

# BRANFORD ROAD SAFETY AUDIT

ROUTE 146: BRANFORD RIVER TO LIMWOOD AVENUE



MAY 2022

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# 1 COMMUNITY CONNECTIVITY PROGRAM



## 1.1 Program Background

The Connecticut Department of Transportation (CTDOT) has created a Community Connectivity Program that focuses on improving the state's transportation network for all users. A major component of this program is conducting Road Safety Audits (RSAs) at selected locations. An RSA is a formal safety assessment of the existing roadway. It is a qualitative review by an independent team experienced in traffic, pedestrian, and bicycle operations and design that considers the safety of all road users and proactively assesses mitigation measures to improve the safe operation of the facility by reducing the potential crash risk frequency and/or severity.

The RSA team includes CTDOT staff, municipal officials and staff, municipal police, local stakeholders, FHI Studio staff, and community leaders. The RSA team is established for each municipality based on the requirements of the individual location. They assess and review factors that can promote or obstruct safe walking and bicycling routes. These factors include traffic volumes and speeds, topography, roadway geometrics, crash data, roadway inventory (i.e. signage, curbs, bicycle/pedestrian facilities, amenities, safety components), and sidewalks.

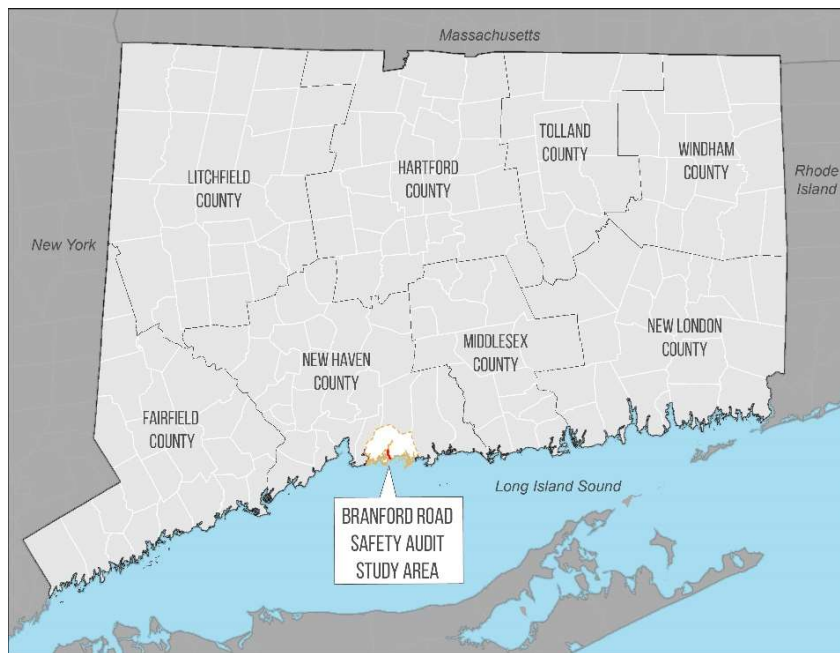
Each RSA is conducted using RSA protocols published by the FHWA. For details on this program, please refer to the CT Connectivity RSA site on the CTDOT webpage.

Prior to the site visit, area topography, land use characteristics, intersection sight distance concerns, sidewalk locations, parking, and bicycle facilities are examined using available mapping and imagery. The site visit includes a "Pre-Audit" meeting, the "Field Audit" itself, and a "Post-Audit" meeting to discuss the field observations and formulate recommendations. This procedure and the summary results are discussed in the following sections.

## 1.2 Branford RSA Study Area and Location

CTDOT sponsored an RSA for the Town of Branford in the Route 146 (South Montowese Street and Sybil Avenue) area. The study area encompasses Route 146 between the Branford River and Limewood Avenue. Exhibit 1 shows the study area in context to the State of Connecticut, while Exhibit 2 shows the study area in further detail.

*Exhibit 1: Branford RSA Regional Location*



The purpose of the RSA is to observe any safety concerns while discussing possible safety improvements for pedestrians and bicyclists travelling along the study area corridor. The study area serves many purposes including local residential access, restaurant and commercial business access, marina access, truck access to the sewage treatment plant, and pedestrian and bicyclist movement throughout the beach community. The Shoreline Greenway Trail also runs through the northern end of the study area at Tabor Drive. See Exhibit 3 for points of interest located along the corridor.

Route 146 is a collector roadway that provides an east to west connection along the southern portions of Branford and Guilford. The study area has limited sidewalks and crosswalks and there are gaps in the pedestrian network. It lacks bicycle facilities.

Average Daily Traffic (ADT) in the study area ranges between 3,100 vehicles per day at the southern end of the study area (Sybil Avenue, south of Linden Avenue) to about 7,200 - 9,400 vehicles per day in the middle of the study area in the commercial core depending on the season. As a seasonal destination, the study area experiences higher traffic volumes during summer months than it does in off-season, with traffic volumes being the highest in the late mid-week and Saturday during summer months. Exhibit 4 displays daily traffic in the study area. The study area is intersected by seven roadway intersection that are controlled by stop signs. All intersections are signed as two-way stop control where Route 146 does not stop, except the intersection with Indian Neck Road, which is all-way stop controlled. There are no signalized intersections in the study area. Route 146 is designated as a scenic roadway.

Exhibit 2: Branford RSA Study Area

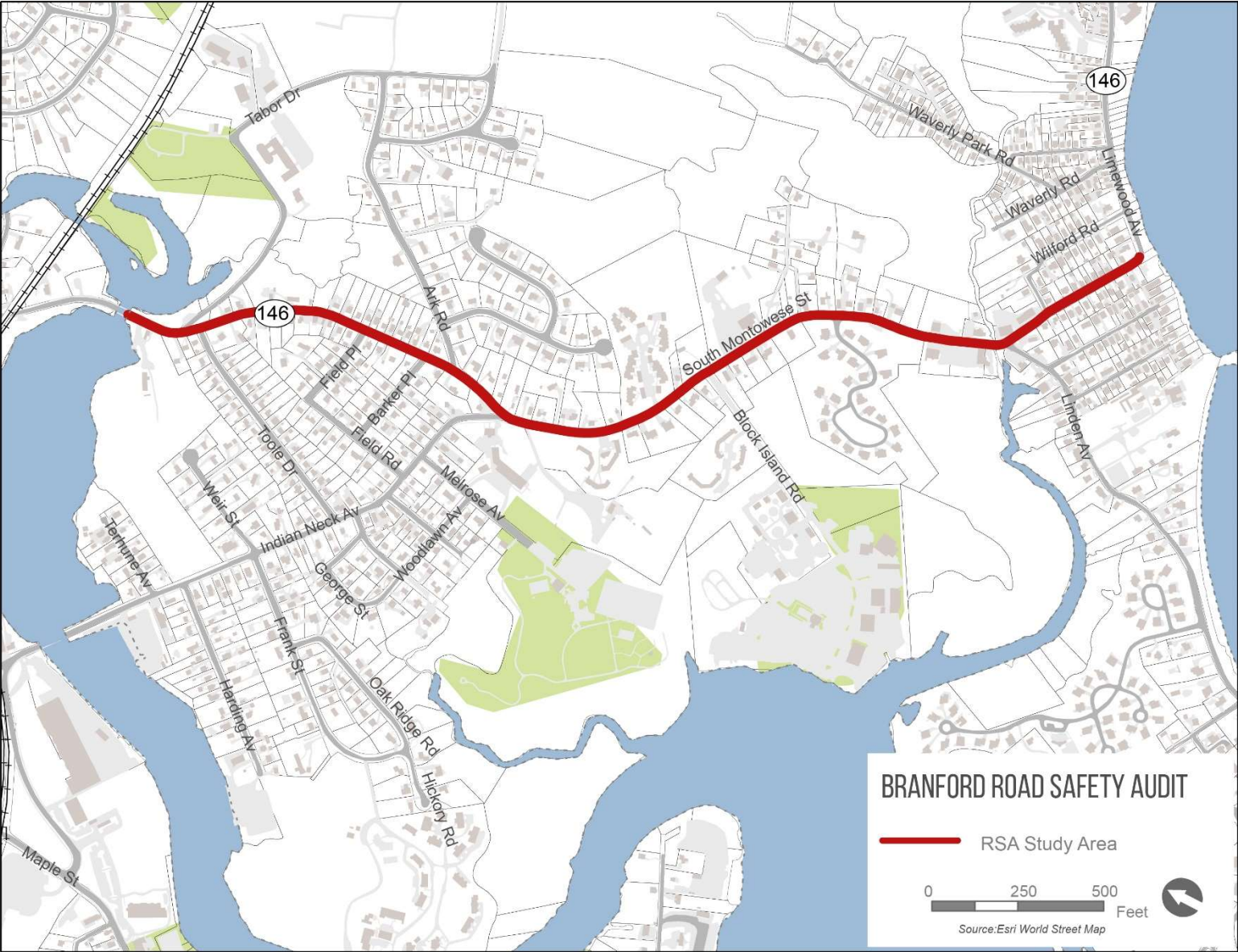


Exhibit 3: Study Area Points of Interest

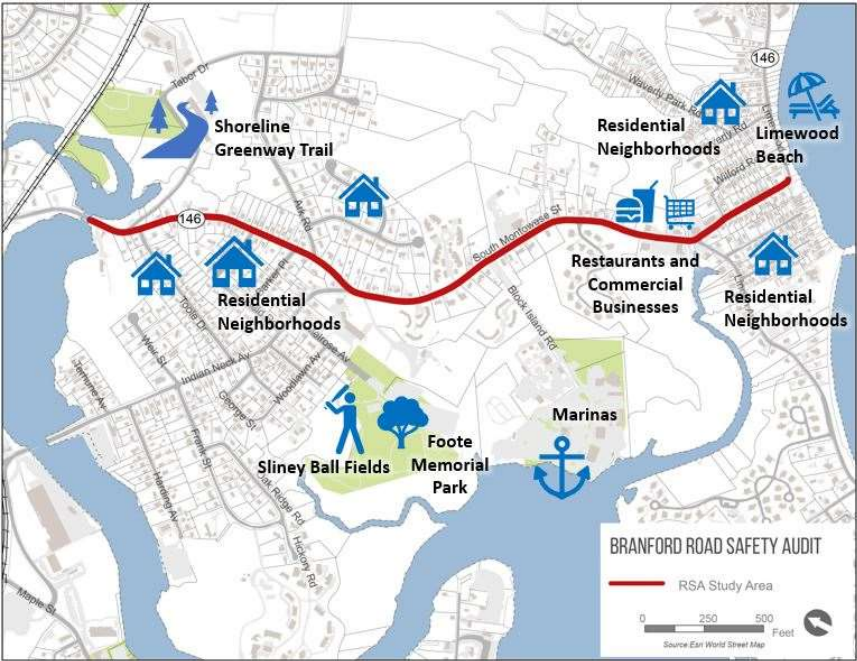
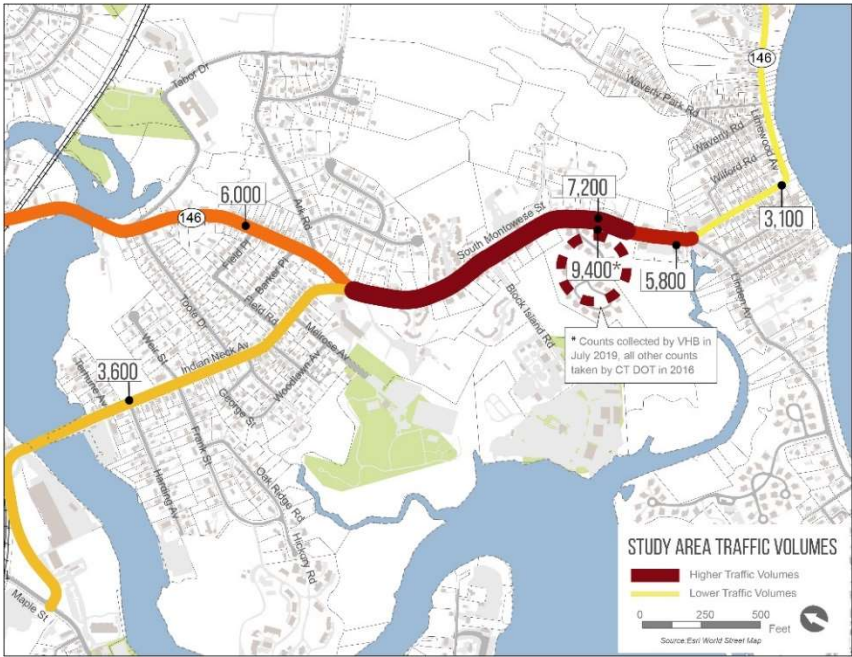


Exhibit 4: Average Daily Traffic Volumes



## 2 PRIOR EFFORTS IN STUDY AREA

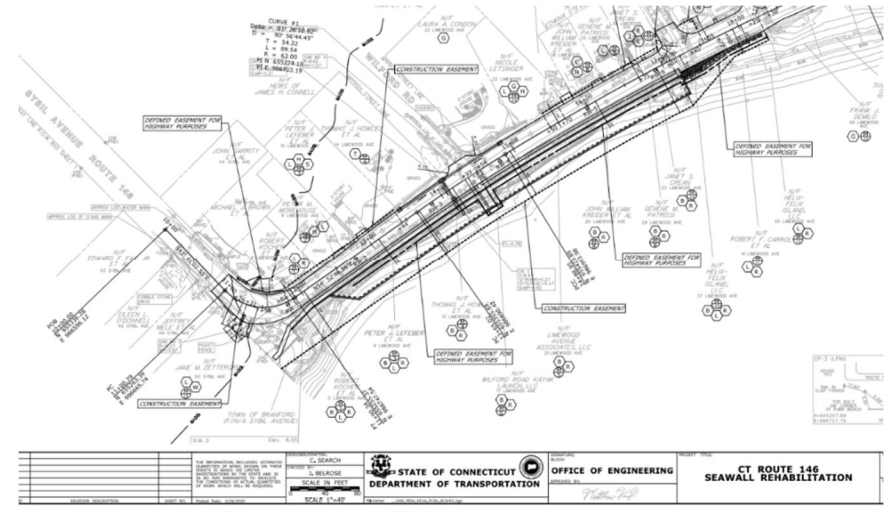
### 2.1 Route 146 Existing Conditions Technical Memorandum

The Route 146 Existing Conditions Technical Memorandum, completed in July of 2021 examined existing roadway conditions along Route 146 between Route 1 (North Main Street) at Route 146 (West Main Street) in Branford and the intersection of Route 146 at Route 1 (Boston Post Road) in Guilford. This study included traffic volumes in some locations in the study area for this RSA. A future study is planned that will build upon findings from this report.

### 2.2 Sidewalk along Long Island Sound on Limewood Avenue (Route 146)

Rehabilitation of the existing seawall is underway along Limewood Avenue between Sybil Avenue and Waverly Road. A component of this project is the construction of an eight-foot flush sidewalk and expanded shoulder. The flush sidewalk will allow for drainage during extreme weather events and will provide a pedestrian route along this heavily traveled section of the roadway. Construction is anticipated to be completed in June 2022. Exhibit 5 shows the construction plans for the sidewalk in this section.

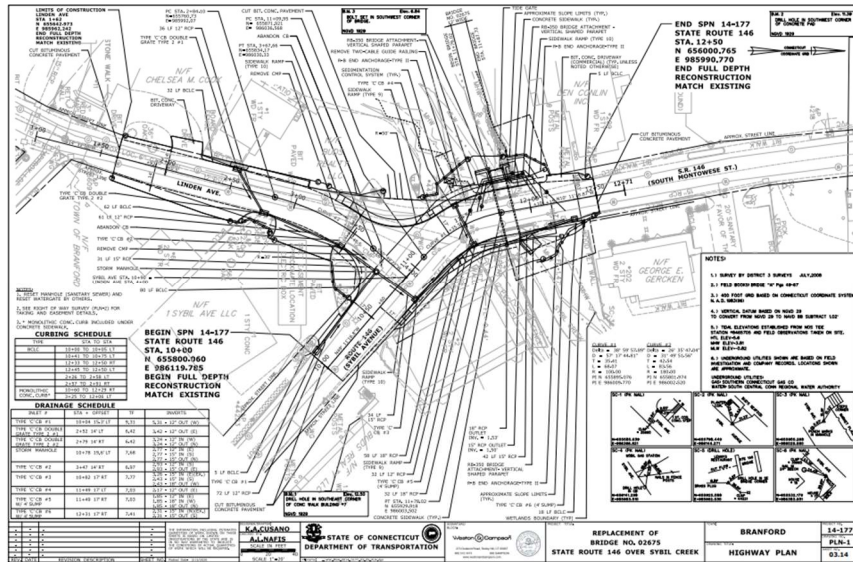
Exhibit 5: Sidewalk Plans on Limewood Avenue



### 2.3 Bridge on Route 146 north of Linden Avenue

Construction is underway to replace the existing bridge on Route 146 that crosses Sybil Creek, north of Linden Avenue. This project will include sidewalks on both sides of the bridge and will include a crosswalk at the southern end of the project limits, crossing Route 146. The project will also include the realignment of Linden Avenue to T-up Linden Avenue as much as possible. Exhibit 6 shows the construction plans for the replacement of this bridge with the inclusion of sidewalks and a crosswalk north of Linden Avenue.

Exhibit 6: Sidewalk Plans on Limewood Avenue



### 2.4 Branford Housing Authority Project

The Branford Housing Authority will be constructing new units at its existing location at 115 South Montowese Street. The construction will allow the units to comply with ADA standards. Entry and existing driveways and sidewalk modifications are expected as part of this project.

### 2.5 Shoreline Greenway Trail

The Shoreline Greenway Trail is a project to build a multi-use trail for pedestrians and bicyclists and to connect communities in a 25-mile corridor from New Haven to Madison. The trail is in on-going development, with a section of the trail between Tabor Drive and Pine Orchard Road opening in 2018. There is a desire to expand the trail further west from the existing terminus at Tabor Drive to Indian Neck

Avenue potentially along the Branford River on the northern bank. Exhibit 7 shows a map of the Shoreline Greenway Trail in Branford to the east of Tabor Drive.

Exhibit 7: Shoreline Greenway Trail between Tabor Drive (left) and Stony Creek (right).



### 2.6 CT Active Transportation Plan

Route 146 north of Tabor Drive is included in the statewide bike planning network. This section of the network provides a connection between the existing terminus of the Shoreline Greenway Trail at Tabor Drive and Branford Center to the north and East Haven to the west.



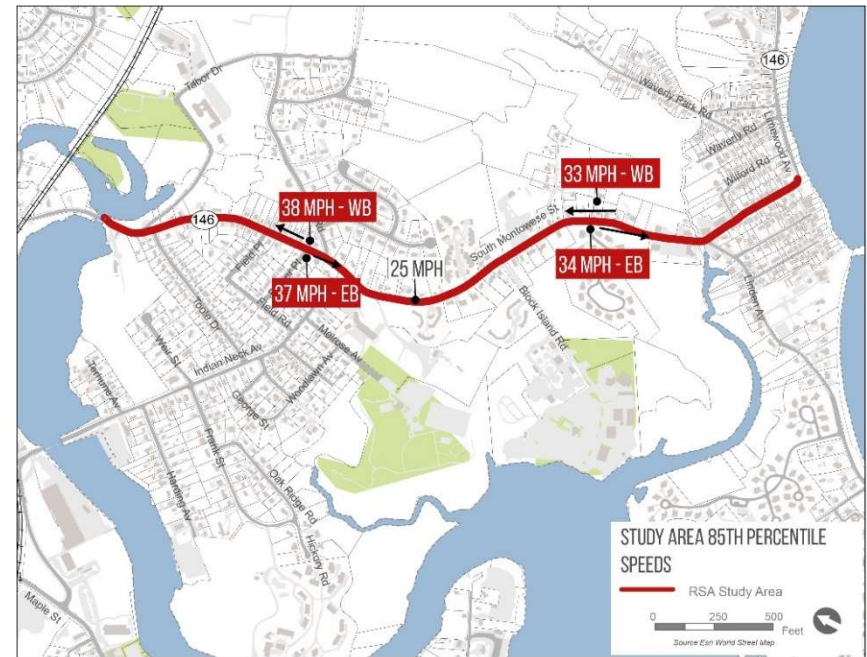
### 3 PRE-AUDIT MEETING

#### 3.1 Pre-Audit Information

The RSA team conducted a pre-audit meeting in the afternoon of Thursday, March 24, 2022. The RSA team presented a brief presentation that included an overview of the Branford RSA goals and purpose, the study area, and key existing conditions findings. Key themes discussed during the pre-audit meeting are presented below.

**Speeds:** Speed limits in the study area are 25 miles per hour (mph) throughout the entire length of the corridor. Exhibit 8 displays speed limits in the study area as well as 85<sup>th</sup> percentile speeds. 85<sup>th</sup> percentile speeds is the measured speed at which 85% of motorist travel below. 85<sup>th</sup> percentile speeds for the study area range between 33 mph to 38 mph, with higher speeds observed in the northern part of the corridor.

Exhibit 8: Study Area 85th Percentile Speeds

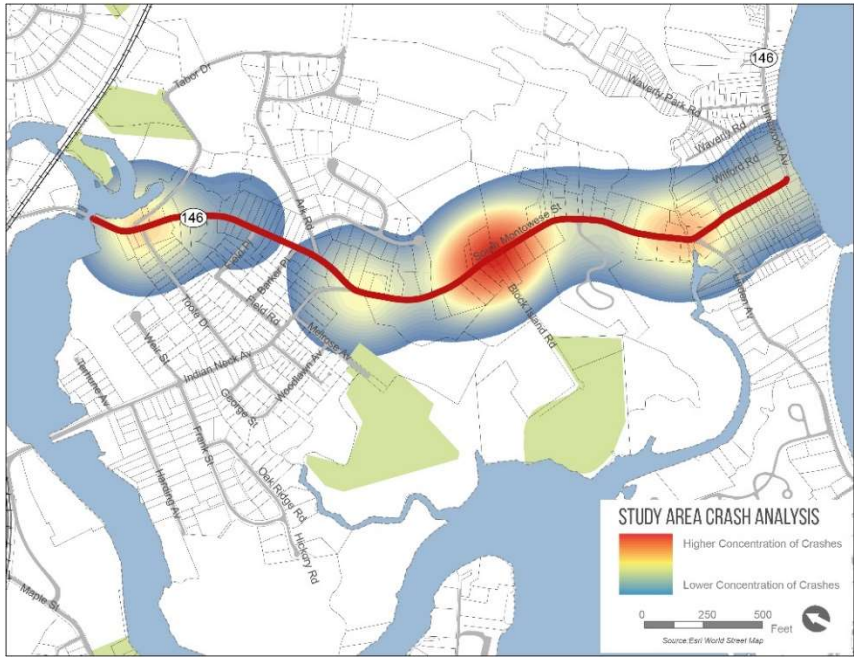


**Crashes:** Based on data retrieved from the Connecticut Crash Data Repository (CTCDR) for the five-year period between January 2016 through December 2020, there were a total of 41 crashes in the Branford RSA study area. Crashes were concentrated in the vicinities of Block Island Road, Linden Avenue and the commercial area, Toole and Tabor Drives, and Indian Neck Avenue. Exhibit 9 displays the study area crash summary and Exhibit 10 displays a study area crash heatmap.

*Exhibit 9: Study Area Crash Summary*

Year	Fatal Injury	Suspected Minor Injury	Possible Injury	Property Damage Only	TOTAL
2016				8	8
2017	1	3		6	10
2018			2	5	7
2019			2	6	8
2020		3		5	8
<b>TOTAL</b>	<b>1</b>	<b>6</b>	<b>4</b>	<b>30</b>	<b>41</b>

*Exhibit 10: Study Area Crash Heatmap*



**Crashes by Type:** The majority of crashes involve a single vehicle or are front to rear crashes. Single vehicle crashes are indicative of crashes where motorists veered off the road, ran into a guardrail, etc. These are often seen on roadways like Route 146 where the right-of-way (ROW) varies and the road curves at various places. The “rear-end” crashes are common in areas of stopped traffic such as an approach to an intersection, commercial area, or in areas with many driveways. Other types of crashes including angle crashes and sideswipe crashes are common in areas with ingress and egress movements such as business areas. Exhibit 11 and Exhibit 12 display the location and breakdown of crashes by type in the corridor.

Exhibit 11: Crashes by Type

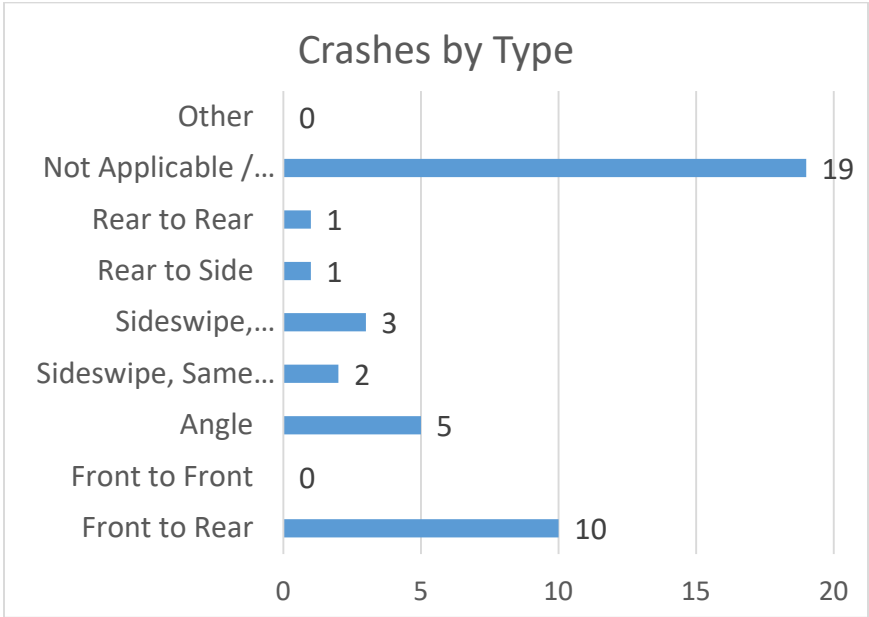
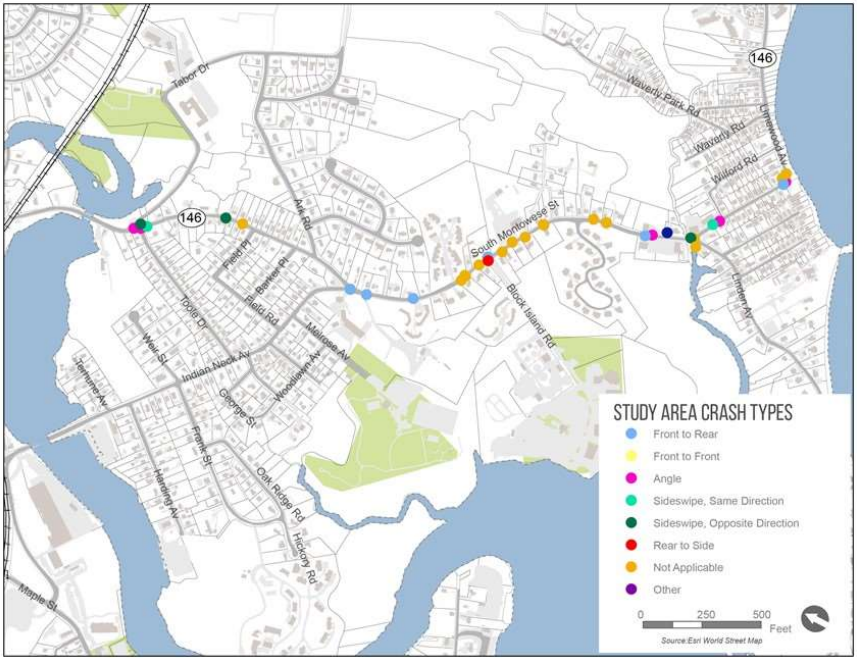


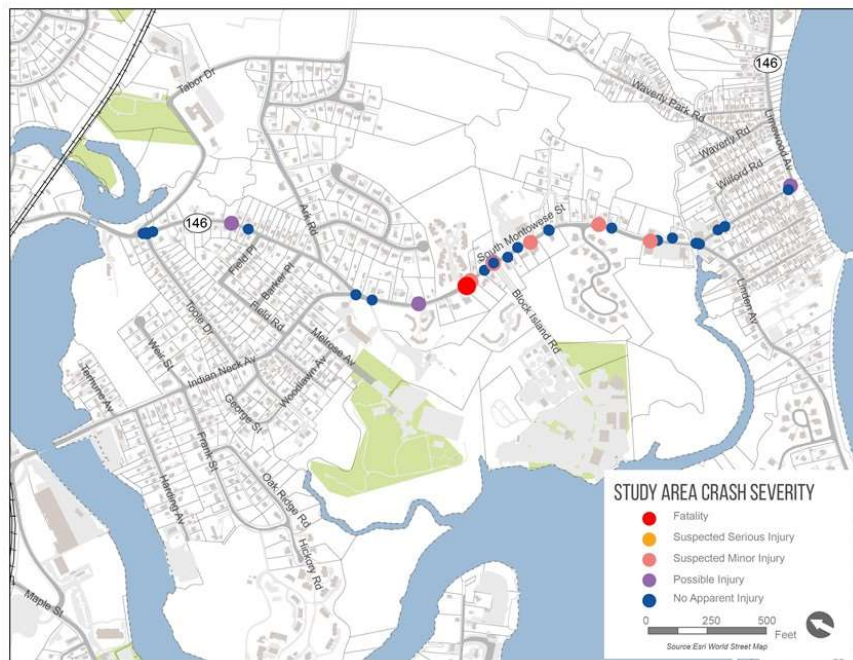
Exhibit 12: Crashes by Type



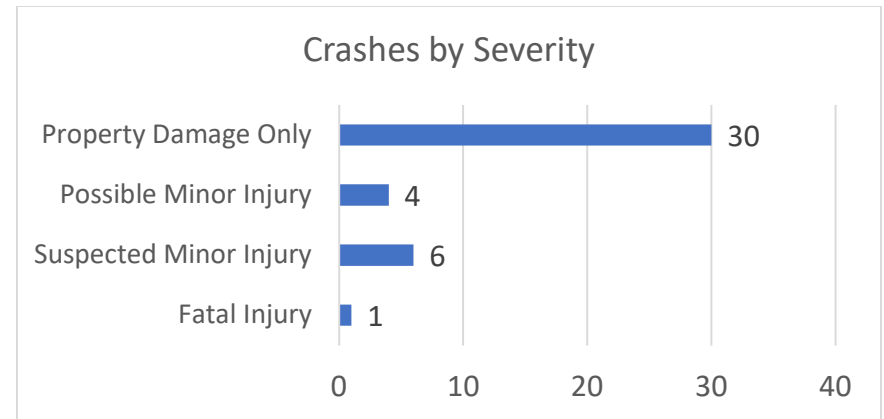
**Crash Severity:** There was one fatal crash (vehicular) and 10 crashes resulting in injury in the study area. The fatality occurred in 2017, north of Block Island Road. Many crashes (30) are classified as property damage only. This is typical for single vehicle and front-to-rear type crashes that are prevalent in the study area. Exhibit 13 and Exhibit 14 show crash severity by location and a summary of total crashes by severity.

**Crashes by Involved Person:** There was one crash involving a bicyclist in the study area, which occurred at the intersection of Route 146 and Indian Neck Avenue. There was one crash involving a pedestrian north of Block Island Road. Exhibit 15 shows locations of these two crashes.

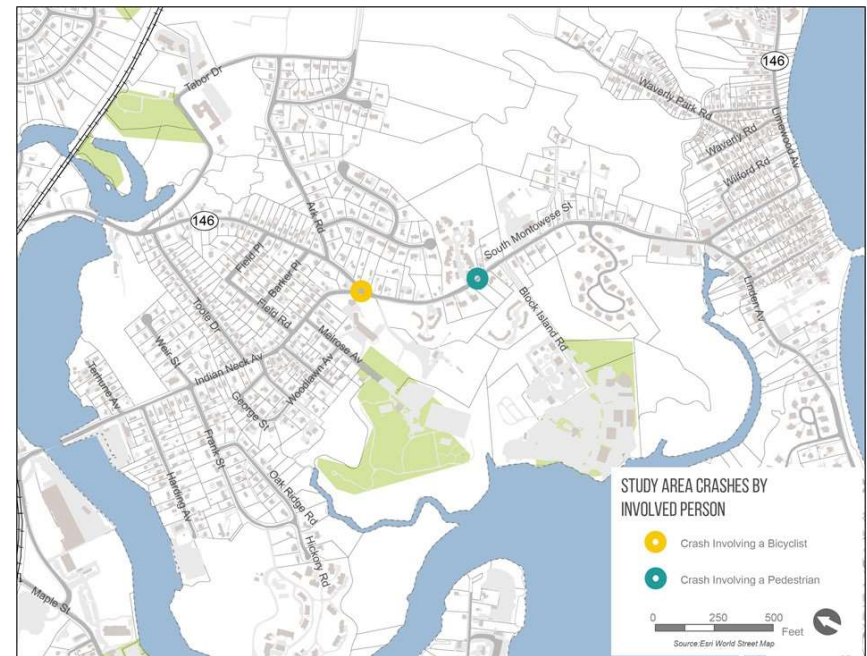
*Exhibit 13: Crash Severity by Location*



*Exhibit 14: Crash Severity Summary*



*Exhibit 15: Crashes by Involved Person*



**3.2 Pre-Audit Discussion**

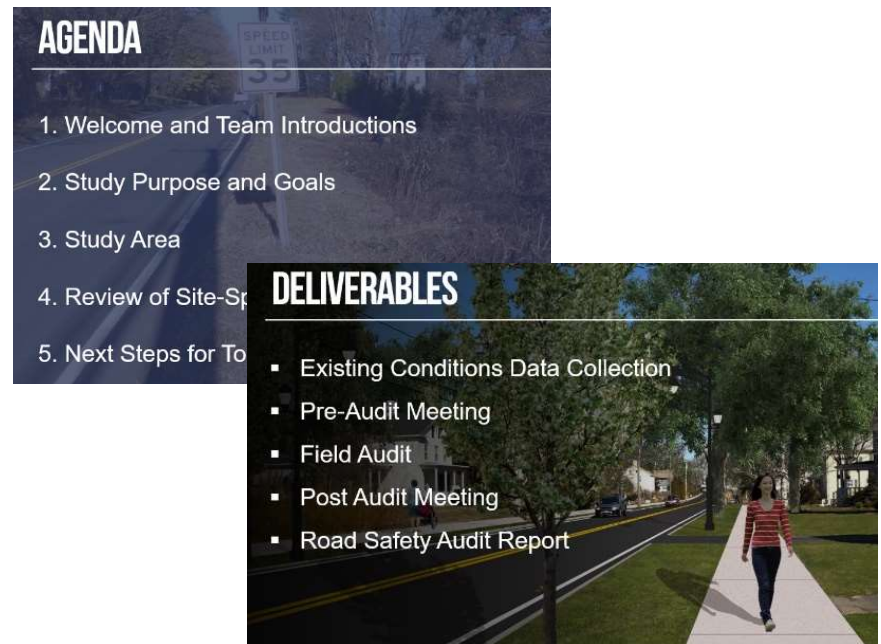
Immediately following the pre-audit presentation, a discussion followed that highlighted concerns and notes regarding the Branford RSA study area. Highlights from this discussion are presented below:

- There is a lot of commercial activity by the marina on Block Island Road and southward towards the restaurants and business area. This activity and southward poses safety concerns especially with late night bar traffic, etc.
- The Branford housing authority will be renovating their property and realigning sidewalks and driveways to the housing.
- South Montowese Street has been a scenic road since the 1990's, although members of the scenic road committee recognize that safety is an issue, members feel that a balance is needed. Members feel that recommendations should be focused on reducing speeds.
- There is a need to make the area more attractive and safer for pedestrians and bicyclists to enjoy.
- In the summer, traffic volumes increase due to tourism.
- The firehouse sidewalk does not connect to the one planned to be constructed as part of the new bridge on Route 146.
- Sightlines at some driveways and intersections can be difficult in summertime due to vegetation growth.
- Sightlines turning left onto Linden from Sybil Avenue (Route 146 northbound) is difficult due to poor sightlines around the horizontal curve to the north and fast speeds of southbound traffic.
- Sybil Creek bridge project is currently in construction; it will have sidewalks on both sides.

- There is a sidewalk project ongoing on the southside of Limewood Avenue, along the Long Island Sound. The sidewalk will be constructed at grade level, separated by a landscaped buffer.
- The sidewalk projects at Limewood Avenue and on Sybil Creek are opportunities to include connections to in the future.

Sample slides from the pre-audit presentation are shown in Exhibit 16.

*Exhibit 16: Sample slides from Pre-Audit Presentation*



## 4 RSA ASSESSMENT

The following summary describes observations and discussion regarding issues and concerns throughout the Branford RSA study area. Exhibit 17 shows RSA participants engaging in conversation during the RSA. Discussions were held at each of the noted locations below.

*Exhibit 17: RSA participants during the RSA Assessment date*



### 4.1 Intersection of Route 146 (Sybil Avenue) and Limewood Avenue

- The sidewalk construction on Limewood Avenue is expected to cause an increase in pedestrian traffic. A town parcel at the end of Route 146 is being improved and expected to be a draw. See Exhibit 18.

- The curve at Route 146 and Limewood is not perceived to be an issue. DOT staff expressed concern for the burying of utility lines which may eliminate some of the visual cues of this curve.
- Crosswalks near this area should be avoided due to poor visibility around the curve at this location.

*Exhibit 18: Sidewalk construction underway on Limewood Avenue*



### 4.2 Route 146 (Sybil Avenue) Between Limewood Avenue and Linden Avenue

- Shoulders are narrow on Sybil Avenue. Pedestrians often use Wilford Road to get to Limewood Avenue to avoid traffic on Sybil Avenue.
- While GIS shows that the right-of-way (ROW) is approximately 40-ft, there is apparent encroachment on ROW from adjacent properties, especially from properties on northeast side.

- Utility poles are located on the west side of the roadway and would likely have to be removed if sidewalk were to be installed on that side. However, participants felt that a sidewalk on the west side would be preferable as it would connect with a sidewalk currently being constructed at Limewood Avenue, without the need for a crossing near the curve. See Exhibit 19.

*Exhibit 19: Utility poles on Sybil Avenue*



#### 4.3 Intersection of Route 146 (South Montowese Street) and Linden Avenue

- Bridge reconstruction work north of Linden Avenue will include a crosswalk north of Linden Avenue. CTDOT should look at possibly extending the sidewalk in this area to connect to the firehouse

sidewalk and make the crosswalk more visible. A possible change order may be warranted. See Exhibit 20 for a view of this sidewalk.

- A mini-roundabout was discussed at Linden Avenue intersection. It could include gateway signage and plantings as appropriate.
- The property to the south of the intersection of Route 146 at Linden has many undefined curb cuts.
- An all-way stop at Linden was reviewed using 2019 summer volumes, but found at that time to not be warranted.
- Participants noted the potential for bicycle lane, which may help narrow roadway.

*Exhibit 20: No connection to sidewalk at firehouse*



**4.4 Route 146 (South Montowese Street) between Linden Avenue and Block Island Road**

- The commercial area north of Linden Avenue is very busy on the weekends. Lenny's Restaurant is always busy and parking is a concern for the business owners. Curb cuts are very wide and there is no real delineation between the road and the parking lot. See Exhibit 21.
- Pedestrians often cross RT 146 in this area to go between the businesses. There is not a designated crosswalk.
- In the summer, there are many bicyclists, particularly north of the commercial area. Participants said there are typically more bicyclists than pedestrians. The curve just north of Sybil Creek Place is tight, the shoulder is very narrow. This causes conflicts between bicyclists, pedestrians, and cars traveling at high speeds.
- Eversource installed additional cobra head lighting in the commercial area, but the area is lacking pedestrian scale lighting.
- Plantings and vegetation growth in the summer cause sight line issues at many of the driveways in the commercial area, particularly at 202 South Montowese Street.
- Decorative crosswalks could be used in the commercial area. Note that striping should also be used for increased nighttime visibility.
- Many of the crashes are single vehicle crashes, where cars ran off the roadway. Wider edge lines up to 6" could be considered to improve visibility at night. Town and Scenic Roads Committee both request minimal signage due to the scenic road designation.
- The visibility of southbound traffic entering the commercial area is a concern. Traffic enters this area at high speed without the ability to see pedestrians in roadway. Some participants inquired about additional signage entering this area or a gateway treatment.

- Shoulder width consistency is not present in this area.
- Additional countermeasures for single-vehicle crashes in this area should be explored and open to consideration by DOT.

*Exhibit 21: Route 146 north of Linden Avenue. View looking north.*



**4.5 Intersection of Route 146 (South Montowese Street) and Block Island Road**

- Many trucks turn left out of Block Island Road, sight line issues make this intersection challenging. Elevation and grade change also contribute to poor sightlines, especially to the north. The road is narrow in this location. See Exhibit 22 for a photo from Block Island Road looking north.
- A utility pole on the southwest corner of the intersection can be an obstacle for turning traffic.



- In general, there is a lot of truck traffic on Block Island Road. The tight geometry of the intersection can pose difficulties for truck traffic navigating this intersection.

*Exhibit 22: View of Route 146 looking north from Block Island Road. Note the vertical grade and reverse curve obstructing sight lines to the north.*



#### 4.6 Route 146 (South Montowese Street) between Block Island Road and Indian Neck Avenue

- Foote Memorial Park, located on Melrose Avenue off Indian Neck Avenue attracts many kids. Kids often bike to the park.

- There is a narrow shoulder and limited sidewalks in this area. Exhibit 23 displays gaps in the sidewalk network at this location. Any existing sidewalk is on the west side of Route 146.

*Exhibit 23: Small section of existing sidewalk at 123 South Montowese Street.*



#### 4.7 Intersection of Route 146 (South Montowese Street) and Indian Neck Avenue

- The Housing Authority is renovating its buildings. Construction will include new driveways and realigned sidewalks.
- The three-way stop at Indian Neck Avenue and South Montowese Street functions well. Sidewalks go up Indian Neck Avenue and connect north to the train station.
- The entrance drive to Sliney Field will be widened.
- The sidewalk on Indian Neck Avenue is continuous all the way to the Branford Train Station.

- Discussing crossings, due to the geometry of the road, a crosswalk on the northbound approach seemed the most feasible. See Exhibit 24 for a photo of the intersection. The northbound approach is just to the right, outside the frame of the photo.

*Exhibit 24: Intersection of South Montowese Street and Indian Neck Avenue*



#### 4.8 Route 146 (South Montowese Street) between Indian Neck Avenue and Tabor Drive

- Sidewalk on Route 146 south of Ark Road almost connects to intersection at Indian Neck Avenue. Opportunity to evaluate to connect to existing sidewalk on Route 146 with crosswalk south of intersection.
- Route 146 north of Ark Road is very narrow. Participants believed a sidewalk would be difficult to achieve in this area. See Exhibit 25.

*Exhibit 25: Narrow section of Route 146 north of Ark Road*



#### 4.9 Intersection of Route 146 (South Montowese Street) and Tabor Drive

- The Shoreline Greenway Trail is located off of Ark Road and Tabor Drive. It connects east to Pine Orchard Road. Shoreline Greenway Trail committee is working to get additional sections built to the west towards Indian Neck Avenue, potentially along the Branford River on the northern bank.
- Tabor Drive is the main entrance to neighborhoods in that area.
- Toole Drive residents are generally opposed to any cut through traffic. It would be ideal to T-up the intersection here, but grades in the area present challenged.
- There are gaps between the boardwalk south of the Branford River and the sidewalks along the bridge. Connecting these gaps with an elevated sidewalk is important. See Exhibit 26.

*Exhibit 26: Gap between the boardwalk and the sidewalk along the bridge*



## 5 RECOMMENDATIONS

Based on the findings discussed during the RSA, the RSA team compiled a set of recommendations for the study area. These recommendations are organized by study area location. During the RSA, participants agreed the focus area of the findings were from 196 South Montowese Street south to Limewood Avenue. This area is provided in further detail with conceptual drawings of potential recommendations in this area.

All recommendations for all locations are divided into short-term, medium-term, and long-term recommendations.

- **Short-term recommendations:** These are improvements that are simpler and could be completed on a quick timeline. These recommendations are low-cost alternatives such as striping and signage. These recommendations generally do not require extensive engineering or construction costs. More extensive recommendations which have funding previously committed may be included. These projects are defined as those that may be complete within two years.
- **Medium-term recommendations:** These are improvements that may require more substantial engineering than those generally included as short-term recommendations. These may require establishment of funding in capital improvement plans, or a dedicated funding item. However, these recommendations are generally simpler than long-term recommendations and generally do not include ROW acquisition etc. These projects are defined as those that may be completed in two-to-five years.
- **Long-term recommendations:** These are improvements that require substantial study and engineering. These recommendations generally require significant funding for implementation and may require several years of planning to budget. These projects are defined as

those recommendations that may take five years or longer to complete.

It should be noted that any work within the State ROW to be done by non-State forces will require an encroachment permit from the District 3 Permit Office and/or an official request from the Branford Local Traffic Authority.

### 5.1 Route 146 (Sybil Avenue) between Limewood Avenue and 196 South Montowese Street

Route 146 between Limewood Avenue and Linden Avenue is currently characterized by a two-lane roadway, with 26-foot curb-to-curb width and an approximately 40-foot ROW. North of Linden Avenue and Sybil Creek to 196 South Montowese Street, Route 146 is approximately 30-foot curb-to-curb and an approximately 32-foot ROW. The roadway includes two 11-foot travel lanes and 2-foot shoulders between Limewood Avenue and Linden Avenue and 4-foot shoulders near 196 South Montowese Street. Adjacent properties in this area are mostly residential between Limewood Avenue and Wilford Road and mostly commercial between Wilford Road and 196 South Montowese Street. The recommendations included for this section focus on creating safer and stronger pedestrian connections between two separate ongoing projects to construct sidewalks along the Long Island Sound side of Limewood Avenue and an ongoing improvement of a bridge over Sybil Creek which will install sidewalks on both sides of Route 146. The recommendations expand these connections by improving pedestrian crossings in the area of Linden Avenue and area businesses in this segment, which was frequently noted by RSA participants. Finally, the recommendations included in this section include a mini-roundabout for the intersection of Route 146 and Linden Avenue. The mini-roundabout would establish a center for this small

commercial area and serve to slow traffic speeds for vehicles heading southbound on Route 146 towards Long Island Sound.

#### Short-term

- 1) Note: Project 14-177 will install sidewalks over Sybil Creek on both sides of Route 146 as part of the reconstruction of the bridge.
- 2) Restripe roadway between Linden Avenue and Limewood Avenue to narrow travel lanes to widen space for non-motorized users in shoulder and to narrow perceived roadway width. Restripe as follows
  - a) 2 x 10 ½-foot travel lanes (*Existing: 2 x 11-foot travel lanes*)
  - b) 2 ½-foot shoulders and consider the use of sharrows (*Existing: 2-foot shoulders*)
- 3) Conduct a warrant analysis for all-way stop control on a Friday afternoon during summer peak traffic period. Obtain traffic volumes to support analysis. Consider fluctuations in traffic volumes from Linden Avenue due to events at Owenego Inn. Note that an all-way stop warrant analysis provided by the *Manual on Uniform Traffic Control Devices* (MUTCD) is provided as guidance, and as such, is not required by the MUTCD. Local traffic conditions could lead to further consideration for an all-way stop.
  - a) Prior counts conducted in summer of 2019 as part of the *Route 146 Corridor Study Existing Conditions Technical Memorandum* indicate that mainline Route 146 volumes meet the threshold for an all-way stop consideration. However, volumes for Linden Avenue to complete an all-way stop warrant analysis was not provided in this report and not provided to the RSA team.
- 4) As part of the on-going reconstruction of the bridge over Sybil Creek, connect sidewalks from bridge to existing sidewalk at Branford Fire Department.

- 5) As part of the on-going reconstruction of the bridge over Sybil Creek, consider a rectangular rapid flashing beacon (RRFB) on the crosswalk to be installed north of Linden Avenue. Refer to Exhibit 27 for an example of an RRFB.
- 6) Trim and/or remove brush blocking sightlines in ROW at 202 South Montowese Street.
- 7) Consider the use of sharrows along Route 146 with a priority for sharrows between Linden Avenue and Limewood Avenue.

#### *Medium-term*

- 1) Install 5-foot concrete sidewalk on southwest side of Route 146 between Linden Avenue and Limewood Avenue. Due to location of utilities, relocate utilities or consider buried utilities in this section. Utilities were relocated to the north of Limewood Avenue as part of the on-going construction project. Move curb on west side of Route 146 eastward 1-foot to help accommodate sidewalk and restripe Route 146 as follows:
  - a) 2 x 10 ½-foot travel lanes (*Maintain same as short-term plan*)
  - b) 2 x 2-foot shoulders (*Reduction from 2.5-ft shoulders proposed in short-term plan*)
- 2) Install sidewalk on east side of Route 146 from Linden Avenue to 196 South Montowese Street.
- 3) Install crosswalk with standard continental crosswalk markings for night-time visibility and consider a decorative crosswalk to keep crosswalk in line with scenic character of roadway at 196 South Montowese Street. Consider RRFB at this location. Refer to Exhibit 28 for an example of a decorative crosswalk with continental markings on top of the decorative surface. Note the limited contrast between

the decorative red surface and the roadway surface which limits night time visibility without the continental crosswalk markings.

- 4) Install decorative pedestrian scale lighting near businesses. Match lighting style in Branford Center. Refer to Exhibit 29 for an example of decorative, pedestrian scale lighting present in Branford Center.

#### *Long-term*

- 1) Continue to monitor curve on Route 146 at Limewood Avenue for safety concerns following on-going construction projects which will remove utilities which give visual cues on presence of curve for southbound motorists on Route 146. Consider in-lane curve warning markings, 6-inch edgelines, and/or retroreflective roadside delineators if visibility of curve is reduced with ongoing projects.
- 2) Consider mini-roundabout with decorative, mountable island with a diameter of approximately 65-feet at the intersection of Route 146 and Linden Avenue. Include crosswalks on all approaches to the roundabout and consider decorative crosswalk to keep crosswalk in line with scenic character of roadway. To maintain night-time visibility to decorative crosswalk, consider marking standard continental crosswalk markings on top of decorative surface. Consider maintaining RRFB at crosswalk north of Linden Avenue as recommended in the short-term plan.
- 3) Consider access management at 209 South Montowese Street to reduce number of curb cuts in this section. Install sidewalk on west side of Route 146 in this area.
- 4) Narrow driveway curb cut at 195 South Montowese Street.

Exhibit 27: Example of RRFB (Source: CTDOT)



Exhibit 28: Example of decorative crosswalk with continental marked crosswalk in Stamford, CT. (Source: Google Maps Streetview)



Exhibit 29: Example of decorative pedestrian scale lighting in Branford Center. (Source: Zip06)



Exhibit 30: Example of a mini-roundabout in Manchester, VT with a diameter of 65-feet. Note the decorative, mountable center island to allow large vehicle movements. (Source: Google Maps Streetview)



**LEGEND**

Short-term Recommendation

Medium-term Recommendation

Long-term Recommendation

Maintain curbline on east side. Reduce short term recommendation of 2.5-ft shoulders to 2-ft shoulders and maintain 10.5-ft travel lanes and move west curb eastward to accommodate sidewalk

Consider sharrows

Install 5-ft sidewalk on southwest side of Route 146. Relocate utility poles or consider buried utilities between Limewood Avenue and Linden Avenue

Monitor curve for safety concerns following on-going construction projects. Consider in-lane curve warning markings, wider edgelines, and/or delineators if visibility of curve is reduced with ongoing projects.

MATCH LINE

WILFORD ROAD

LIMEWOOD AVENUE

SYBIL AVENUE

146

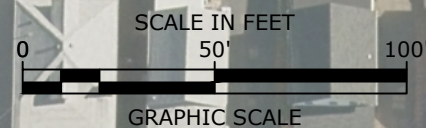
146

146

**BRANFORD ROAD SAFETY AUDIT  
BRANFORD, CONNECTICUT**

**EXHIBIT 31: CT ROUTE 146 (SYBIL AVE)  
LIMEWOOD AVE - WILFORD RD CONCEPT PLAN**

DATE: 5/2/2022  
SCALE: 1" = 50'  
CONCEPT



**LEGEND**

Short-term Recommendation

Medium-term Recommendation

Long-term Recommendation

Consider sharrow

Install crosswalk. Consider decorative crosswalk. Consider RRFB at this location

Sidewalks continue north on Route 146 on west side. Consider bituminous sidewalk north of 195 South Montowese Street due to scenic character of roadway.

Narrow driveway curb cuts

Trim and/or remove brush blocking sightlines in right-of-way

Install sidewalks on east side of Route 146 from Linden Avenue to 196 South Montowese Street

Install decorative pedestrian scale lighting near businesses. Match lighting style in Branford Center.

Consider access management in this area. Example parking layout shown to demonstrate curb cut elimination.

Conduct warrant analysis for all-way stop control on a Friday afternoon during summer. Obtain traffic volumes to support analysis.

Note: Sidewalks to be installed on both sides of Rte 146 following bridge reconstruction

Install crosswalks. Consider decorative crosswalk. Consider RRFB at this location if intersection continues as two-way stop control. Maintain RRFB in mini-roundabout concept.

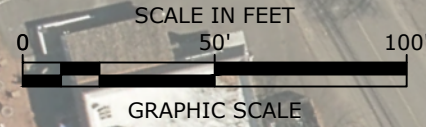
Install 5-ft sidewalk on southwest side of Route 146. Relocate utility poles or consider buried utilities between Limewood Avenue and Linden Avenue

Connect sidewalk to Branford Fire Department

Consider mini-roundabout with mountable island. Roundabout shown with a diameter of 65-ft.

**BRANFORD ROAD SAFETY AUDIT  
BRANFORD, CONNECTICUT**

**EXHIBIT 32: CT ROUTE 146  
WILFORD RD - 196 S. MONTOWESE ST  
CONCEPT PLAN**



DATE: 5/2/2022  
SCALE: 1" = 50'  
CONCEPT





## 5.2 Route 146 (South Montowese Street) between 196 South Montowese Street and Indian Neck Avenue

Route 146 between 196 South Montowese Street and Indian Neck Avenue is the segment with the highest traffic counts in the RSA study area. To the north, traffic splits between Indian Neck Avenue towards Branford Train Station and points to the west, and Route 146 (South Montowese Street) towards Branford Center and points to the north. A low clearance bridge under the railroad tracks just north of the Branford River effectively prohibits vehicles over 9' – 6" tall on Route 146 north of this point. Within this segment, Route 146 is characterized by 11-foot travel lanes, with inconsistent shoulder widths. There are locations with little to no shoulder and areas with shoulder width of approximately 4-feet. Additionally, this area is characterized by several vertical and horizontal curves, with particular attention to a horizontal curve at Isabel Lane which acts as a pinch point for pedestrians and bicyclists navigating the corridor, and a vertical curve and reverse horizontal curve just north of Block Island Road which restricts sight lines from that street. Recommendations for this section include recommendations to mitigate concern for a high number of single-vehicle crashes which occur in this segment during all times of day throughout the week. Additionally, it is recommended that this segment be evaluated for a sidewalk to connect between an existing sidewalk north of Block Island Road and sidewalk proposed in this RSA report in the commercial area near Linden Avenue

### *Short-term*

- 1) Install 2 x 3" reflective roadside delineators post mounted at 4-feet along this segment to enhance night time visibility of curves. This

recommendation is a Proven Safety Countermeasure by the Federal Highway Administration (FHWA) for enhanced delineator for horizontal curves.<sup>1</sup> This recommendation is also less visually intrusive than other signage such as chevrons. Refer to Exhibit 33 for an example of delineators at night.

- 2) Stripe 6-inch wide retroreflective edgelines to enhance visibility of curves. Wider edge lines are a Proven Safety Countermeasure by FHWA and found to reduce crashes up to 37%.

### *Medium-term*

- 1) Evaluate feasibility of realigning horizontal curve at Isabel Lane. Evaluate parking at 165 South Montowese Street which requires parkers at this location to back out onto Route 146 on a curve.
- 2) Consider the use of sharrows along Route 146.

### *Long-term*

- 1) Relocate utility poles close to roadway at horizontal curve at Isabel Lane. Evaluate feasibility within available right-of-way.
- 2) Relocate utility pole on southwest corner of intersection of Route 146 and Block Island Road. Consider adjustment to curb radii to better accommodate truck turns from Block Island Road. Trucks are frequent on this road due to the sewage treatment plant and the marina.
- 3) Consider installing bituminous or concrete sidewalk on west side to connect to existing sidewalk segments near Indian Neck Avenue and the Branford Housing Authority property, and the sidewalk proposed near Linden Avenue. A bituminous sidewalk has been used as a

<sup>1</sup> [https://safety.fhwa.dot.gov/provencountermeasures/enhanced\\_delineation.cfm](https://safety.fhwa.dot.gov/provencountermeasures/enhanced_delineation.cfm)

solution sensitive to the rural character of a roadway in Norwalk, CT. See Exhibit 34 for an example.

Exhibit 35 displays these recommendations on a map of the study area.

*Exhibit 33: Example of post mounted delineators at night. Source: FHWA / Texas Transportation Institute*



*Exhibit 34: Example of a bituminous sidewalk in Norwalk, CT.*



### 5.3 Route 146 (South Montowese Street) between Indian Neck Avenue and Tabor Drive

Route 146 between Indian Neck Avenue and Tabor Drive features the greatest number of houses than any other segment of the RSA study area. The roadway consists of two 11-foot travel lanes with 2-foot shoulders. ROW in this area is approximately 34-feet, however landscaping elements such as stone walls and bushes restrict available roadside space further in many areas. This area generally has better sightlines than Route 146 to the south and notably less traffic. Recommendations in this area prioritize establishing a pedestrian connection between the existing sidewalk at the intersection of Indian Neck Road to Ark Road. Connecting this intersection will allow safe pedestrian travel to many residences on Ark Road, and the recently completed Shoreline Greenway Trail off the intersection of Tabor Drive and Ark Road. Additionally, further recommendations to improvements to the intersection of Tabor Drive are recommended.

#### *Medium-term*

- 1) Install a crosswalk on the southern side of the intersection of Route 146 and Indian Neck Avenue.
- 2) Install sidewalk at 86-90 South Montowese Street. Connect to existing sidewalk to the north to establish pedestrian connectivity to Ark Road. This connection continues to the Shoreline Greenway Trail.
- 3) Install a sidewalk between the existing boardwalk north of Tabor Drive and the existing sidewalk on the bridge over the Branford River.
- 4) Consider the use of sharrows along Route 146.

#### *Long-term*

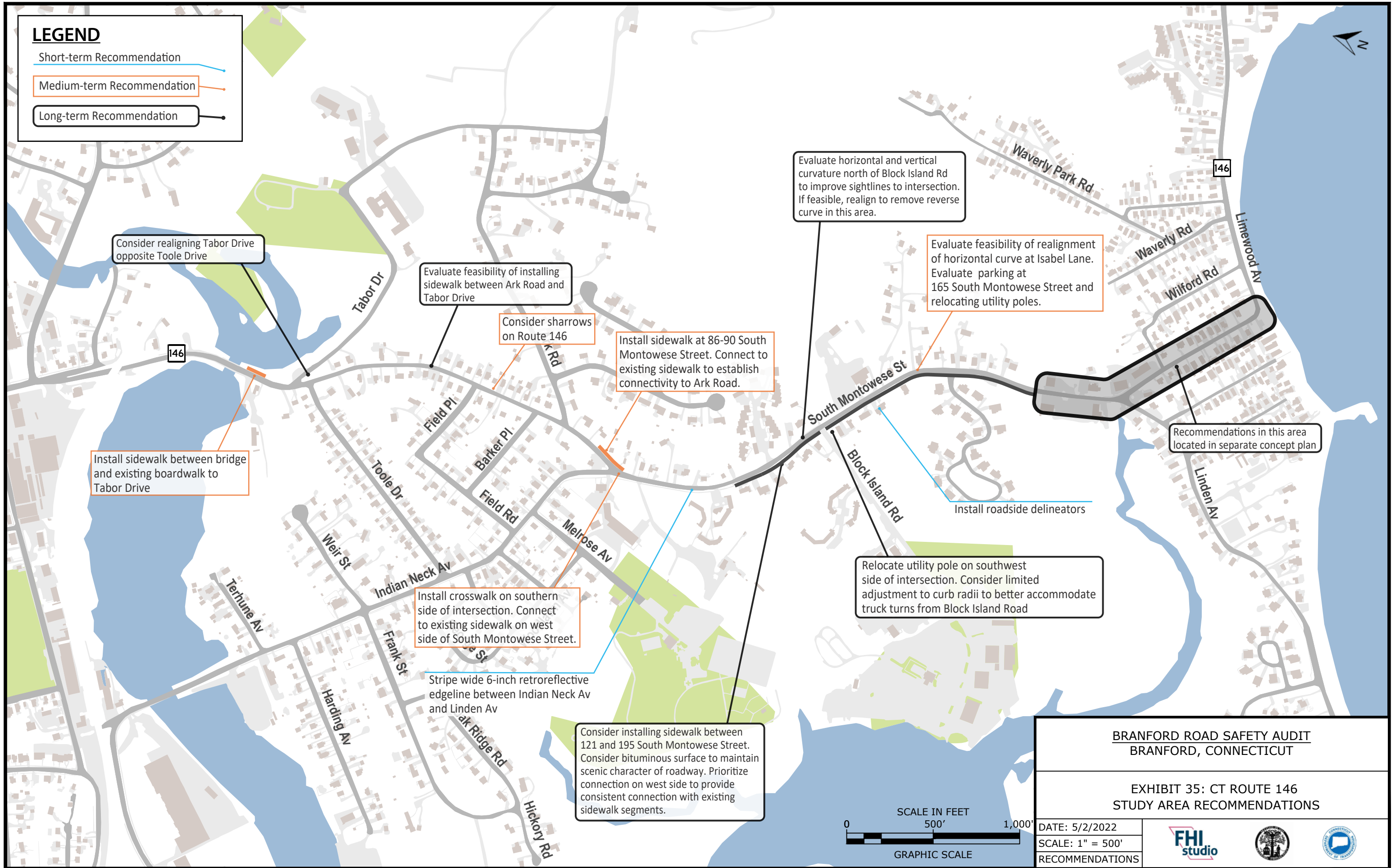
- 1) Evaluate the feasibility of realigning Tabor Drive opposite Toole Drive.

- 2) Evaluate the feasibility of installing a sidewalk between Ark Road and Tabor Drive. RSA visit and property database suggest limited available right-of-way to construct a sidewalk. Consider a sidewalk on the east side of Route 146 to connect to existing sidewalk section north of Tabor Drive and to connect to proposed sidewalk south of Ark Road.

Exhibit 35 displays these recommendations on a map of the study area.

**LEGEND**

- Short-term Recommendation
- Medium-term Recommendation
- Long-term Recommendation



Consider realigning Tabor Drive opposite Toole Drive

Evaluate feasibility of installing sidewalk between Ark Road and Tabor Drive

Consider sharrows on Route 146

Install sidewalk at 86-90 South Montowese Street. Connect to existing sidewalk to establish connectivity to Ark Road.

Evaluate horizontal and vertical curvature north of Block Island Rd to improve sightlines to intersection. If feasible, realign to remove reverse curve in this area.

Evaluate feasibility of realignment of horizontal curve at Isabel Lane. Evaluate parking at 165 South Montowese Street and relocating utility poles.

Install sidewalk between bridge and existing boardwalk to Tabor Drive

Recommendations in this area located in separate concept plan

Install roadside delineators

Relocate utility pole on southwest side of intersection. Consider limited adjustment to curb radii to better accommodate truck turns from Block Island Road

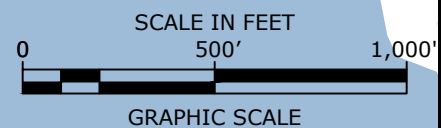
Install crosswalk on southern side of intersection. Connect to existing sidewalk on west side of South Montowese Street.

Stripe wide 6-inch retroreflective edgeline between Indian Neck Av and Linden Av

Consider installing sidewalk between 121 and 195 South Montowese Street. Consider bituminous surface to maintain scenic character of roadway. Prioritize connection on west side to provide consistent connection with existing sidewalk segments.

**BRANFORD ROAD SAFETY AUDIT  
BRANFORD, CONNECTICUT**

**EXHIBIT 35: CT ROUTE 146  
STUDY AREA RECOMMENDATIONS**



DATE: 5/2/2022  
SCALE: 1" = 500'  
RECOMMENDATIONS



## 6 SUMMARY

This report documents the observations, discussions, and recommendations developed during the completion of the Town of Branford's RSA. It provides the Town with an outlined strategy to improve the transportation network for all users in the study area, particularly focusing on pedestrians and cyclists. Moving forward, the Town of Branford and CTDOT may use this report to prepare strategies for funding and implementing the improvements. This report provides Branford with a toolkit to plan for including these multi-modal recommendations into future development within the study area.

The aforementioned Community Connectivity Program: Road Safety Audit Report is an objective review intended for the municipality use to help assess the existing conditions within a predetermined area of town selected by the municipality. The conclusions of this report are advisory and intended for general planning purposes to help identify bicycle, pedestrian and non-motorized transportation needs that encourage walking and bicycling, as well as assists in developing recommendations to improve the existing conditions. The contents of this report are not intended to be legally binding, but rather offer recommendations to improve safety in the vicinity of the audit location and create a more appealing transportation alternative.

## **APPENDICES**

A: Pre-Audit Presentation

B: Walk Audit Materials

# BRANFORD ROAD SAFETY AUDIT

ROUTE 146: BRANFORD RIVER TO  
LIMEWOOD AVENUE



MARCH 2022

# INTRODUCTIONS



Limewood Ave



# AGENDA

---

1. Welcome and Team Introductions
2. Study Purpose and Goals
3. Study Area
4. Review of Site-Specific Data and Issues
5. Next Steps for Tomorrow's Site Visit Audit

# PROJECT TEAM

---

- Connecticut Department of Transportation (CTDOT) is sponsoring
- Town of Branford
- FHI Studio is conducting the Road Safety Audit reporting
- Support from SCRCOG

# PURPOSE AND GOALS OF THE ROAD SAFETY AUDIT

---

Safety assessment of existing walking and biking routes

Improve transportation network for all users by making conditions safer and more comfortable for pedestrians and cyclists

Identify the issues that may discourage or prevent walking and bicycling

Identify next steps, evaluate feasibility of proposed improvements, and potential funding sources.

# DELIVERABLES

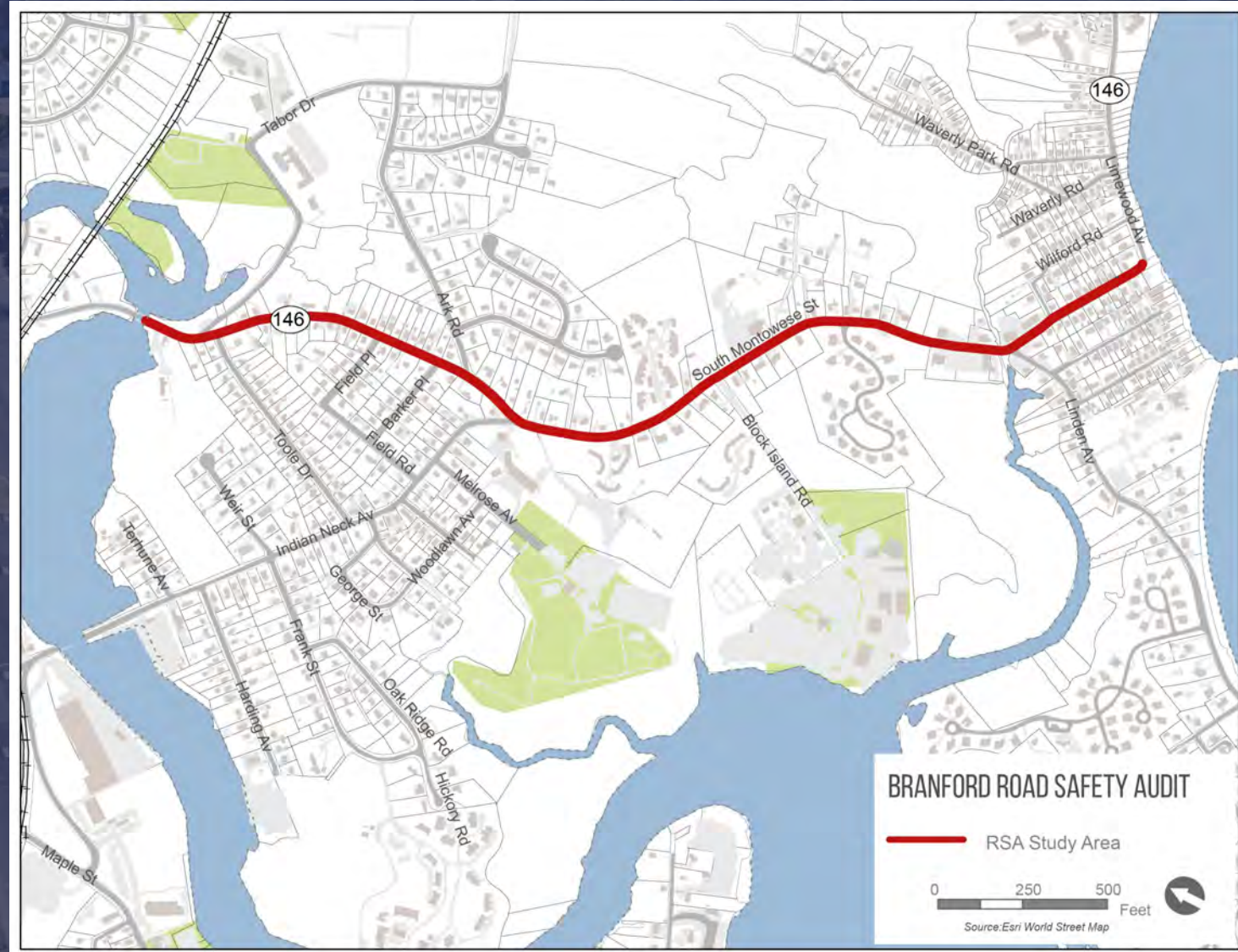
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- Existing Conditions Data Collection
- Pre-Audit Meeting
- Field Audit
- Post Audit Meeting
- Road Safety Audit Report



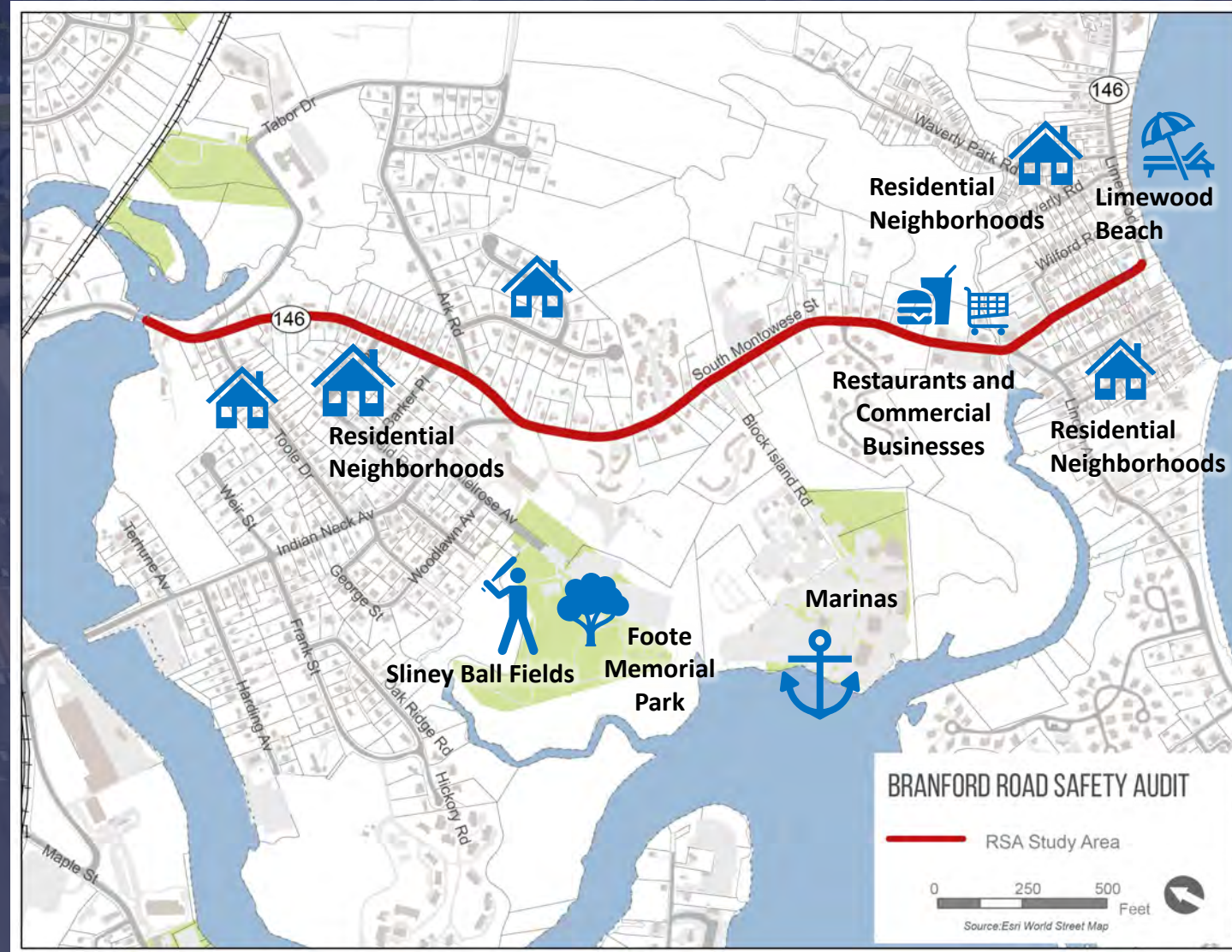
# STUDY AREA

- Route 146 (South Montowese Street/ Sybil Avenue) between the Branford River and Limewood Avenue



# POINTS OF INTEREST

- Primarily Residential
- Restaurant and Commercial cluster
- Marina and boat storage
- Foote Memorial Park and Sliney Ball Fields
- Owenego Inn



# EXISTING CONDITIONS FINDINGS

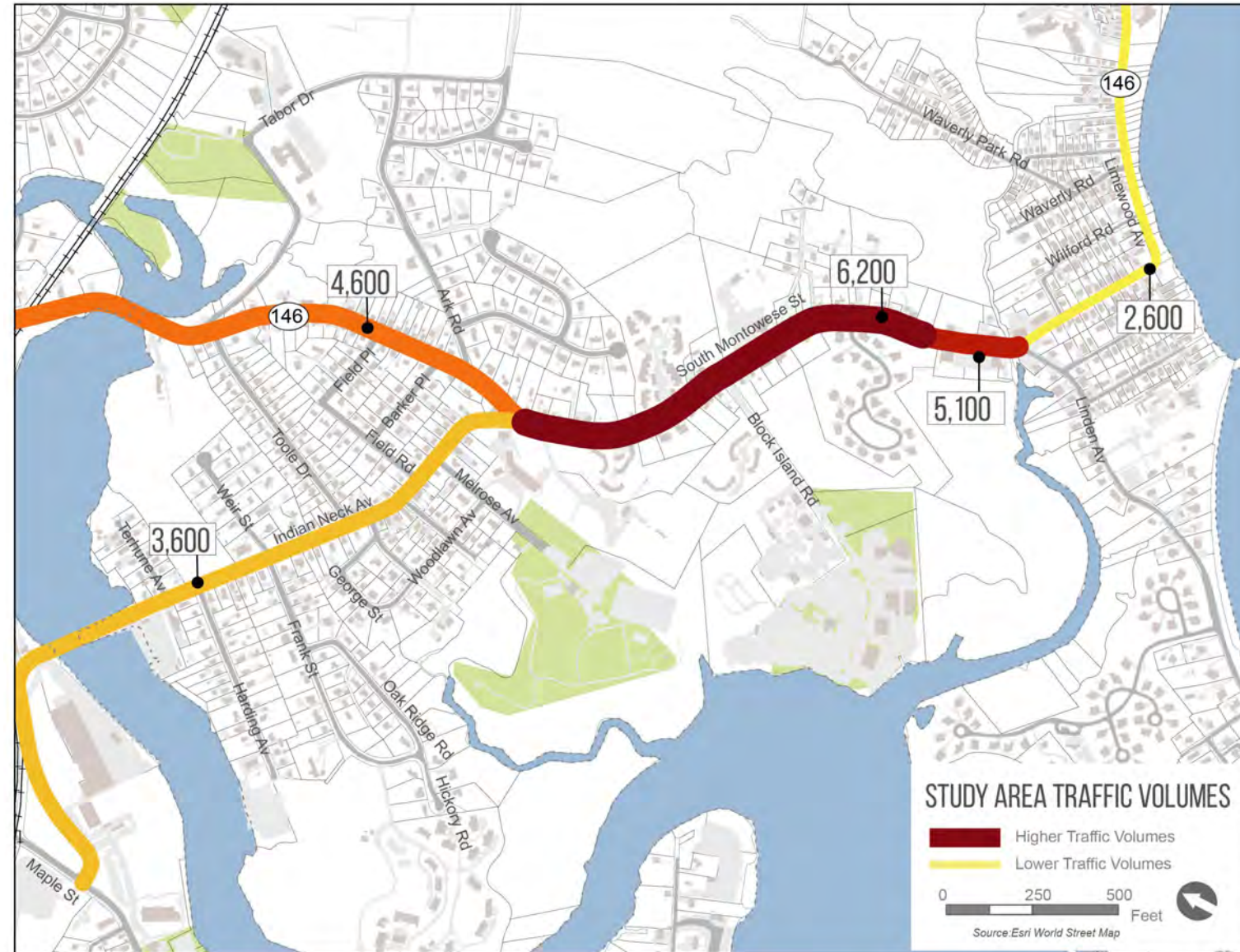
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Route 146 serves many purposes including:

- Local traffic
- Local residential access
- Pedestrian and Bicyclist movement to serve local neighborhoods
- Restaurants/ Commercial uses
- Marina access

# TRAFFIC VOLUMES

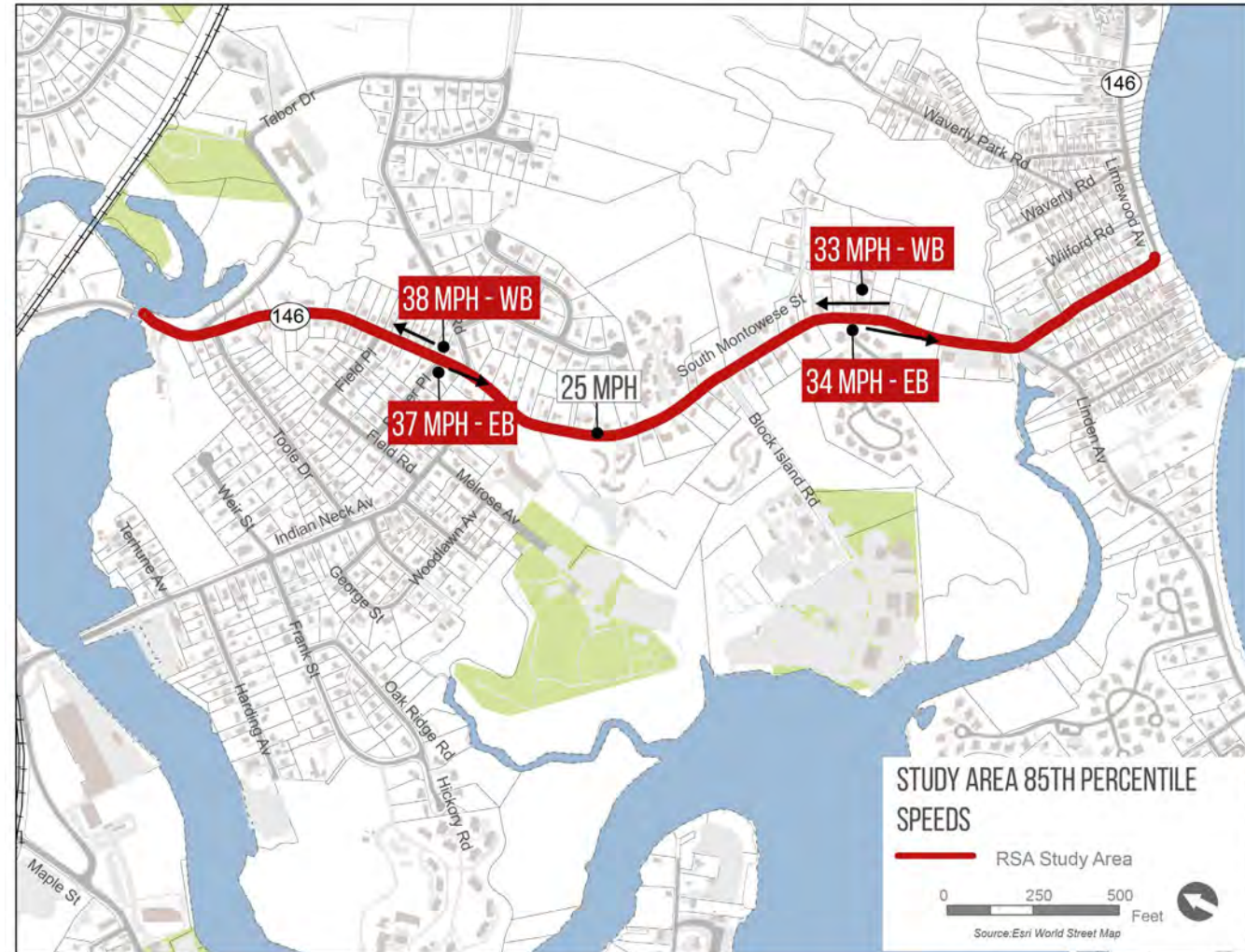
- Higher traffic volumes in center of Study Area
  - Highest volumes are at the merger of South Montowese Street and Indian Neck Avenue south to the restaurant cluster north of Linden Avenue
- Lowest volumes found on Sybil Avenue and Limewood Avenue





# TRAFFIC SPEED LIMITS

- Speed limit in Study Area is 25 MPH throughout
- 85<sup>th</sup> Percentile Speeds on South Montowese Street were observed to be between 33 MPH and 38 MPH
  - Average speeds ranged from 30 MPH to 35 MPH



# TRAFFIC SPEED LIMITS

## Overall Summary

Total Days of Data: 11

Speed Limit: 25

Average Speed: 26.2

50th Percentile Speed: 27.16

85th Percentile Speed: 32.0

Pace Speed Range: 23-33

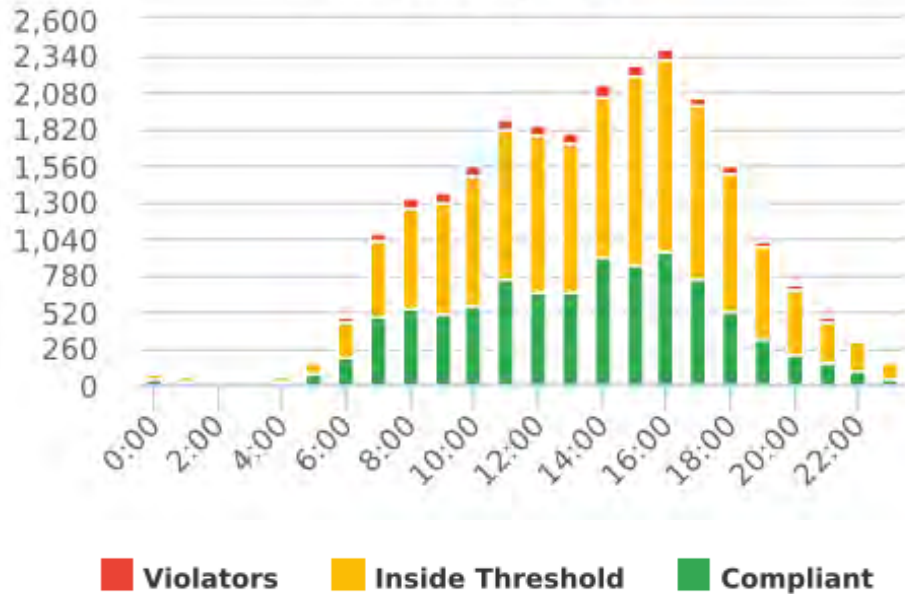
Minimum Speed: 5

Maximum Speed: 52

Display Mode: Speed Display

Average Volume per Day: 2258.5

Total Volume: 24844



# ROADWAY GEOMETRY

## Branford - RSA - Route 146 Street Inventory

Road	From	To	Distance	Direction	Lanes	Lane Width	Sidewalk			ADA Ramps		Curb	Parking	Shoulder	Notes
							Type	Width	Condition	Present	Compliant				
S. Montowese Street (Route 146)	Branford River	Indian Neck Avenue	2,400'	EB	1	11'	N/A	N/A	N/A	N/A	N/A	Paved	N/A	2'	Boardwalk located near Branford River Small sidewalk segment near Ark Rd.
				WB	1	11'	*See Note	N/A	N/A	N/A	N/A	N/A	Paved	N/A	
S. Montowese Street (Route 146)	Indian Neck Avenue	Linden Avenue	3,200'	EB	1	11'	*See Note	N/A	N/A	N/A	N/A	Paved	N/A	2'	Sidewalk segment near Indian Neck Ave (EB Side)
				WB	1	11'	N/A	N/A	N/A	N/A	N/A	Paved	N/A	2'	
Sybil Avenue (Route 146)	Linden Avenue	Limewood Avenue (Route 146)	900'	EB	1	11'	N/A	N/A	N/A	N/A	N/A	Paved	N/A	2'	Sidewalk on bridge (WB side)
				WB	1	11'	*See Note	N/A	N/A	N/A	N/A	N/A	Paved	N/A	

\*CONDITION - "Good" is Serviceable Condition that meets current design standards. "Fair" is generally serviceable, but may need minor repairs, or may not completely align with current design standards. "Poor" is not serviceable, and generally inadequate for continued long-term use.

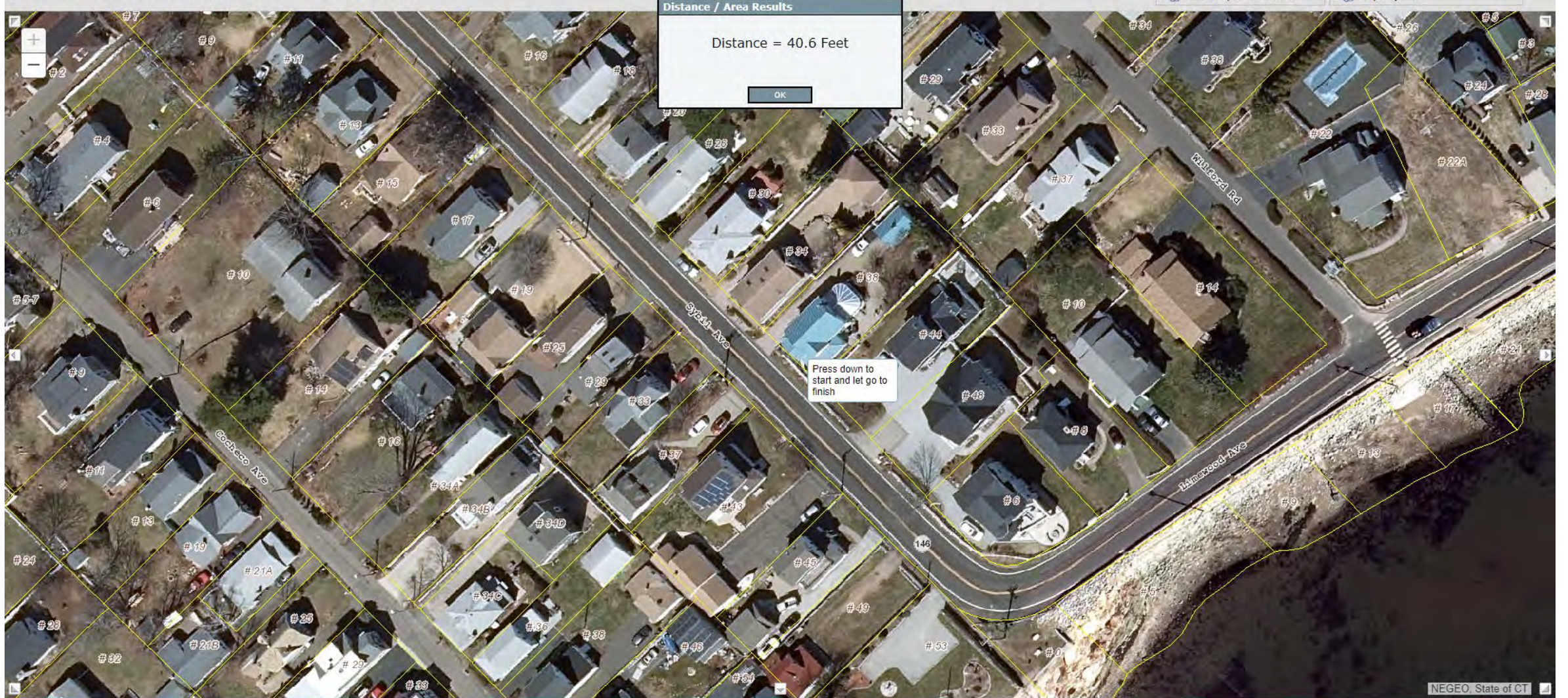
Highlighted cells indicate values which may warrant further investigation

# RIGHT-OF-WAY

Town of Branford, CT - MapXpress Property Information Viewer

Full Town View Reset Map Search Print Map Help View Legend

Base Maps / Air Photos Map Layers



Full Extent Zoom In Zoom Out Prev Extent Next Extent Pan Parcel Information Simple Measure Path Measure Area Measure

MapXpress v1.2

Scale: 1 in = 50 ft

CT State Plane NAD 1983 - X,Y 986576, 655392

# RIGHT-OF-WAY

Town of Branford, CT - MapXpress Property Information Viewer

Full Town View Reset Map Search Print Map Help View Legend

Base Maps / Air Photos Map Layers

Distance / Area Results

Distance = 34.6 Feet

OK

Press down to start and let go to finish

Block Island Rd South Montrose St Newton Rd

# 138 # 137 # 141 # 149 # 149 # 133 # 137 # 131 # 136 # 162 # 133

146

NEGEO, State of CT

Full Extent Zoom In Zoom Out Prev Extent Next Extent Pan Parcel Information Simple Measure Path Measure Area Measure

MapXpress v1.2 Scale: 1 in = 50 ft CT State Plane NAD 1983 - X,Y 985493, 657462

# RIGHT-OF-WAY

Town of Branford, CT - MapXpress Property Information Viewer

Full Town View Reset Map Search Print Map Help View Legend

Base Maps / Air Photos Map Layers

Distance / Area Results

Distance = 35.4 Feet

OK

Press down to start and let go to finish

Field Pl

South Main St

Barker Pl

Map Pl

NEGEO, State of CT

Full Extent Zoom In Zoom Out Prev Extent Next Extent Pan Parcel Information Simple Measure Path Measure Area Measure

MapXpress v1.2

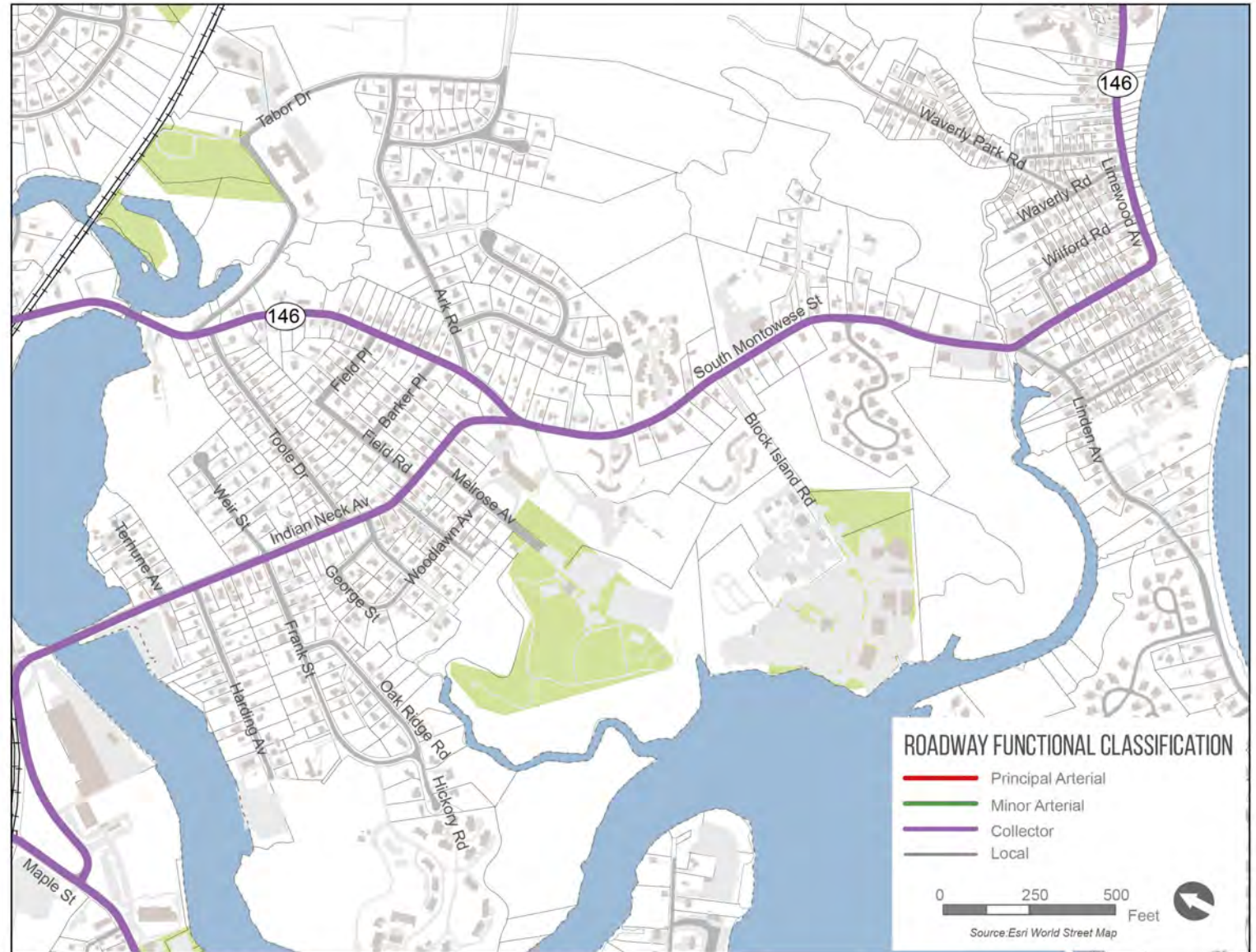
Scale: 1 in = 50 ft

CT State Plane NAD 1983 - X,Y 985100, 659377

The image displays a web-based map application for the Town of Branford, CT. The main view is an aerial photograph with yellow lines delineating property boundaries. A measurement tool is currently active, displaying a distance of 35.4 feet. The interface includes a top navigation bar with options like 'Full Town View', 'Reset Map', 'Search', 'Print Map', 'Help', and 'View Legend'. There are also buttons for 'Base Maps / Air Photos' and 'Map Layers'. A 'Distance / Area Results' dialog box is centered on the screen, showing the measurement and an 'OK' button. A tooltip is visible over the map, indicating that the user should 'Press down to start and let go to finish'. The map shows several residential lots, some with house numbers, and streets including Field Pl, South Main St, Barker Pl, and Map Pl. The bottom of the screen features a toolbar with various map navigation and measurement tools, and a status bar with the scale (1 in = 50 ft) and coordinates (CT State Plane NAD 1983 - X,Y 985100, 659377).

# FUNCTIONAL CLASSIFICATION

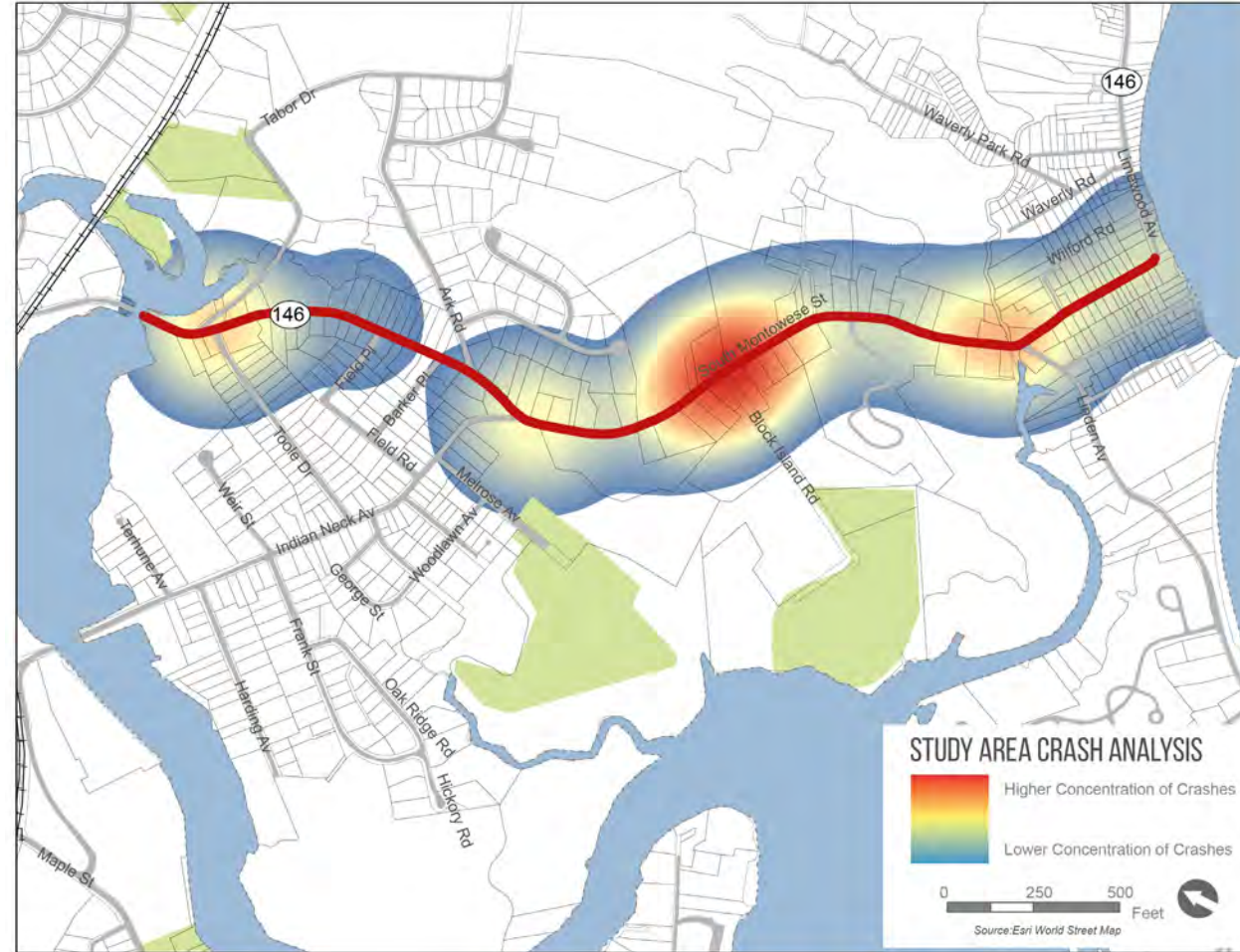
- Route 146 is a Collector Roadway
- Indian Neck Avenue is a Collector Roadway
- Other streets that intersect Study Area are Local Roads
- Route 146 is classified as a scenic road by CT



# CRASH ANALYSIS

2016 - 2020

Year	Fatal Injury	Suspected Major Injury	Property Damage Only	TOTAL
2016			8	8
2017	1	3	6	10
2018		2	5	7
2019		2	6	8
2020		3	5	8
<b>TOTAL</b>	<b>1</b>	<b>10</b>	<b>30</b>	<b>41</b>



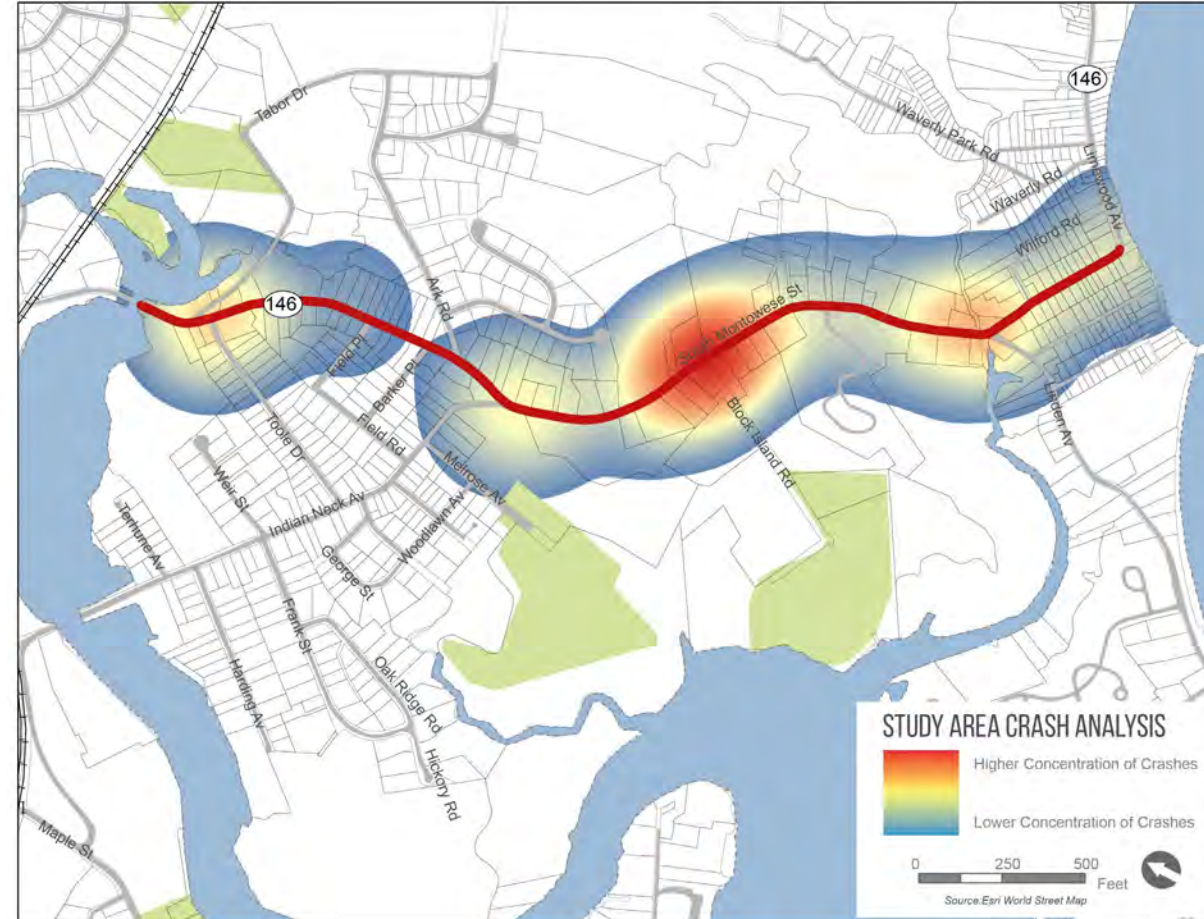


# CRASH ANALYSIS

2016 - 2020

Crash Severity

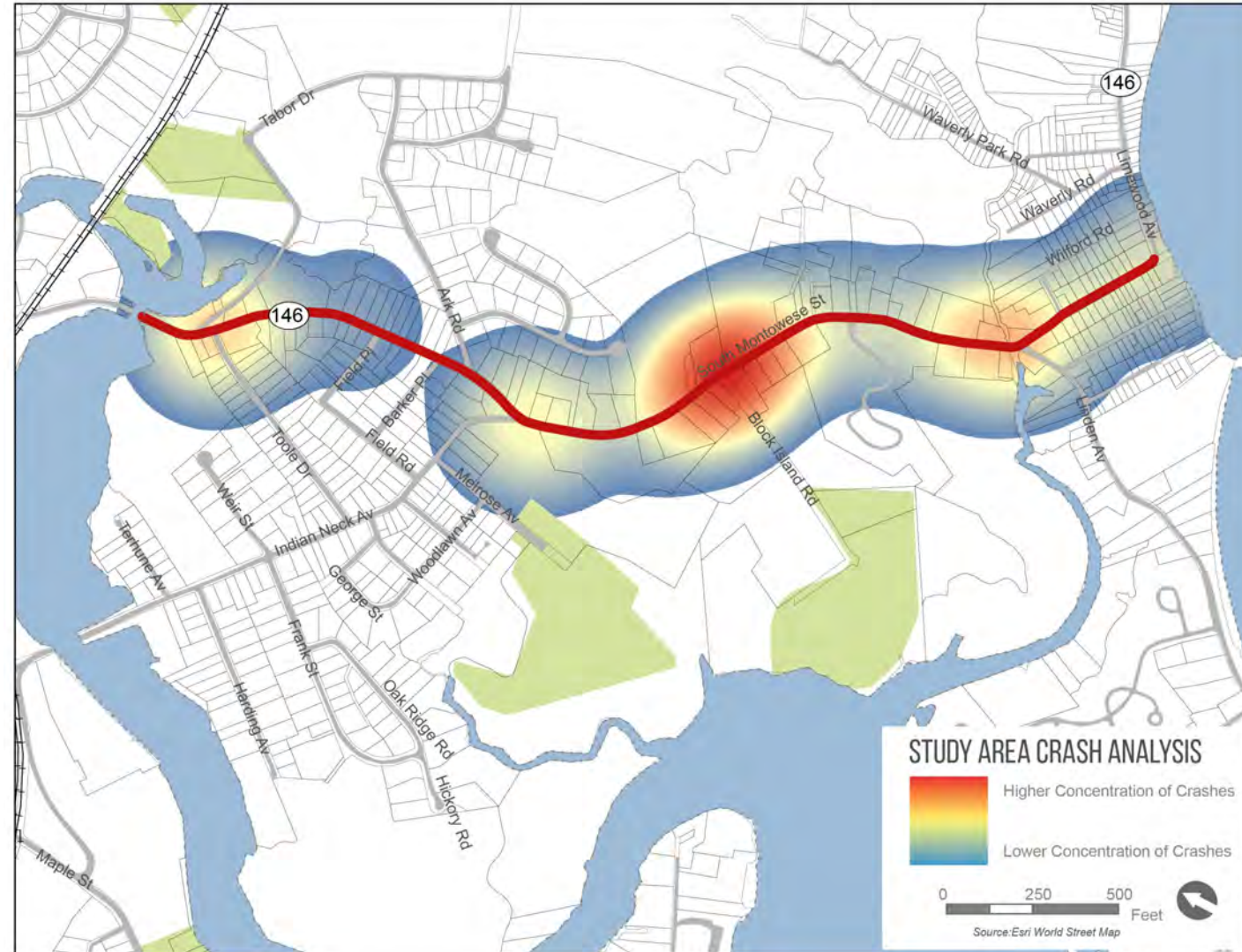
Crash Type	Crash Severity					TOTAL
	Fatal Injury	Serious Injury	Minor Injury	Possible Injury	No Apparent Injury, Property Damage Only	
Front to Rear			2	2	6	10
Front to Front						
Angle					5	5
Sideswipe, Same Direction					2	2
Sideswipe, Opposite Direction				1	2	3
Rear to Side					1	1
Rear to Rear					1	1
Not Applicable / Single Vehicle	1		4	1	13	19
Other						
<b>TOTAL</b>	<b>1</b>		<b>6</b>	<b>4</b>	<b>30</b>	<b>41</b>
Crashes Involving Pedestrians			1			
Crashes Involving Bicyclists					1	



# CRASH ANALYSIS

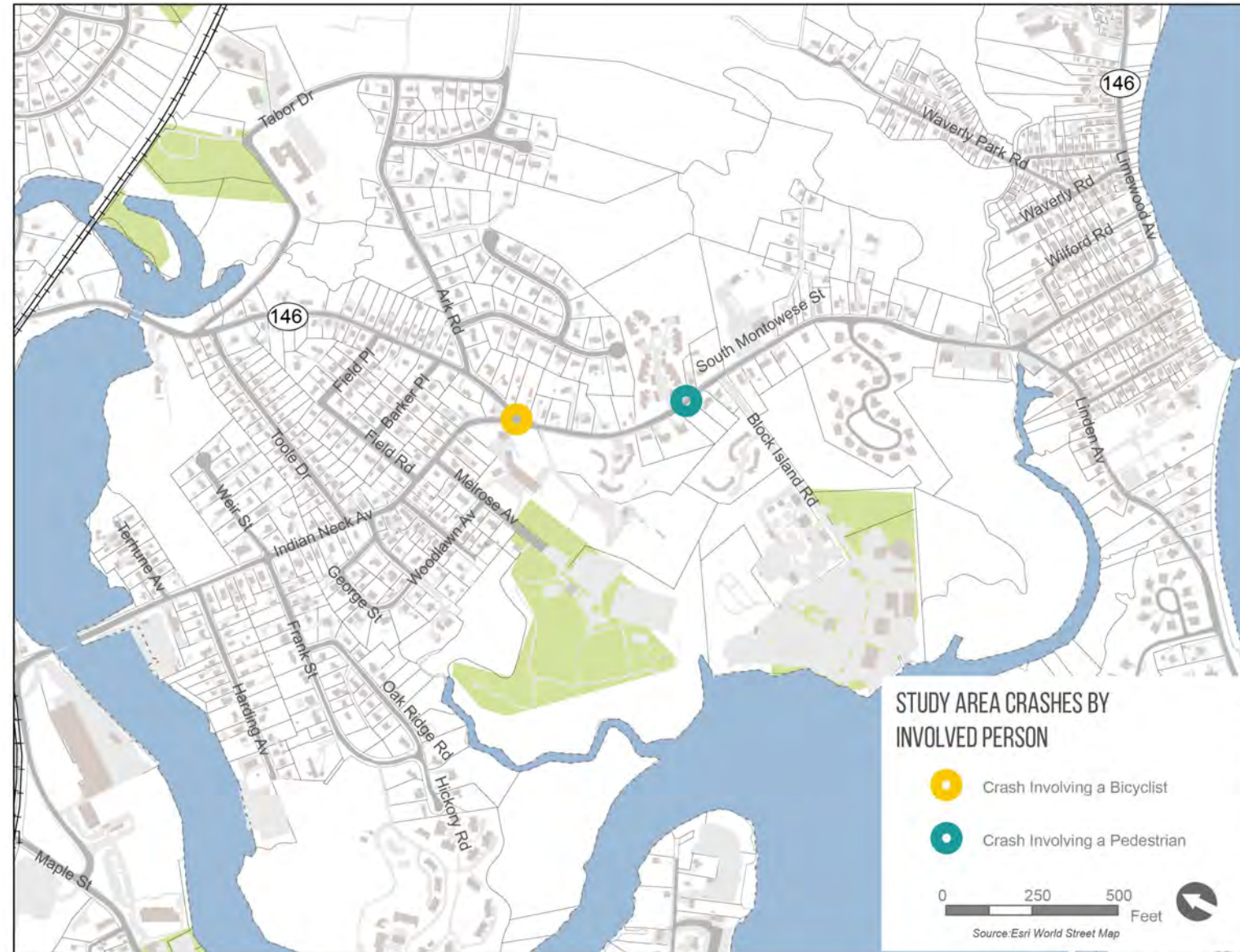
Crash Hotspots (5 Yr Crash Total approx.)  
41 Crashes Total

- Rte 146 & Block Island Road
- Rte 146 & Linden Avenue
- Rte 146 & Toole/ Tabor Drives
- Rte 146 & Indian Neck Avenue



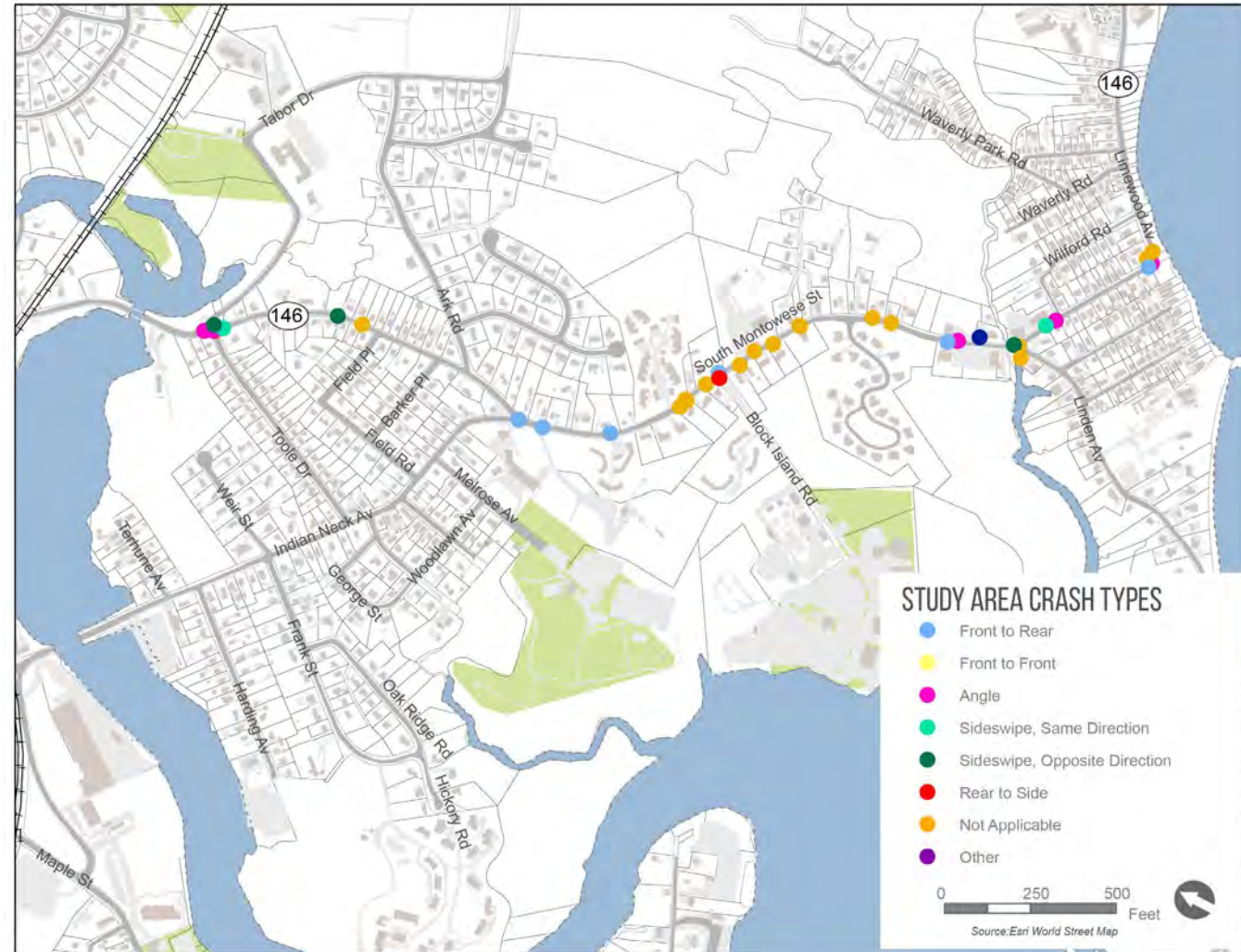
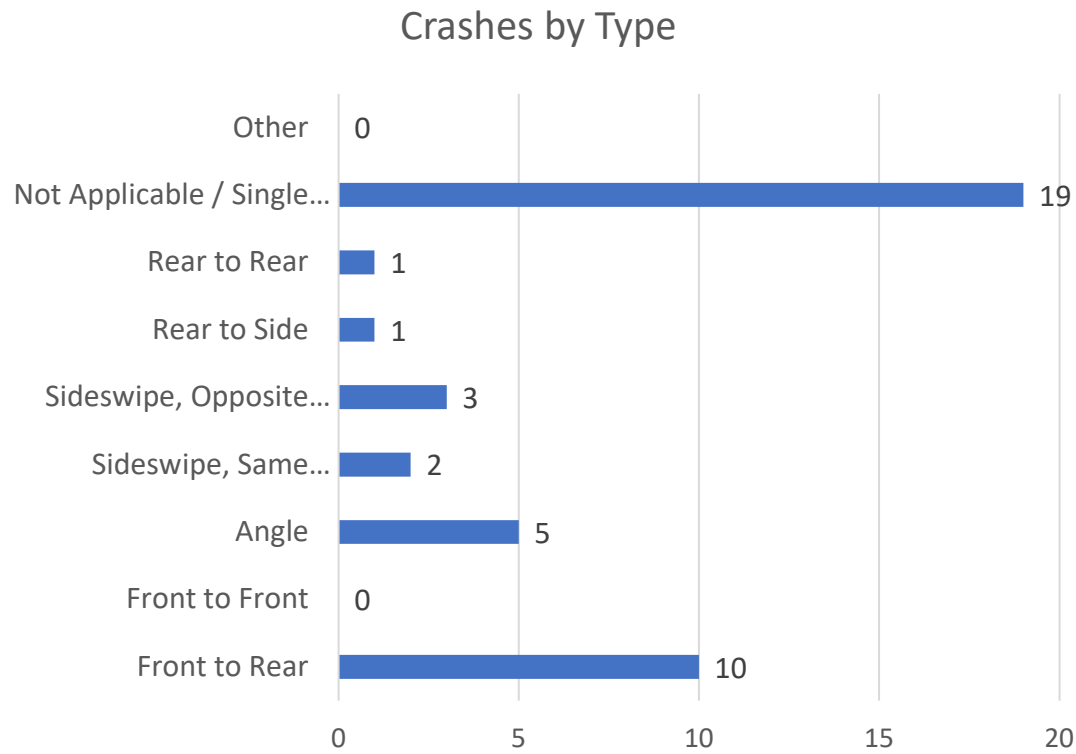
# CRASH ANALYSIS — INVOLVED PERSON

- There was 1 crash involving a bicyclist in the Study Area (2019).
- There was 1 crash involving a pedestrian in the Study Area (2020).



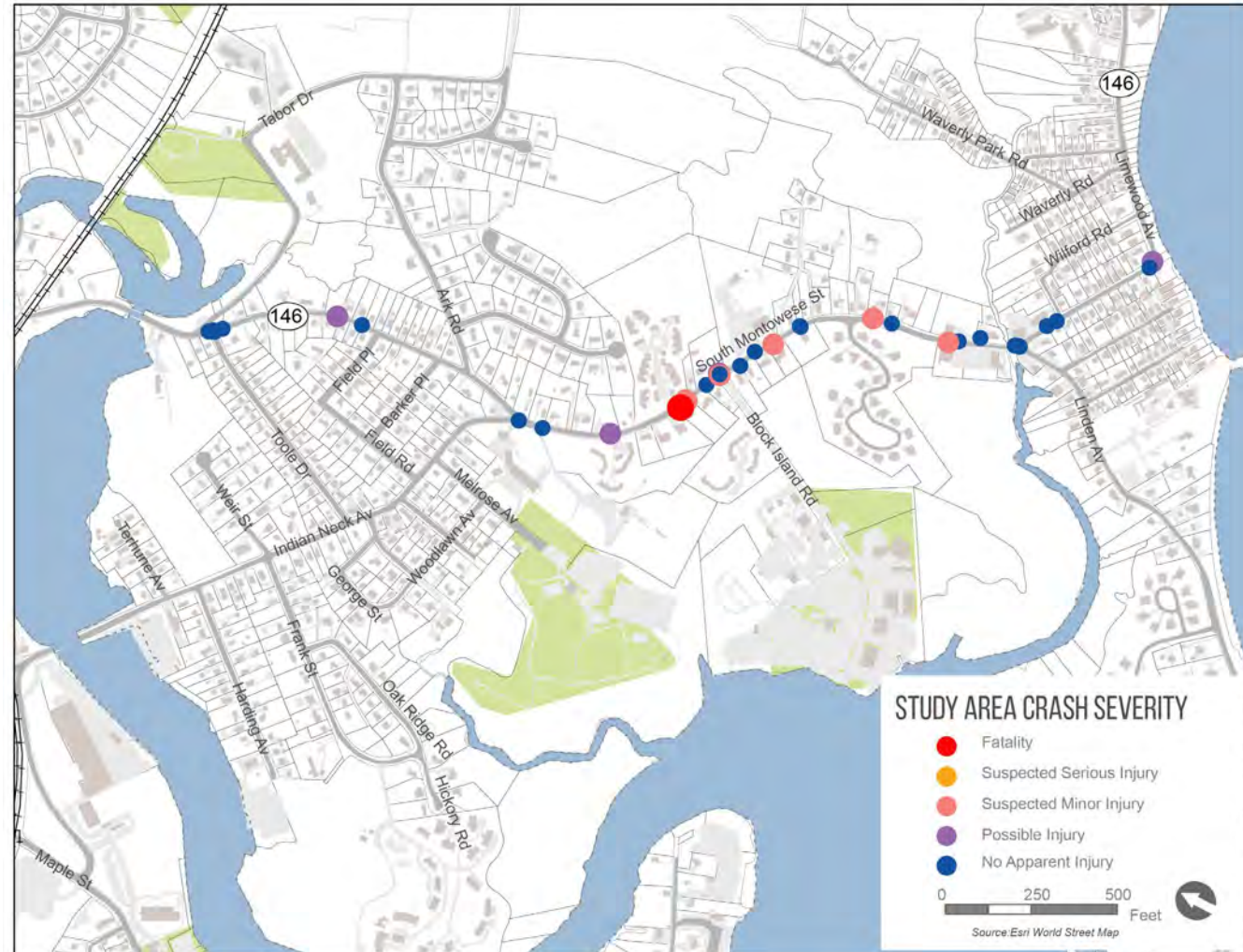
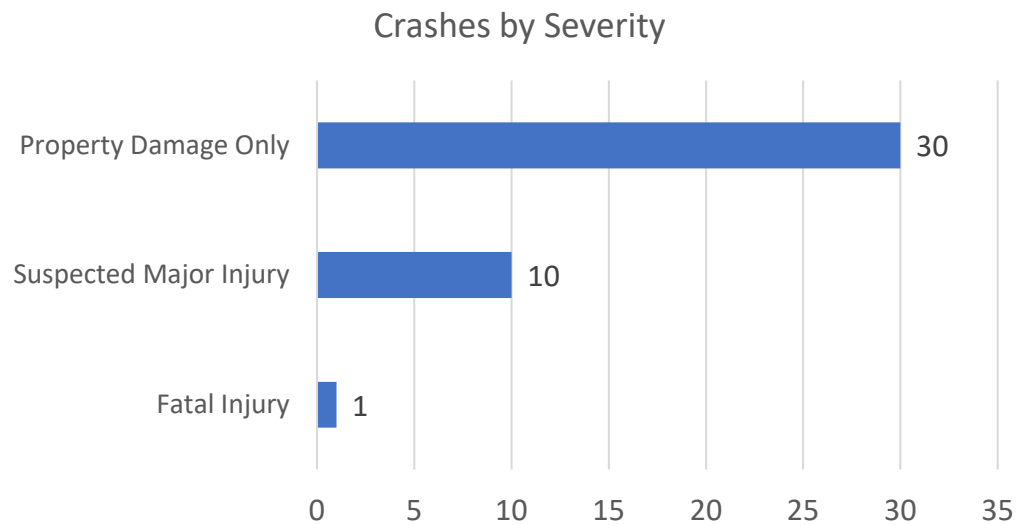
# CRASH TYPE

- Majority of Crashes involve a single vehicle or are Front to Rear (Rear End) Crashes.



# CRASH SEVERITY

- Majority of crashes are classified as No Apparent Injury- Property Damage Only
- There were 11 crashes resulting in at least one injury with 10 crash resulting in a major injury
- 
- 1 fatality south of Great Oaks condominium complex, 2017



# REVIEW OF PAST/CURRENT WORK

- Route 146 Existing Conditions Technical Memorandum - Completed in July 2021



**LEGEND**  
● Study Intersection  
— Study Corridor

0 600 1200 Feet

**vhb** Study Intersection Locations  
Route 146 Corridor  
Branford, CT  
Guilford, CT

**Figure 1-A**  
Nov. 2020

EXISTING CONDITIONS TECHNICAL MEMORANDUM

## Route 146 Corridor Study

Town of Branford  
Town of Guilford

PREPARED FOR  
South Central Regional Council of  
Governments (SCRCOG)  
Town of Branford  
Town of Guilford

PREPARED BY  
**vhb**  
100 Great Meadow Road  
Suite 200  
Wethersfield, CT 06109  
860.807.4300

Issued: July 31, 2021

A photograph of a two-lane asphalt road with double yellow lines, surrounded by trees and utility poles. The road is flanked by greenery and utility poles with power lines. The scene is captured from a low angle, looking down the road.

**SAMPLE IMPROVEMENTS TO IMPROVE  
SAFETY IN THE STUDY AREA**

# LANE NARROWING

- Standard CTDOT lane width is 11 feet
- Narrow lane width (as low as 9 feet) can promote slower speeds and provide space for other purposes
- Narrower width may be appropriate in areas with limited daily traffic and truck traffic



A 10-ft lane installed in Hopkinton, NH



# BIKE SHARROWS

- Bike sharrow markings in lane can alert motorists to presence of bicyclists in roadway
- Sharrows likely appropriate based on vehicular volumes near beach and target speeds in this area



Bike Sharrow in Concord, NH

# BIKE LANES

- Bike lanes and other bike facilities can provide comfortable bike travel in ROW
- A buffer can also be striped to reinforce separation from motorists



Buffered Bike Lane in West Hartford, CT

# ON-STREET PARKING

---

- On-street parking can narrow roadway travel lanes by adding friction to traffic flow
- Parking can provide buffer for pedestrian zones



# SIDEWALKS

- Sidewalks provide a dedicated space for pedestrians
- 5 feet is preferred minimum width
- Sidewalks may not be feasible in areas with parking adjacent to roadway (e.g. near Bud's Fish Market)



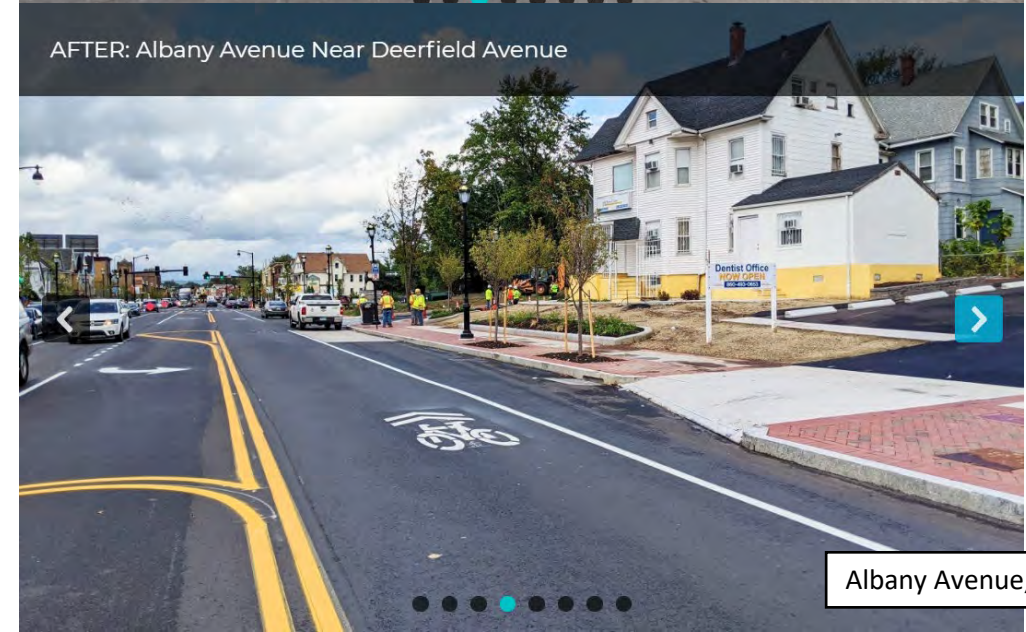
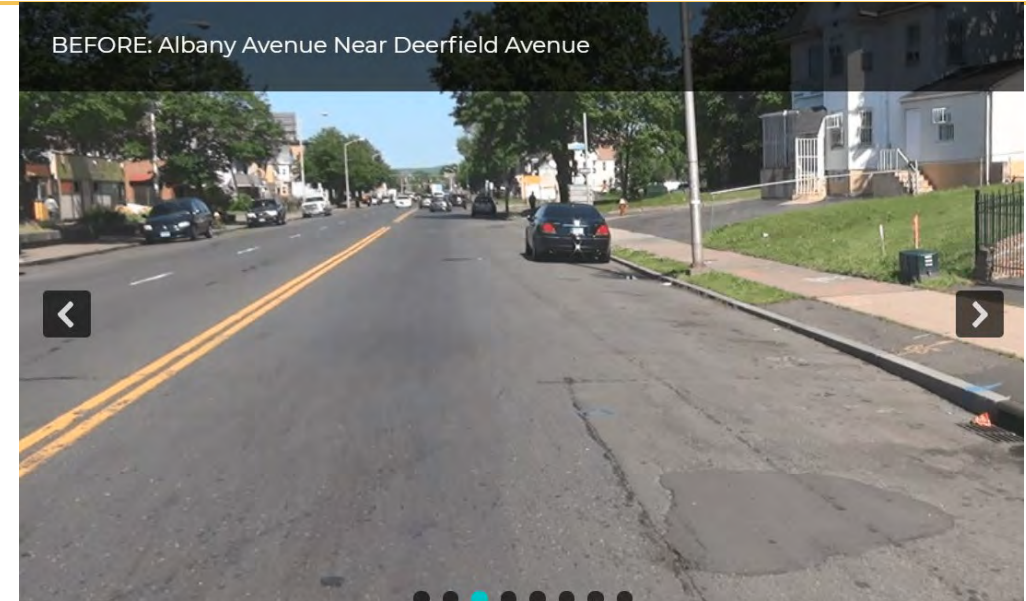
# PEDESTRIAN LANE

- A pedestrian lane can be striped on one side of the road to provide space for pedestrians
- This lane can be reinforced with vertical elements such as flex posts
- This can be a temporary solution until a permanent sidewalk can be constructed



# STREETSCAPE DESIGN

- Streetscape elements can communicate different priorities based on design with use of:
  - Curbing materials
  - Landscaping
  - Lighting
  - Sidewalk / Buffer Materials
  - Other amenities

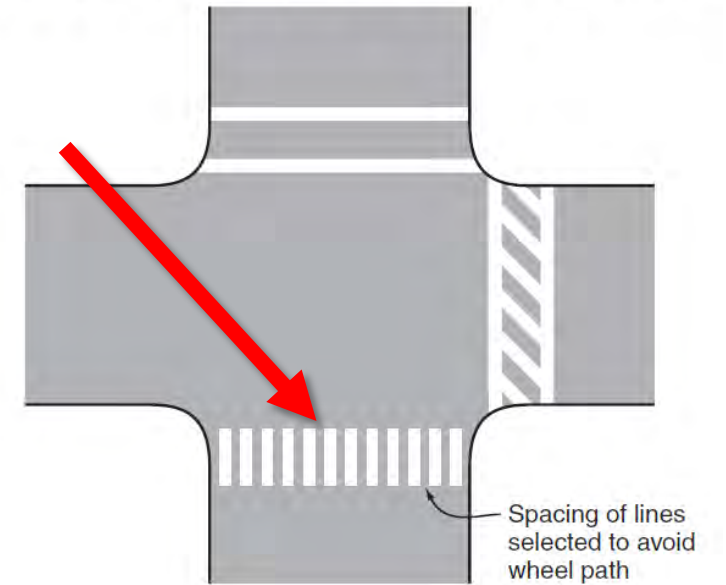


Albany Avenue, Hartford, CT

# CROSSWALKS

- Continental crosswalks provide the most visibility for crosswalks
- Continental crosswalks are already standard at many crossings, but some crossings do not have any markings

Figure 3B-19. Examples of Crosswalk Markings



# RAISED CROSSWALKS

- Improves pedestrian safety by causing motorist speeds to decrease at the crossing.
- Typically between 3 and 6 inches above street level. It is common for a raised crosswalk to be level with the street curb.
  - Height increases the visibility of a pedestrian in a crosswalk to a motorist.





# RRFB

- RRFB
  - Rectangular Rapid Flashing Beacon
  - Provides enhanced visibility of crosswalks, but is **not** a regulatory signal



# CORNER EXTENSION/BULBOUT

- A curb extension is a horizontal extension of the sidewalk into the street resulting in a narrower roadway and a shorter crosswalks.
- Slows automobile turning speeds, shortens pedestrian crossing distance, and increases pedestrian visibility



# ROUNDAABOUT

- Slows traffic by requiring horizontal deflection for entering vehicles
- Modern roundabout requires entering vehicles to yield to circulating traffic
- Roundabout provides opportunity for greenspace or gateway signage
- Roundabouts reduce vehicles speeding to make green lights etc.



# MINI-ROUNDAABOUT

- Similar to larger roundabout, but with a mountable median traversable by large trucks



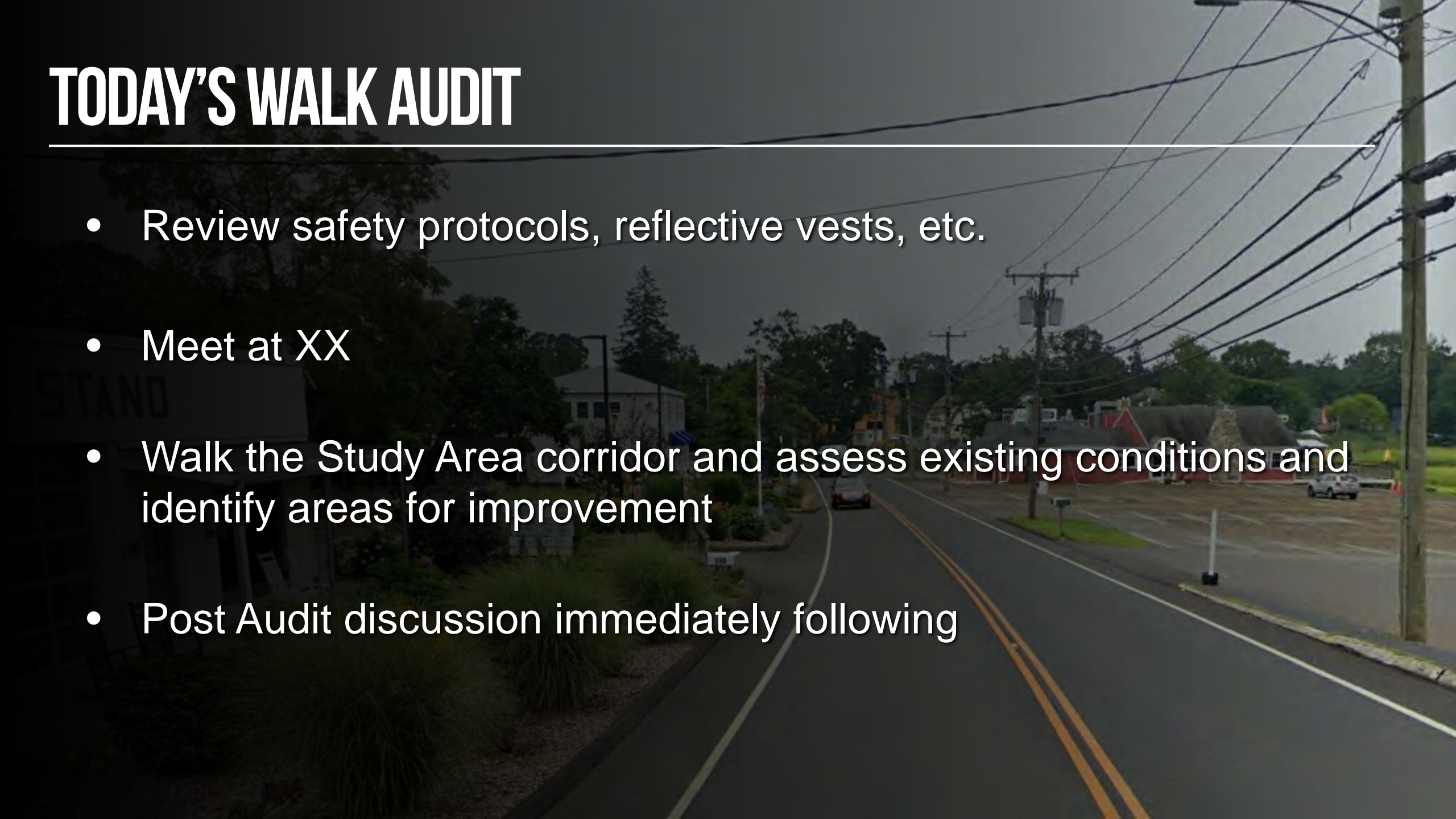
[Manchester Center, VT](#)  
VT Route 30 & 7A  
Diameter = 65'

A photograph of a paved road with a white car in the distance, surrounded by trees and a sign for 'THE LANDINGS' on the right. The road has a white center line and a white edge line. The car is a white SUV. The sign is a blue oval with white text. The background shows a clear blue sky and lush green trees.

**DISCUSSION ON  
ISSUES IN THE STUDY AREA AND  
OPPORTUNITIES**

# TODAY'S WALK AUDIT

---

- Review safety protocols, reflective vests, etc.
  - Meet at XX
  - Walk the Study Area corridor and assess existing conditions and identify areas for improvement
  - Post Audit discussion immediately following
- 

A street scene featuring a red SUV at an intersection. In the background, there is a building with a sign that reads 'MFG & WARRANTY'. The scene includes trees, utility poles with power lines, and residential houses. A large white text overlay 'THANK YOU!' is positioned in the lower center of the image.

**THANK YOU!**



## **Branford Road Safety Audit**

**Meeting Location:** Virtual Meeting

**Date and Time:** March 24<sup>th</sup>, 2:00 PM – 3:00 PM

### **Agenda**

- 1. Welcome and Introductions**
- 2. Pre-Audit Presentation and Discussion**
  - Definition of Study Area
  - Review Site Specific Data
    - Average Daily Traffic
    - Crash Data
    - Geometrics
- 3. Walk Audit Procedures and Safety**

### **Notes for Participants**

- All participants will be actively involved in the process throughout. Participants are encouraged to come with thoughts and ideas, as stakeholders' opinions are key elements to the success of the overall RSA process.
- After the RSA meeting, participants will be asked to comment and respond to the document materials to assure it is reflective of the RSA completed by the multidisciplinary team.





## **Branford Road Safety Audit**

**Meeting Location:** RT 146 Study Area

**Address:** TBD

**Date and Time:** 10:00 AM

### **Agenda**

- 4. Welcome and Introductions**
- 5. Review of Road Safety Audit Route**
- 6. Audit**
  - Visit Study Area
  - Complete Audit Checklist
  - Identify issues and opportunities for improvements
- 7. Post-Audit Discussion**
  - Discussion observations and finalize findings
  - Discuss potential improvements and final recommendations
  - Next Steps

### **Notes for Participants**

- All participants will be actively involved in the process throughout. Participants are encouraged to come with thoughts and ideas, as stakeholders' opinions are key elements to the success of the overall RSA process.
- After the RSA meeting, participants will be asked to comment and respond to the document materials to assure it is reflective of the RSA completed by the multidisciplinary team.



## Branford Audit Checklist

Pedestrians and Bicycles	Comment
<p><b>Pedestrian Crossings</b></p> <ul style="list-style-type: none"> <li>• Sufficient time to cross (signal)</li> <li>• Signage</li> <li>• Pavement Markings</li> <li>• Detectable warning devices (signal)</li> <li>• Adequate sight distance</li> <li>• Wheelchair accessible ramps               <ul style="list-style-type: none"> <li>○ Grades</li> <li>○ Orientation</li> <li>○ Tactile Warning Strips</li> </ul> </li> <li>• Pedestrian refuge at islands</li> <li>• Other</li> </ul>	
<p><b>Pedestrian Facilities</b></p> <ul style="list-style-type: none"> <li>• Sidewalk               <ul style="list-style-type: none"> <li>○ Width</li> <li>○ Grade</li> <li>○ Materials/Condition</li> <li>○ Drainage</li> <li>○ Buffer</li> </ul> </li> <li>• Pedestrian lighting</li> <li>• Pedestrian amenities (benches, trash receptacles)</li> <li>• Other</li> </ul>	

**Bicycles**

- Bicycle facilities/design
- Separation from traffic
- Conflicts with on-street parking
- Pedestrian Conflicts
- Bicycle signal detection
- Visibility
- Roadway speed limit
- Bicycle signage/markings
- Shared Lane Width
- Shoulder condition/width
- Traffic volume
- Heavy vehicles
- Pavement condition
- Other

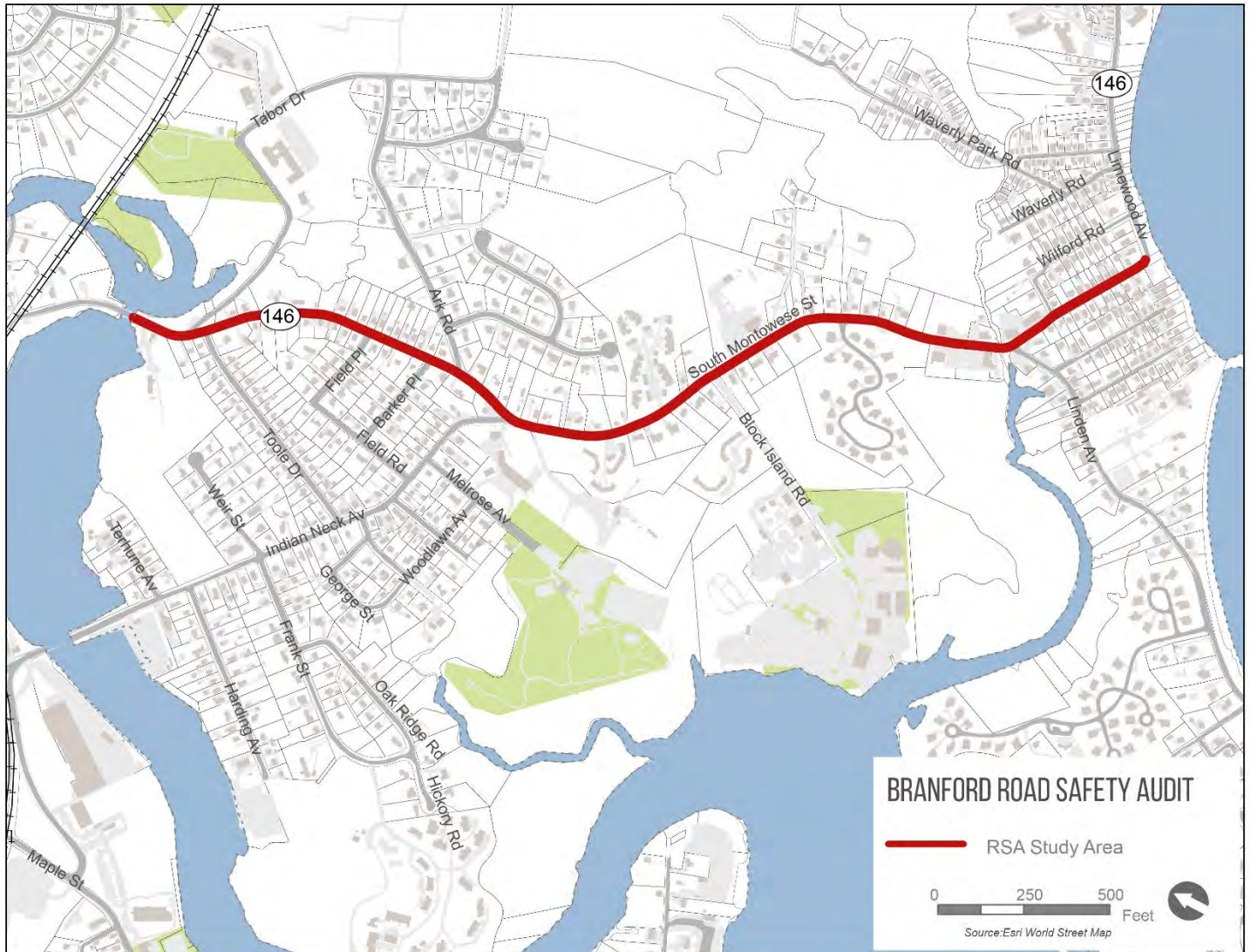
**Roadway & Vehicles**

- Speed-related issues
  - Alignment;
  - Driver compliance with speed limits
  - Sight distance adequacy
  - Safe passing opportunities
- Geometry
  - Road width (lanes, shoulders, medians);
  - Access points;
  - Drainage
  - Tapers and lane shifts
  - Roadside clear zone /slopes
  - Guide rails / protection systems
- Intersections
  - Geometrics
  - Sight Distance
  - Traffic control devices
  - Safe storage for turning vehicles
  - Capacity Issues

<ul style="list-style-type: none"> <li>• Pavement <ul style="list-style-type: none"> <li>○ Pavement Condition (excessive roughness or rutting, potholes, loose material)</li> <li>○ Edge drop-offs</li> <li>○ Drainage issues</li> </ul> </li> <li>• Lighting Adequacy</li> </ul>	
<ul style="list-style-type: none"> <li>• Signing <ul style="list-style-type: none"> <li>• Correct use of signing</li> <li>• Clear Message</li> <li>• Good placement for visibility</li> <li>• Adequate retroreflectivity</li> <li>• Proper support</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>• Signals <ul style="list-style-type: none"> <li>○ Proper visibility</li> <li>○ Proper operation</li> <li>○ Efficient operation</li> <li>○ Safe placement of equipment</li> <li>○ Proper sight distance</li> <li>○ Adequate capacity</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>• Pavement Markings <ul style="list-style-type: none"> <li>○ Correct and consistent with MUTCD</li> <li>○ Adequate visibility</li> <li>○ Condition</li> <li>○ Edgelines provided</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>• Miscellaneous <ul style="list-style-type: none"> <li>○ Weather conditions impact on design features.</li> <li>○ Snow storage</li> </ul> </li> </ul>	

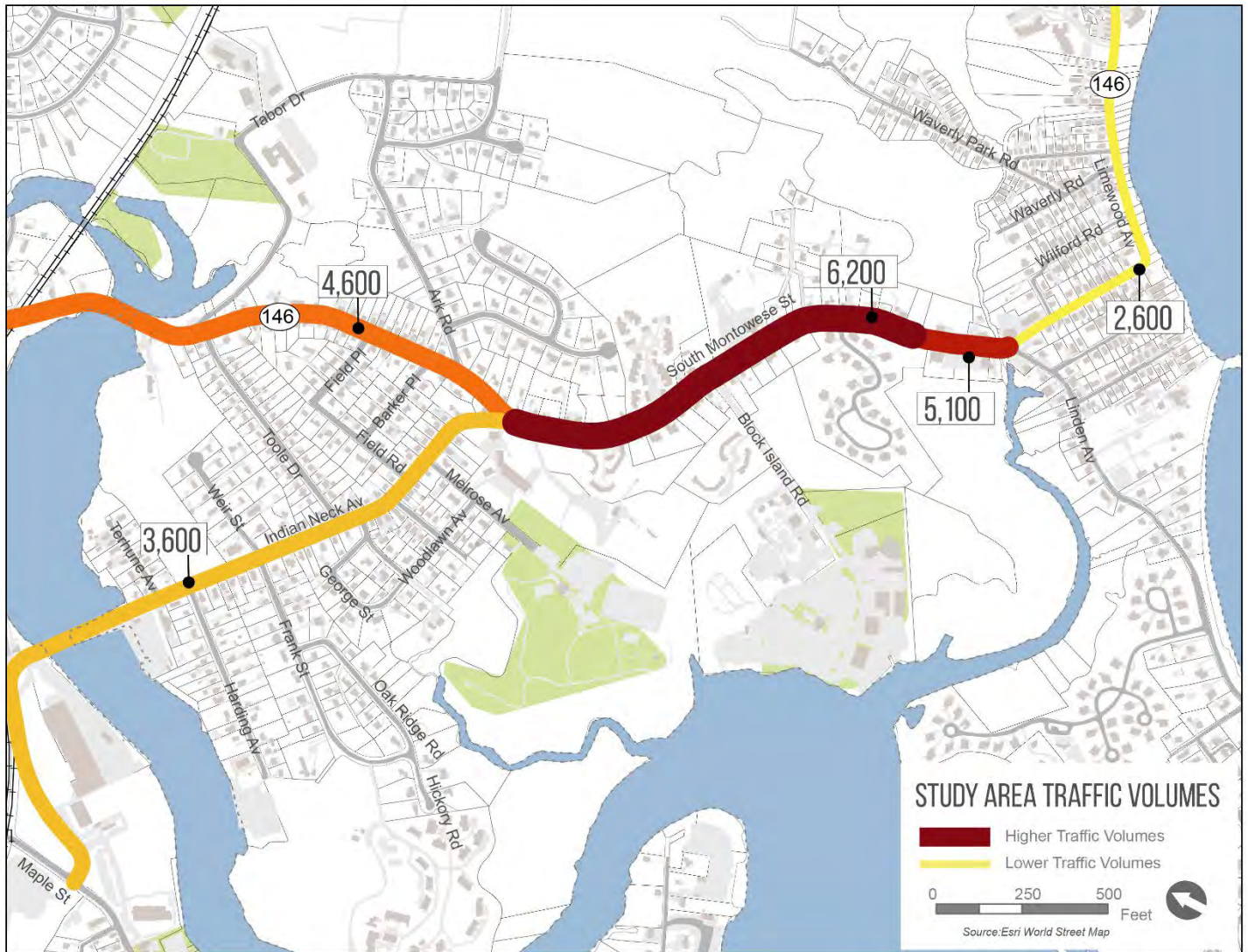
## Branford Road Safety Audit - Study Area

- Route 146 between the Branford River south to Limewood Avenue



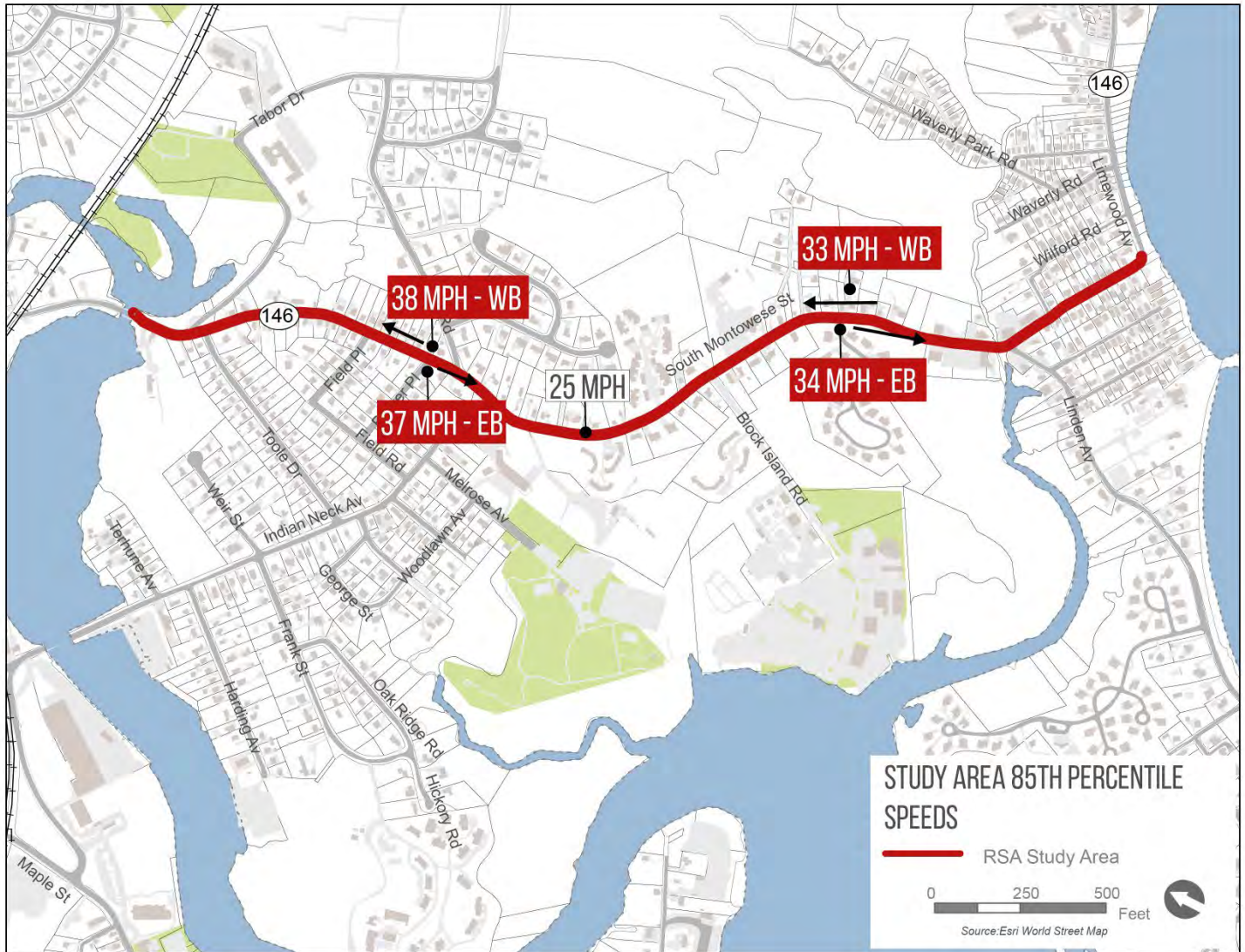
# Branford Road Safety Audit - Average Daily Traffic Volumes in 2020

\*(Note, during 2020 COVID-19, volumes were reported at less than half of these numbers)

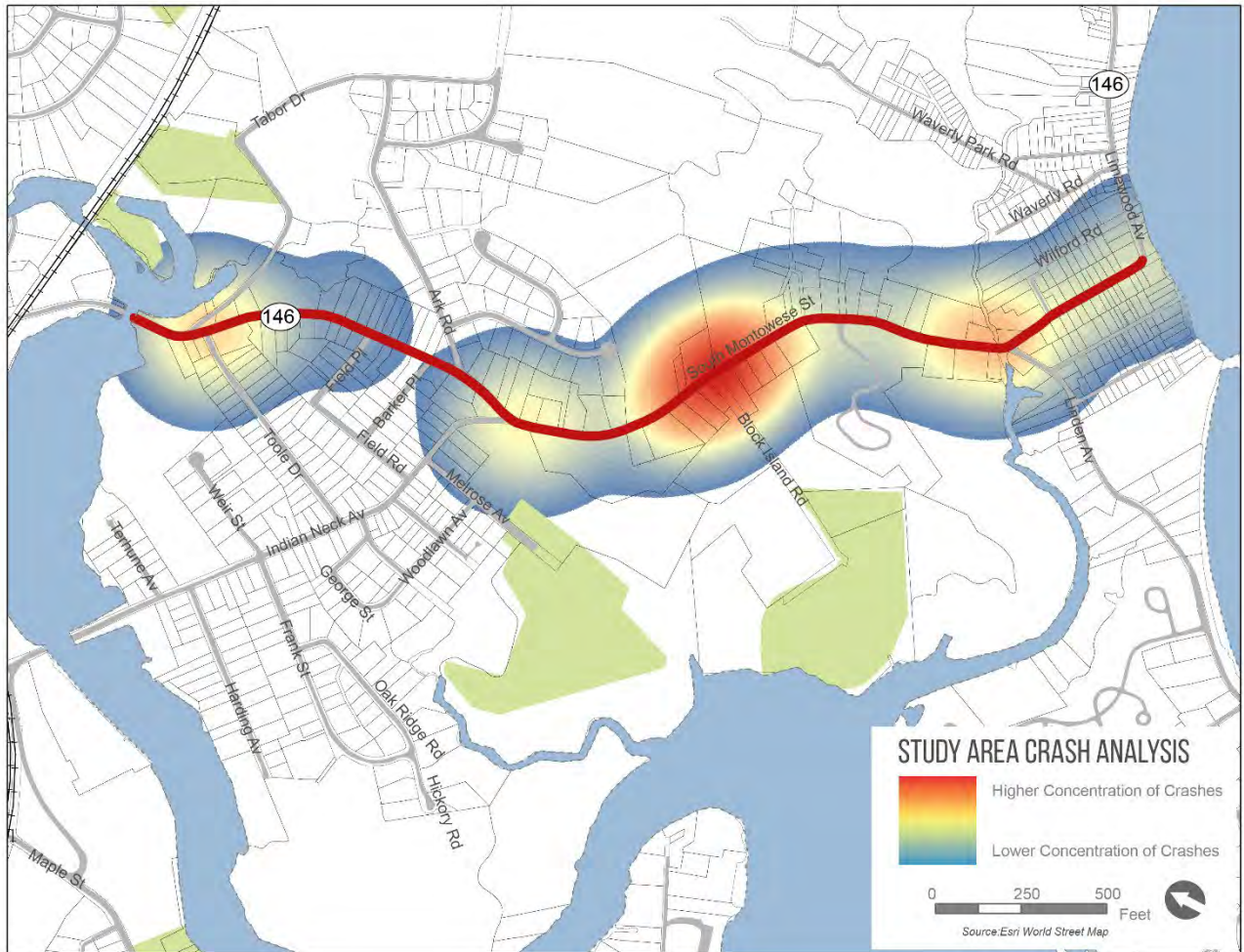


## Branford Road Safety Audit - 85<sup>th</sup> Percentile Speeds – 2020 and 2021

- Speed limit in Study Area is 25 MPH throughout. Based on data collected in Branford in July 2019, and speed surveys conducted by CT DOT in 2013, 85<sup>th</sup> percentile speeds on South Montowese Street were observed to be between 33 and 38 MPH. Average speeds ranged from 30 to 35 MPH.



# Branford Road Safety Audit - Crash Summary Heat Map





## Branford Road Safety Audit - Crash Summary

Years: 2016 – 2020

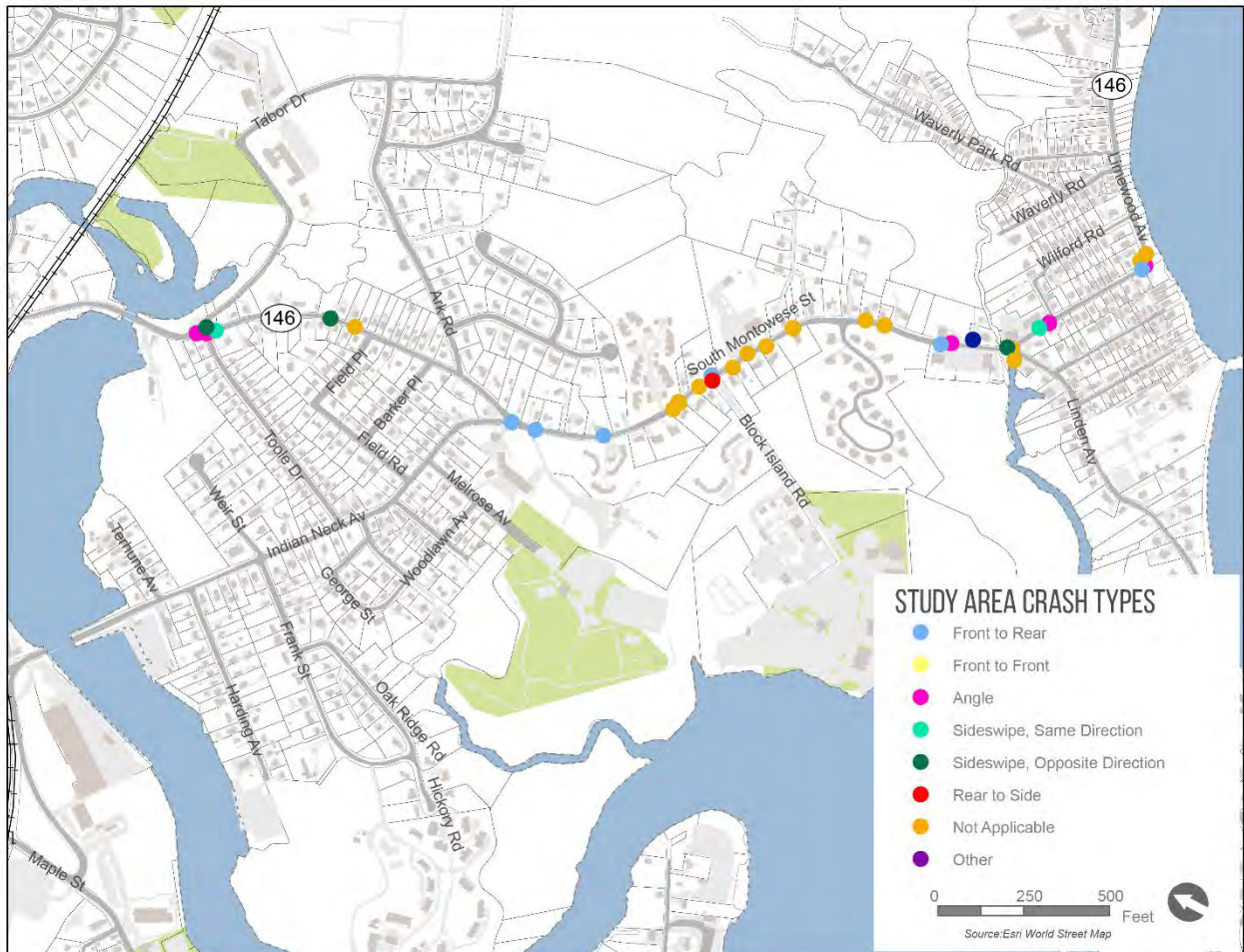
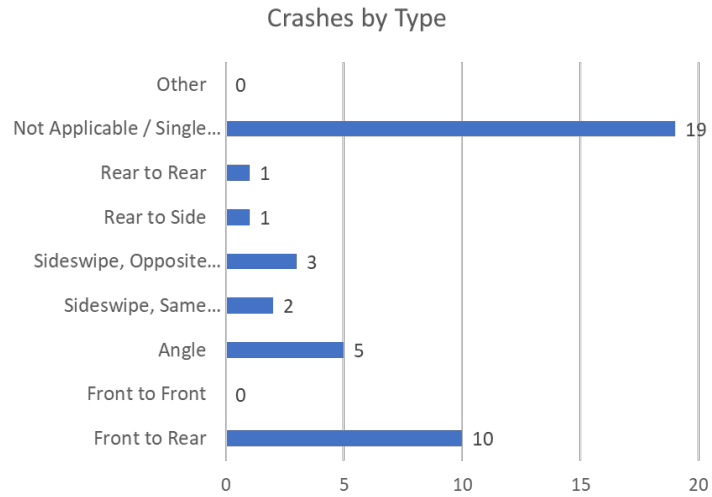
		Crash Severity					TOTAL
		Fatal Injury	Serious Injury	Minor Injury	Possible Injury	No Apparent Injury, Property Damage Only	
Crash Type	Front to Rear			2	2	6	10
	Front to Front						
	Angle					5	5
	Sideswipe, Same Direction					2	2
	Sideswipe, Opposite Direction				1	2	3
	Rear to Side					1	1
	Rear to Rear					1	1
	Not Applicable / Single Vehicle	1		4	1	13	19
	Other						
	<b>TOTAL</b>	<b>1</b>		<b>6</b>	<b>4</b>	<b>30</b>	<b>41</b>
Crashes Involving Pedestrians			1				
Crashes Involving Bicyclists					1		

### Summary Analysis:

Crash Hotspots (5 Year Crash Total approx.) 41 Crashes Total

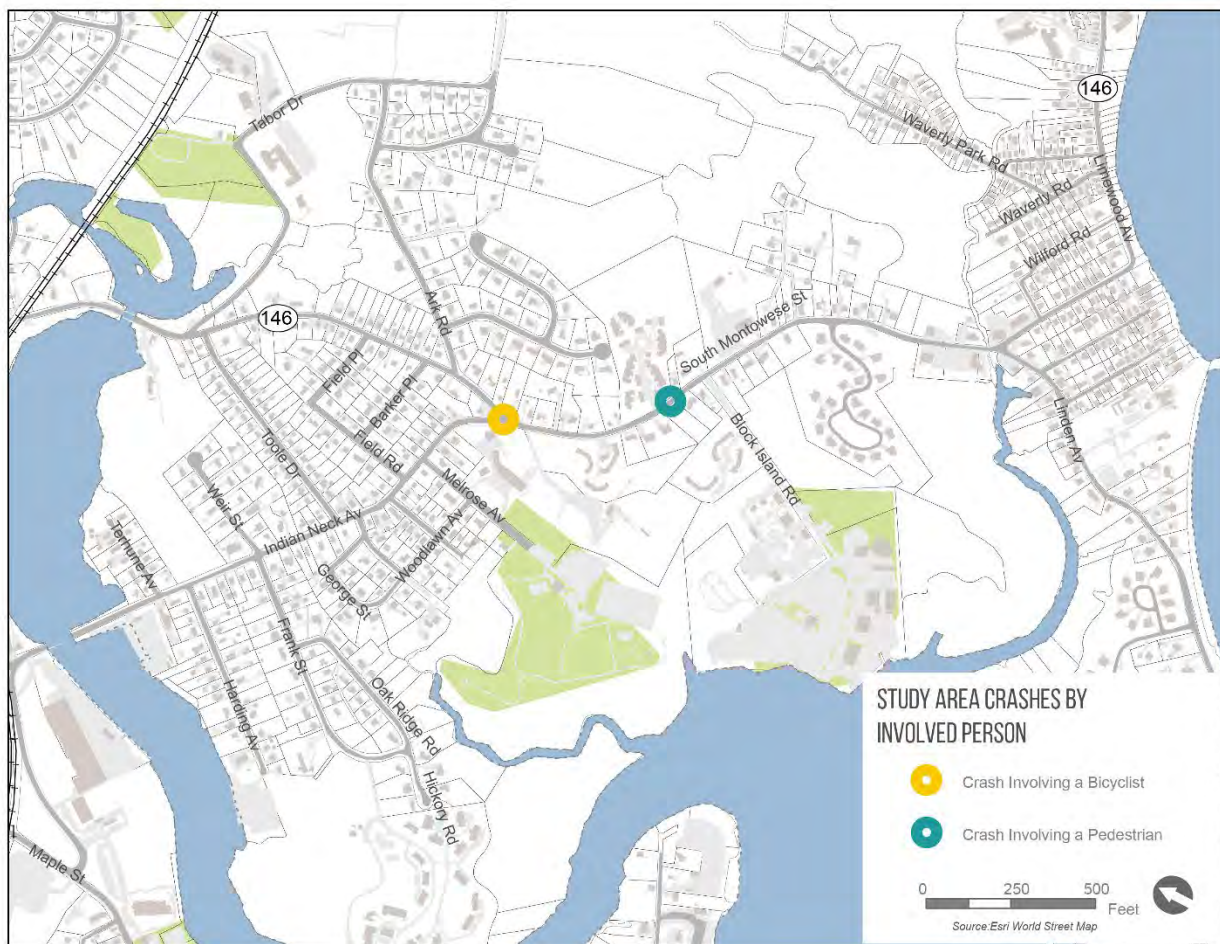
- Rte 146 & Block Island Road
- Rte 146 & Linden Avenue
- Rte 146 & Toole/ Tabor Drives
- Rte 146 & Indian Neck Avenue

# Branford Road Safety Audit Crash Summary - Crashes by Type



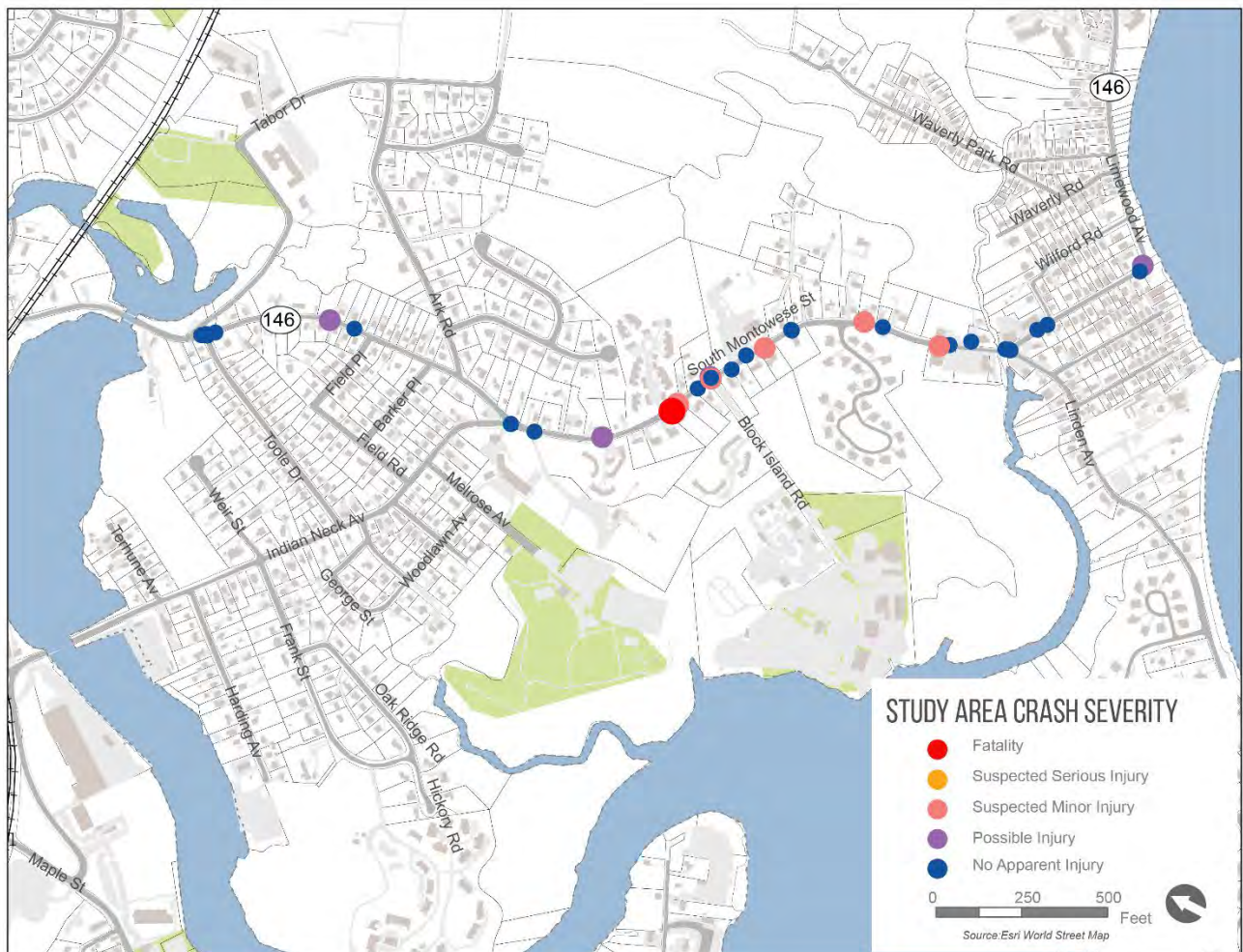
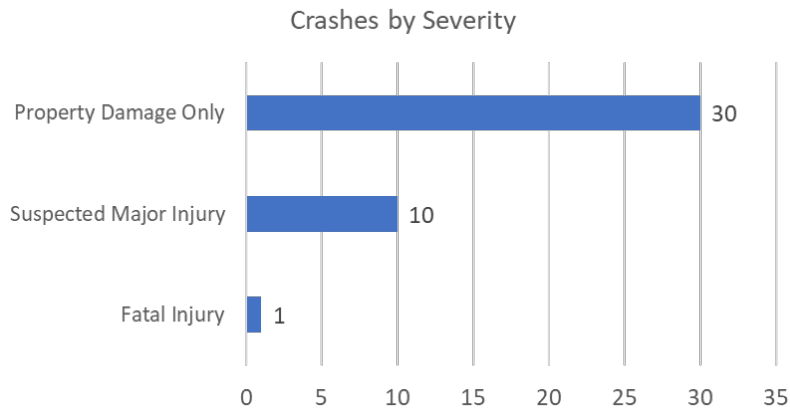
## Branford Road Safety Audit Crash Summary - Crashes by Involved Person

- There was 1 crash involving a bicyclist in the Study Area (2019)
- There was 1 crash involving a pedestrian in the Study Area (2020)



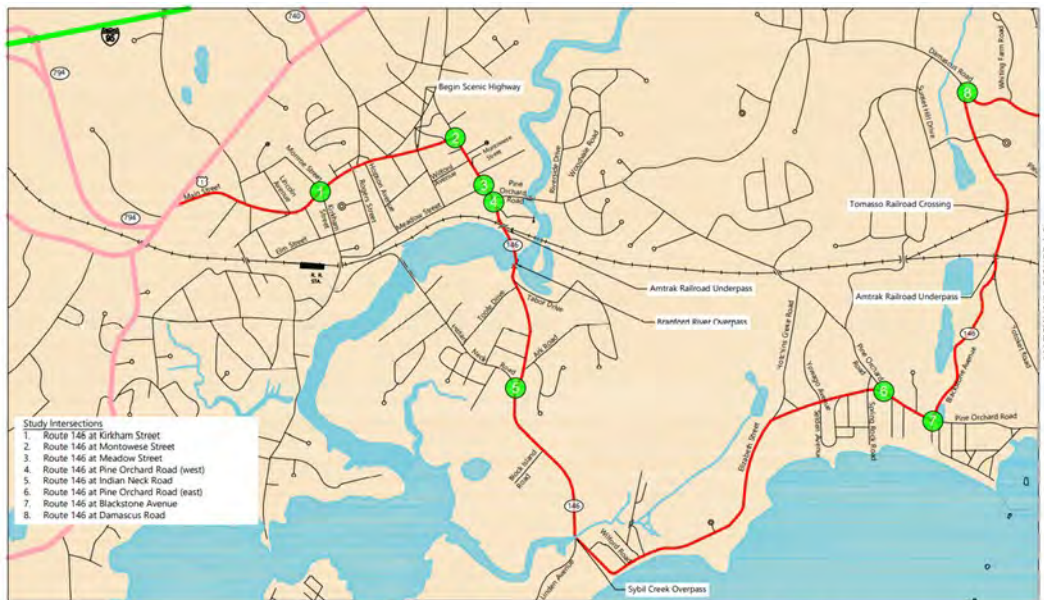
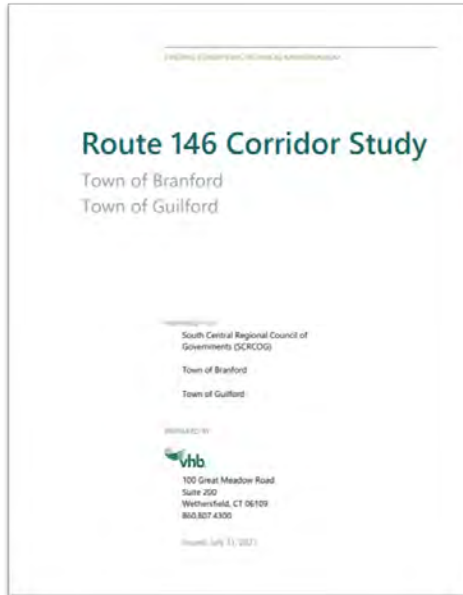
## Branford Road Safety Audit Crash Summary - Crash Severity

- Majority of crashes are classified as No Apparent Injury- Property Damage Only
- There were 11 crashes resulting in at least one injury with 10 crash resulting in a major injury and 1 fatality south of the Great Oaks condominium complex in 2017



# Branford Road Safety Audit – Review of Past and Current Work

- Route 146 Existing Conditions Technical Memorandum – Completed in July 202



**LEGEND**  
 ● Study Intersection  
 — Study Corridor

0 600 1200 Feet

vhb Study Intersection Locations  
 Route 146 Corridor  
 Branford, CT  
 Guilford, CT

**Figure 1-A**  
 Nov. 2020

MATCHLINE FIGURE 1-B

## **Branford Road Safety Audit - Post Audit Discussion Guide**

### **Safety Issues:**

- Confirmation of safety issues identified during the pre-audit meeting and the walk audit

### **Potential Recommendations to Address Issues:**

- **Short Term Recommendations**
  
  
  
  
  
  
  
  
  
  
- **Medium Term Recommendations**
  
  
  
  
  
  
  
  
  
  
- **Long Term Recommendations**

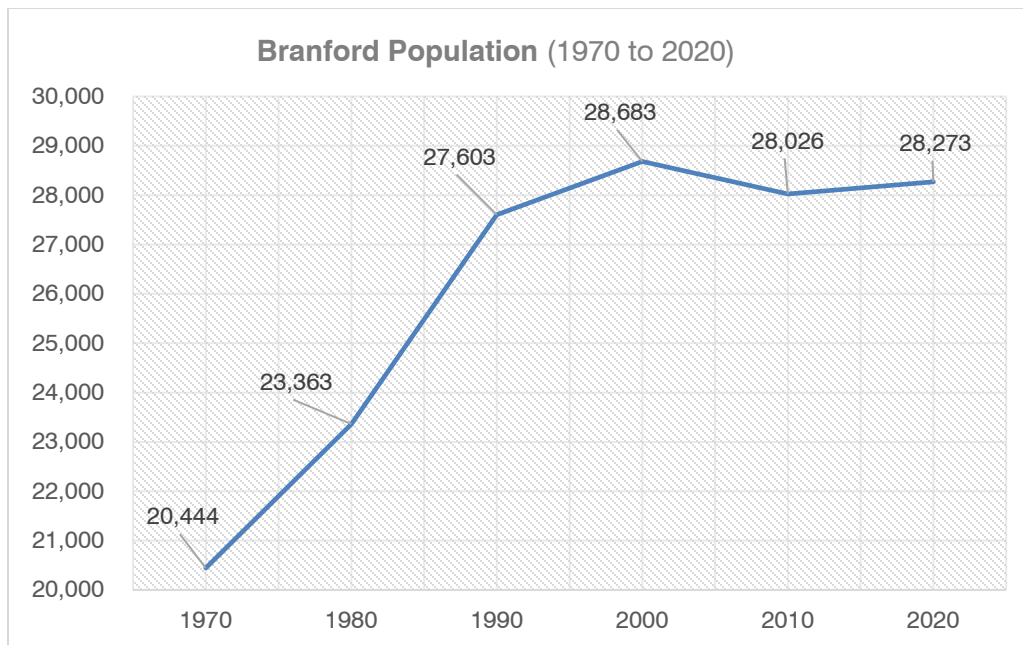
### **Next Steps**

- Discussion involving implementation strategies and responsibilities and funding sources

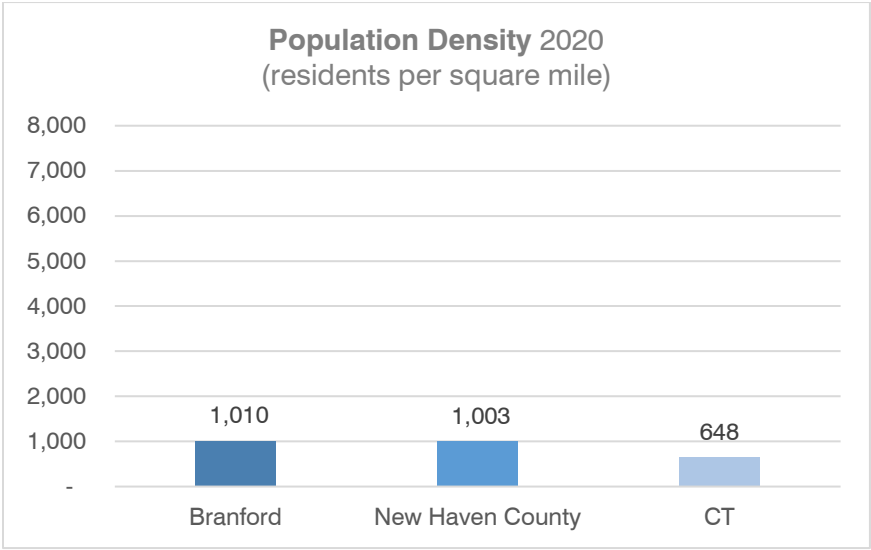
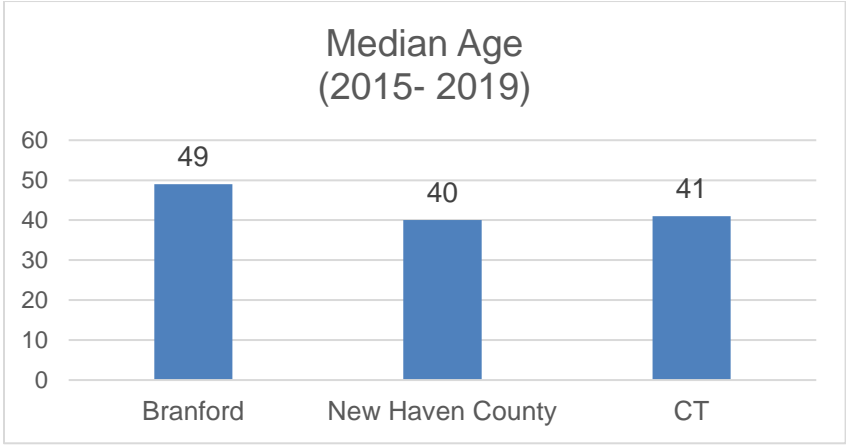
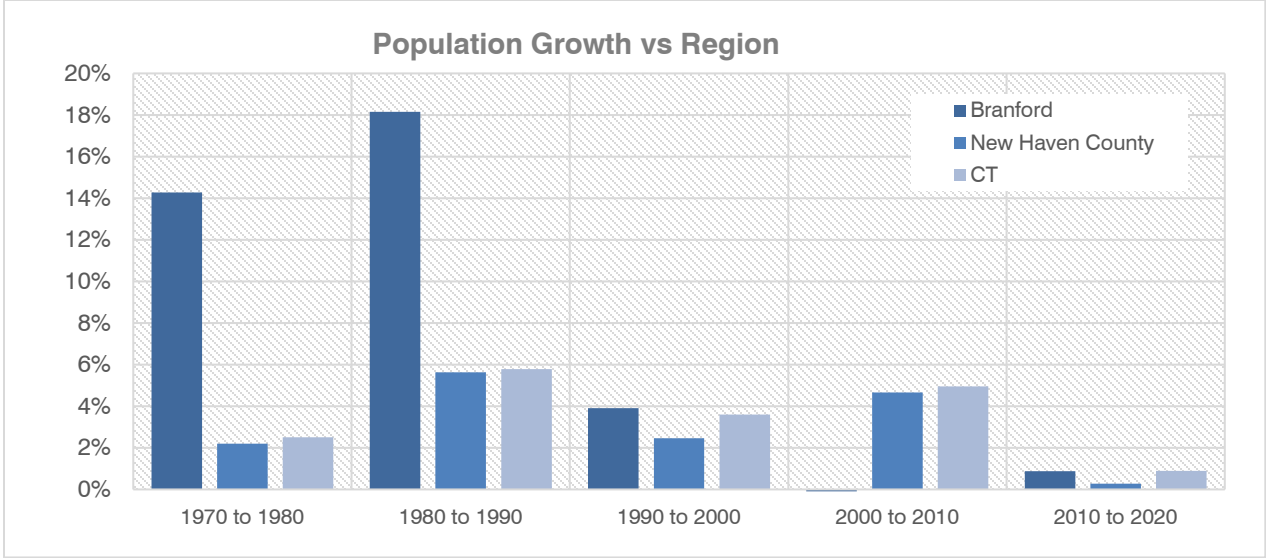
## Branford Road Safety Audit – Branford Fact Sheet

### Demographic Highlights<sup>1</sup>:

- Total population in Branford is 28,273.
- Branford has outpaced both New Haven County and the State in population growth between 1970 and 2020 despite losing population (2.3%) between 2000-2010.
- There are approximately 1,010 residents per square mile in Branford which matches the density of New Haven County. It is nearly twice as dense as the State (648 residents per square mile).
- The median age in Branford is 49, which is nine years older than that of New Haven County, and eight years older than the State's median age.
- Branford's non-white population makes up just over 11% of the total population. This is well below that of New Haven County's non-white population (27.3%) and below the State's non-white population (24.7%).
- The poverty rate in Branford is just under 6% (5.9%), which is below New Haven County's 11.7% and the State's 9.9%.

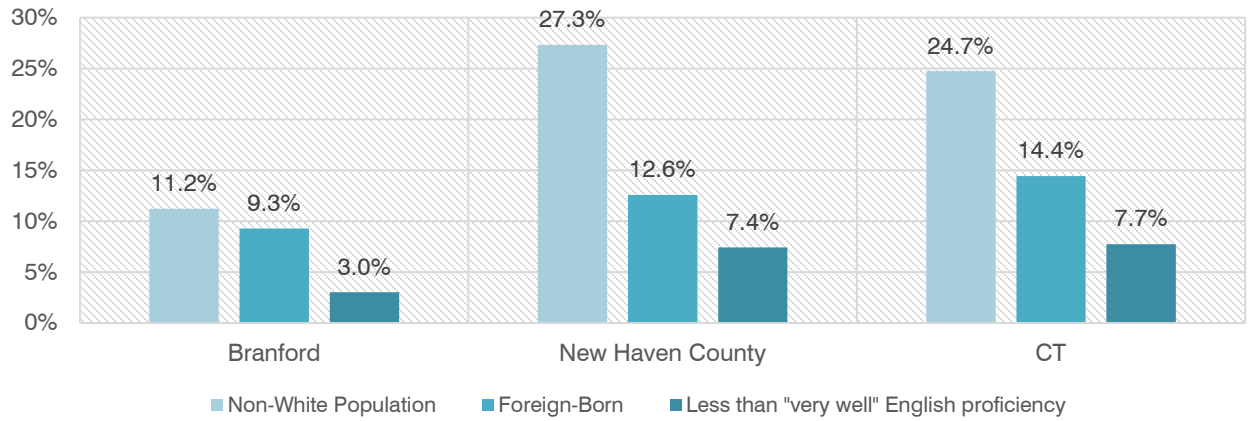


<sup>1</sup> 2020 Decennial Census and 2015- 2019 American Community Survey, 5- year estimate table DP05, Accessed on 1/7/2022 at <https://data.census.gov/cedsci/>

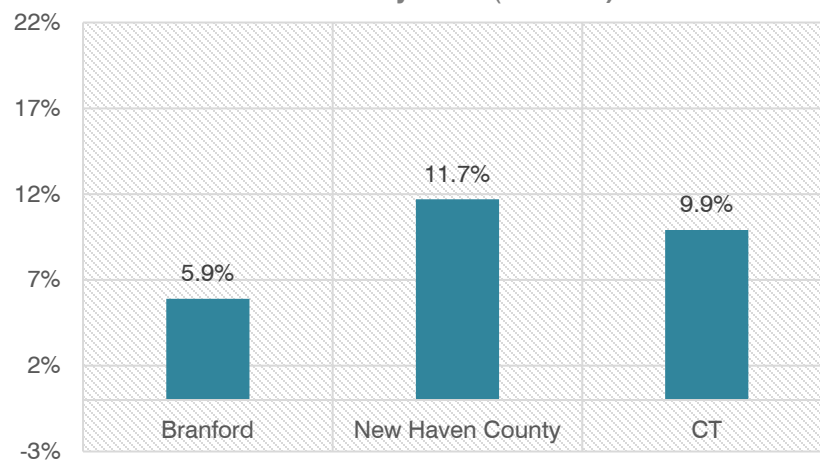




**Diversity Indicators 2015-19**  
(% of population)



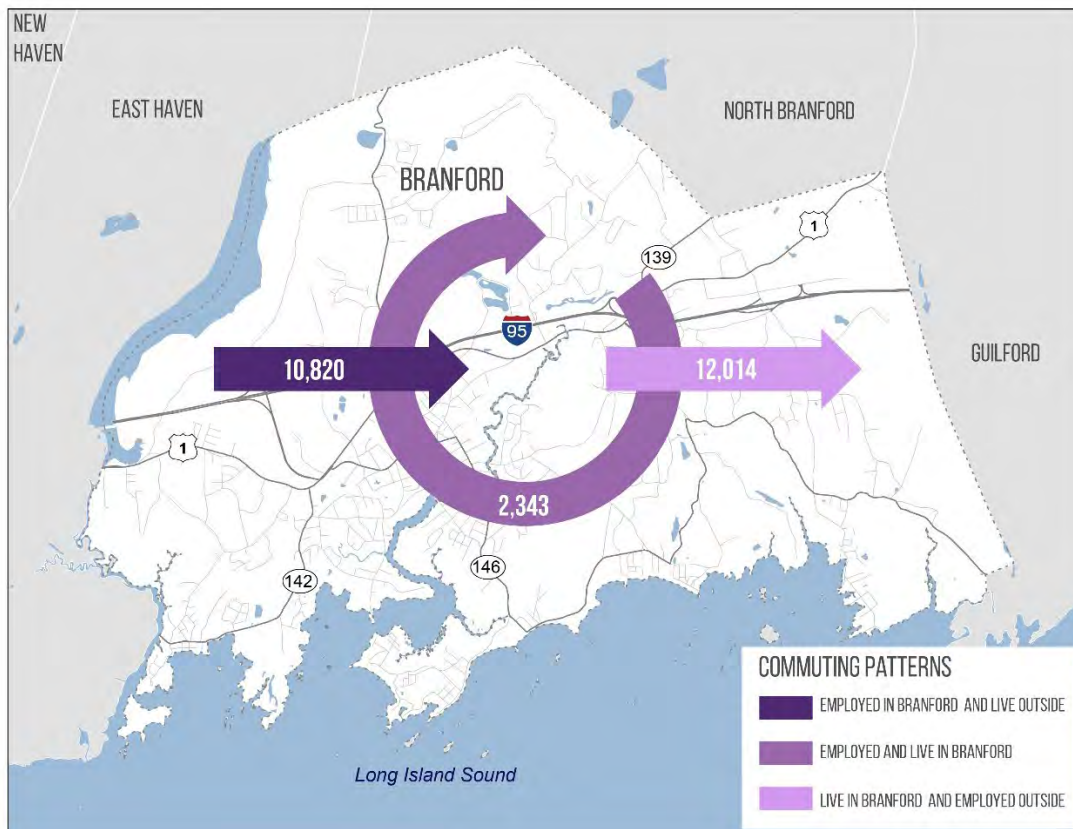
**Poverty Rate (2015-19)**



## Branford Road Safety Audit – Branford Fact Sheet

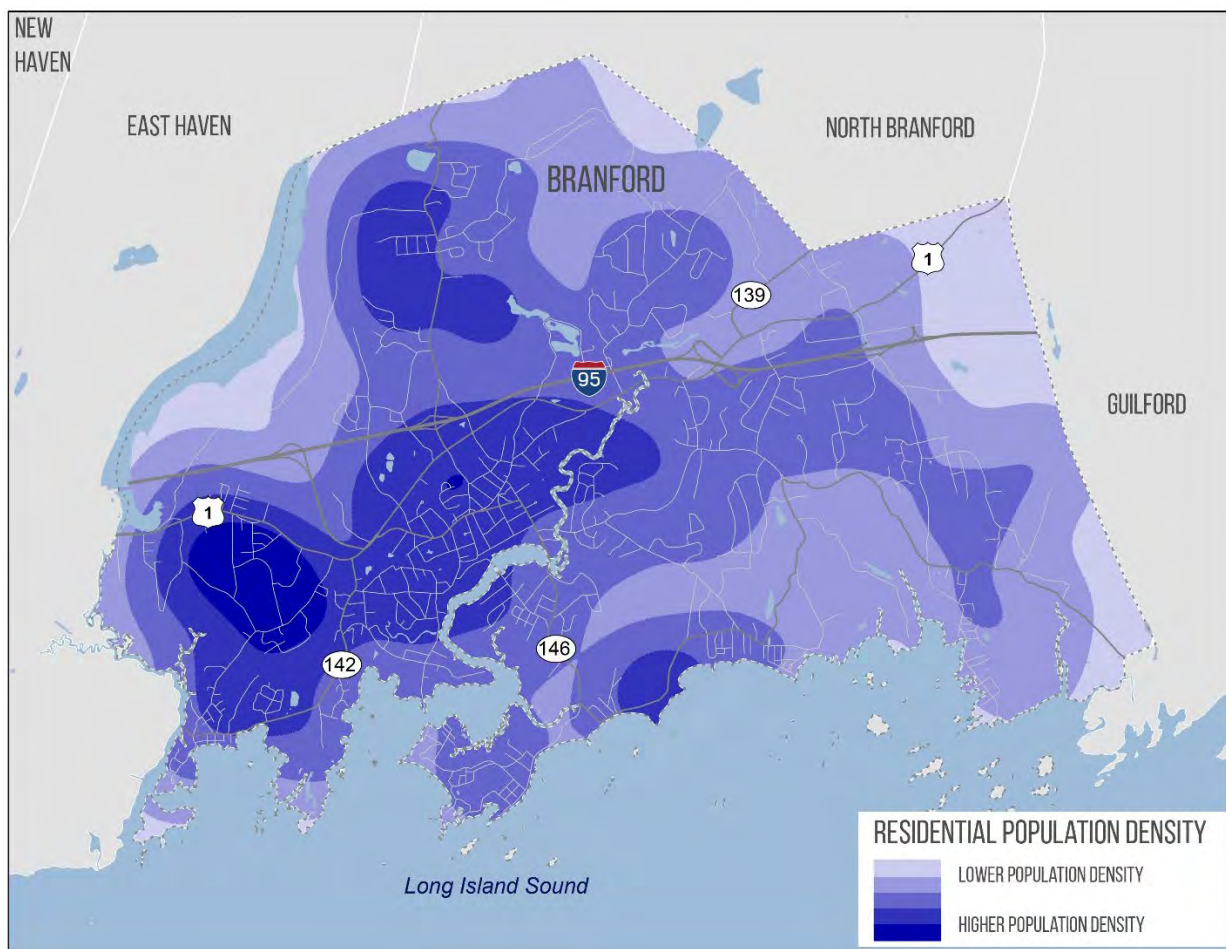
### Employment Highlights<sup>2</sup>:

- There were approximately 10,820 workers commuting into Branford for employment in 2019. Approximately 2,343 residents of Branford are also employed in Branford and 12,014 Branford residents commuted out of town for employment. (2019)
- The top five employment destinations for Branford’s residents include:
  - New Haven
  - Branford
  - North Haven
  - West Haven
  - Milford
- The Study Area and surrounding neighborhoods have a medium to low population density. The Study Area is home to many residential beach neighborhoods which typically have smaller lots and greater densities of homes. The Study Area is home to both yearly and seasonal residents.



<sup>2</sup> U.S. Census Bureau. (2021). LEHD Origin-Destination Employment Statistics (2002-2019) All Jobs. Washington, DC: U.S. Census Bureau, Longitudinal-Employer Household Dynamics Program, accessed on December 28th, 2021 at <https://onthemap.ces.census.gov>. LODS 7.5

## Residential Population Density



## Branford Road Safety Audit – Location Highlights

- Roadway functional classifications near the Study Area are as follows:
  - Route 146 – Collector Roadway
- Traffic volumes in the Study Area vary between 6,200 vehicles per day on South Montowese Street between Indian Neck Avenue and north of Linden Avenue, and 2,600 vehicles per day in the vicinity of Sybil Avenue and Limewood Avenue.

