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Town of Harwich  
Road Safety Audit  
Route 39 (Orleans Road) at  
Pleasant Bay Road

July 29, 2016





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## Background

All levels of government— local, regional, state, and federal—have been considering locations where crashes are most severe for many years. Several years ago the national consensus was that there should be goals to reduce crashes, and in the 2005 federal legislation: Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), there was more emphasis on improving highway safety along with a dedicated funding program—the Highway Safety Improvement Program (HSIP). The latest federal legislation: **Fixing America’s Surface Transportation (FAST)**, signed into law on December 4, 2015, retains the Highway Safety Improvement Program (HSIP) as one of its core highway programs.

In an effort to reduce the number of crash-related fatalities and incapacitating injuries, Massachusetts developed a Strategic Highway Safety Plan in 2006. The mission of the **Safety Plan is to “Develop, promote, implement, and evaluate data-driven, multidisciplinary strategies to maximize safety for users of the roadway system.”** One of the many strategies noted in the Safety Plan is to **“conduct Road Safety Audits at high-crash locations throughout the Commonwealth.”** MassDOT incorporated the Road Safety Audit as a requirement for securing Federal funding (Highway Safety Improvement Program [HSIP] funds) for safety projects.

The Federal Highway Administration (FHWA) defines a Road Safety Audit as the formal safety examination of an existing or future road or intersection by an independent, multidisciplinary team. The purpose of a Road Safety Audit is to identify potential safety issues and possible opportunities for safety improvements while considering all roadway users.

The Cape Cod Commission (CCC), serving as the regional planning agency for the fifteen towns on Cape Cod, has reviewed many transportation locations over the years during various processes, including the Regional Transportation Plan, the Transportation Improvement Program, and Developments of Regional Impact, considering the existing safety issues and potential improvements. In addition, the CCC began looking at specific safety locations annually through safety studies and Road Safety Audits. A portion of the federal HSIP **funds are allocated for improvements to the region’s highest crash** locations.

This RSA evaluates the intersection of Route 39 (Orleans Road) at Pleasant Bay Road in Harwich, MA as shown in Figure 1.



## Road Safety Audit Multidisciplinary Team

The Road Safety Audit was scheduled with representatives of the Massachusetts Department of Transportation (MassDOT), town officials, and representatives of other stakeholders. The Road Safety Audit meeting was held on June 1, 2016, beginning at 1:00 p.m., at the Harwich Town Hall. The multidisciplinary team also visited the site during the Road Safety Audit meeting, and then reconvened at the Town Hall.

<b>Audit Team Member</b>	<b>Agency / Affiliation</b>
Aram Goshgarian	Harwich Police Department
Dave LeBlanc	Harwich Fire Department
Christopher Clark	Harwich Administration
Lincoln Hooper	Harwich Department of Public Works
Bob Cafarelli	Harwich Engineering
Jerry Beltis	Harwich Traffic Safety Committee
Jerry Scannell	Harwich Traffic Safety Committee
Robert Gregory	MassDOT Highway Division– District 5 Traffic
Jason Walters	MassDOT Highway Division– District 5 Projects
Lisa Schletzbaum	MassDOT Highway Division/Safety
Steven Tupper	Cape Cod Commission



## Project Location and Description

Route 39 (Orleans Road) at Pleasant Bay Road in Harwich is a four-way unsignalized intersection shown on the locus map in Figure 2. The intersection serves both regional and local traffic. The location of the intersection makes it important for commercial and non-commercial trips between the towns of Harwich, Brewster, Orleans, and Chatham.

Figure 3 shows a close-up view of the intersection (imaergy from May 2015). All four approaches consist of a single multi-purpose lane. The westbound and eastbound Pleasant Bay Road approaches are stop controlled. There are no dedicated pedestrian or bicyclist accommodation.

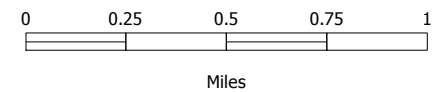
A number of physical changes to the intersection have been made over the years to address on-going safety issues. These changes include the installation of flashing-LED stop signs with **“Cross Traffic Does Not Stop”** plaques, **installation of stop ahead signs**, **installation of “Dangerous Intersection Ahead”** signs, **tree removal**, **vegetation trimming**, and installation of a painted median.



**Figure 1 - View from Pleasant Bay Road looking east, showing LED stop sign**



Figure 2 – Locus Map



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The information depicted on these maps is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel level analysis. It should not substitute for actual on-site survey, or supersede deed research.



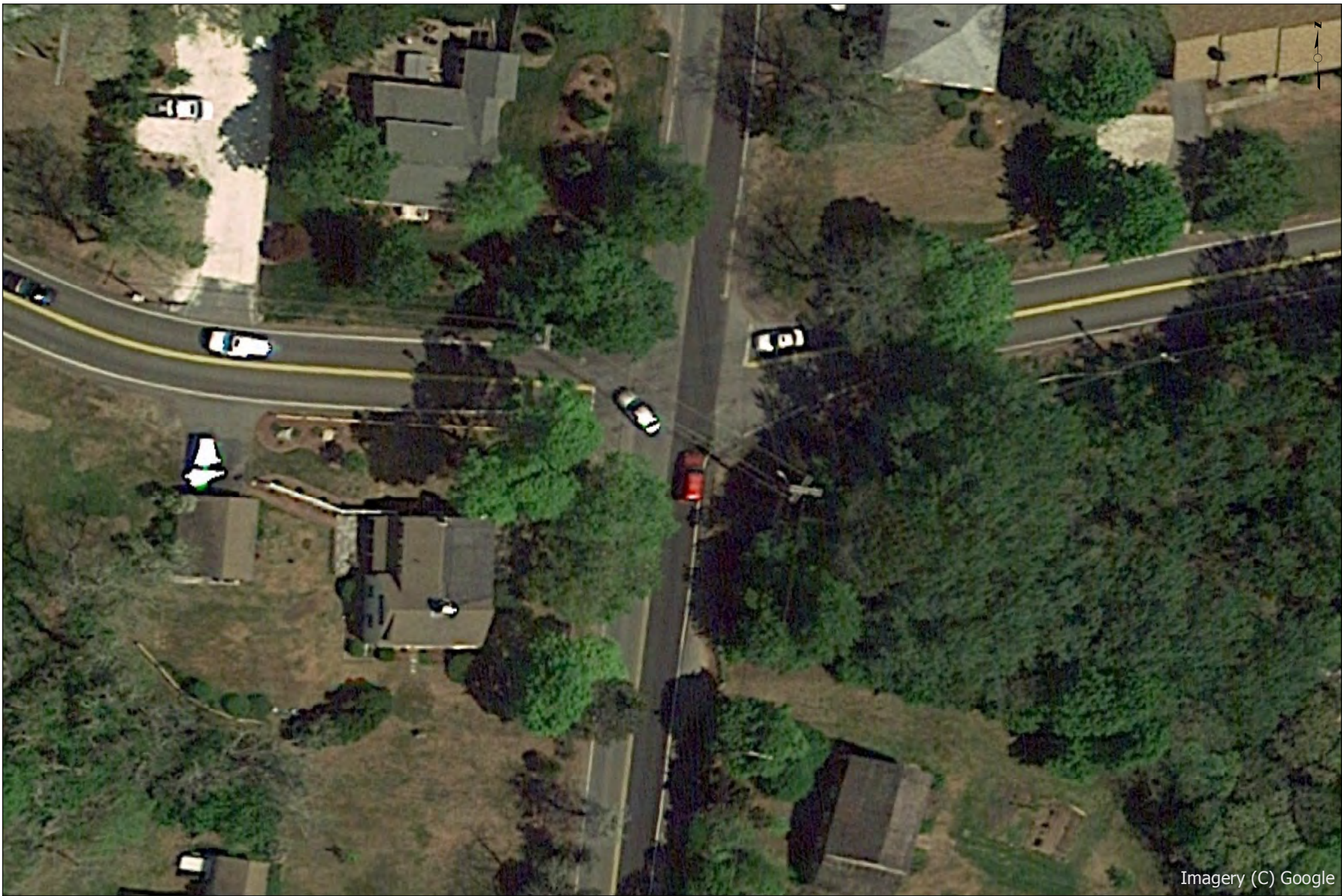
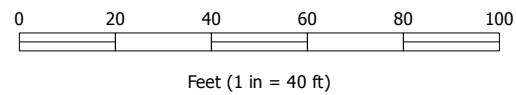


Figure 3 – Close Aerial View of Intersection





## Project Data

Crash reports were requested from the Town of Harwich for this Road Safety Audit and were supplied by the Harwich Police Department. The crash data were reviewed and a collision diagram was developed. The reported crashes were analyzed based on year, month, day of week, crash time, collision severity, collision type, ambient light condition, weather condition, road surface condition, driver contributing code noted on the crash report.

From the reports provided by Harwich Police Department, 31 crashes occurred at the location between 2013 and 2015 with 16 property-damage-only crashes, 15 injury crashes, and no fatal crashes. The resulting Equivalent Property Damage Only (EPDO) crash count is 91. EPDO is an indicator of overall severity; Property Damage Only crashes are scored with a value of 1, Injury crashes are scored with a value of 5, and Fatality crashes are scored with a value of 10. There was a fatal crash at this location in 2006.

No clear trends were evident in terms of year, month, day of week, or crash time. The safety issue appears to be a year-round problem not particularly sensitive to traffic volume fluctuations.

Of the 31 crashes, the vast majority (84%) were angle crashes; the remainder were either single vehicle (10%) or rear-end (6%) crashes.

Analysis of ambient conditions at the time of the crash (lighting, weather, and road surface) did not indicate a clear influence of these factors on crashes.

The most frequent driver contributing code noted on the crash reports was “failure to yield right of way” with several instances of inattention also noted.

Cape Cod Commission staff also prepared reports of the traffic volume data at the intersection.

The collision diagram, an analysis of crash factors, and the traffic count data are included in the Appendix A.



## Road Safety Audit Observations and Potential Improvements

On Wednesday, June 1, 2016 the Road Safety Audit Team met at the Harwich Town Hall for a discussion of the existing conditions, visited the site for field observations, and returned to discuss the safety issues at the location. The summary crash data, a collision diagram, and traffic volume reports were brought to the Road Safety Audit team meeting, and are included in Appendix A.



**Figure 4 - View looking south, showing newly installed painted median**

The following safety issues were identified through the site visit and discussions with the Road Safety Audit team.



## Safety Issue #1. Obstructions

*A Policy on Geometric Design of Highways and Streets* (2011), prepared by the American Association of State Highway and Transportation Officials, is the definitive reference manual on roadway design. The manual states that “**each quadrant of an intersection should contain a triangular area free of obstructions that might block an approaching driver’s view of potentially conflicting vehicles.**” This clear sight triangle is also needed to provide “**sight distance for a stopped vehicle on a minor-road approach to depart from the intersection and enter or cross the major road.**”

### **Observations:**

Team members observed several trees and hedges obstructing the sight lines for drivers approaching the intersection. While it was noted that Town staff and home owners have made efforts to keep vegetation well-trimmed, sight distance obstructions remain. These **obstructions are limiting drivers’ ability to see and appropriately react to potential hazards.**

Obstructions on the southwest and southeast quadrant of the intersection are restricting the ability of drivers traveling north on Route 39 to see vehicles potentially crossing their path from Pleasant Bay Road. Figure 5 shows the view of a driver traveling northbound on Route 39 approximately 360 feet south of the intersection. This is the approximate distance required for a driver traveling 45 mph to identify a potential conflict and safely stop. Trees on the west side of Route 39 and hedges on the east side of Route 39 are **limiting drivers’ ability to see potential crossing vehicles.**



**Figure 5 - View looking north from Route 39 approximately 360 feet south of the intersection (intersection circled in red)**



Obstructions on the southwest and southeast quadrant of the intersection are also restricting the ability of drivers stopped on Pleasant Bay Road to view vehicles approaching from the south on Route 39.

Figure 6 shows the view of a driver traveling westbound on Pleasant Bay Road looking south on Route 39. The hedges on the east side of Route 39 obstruct the view of oncoming traffic. Assuming vehicles on Route 39 are traveling 45 mph, a driver turning left out of Pleasant Bay Road should be provided clear sight lines to see vehicles 500 feet south down Route 39. The current available sight distance is less than 500 feet.



**Figure 6 - View looking south down Route 39 from the Pleasant Bay Road eastbound**



Figure 7 shows the view of a driver traveling eastbound on Pleasant Bay Road looking south on Route 39. The trees on the west side of Route 39 obstruct the view of oncoming traffic. Assuming vehicles on Route 39 are traveling 45 mph, a driver turning left out of Pleasant Bay Road should be provided clear sight lines to see vehicles 500 feet south down Route 39.



**Figure 7 - View looking south down Route 39 from the Pleasant Bay Road westbound**



Another obstruction noted was a tree on the north side of the westbound Pleasant Bay Road approach partially blocking the view of the LED stop sign as shown in Figure 8. This obstruction partially obscures the LED stop sign when drivers are more than 300 feet from the intersection. From 300 feet in, the LED stop sign is fully visible. The advanced stop signage is visible from well beyond 500 feet of the intersection.

Given that the sign is visible well advanced of the intersection, censuses was that removing this tree would not have a significant safety benefit. Adding a supplemental stop sign on the left sign of the road, as discussed in the next section of the report, would likely have a greater safety benefit.



**Figure 8 – Pleasant Bay Road westbound approach showing partially obscured stop sign**

**Potential Enhancements:**

Remove trees and hedges to the south of the intersection that are currently obstructing sight lines



## Safety Issue #2. Pavement Markings & Signage

The traffic control devices, including pavement markings and signs, are critical for the safety of all roadway users. The *Manual on Uniform Traffic Control Devices (MUTCD)* sets minimum standards and provides guidance to ensure uniformity of traffic control devices across the nation.

### Observations

The placement of stop lines and stop signs at both Pleasant Bay Road approaches was discussed extensively by team members. Moving the stop lines closer to Route 39 encourages drivers to stop closer to Route 39 providing for better sight lines. However, moving the vehicles closer to Route 39 also presents issues for vehicles, particularly large trucks, turning onto Pleasant Bay Road.

Proper placement depends in large part on the degree to which vegetation is removed within the intersection sight triangles. As such, the placement of the stop lines and stop signs should be reassessed after such changes to the intersection are made.



**Figure 9 – Looking south on Route 39, showing stop line placement on Pleasant Bay Road**





A team member noted a speed limit sign on Route 39, approximately ½ mile north of the intersection, was currently tilted as shown in Figure 10. There were also questions about the spacing of the sign with other in the area, the condition of the sign, and whether or not it is an appropriate location for the sign. A review of speed limit signs along the corridor, beyond the area of this project, may be warranted.



**Figure 10 – Tilted speed limit sign on Route 39**

Team members discussed making improvements to the Pleasant Bay approaches to ensure drivers are aware that they will be required to stop at the intersection. Improvements to that end that have been completed by Town staff to date, include the installation of stop ahead signage and flashing LED stop signs as shown in Figure 11. Additional potential improvements discussed include installing a secondary (left side) **stop sign eastbound approach and installing “Stop Ahead” pavement markings on both Pleasant Bay Rd approaches**. It was noted that any pavement markings placed in the travel lanes should use an application technique designed to maintain skid resistance, particularly in consideration of motorcyclist and bicyclists.



**Figure 11 – Looking east on Pleasant Bay Road, showing LED stop sign**



Team members discussed making improvements to Route 39 to improve advanced warning of the intersection. Figure 12 shows the current signage approaching the intersection from the south. Potential improvements discussed include installation of a cross road ahead sign (W2-1) on Route 39 northbound and adding street names to intersection ahead signs on both Route 39 approaches.



**Figure 12 – Looking north on Route 39, showing current signage**

Team members also discussed the recently installed painted median, as shown in Figure 4 and Figure 9, and potential adjustments to it. Town staff noted that early feedback on the painted median (installed in November 2015) has been positive.

The installation of the painted median seems to give drivers on Pleasant Bay Road an impression that they are crossing a major road and that they should proceed with care. The effect on Route 39 drivers is less clear. While it certainly makes drivers take note of the intersection, it is unclear if it has slowed vehicle speeds.

One potential adjustment to the painted median would be to narrow the painted median and move the edge lines in, increasing the shoulder width. This would push Route 39 drivers away from the edge of roadway, allowing drivers on Pleasant Bay Road to stop a bit closer to Route 39 and improving sight lines.

The Board of Selectmen previously approved installation of transverse speed reduction markings on both Route 39 approaches to the intersection as shown Traffic Rule in Appendix E. A schematic of these marking is also included in Appendix E. These MUTCD-approved markings are to “be placed in advance of an unexpectedly severe horizontal or vertical curve or other roadway feature where drivers need to decelerate prior to reaching the feature and where the desired reduction in speeds has not been achieved by the installation of warning signs and/or other traffic control devices.” (2010 MUTCD)

### **Potential Enhancements**

Review stop sign and stop line placement

Review speed limit signs placed along the Route 39 corridor

Install secondary (left side) stop signs on Pleasant Bay Rd westbound approach



### **Install “Stop Ahead” pavement marking on both Pleasant Bay Rd approaches**

Install cross road ahead sign (W2-1) on Rte 39 northbound and remove the damaged intersection ahead speed limit sign

Add street names tabs to intersection ahead signs

Move edge lines in and narrow painted median

Install transverse speed reduction markings

### **Safety Issue #3. Speed**

The distance required for a driver traveling 30 mph (advisory speed limit) to identify a potential conflict and safety stop is approximately 200 feet. This distance increases to 360 feet if the vehicle is traveling at 45 mph (posted speed limit).

### **Observations**

Team members noted that speeds of vehicles on Route 39 pose a hazard at this location. Based on the crash reports and observations of local team members, high vehicle speeds increase the frequency and severity of crashes at this intersection. It was noted that the momentum involved in many of these crashes pushed the impacted vehicle across the intersection and into a third vehicle.

Efforts to reduce speed were discussed to help avoid crashes and, in the event they occur, reduce their severity. As a first step, team members suggested measurements of existing speeds on Route 39 be made. Depending on these measurements, the appropriateness of the posted speed limit could be evaluated. Based on the trends of the speed measurements, the police department could consider speed enforcement targeted to the worst times of the day.

Beyond speed limit review and enforcement activities, team members discussed potential physical changes to the roadway to affect vehicle speeds. One potential improvement discussed was installing radar-based **“Your Speed Is” signs on Route 39. As** a more long-term consideration, there was discussion of converting the painted median to a mountable, raised median. Full access would need to be maintained for all vehicles.

### **Potential Enhancements**

Review posted speed limit and update as appropriate

Continue assessment and focus periodic enforcement

### **Install “Your Speed Is” signs on Rte 39**

Replace painted median with mountable, raised median (maintain full access)



## Safety Issue #4. Pavement Condition and Drainage

### Observations

While the intersection appeared to generally be well-designed for drainage, a team member noted seeing some ponding during a recent heavy rain event. This ponding is shown in Figure 13.



**Figure 13 - Looking west, showing ponding during heavy rain event**

Team members observed vehicles tracking over the corners of the intersection as shown in Figure 14. This could cause damage to the edge of pavement and, potentially, the adjacent catch basin.



**Figure 14 – Northeast corner of intersection, showing vehicle tracks over corner**



While the pavement in the vicinity of the intersection was observed to be generally serviceable, a milling and repaving of Route 39 will be required in the future.

### **Potential Enhancements**

Clean/repair catch basin as necessary

Repair/reinforce corner

Mill and repave full width of Route 39

### Safety Issue #5. Intersection Control

Conversion of a two-way stop controlled intersection to a roundabout has been shown to reduce injury and fatal crashes by 82% (Federal Highway Administration, National Cooperative Highway Research Program Report 672).

### **Observations**

Given the crash history of location conversion of this two-way stop-controlled intersection to a higher level of traffic control was discussed. It was noted that courtesy is often extended to side street vehicles by drivers on Route 39, at times, resulting in confusion about who has the right of way.

Conversion to a four-way stop-controlled was discussed but eliminated from consideration given the traffic volumes present at this location. Conversion to a roundabout or a traffic signal was discussed as possible alternatives. While a roundabout was seen as more in character with the area than a traffic signal, it was acknowledged that significant public outreach would be required before considering either of these alternatives.

There was also discussion of installing a flashing beacon over the intersection. The beacon would not change the level of control at the intersection, but would rather reinforce the existing control. The Route 39 approaches would see a flashing yellow indication while the Pleasant Bay Road approaches would see a flashing red indication. It was acknowledged that these installations typically have a relatively low safety payoff and can be seen as a nuisance by neighbors. Furthermore, the tree canopy, particularly on the Pleasant Bay Road approaches, would likely restrict drivers' ability to see the beacon. Significant tree trimming and or removal would be required for any safety benefit to be realized from this potential enhancement.

### **Potential Enhancements**

Install flashing beacon

Install roundabout

Install traffic signal



## Safety Issue #6. Multi-modal Accommodation

### Observations

While this intersection does not typically experience a high level of pedestrian or bicyclist activity, it was acknowledged that it is an important route for some non-motorists. Figure 15 shows a bicyclist traveling north on Route 39.



**Figure 15 – Bicyclist traveling north on Route 39**

There is no dedicated accommodation for pedestrians or bicyclists at the intersection and very little shoulder on the approaching roadways. While many team members expressed a desire to safely accommodate non-motorists, they recognized that isolated improvements at this intersection may not be of particular value. In the event that a geometric change is made to this intersection, consideration should be given to improving bicycle and pedestrian accommodation.

### Potential Enhancements

Consider improved bicycle/pedestrian accommodation if any geometry change are considered



## Summary of Road Safety Audit

The summary list of the Road Safety Audit observations and enhancements is provided in Table 1 to assist in the design and/or implementation of potential improvements elicited during the process. It is also recommended that any design process for more involved geometric changes include further analysis and public input.

Safety payoff estimates are subjective judgement of the potential effectiveness of the potential enhancement. Where available, documented crash reduction factors were used to develop these safety payoff estimates.

The time frame is categorized as short-term (<1 year), medium-term (1 to 3 years), or long-term (>3 years). The costs are categorized as low (<\$10,000), medium (\$10,001 to \$50,000), or high (>\$50,000).





**Table 1 - Potential Safety Enhancement Summary**

Safety Issue	Potential Safety Enhancement	Safety Payoff	Time Frame	Cost	Responsible Agency
<b>Obstructions</b>	Remove trees and hedges to the south of the intersection that are currently obstructing sight lines	Medium-High	Short	Low	Town
<b>Pavement markings &amp; signage</b>	Review stop sign and stop line placement	Medium	Short	Low	Town
	Review speed limit signs placed along the Route 39 corridor	Low	Short	Low	
	Install secondary (left side) stop signs on Pleasant Bay Rd westbound approach	Low	Medium	Low	
	<b>Install “Stop Ahead” pavement marking on both Pleasant Bay Rd approaches</b>	Low	Medium	Low	
	Install cross road ahead sign (W2-1) on Rte 39 northbound and remove the damaged intersection ahead speed limit sign	Low	Medium	Low	
	Add street names tabs to intersection ahead signs	Low	Medium	Low	
	Move edge lines in and narrow painted median	Low	Medium	Medium-High	
Install transverse speed reduction markings	Low	Medium	Low		
<b>Speed</b>	Review posted speed limit and update as appropriate	Low-Medium	Medium	Low	Town
	Continue assessment and focus periodic enforcement	Low	Medium	Low	
	<b>Install “Your Speed Is” signs on Rte 39</b>	Low	Medium	Medium	
	Replace painted median with mountable, raised median (maintain full access)	Medium	Medium	High	
<b>Pavement conditions &amp; drainage</b>	Clean/repair catch basin as necessary	Low	Short	Low	Town
	Repair/reinforce corner	Low	Short	Low	
	Mill and repave full width of Rte 39	Low	Long	High	
<b>Intersection control</b>	Install flashing beacon	Low	Medium	Medium-High	Town
	Install roundabout	High	Long	High	
	Install signal	High	Long	High	
<b>Multi-modal accommodation</b>	Consider improved bicycle/pedestrian accommodation if any geometry change are considered	Medium	Long	High	Town





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# Appendix A

## Road Safety Audit Meeting Agenda

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BARNSTABLE, MASSACHUSETTS 02630



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## Road Safety Audit (RSA) Meeting

### Harwich: Intersection of Route 39 (Orleans Road) at Pleasant Bay Road

Date: June 1, 2016

Location: Harwich Town Hall, 732 Main Street, Harwich, MA 02645

#### **1:00 p.m. Welcome and Introductions**

#### **1:10 p.m. Review of Site-Specific Material**

- Crash and Traffic Volume Summaries
- Existing Geometries and Conditions

#### **1:30 p.m. Visit the Site (Group)**

- Assemble as a group at the site for observation of conditions
- As a group, identify areas for improvement

#### **2:15 p.m. Post-Visit Discussion at Meeting Room / Completion of RSA**

- Discuss observations and finalize on-site findings
- Discuss potential improvements and draft recommendations

#### **3:00 p.m. Adjourn**

**Next Steps:** After the RSA meeting, CCC staff will prepare a draft document and circulate it to participants. Participants will be asked to comment and respond to the draft document to assure that it is reflective of the RSA completed by the multidisciplinary team. With comments submitted, a final document is then produced; the final document is expected to be available within three weeks of the RSA.





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## Appendix B

# Road Safety Audit Team Contact List

## **Participating Audit Team Members**

<b>Audit Team Member</b>	<b>Agency / Affiliation</b>	<b>Email Address</b>
Aram Goshgarian	Harwich Police Department	agoshgarian@harwichpolice.com
Dave LeBlanc	Harwich Fire Department	dleblanc@harwichfire.com
Christopher Clark	Harwich Administration	cclark@town.harwich.ma.us
Lincoln Hooper	Harwich Department of Public Works	highway@cape.com
Bob Cafarelli	Harwich Engineering	rcafarelli@town.harwich.ma.us
Jerry Beltis	Harwich Traffic Safety Committee	jbeltis@comcast.net
Jerry Scannell	Harwich Traffic Safety Committee	maxflex2@gmail.com
Robert Gregory	MassDOT Highway Division– District 5 Traffic	robert.gregory@state.ma.us
Jason Walters	MassDOT Highway Division– District 5 Projects	jason.walters@state.ma.us
Lisa Schletzbaum	MassDOT Highway Division/Safety	lisa.schletzbaum@state.ma.us
Steven Tupper	Cape Cod Commission	stupper@capecodcommission.org



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# Appendix C

## Collision Diagram & Crash Report Summary

# COLLISION DIAGRAM

Location: Orleans Road (Route 39) at Pleasant Bay Road

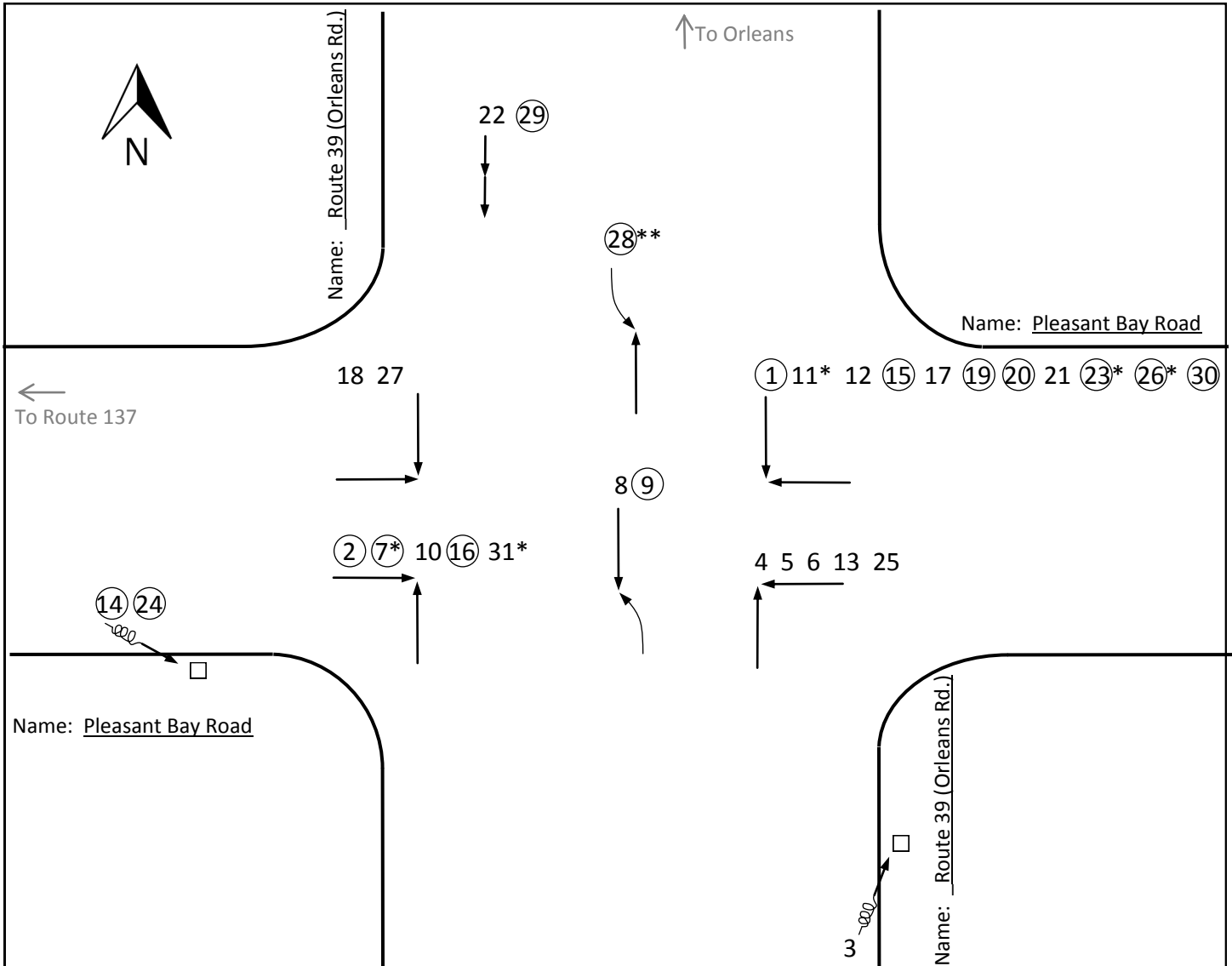
Town: Harwich

Dates of Crash Data: 2013-2015

Total Crashes: 31 Injury Crashes: 15 Fatal Crashes: 0



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SYMBOLS	MANNER OF COLLISION	NOTES
→ Moving Vehicle	→ Single Vehicle Crash	See reverse for details on each crash.
← Backing Vehicle	→ Rear-end	
↗ Lane Change	↗ Angle	*A third vehicle waiting across the intersection was struck as by the colliding vehicles.
↖ Turning Vehicle	↖ Sideswipe	
∞ Out of Control	→ Head on	**The colliding vehicles stuck and injured a pedestrian standing at the corner.
- - - Indirectly Involved Vehicle	↔ Rear to Rear	
🚲 Bicycle	<b>SEVERITY</b>	
🚶 Pedestrian	○ Injury Crash	
▭ Parked Vehicle	● Fatal Crash	
□ Fixed Object		



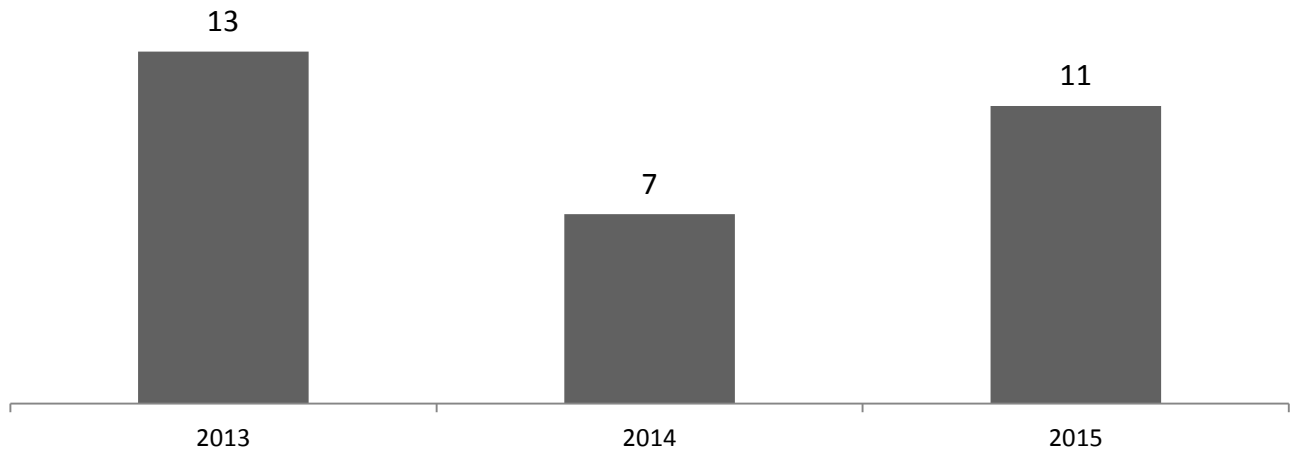
## Crash Data Summary Route 39 (Orleans Road) at Pleasant Bay Road, Harwich

Source: Town of Harwich Police Department Crash Records and Massachusetts Department of Transportation Registry of Motor Vehicles Online Crash Database; <http://services.massdot.state.ma.us/crashportal/>

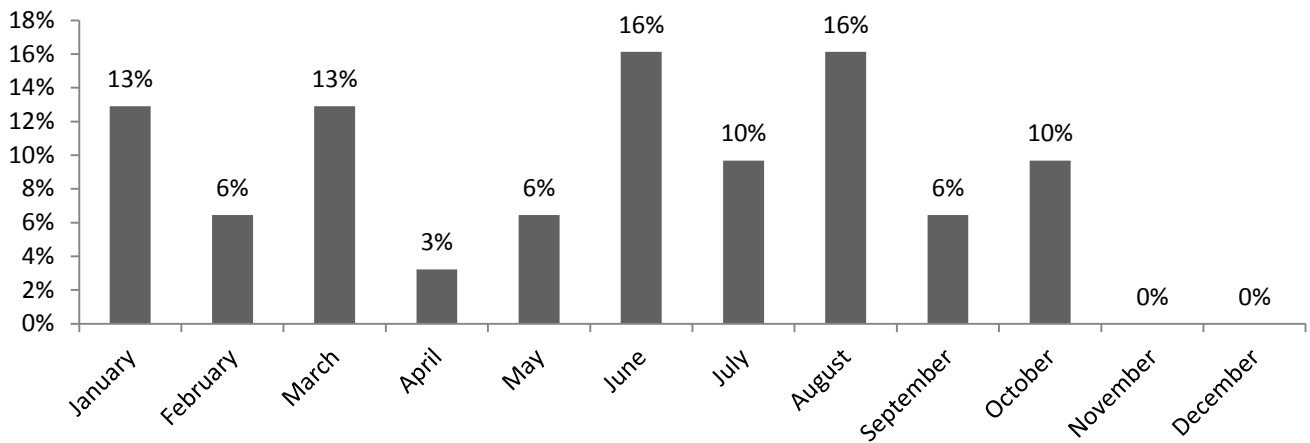
#	Crash Date	Crash Time	Crash Severity	# Vehicle	# Injured	Manner of Collision	Ambient Light	Weather Condition	Road Surface	Driver Contributing Codes	Notes
1	1/11/2013	10:04 PM	Non-fatal injury	2	1	Angle	Dark - lighted roadway	Rain	Wet	D1:(Distracted) D2:(No improper driving)	D1 unfamiliar with area, distracted by GPS, did not stop at stop sign
2	1/24/2013	9:48 AM	Non-fatal injury	2	1	Angle	Daylight	Cloudy	Dry	D1:(No improper driving) D2:(Failed to yield right of way)	D2 stopped then proceeded without appropriate gap in traffic
3	1/29/2013	7:38 AM	Property damage only (none injured)	1	0	Single vehicle crash	Daylight	Cloudy	Slush	D1:(No improper driving)	Lost control due to slippery road conditions
4	5/23/2013	7:04 PM	Property damage only (none injured)	2	0	Angle	Daylight	Rain	Wet	D1:(Failed to yield right of way) D2:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic
5	6/5/2013	5:48 PM	Property damage only (none injured)	2	0	Angle	Daylight	Clear	Dry	D1:(Inattention) D2:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic assuming it was a 4-way stop
6	6/24/2013	1:40 PM	Property damage only (none injured)	2	0	Angle	Daylight	Clear	Dry	D1:(Failed to yield right of way) D2:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic
7	6/27/2013	4:02 PM	Non-fatal injury	3	2	Angle	Daylight	Cloudy	Dry	D1:(Failed to yield right of way) D2:(No improper driving) D3:(No improper driving)	D2 stopped then proceeded without appropriate gap in traffic; third vehicle opposite of intersection struck.
8	6/28/2013	4:35 PM	Property damage only (none injured)	2	0	Angle	Daylight	Cloudy	Wet	D1:(Failed to yield right of way) D2:(No improper driving)	D1 stated not seeing opposing vehicle
9	7/22/2013	3:13 PM	Non-fatal injury	2	1	Angle	Daylight	Cloudy	Dry	D1:(Failed to yield right of way) D2:(No improper driving)	D1 stated not seeing opposing vehicle
10	8/6/2013	4:18 PM	Property damage only (none injured)	2	0	Angle	Daylight	Clear	Dry	D1:( ) D2:(Failed to yield right of way)	D1 stopped then proceeded without appropriate gap in traffic assuming it was a 4-way stop
11	10/12/2013	3:31 PM	Property damage only (none injured)	3	0	Angle	Daylight	Clear	Dry	D1:(Failed to yield right of way) D2:(No improper driving) D3:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic; third vehicle opposite of intersection struck.
12	10/22/2013	2:15 PM	Property damage only (none injured)	2	0	Angle	Daylight	Clear	Dry	D1:(Inattention),(Failed to yield right of way) D2:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic
13	10/27/2013	8:51 AM	Property damage only (none injured)	2	0	Angle	Daylight	Clear	Dry	D1:(Disregarded traffic signs, signals, road markings) D2:(No improper driving)	Witness stated D1 did not stop at stop sign
14	1/3/2014	8:43 AM	Non-fatal injury	1	1	Single vehicle crash	Daylight	Snow/Blowing sand, snow	Snow	D1:(Driving too fast for conditions)	Tractor trailer unit lost control due to snowy conditions
15	3/20/2014	10:06 AM	Non-fatal injury	2	1	Angle	Daylight	Cloudy	Wet	D1:(Inattention),(Failed to yield right of way) D2:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic assuming it was a 4-way stop
16	4/4/2014	11:59 AM	Non-fatal injury	2	1	Angle	Daylight	Clear	Dry	D1:(Failed to yield right of way) D2:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic
17	7/2/2014	12:52 PM	Property damage only (none injured)	2	0	Angle	Daylight	Clear	Dry	D1:(Failed to yield right of way) D2:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic noting they did not see the other vehicle
18	8/9/2014	4:58 PM	Property damage only (none injured)	2	0	Angle	Daylight	Clear	Dry	D1:(Failed to yield right of way) D2:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic
19	8/19/2014	8:49 AM	Non-fatal injury	2	2	Angle	Daylight	Clear	Dry	D1:(Other improper action),(Failed to yield right of way) D2:(No improper driving)	D1 failed to stop at stop sign
20	8/23/2014	12:10 PM	Non-fatal injury	2	4	Angle	Daylight	Clear	Dry	D1:(Disregarded traffic signs, signals, road markings),(Inattention) D2:(No improper driving)	D1 failed to stop at stop sign
21	2/18/2015	11:07 AM	Property damage only (none injured)	2	0	Angle	Daylight	Cloudy	Dry	D1:(Failed to yield right of way),(Distracted) D2:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic noting they did not see the other vehicle
22	2/21/2015	11:45 PM	Property damage only (none injured)	2	0	Rear-end	Dark - unknown roadway lighting	Rain	Wet	D1:(Operating vehicle in erratic, reckless, careless, negligent or aggressive manner),(Failure to keep in proper lane or running off road) D2:(No improper driving)	D2 passed vehicle 2 then slowed causing the rear-end collision
23	3/12/2015	1:35 PM	Non-fatal injury	3	1	Angle	Daylight	Clear	Dry	D1:(No improper driving) D2:(Failed to yield right of way) D3:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic noting they did not see the other vehicle; third vehicle opposite of intersection struck
24	3/18/2015		Non-fatal injury	1	1	Single vehicle crash	Dark - lighted roadway	Clear	Dry	D1:(Other improper action),(Exceeded authorized speed limit)	Run off the road crash; struck fence and tree
25	3/24/2015	4:14 PM	Property damage only (none injured)	3	0	Angle	Daylight	Clear	Dry	D1:(Failed to yield right of way) D2:(No improper driving) D3:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic; third vehicle opposite of intersection struck
26	5/10/2015	5:42 PM	Non-fatal injury	3	2	Angle	Daylight	Clear	Dry	D1:(Failed to yield right of way) D2:(No improper driving) D3:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic; third vehicle opposite of intersection struck
27	6/26/2015	10:55 AM	Property damage only (none injured)	2	0	Angle	Daylight	Cloudy	Dry	D1:(Failed to yield right of way) D2:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic
28	7/3/2015	9:42 AM	Non-fatal injury	2	1	Angle	Daylight	Clear	Dry	D1:(Failed to yield right of way) D2:(No improper driving)	D1 mistakenly thought D2 was taking a left affording a gap in traffic; pedestrian on corner struck as colliding vehicles left the roadway
29	8/11/2015	2:18 PM	Non-fatal injury	2	2	Rear-end	Daylight	Rain	Wet	D1:(Failed to yield right of way) D2:(Followed too closely)	D2 stopped on Rte 39 for a vehicle turning onto Pleasant Bay and was struck from behind
30	9/6/2015	11:54 AM	Non-fatal injury	2	1	Angle	Daylight	Clear	Dry	D1:(Inattention) D2:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic noting they did not see the other vehicle
31	9/17/2015	10:03 AM	Property damage only (none injured)	3	0	Angle	Daylight	Clear	Dry	D1:(Failed to yield right of way) D2:(No improper driving) D3:(No improper driving)	D1 stopped then proceeded without appropriate gap in traffic noting they did not see the other vehicle
<b>Total</b>				<b>65</b>	<b>22</b>						

# Route 39 (Orleans Road) at Pleasant Bay Road 2013-2015 Crash Analysis

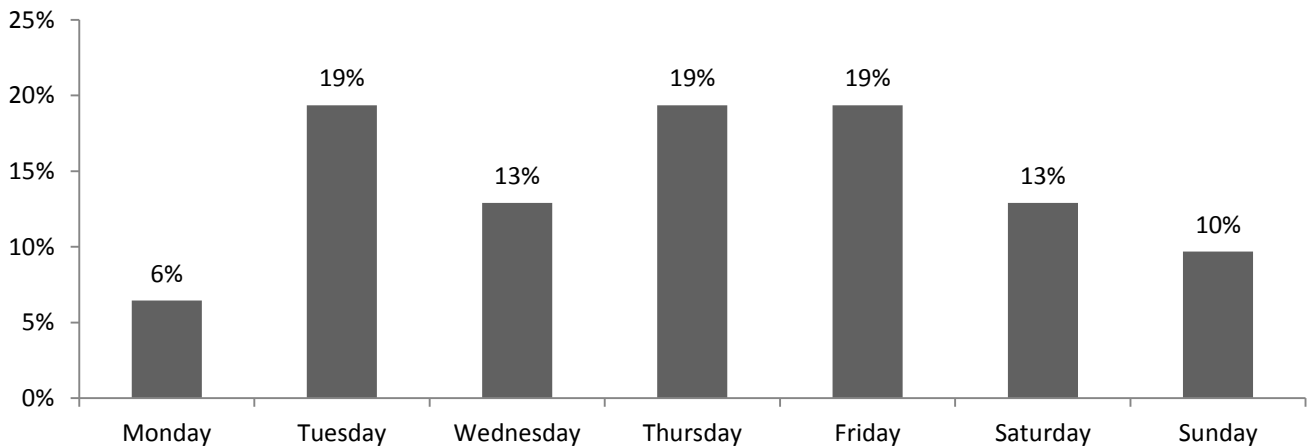
## Crashes by Year



## Crash Month

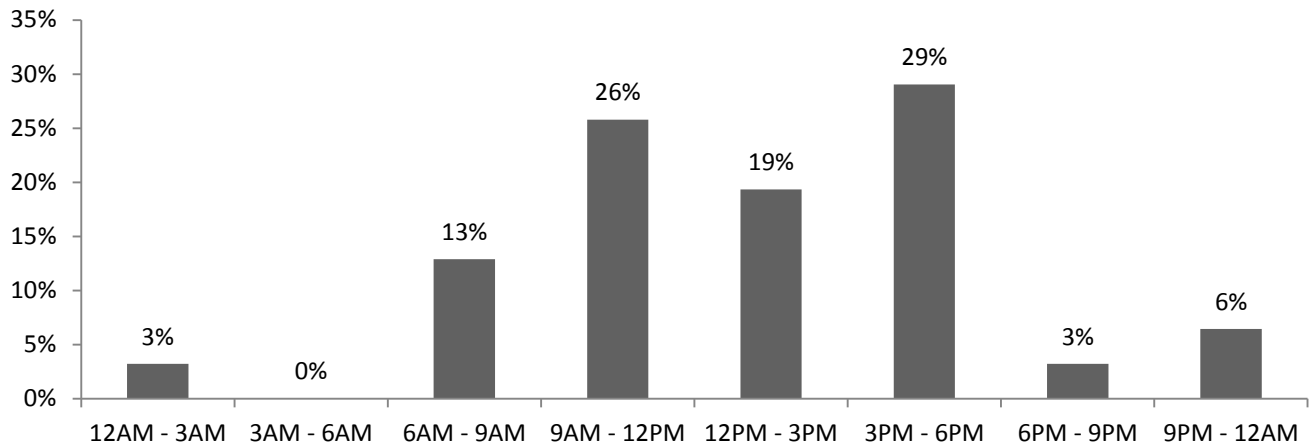


## Crash Day of Week

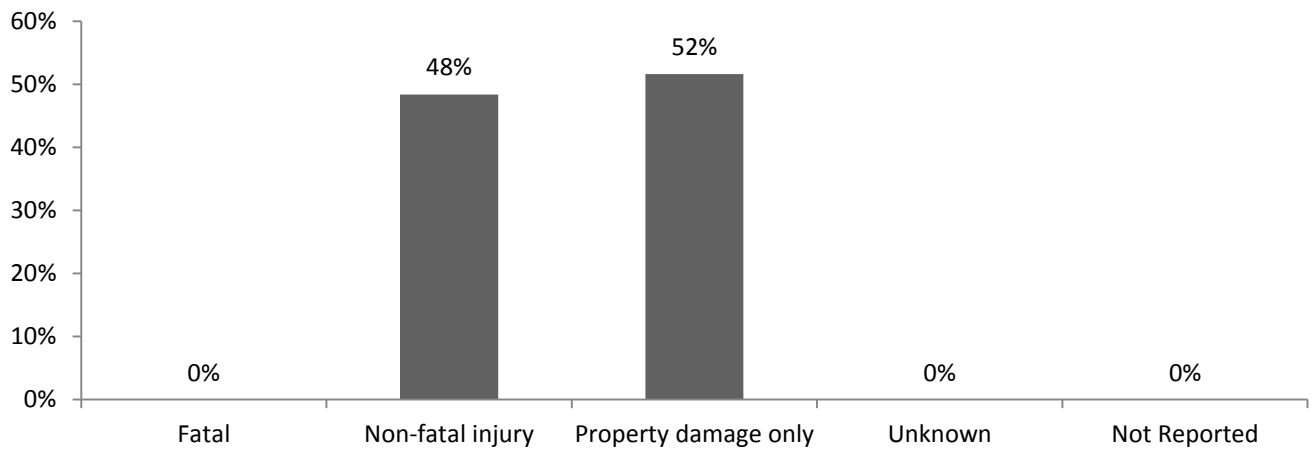


# Route 39 (Orleans Road) at Pleasant Bay Road 2013-2015 Crash Analysis

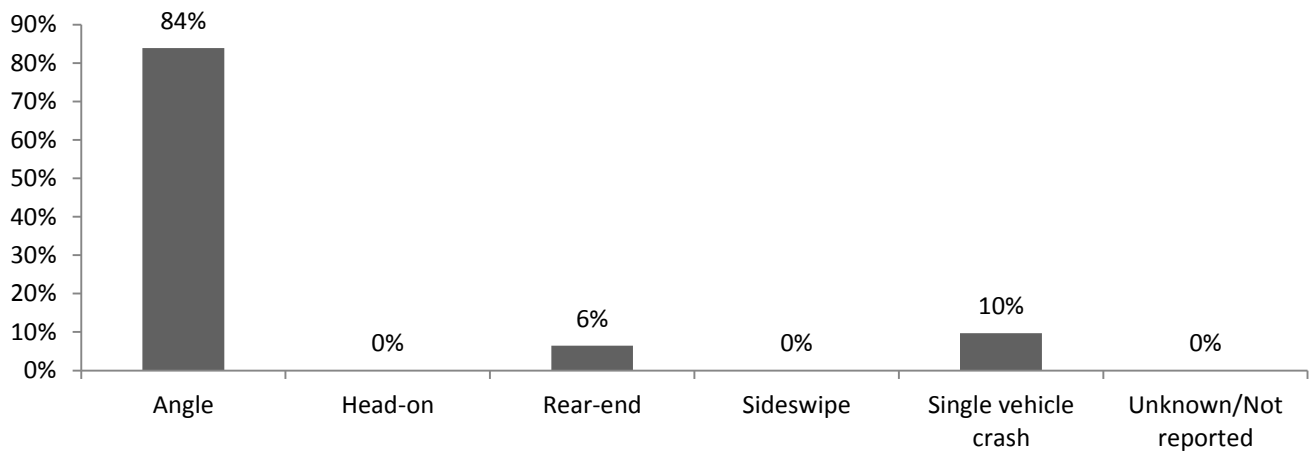
## Crash Time



## Collision Severity

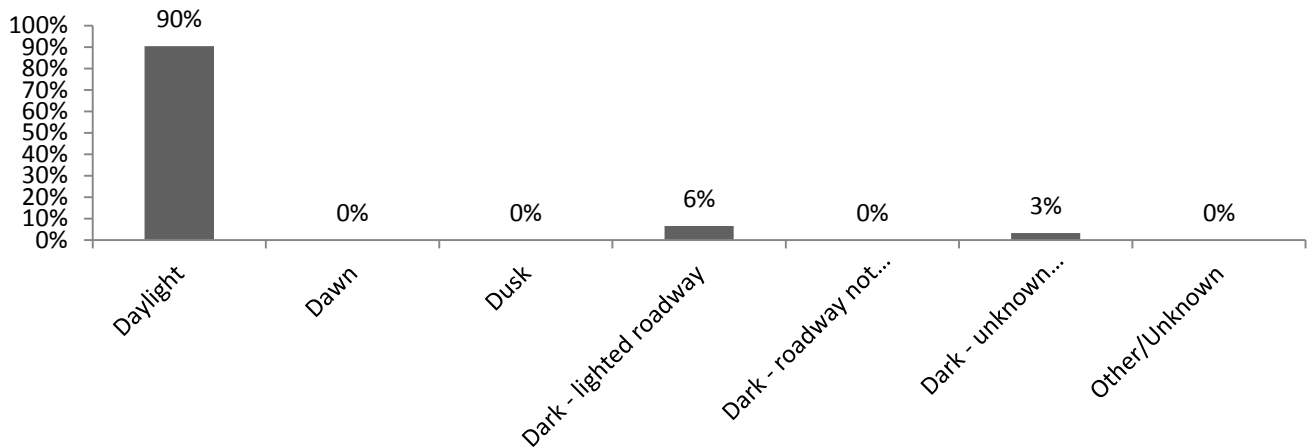


## Collision Type

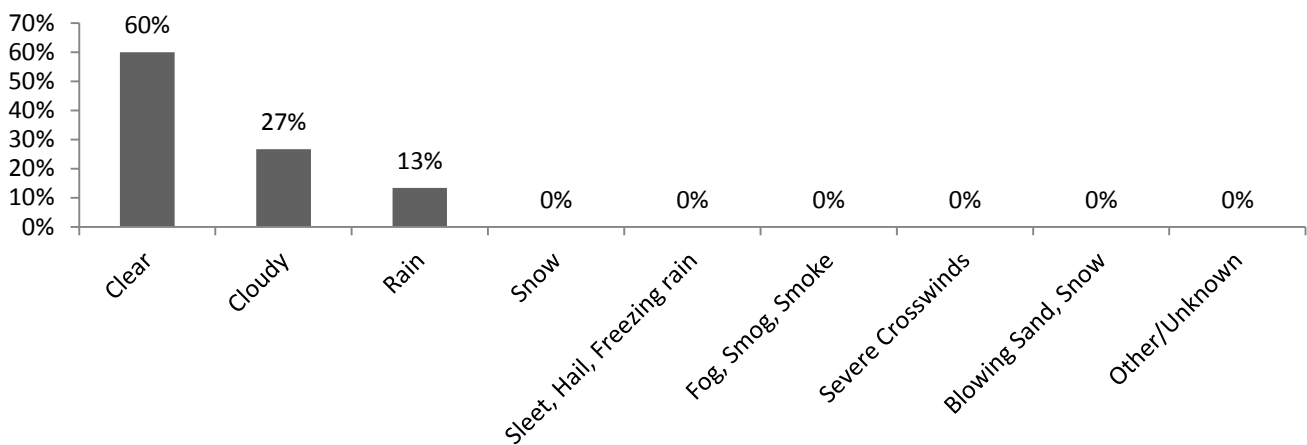


# Route 39 (Orleans Road) at Pleasant Bay Road 2013-2015 Crash Analysis

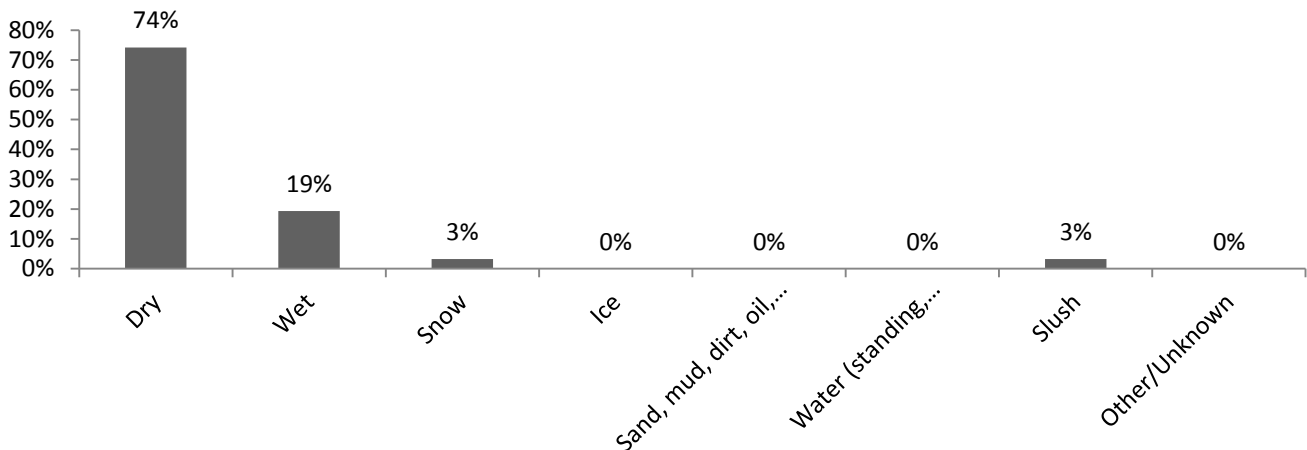
## Ambient Light



## Weather Condition

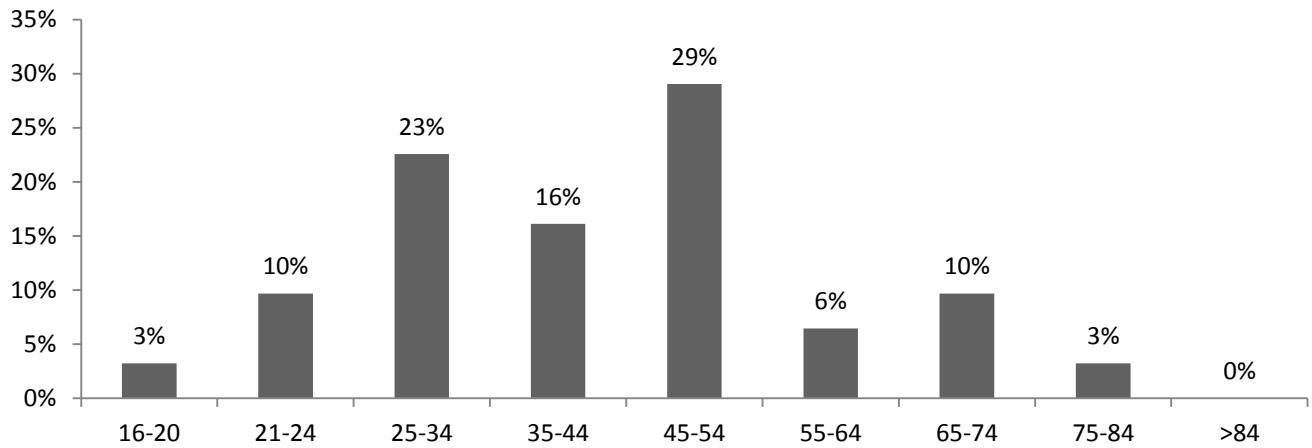


## Road Surface

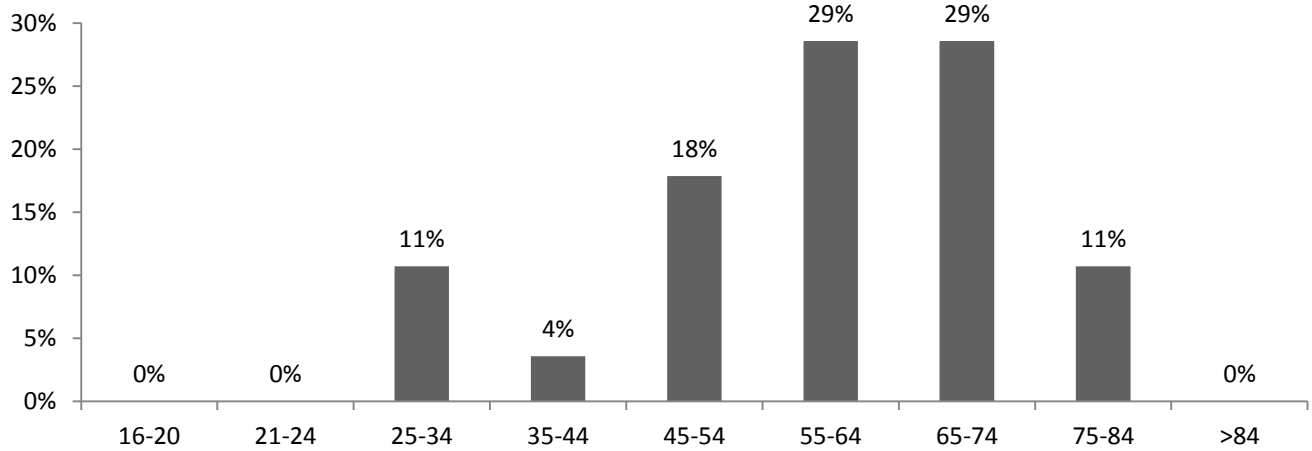


# Route 39 (Orleans Road) at Pleasant Bay Road 2013-2015 Crash Analysis

## Age of Driver - Youngest Know



## Age of Driver - Oldest Known



# Appendix D

## Traffic Data

# Cape Cod Commission

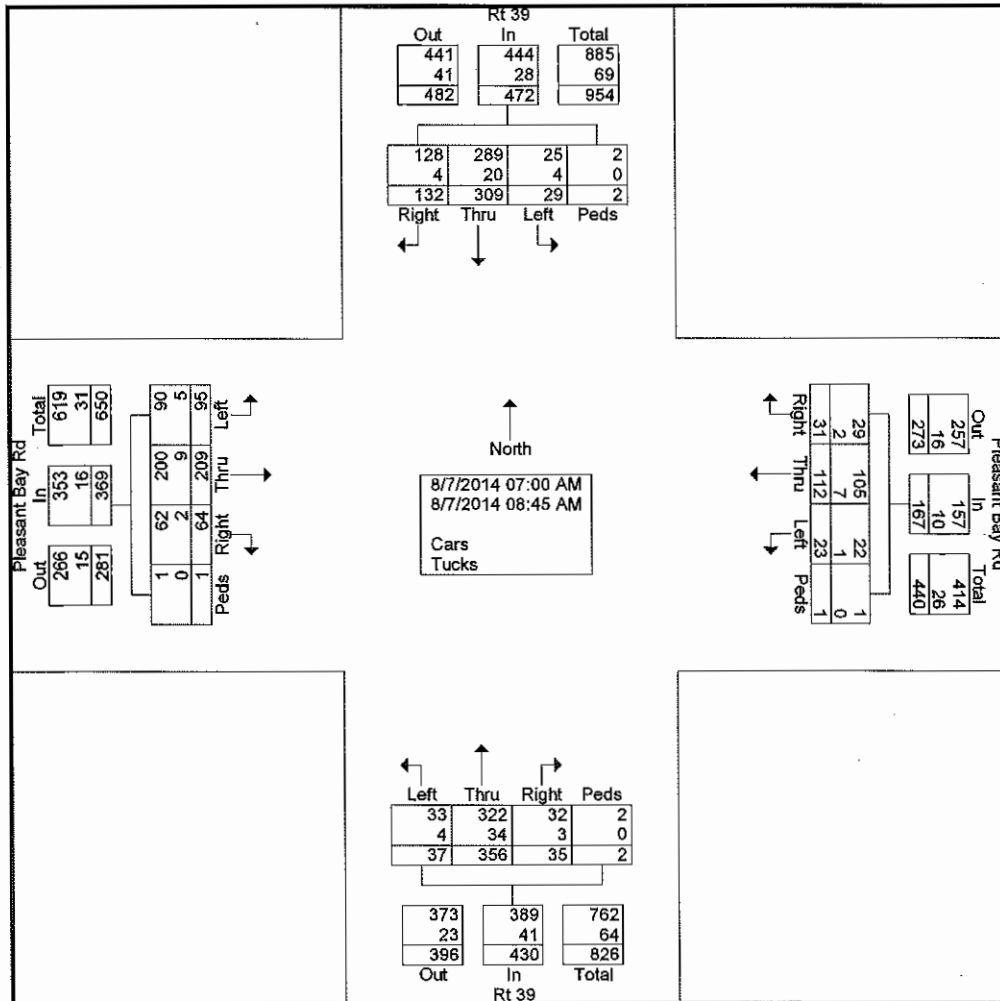
3225 Main Street  
 Barnstable, Massachusetts 02632  
 www.capecodcommission.org

Rt 39 @ Pleasant Bay Rd  
 Town: Harwich  
 Counted by: SMT  
 Counters: 6

File Name : 2512\_08072014  
 Site Code : 00232323  
 Start Date : 8/7/2014  
 Page No : 1

Groups Printed- Cars - Tucks

Start Time	Rt 39 From North					Pleasant Bay Rd From East					Rt 39 From South					Pleasant Bay Rd From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
07:00 AM	4	28	9	0	41	6	8	1	0	15	5	35	3	0	43	17	20	2	0	39	138
07:15 AM	0	28	10	0	38	1	11	2	0	14	4	40	2	0	46	5	22	3	0	30	128
07:30 AM	5	24	22	0	51	0	11	5	0	16	3	61	5	1	70	9	22	9	0	40	177
07:45 AM	3	47	19	0	69	2	12	5	0	19	3	34	5	0	42	11	27	13	0	51	181
<b>Total</b>	<b>12</b>	<b>127</b>	<b>60</b>	<b>0</b>	<b>199</b>	<b>9</b>	<b>42</b>	<b>13</b>	<b>0</b>	<b>64</b>	<b>15</b>	<b>170</b>	<b>15</b>	<b>1</b>	<b>201</b>	<b>42</b>	<b>91</b>	<b>27</b>	<b>0</b>	<b>160</b>	<b>624</b>
08:00 AM	4	52	16	0	72	3	18	8	1	30	4	41	7	1	53	8	26	8	1	43	198
08:15 AM	5	43	14	1	63	2	14	2	0	18	6	33	2	0	41	18	27	10	0	55	177
08:30 AM	5	42	23	0	70	5	15	3	0	23	7	60	5	0	72	15	32	7	0	54	219
08:45 AM	3	45	19	1	68	4	23	5	0	32	5	52	6	0	63	12	33	12	0	57	220
<b>Total</b>	<b>17</b>	<b>182</b>	<b>72</b>	<b>2</b>	<b>273</b>	<b>14</b>	<b>70</b>	<b>18</b>	<b>1</b>	<b>103</b>	<b>22</b>	<b>186</b>	<b>20</b>	<b>1</b>	<b>229</b>	<b>53</b>	<b>118</b>	<b>37</b>	<b>1</b>	<b>209</b>	<b>814</b>
<b>Grand Total</b>	<b>29</b>	<b>309</b>	<b>132</b>	<b>2</b>	<b>472</b>	<b>23</b>	<b>112</b>	<b>31</b>	<b>1</b>	<b>167</b>	<b>37</b>	<b>356</b>	<b>35</b>	<b>2</b>	<b>430</b>	<b>95</b>	<b>209</b>	<b>64</b>	<b>1</b>	<b>369</b>	<b>1438</b>
Apprch %	6.1	65.5	28	0.4		13.8	67.1	18.6	0.6		8.6	82.8	8.1	0.5		25.7	56.6	17.3	0.3		
Total %	2	21.5	9.2	0.1	32.8	1.6	7.8	2.2	0.1	11.6	2.6	24.8	2.4	0.1	29.9	6.6	14.5	4.5	0.1	25.7	
Cars	25	289	128	2	444	22	105	29	1	157	33	322	32	2	389	90	200	62	1	353	1343
% Cars	86.2	93.5	97	100	94.1	95.7	93.8	93.5	100	94	89.2	90.4	91.4	100	90.5	94.7	95.7	96.9	100	95.7	93.4
Tucks	4	20	4	0	28	1	7	2	0	10	4	34	3	0	41	5	9	2	0	16	95
% Tucks	13.8	6.5	3	0	5.9	4.3	6.2	6.5	0	6	10.8	9.6	8.6	0	9.5	5.3	4.3	3.1	0	4.3	6.6



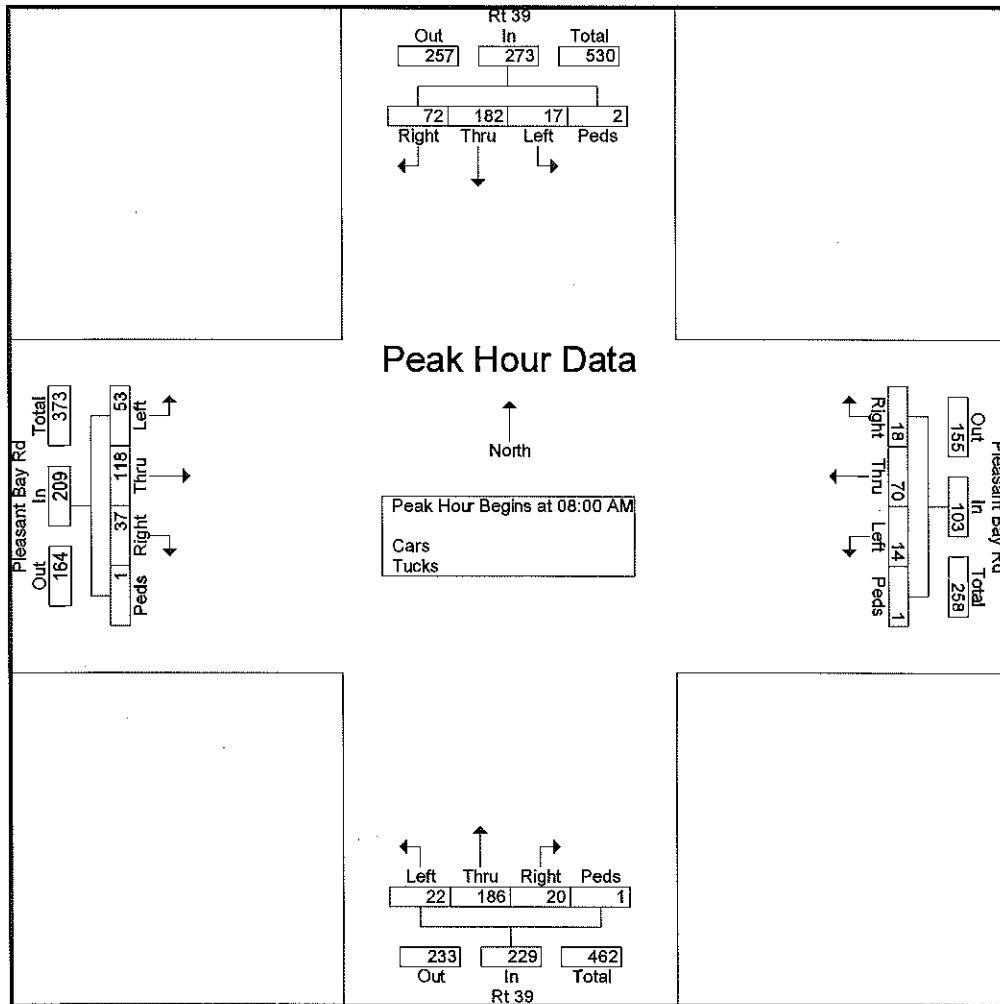
# Cape Cod Commission

3225 Main Street  
 Barnstable, Massachusetts 02632  
 www.capecodcommission.org

Rt 39 @ Pleasant Bay Rd  
 Town: Harwich  
 Counted by: SMT  
 Counters: 6

File Name : 2512\_08072014  
 Site Code : 00232323  
 Start Date : 8/7/2014  
 Page No : 2

Start Time	Rt 39 From North					Pleasant Bay Rd From East					Rt 39 From South					Pleasant Bay Rd From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	4	52	16	0	72	3	18	8	1	30	4	41	7	1	53	8	26	8	1	43	198
08:15 AM	5	43	14	1	63	2	14	2	0	18	6	33	2	0	41	18	27	10	0	55	177
08:30 AM	5	42	23	0	70	5	15	3	0	23	7	60	5	0	72	15	32	7	0	54	219
08:45 AM	3	45	19	1	68	4	23	5	0	32	5	52	6	0	63	12	33	12	0	57	220
Total Volume	17	182	72	2	273	14	70	18	1	103	22	186	20	1	229	53	118	37	1	209	814
% App. Total	6.2	66.7	26.4	0.7		13.6	68	17.5	1		9.6	81.2	8.7	0.4		25.4	56.5	17.7	0.5		
PHF	.850	.875	.783	.500	.948	.700	.761	.563	.250	.805	.786	.775	.714	.250	.795	.736	.894	.771	.250	.917	.925





# Cape Cod Commission

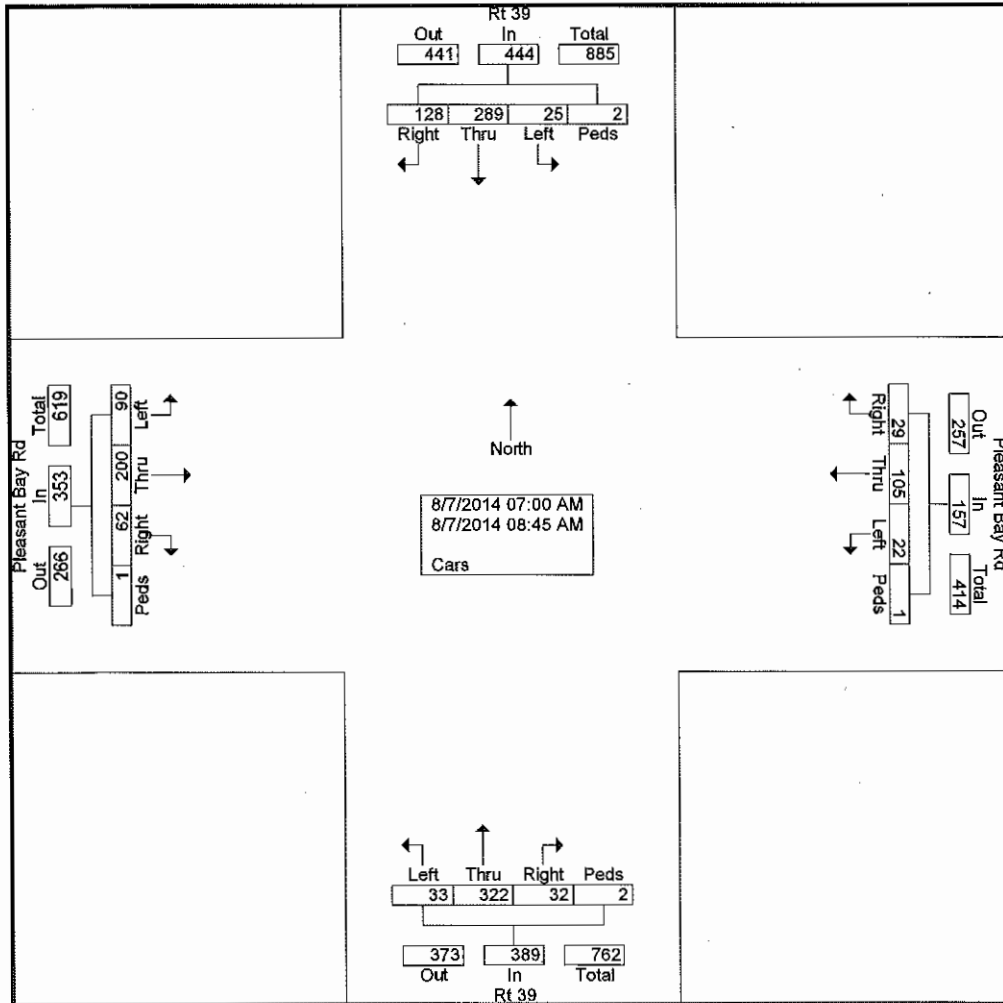
3225 Main Street  
 Barnstable, Massachusetts 02632  
 www.capecodcommission.org

Rt 39 @ Pleasant Bay Rd  
 Town: Harwich  
 Counted by: SMT  
 Counters: 6

File Name : 2512\_08072014  
 Site Code : 00232323  
 Start Date : 8/7/2014  
 Page No : 1

### Groups Printed- Cars

Start Time	Rt 39 From North					Pleasant Bay Rd From East					Rt 39 From South					Pleasant Bay Rd From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
07:00 AM	4	26	9	0	39	6	8	1	0	15	5	32	3	0	40	16	20	2	0	38	132
07:15 AM	0	27	9	0	36	1	9	2	0	12	4	36	2	0	42	5	19	3	0	27	117
07:30 AM	5	22	22	0	49	0	11	5	0	16	3	55	4	1	63	9	21	9	0	39	167
07:45 AM	2	46	16	0	64	2	11	3	0	16	3	28	5	0	36	11	26	13	0	50	166
Total	11	121	56	0	188	9	39	11	0	59	15	151	14	1	181	41	86	27	0	154	582
08:00 AM	3	47	16	0	66	3	17	8	1	29	3	37	6	1	47	7	26	8	1	42	184
08:15 AM	4	40	14	1	59	2	14	2	0	18	6	31	2	0	39	17	25	9	0	51	167
08:30 AM	5	41	23	0	69	4	14	3	0	21	5	57	4	0	66	13	30	6	0	49	205
08:45 AM	2	40	19	1	62	4	21	5	0	30	4	46	6	0	56	12	33	12	0	57	205
Total	14	168	72	2	256	13	66	18	1	98	18	171	18	1	208	49	114	35	1	199	761
Grand Total	25	289	128	2	444	22	105	29	1	157	33	322	32	2	389	90	200	62	1	353	1343
Apprch %	5.6	65.1	28.8	0.5		14	66.9	18.5	0.6		8.5	82.8	8.2	0.5		25.5	56.7	17.6	0.3		
Total %	1.9	21.5	9.5	0.1	33.1	1.6	7.8	2.2	0.1	11.7	2.5	24	2.4	0.1	29	6.7	14.9	4.6	0.1	26.3	



# Cape Cod Commission

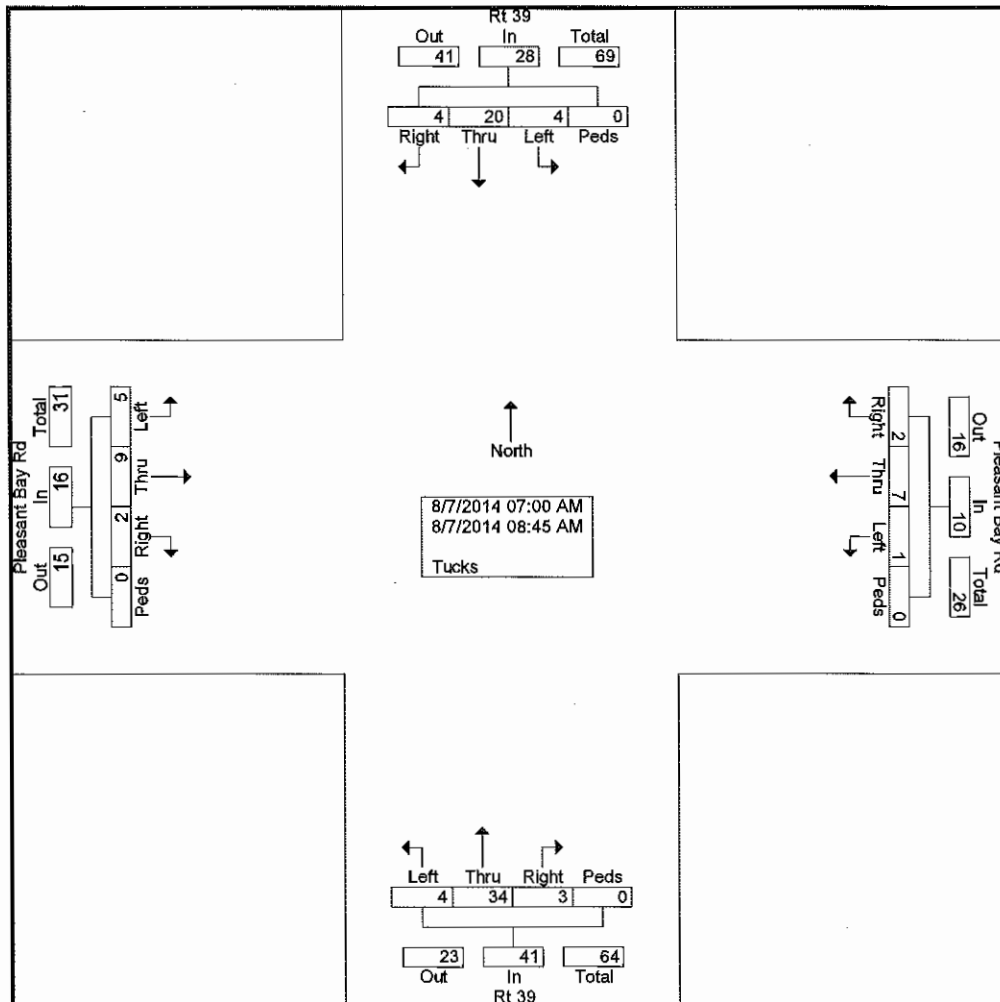
3225 Main Street  
Barnstable, Massachusetts 02632  
[www.capecodcommission.org](http://www.capecodcommission.org)

Rt 39 @ Pleasant Bay Rd  
Town: Harwich  
Counted by: SMT  
Counters: 6

File Name : 2512\_08072014  
Site Code : 00232323  
Start Date : 8/7/2014  
Page No : 1

### Groups Printed- Tucks

Start Time	Rt 39 From North					Pleasant Bay Rd From East					Rt 39 From South					Pleasant Bay Rd From West					int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
07:00 AM	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	1	0	0	0	1	6
07:15 AM	0	1	1	0	2	0	2	0	0	2	0	4	0	0	4	0	3	0	0	3	11
07:30 AM	0	2	0	0	2	0	0	0	0	0	0	6	1	0	7	0	1	0	0	1	10
07:45 AM	1	1	3	0	5	0	1	2	0	3	0	6	0	0	6	0	1	0	0	1	15
<b>Total</b>	<b>1</b>	<b>6</b>	<b>4</b>	<b>0</b>	<b>11</b>	<b>0</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>19</b>	<b>1</b>	<b>0</b>	<b>20</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>42</b>
08:00 AM	1	5	0	0	6	0	1	0	0	1	1	4	1	0	6	1	0	0	0	1	14
08:15 AM	1	3	0	0	4	0	0	0	0	0	0	2	0	0	2	1	2	1	0	4	10
08:30 AM	0	1	0	0	1	1	1	0	0	2	2	3	1	0	6	2	2	1	0	5	14
08:45 AM	1	5	0	0	6	0	2	0	0	2	1	6	0	0	7	0	0	0	0	0	15
<b>Total</b>	<b>3</b>	<b>14</b>	<b>0</b>	<b>0</b>	<b>17</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>4</b>	<b>15</b>	<b>2</b>	<b>0</b>	<b>21</b>	<b>4</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>10</b>	<b>53</b>
<b>Grand Total</b>	<b>4</b>	<b>20</b>	<b>4</b>	<b>0</b>	<b>28</b>	<b>1</b>	<b>7</b>	<b>2</b>	<b>0</b>	<b>10</b>	<b>4</b>	<b>34</b>	<b>3</b>	<b>0</b>	<b>41</b>	<b>5</b>	<b>9</b>	<b>2</b>	<b>0</b>	<b>16</b>	<b>95</b>
<b>Apprch %</b>	<b>14.3</b>	<b>71.4</b>	<b>14.3</b>	<b>0</b>		<b>10</b>	<b>70</b>	<b>20</b>	<b>0</b>		<b>9.8</b>	<b>82.9</b>	<b>7.3</b>	<b>0</b>		<b>31.2</b>	<b>56.2</b>	<b>12.5</b>	<b>0</b>		
<b>Total %</b>	<b>4.2</b>	<b>21.1</b>	<b>4.2</b>	<b>0</b>	<b>29.5</b>	<b>1.1</b>	<b>7.4</b>	<b>2.1</b>	<b>0</b>	<b>10.5</b>	<b>4.2</b>	<b>35.8</b>	<b>3.2</b>	<b>0</b>	<b>43.2</b>	<b>5.3</b>	<b>9.5</b>	<b>2.1</b>	<b>0</b>	<b>16.8</b>	



# Cape Cod Commission

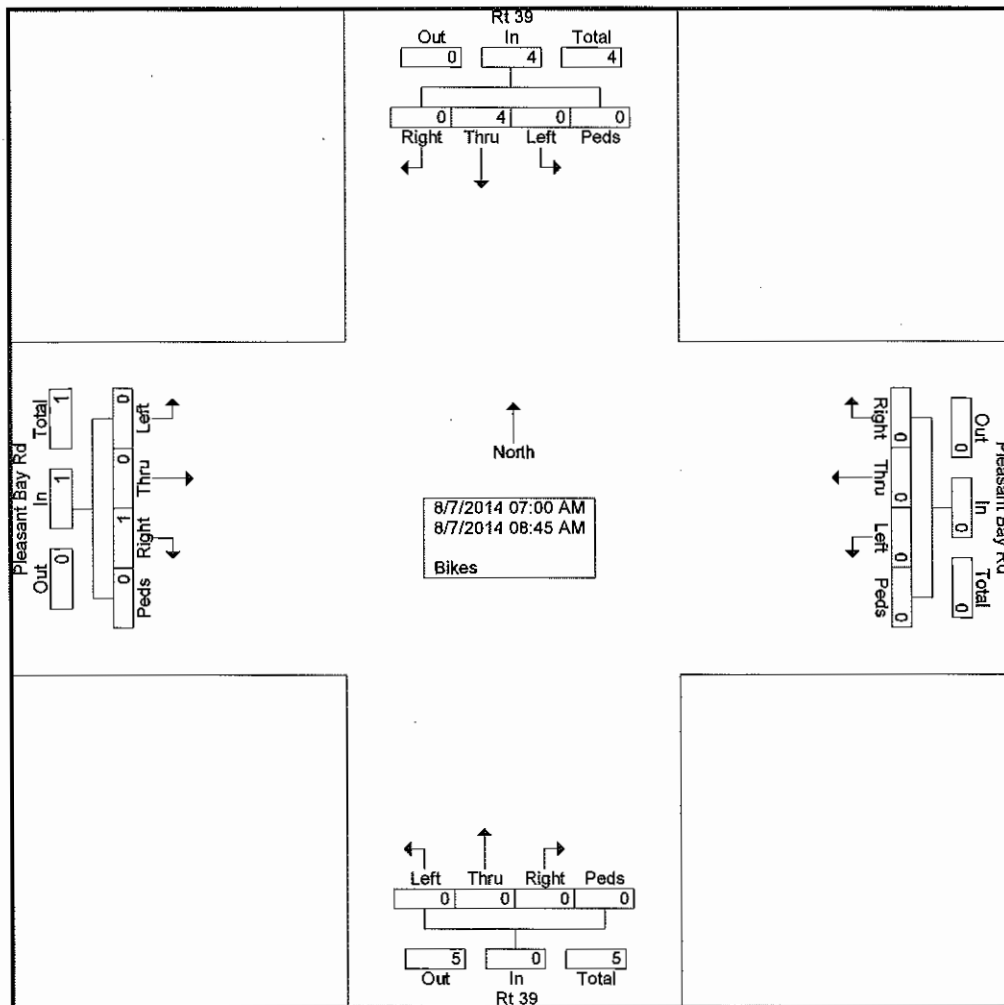
3225 Main Street  
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Rt 39 @ Pleasant Bay Rd  
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Counted by: SMT  
Counters: 6

File Name : 2512\_08072014  
Site Code : 00232323  
Start Date : 8/7/2014  
Page No : 1

### Groups Printed- Bikes

Start Time	Rt 39 From North					Pleasant Bay Rd From East					Rt 39 From South					Pleasant Bay Rd From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
*** BREAK ***																					
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
07:45 AM	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	4
*** BREAK ***																					
08:30 AM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
*** BREAK ***																					
Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Grand Total	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5
Apprch %	0	100	0	0		0	0	0	0		0	0	0	0		0	0	100	0		
Total %	0	80	0	0	80	0	0	0	0	0	0	0	0	0	0	0	0	20	0	20	



# Cape Cod Commission

3225 Main Street

Barnstable, Massachusetts 02630

[www.capecodcommission.org](http://www.capecodcommission.org)

Location: Rt 39 & Pleasant Bay Rd

Town: Harwich

Counted by: Jake Wright

Counters: 5

File Name : 2512\_08122014

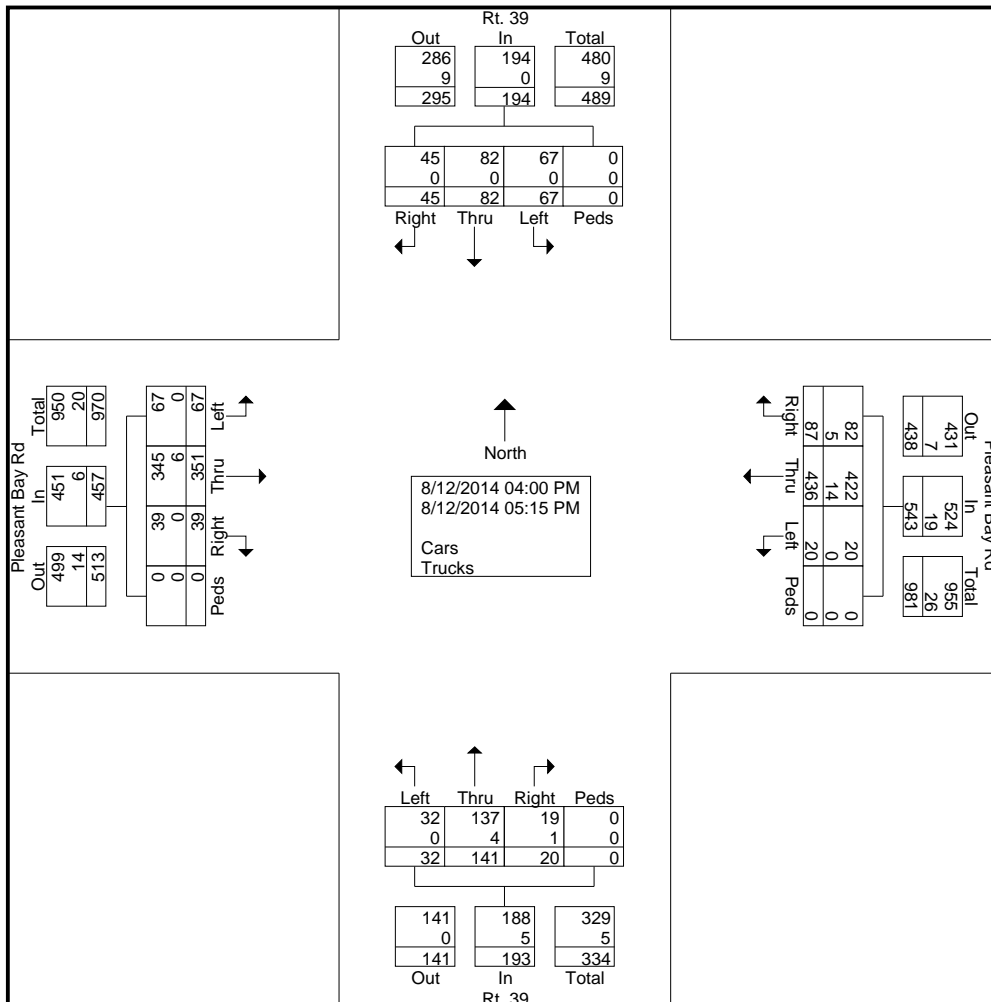
Site Code : 2512

Start Date : 8/12/2014

Page No : 1

## Groups Printed- Cars - Trucks

Start Time	Rt. 39 From North					Pleasant Bay Rd From East					Rt. 39 From South					Pleasant Bay Rd From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
04:00 PM	10	17	12	0	39	6	67	19	0	92	6	33	4	0	43	11	55	2	0	68	242
04:15 PM	10	12	2	0	24	1	75	19	0	95	2	26	1	0	29	14	55	7	0	76	224
04:30 PM	8	8	10	0	26	3	58	14	0	75	6	29	2	0	37	7	63	5	0	75	213
04:45 PM	6	10	4	0	20	3	78	9	0	90	2	15	4	0	21	8	61	5	0	74	205
Total	34	47	28	0	109	13	278	61	0	352	16	103	11	0	130	40	234	19	0	293	884
05:00 PM	17	15	12	0	44	4	91	15	0	110	7	17	5	0	29	17	62	9	0	88	271
05:15 PM	16	20	5	0	41	3	67	11	0	81	9	21	4	0	34	10	55	11	0	76	232
Grand Total	67	82	45	0	194	20	436	87	0	543	32	141	20	0	193	67	351	39	0	457	1387
Apprch %	34.5	42.3	23.2	0		3.7	80.3	16	0		16.6	73.1	10.4	0		14.7	76.8	8.5	0		
Total %	4.8	5.9	3.2	0	14	1.4	31.4	6.3	0	39.1	2.3	10.2	1.4	0	13.9	4.8	25.3	2.8	0	32.9	
Cars	67	82	45	0	194	20	422	82	0	524	32	137	19	0	188	67	345	39	0	451	1357
% Cars	100	100	100	0	100	100	96.8	94.3	0	96.5	100	97.2	95	0	97.4	100	98.3	100	0	98.7	97.8
Trucks	0	0	0	0	0	0	14	5	0	19	0	4	1	0	5	0	6	0	0	6	30
% Trucks	0	0	0	0	0	0	3.2	5.7	0	3.5	0	2.8	5	0	2.6	0	1.7	0	0	1.3	2.2



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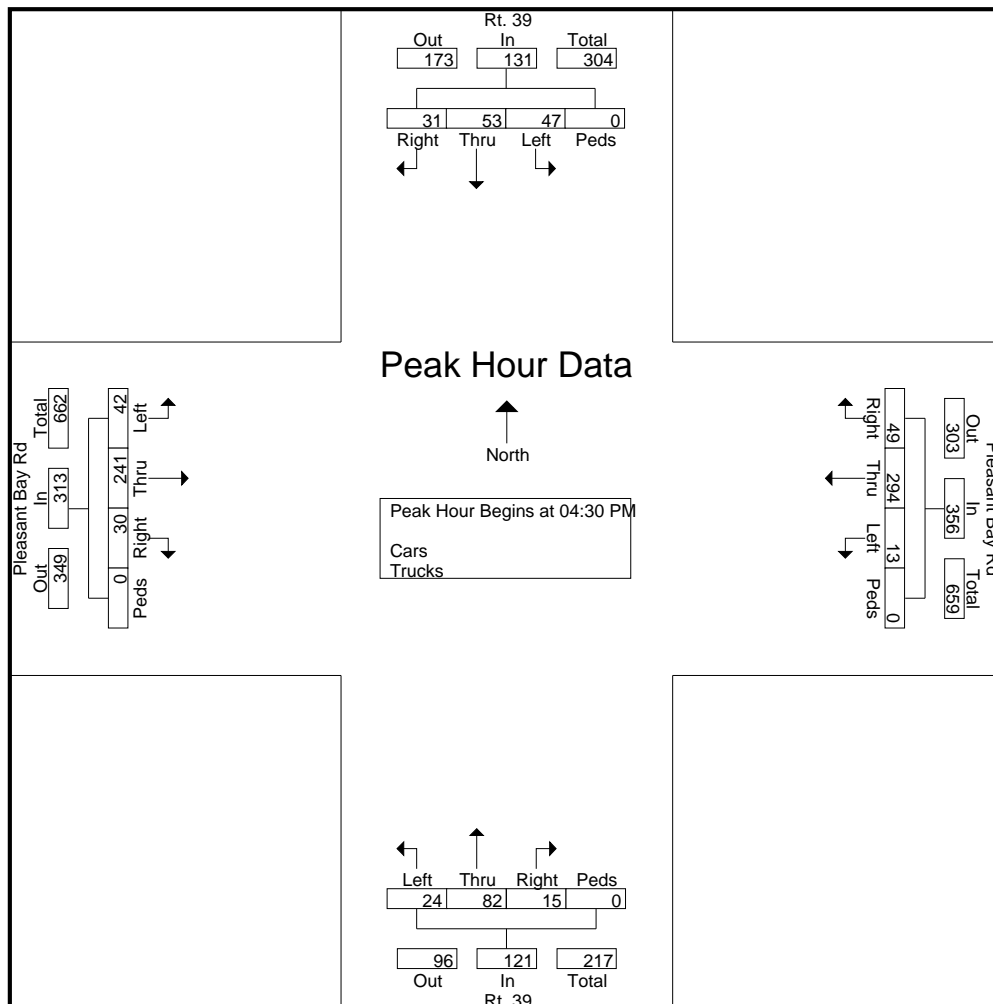
File Name : 2512\_08122014

Site Code : 2512

Start Date : 8/12/2014

Page No : 2

Start Time	Rt. 39 From North					Pleasant Bay Rd From East					Rt. 39 From South					Pleasant Bay Rd From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	8	8	10	0	26	3	58	14	0	75	6	29	2	0	37	7	63	5	0	75	213
04:45 PM	6	10	4	0	20	3	78	9	0	90	2	15	4	0	21	8	61	5	0	74	205
05:00 PM	17	15	12	0	44	4	91	15	0	110	7	17	5	0	29	17	62	9	0	88	271
05:15 PM	16	20	5	0	41	3	67	11	0	81	9	21	4	0	34	10	55	11	0	76	232
Total Volume	47	53	31	0	131	13	294	49	0	356	24	82	15	0	121	42	241	30	0	313	921
% App. Total	35.9	40.5	23.7	0		3.7	82.6	13.8	0		19.8	67.8	12.4	0		13.4	77	9.6	0		
PHF	.691	.663	.646	.000	.744	.813	.808	.817	.000	.809	.667	.707	.750	.000	.818	.618	.956	.682	.000	.889	.850



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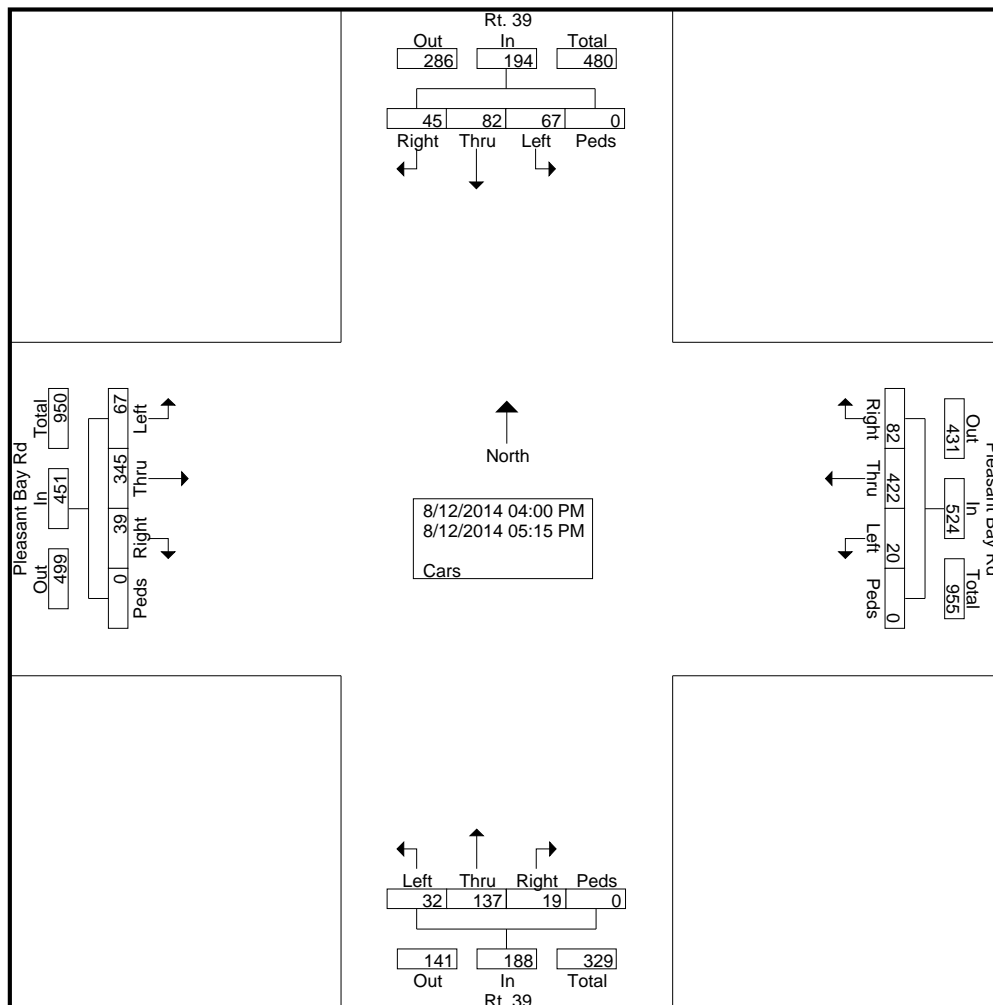
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Start Date : 8/12/2014

Page No : 1

### Groups Printed- Cars

Start Time	Rt. 39 From North					Pleasant Bay Rd From East					Rt. 39 From South					Pleasant Bay Rd From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
04:00 PM	10	17	12	0	39	6	64	17	0	87	6	31	4	0	41	11	55	2	0	68	235
04:15 PM	10	12	2	0	24	1	73	18	0	92	2	26	1	0	29	14	53	7	0	74	219
04:30 PM	8	8	10	0	26	3	54	14	0	71	6	29	2	0	37	7	60	5	0	72	206
04:45 PM	6	10	4	0	20	3	76	8	0	87	2	14	4	0	20	8	61	5	0	74	201
Total	34	47	28	0	109	13	267	57	0	337	16	100	11	0	127	40	229	19	0	288	861
05:00 PM	17	15	12	0	44	4	89	15	0	108	7	16	5	0	28	17	62	9	0	88	268
05:15 PM	16	20	5	0	41	3	66	10	0	79	9	21	3	0	33	10	54	11	0	75	228
Grand Total	67	82	45	0	194	20	422	82	0	524	32	137	19	0	188	67	345	39	0	451	1357
Apprch %	34.5	42.3	23.2	0		3.8	80.5	15.6	0		17	72.9	10.1	0		14.9	76.5	8.6	0		
Total %	4.9	6	3.3	0	14.3	1.5	31.1	6	0	38.6	2.4	10.1	1.4	0	13.9	4.9	25.4	2.9	0	33.2	



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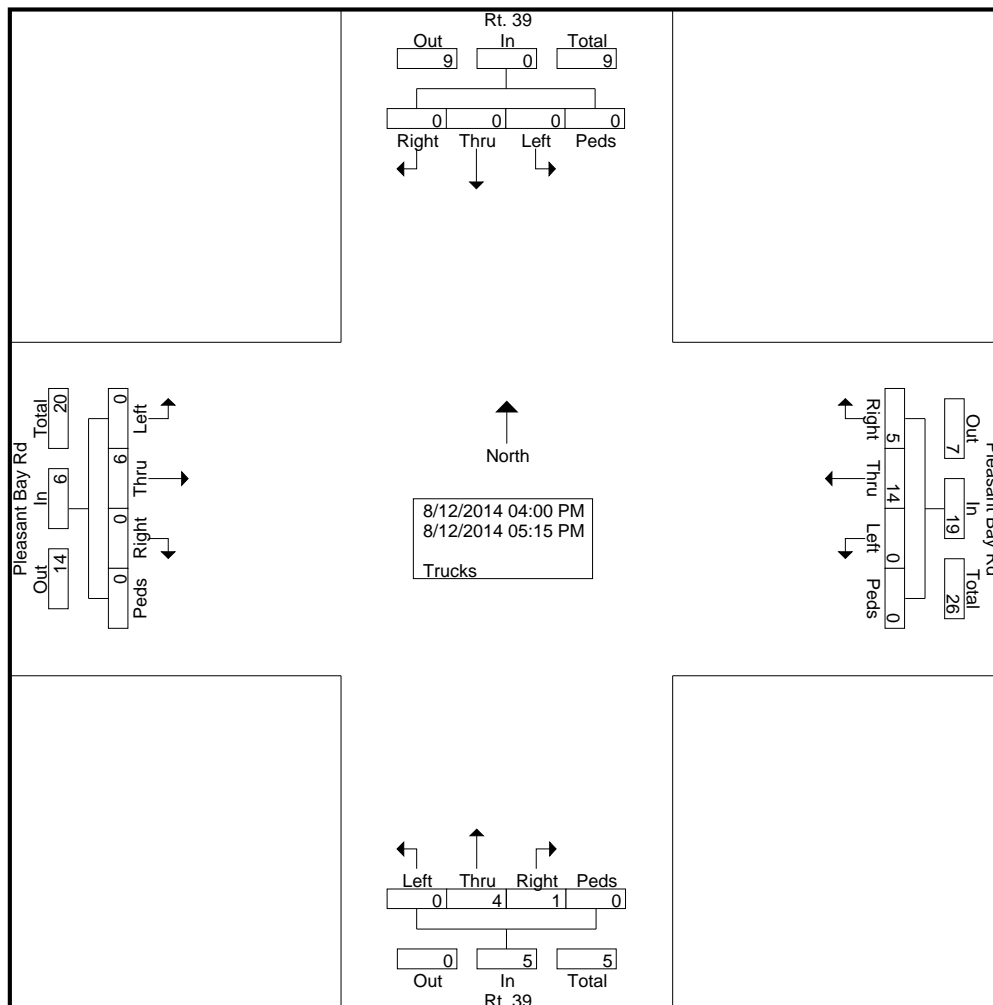
Site Code : 2512

Start Date : 8/12/2014

Page No : 1

### Groups Printed- Trucks

Start Time	Rt. 39 From North					Pleasant Bay Rd From East					Rt. 39 From South					Pleasant Bay Rd From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
04:00 PM	0	0	0	0	0	0	3	2	0	5	0	2	0	0	2	0	0	0	0	0	7
04:15 PM	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	0	2	0	0	0	5
04:30 PM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	3	0	0	0	7
04:45 PM	0	0	0	0	0	0	2	1	0	3	0	1	0	0	1	0	0	0	0	0	4
Total	0	0	0	0	0	0	11	4	0	15	0	3	0	0	3	0	5	0	0	0	23
05:00 PM	0	0	0	0	0	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	3
05:15 PM	0	0	0	0	0	0	1	1	0	2	0	0	1	0	1	0	1	0	0	0	4
Grand Total	0	0	0	0	0	0	14	5	0	19	0	4	1	0	5	0	6	0	0	0	30
Apprch %	0	0	0	0	0	0	73.7	26.3	0		0	80	20	0		0	100	0	0	0	
Total %	0	0	0	0	0	0	46.7	16.7	0	63.3	0	13.3	3.3	0	16.7	0	20	0	0	20	



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 Page No : 1

Groups Printed- Bikes

Start Time	Rt. 39 From North					Pleasant Bay Rd From East					Rt. 39 From South					Pleasant Bay Rd From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
*** BREAK ***																					
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
Total %																					





CAPE COD  
COMMISSION

## Appendix E

# Harwich Board of Selectmen Traffic Rule – Speed Reduction Markings

VOTED:

That the Traffic Rules and Orders adopted by the Board of Selectmen July 1, 1940, and subsequent amendments thereto, be and hereby amended in accordance with the provisions of Chapter 85, Section 2 of the General Laws by adding to Article III, Section 3-5, Schedule R3-5, ADVISORY SIGNS the following streets designated for SPEED REDUCTION MARKINGS as authorized by Section 3B.22, Speed Reduction Markings of the Manual on Uniform Traffic Control Devices at the location and in the direction indicated:

Northbound on the Route 39 curve approaching Pleasant Bay Road, and  
Southbound on the Route 39 curve approaching Pleasant Bay Road.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

HARWICH BOARD OF SELECTMEN

Effective Date of passage \_\_\_\_\_

Printed in the Cape Cod Chronicle on \_\_\_\_\_

\_\_\_\_\_  
initial

Attest

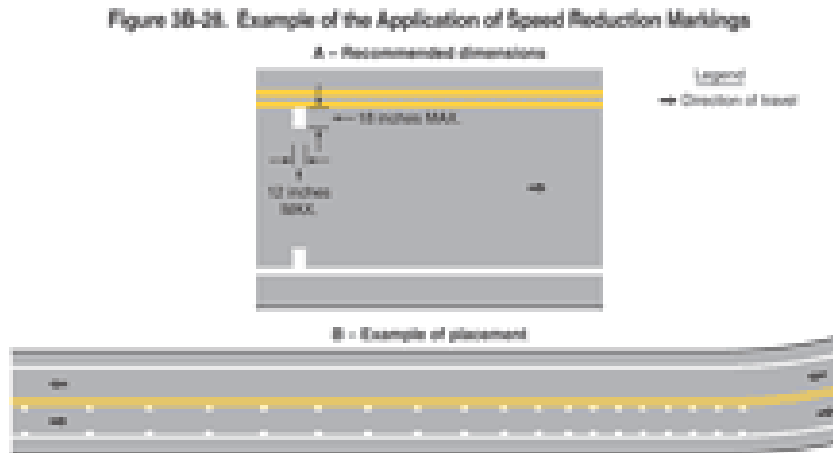
\_\_\_\_\_  
Town Clerk

## Section 3B.22 Speed Reduction Markings

Support:

01 Speed reduction markings (see [Figure 3B-28](#)) are transverse markings that are placed on the roadway within a lane (along both edges of the lane) in a pattern of progressively reduced spacing to give drivers the impression that their speed is increasing. These markings might be placed in advance of an unexpectedly severe horizontal or vertical curve or other roadway feature where drivers need to decelerate prior to reaching the feature and where the desired reduction in speeds has not been achieved by the installation of warning signs and/or other traffic control devices.

Figure 3B-28 Example of the Application of Speed Reduction Markings



Guidance:

02 If used, speed reduction markings should be reserved for unexpected curves and should not be used on long tangent sections of roadway or in areas frequented mainly by local or familiar drivers, (e.g., school zones). If used, speed reduction markings should supplement the appropriate warning signs and other traffic control devices and should not substitute for these devices.

Standard:

03 If used, speed reduction markings shall be a series of white transverse lines on both sides of the lane that are perpendicular to the center line, edge line, or lane line. The longitudinal spacing between the markings shall be progressively reduced from the upstream to the downstream end of the marked portion of the lane.

Guidance:

04 Speed reduction markings should not be greater than 12 inches in width, and should not extend more than 18 inches into the lane.

Standard:

05 Speed reduction markings shall not be used in lanes that do not have a longitudinal line (center line, edge line, or lane line) on both sides of the lane.

## CAPE COD COMMISSION

3225 MAIN STREET • P.O. BOX 226 • BARNSTABLE, MASSACHUSETTS 02630  
(508) 362-3828 • Fax (508) 362-3136 • [www.capecodcommission.org](http://www.capecodcommission.org)

