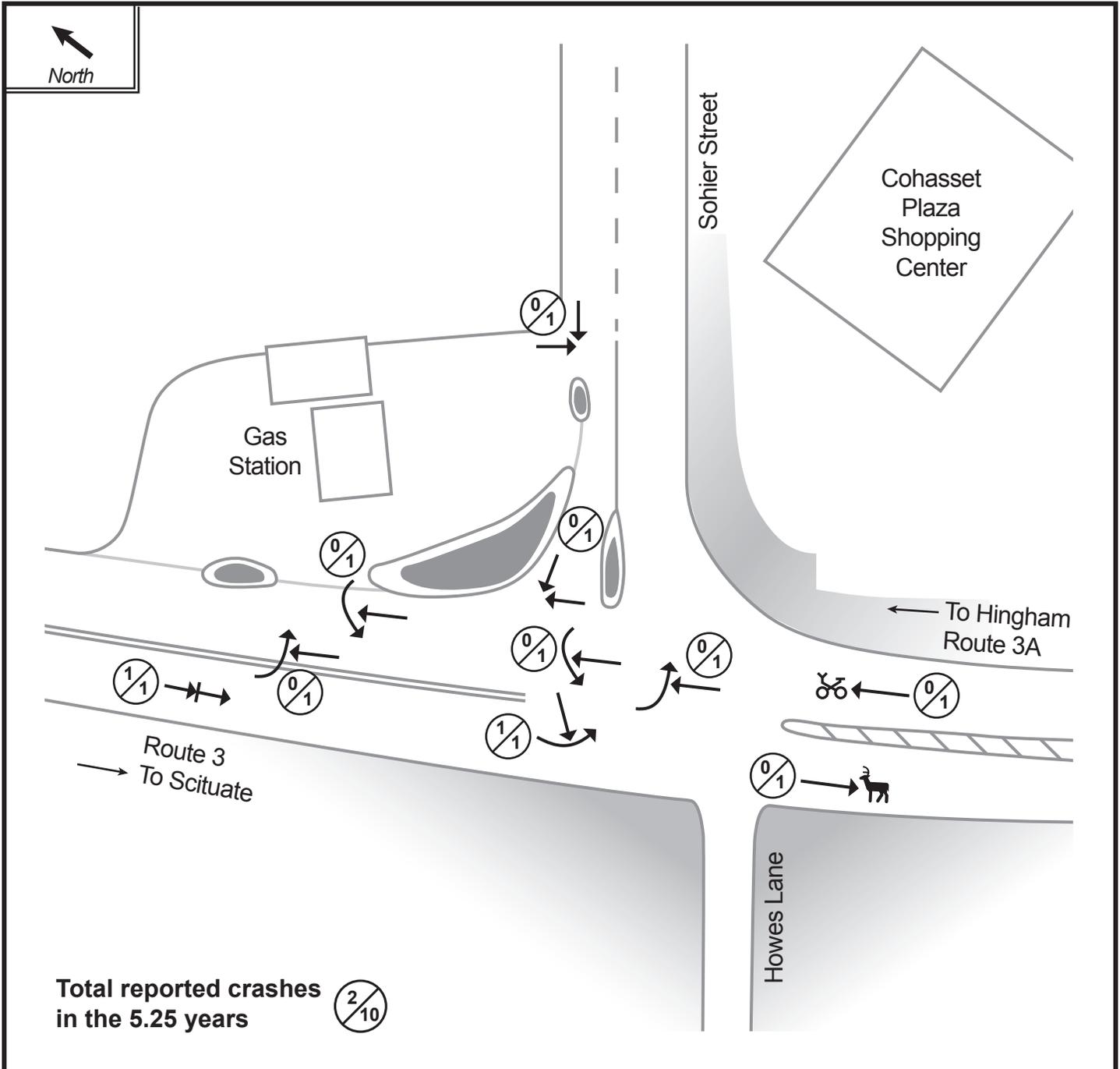
SYMBOLS	TYPES OF CRASH	SEVERITY
<ul style="list-style-type: none"> <li> Moving Vehicle</li> <li> Backing Vehicle</li> <li> Non-Involved Vehicle</li> <li> Pedestrian</li> <li> Parked Vehicle</li> <li> Fixed Object</li> <li> Bicycle</li> <li> Animal</li> </ul>	<ul style="list-style-type: none"> <li> Head On</li> <li> Angle</li> <li> Rear End</li> <li> Sideswipe</li> <li> Out of Control</li> </ul>	<div style="text-align: center;">  </div> <p>A Number of Injury Crashes            B Total Number of Crashes</p>

**Figure ; -2**  
**Collision Diagram, Cohasset Police Reports 1/1/2008–3/31/2013**  
**Route 3A @ King Street, Cohasset**



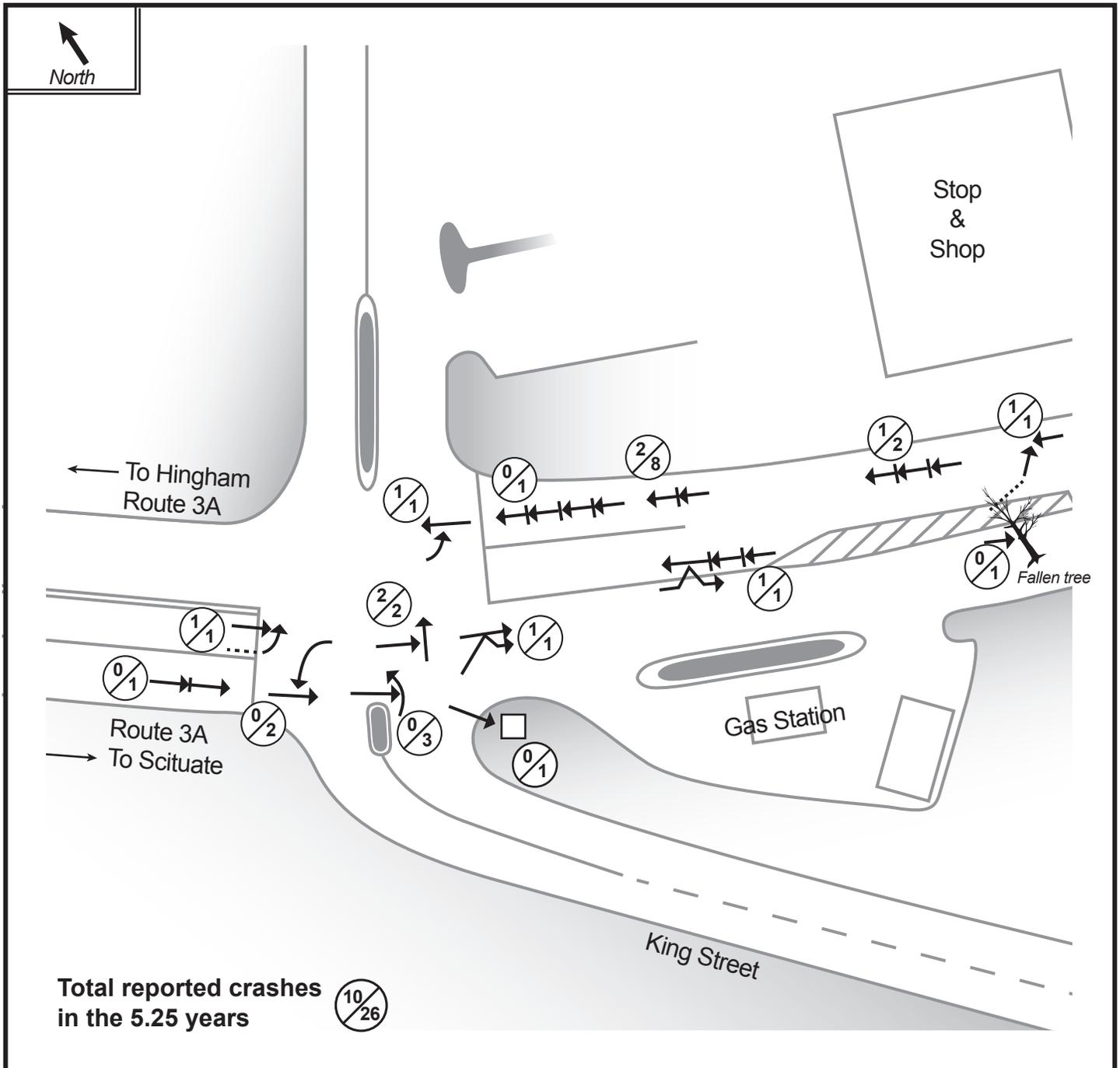
SYMBOLS	TYPES OF CRASH	SEVERITY
<ul style="list-style-type: none"> <li>→ Moving Vehicle</li> <li>←←← Backing Vehicle</li> <li>- - - - - Non-Involved Vehicle</li> <li>→  Pedestrian</li> <li>→  Parked Vehicle</li> <li>→  Fixed Object</li> <li>→  Bicycle</li> <li>→  Animal</li> </ul>	<ul style="list-style-type: none"> <li>→ ← → ↘ Head On</li> <li>→ ↓ ↙ ↘ Angle</li> <li>→ → Rear End</li> <li>→ ↗ ↘ Sideswipe</li> <li>→ ↻ Out of Control</li> </ul>	<div style="text-align: center;"> </div> <p>A Number of Injury Crashes            B Total Number of Crashes</p>

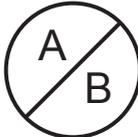
**Figure -3**  
**Collision Diagram, Cohasset Police Reports 1/1/2008–3/31/2013**  
**Route 3A @ Sohier Street, Cohasset**



SYMBOLS	TYPES OF CRASH	SEVERITY
<ul style="list-style-type: none"> <li>→ Moving Vehicle</li> <li>← Backing Vehicle</li> <li>- - - Non-Involved Vehicle</li> <li>→  Pedestrian</li> <li>→  Parked Vehicle</li> <li>→  Fixed Object</li> <li>→  Bicycle</li> <li>→  Animal</li> </ul>	<ul style="list-style-type: none"> <li>↔↔↔ Head On</li> <li>→↓↙ Angle</li> <li>→→ Rear End</li> <li>↔↔ Sideswipe</li> <li>→↻ Out of Control</li> </ul>	<div style="text-align: center;"> </div> <p>A Number of Injury Crashes            B Total Number of Crashes</p>

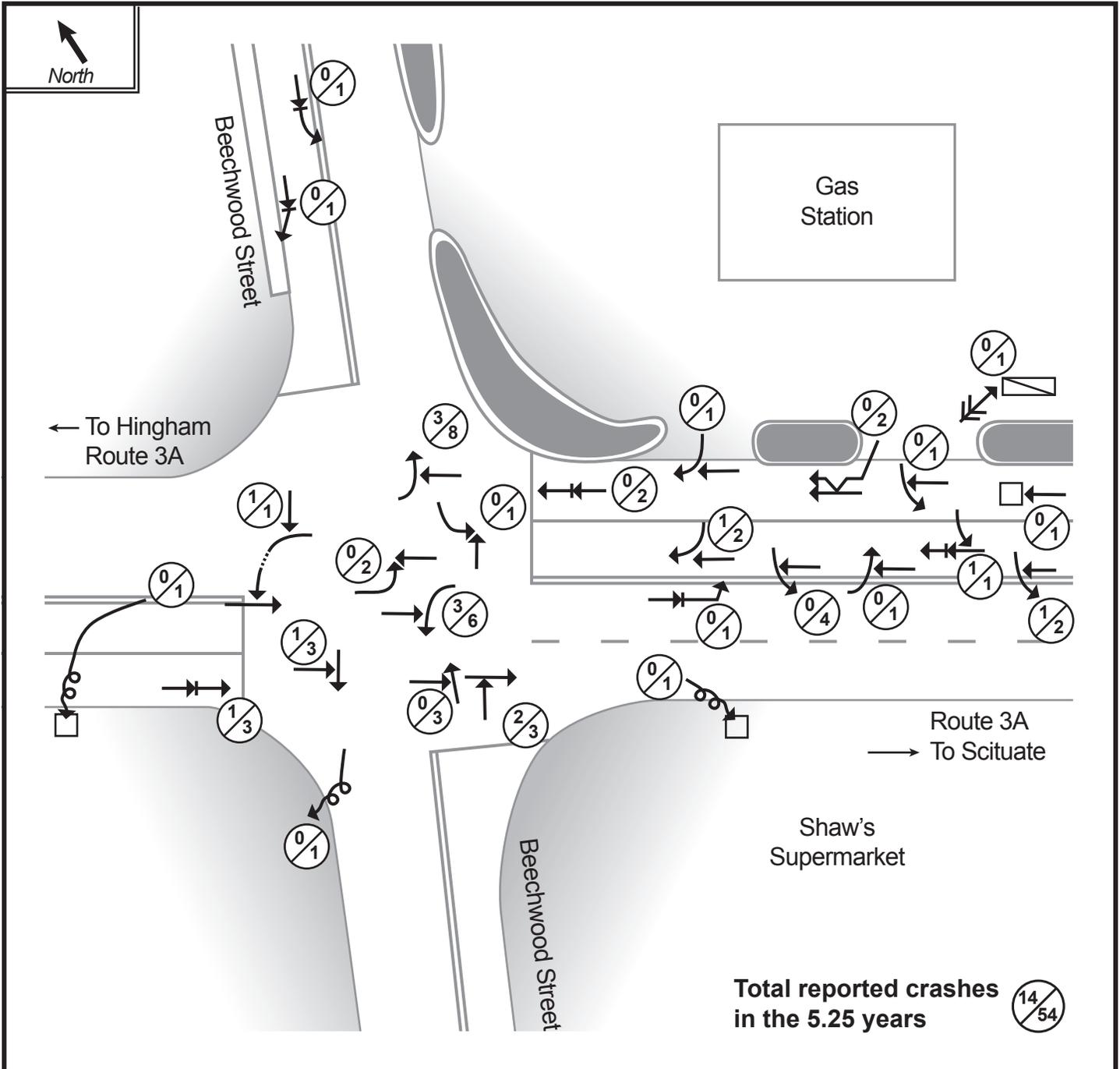
**Figure ; -4**  
**Collision Diagram, Cohasset Police Reports 1/1/2008–3/31/2013**  
**Route 3A @ Stop & Shop Driveway/King Street, Cohasset**



SYMBOLS	TYPES OF CRASH	SEVERITY
<ul style="list-style-type: none"> <li> Moving Vehicle</li> <li> Backing Vehicle</li> <li> Non-Involved Vehicle</li> <li> Pedestrian</li> <li> Parked Vehicle</li> <li> Fixed Object</li> <li> Bicycle</li> <li> Animal</li> </ul>	<ul style="list-style-type: none"> <li> Head On</li> <li> Angle</li> <li> Rear End</li> <li> Sideswipe</li> <li> Out of Control</li> </ul>	<div style="text-align: center;">  </div> <p>A    Number of Injury Crashes            B    Total Number of Crashes</p>

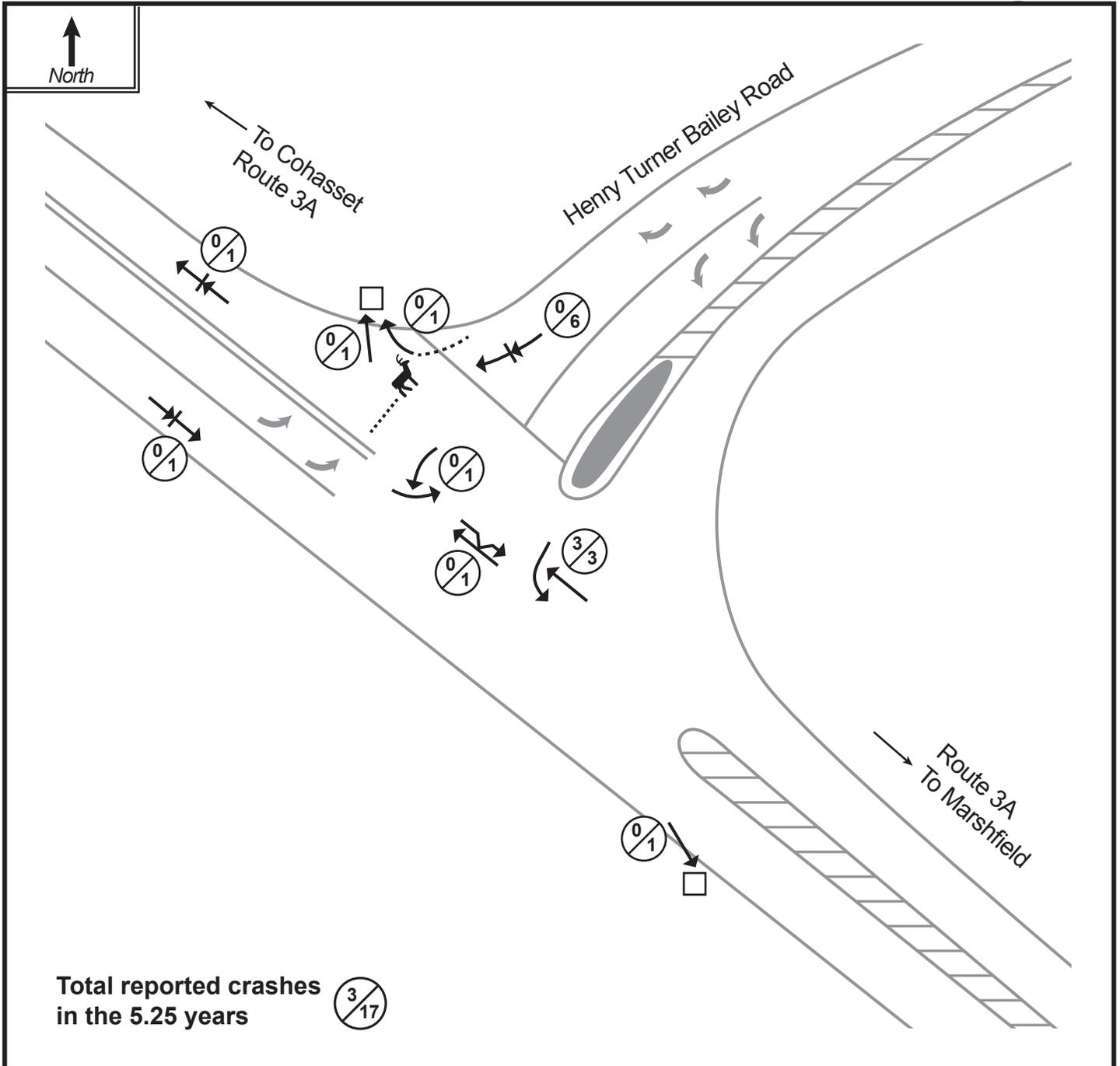


**Figure ; -6**  
**Collision Diagram, Cohasset Police Reports 1/1/2008–3/31/2013**  
**Route 3A @ Beechwood Street, Cohasset**



SYMBOLS	TYPES OF CRASH	SEVERITY
<ul style="list-style-type: none"> <li>→ Moving Vehicle</li> <li>← Backing Vehicle</li> <li>- - - Non-Involved Vehicle</li> <li>→  Pedestrian</li> <li>→  Parked Vehicle</li> <li>→  Fixed Object</li> <li>→  Bicycle</li> <li>→  Animal</li> </ul>	<ul style="list-style-type: none"> <li>↔↔ Head On</li> <li>↘↙ Angle</li> <li>→↔ Rear End</li> <li>↔↔ Sideswipe</li> <li>↪↪ Out of Control</li> </ul>	<div style="text-align: center;"> </div> <p>A Number of Injury Crashes            B Total Number of Crashes</p>

**Figure G-7**  
**Collision Diagram, Scituate Police Reports 1/1/2008–3/31/2013**  
**Route 3A @ Henry Turner Bailey Road, Scituate**



SYMBOLS	TYPES OF CRASH	SEVERITY
<ul style="list-style-type: none"> <li> Moving Vehicle</li> <li> Backing Vehicle</li> <li> Non-Involved Vehicle</li> <li> Pedestrian</li> <li> Parked Vehicle</li> <li> Fixed Object</li> <li> Bicycle</li> <li> Animal</li> </ul>	<ul style="list-style-type: none"> <li> Head On</li> <li> Angle</li> <li> Rear End</li> <li> Sideswipe</li> <li> Out of Control</li> </ul>	<div style="text-align: center;"> </div> <p>A    Number of Injury Crashes            B    Total Number of Crashes</p>

## **APPENDIX H**

### **Preliminary Traffic Signal Warrants Analyses**

Table H-1

Route 3A at King Street, Cohasset

Table H-2

Route 3A at Sohier Street, Cohasset

Table H-3

Route 3A at Henry Turner Bailey Road, Scituate

**Table H-1**  
**Summary of Hourly Volumes and Warrant Analyses**  
**Route 3A at King Street, Cohasset**

Hourly period starting	Route 3A (main street)		King Street (minor street)		Sum of main street*	Max. of minor street*	Volumes above the required minimum on main/minor street		
	NB	SB	EB	WB			Warrant 1	Warrant 2	Warrant 7
6:00	787	226	0	92	913	83	√		√
7:00	1171	449	0	168	1461	151	√	√	√
8:00	1047	548	0	175	1438	158	√	√	√
9:00	821	506	0	163	1196	147	√	√	√
10:00	657	528	0	161	1068	145	√	√	√
11:00	689	567	0	144	1132	130	√	√	√
12:00	673	558	0	154	1110	139	√	√	√
13:00	821	585	0	162	1268	146	√	√	√
14:00	723	636	0	193	1225	174	√	√	√
15:00	821	744	0	184	1411	166	√	√	√
16:00	723	808	0	170	1380	153	√	√	√
17:00	713	741	0	151	1311	136	√	√	√
18:00	542	765	0	131	1178	118	√	√	√
19:00	431	569	0	89	902	80	√		√

\* Based on 4/30-5/1/2013 MassDOT ATR counts and adjusted by seasonal factor 0.92 and trend factor 0.98

**Warrant 1 (8-Hour Volume) is fulfilled.** It requires that the traffic conditions (observed vehicular volumes higher than the specified minimum volumes) exist for each of any 8 hours of an average day. Conditions B was applied in this case.

**Warrant 2 (4-Hour Volume) is fulfilled.** It requires that the traffic conditions (main street combined/minor street maximum volume falling above an applicable curve) exist for each of any 4 hours of an average day.

**Warrant 7 (Crash Experience) is not fulfilled.** The traffic conditions meets the volume requirement (higher than 80% of the volumes specified in Warrant 1), but does not meet the crash requirement: five or more correctable crashes in the recent 12-month period.

**Table H-2**  
**Summary of Hourly Volumes and Warrant Analyses**  
**Route 3A at Sohier Street, Cohasset**

Hourly period starting	Route 3A (main street)		Sohier Street (minor street)		Sum of main street*	Max. of minor street*	Volumes above the required minimum on main/minor street		
	NB	SB	EB	WB			Warrant 1	Warrant 2	Warrant 7
6:00	643	246	0	63	802	57			
7:00	744	510	0	132	1131	119	√	√	√
8:00	779	590	0	152	1234	137	√	√	√
9:00	637	553	0	183	1073	165	√	√	√
10:00	557	602	0	132	1045	119	√	√	√
11:00	605	667	0	170	1147	153	√	√	√
12:00	577	668	0	158	1122	142	√	√	√
13:00	556	667	0	133	1103	120	√	√	√
14:00	622	737	0	185	1225	167	√	√	√
15:00	643	844	0	226	1341	204	√	√	√
16:00	631	947	0	161	1423	145	√	√	√
17:00	593	974	0	148	1413	133	√	√	√
18:00	457	921	0	99	1242	89	√	√	√
19:00	305	634	0	118	847	106	√		√

\* Based on 4/30-5/1/2013 MassDOT ATR counts and adjusted by seasonal factor 0.92 and trend factor 0.98

**Warrant 1 (8-Hour Volume) is fulfilled.** It requires that the traffic conditions (observed vehicular volumes higher than the specified minimum volumes) exist for each of any 8 hours of an average day. Conditions B was applied in this case.

**Warrant 2 (4-Hour Volume) is fulfilled.** It requires that the traffic conditions (main street combined/minor street minimum volume falling above an applicable curve) exist for each of any 4 hours of an average day.

**Warrant 7 (Crash Experience) is not fulfilled.** The traffic conditions meets the volume requirement (higher than 80% of the volumes specified in Warrant 1), but does not meet the crash requirement: five or more correctable crashes in the recent 12-month period.

**Table H-3**  
**Summary of Hourly Volumes and Warrant Analyses**  
**Route 3A at Henry Turner Bailey Road, Scituate**

Hourly period starting	Route 3A (main street)		H. T. Bailey Road (minor street)		Sum of main street*	Max. of minor street*	Volumes above the required minimum on main/minor street		
	NB	SB	EB	WB			Warrant 1	Warrant 2	Warrant 7
6:00	481	167	0	216	584	195			
7:00	736	373	0	277	1000	250	√	√	√
8:00	689	481	0	297	1055	268	√	√	√
9:00	530	474	0	256	905	231	√	√	√
10:00	454	539	0	227	895	205	√	√	√
11:00	494	617	0	232	1002	209	√	√	√
12:00	448	619	0	256	962	231	√	√	√
13:00	443	594	0	246	935	222	√	√	√
14:00	526	686	0	238	1093	215	√	√	√
15:00	569	789	0	274	1224	247	√	√	√
16:00	522	864	0	275	1250	248	√	√	√
17:00	519	912	0	212	1290	191	√	√	√
18:00	387	809	0	175	1078	158	√	√	√
19:00	279	576	0	130	771	117			√

\* Based on 4/30-5/1/2013 MassDOT ATR counts and adjusted by seasonal factor 0.92 and trend factor 0.98

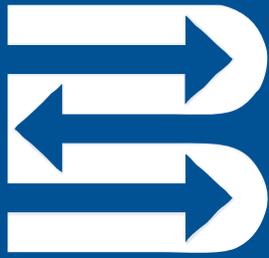
**Warrant 1 (8-Hour Volume) is fulfilled.** It requires that the traffic conditions (observed vehicular volumes higher than the specified minimum volumes) exist for each of any 8 hours of an average day. Conditions B was applied in this case.

**Warrant 2 (4-Hour Volume) is fulfilled.** It requires that the traffic conditions (main street combined/minor street minimum volume falling above an applicable curve) exist for each of any 4 hours of an average day.

**Warrant 7 (Crash Experience) is not fulfilled.** The traffic conditions meets the volume requirement (higher than 80% of the volumes specified in Warrant 1), but does not meet the crash requirement: five or more correctable crashes in the recent 12-month period.

## **APPENDIX I**

### **Information and Guidelines: Pedestrian Hybrid Beacon**



## #65-PEDESTRIAN HYBRID BEACON

# Pedestrian Hybrid Beacon: A FHWA Proven Safety Countermeasure

The pedestrian hybrid beacon (also known as the High intensity Activated crossWalk or HAWK) is a pedestrian-activated warning device located on the roadside or on mast arms over midblock pedestrian crossings. The beacon head consists of two red lenses above a single yellow lens.

The beacon head is “dark” until the pedestrian desires to cross the street. At this point, the pedestrian will push an easy-to-reach button that activates the beacon. After displaying brief flashing and steady yellow intervals, the device displays a steady red indication to drivers and a “WALK” indication to pedestrians, allowing them to cross a major roadway while traffic is stopped. After the pedestrian phase ends, the “WALK” indication changes to a flashing orange hand to notify pedestrians that their clearance time is ending. The hybrid beacon displays alternating flashing red lights to drivers while pedestrians finish their crossings before, once again, going dark at the conclusion of the cycle.

### Background

Midblock locations account for more than 70 percent of pedestrian fatalities. Vehicle travel speeds are usually higher at midblock locations, contributing to the higher injury

and fatality rates at these locations. More than 80 percent of pedestrians die when hit by vehicles traveling at 40 mph or faster while less than 10 percent die when hit at 20 mph or less.

The pedestrian hybrid beacon is a great intermediate option between the operational requirements and effects of a rectangular rapid flash beacon and a full pedestrian signal because it provides a positive stop control in areas without the high pedestrian traffic volumes that typically warrant the installation of a signal. In addition, the alternating red signal heads allow vehicles to proceed once the pedestrian has cleared their side of the travel lane, thus improving vehicle traffic flow.

Installation of the pedestrian hybrid beacon has been shown to provide the following safety benefits:

- Up to a 69 percent reduction in pedestrian crashes; and
- Up to a 29 percent reduction in total roadway crashes.



### Guidance

Pedestrian hybrid beacons should only be used in conjunction with a marked crosswalk. In general, they should be used if gaps in traffic are not adequate to permit pedestrians to cross, if vehicle speeds on the major street are too high to permit pedestrians to cross, or if pedestrian delay is excessive. Transit and school locations may be good places to consider using the pedestrian hybrid beacon. Chapter 4F of the Manual on Traffic Control Devices (MUTCD) contains a chapter on the pedestrian hybrid beacon and when and where it should be installed. Practitioners should follow the MUTCD guidelines, which are referenced below. Since the pedestrian hybrid beacon is a traffic control device many people are not yet familiar with, effort should be made to perform outreach to the public before implementation so there is no confusion about how the beacon operates and what drivers and pedestrians should do when encountering it.

# MUTCD requirements for Pedestrian Hybrid Beacons

The following text is from Section 4F, December 2009. MUTCD 2009 Edition

## Section 4F.01 Application of Pedestrian Hybrid Beacons

### Support:

01 A pedestrian hybrid beacon is a special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk.

### Option:

02 A pedestrian hybrid beacon may be considered for installation to facilitate pedestrian crossings at a location that does not meet traffic signal warrants (see Chapter 4C), or at a location that meets traffic signal warrants under Sections 4C.05 and/or 4C.06 but a decision is made to not install a traffic control signal.

### Standard:

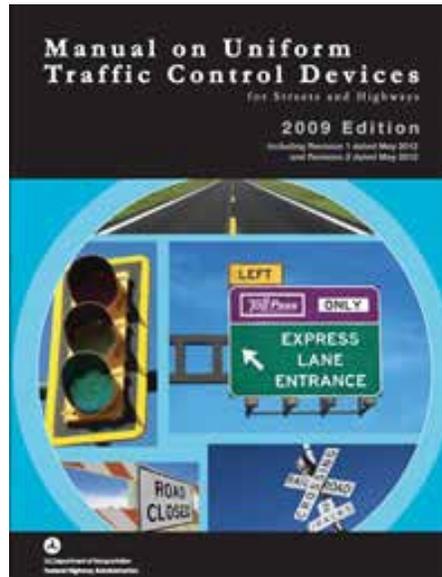
03 If used, pedestrian hybrid beacons shall be used in conjunction with signs and pavement markings to warn and control traffic at locations where pedestrians enter or cross a street or highway. A pedestrian hybrid beacon shall only be installed at a marked crosswalk.

### Guidance:

04 If one of the signal warrants of Chapter 4C is met and a traffic control signal is justified by an engineering study, and if a decision is made to install a traffic control signal, it should be installed based upon the provisions of Chapters 4D and 4E.

05 If a traffic control signal is not justified under the signal warrants of Chapter 4C and if gaps in traffic are not adequate to permit pedestrians to cross, or if the speed for vehicles approaching on the major street is too high to permit pedestrians to cross, or if pedestrian delay is excessive, the need for a pedestrian hybrid beacon should be considered on the basis of

an engineering study that considers major-street volumes, speeds, widths, and gaps in conjunction with pedestrian volumes, walking speeds, and delay.



06 For a major street where the posted or statutory speed limit or the 85th-percentile speed is 35 mph or less, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-1 for the length of the crosswalk.

07 For a major street where the posted or statutory speed limit or the 85th-percentile speed exceeds 35 mph, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour

(any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-2 for the length of the crosswalk.

08 For crosswalks that have lengths other than the four that are specifically shown in Figures 4F-1 and 4F-2, the values should be interpolated between the curves.

## Section 4F.02 Design of Pedestrian Hybrid Beacons

### Standard:

01 Except as otherwise provided in this Section, a pedestrian hybrid beacon shall meet the provisions of Chapters 4D and 4E.

02 A pedestrian hybrid beacon face shall consist of three signal sections, with a CIRCULAR YELLOW signal indication centered below two horizontally aligned CIRCULAR RED signal indications (see Figure 4F-3 on page 11).

03 When an engineering study finds that installation of a pedestrian hybrid beacon is justified, then:

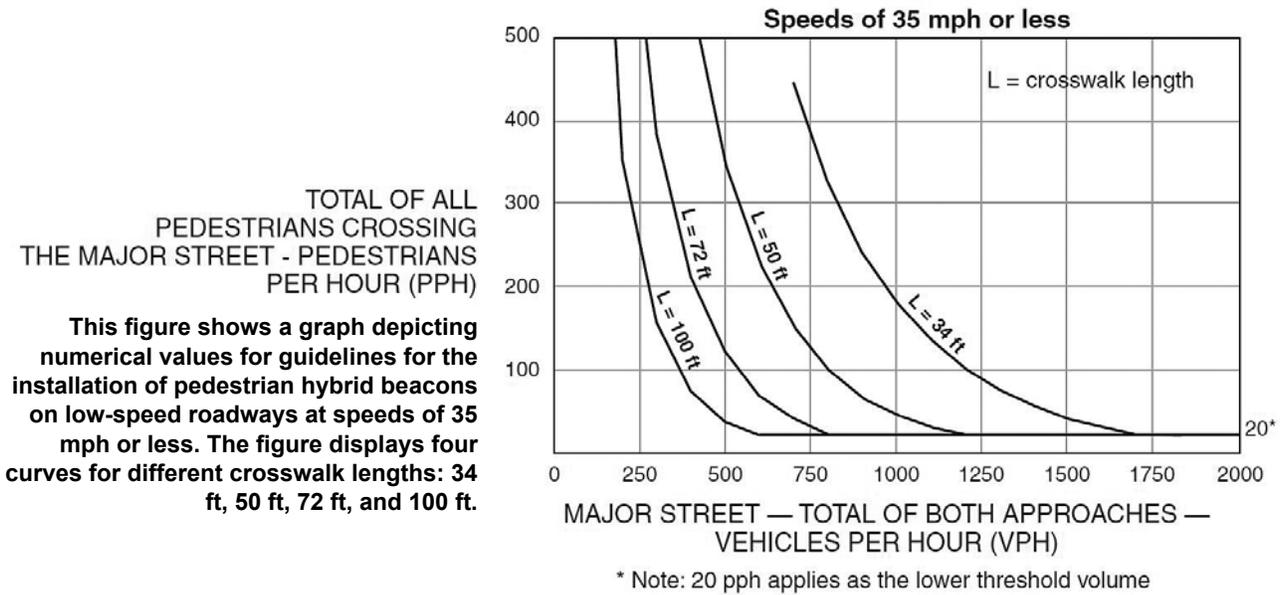
- At least two pedestrian hybrid beacon faces shall be installed for each approach of the major street,
- A stop line shall be installed for each approach to the crosswalk,
- A pedestrian signal head conforming to the provisions set forth in Chapter 4E shall be installed at each end of the marked crosswalk, and
- The pedestrian hybrid beacon shall be pedestrian actuated.

### Guidance:

04 When an engineering study finds that installation of a pedestrian hybrid beacon is justified, then:

- The pedestrian hybrid beacon should be installed at least 100 feet from side streets or driveways that are controlled by

**Figure 4F-1. Guidelines for the Installation of Pedestrian Hybrid Beacons on Low-Speed Roadways**



The table below shows the approximate vehicles per hour (VPH) on the major street and corresponding pedestrians per hour (PPH) for the total of all pedestrians crossing the major street.

**Table for Figure 4F-1**

Crosswalk length = 34 ft		Crosswalk length = 50 ft		Crosswalk length = 72 ft		Crosswalk length = 100 ft	
VPH on the major street (Total of both approaches)	PPH for total of all pedestrians crossing the major street	VPH on the major street (Total of both approaches)	PPH for total of all pedestrians crossing the major street	VPH on the major street (Total of both approaches)	PPH for total of all pedestrians crossing the major street	VPH on the major street (Total of both approaches)	PPH for total of all pedestrians crossing the major street
2000	20*	2000	20*	2000	20*	2000	20*
1750	20*	1750	20*	1750	20*	1750	20*
1500	40	1500	20*	1500	20*	1500	20*
1250	90	1250	20*	1250	20*	1250	20*
1000	190	1000	50	1000	20*	1000	20*
750	40	750	125	750	25	750	20*
500	—	500	350	500	120	500	30
250	—	250	—	250	500	250	250
225	—	225	—	225	—	225	500

\* Note: 20 pph applies as the lower threshold volume.

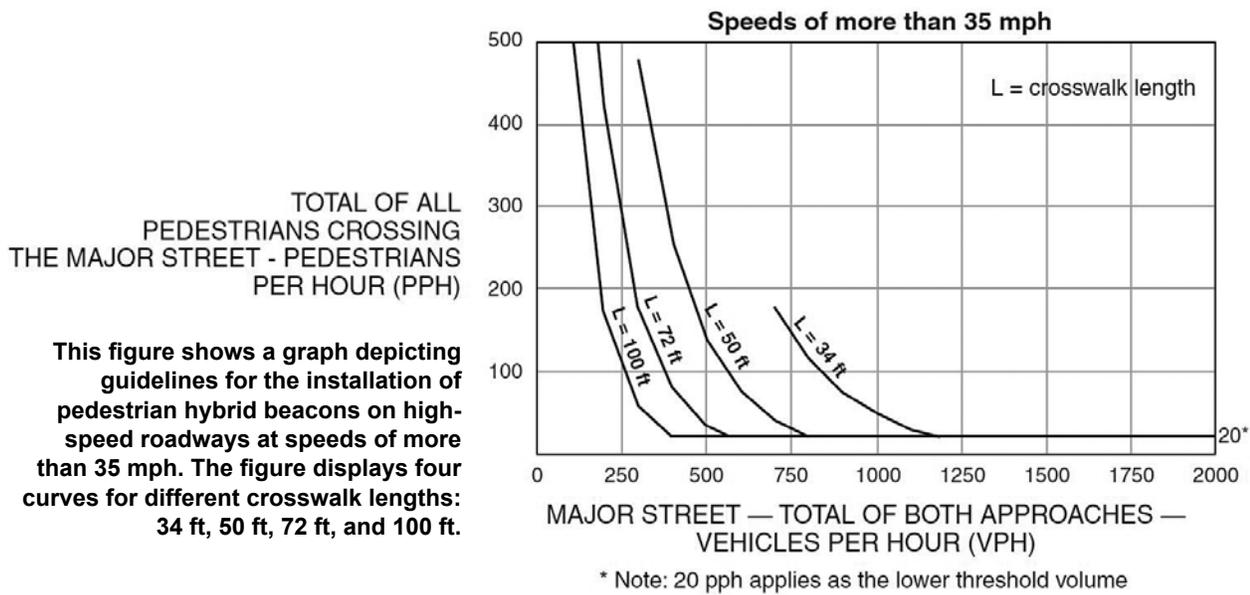
- STOP or YIELD signs, Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk, or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance,
- The installation should include suitable standard signs and pavement markings, and

- If installed within a signal system, the pedestrian hybrid beacon should be coordinated.
- 05 On approaches having posted or statutory speed limits or 85th-percentile speeds in excess of 35 mph and on approaches having traffic or operating conditions that would tend to obscure visibility of roadside hybrid beacon face locations, both of the minimum of two pedestrian hybrid beacon faces should be installed over the roadway.

- 06 On multi-lane approaches having a posted or statutory speed limits or 85th-percentile speeds of 35 mph or less, either a pedestrian hybrid beacon face should be installed on each side of the approach (if a median of sufficient width exists) or at least one of the pedestrian hybrid beacon faces should be installed over the roadway.
- 07 A pedestrian hybrid beacon should

*Continued on next page*

**Figure 4F-2. Guidelines for the Installation of Pedestrian Hybrid Beacons on High-Speed Roadways**



This figure shows a graph depicting guidelines for the installation of pedestrian hybrid beacons on high-speed roadways at speeds of more than 35 mph. The figure displays four curves for different crosswalk lengths: 34 ft, 50 ft, 72 ft, and 100 ft.

The table below shows the approximate vehicles per hour (VPH) on the major street and corresponding pedestrians per hour (PPH) for the total of all pedestrians crossing the major street.

**Table for Figure 4F-2**

Crosswalk length = 34 ft		Crosswalk length = 50 ft		Crosswalk length = 72 ft		Crosswalk length = 100 ft	
VPH on the major street (Total of both approaches)	PPH for total of all pedestrians crossing the major street	VPH on the major street (Total of both approaches)	PPH for total of all pedestrians crossing the major street	VPH on the major street (Total of both approaches)	PPH for total of all pedestrians crossing the major street	VPH on the major street (Total of both approaches)	PPH for total of all pedestrians crossing the major street
2000	20*	2000	20*	2000	20*	2000	20*
1750	20*	1750	20*	1750	20*	1750	20*
1500	20*	1500	20*	1500	20*	1500	20*
1250	20*	1250	20*	1250	20*	1250	20*
1000	50	1000	20*	1000	20*	1000	20*
750	150	750	25	750	20*	750	20*
500	—	500	150	500	25	500	20*
250	—	250	—	250	300	250	100
225	—	225	—	225	—	225	500

\* Note: 20 pph applies as the lower threshold volume.

comply with the signal face location provisions described in Sections 4D.11 through 4D.16.

**Standard:**

08 A CROSSWALK STOP ON RED (symbolic circular red) (R10-23) sign (see Section 2B.53) shall be mounted adjacent to a pedestrian hybrid beacon face on each major street approach. If an overhead pedestrian hybrid beacon face is provided, the sign shall be mounted adjacent to the overhead signal face.

**Option:**

09 A Pedestrian (W11-2) warning sign (see Section 2C.50) with an

AHEAD (W16-9P) supplemental plaque may be placed in advance of a pedestrian hybrid beacon. A warning beacon may be installed to supplement the W11-2 sign.

**Guidance:**

10 If a warning beacon supplements a W11-2 sign in advance of a pedestrian hybrid beacon, it should be programmed to flash only when the pedestrian hybrid beacon is not in the dark mode.

**Standard:**

11 If a warning beacon is installed to supplement the W11-2 sign, the

design and location of the warning beacon shall comply with the provisions of Sections 4L.01 and 4L.03.

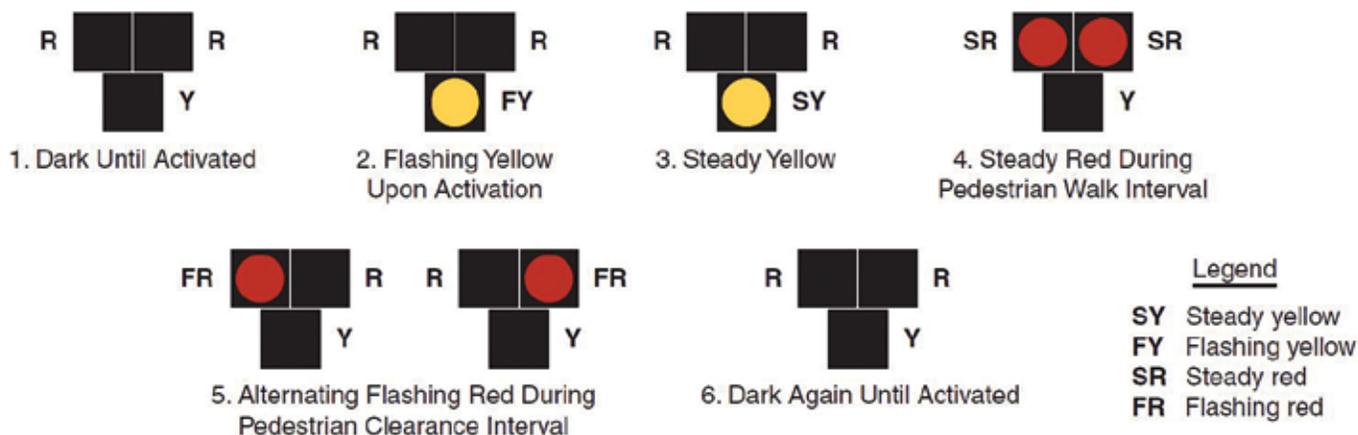
**Section 4F.03 Operation of Pedestrian Hybrid Beacons Standard:**

01 Pedestrian hybrid beacon indications shall be dark (not illuminated) during periods between actuations.

02 Upon actuation by a pedestrian, a pedestrian hybrid beacon face shall display a flashing CIRCULAR yellow signal

*Please see MUTCD on page 10*

**Figure 4F-3. Sequence for a Pedestrian Hybrid Beacon**



- Each interval is shown as a signal face having three lenses: two horizontally aligned with a third centered under them.
- The first interval is labeled “1. Dark Until Activated.” It shows black squares for a circular red signal (not shown) to the left of a circular red signal (not shown) above a black square for a circular yellow signal (not shown).
  - The second interval is labeled “2. Flashing Yellow Upon Activation.” It shows black squares for a circular red signal (not shown) to the left of a circular red signal (not shown) above a circular yellow signal labeled “flashing yellow.”
  - The third interval is labeled “3. Steady Yellow.” It shows black squares for a circular red signal (not shown) to the left of a circular red signal (not shown) above a circular yellow signal labeled “steady yellow.”
  - The fourth interval is labeled “4. Steady Red During Pedestrian Walk Interval.” It shows a circular red signal to the left of a circular red signal, both labeled “steady red” above a black square for a circular yellow signal (not shown).
  - The fifth interval is labeled “5. Alternating Flashing Red During Pedestrian Clearance Interval.” It shows a circular red signal labeled “flashing red” to the left of a black square for a circular red signal (not shown) above a black square for a circular yellow signal (not shown). To the right, the same arrangement is shown, except the circular red signal labeled “flashing red” is shown at the top right instead of the top left.
  - The sixth interval is labeled “6. Dark Again Until Activated.” It shows black squares for a circular red signal (not shown) to the left of a circular red signal (not shown) above a black square for a circular yellow signal (not shown).

# MUTCD

Continued from page 11

indication, followed by a steady CIRCULAR yellow signal indication, followed by both steady CIRCULAR RED signal indications during the pedestrian walk interval, followed by alternating flashing CIRCULAR RED signal indications during the pedestrian clearance interval (see Figure 4F-3 on page 11). Upon termination of the pedestrian clearance interval, the pedestrian hybrid beacon faces shall revert to a dark (not illuminated) condition.

03 Except as provided in Paragraph 4, the pedestrian signal heads shall continue to display a steady UPRAISED HAND (symbolizing DON'T WALK) signal indication when the pedestrian hybrid beacon faces are either dark or displaying flashing or steady CIRCULAR yellow signal indications. The pedestrian signal heads shall

display a WALKING PERSON (symbolizing WALK) signal indication when the pedestrian hybrid beacon faces are displaying steady CIRCULAR RED signal indications. The pedestrian signal heads shall display a flashing UPRAISED HAND (symbolizing DON'T WALK) signal indication when the pedestrian hybrid beacon faces are displaying alternating flashing CIRCULAR RED signal indications. Upon termination of the pedestrian clearance interval, the pedestrian signal heads shall revert to a steady UPRAISED HAND (symbolizing DON'T WALK) signal indication.

Option:

04 Where the pedestrian hybrid beacon is installed adjacent to a roundabout to facilitate crossings by pedestrians with visual disabilities and an engineering study determines that pedestrians without visual disabilities can be allowed to cross the roadway without actuating

the pedestrian hybrid beacon, the pedestrian signal heads may be dark (not illuminated) when the pedestrian hybrid beacon faces are dark.

Guidance:

05 The duration of the flashing yellow interval should be determined by engineering judgment.

Standard:

06 The duration of the steady yellow change interval shall be determined using engineering practices.

Guidance:

07 The steady yellow interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds (see Section 4D.26). The longer intervals should be reserved for use on approaches with higher speeds. 

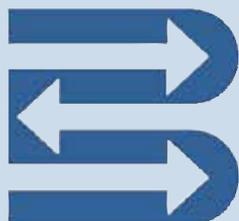
## References

### The Manual on Uniform Traffic Control Devices(MUTCD)

Published by the FHWA, the MUTCD defines the standards used by transportation professionals nationwide to install and maintain traffic control devices on all streets and highways. The most recent version (2009) can be found at <http://mutcd.fhwa.dot.gov/index.htm>

### Proven Safety Countermeasures, Pedestrian Hybrid Beacon

U.S. Department of Transportation Federal Highway Administration. FHWA-SA-12-012  
[http://safety.fhwa.dot.gov/provencountermeasures/fhwa\\_sa\\_12\\_012.htm](http://safety.fhwa.dot.gov/provencountermeasures/fhwa_sa_12_012.htm)



*The Baystate Roads Program is a cooperative effort of the Federal Highway Administration, Massachusetts Department of Transportation (MassDOT), and the University of Massachusetts. Program Director, Dr. John Collura, and Program Manager, Dr. Christopher J. Ahmadjian, provide technology transfer assistance to all communities in the Commonwealth. Our purpose is to provide information and training on transportation and related topics, to answer the needs and problems of local agencies, to identify and transfer new technologies and innovations into a usable format, and to operate as a link between transportation research and practicing highway personnel. [www.baystateroads.org](http://www.baystateroads.org).*



**APPENDIX J**

**Route 3A Study Comments**

**Collected by Cohasset Project Management and Planning Department**

**11/5/2013**

#	Location/ Intersection	Comments
1	<b>General Comments &amp; Speed Limits</b>	Agrees with the long term recommendations to install a sidewalk for pedestrians and a wide shoulder for bicycles in all sections of the corridor
2		Recommends that the speed limit between Pond St. and Beechwood St. be reduced from 50 mph to 45 mph
3		Recommends that the speed limit between King St. and Sanctuary Pond Rd. be reduced from 50 mph to 45 mph
4		Many vehicles do not reduce their speed to 35 mph in marked areas
5		Disagrees in raising the speed limit from 45 mph to 50 mph in proposed segments, especially when the speed limit is going to be reduced to 35 mph
6		Recommends that there needs to be definitive left turn lanes with left turn arrows on 3A
7		Recommends that the speed limit between Stop and Shop and Beechwood St. be reduced from 45 mph to 40 mph; the 35 mph zone is appropriate
8		Suggests that the speed limit from the Hingham town line to the train station lights be reduced to 40 mph; also the speed limit should be reduced from the train station lights all the way to the Scituate town line to 35 mph
9		Recommends drastically lowering the speed limit the lower part 3A to allow for easier access to the surrounding businesses (dunkin' donuts, marylou's, Avalon, etc)
10		It seems to me that the major intersections of Beechwood and Pond are dangerous less from a structural issue and more from a lack of enforcement of the speed limit and cars running yellow/red lights. Much improvement could be attained immediately from such enforcement. Additionally, lowering the speed limit and making it consistent from the Scituate-Cohasst border to the train station would improve matters greatly.
11	<b>Henery Turner Baily Road / RT 3A</b>	Agrees with the short, medium, and long-term recommendations at the intersection of Henry Turner Bailey Road
12		Supports improvements of reducing curb cuts at his other property (Aubuchon hardware) but would like to adjust their proposed location
13	<b>Beechwood St. / RT 3A</b>	Agrees in principal with the medium-term recommendations at the Beechwood St. intersection; it should be noted that the medium-term solution may require installation of new mast arms to properly provide for left turn lane signals
14		Agrees with the recommendation to reconfigure the 4-lane section to a 3-lane section with a center left turn lane/median; this will allow for wider shoulders for bicycles. Also recommendeds that this improvement be considered as part of MassDOT's next pavement maintenance program
15		Beechwood Street lights - look at the queue on Beechwood Street - Need to time the light better to allow for the vehicles in the max queue to pass onto 3A
16		Beechwood Street lights- Need to include a delay from the red to green in both direction to avoid accidents from those running the red light and those jumping on the green light
17		Nissan Dealership doe not have a shared access with the adjacent property - need a separate left/right turn curb cut
18		Beechwood Street lights - 3A northbound -Shorten the left turn bay lane onto Beechwood, and install center left turn lane into gas station and Nissan Dealership
19		Concerned that 41+ new homes will increase traffic on both 3A and Beechwood St.
20		Concerned about the potentially dangerous left hand turn when headed South on 3A turning onto Beechwood St.; If two cars, one headed South and the other North, make left turns simultaneously at this intersection often the right lane is obscured from view which can result in increased accidents.
21		Concerned about the "delayed green light" when attempting to make a left turn off of 3A; this delayed green light is rarely received
22		The intersection at 3A and Beechwood needs to have dedicated left-turn lanes with left-turn arrows
23		Recommends that the current Beechwood intersection be re-thought due to high traffic and accident rates

#	Location/ Intersection	Comments
24		Recommends that a rotary be installed at the intersection of 3A and Beechwood St.; This would keep traffic moving while ensuring people slow down when approaching the intersection ideally reducing accidents
25	<b>Pond St. / RT 3A</b>	Agrees with long-term recommendation to install left turn lanes at the intersection of Route 3A and Pond St.
26		Recommends that there be a light installed with a left turn arrow at the bottom of pond street where it meets 3A, concerned about the amount of traffic build up especially for school drop off and pick up in the morning and afternoon. If the light can't be installed then the speed limit should be reduced to make turning off of 3A more managable
27	<b>King St. / RT 3A</b>	Establish a center two-way left turn lane for the King St. Shopping Center as suggested
28	<b>Sohier St. / RT 3A</b>	Agrees with short and long term improvements at the intersection of 3A and Sohier St.
29		Recommends that a traffic light be installed at the intersection of Sohier St. and 3A
30		Recommends that there be an entrance at the backside of the Stop and Shop Plaza so people can take a left off of Sohier St into the Plaza without having to turn onto 3A first
31		Boat Yard Storage business - Concerned with turn radius to tow boats on and off the lot with proposed curb cut configuration in study
32		Concerned with reduction of traffic to businesses due to reduction in curb cuts, 2 to 1
33		The safety issues at Sohier Street and lower King Street could benefit immediately from right only turns during rush hour traffic hours and would also require enforcement. Ultimately, traffic lights at these locations might be necessary.
34		Supports all improvements proposed at stop and shop complex including back driveway
35		Recommends that there needs to either be a cross walk or pedestrian crossing light at the bottom of Avalon; concerned that there are hundreds of people who are bound to their cars to leave their homes because of dangerous crossing situation
36	<b>(Lower) King St. / RT 3A</b>	Recommends that as a medium-term improvement, a traffic signal should be installed at the intersection of Route 3A and King St. as part of mitigation for development; also what is the status of development in this area and the feasibility of requiring this type of mitigation?
37		The safety issues at Sohier Street and lower King Street could benefit immediately from right only turns during rush hour traffic hours and would also require enforcement. Ultimately, traffic lights at these locations might be necessary.
38		Recommends that there be a traffic light installed at the intersetion of lower King St. and RT 3A
39		Concerned about the intersection of 3A and lower King St. - speed limit should be reduced and better mark a right turn lane
40	<b>RT 228 / RT 3A</b>	Concerned about the intersection of 3A and RT 228 - when making a right off of 3A onto 228, heading towards West Corner, you have to turn off before the island with ornamental grass and merge onto 228, however, the height of the grass makes it hard to see oncomming traffic and difficult to merge
41		Recommends that the right and left turn lanes at the intersection of RT 228 and 3A be extended on both sides to reduce traffic build up