Town of Scarborough, Maine

Town-Wide Transportation Assessment: Moving Scarborough Forward

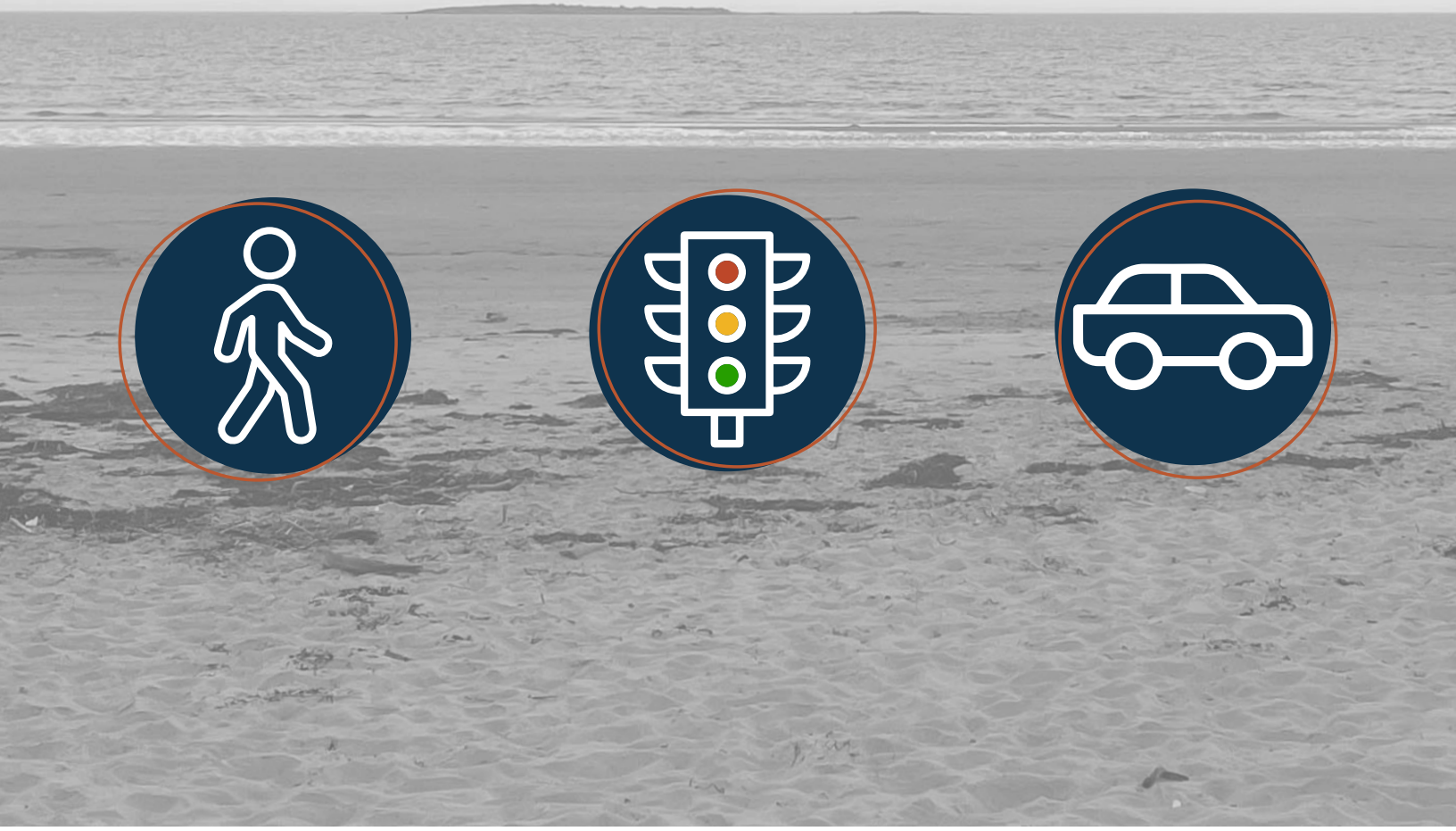
November 2024

Transportation systems are essential to every city. In Scarborough, we aim to develop transportation networks that align with our community's values and the visions outlined in this document. These systems will reflect our shared goals and contribute to a future of efficient and connected mobility.

We are dedicated to providing efficient and safe transportation options for residents and visitors. We aim to build a system for people that meets their needs while addressing the realities of climate change head-on.

This plan is how we get there.

Prepared for the Town of Scarborough by Barton & Loguidice, LLC and TYLin Group.
• November 2024 •



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Section 1 • Introduction to the Town-Wide Transportation Study

Introduction

The Town of Scarborough has thoughtfully developed guiding principles to enhance the efficiency and accessibility of its transportation network. These principles form the foundation of our transportation study and will direct all proposed improvements. Our goal is to ensure that changes align with the needs and values of the town and its residents and visitors. These guiding principles will guide us toward the best solutions for improving transportation in Scarborough.

Guiding Principles

Scarborough's primary goal is to create a multi-modal transportation network that promotes health, safety, economic viability, quality of life, and accessibility for residents, pedestrians, bicyclists, transit riders, and motorists. This will be achieved by implementing the following action items:

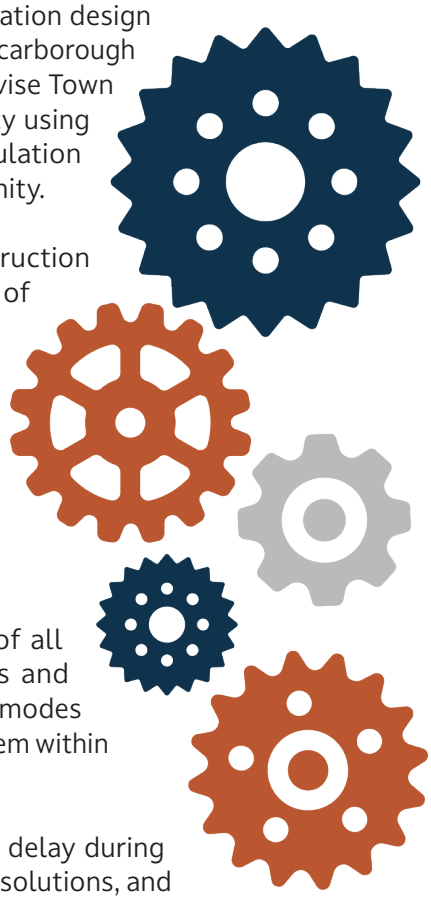
1. **Implement Complete Streets** • Update, develop, and adopt transportation design standards and guidelines and Complete Streets Policies for the Town of Scarborough to enhance safety, mobility, and multimodal network connectivity. Revise Town ordinances to encourage and expand multimodal network connectivity using Complete Streets policies, reflecting the Town's economic and population growth, and creating an appealing, enjoyable, and sustainable community.

2. **Provide Safety Measures** • Prioritize safety in the design and construction of infrastructure for all modes of transportation within the Town of Scarborough.

3. **Create Multi-modal Network** • Increase transportation options within the Town of Scarborough by growing and improving multimodal network connectivity and mobility and enhancing transit access and alternatives. Establish multimodal design requirements for different roadway types including rural, sub-urban, and in-town roadways and protected or separated bicycle and pedestrian infrastructure.

4. **Meet Transportation Demands** • Consider the needs of travelers of all modes including pedestrians, bicyclists, drivers, and transit users and optimize transportation improvements to achieve a balance between modes of transportation. Increase the capacity of the whole transportation system within the Town of Scarborough.

5. **Encourage Connectivity** • Reduce travel time, traffic congestion, and delay during peak hours by expanding roadway connectivity, implementing mobility solutions, and offering a well-connected network of bike and pedestrian travel options.



Section 1 • Introduction to the Town-Wide Transportation Study

What follows is a comprehensive list of definitions for words and phrases used throughout this document.

Access Point	The intersection where a road or driveway meets a public street.
Access Management	Design strategies used at entry and exit points along a main road to control and improve traffic flow.
Access Spacing	The distance between road entrances.
Acute Angle	An angle less than 90 degrees, which is not ideal for intersections.
Advanced Warning Sign	A sign intended to alert drivers about upcoming changes in traffic patterns.
All-Way Stop	An Intersection where all roads have stop signs.
Backage and Frontage Roads	Roads running parallel to the main road, either in front of or behind buildings.
Bollard Sign	A sign placed in the center of the roadway intended to slow down vehicles and help pedestrians cross safely.
Bridge Abutment	The part of a bridge that connects to the ground and supports the bridge.
Capacity	The maximum number of vehicles a roadway can handle using all lanes.
Center Median with a Pedestrian Refuge	A raised island in the middle of a roadway with an area for pedestrians to wait before continuing to cross the road.
Channelized Right Turn Lane	A designated lane for smooth right turns at an intersection, often marked by pavement or curbs.
Concurrent Left Turns	When two opposite left-turn lanes can turn at the same time while other traffic is stopped.
Concurrent Pedestrian Phase	When pedestrians can cross the street in the same direction as the parallel traffic.
Conflict Point	The spot where different traffic paths cross each other in an intersection and crashes can occur.
Connector	A road that links one state highway to another.
Consolidation of a Driveway	Combining multiple driveways into one to reduce the number of road entries.
Construction Engineering	The engineering required to oversee the design, bidding, and construction process of a project.
Controlled Intersection	An intersection managed by traffic signals, stop signs, or yield signs.
Corrective Action	Steps taken to fix any problems with a road or intersection.
Corridor	A designated area used for transportation by one or more types of transportation.
Corner Property	A property located at an intersection, bordered by one or more streets.
Crash Diagram	A visual representation of a road or intersection showing past crashes created to understand how they happened and how to prevent them.
Crash Pattern	Repeated collisions occurring at the same place under similar conditions.
Crash Rate	The number of crashes in a specific area over a certain time, divided by the total number of vehicles using that area.
Critical Rate Factor (CRF)	The ratio of the crash rate at a specific location to the average crash rate for similar roads in the state.
Curb	The raised edge of a road or path, usually made of stone or concrete.
Cycle Length	The total time it takes for all traffic signals at an intersection to complete one full sequence.
Delay	The time lost by drivers, bicyclists, or pedestrians at traffic signals or pedestrian crossings.
Design Application	How a road is planned and built to meet the needs of its users.

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Development	A new construction project that is starting or in progress.
Diverging Diamond Interchange	A road design that lets traffic cross to the left side to improve traffic flow and decrease conflict points, often used near highways.
Driveway Entrance	The entry point to a private or public road.
EB (Eastbound)	Traveling towards the east.
Enter Only Driveway	A road section where vehicles can enter but not exit.
Esplanade	The space between the road shoulder and the sidewalk, often planted with grass or trees.
Existing Lane Use	The current direction in which a vehicle may travel in a lane (right, left, or through) before any proposed changes are made to an intersection.
Exit Only Driveway	A road section where vehicles can exit but not enter.
Failing to Yield	When drivers do not wait for a clear space or give the right of way appropriately before moving.
Flasher	An automated device that rapidly turns a light on and off.
Four Lane Road	A road with two lanes in each direction.
Four-Way Intersection	An intersection where four roads meet.
Free Flowing Legs	Roads at an intersection that don't have traffic signals or stop signs.
Future Study	A need for preliminary or additional analysis of an area before possible solutions or improvements can be recommended.
Heavy Volumes	A large number of vehicles on a road.
High Crash Location (HCL)	A place with a high number of crashes compared to the traffic it handles, meeting the following specific criteria: critical rate factor greater than or equal to 1.0 and at least eight crashes in a three-year period.
Highway Segment	A section of a highway.
High Visibility Thermoplastic Crosswalk Marking	Crosswalk markings made with reflective, durable thermoplastic inlay that can be easily seen by drivers.
Inbound Lanes	Lanes for traffic entering from another road network.

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Injury Classifications According to the Federal Highway Administration	1. Fatality (K): Death caused by a crash within a 30-day period after the crash has occurred. 2. Serious Injury (A): Injury that prevents a person from walking, driving, or performing normal day-to-today activities. 3. Minor Injury (B): Injuries which are visible (examples include and are not limited to contusions, lacerations, bloody nose) but allows for the continuation of day-to-day activities. 4. Possible injury (C): Complaint of pain with no visible injury. (examples include and are not limited to unconsciousness, limping, nausea) 5. No Injury (O): There are no injuries as a result of the crash.
Interconnectivity Regulations	Rules for how roads should connect and the standards they must follow.
Intersection	Where two or more roads meet.
Intersection Movement Crash	A crash at an intersection caused by vehicle movements like unsafe turns.
Lane Utilization	How much traffic uses each lane of a road.
Left Turn Lanes	Lanes marked with paint or signs specifically for making left turns at intersections.
Lengthening of Lanes	Extending a lane to hold more cars waiting at an intersection.
Maine Department of Transportation (MaineDOT)	The Maine Department of Transportation, which manages transportation across the state.
Major Arterial	A main road that connects highways to cities or towns.
Major Roads	Main roads with a lot of traffic.
Mast Arm	A large pole with a horizontal arm that holds traffic lights.
Median Breaks	Openings in the middle divider of a road for turning.
Median Island (Raised Median)	A raised area in the middle of a road, often with plants, intended to slow traffic and look appealing.
Merge Tapers	Road markings that help guide traffic from one lane to another, especially at high speeds.
Minor Roads	Smaller roads with less traffic.
Mobility	The ability to move around easily, whether by car, bike, walking, etc.
Modes	Different ways of traveling, like by car, bike, train, boat, or plane.

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Multimodal	Allowing and using different ways of traveling.
NB (Northbound)	Traveling towards the north.
Network Connectivity (Roadway Connectivity)	How different roads connect to create routes to various places.
New Ownership	The legal process of becoming the new owner of a property.
Offset	The distance something is set back from another thing, like a road.
Ordinances	Local laws, codes, and regulations passed by the Scarborough Town Council.
Overhead Flashing Beacon	A traffic signal above the road that flashes to control or warn traffic.
Overpass	A road that goes over another road.
Parcel	A small piece of land separated from a larger area, often for sale or development.
Peak Hour	The busiest hour of traffic on a road each day.
Pedestrian Beacon (HAWK Signal)	A light over the road that is activated by a pedestrian pushing a button that stops traffic on both directions so that the pedestrian can cross safely.
Pedestrian Crosswalks	Marked paths indicating where people should cross the road.
Pedestrian Phase	The time allowed for pedestrians to cross a road at crosswalks.
Perimeter Blinker Lights	Lights around the edges of a sign.
Permissive Phase	When left-turning cars are allowed to turn left while vehicles traveling in the opposite direction can move through the intersection, creating a need for left turning cars to wait for a clear space before turning.
Phase	A specific time when cars can move in a certain direction at an intersection without conflicts.
Phase Sequencing	The order in which cars from different directions move through an intersection.
Planning Level Cost	A preliminary estimate of the funding required to construct a project, created before the project has been designed.
Plaza	A shopping center or open public space in a city or town.
Professional Engineering	The work and time required by professional engineers to design a project to completion.

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Protected Left Turn/ Protected Phase	When left-turning cars are allowed to turn left only when all other vehicles are the intersection are stopped by a red light.
Queue	A line of vehicles waiting at a traffic signal, stop sign, or yield sign.
Queue Length	The distance from the stop line to the end of the line of waiting cars.
Raised Walkway	A raised path with railings for pedestrians next to a road.
Realign Entrance	Moving to a better location or changing the angle of a driveway due to existing problems.
Rear End Crash	When one car crashes into the back of another car.
Rectangular Rapid Flashing Beacons (RRFB)	Flashing lights paired with pedestrian crossing signs that alert drivers to pedestrians using a crosswalk.
Restricted Crossing U-Turns (RCUT)	A safer intersection design that allows for U-turns and easy access to major roads.
Re-Stripe	Changing the road lines to create new traffic patterns.
Right of Way	The land around a corridor, bound by property lines, in which a town or state may construct improvements.
Right Turn Lanes	Lanes specifically for making right turns at intersections.
Roadway Classification	Categorizing roads as highways, arterial, collector, or local for better management and planning.
Roadway Safety Audit (RSA)	A review of a road or intersection to identify safety issues and needed improvements.
Roadway Segment	Section of a road.
Roundabout or Traffic Circle	A circular intersection where traffic flows in one direction around a central island. Roundabouts and traffic circles are distinct from one another and vary in many small ways.
Rural Rating	Areas outside cities, based on population and housing.
Safety and Mobility Analysis	Checking a road or intersection for safety and movement issues.
SB (Southbound)	Traveling towards the south.
Shared Left Turn and Thru Lane	Lanes used for both going straight and making left turns.
Shared-Use Path	Paths design for use by pedestrians and cyclists.

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Shift Existing Lanes	Slightly moving traffic lanes horizontally, sometimes temporarily around construction zones.
Shoulder	The area of a roadway that is on the sides of the travel way adjacent to the pavement giving both lateral support and can be used for emergency stopping. The side area of a road for emergency stops.
Shoulder Lines	White lines marking the edge between the main road and the shoulder, also called a fog line.
Side Road	A smaller road off a main road.
Sideswipe Crash	When the side of one vehicle hits the side of another.
Sidewalk	A paved path next to a road for pedestrians.
Sight Distance	How far a driver can see down the road, based on speed limits for safe driving.
Signal Heads	The parts of a traffic light that hold the red, yellow, and green lights controlling traffic.
Signalized Intersection	An intersection with traffic lights controlling all directions.
Signal Timing	Adjusting traffic light times based on traffic needs.
Site Plan Review Ordinance	The requirement to review a new development or construction plan to ensure that what is proposed meets all of the local and state regulations and guidelines.
Slope	The pitch or grade of the ground.
Split Phasing	When traffic lights are set up to handle opposing directions separately at an intersection.
Statewide Crash Rate	The number of crashes in the state over a certain time, divided by the total number of vehicles on the roads in selected areas.
Stop Bar	The line on the road where vehicles must stop at stop signs, red lights, or when it's unsafe to proceed.
Stop Controlled Legs	Approaches of an intersection that have stop signs.
Street Acceptance Ordinance	The requirements that a roadway must meet before it can be opened to the public or ownership can be transitioned to the municipality or state.
Three-Way Intersection	Where three roads meet.
Thru and Right Turn Traffic Phase	The time when cars can either go straight or turn right at a signalized intersection.
Thru Lanes	Lanes for cars going straight through an intersection.

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Thru-Right Lane	Lanes for cars going straight or turning right at an intersection.
Thru Traffic	Cars driving straight through an intersection.
Town Limits	The boundary or edge of a town.
Traffic Adaptive System	A collection of cameras and computers that collect traffic data and learn traffic patterns during the day, week, and year allowing traffic signals to optimize signal timing at an intersection.
Traffic Calming Measure	Features like speed bumps or narrowed lanes that make drivers slow down.
Traffic Cycles	The time it takes for a traffic light to go through green, yellow, and red once.
Traffic Demands	The number of cars wanting to use a road, which might be more than the road can handle.
Traffic Patterns	How traffic moves on a road or intersection, which can be studied.
Traffic Signal	The light system at an intersection that tells cars when to stop and go.
Traffic Signal Modifications	Changes to traffic light timings to improve flow and safety at an intersection.
Traffic Signal Warrant Study	A study to decide if a new traffic light is needed based on certain conditions.
Transportation System	The network of services that allows people to travel in an area.
Travel Way	The part of the road where vehicles, including bikes, drive.
Two-Way Left Turn Lane	A center lane that lets cars from both directions wait to turn left without blocking traffic.
Un-Developed Lot	Empty land that can be developed in the future.
Unsafe Speed	Driving faster than the posted speed limit.
Unsignalized Intersection	An intersection controlled by stop signs or other methods, not traffic lights.
Urban Rating	Areas that are densely populated and developed, including homes, businesses, and other buildings.
U-Turn	Turning your car around in a U-shape to go in the opposite direction.
WB (Westbound)	Traveling towards the west.

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Widening	Making the road or its lanes wider.
Yield Markings (Shark's Teeth)	Triangle markings lined up across the road that tell drivers to slow down and yield at a cross walk.
Zoning Ordinances	Rules set by a town or city that dictate how land and buildings in certain areas can be used to ensure safety and order.

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Active and Planned Initiatives

The following intersections and segments within the Town of Scarborough have improvements that are currently being implemented or will be implemented in the near future. These include:

- Intersection of Gorham Road at Saco Street and Beech Ridge Road
- Intersection of County Road and Gorham Road
- Intersection of County Road and Saco Street
- Intersection of Gorham Road and Payne Road
- Intersection of Holmes Road, Payne Road, and Scarborough Downs Road
- Intersection of Mussey Road and Payne Road
- Segment of Gorham Road from Black Point Road to Hannaford Drive
- Intersection of Route 1 and Gorham Road/Black Point Road (Oak Hill)
- Segment of Spring Street from Mussey Road to Gallery Boulevard
- Intersection of Gorham Road and Maple Avenue
- Segment of Spurwink Road from Pleasant Hill Road to the Cape Elizabeth Town Line

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Summary of Locations Studied in this Report

Roadways within the Town of Scarborough were analyzed based on three key metrics: **safety, mobility, and roadway connectivity/access management**.

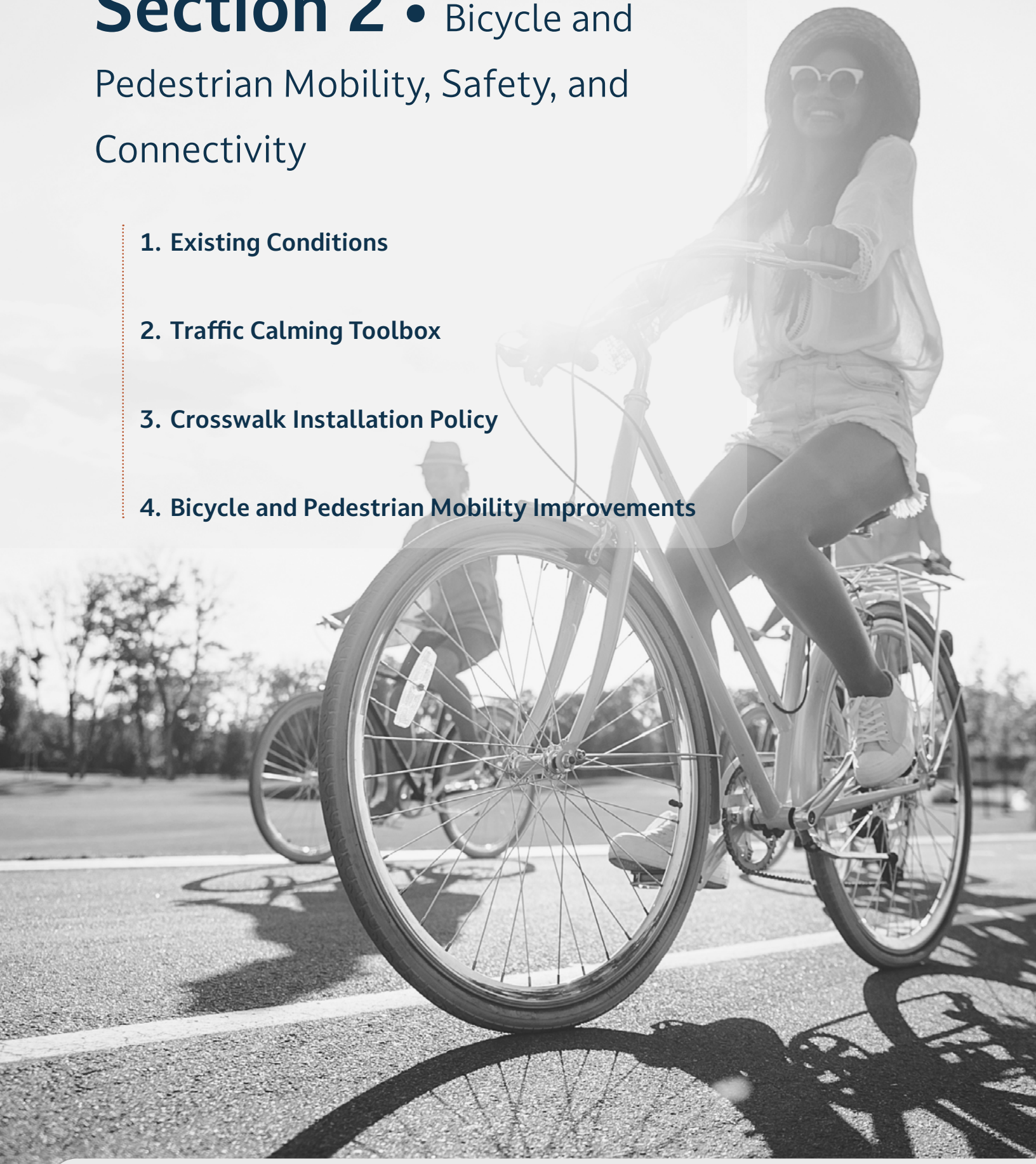
Sections 3, 4, and 5 of this study document provide additional detailed insights into these areas.

The table below summarizes the locations within the Town where corrective actions are most recommended to enhance those three key metrics (safety, mobility, and roadway connectivity/access management).

Number	Intersection/Segment Description	Safety Issue?	Mobility Issue?	Opportunity for Roadway Connectivity?
1	Intersection of US Route 1 and Broadturn Road		Y	
2	Segment of US Route 1 from Broadturn Road to Dunstan Avenue	Y		Y
3	Intersection of US Route 1 and Dunstan Avenue	Y		
4	Intersection of Payne Road and Cummings Road	Y	Y	
5	Intersection of Payne Road and Gallery Boulevard		Y	
6	Segment of Payne Road from Gorham Road to South Portland Town Line		Y	Y
7	Segment of Payne Road from Haigis Parkway to Gorham Road		Y	Y
8	Intersection of Broadturn Road at Burnham Road	Y		
9	Intersection of Broadturn Road at Holmes Road	Y	Y	
10	Intersection of Running Hill Road and Route 114		Y	
11	Intersection of Route 1 at Hannaford Drive	Y	Y	
12	Segment of Route 1 from Sawyer Road to Portland Farms Road	Y		Y
13	Segment of Route 1 from Southgate Road to Sawyer Road			Y

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

1. **Existing Conditions**
2. **Traffic Calming Toolbox**
3. **Crosswalk Installation Policy**
4. **Bicycle and Pedestrian Mobility Improvements**



Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Introduction

Section 2 provides information on bicycle and pedestrian mobility, safety, and connectivity and includes information on existing conditions and recommendations on improving conditions. Improvements are largely driven by an understanding of existing origin and destination patterns and roadway characteristics (speed and volume). Bicycle facility types were identified for select roadways and included traditional bike lanes, side paths, and shared roadway conditions. Recommendations for sidewalks were primarily determined by land use and gaps in the system. Proposed bicycle facilities are generally proposed east of the Maine Turnpike and consider both east/west connectivity to important ocean destinations and the Eastern Trail, but also north/south connectivity along or parallel to Route 1. Proposed sidewalks link existing sidewalks or include facilities (shared use paths) that serve both pedestrians and bicyclists.

Existing Conditions

The purpose of this section is to present existing pedestrian and bicycle conditions in the Town of Scarborough and presents information on the following:

- Existing speed limits
- Pedestrian and bicycle crash data
- Average Annual Daily Traffic Volumes (AADT)
- Existing sidewalks
- Existing bicycle lanes or shoulders
- Trails and recreation facilities
- Bicycle stress level map
- Bicycle origin and destination patterns

Table 2.1 in **Appendix E** presents guidance for choosing bikeway designs that can create an "All Ages & Abilities" bicycle environment, based on basic street design and motor vehicle traffic conditions such as vehicle speed and volume. This guidance was used to determine data needed to assess existing traffic stress levels on Scarborough's roadways and to identify recommended bikeway design treatments.

Existing Speed Limits

Traffic speed clearly affects cyclists' comfort. Speed limits is one criterion used to assess traffic stress for bicyclists on Scarborough roadways. Existing speed limits were obtained from MaineDOT resources. MaineDOT is responsible for setting speed limits at the request of the Town. **Figure 2.1** depicts the speed limits on major roadways in the Town. For neighborhood roadways, speed limits of 25 MPH were assumed. **Table 2.2** notes speed limits on roadways with speeds above 30 MPH.

TABLE 2.2
SPEED LIMITS ABOVE 35MPH

Roadway	Speed Limit
Payne Road north of Haigis Parkway to south of Gorham Road	45MPH
Broadturn Road from Buxton TL to near Route 1	45MPH
Broadturn Road near Route 1	35MPH
Holmes Road from Two Rod Road to Payne Road	40MPH
Ash Swamp Road	40MPH
County Road Gorham TL to Buxton TL	45MPH
County Road from Gorham TL to Gorham Road	40MPH
County Road east of Saco Street to Westbrook TL	40MPH

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Existing Speed Limits (continued)

TABLE 2.2 (CONTINUED)
SPEED LIMITS ABOVE 35MPH

Roadway	Speed Limit
Beech Ridge Road from Payne Road to Gorham Road	40MPH
Gorham Road from the Turnpike to Tamarack Lane	45MPH
Route 1 from Saco TL to Queens Drive	45MPH
Route 1 from Dolloff Drive to Southgate Road	50MPH
Route 1 from Southgate Road to Sawyer Road	40MPH
Route 1 from Hillcrest Avenue to south of Pleasant Hill Road	45MPH
Old Blue Point Road from Hunter Point Drive to Mayflower Drive	40MPH
Milliken Mills Road	45MPH
Highland Avenue from Highland Pines Road to South Portland TL	45MPH
Pleasant Hill Road from Fogg Road to Spurwink Road	40MPH
Spurwink Road from Black Point Road to near Ocean Avenue	40/45MPH
Haigis Parkway from Payne Road to Scottow Hill Road	45MPH
Mussey Road from Carrier Woods Road to South Portland TL	40MPH

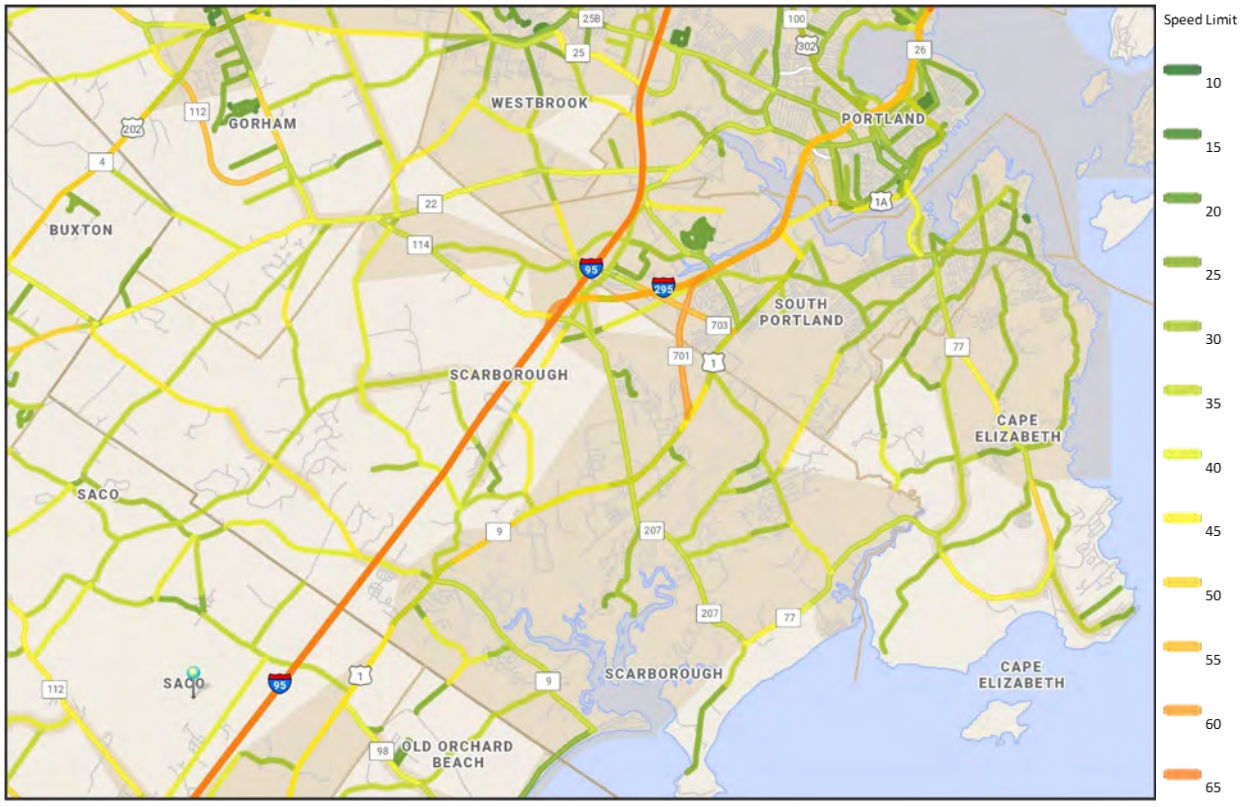


Figure 2.1 Speed Limits on Major Roads

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Pedestrian and Bicycle Crash Data

Pedestrian and bicycle crash history was obtained from MaineDOT for the 10-year period 2013 to 2022. **Figure 2.2 red dots are bike crashes blue are pedestrian crashes)** illustrates the location of the crashes and **Table 2.3** in **Appendix E** presents detailed information on crashes. A summary of the crash data is noted as follows:

- Most crashes have occurred on Route 1. With a concentration in the Oak Hill and Dunstan Corner areas.
- There were 24 reported bicycle crashes over the 10-year period.
- There were 19 reported crashes involving pedestrians over the 10-year period.
- Nine (9) crashes occurred under dark conditions without illumination. And 5 crashes occurred under dark conditions with illumination.
- Most crashes occurred under dry and clear conditions.
- Most crashes occurred on roadways with speed limits of 35 MPH and above.
- Most crashes occurred in non-winter months.

Average Annual Daily Traffic Volumes

Figure 2.3 depicts existing Average Annual Daily Traffic (AADT) volumes obtained from MaineDOT. **Table 2.4** presents the existing AADT on some roadways, with Route 1 carrying the highest number of vehicles. The roadways included in **Table 2.4** were selected because they were roadways where bicycle facilities were investigated.

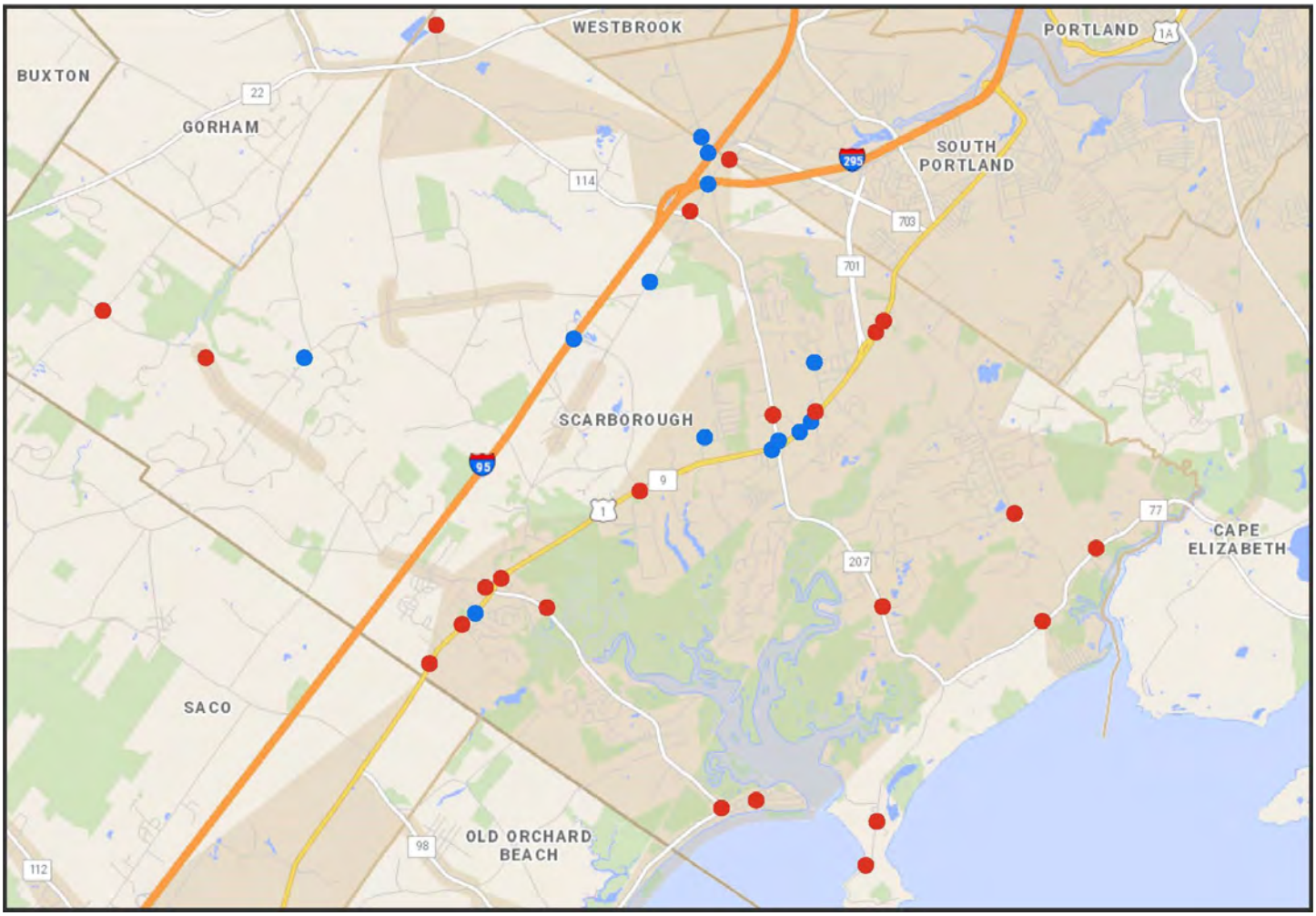


Figure 2.2 Bicycle and Pedestrian Crash Locations

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Average Annual Daily Traffic Volumes (continued)

TABLE 2.4

AVERAGE ANNUAL DAILY TRAFFIC VOLUMES (AADT)

Roadway	2019 AADT	2022AADT	% Change
Maple Avenue n/o Route 1	-	850	-
Elmwood Avenue e/o Maple Avenue	-	890	-
Old Blue Point Road w/o Pine Point Road	830	900	8%
Eastern Road n/o Black Point Road	-	940	-
Sawyer Road w/o Gorham Road	-	1,110	-
Chamberlain Road n/o Highland Avenue	-	1,350	-
King Street	1,500	1,430	-5%
Fogg Road n/o Black Point Road	2,520	2,800	11%
Black Point Road s/o Spurwink Avenue	2,160	2,838	31%
Portland Farms Road s/o Route 1	3,320	2,970	-11%
Lincoln Avenue s/o Route 1	-	3,300	-
Highland Avenue n/o Black Point Road	4,450	3,320	-25%
Spring Street n/o Eight Corners	4,400	3,580	-19%
Spurwink Avenue n/o Black Point Road	3,250	4,020	24%
Payne Road s/o Haigis Parkway	9,560	-	-
Pleasant Hill Road n/o Spurwink Avenue	4,690	5,340	14%
Pine Point Road e/o Route 1	8,220	8,020	-2%
Gorham Road s/o Eight Corners	11,990	9,330	-22%
Mussey Road e/o Eight Corners	10,660	10,100	-5%
Haigis Parkway n/o Route 1	-	10,420	-
Gorham Road w/o Payne Road	13,760	13,970	2%
Payne Road n/o Haigis Parkway	14,640	15,162	4%
Black Point Road s/o Route 1	-	16,220	-
Route 1 s/o Old Blue Point Road	17,160	18,200	6%
Route 1 n/o Gorham Road	-	24,900	-
Route 1 n/o Haigis Parkway	-	26,870	-

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Average Annual Daily Traffic Volumes (continued)

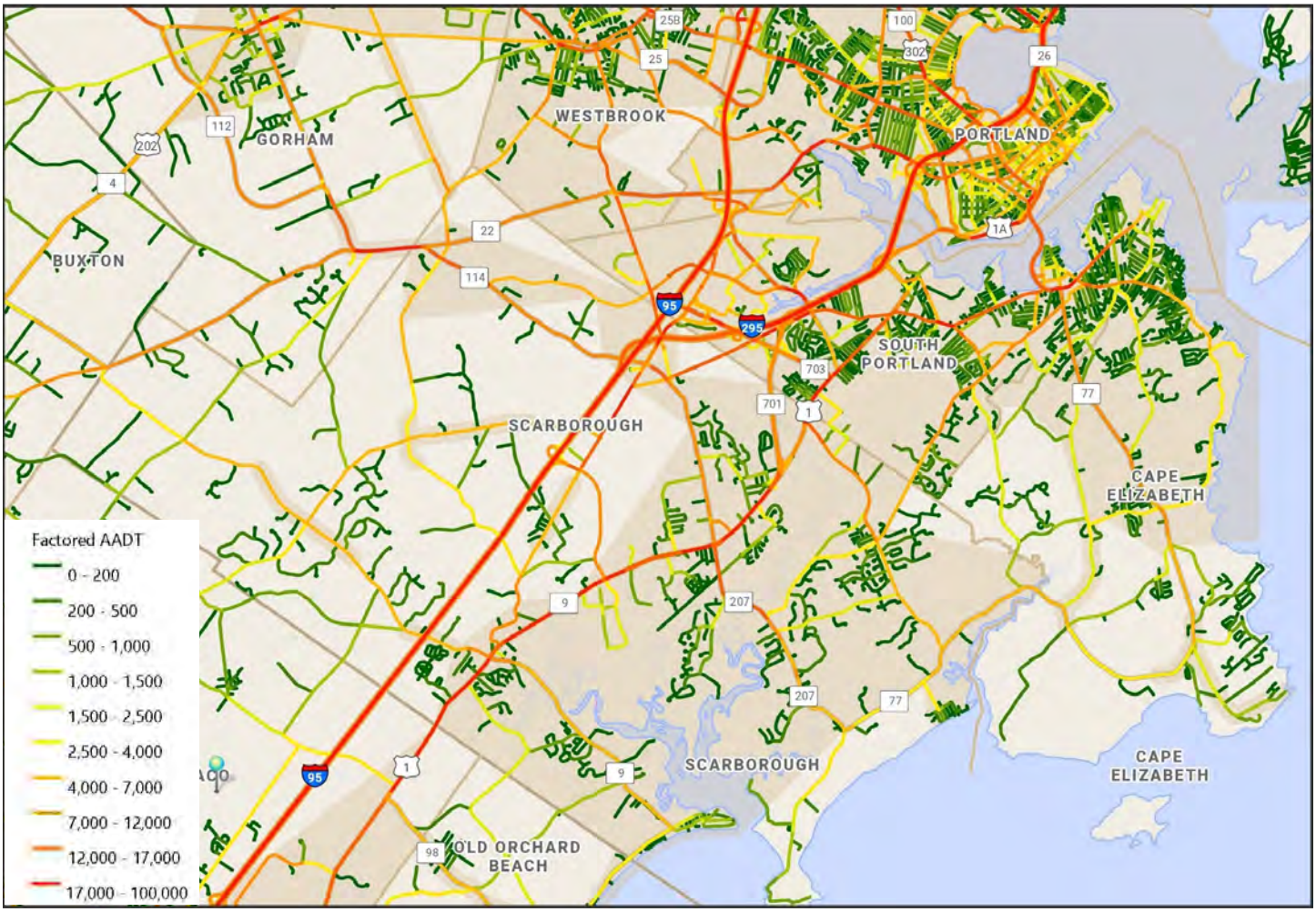


Figure 2.3 2022 Average Annual Daily Traffic Volumes

Existing Sidewalks

Sidewalk locations were obtained from Town GIS sources and are depicted on **Figure 2.4.** There are no sidewalks west of Payne Road with most sidewalks located in the Oak Hill area of the town. Currently there are 38 miles of sidewalk provided in the town which has 183 miles of roadway.

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Existing Sidewalks (continued)

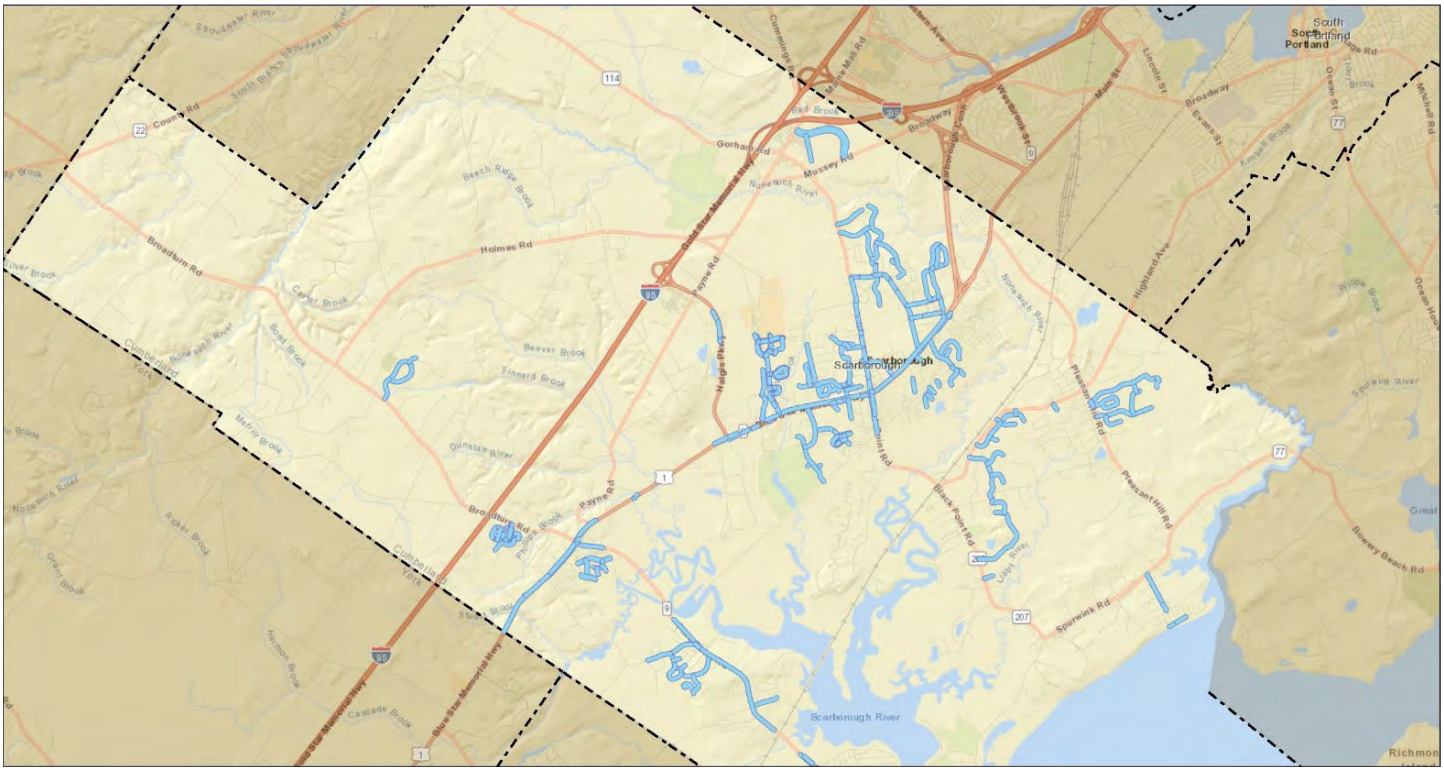


Figure 2.4 Existing Sidewalk Locations

Existing Bicycle Lanes and Shoulders

Figure 2.5 depicts roadways with either bike lanes or shoulders of suitable width for biking. There are few formal marked bike lanes in Town. Shoulder widths vary from none to over 5 feet. Wide shoulders (5 feet and wider) provide good space for bicyclists. Moderate shoulders (2 to 5 feet), provide some space for bicyclists and when 4 feet wide can meet minimum requirements for a designated bike lane. Less than 4 feet is constraining for bicyclist.

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Existing Bicycle Lanes and Shoulders (continued)

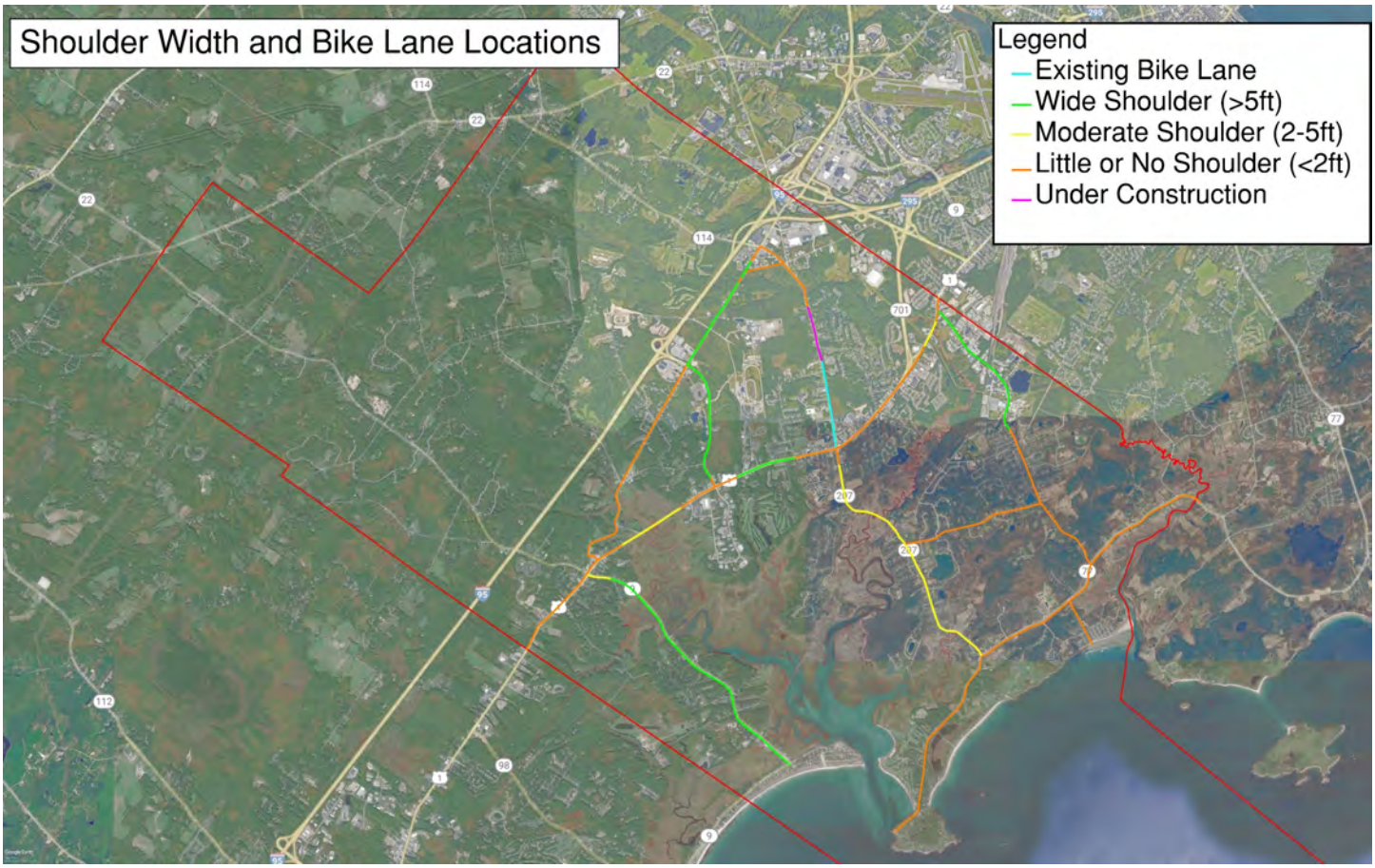


Figure 2.5 Existing Bike Lanes or Shoulders

Bicycle Stress Level

Level of Traffic Stress (LTS) is a rating given to a road segment indicating the traffic stress it imposes on bicyclists. Levels of traffic stress range from 1 to 4 as noted in **Table 2.5**. The methodology takes into consideration the limits and reliability of the available data. The analysis primarily uses a street's vehicle volume, speed limit, bicycle facilities, and on-street parking presence to determine the level of stress a bicycle rider is expected to experience on that street segment. In cases where vehicle volume data is unavailable, functional class and number of lanes are used.

The LTS score for each road segment is based on traffic speed, average daily traffic volume, number of lanes in each direction, and conflict factors such as bus lanes and school zones. As each of these criteria increases so does the need for protective measures such as physically protected or separated bike lanes. The resulting town-wide map of existing LTS streamlines mitigation and reduces any obscurity on how the town will improve bicycle facilities. It also highlights gaps in the bicycle network and identifies segments with unacceptably high traffic stress, variables critical to increasing cycling commuters/users. **Table 2.6** in **Appendix E** presents the criteria used to assign a stress level score for area roadways. **Figure 2.6** presents the stress level map for the town.

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Bicycle Stress Level (continued)

TABLE 2.5

AVERAGE ANNUAL DAILY TRAFFIC VOLUMES (AADT)

LTS	Description
1	Corridor is comfortable for all ages and abilities including children. LTS 1 roadways are characterized by protected bike lanes or greenways, and very little to no intermingling with vehicular traffic.
2	Tolerated by most adults. There may be some turning conflicts but cyclists are mostly separated from traffic through bike lanes. This type of corridor demands more attention from riders than an LTS 1 and is likely not suitable for children. Projects must improve bicycle facilities to meet an LTS 2 standard or better.
3	Roadways may have bike lanes next to multilane vehicular traffic with above average traffic volumes or vehicular speeds higher than Boston's default speed limit. An LTS 3 may also include shared lanes on streets that are not multilane and experience vehicular traffic at the City's default speed limit or lower.
4	Tolerated by only the most experienced and able-bodied riders.

Figure 2.6 Stress Level Map

Traffic Calming Toolbox

The goal of a toolbox is to provide examples of traffic calming measures and techniques that can be applied in a contextually sensitive manner in Scarborough. Traffic calming measures can be physical alterations of the roadway design that reduce vehicle speeds and/or decrease cut-through vehicle traffic volumes. The consideration of strategies to address cut-through traffic should balance the benefits of roadway connectivity versus neighborhood impacts. Roadway connectivity helps to spread traffic demand and thus reduces capacity pressure at some intersections. There are four general types of traffic calming treatments including the following.

Traffic Calming Measure – Vertical Deflection
These treatments use raised elements that draw the driver's attention and reduce the driver's speed. These speed control treatments are best suited for lower speed, lower volume roads.

Traffic Calming Measure – Horizontal Deflection
These treatments use horizontal shifts in the roadway, painted or raised impediments, to cause the driver to make subtle swerves and reduce vehicle speeds.

Traffic Calming Measure – Street Width Reduction
These treatments consider changes to the roadway cross-section that impact the visual characteristics of the roadway. They tend to include improvements like, curb extensions, chokers, gateway treatments, lane narrowing, median islands, and road diets (reducing the number of lanes at an intersection or along a roadway).

Traffic Calming Measure – Vehicle Use and Routing Restriction
These traffic calming measures can include physical impediments and signage to regulate vehicle use, reduce cut-through traffic, and control turning movements. Review of strategies that aim to reduce cut-through traffic should balance the benefits of roadway connectivity.

The development of a Traffic Calming Toolbox should be an independent effort that engages town staff and the public. Accordingly, the development of a Toolbox is outside the scope of this study.

It is recommended that a formal adopted Traffic Calming Toolbox be developed in the future.

Crosswalk Installation Policy

The Town of Scarborough currently has a Crosswalk Marking Policy dated April 25, 2017. It includes procedures for requests for new crosswalks, site criteria, and general guidelines. Given the age of the document, it is suggested that it be updated periodically to reflect state of the practice information.

Bicycle and Pedestrian Mobility Improvements

This section presents recommended improvements for enhancing safety, connectivity, and safety for bicyclists and pedestrians. It should be noted that the Town should develop a process or policy for funding and staffing needs associated with the expanded system outlined in this report and include winter operations and maintenance.

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Destinations

The assessment of pedestrian and bicycle improvements was informed by key destinations in the Town. The destinations included beaches, parks, libraries, schools, major retail areas, town hall, and bike shops. Figure 2.9 depicts general destinations.

Open House and Transportation Committee Input

The identification of bicycle facility improvements was based on input from the Open House and the Transportation Committee. The following specific comments were provided.

From Open House

- Path on Pleasant Hill Road – Highland Avenue to Fogg Road
- Bikes thru Oak Hill – Black Point Road to library
- Bike lanes on Black Point Road
- Haigis Parkway – walk/bike
- Highland Avenue needs bike lanes
- Nonesuch River bridge crossing on Gorham Road is a constraint

Scarborough Byways

- Pine Point Road – Eastern Trail to Pine Point Beach
- Oak Hill Byway – Maple Avenue to Route 1 North to Portland Farms Road
- Commerce Drive Byway – Commerce Drive to Ballantyne Drive to Inspiration Drive to Classical Lane to Federal Lane to Eastern Trail
- Black Point Road Byway – Wentworth Drive to Municipal Drive to Durant Drive to Sawyer Road thru MaineHealth to Commerce Drive to Evergreen Farms Road to Eastern Trail.

Proposed Connections

- White Hart Lane to Ward Street
- Maple Avenue to Jameco Mill Road
- Imperial Lane to Wentworth School
- Nutter Way to Pleasant Hill Road

Proposed Paths

- Utility road between Haigis Parkway and Scarborough Downs Road
- Future Downs Development
    - Bike Lanes
    - Multi-Use Paths
    - Connections to adjacent infrastructure
- Off Trail
    - Continue Eastern Trail path to show connection to roads behind Maine Medical Scarborough Campus
- Quiet/Slow Roads
    - Washington Avenue/Lincoln Avenue from Eastern Trail (potential spot for sign off ET). Would allow biking to Holy Donut, Bowling, Toddle Inn Daycare.
    - Enterprise Drive
        - Decent separated pathway
        - Access to dentist, daycare, trailhead to small trails

Future Paths to Consider

- Path between Rodgers Ski & Sport to Evergreen Farms Road for easy access to the Eastern Trail from the Downs (removes all riding along Route 1 and only need to cross)
- Separated path along Haigis Parkway (similar to Gorham Road)
- Need better bike/ped infrastructure on Payne Road
- Separated bike paths to the beaches

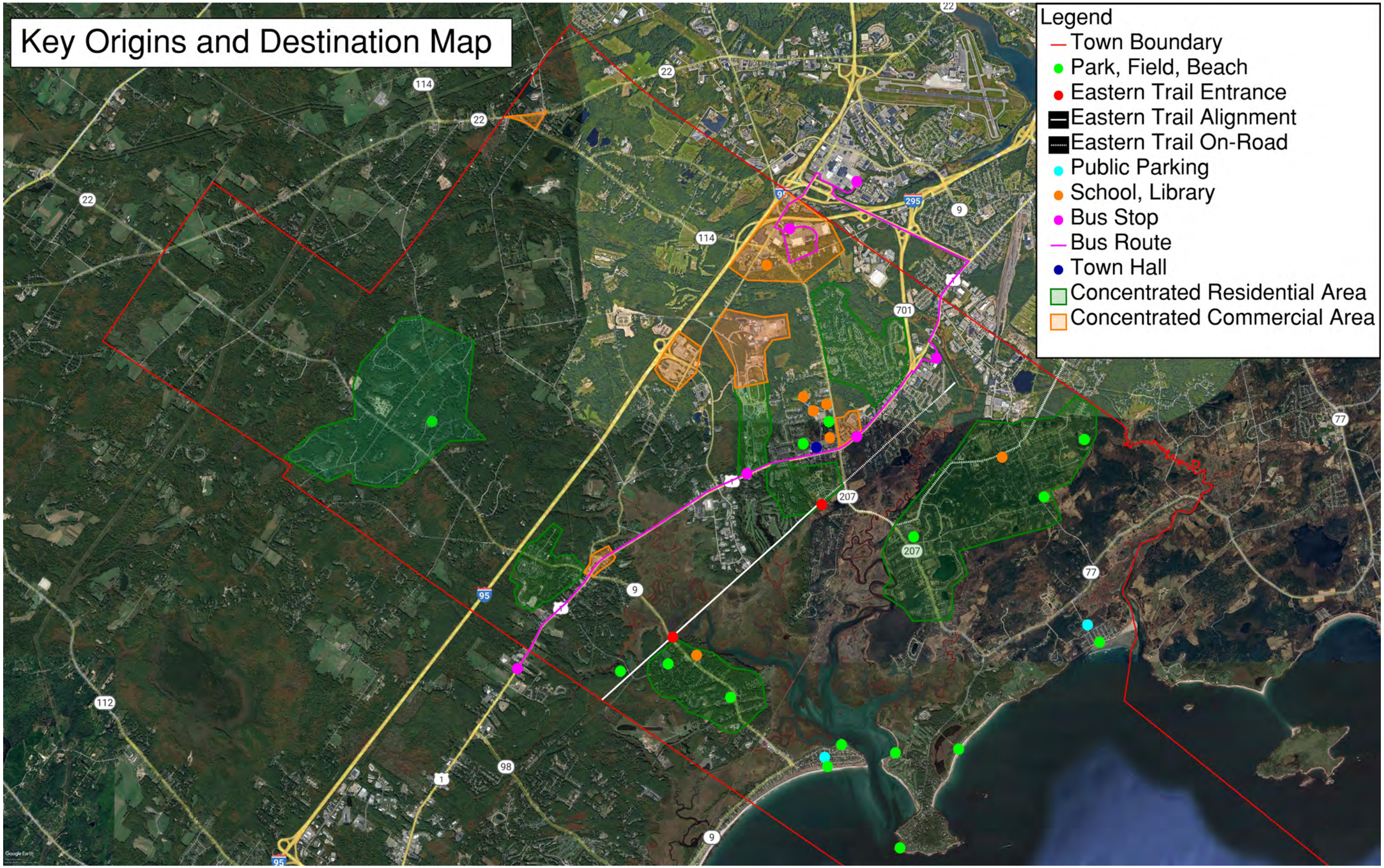


Figure 2.9 Pedestrian and Bicycle Origins and Destinations

Bicycle Facility Types

Bike Lane

A Bike Lane is defined as a portion of the roadway that has been designated by striping, signage, and pavement markings for the preferential or exclusive use of bicyclists. Bike lanes enable bicyclists to ride at their preferred speed without interference from prevailing traffic conditions and facilitate predictable behavior and movements between bicyclists and motorists. A bike lane is distinguished from a cycle track in that it has no physical barrier (bollards, medians, raised curbs, etc.) that restricts the encroachment of motorized traffic. Conventional bike lanes run curbside when no parking is present, adjacent to parked cars on the right-hand side of the street or on the left-hand side of the street in specific situations. Bike lanes typically run in the same direction of traffic, though they may be configured in the contra-flow direction on low-traffic corridors necessary for the connectivity of a particular bicycle route.

The configuration of a bike lane requires a thorough consideration of existing traffic levels and behaviors, adequate safety buffers to protect bicyclists from parked and moving vehicles, and enforcement to prohibit motorized vehicle encroachment and double-parking. Bike Lanes may be distinguished using color, lane markings, signage, and intersection treatments.

Conventional Bike Lane

Bike lanes designate an exclusive space for bicyclists using pavement markings and signage. The bike lane is located adjacent to motor vehicle travel lanes and flows in the same direction as motor vehicle traffic. Benefits include:

- Increases bicyclist comfort and confidence on busy streets.
- Creates separation between bicyclists and automobiles.
- Increases predictability of bicyclist and motorist positioning and interaction.
- Increases total capacities of streets carrying mixed bicycle and motor vehicle traffic.
- Visually reminds motorists of bicyclists' right to the street.
- A bike lane has a minimum width of 4 feet without curbing and 5 feet with curbing. The desired width is 6 feet.

Figure 2.10 summarizes design guidance (reference NACTO, Urban Bikeway Design Guide).

Design Guidance

Conventional Bike Lanes

Required Features

(1) The desirable bike lane width adjacent to a curbface is 6 feet. The desirable ridable surface adjacent to a street edge or longitudinal joint is 4 feet, with a minimum width of 3 feet. In cities where illegal parking in bike lanes is an concern, 5 foot wide bike lanes may be preferred.[2]

(2) When placed adjacent to a parking lane, the desirable reach from the curb face to the edge of the bike lane (including the parking lane, bike lane, and optional buffer between them) is 14.5 feet; the absolute minimum reach is 12 feet. A bike lane next to a parking lane shall be at least 5 feet wide, unless there is a marked buffer between them. Wherever possible, minimize parking lane width in favor of increased bike lane width.[3]

(3) The desirable bike lane width adjacent to a guardrail or other physical barrier is 2 feet wider than otherwise in order to provide a minimum shy distance from the barrier.[4]

(4) Bicycle lane word and/or symbol and arrow markings (MUTCD Figure 9C-3) shall be used to define the bike lane and designate that portion of the street for preferential use by bicyclists.[5]

(5) Bike lane word, symbol, and/or arrow markings (MUTCD Figure 9C-3) shall be placed outside of the motor vehicle tread path at intersections, driveways, and merging areas in order to minimize wear from the motor vehicle path.

(6) A solid white lane line marking shall be used to separate motor vehicle travel lanes from the bike lane. Most jurisdictions use a 6 to 8 inch line.[6]

(7) A through bike lane shall not be positioned to the right of a right turn only lane or to the left of a left turn only lane (MUTCD 9C.04). A bike lane may be positioned to the right of a right turn only lane if split-phase signal timing is used. For additional information, see bicycle signal heads. For additional strategies for managing bikeways and right turn lanes, see through bike lanes in this guide.

Recommended Features

(8) Bike lanes should be made wider than minimum widths wherever possible to provide space for bicyclists to ride side-by-side and in comfort. If sufficient space exists to exceed desirable widths, see buffered bike lanes. Very wide bike lanes may encourage illegal parking or motor vehicle use of the bike lane.

(9) When placed adjacent to parking, a solid white line marking of 4 inch width should be used between the parking lane and the bike lane to minimize encroachment of parked cars into the bike lane.[7]

(10) Gutter seams, drainage inlets, and utility covers should be flush with the ground and oriented to prevent conflicts with bicycle tires.[8]

(11) If sufficient space exists, separation should be provided between bike lane striping and parking boundary markings to reduce door zone conflicts. Providing a wide parking lane may offer similar benefits. Refer to buffered bike lanes for additional strategies.

(12) If sufficient space exists and increased separation from motor vehicle travel is desired, a travel side buffer should be used. Refer to buffered bike lanes for additional details.

(13) Lane striping should be dashed through high traffic merging areas. See through bike lanes for more information.

(14) The desirable dimensions should be used unless other street elements (e.g., travel lanes, medians, median offsets) have been reduced to their minimum dimensions.

(15) In cities where local vehicle codes require motor vehicles to merge into the bike lane in advance of a turn movement, lane striping should be dashed from 50 to 200 feet in advance of intersections to the intersection. Different states have varying requirements.

Optional Features

(16) "Bike lane" signs (MUTCD R3-17) may be located prior to the beginning of a marked bike lane to designate that portion of the street for preferential use by bicyclists. The 2009 MUTCD lists bike lane signs as optional; however, some states still require their use.

(17) On bike lanes adjacent to a curb, "No Parking" signs (MUTCD R8-3) may be used to discourage parking within the bike lane.

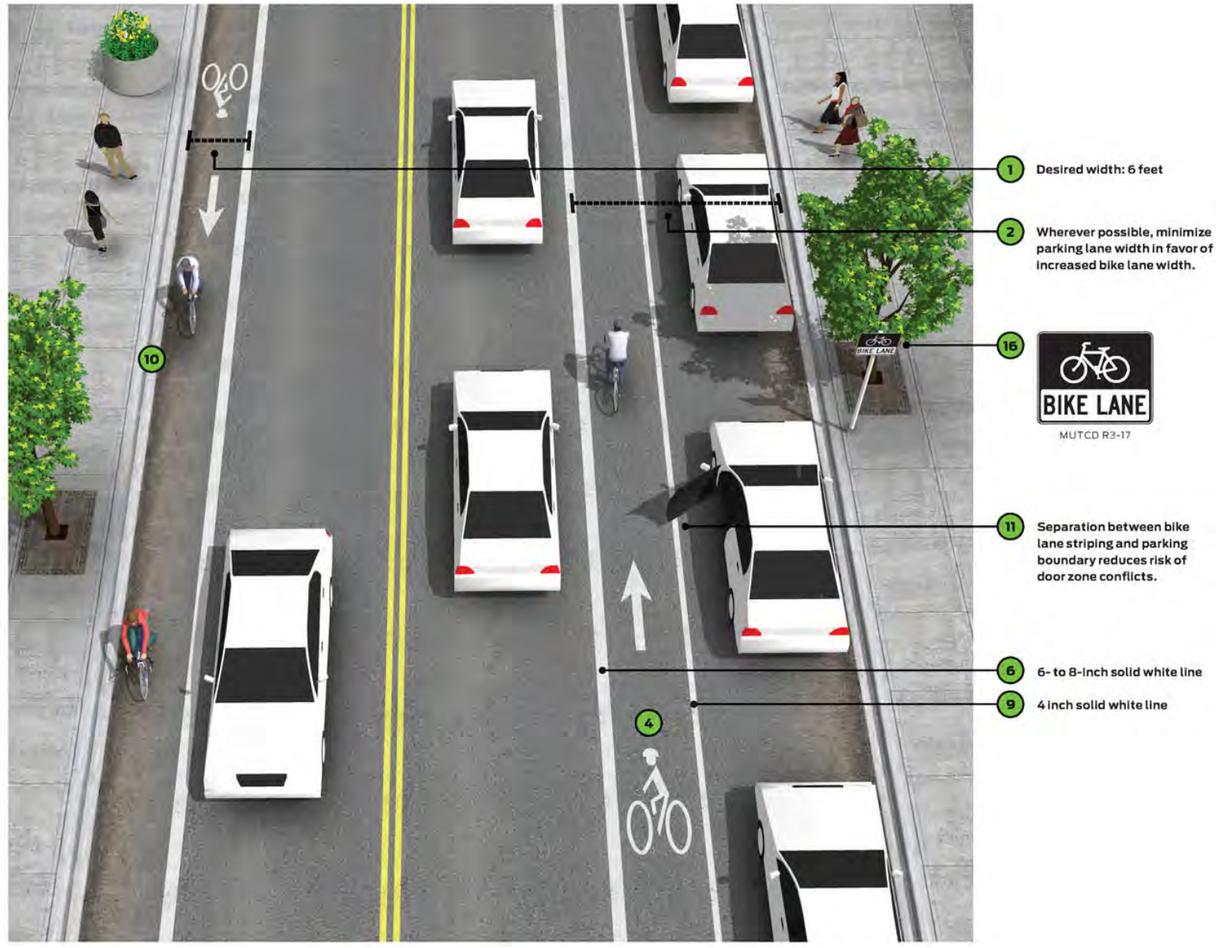


Figure 2.10 Bike Lane Design Guidance, NACTO

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Buffered Bike Lane

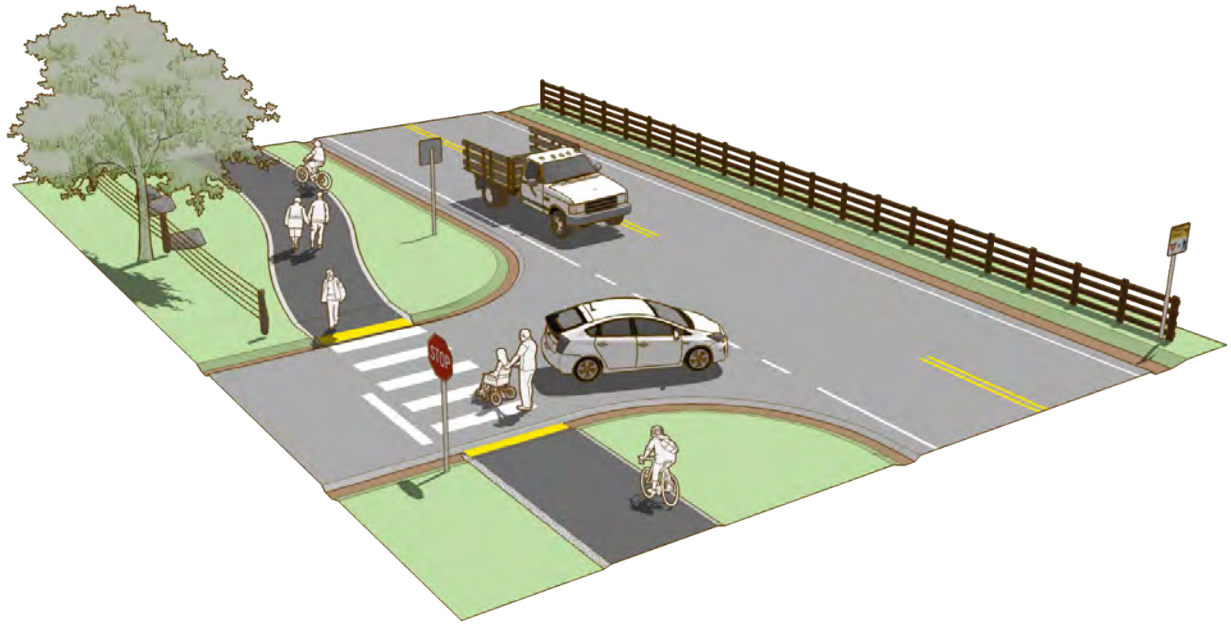
Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Benefits include:

- Provides greater shy distance between motor vehicles and bicyclists.
- Provides space for bicyclists to pass another bicyclist without encroaching into the adjacent motor vehicle travel lane.
- Encourages bicyclists to ride outside of the door zone when buffer is between parked cars and bike lane.
- Provides a greater space for bicycling without making the bike lane appear so wide that it might be mistaken for a travel lane or a parking lane.
- Appeals to a wider cross-section of bicycle users.
- Encourages bicycling by contributing to the perception of safety among users of the bicycle network.
- The combined width of the buffer and bike lane should be considered the “bike lane width”. For travel side buffers next to on-street parking, a 5-foot minimum width is recommended. The minimum buffer width is 18 inches and cross hatching shall be provided if the width is 3 feet or wider.

Figure 2.11 summarizes design guidance (reference NACTO, Urban Bikeway Design Guide).

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Shared Use Path (or Sidepath)



A **Shared Use path** is a bidirectional path located immediately adjacent and parallel to a roadway. Sidepaths can offer a high-quality experience for users of all ages and abilities as compared to on-roadway facilities in heavy traffic environments, allow for reduced roadway crossing distances, and maintain rural and small-town community character. Sidepaths offer a low-stress experience for bicyclists and pedestrians on network routes otherwise inhospitable to walking and bicycling due to high-speed or high-volume traffic.

Geometric Design (Small Town and Rural Design Guide, FHWA)

Widths and design details of sidepath elements may vary in response to the desire for increased user comfort and functionality, the available right-of-way, and the need to preserve natural resources.

Pathway

Sidepath width impacts user comfort and path capacity. As user volumes or the mix of modes increases, additional path width is necessary to maintain comfort and functionality.

- Minimum recommended pathway width is 10 feet. In low-volume situations and constrained conditions, the absolute minimum sidepath width is 8 feet.
- Provide a minimum of 2 feet clearance to signposts or vertical elements.

Roadway Separation

Separation from the roadway should be informed by the speed and configuration of the adjacent roadway and by available right-of-way.

- Preferred minimum separation width is 6.5 feet. Minimum separation distance is 5 feet.
- Separation narrower than 5 feet is not recommended, although may be accommodated with the use of a physical barrier between the sidepath and the roadway. The barrier and end treatments should be crashworthy which may introduce additional complexity if there are


Shared Use Path on Route 1 in Falmouth, ME

frequent driveways and intersections.

- On high-speed roadways, a separation width of 16.5–20 feet is recommended for proper positioning at crossings and intersections.

Landscaping

Trees and landscaping can maintain community character and add value to the experience of using a sidepath. They provide shade for users during hot weather and help to absorb stormwater runoff.

- Provide a 3 feet horizontal clearance between trees and the pathway to minimize pavement cracking and heaving of the paved surface. Consult a local arborist in the selection and placement of trees.
- When trees are desired within the roadway separation area, consider planting small caliber trees with a maximum diameter of 4 inches to alleviate concerns about fixed objects or visual obstructions between the roadway and the pathway.

Intersections

Operational and safety concerns exist where sidepaths cross driveways and intersections. Design crossings to promote awareness of conflict points and facilitate proper yielding of motorists to bicyclists and pedestrians.

Design Strategies

Collision risk increases as the speed and volume of the parallel roadway increase. A variety of design strategies for enhancing sidepath crossings include:

- Reduce the frequency of driveways.
- Design intersections to reduce driver speeds and heighten awareness of path users.
- Encourage low speeds on pathway approaches.
- Maintain visibility for all users.
- Provide clear assignment of right-of- way with signs and markings and elevation change.

Design Details

- Maintain physical separation of the sidepath through the crossing. Sidepath separation distance may vary from 5 feet–24 feet.
- Use small roadway corner radii to enforce slow turning speeds of 20 MPH or less, where possible. On a high-speed roadway, a deceleration lane may be necessary to achieve desired slow turning speeds.
- The roadway and path approaches to an intersection should always provide enough stopping sight distance to obey the established traffic control and execute a stop before entering the intersection.
- Configure driveway geometry so the path crossings are raised (so the path does not transition down to a driveway and up again after the driveway) to create vertical deflection of turning vehicles. This physically indicates priority of path travel overturning or crossing traffic and helps reduce the risk associated with bidirectional sidepath use.
- Where possible, include raised median island on the cross street to provide additional safety and speed management benefits.
- Use crosswalk markings to indicate the through crossing along the pathway. Continental crosswalk markings are preferred for increased visibility. At low-volume residential driveways, crosswalk markings may be omitted.
- Use stop or yield line markings in advance of the crossing to discourage encroachment into the crosswalk area.

Design Guidance

Buffered Bike Lanes

Required Features

1 Bicycle lane word and/or symbol and arrow markings (MUTCD Figure 9C-3) shall be used to define the bike lane and designate that portion of the street for preferential use by bicyclists.[9]

2 The buffer shall be marked with 2 solid white lines. with diagonal hatching if 3 feet in width or wider. White lines on both edges of the buffer space indicate lanes where crossing is discouraged, though not prohibited. For clarity, consider dashing the buffer boundary where cars are expected to cross at driveways.[10]

3 The buffer area shall have interior diagonal cross hatching or chevron markings if 3 feet in width or wider.[11]

Recommended Features

4 If used, interior diagonal cross hatching should consist of 4 inch lines angled at 30 to 45 degrees and striped at intervals of 10 to 40 feet. Increased striping frequency may increase motorist compliance.[12]

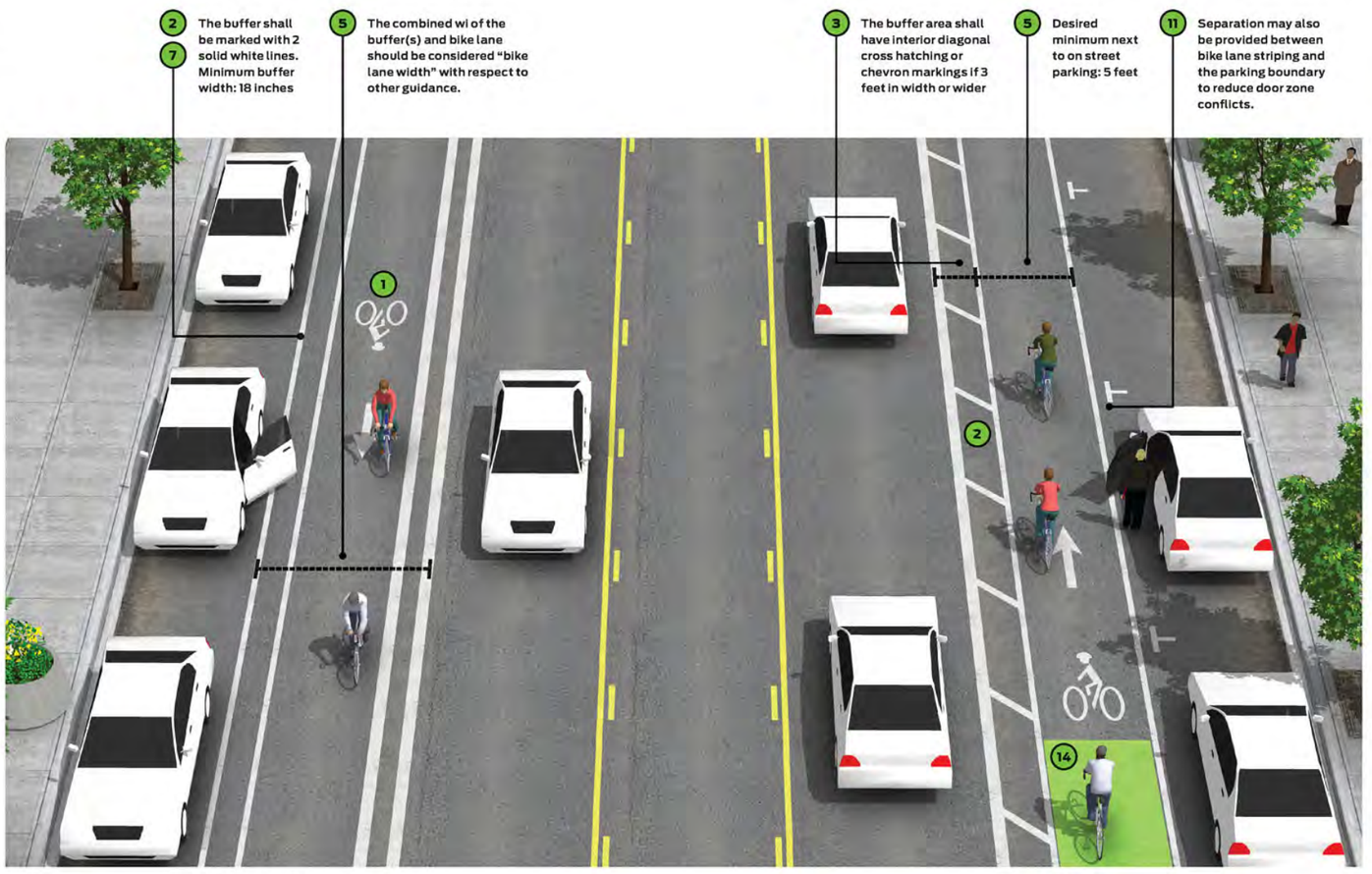
5 The combined width of the buffer(s) and bike lane should be considered "bike lane width" with respect to guidance given in other documents that don't recognize the existence of buffers. Where buffers are used, bike lanes can be narrower because the shy distance function is assumed by the buffer. For example, a 3 foot buffer and 4 foot bike lane next to a curb can be considered a 7 foot bike lane. For travel side buffered lanes next to on street parking, a 5 foot minimum width is recommended to encourage bicyclists to ride outside of the door zone.

6 Where bicyclist volumes are high, bicyclist speed differentials are significant, or where side-by-side riding is desired, the desired bicycle travel area width is 7 feet.

7 Buffers should be at least 18 inches wide because it is impractical to mark a zone narrower than that.

8 On intersection approaches with right turn only lanes, the bike lane should be transitioned to a through bike lane to the left of the right turn only lane, or a combined bike lane/turn lane should be used if available road space does not permit a dedicated bike lane.

9 On intersection approaches with no dedicated right turn only lane the buffer markings should transition to a conventional dashed line. Consider the use of a bike box at these locations.



MUTCD FIGURE 3B-24

MUTCD FIGURE 3B-24

MUTCD FIGURE 3D-2

Optional Features

10 Like a conventional bike lane, a wide (6 to 8 inch) solid white line may be used to mark the edge adjacent to a motor vehicle travel lane. For a parking side buffer, parking T's or a solid line are acceptable to mark between a parking lane and the buffer.

11 For travel lane buffer configurations, separation may also be provided between bike lane striping and the parking boundary to reduce door zone conflicts. This creates a type of parking-side buffer.

12 On wide one-way streets with buffered bike lanes, consider adding a buffer to the opposite side parking lane if the roadway appears too wide. This will further narrow the motor vehicle lanes and encourage drivers to maintain lower speeds.

13 The interior of the buffer area may use different paving materials to separate it from the bike lane. Textured surface materials may cause difficulties for bicyclists as surfaces may be rough. Increased maintenance requirements are likely.

14 Color may be used at the beginning of each block to discourage motorists from entering the buffered lane. For other uses of color in buffered bike lanes see colored bike facilities.

Figure 2.11 Design Guidance for Buffered Bike Lanes, NACTO

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Bicycle / Neighborhood Byways

Bicycle boulevards are streets with low motorized traffic volumes and speeds, designated and designed to give bicycle travel priority. Bicycle Boulevards use signs, pavement markings, and speed and volume management measures to discourage through trips by motor vehicles and create safe, convenient bicycle crossings of busy arterial streets.

Design Elements

Many local streets with low existing speeds and volumes offer the basic components of a safe bicycling environment. These streets can be enhanced using a range of design treatments, tailored to existing conditions and desired outcomes, to create bicycle boulevards. Design treatments are grouped into measures that provide the following benefits.

1. Route Planning: Direct access to destinations
2. Signs and Pavement Markings: Easy to find and to follow
3. Speed Management: Slow motor vehicle speeds
4. Volume Management: Low or reduced motor vehicle volumes
5. Minor Street Crossings: Minimal bicyclist delay
6. Major Street Crossings: Safe and convenient crossings
7. Offset Crossings: Clear and safe navigation
8. Green Infrastructure: Enhancing environments

Streets that are formally designated as bicycle boulevards should meet strict targets of fewer than 3,000 motor vehicles per day (1,500 preferred) and speeds of 25 MPH (20 preferred). There are limited streets in Scarborough that would be eligible for this type of facility. They typical would be located in established neighborhoods. Example streets include Maple Avenue, Ward Street, Ballantyne Drive, Eastern Road, Evergreen Road, Municipal Campus, Portland Farms Road, and Elmwood Avenue.

Figure 2.12 summarizes design guidance (reference NACTO, Urban Bikeway Design Guide).

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Advisory Bike Lanes

Roads with advisory bike lanes accommodate low to moderate volumes of two-way motor vehicle traffic and provide a prioritized space for bicyclists with little or no widening of the paved roadway surface. Unlike a conventional bike lane, an advisory bike lane is a part of the traveled way, and it is expected that vehicles will regularly encounter meeting or passing situations where driving in the advisory bike lane is necessary and safe.

The advisory bike lane space is a visually distinct area on the edge of the roadway, offering a prioritized space for people to bicycle and walk.

- The preferred width of the advisory bike lane space is 6 feet. Absolute minimum width is 4 feet when no curb and gutter is present.
- Consider using contrasting paving materials between the advisory bike lanes and center travel lane to differentiate the advisory bike lane from the center two-way travel lane in order to minimize unnecessary encroachment and reduce regular straddling of the advisory bike lane striping.

The two-way center travel lane is created from the remaining paved roadway space after the advisory bike lane has been accounted for. Preferred two-way center travel lane width is 13.5–16 feet although may function with widths of 10–18 feet.

A broken lane line used to delineate the advisory bike lane should consist of 3 feet line segments and 6 feet gaps. Where additional edge definition is desired, stripe a normal solid white edge line in addition to the broken advisory bike lane line. In general, do not mark a center line on the roadway.

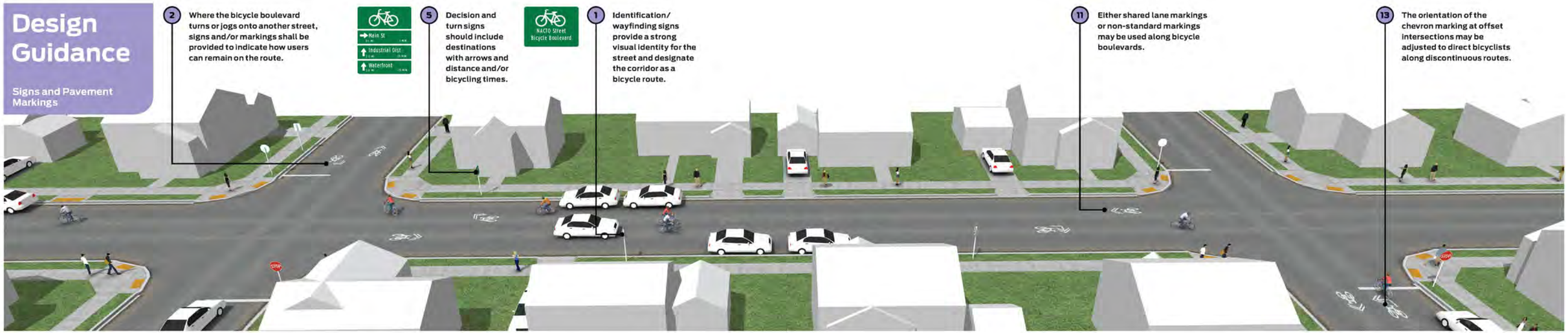
Shared Lane Markings

Shared Lane Markings (SLMs), or "sharrows," are road markings used to indicate a shared lane environment for bicycles and automobiles. Among other benefits shared lane markings reinforce the legitimacy of bicycle traffic on the street, recommend proper bicyclist positioning, and may be configured to offer directional and wayfinding guidance. The shared lane marking is a pavement marking with a variety of uses to support a complete bikeway network; it is not a facility type and should not be considered a substitute for bike lanes, cycle tracks, or other separation treatments where these types of facilities are otherwise warranted or space permits. The MUTCD outlines guidance for shared lane markings in section 9C.07.

Benefits

- Encourages bicyclists to position themselves safely in lanes too narrow for a motor vehicle and a bicycle to comfortably travel side by side within the same traffic lane.
- Alerts motor vehicle drivers to the potential presence of bicyclists.
- Alerts road users of the lateral position bicyclists are expected to occupy within the travel lane.
- Indicates a proper path for bicyclists through difficult or potentially hazardous situations, such as railroad tracks.
- Advertises the presence of bikeway routes to all users.
- Provides a wayfinding element along bike routes.
- Demonstrated to increase the distance between bicyclists and parked cars, keeping bicyclists out of the "door zone."
- Encourages safe passing by motorists.
- Requires no additional street space.
- Reduces the incidence of sidewalk riding.
- Reduces the incidence of wrong-way bicycling

Figure 2.13 summarizes design guidance (reference NACTO, Urban Bikeway Design Guide).



Required Features

1. Bicycle wayfinding signage and pavement markings shall be included on bicycle boulevards. Pavement markings and identification/wayfinding signs provide a strong visual identity for the street and designate the corridor as a bicycle route.

2. Where the bicycle boulevard turns or jogs onto another street, signs and/or markings shall be provided to indicate how users can remain on the route.

3. Center line stripes (if present) shall be removed or not repainted, except for short sections on intersection approaches that have a stop line or traffic circle. Drivers have an easier time passing bicyclists on roads that do not have centerline stripes. If vehicles cannot easily pass each other using the full width of the street, it is likely that there is too much traffic for the street to be a successful bicycle boulevard.[128]

Recommended Features

4. Pavement markings should be large enough to be visible to all road users; 112 inches by 40 inches (the standard size of a shared lane marking) is the minimum recommended size.

5. Decision and turn signs should include destinations with arrows and distance and/or bicycling times. Bicycling time should assume a typical speed of 10 mph.

6. Advanced crossing warning signs such as MUTCD sign W11-1 (bicycle crossing; may be supplemented with AHEAD plaque) should be placed on intersecting streets with more than 5,000 vpd. A non-standard sign using the coloration and style of other bicycle boulevard signs may be used with an arrow showing bi-directional cross traffic.

7. On narrow local streets where it can be difficult for cars traveling in opposite directions to pass, pavement markings should be applied in closer intervals near the center of the travel lane.

Optional Features

8. Signs may differ from those outlined in the MUTCD to highlight or brand the bicycle boulevard network. If used, signs shall be consistent in content, design, and intent; colors reserved by the MUTCD Section 1A.12 for regulatory and warning road signs (red, yellow, orange, etc.) are not recommended. Green, blue and purple are commonly used.

9. Confirmation signs may include destinations and distance and/or bicycling times.

10. To minimize sign clutter, a bicycle symbol may be placed on a standard street name sign, along with distinctive coloration.[129]

11. Either shared lane markings or non-standard markings may be used along bicycle boulevards.

12. On particularly narrow streets (approximately 25 feet wide with parking), shared lane marking stencils may be placed either in the center of the lane facing each other, or with the bicycle marking in the center of the roadway and two sets of chevrons offset 1 foot in each direction or travel.

13. For wayfinding purposes, the orientation of the chevron marking at offset intersections may be adjusted to direct bicyclists along discontinuous routes. Alternately, an arrow may be used with the chevrons to indicate the direction of the turn.

14. On-street parking spaces may be delineated with paint or other materials to clearly indicate where a vehicle should be parked and to discourage motorists from parking their vehicles too far into the adjacent travel lane.[130]

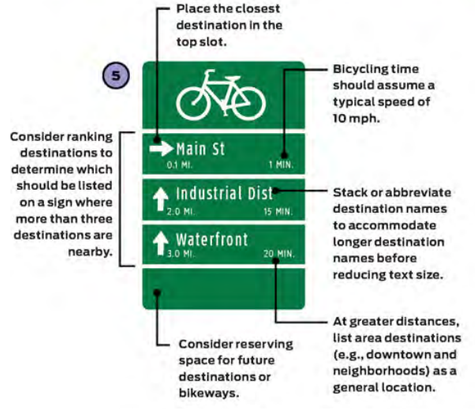


Figure 2.12 Neighborhood Byway Design Guidance, NACTO

Design Guidance

Shared Lane Markings

Required Features

1 The Shared Lane Marking in use within the United States is the bike-and-chevron "sharrow," illustrated in MUTCD figure 9C-9.

2 Shared Lane Markings shall not be used on shoulders, in designated bicycle lanes, or to designate bicycle detection at signalized intersections. (MUTCD 9C.07 03)

Recommended Features

3 Frequent, visible placement of markings is essential. The number of markings along a street should correspond to the difficulty bicyclists experience taking the proper travel path or position. SLMs used to bridge discontinuous bicycle facilities or along busier streets should be placed more frequently (50 to 100 feet) than along low traffic bicycle routes (up to 250 feet or more). SLMs used along low volume routes can be staggered by direction to provide markings closer together.[110]

4 Lateral placement is critical to encourage riders to avoid the "door zone," and to encourage safe passing behavior. MUTCD guidance recommends minimum placement when a parking lane is present at 11 feet from the curb face.[111]

5 On streets with posted 25 mph speeds or slower, preferred placement is in the center of the travel lane to minimize wear and encourage bicyclists to occupy the full travel lane.

6 On streets with posted 35 mph speeds or faster and motor vehicle volumes higher than 3,000 vpd shared lane markings are not a preferred treatment. On these streets other bikeway types are preferred.

7 If on-street vehicle parking is not present, SLMs should be placed far enough from the curb to direct bicyclists away from gutters, seams, and other obstacles. On streets with posted 25 mph speeds or slower, preferred placement is in the center of the travel lane to minimize wear and encourage bicyclists to occupy the full travel lane. MUTCD guidance recommends minimum placement with no parking at 4 feet from the curb face.[112]

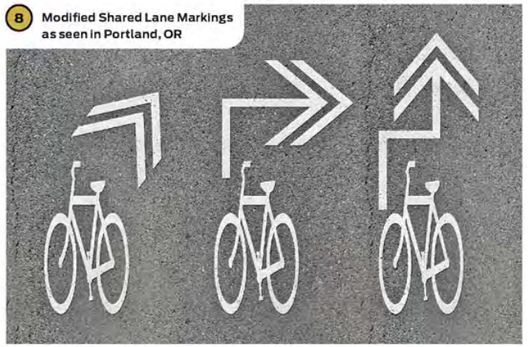
Optional Features

8 For wayfinding purposes the orientation of the chevron marking may be adjusted to direct bicyclists along discontinuous routes.

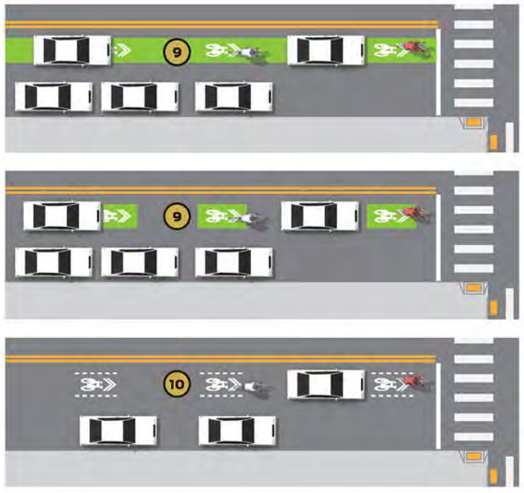
9 Color may be used to enhance the visibility of the shared lane marking and to further encourage desired lane positioning.[113]

10 Dotted line markings may accompany the shared lane marking to further encourage desired lane positioning.[14]

8 **Modified Shared Lane Markings as seen in Portland, OR**



Optional Shared Lane Marking Applications



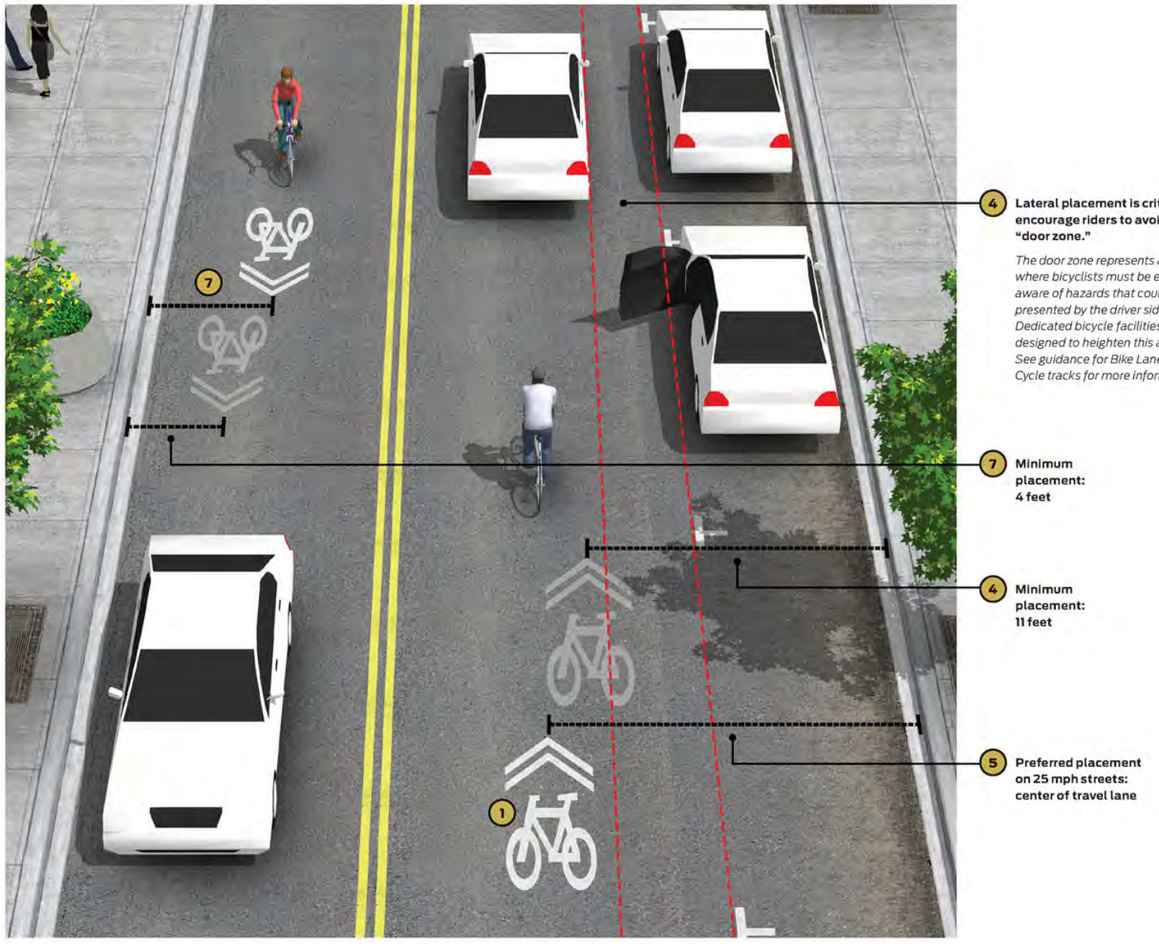


Figure 2.13 Shared Lane Marking Design Guidance, NACTO

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Cycle Tracks / Protected Bike Facility

A cycle track is an exclusive bike facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane. A cycle track is physically separated from motor traffic and distinct from the sidewalk. Cycle tracks have different forms but all share common elements—they provide space that is intended to be exclusively or primarily used for bicycles, and are separated from motor vehicle travel lanes, parking lanes, and sidewalks. In situations where on-street parking is allowed cycle tracks are located to the curbside of the parking (in contrast to bike lanes).

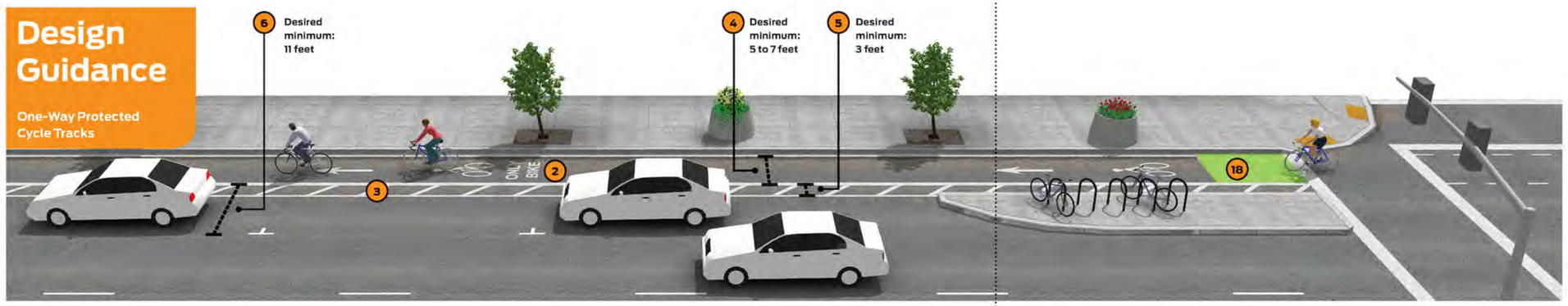
Two-way cycle tracks (also known as protected bike lanes, separated bikeways, and on-street bike paths) are physically separated cycle tracks that allow bicycle movement in both directions on one side of the road. Two-way cycle tracks share some of the same design characteristics as one-way tracks but may require additional considerations at driveway and side-street crossings. Benefits include:

- Dedicates and protects space for bicyclists by improving perceived comfort and safety. Eliminates risk and fear of collisions with over-taking vehicles.
- Reduces risk of 'dooring' compared to a bike lane and eliminates the risk of a doored bicyclist being run over by a motor vehicle.
- On one-way streets, reduces out of direction travel by providing contra-flow movement.
- Low implementation cost when making use of existing pavement and drainage and using parking lane or other barrier for protection from traffic.
- More attractive to a wide range of bicyclists at all levels and ages.

Figures 2.14 through 2.16 summarize design guidance (reference NACTO, Urban Bikeway Design Guide).

Design Guidance

One-Way Protected Cycle Tracks



Required Features

1. A cycle track, like a bike lane, is a type of preferential lane as defined by the MUTCD.[19]

2. Bicycle lane word, symbol, and/or arrow markings (MUTCD Figure 9C-3) shall be placed at the beginning of a cycle track and at periodic intervals along the facility based on engineering judgment.

3. If pavement markings are used to separate motor vehicle parking lanes from the preferential bicycle lane, solid white lane line markings shall be used. Diagonal crosshatch markings may be placed in the neutral area for special emphasis. See MUTCD Section 3B.24. Raised medians or other barriers can also provide physical separation to the cycle track.

Recommended Features

4. The minimum desired width for a cycle track should be 5 feet. In areas with high bicyclist volumes or uphill sections, the minimum desired width should be 7 feet to allow for bicyclists passing each other.[20]

5. Three feet is the desired width for a parking buffer to allow for passenger loading and to prevent door collisions.[21]

6. When using a parking protected pavement marking buffer, desired parking lane and buffer combined width is 11 feet to discourage motor vehicle encroachment into the cycle track.

7. In the absence of a raised median or curb, the minimum desired with of the painted buffer is 3 ft. The buffer space should be used to locate bollards, planters, signs or other forms of physical protection.[22]

8. Driveways and minor street crossings are a unique challenge to cycle track design. A review of existing facilities and design practice has shown that the following guidance may improve safety at crossings of driveways and minor intersections:

- If the cycle track is parking protected, parking should be prohibited near the intersection to improve visibility. The desirable no-parking area is 30 feet from each side of the crossing.[23]
- For motor vehicles attempting to cross the cycle track from the side street or driveway, street and sidewalk furnishings and/or other features should accommodate a sight triangle of 20 feet to the cycle track from minor street crossings, and 10 feet from driveway crossing.
- Color, yield lines, and "Yield to Bikes" signage should be used to identify the conflict area and make it clear that the cycle track has priority over entering and exiting traffic.[24]
- Motor vehicle traffic crossing the cycle track should be constrained or channelized to make turns at sharp angles to reduce travel speed prior to the crossing.

9. Gutter seams, drainage inlets, and utility covers should be configured so as not to impede bicycle travel and to facilitate run-off.

10. Sidewalk curbs and furnishings should be used to prevent pedestrian use of the cycle zone.

11. Cycle track width should be larger in locations where the gutter seam extends more than 12 inches from the curb.[25]

Optional Features

12. Tubular markers may be used to protect the cycle track from the adjacent travel lane. The color of the tubular markers shall be the same color as the pavement marking they supplement.[26]

13. Cycle tracks may be shifted more closely to the travel lanes on minor intersection approaches to put bicyclists clearly in the field of view of motorists. See Cycle Track Intersection Approach for other methods of transitioning a cycle track to an intersection.[27]

14. A raised median, bus bulb, or curb extension may be configured in the cycle track buffer area to accommodate transit stops. Bicyclists should yield to pedestrians crossing the roadway at these points to reach the transit stop.

15. At transit stops, consider wrapping the cycle track behind the transit stop zone to reduce conflicts with transit vehicles and passengers. Bicyclists should yield to pedestrians in these areas. At intersection bus stops, an extended mixing zone may be provided with signage directing bicyclists to yield to buses and loading passengers.

Cycle tracks may be configured on the left side of a one-way street to avoid conflicts at transit stops.

16. A "Bike Lane" sign (MUTCD R3-17) may be used to designate the portion of the street for preferential use by bicyclists. A supplemental "No Cars" selective exclusion sign may be added for further clarification.

17. "Bike Only" legend (MUTCD 3D.01) may be used to supplement the preferential lane word or symbol marking.[28]

18. Colored pavement may be used to further define the bicycle space.

Alternate Protection Strategies

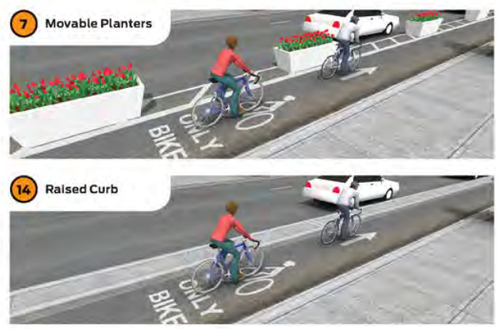


Figure 2.14 One-Way Cycle Track Design Guidance, NACTO

Design Guidance

Two-Way Cycle Track

Required Features

1 Bicycle lane word, symbol, and/or arrow markings (MUTCD Figure 9C-3) shall be placed at the beginning of a cycle track and at periodic intervals along the facility to define the bike lane direction and designate that portion of the street for preferential use by bicyclists.

2 If configured on a one-way street, a "ONE WAY" sign (MUTCD R6-1, R6-2) with "Except Bikes" plaque shall be posted along the facility and at intersecting streets, alleys, and driveways informing motorists to expect two-way traffic.

3 A "DO NOT ENTER" sign (MUTCD R5-1) with "EXCEPT BIKES" plaque shall be posted along the facility to only permit use by bicycles.

4 Intersection traffic controls along the street (e.g., stop signs and traffic signals) shall also be installed and oriented toward bicyclists traveling in the contra-flow direction.

Recommended Features

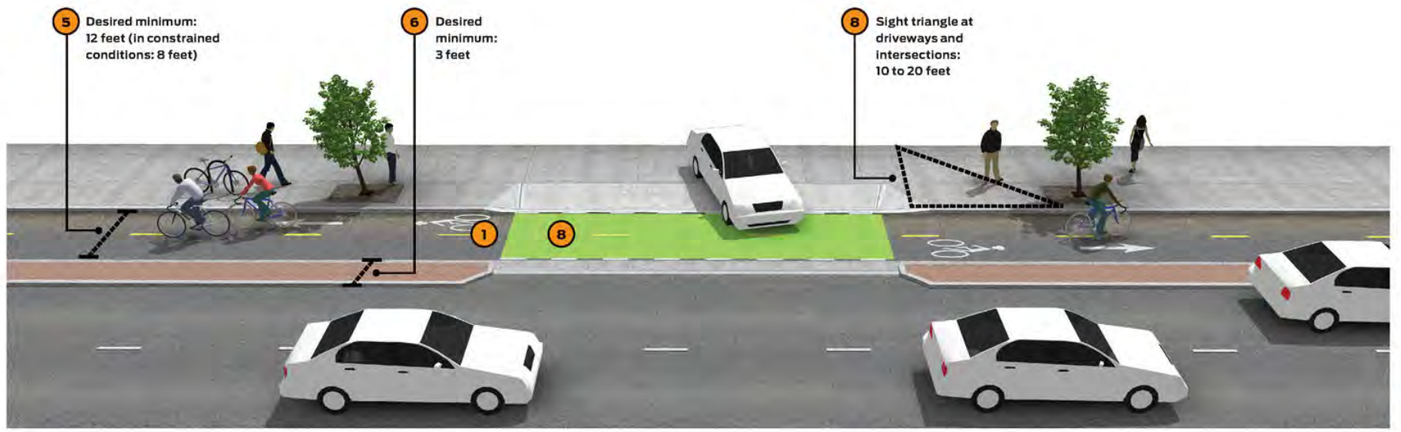
5 The desirable two-way cycle track width is 12 feet. Minimum width in constrained locations is 8 feet.[42]

6 When protected by a parking lane, 3 feet is the desired width for a parking buffer to allow for passenger loading and to prevent dooring collisions.[43]

7 A dashed yellow centerline should be used to separate two-way bicycle traffic and to help distinguish the cycle track from any adjacent pedestrian area.

8 Driveways and minor street crossings are a unique challenge to cycle track design. A review of existing facilities and design practice has shown that the following guidance may improve safety at crossings of driveways and minor intersections:

- If the cycle track is parking protected, parking should be prohibited near the intersection to improve visibility. The desirable no-parking area is 30 feet from each side of the crossing.[44]
- For motor vehicles attempting to cross the cycle track from the side street or driveway, street and sidewalk furnishings and/or other features should accommodate a sight triangle of 20 feet to the cycle track from minor street crossings, and 10 feet from driveway crossing.
- Color, yield lines, and "Yield to Bikes" signage should be used to identify the conflict area and make it clear that the cycle track has priority over entering and exiting traffic.[45]



- Motor vehicle traffic crossing the cycle track should be constrained or channelized to make turns at sharp angles to reduce travel speed prior to the crossing.
- If configured as a raised cycle track, the crossing should be raised, in which the sidewalk and cycle track maintain their elevation through the crossing. Sharp inclines on either side from road to sidewalk level serve as a speed hump for motor vehicles.[46]

9 Two-stage turn queue boxes should be provided to assist in making turns from the cycle track facility.

Optional Features

10 Tubular markers may be used to protect the cycle track from the adjacent travel lane. The color of the tubular markers shall be the same color as the pavement marking they supplement.[47]

11 Cycle tracks may be shifted more closely to the travel lanes on minor intersection approaches to put bicyclists clearly in the field of view of motorists.[48]

12 A raised median, bus bulb or curb extension may be configured in the cycle track buffer area to accommodate transit stops. Cyclists should yield to pedestrians crossing the roadway at these points to reach the bus stop. A two-way cycle tracks may be configured on the left side of a one-way street to avoid conflicts at transit stops.

13 May be configured as a raised cycle track.

Intersection Configuration Alternatives

See the Cycle Track Intersection Approach and Bicycle Signals sections for details on design strategies at intersections.

Bicycle Signal Phase
A dedicated bicycle signal phase can eliminate conflict between turning automobiles and bicyclists.

"Bend In" Crossing
Using a curb extension or painted buffer, the cycle track may be bent-in to promote visibility of bicyclists in advance of the intersection.

Figure 2.15 Two-Way Cycle Track Design Guidance, NACTO

Design Guidance

Rasied Cycle Tracks

Required Features

(1) The cycle track shall be vertically separated from the street at an intermediate or sidewalk level.

(2) Bicycle lane word, symbol, and/or arrow markings (MUTCD Figure 9C-3) shall be placed at the beginning of a cycle track and at periodic intervals along the facility based on engineering judgment.

(3) A raised cycle track shall be protected from the adjacent motor vehicle travel lane. Protection strategies may include a raised or mountable curb, street furnishings, low vegetation or a parking lane.

(4) If used, the mountable curb should have 4:1 slope edge without any seams or lips to interfere with bike tires to allow for safe entry and exit of the roadway. This curb should not be considered a ridable surface when determining cycle track width.[31]

Recommended Features

(5) Desirable one-way raised cycle track travel surface width is 6.5 feet to allow side-by-side riding or passing. Desired minimum width is 5 feet at intersections and pinch points. Additional width may be needed for protection from traffic or parking and/or shy distance to sidewalks or furnishings.[32]

(6) When configured next to a parking lane, 3 feet is the minimum desired width for a parking buffer to allow for passenger loading and to prevent dooring collisions. The buffer can be at street level or at the level of the cycle track.[33]

(7) When configured next to a motor vehicle travel lane, the desired minimum width of a mountable curb is 1 foot, depending on elevation. Raised curbs may require additional width for added shy distance from the curb edge. Raised curb buffer minimum width should be increased to 3 feet or greater when buffer space is used to locate lamp posts, bollards, street furniture, low vegetation, and/or trees.[34]

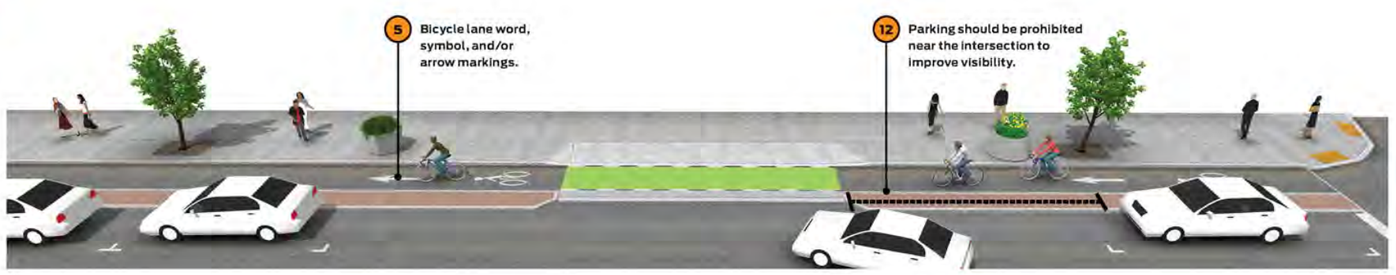
(8) Vertical separation between the roadway and the cycle track should be between 1 and 6 inches. Higher separation values discourage illegal parking.

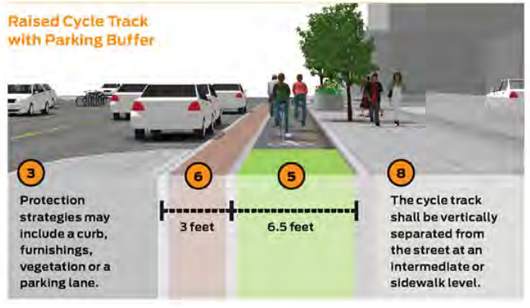
(9) Vertical separation between the cycle track and the sidewalk should be between zero (flush with the sidewalk surface) and 5 inches. A separation of 3 inches or greater discourages conflicts with pedestrians.

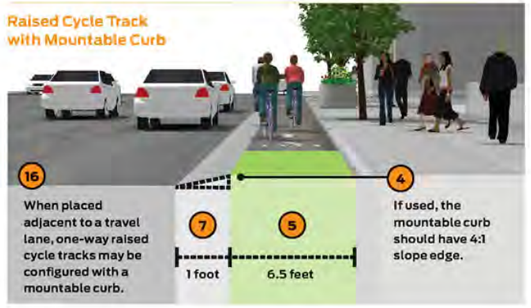
(10) If curb or median separated, careful consideration should be given to the curb design. Curbs of 6 inches can be hazards to bicyclists by interfering with the space needed for pedaling, but can be more effective deterrents to illegal parking or loading. Consider the use of alternative bicycle-friendly curb profiles where possible.[35]

(11) Supplemental shy distance striping should be added at the entrance to curb protected cycle tracks to encourage bicyclists to keep their distance.

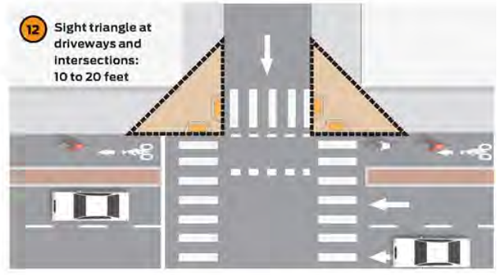
(12) Driveways and minor street crossings are a unique challenge to cycle track design. A review of existing facilities and design practice has shown that the following guidance may improve safety at crossings of driveways and minor intersections:







- If the cycle track is parking protected, parking should be prohibited near the intersection to improve visibility. The desirable no-parking area is 30 feet from each side of the crossing.[36]
- For motor vehicles attempting to cross the cycle track from the side street or driveway, street and sidewalk furnishings and/or other features should accommodate a sight triangle of 20 feet to the cycle track from minor street crossings, and 10 feet from driveway crossings.
- Color, yield lines, and "Yield to Bikes" signage should be used to identify the conflict area and make it clear that the cycle track has priority over entering and exiting traffic.[37]
- Motor vehicle traffic crossing the cycle track should be constrained or channelized to make turns at sharp angles to reduce travel speed prior to the crossing.
- The crossing should be raised, in which the sidewalk and cycle track maintain their elevation through the crossing. Sharp inclines on either side from road to sidewalk level serve as a speed hump for motor vehicles.[38]
- If configured at a height flush with the sidewalk, color, pavement markings, textured surfaces, landscaping, or other furnishings should be used to discourage pedestrian use of the cycle zone.



(13) Drainage should slope to the street. Drainage grates should be in adjacent travel or parking lane.

(14) Two-stage turn boxes should be provided to assist in making turns from the cycle track facility.

Optional Features

(15) Cycle tracks may be shifted more closely to the travel lanes on minor intersection approaches to put bicyclists clearly in the field of view of motorists.[39]

(16) When placed adjacent to a travel lane, one-way raised cycle tracks may be configured with a mountable curb to allow entry and exit from the bicycle lane for passing other bicyclists or to access vehicular turn lanes. This configuration has also been known as a "raised bike lane."

(17) If the cycle track is not already at sidewalk level, consider raising the cycle track to sidewalk level and wrapping the cycle track around the transit stop zone to reduce conflicts with transit vehicles at midblock or signal protected intersections. Bicyclists should yield to pedestrians in these areas.

(18) Contra-flow bike lanes may be raised in a cycle track configuration to offer further physical protection for contra-flow riders.

(19) Cycle tracks may be configured on the left side of a one-way street to avoid conflicts at transit stops.

(20) Color may be used to contrast with the adjacent pedestrian area or to increase the visibility of the cycle track in conflict areas.

Figure 2.16 Raised Cycle Track Design Guidance, NACTO

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Figure 2.17 depicts the proposed bicycle facility improvements and **Table 2.7** summarizes the recommendations. Low, medium and high priorities, cost ($ low/$$ medium/$$$ high) and ease of implementation are noted. Improvements by town center areas are provided in **Appendix E.**

Table 2.7

Bicycle Facility Recommendations

Location	Facility Type	Comments	Priority	Cost	Ease of Implementation
Payne Road	▪ 12-Foot **Shared Use Path** on east side from Haigis Parkway to Gorham Road	▪ See Payne Road concept plans	▪ Medium	▪ $$$	▪ Moderate
	▪ Add **Shared Use Path** on east side from Haigis Parkway to South Portland	▪ Medium	▪ Moderate	▪ $$$	▪ Difficult
	▪ Add **sidewalk** on west side from Haigis Parkway to South Portland		▪ Medium	▪ $$$	▪ Moderate
	▪ Add **sidewalk** from Haigis Parkway to Regal Pines Drive		▪ Medium	▪ $$$	▪ Moderate
Haigis Parkway: Payne Road to Route 1	▪ 12-Foot **Shared Use Path** on north side	▪ See Haigis Parkway concept plans	▪ Medium	▪ $$$	▪ Moderate
Scarborough Downs Road: Route 1 to Payne Road	▪ **Bike Lanes**	▪ Future plans not known	▪ Medium	▪ $$	▪ Easy to Moderate
Enterprise Drive: Route 1 to End	▪ Widen sidewalk on north side for a **Shared Use Path**	▪ Passage Way only has a sidewalk on west side. Would need to be shared or widened sidewalk for path. Passage Way is 22’ wide.	▪ Low	▪ $$	▪ Easy
Gorham Road	▪ Extend **bike lanes/wide shoulders** to Payne Road	▪ Widen the Nonesuch River bridge	▪ High	▪ $$$	▪ Difficult
	▪ Add **sidewalk** on north side from Oak Hill Drive to Hannaford Drive		▪ Medium/High	▪ $	▪ Easy
	▪ Add **sidewalk** on northeast side to Payne Road		▪ Medium/High	▪ $$$	▪ Difficult
	▪ Add **sidewalk** from Saco Street to County Road				
Oak Hill Byway North – Maple Avenue to Route 1 North to Portland Farms Road	▪ Maple Avenue - **Shared Lanes** or **Advisory Bike Lanes** ▪ Route 1 – **Shared Use Path** on west side ▪ Portland Farms Road – **Shared lanes, Advisory Bike Lanes** or **Shared Use Path** on north side	▪ Traffic calming should be considered for Maple Avenue and Portland Farms Road.	▪ High	▪ $$	▪ Moderate
Oak Hill Byway South - Wentworth Drive to Municipal Drive to Durant Drive to Sawyer to Route 1 to Commerce Drive to Evergreen Farms Road to ET.	▪ Wentworth Drive – **Shared Use Path** on north side (long term) and **Shared Lanes** (short term) ▪ Municipal Drive – widen sidewalk for **Shared Use Path** ▪ Durant Drive - widen sidewalk for **Shared Use Path** (or route through Memorial Park) ▪ Sawyer Road – widen sidewalk through Memorial Park for **Shared Use** Path to Route 1 ▪ Route 1 **Shared Use Path** to Commerce Drive ▪ Evergreen Farms Road **Shared Lanes**	▪ Municipal Drive path has widening constraints at wetlands. ▪ Light poles would need to be relocated. ▪ Memorial Park parking lot would be impacted. ▪ Commerce Drive is 32’ wide – two 11’ lanes and two 5’ bike lanes ▪ Evergreen Farms Road a good connection to the Eastern Trail	▪ High	▪ $$	▪ Moderate
Oak Hill Byway Central – Municipal Campus to Ward Street to White Hart Lane to Classical Lane to Federal Way	▪ **Shared Lanes with Sharrow and signage**	▪ Can circulate through to Ballantyne Drive to access the Eastern Trail. ▪ The White Hart Lane connection is not required.	▪ High	▪ $	▪ Easy
Sawyer Street	▪ **Shared Use Path** from Durant Drive to Sawgrass Drive	▪ Sawyer has a pavement width of 24’ ▪ Sawgrass Drive Connects to the Downs	▪ Medium	▪ $$	▪ Medium
	▪ Add **sidewalk** from Sawgrass Drive to Gorham Road		▪ Medium	▪ $$	▪ Moderate
	▪ Add **sidewalk** from Route 1 to Durant Drive		▪ Medium	▪ $$	▪ Moderate

Table 2.7 (continued)

Bicycle Facility Recommendations

Location	Facility Type	Comments	Priority	Cost	Ease of Implementation
Old Blue Point Road – Route 1 to Pine Point Road	▪ Widen for **Bike lanes**	▪ Speed limit 40MPH – 25 MPH toward Pine Point Road ▪ 29’ wide with 2’ to 3’shoulders ▪ A section has no shoulders ▪ Section with sidewalk consists of 29’ with 3’ shoulders	▪ Low	▪ $$	▪ Medium
Pine Point Road	Route 1 to King Street to Avenue 5 ▪ Option 1 **Buffered Bike Lanes** ▪ Option 2 **Shared Use Path** – Long term	▪ Restripe lanes in sections with narrow shoulders ▪ Future path to be on north side – widen existing sidewalk ▪ Railroad Bridge a constraint for a path ▪ On-street parking section a constraint for a path ▪ Existing bike lane high stress from “dooring” with parked vehicles ▪ Shared lanes on King Street ▪ Eliminate Passing zone in 35 MPH section ▪ Near route 1 Pine Point Road is 40‘wide – with narrow southerly shoulder	▪ High	▪ $ for short-term buffered bike lanes	▪ Easy
	▪ Extend **sidewalk** on north side to Snow Canning Road from the west.	▪ RR Crossing challenging	▪ Medium	▪ $$$	▪ Difficult
	▪ Add **sidewalk** from Eastern Trail to the sidewalk at Dunstan Landing Road		▪ Medium	▪ $$	▪ Moderate
Washington Avenue/Lincoln Avenue from Eastern Trail	▪ **Bike Lanes**	▪ Width of Washington Avenue is 40 feet ▪ Adjust lane width or shared lanes for Lincoln Avenue approaching Route 1 ▪ Some on-street parking on Washington Avenue	▪ High	▪ $	▪ Easy
Black Point Road	Route 1 to Scarborough Beach State Park: **Bike Lanes (with buffer where width permits)** ▪ Restripe to 11’ lanes in some sections ▪ Restripe to 10’ lanes and 4-foot shoulders on section from Spurwink Road to State Park	▪ Widen or restripe ▪ At Thornton Road the total width is 33’ ▪ Near the State Park entrance total width is 28’ ▪ 10’ lanes require a MaineDOT design exception	▪ High	▪ $	▪ Easy
	▪ Extend the **sidewalk** on north side to Eastern Avenue	▪ Utility pole conflicts	▪ High	▪ $$	▪ Moderate
Highland Avenue – Black Point Road to South Portland	▪ 10-Foot **Shared Use Path** – Black Point Road to Chamberlain Road ▪ 10-Foot **Shared Use Path** - Chamberlain Road to Pleasant Hill Road ▪ **Bike Lanes** – Pleasant Hill Road to South Portland	▪ Proposed Project - Black Point Road to Chamberlain Road ▪ Consider buffered bike lanes from Pleasant Hill Road to South Portland ▪ Coordinate with City of South Portland	▪ High	▪ $$$	▪ Medium
Spurwink Road – Black Point Road to Cape Elizabeth	▪ 4-Foot **Bike lanes** ▪ Restripe with 11’ lanes	▪ Proposed Project – 4’foot bike lane uncurbed and 5-foot bike lane curbed ▪ 29’ to 30’ with 12’ lanes – restripe with 11’ lanes ▪ Request MaineDOT to reduced speed limit from 40/45mph	▪ High	▪ $$	▪ Easy for restriping and Medium for roadway widening for bike lanes
Ocean Avenue – Spurwink Road to Higgins Beach	▪ **Advisory Bike lanes/Shared Use Path** on north side/Shared Lanes	▪ Advisory sidewalks complicate the implementation of advisory bike lanes ▪ Path will require some widening	▪ Low	▪ $$	▪ Easy for shared lane markings and medi-um/difficult if path

Table 2.7 (continued)

Bicycle Facility Recommendations

Location	Facility Type	Comments	Priority	Cost	Ease of Implementation
Pleasant Hill Road	Spurwink Road to Eastern Trail ▪ **Bike lanes**	▪ Widen road in some locations ▪ Tree impacts likely ▪ North of Highland Avenue wide shoulders are provided	▪ Medium	▪ $$	▪ Easy for roadway north of Highland Avenue and difficult for widening because of impacts
	▪ Add **sidewalk** from Highland Avenue to Spurwink Road	▪ Tree Impacts likely	▪ Low	▪ $$$	▪ Difficult
Eastern Trail – Eastern Road to South Portland	▪ 10 to 12-Foot **Shared Use Path**	▪ Proposed Project	▪ High	▪ $$$	▪ Difficult
Jameco Mill Road to Maple Avenue	▪ 10-Foot **Shared Use Path**	▪ Existing paved width would need to be widened	▪ Low	▪ $	▪ Easy
Imperial Lane to Wentworth School	▪ 8 to 10 Foot **Shared Use Path**	▪ Neighborhood Connection	▪ High	▪ $	▪ Easy
The Downs Utility Corridor – Haigis Parkway to Scarborough Downs Road	▪ 10 to 12-Foot **Shared Use Path**	▪ Private Land Agreement	▪ Low	▪ $$$	▪ Moderate
Eastern Trail/Commerce Drive/Evergreen Farms to The Downs Connection	▪ **Shared Use Path**	▪ Topographically challenging for a connection behind Joe Jones ▪ Suggest a shared use path on west side of Route 1 from Scarborough Downs to Commerce Drive	▪ High	▪ $$	▪ Moderate
Route 1	Hillcrest Drive to Pleasant Hill Road ▪ **Shared Use Path** from Hillcrest Drive to Hannaford Drive to Wentworth Drive ▪ **Shared Use Path** from Hillcrest Drive to Campus Drive ▪ **Protected Bike lanes** from Campus Drive to Pleasant Hill Road	▪ Requires Road Diet from Scarborough Connector to Pleasant Hill Road ▪ Private Land Agreements needed ▪ RRFB crossing at Campus Drive for access to bike lanes ▪ Further study and coordination with South Portland	▪ Medium	▪ $$$	▪ Difficult
	▪ Add **sidewalk** on east side from City of Saco to Old Blue Point Road		▪ Low	▪ $$	▪ Moderate
	▪ Install **RRFB** at Old Blue Point Road		▪ Low	▪ $	▪ Easy
	▪ Install **RRFB** at Dunstan Avenue		▪ Medium	▪ $	▪ Easy
	▪ Add **sidewalk** on west side from Payne Road to Haigis Parkway	▪ Wetlands constrain sidewalk from Southgate to Lincoln	▪ High	▪ $$$	▪ Difficult
	▪ Provide **sidewalks** on both sides of Route 1 from Haigis Parkway to Hillcrest Avenue	▪ Implement in phases ▪ Shared use paths to be provided in some locations. See above	▪ High	▪ $$$	▪ Difficult
	▪ Add **crosswalk/Median/RRFB** at Little Dolphin Drive	▪ Include pedestrian refuge	▪ High	▪ $$	▪ Moderate
	▪ Add **sidewalk** on west side from Campus Drive to Pleasant Hill Road		▪ Low	▪ $$	▪ Moderate
	▪ Add **crosswalk** and RRFB at Campus Drive		▪ Low	▪ $	▪ Easy
Mussey Road	▪ Add **sidewalk** on north side from Gorham Road to Payne Road		▪ Medium	▪ $$	▪ Moderate
	▪ Add **sidewalk** from Spring Street to Carrier Woods Apartments		▪ Medium	▪ $$	▪ Moderate
Hannaford Drive	▪ Add **sidewalk** on south side from Route 1 to Gorham Road		▪ Low	▪ $$	▪ Moderate
Broadturn Road	▪ Add **sidewalk** from Route 1 to Carpenter Court		▪ Medium	▪ $$	▪ Moderate
Saco Street	▪ Add **sidewalk** from Gorham Road to Wassamki Springs		▪ Low	▪ $$$	▪ Moderate
County Road	▪ Add **sidewalk** from Saco Street to Gorham TL		▪ Medium	▪ $$	▪ Moderate
Fogg Road	▪ Add **sidewalk** on one side		▪ Low	▪ $$$	▪ Moderate

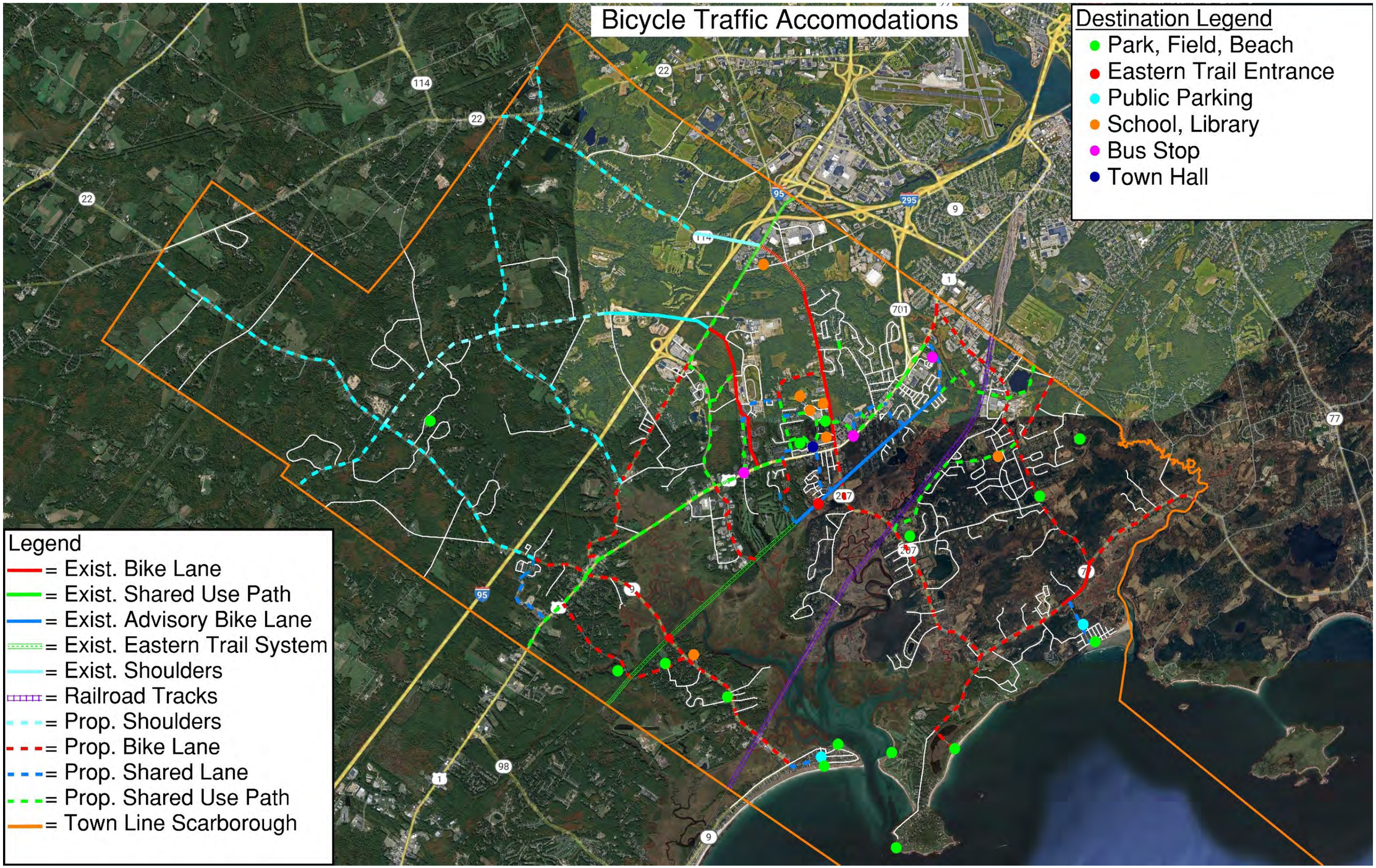


Figure 2.17 Bicycle Facility Recommendations

Section 2 • Bicycle and Pedestrian Mobility, Safety, and Connectivity

Pedestrian Mobility Improvements

The identification of pedestrian facility improvements focused on major corridors and connections to major destinations. Figure 2.18 depicts the suggested improvements as described in Table 2.7. Low, medium and high priorities, cost and ease of implementation are noted. Improvements by town center areas are provided in **Appendix E**.

Sidewalk Design

Sidewalk design should go beyond the bare minimums in both width and amenities. Pedestrians and businesses thrive where sidewalks have been designed at an appropriate scale, with sufficient lighting, shade, and street-level activity. These considerations are especially important for streets with higher traffic speeds and volumes, where pedestrians may otherwise feel unsafe and avoid walking.

Sidewalk Construction and Materials: Sidewalks shall be bituminous concrete. In some cases, as approved by DPW, concrete may be used. Concrete is the suggested material for town center areas.

Sidewalk Accessibility: All sidewalks shall meet any minimum standard set forth by current Americans with Disabilities Act (ADA) and Public Right-of-Way Accessibility Guideline (PROWAG) guidance.

Sidewalk Width: The minimum sidewalk clear width shall be 5.5 feet with curbing and 5 feet without. Where obstructions, such as utility poles, are located in sidewalks, a minimum clear and direct pedestrian access route width of five (5) feet shall be provided between the obstruction and one edge of the sidewalk. Wider sidewalks may be required in locations where heavy pedestrian traffic is expected, based on the site context. New sidewalks shall be at least as wide within the right-of-way as the sidewalk(s) along the adjacent properties.

Esplanade: The esplanade zone is defined as the section of the sidewalk between the curb and the through zone in which street furniture and amenities, such as lighting, benches, newspaper kiosks, utility poles, tree pits, and bicycle parking are provided. The street furniture zone may also consist of green infrastructure elements, such as rain gardens or flow-through planters. The width of the esplanade will vary depending on right-of-way and what is to be designed. It is suggested that a minimum 3 feet be provided.

Bus Stops: Where transit stops are provided, bus shelters should be placed at the left or right edge of the walkway, but never directly within the path of travel. Where insufficient space exists, consider the application of a bus bulb.

Driveways: At driveways, sidewalks should be maintained at-grade through the conflict zone.

Maintenance: When designing sidewalks, coordination with DPW is required to ensure winter maintenance can be performed by the Town's equipment.

Curb Ramps: ADA-compliant curb ramps are required on all projects involving construction of new streets or new sidewalks, and on all projects involving alterations to the abutting street, including repaving of existing streets and sidewalks. Curb ramps shall be designed to prevent ponding of water at the base of the ramp. Ramp designs and details will indicate how positive drainage away from the landing in the vicinity of curb ramps will be achieved.

Curb Extensions: Curb extensions (also known as bump-outs, bulb-outs, or neckdowns) describe any localized narrowing of the roadway, typically at pedestrian crosswalk locations. The installation of any curb extension is subject to the approval of DPW. Curb extensions may be considered where one or more of the following conditions are met:

- There is a documented speeding issue confirmed by a speed study;
- Curb extensions are necessary to construct one or more ADA-compliant curb ramps at an existing or proposed crosswalk;
- As determined necessary at uncontrolled midblock crossings;

- At signalized intersections, where reducing the pedestrian crossing time improves signal timing;
- At locations where there is a history of crashes involving pedestrians and/or crashes involving right-turning vehicles; or
- Where they are prescribed in a master plan or transportation plan.

Curb extensions, where permitted, shall be constructed to achieve the applicable goal(s) without disrupting the functionality of the roadway or intersection. Curb extensions:

- Shall not impede necessary turning movements for trucks or emergency vehicles or winter operations;
- Shall not negatively impact drainage without adequate mitigation;
- Shall not impede upon, or narrow to an unacceptable degree, the adjacent travel or bicycle lanes.

Rural Roadways

For roadways that have rural characteristics, the provision of sidewalks and bicycle facilities may not be cost beneficial. Paved shoulders on the edge of roadways can be enhanced to serve as a functional space for bicyclists and pedestrians to travel in the absence of other facilities with more separation. Accordingly, in some cases a paved shoulder may be appropriate to serve both bicycle and pedestrian activity. Some factors to consider include:

- Provide a stable surface off the roadway for pedestrians and bicyclists to use when sidewalks are not provided.
- Requires a wider roadway to provide an accessible shoulder space.
- Walkable shoulders should be provided along both sides of rural roads and highways routinely used by pedestrians.
- To accommodate bicyclists and pedestrian use of the shoulder, provide a minimum width of 4 feet adjacent to a road edge or curb, exclusive of any buffer or rumble strip.
- When shoulders are intended for use by pedestrians, they must meet accessibility guidelines.

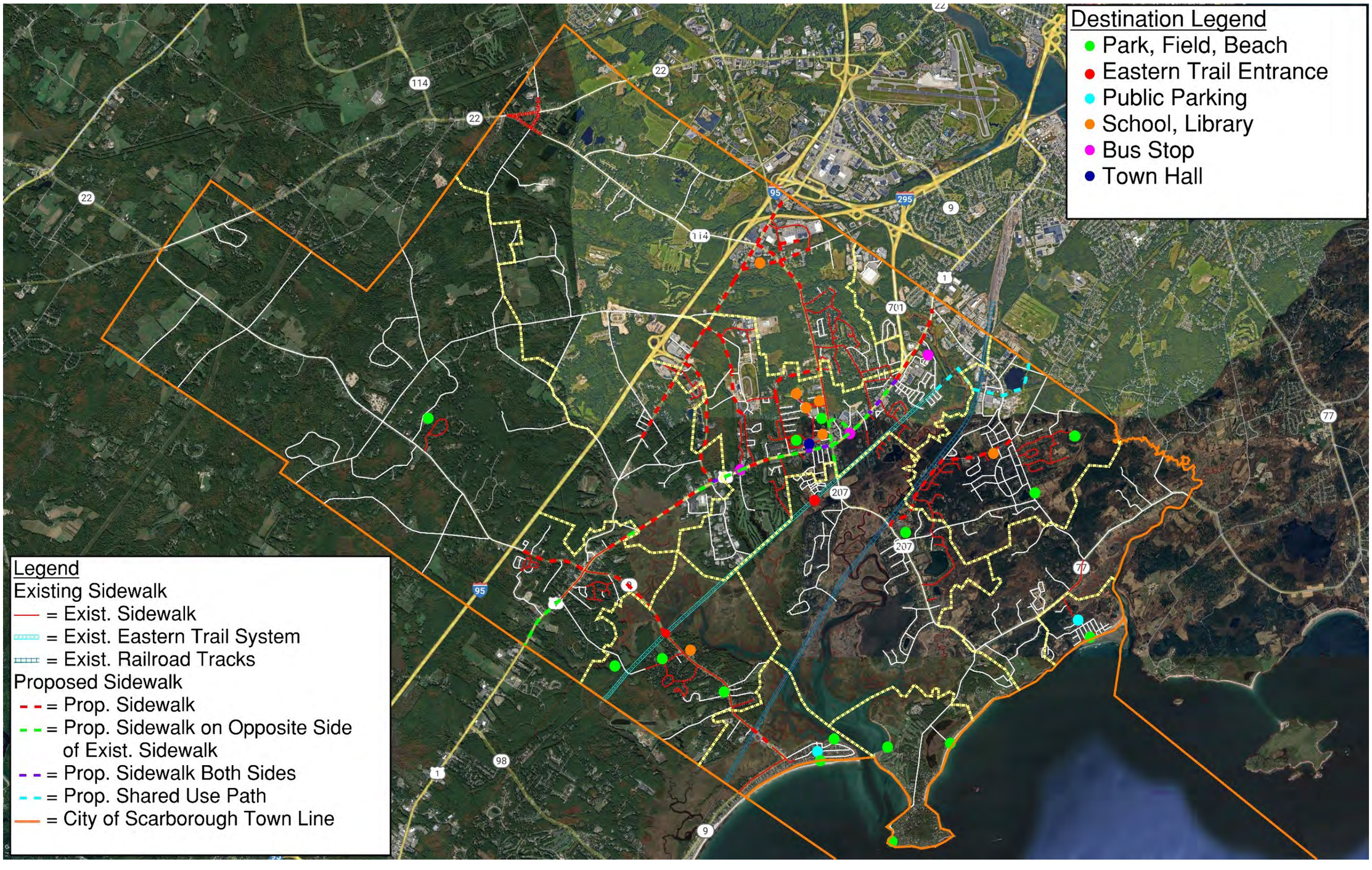


Figure 2.18 Pedestrian Facility Recommendations

Section 3 • Vehicular Safety

Section 3 • Vehicular Safety

Introduction

Improving roadway safety is a top priority for the Town of Scarborough, particularly at intersections and road segments identified as High Crash Locations (**HCL**). An HCL is defined as,**"an intersection or highway segment that experiences an abnormally high number of crashes relative to the traffic demands that are served. An HCL by definition has a critical rate factor greater than or equal to 1.0, and has experienced at least eight crashes in the most recent three-year period."**[1]

The Critical Rate Factor (**CRF**) is defined as the, **"ratio of the crash rate of a given location to the statewide crash rate for roads of similar classification and urban/rural rating."**[1]

In 2023, 14 intersections and eight roadway segments within the town limits were identified as High Crash Locations (HCL). Out of these 22 HCLs, six have been selected for corrective action in this report. While this report provides some analysis and recommendations for improvement for each of the selected intersections, a full safety and mobility analysis should be conducted in the future to complement the information provided in this study. The selected high crash locations are:

- Intersection of US Route 1 at Dunstan Avenue and Orchard Street
- Segment of US Route 1 from Dunstan Avenue/Orchard Street to Broadturn Road
- Intersection of Payne Road and Cummings Road
- Intersection of Broadturn Road at Burnham Road
- Intersection of Broadturn Road at Holmes Road
- Intersection of Route 1 and Hannaford Drive

These intersections and segments were identified for corrective action because of the high number of crashes they experienced (high CRF) in the most recent three-year study period, their history as High Crash Locations in the Town, and because they do not have improvements planned as of the date of this study.

There are several High Crash Locations which were not selected for corrective action that have more crashes or have a longer history of being a High Crash Location than the intersections and segments that were selected for corrective action. For these locations, the Town of Scarborough has already planned or started implementing improvements. See Active and Planned Initiatives in this section for a list of all intersections and segments with planned improvements or existing studies.

In addition to the six High Crash Locations identified for corrective action in this report, five intersections or segments have been identified for future study. These intersections or segments include:

- Intersection of Highland Avenue and Chamberlain Road
- Intersection of Highland Avenue and Pleasant Hill Road
- Intersection of Payne Road, Beech Ridge Road, and Scottow Hill Road
- Intersection of Black Point Road and Eastern Road
- Segment of the Scarborough Connector NB from US Route 1 to the South Portland Town Line

Section 3 • Vehicular Safety

Review of Crash Data

In the 2021 to 2023 three-year period, the Town of Scarborough had a total of 1,953 crashes, the majority of which were rear end/sideswipe crashes and intersection movement crashes.[2] A total of 889 crashes were identified as rear end/sideswipe type crashes, and 422 crashes were identified as intersection movement crashes.[2] (All crashes and crash types are summarized in **Figure 1 - Scarborough 2021 to 2023 Combined, Crash Types**).

In the last three years, crashes more often took place on weekdays (**Figure 3 - Scarborough 2021 to 2023 Combined, Crashes by Day of Week**), in the summer months (June, July, and August), and in December (**Figure 2 -Scarborough 2021 to 2023 Combined, Crashes by Month**).[2]

Additionally, the 4 o'clock hour had the greatest number of crashes during the day (**Figure 4 - Scarborough 2021 to 2023 Combined, Crashes by Time of Day**).[2]

The majority of crashes in Scarborough in the last three years took place on roadways posted at 35mph - a total of 1,118 crashes (or 63% of all crashes in Scarborough) were on roadways with a posted speed limit of 35mph (**Figure 5 - Scarborough 2021 to 2023 Combined, Crashes by Posted Speed Limit**).[2]

There were a total of five fatalities in Scarborough as the result of a crash. Additionally, there were 47 suspected serious injuries, 247 suspected minor injuries, and 404 possible injuries. 3,683 people had no apparent injury after a crash (**Figure 6 - Scarborough 2021 to 2023 Combined, Crashes by Injury Degree**).[2] Note that these numbers include all individuals involved in crashes.

The Town has seen a slight upward trend in the number of crashes over the last 20 years (**Figure 7 - Scarborough 2003 to 2023 Yearly Crash Totals**). There was a noticeable decrease in crashes in 2020 during the pandemic, but the overall number of crashes has increased in the years since.

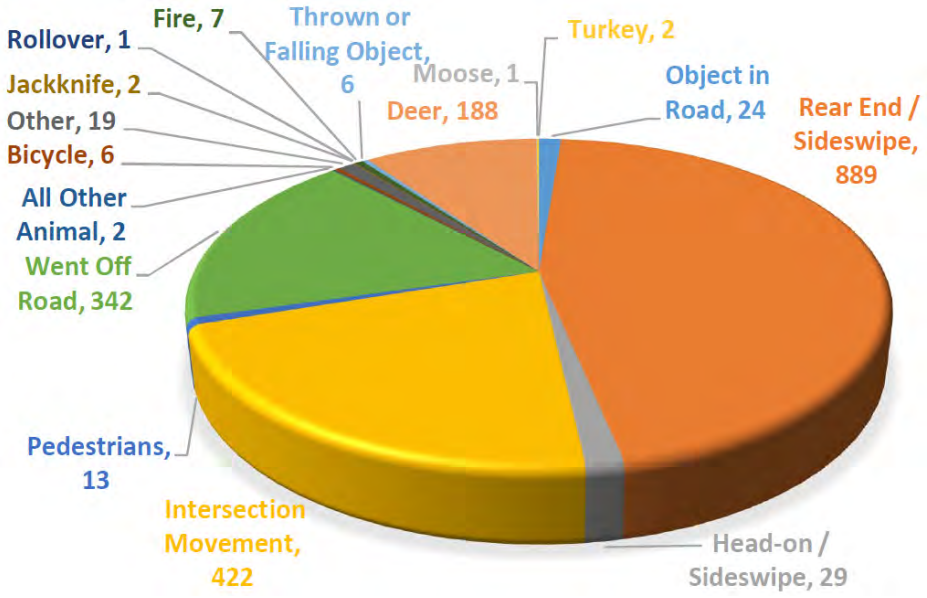


Figure 1 - Scarborough 2021 to 2023 Combined, Crash Types

Appendix C shows all of the 2023 High Crash Locations within the Town of Scarborough and the number of crashes at each location. **Tables 1 and 2** show the history of High Crash Locations in the Town of Scarborough. The blue bars on the tables indicate the time periods where an intersection or segment was designated as a high crash location (**Table 1 - History of High Crash Location Intersections in Scarborough - 20 Years**).

[1]Speak MaineDOT, 2016
[2]Maine Public Crash Query Tool (Accessed April 1, 2024)

Section 3 • Vehicular Safety

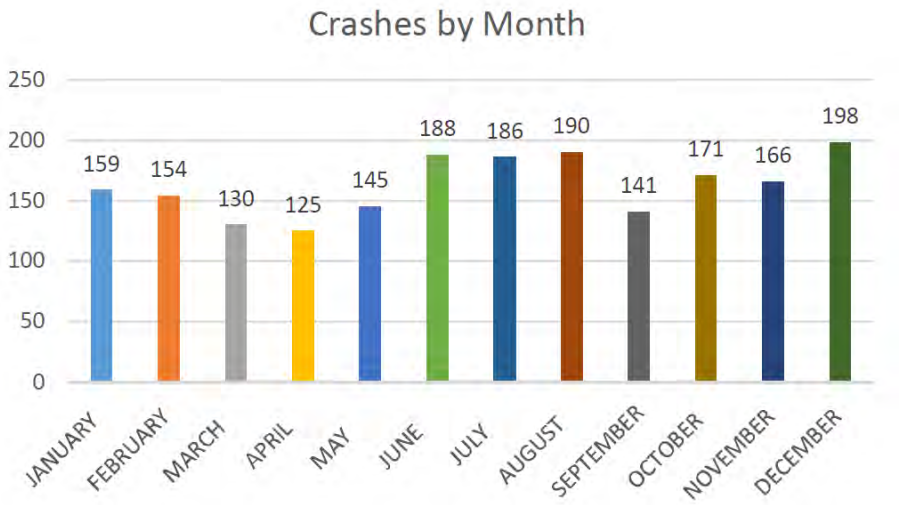


Figure 2 - Scarborough 2021 to 2023 Combined, Crashes by Month

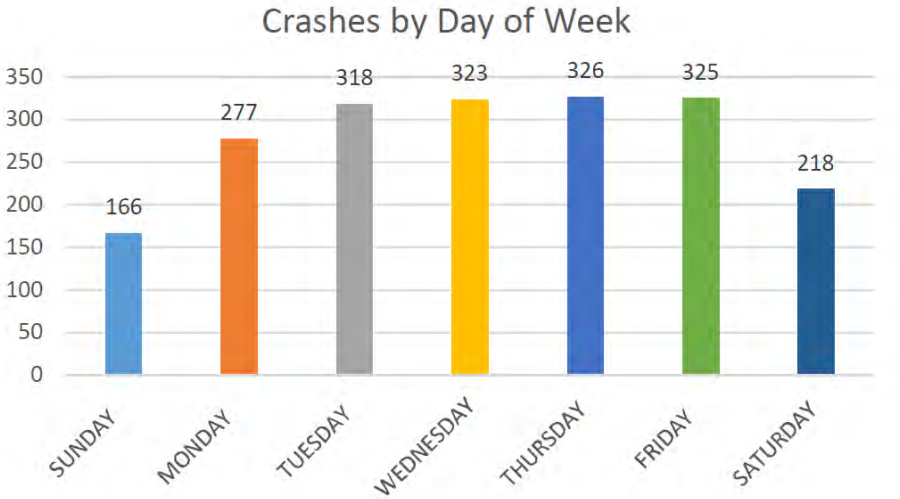


Figure 3 - Scarborough 2021 to 2023 Combined, Crashes by Day of Week

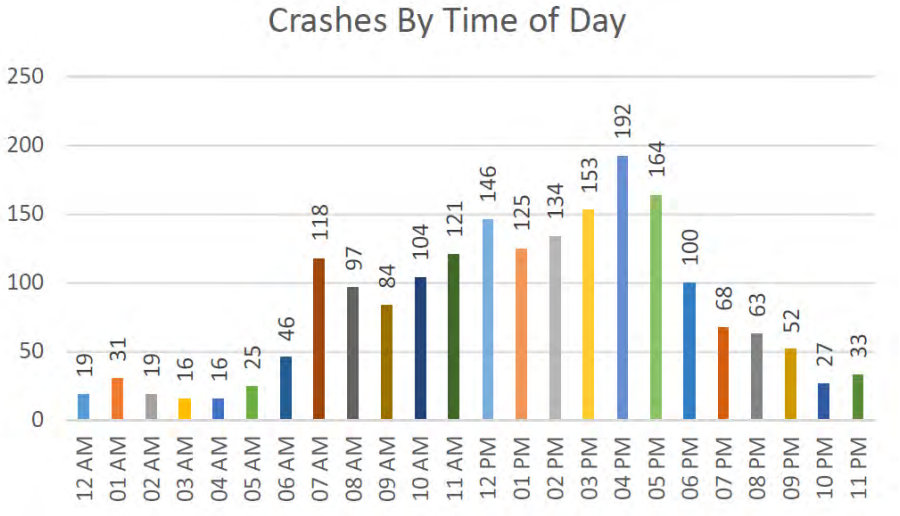


Figure 4 - Scarborough 2021 to 2023 Combined, Crashes by Time of Day

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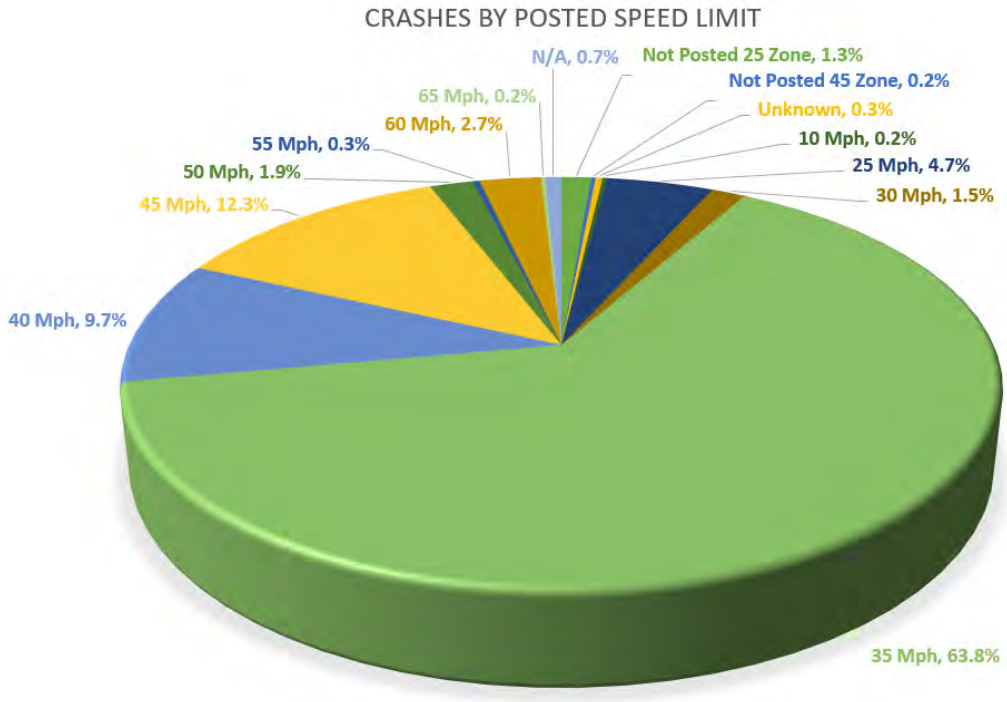


Figure 5 - Scarborough 2021 to 2023 Combined, Crashes by Posted Speed Limit

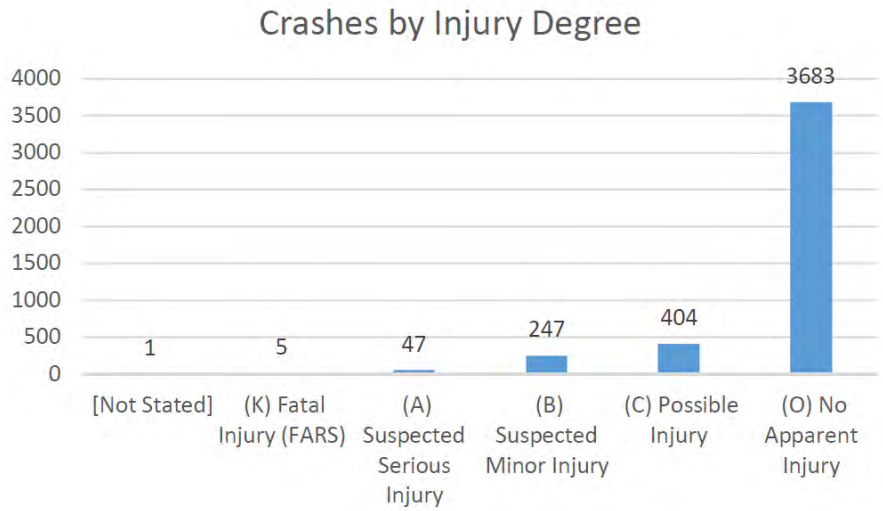


Figure 6 - Scarborough 2021 to 2023 Combined, Crashes by Injury Degree

Figure 7, Table 1, and Table 2 can be found on the following pages

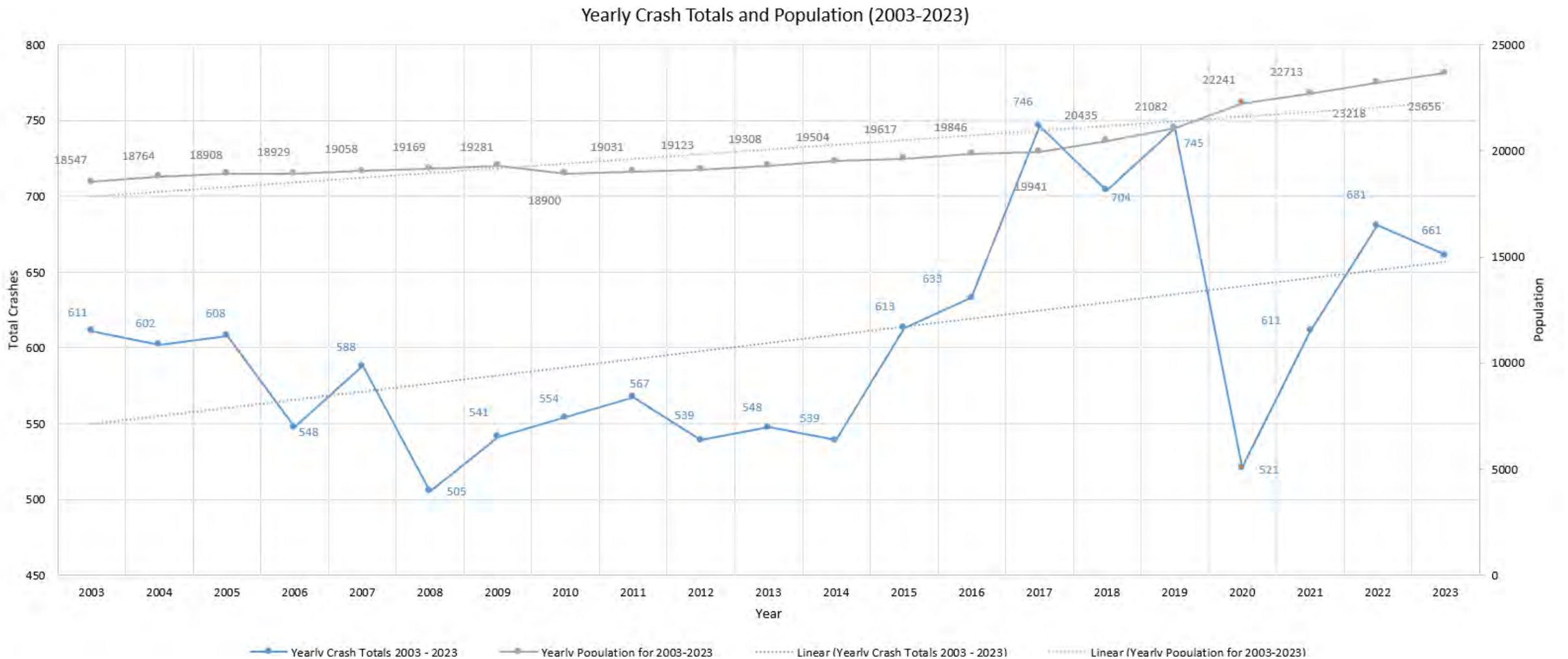


Figure 7 - Scarborough 2003 to 2023 Yearly Crash Totals

Section 3 • Vehicular Safety

Intersection	Year																			
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Beech Ridge Rd/Gorham Rd/Saco St														■	■	■		■	■	■	■
Beech Ridge Rd/Payne Rd/Scottow Hill Rd																					■
Beech Ridge Road/Holmes Rd					■	■				■	■	■							■		
Black Point Rd/Eastern Rd														■	■	■	■				■
Black Point Rd/Winnocks Neck Rd				■																	
Blackpoint Rd/Gorham Rd/Route 1															■						
Bridges Dr/Payne Rd													■	■							
Broadturn Rd/Burnham Rd			■	■							■	■						■	■	■	■
Broadturn Rd/Holmes Rd																		■	■	■	■
County Rd/Saco St															■						
Cummings Rd/Payne Rd									■	■	■	■	■	■		■	■	■	■	■	■
Dunstan Ave/Orchard St/US Route 1																			■	■	■
Exit 42/Haigis Parkway/Payne Rd	■	■	■														■	■	■		
Fairfield Rd/Route 1									■												
Gorham Rd/Hannaford Dr							■		■												■
Gorham Rd/Payne Rd			■	■	■	■			■	■				■	■	■			■	■	■
Gorham Rd/Running Hill Rd					■	■	■	■	■	■	■	■									■
Gorham Rd/Sawyer Rd				■			■	■	■	■							■				
Highland Ave/Pleasant Hill Rd									■	■	■	■	■	■							
Holmes Rd/Payne Rd/Scarborough Downs Rd						■	■	■	■	■											■
I-295 NB/I-95																			■	■	■
Mussey Rd/Payne Rd						■							■	■	■	■	■	■	■	■	■
Mussey Rd/Spring St																					■
Old Blue Point Rd/Route 1					■	■				■	■	■					■	■	■		
Payne Rd/Marden's Entrance				■																	
Payne Rd/Roundwood Dr					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Table 1 - History of High Crash Location Intersections in Scarborough - 20 Years

Section 3 • Vehicular Safety

Segment	Year																				
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Ash Swamp Rd - Trillium Way to Hearn Rd																■					
Beech Ridge Rd - Heathwood Lane to Berry Dr														■							
Blackpoint Rd - Thornton Rd to Gorham Rd		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
Broadturn Rd - Bond Brook Dr to Joss Hill Rd		■	■						■	■				■	■						■
Broadturn Rd - Martin Ave to Pine Point Rd												■	■	■	■	■	■				■
County Rd - Deering Rd to Buxton Town Line	■	■																			
County Rd - Saco St to Gorham Rd				■				■	■	■											
Gorham Rd - Black Point Rd to Hannaford Dr	■	■	■	■	■	■	■	■		■	■	■	■		■	■	■	■	■	■	■
Gorham Rd - New Rd to Laurel Ridge Rd									■		■				■	■	■				
Gorham Rd - Payne Rd to 0.07 Miles East					■	■	■	■	■					■	■	■	■				
Gorham Rd - Ridgeway Rd to Spring St							■	■	■		■										
Gorham Rd - Saco St to County Rd			■	■											■	■					
Highland Ave - Black Point Rd to Bornheimer Pl																■	■				
I-295 NB - I-95 to 0.57 Miles North																			■	■	
I-295 SB - South Portland Town Line to 0.27 Miles South			■	■	■	■	■	■	■								■				
I-95 NB - Exit 42 to 1.7 Miles South																		■	■		
I-95 SB - Haigis Parkway to I-295 SB																		■	■		
Payne Rd - Beech Ridge Rd to Regal Pines Dr				■	■	■	■	■	■												
Payne Rd - Cummings Rd to Southborough Dr											■	■									
Payne Rd - Milliken Rd to Broken Rd		■	■	■				■							■						■
Payne Rd - Sargent Rd to Beech Ridge Rd				■	■																
Payne Rd - Two Rod Rd to Expedition Dr							■	■													
Running Hill Rd - New Rd to Green Rd					■						■										
Running Hill Rd - New Rd to South Portland Town Line										■											
Scarborough Connector NB - US Route 1 to South Portland Town Line																					■
Spring St - Mussey Rd to Gallery Blvd			■							■					■	■	■	■	■	■	■
US Route 1 - Dunstan Ave to Broadturn Rd								■	■				■	■	■	■	■	■	■	■	■
US Route 1 - Fairfield Rd to Westwood Ave											■	■	■	■	■						
US Route 1 - Hannaford Dr to Downeast Ln																■	■				
US Route 1 - Payne Rd to Dolloff Way												■									
US Route 1 NB - Black Point Rd to Plaza Dr																					■

Table 2 - History of High Crash Location Segments in Scarborough - 20 Years

Section 3 • Vehicular Safety

Public Input

The Town of Scarborough sought and received public input on traffic and transportation related issues within the Town at an open house, via emailed comments, and at transportation committee meetings. The following is a summary of the concerns raised by the residents of Scarborough that relate to safety issues within the town.
Residents are concerned about safety for transportation users of all modes within the Town of Scarborough. Topics about which residents are most concerned include:

- **Vehicle speed** – In particular on residential streets and near schools, residents are concerned about speeding vehicles. Maple Avenue was often named as having this issue, but residential neighborhoods across town are interested in considering traffic calming measures to reduce speeds on their roads.
- **Dangerous intersections** – residents identified intersections at which they feel unsafe. Some of those intersections include: Pine Point Road and East Grand Avenue, Stewart Drive at Route 1, Oak Hill, Payne Road at Mussey Road, and Payne Road at Gorham Road.
- **Nonesuch crossing on Gorham Road/Route 114** – There are many concerns for residents at this bridge including: slippery conditions when the bridge is wet, generally narrow width and a lack of space for pedestrians and cyclists, and limited sight distance.
- **Crosswalks** – Residents identified areas where they would like to see new or improved crosswalks. These include: across Downeast Lane at Route 1 and across Pine Point Road to Blue Point School.

Active and Planned Initiatives

The following intersections and segments within the Town of Scarborough have improvements that are currently being implemented or will be implemented in the near future. It is recommended that these intersections and segments be analyzed after improvements have been made to determine what, if any, additional improvements should be made to enhance safety and mobility.

- Intersection of Gorham Road at Saco Street and Beech Ridge Road
- Intersection of County Road and Gorham Road
- Intersection of County Road and Saco Street
- Intersection of Gorham Road and Payne Road (See Roadway Safety Audit, Appendix A)
- Intersection of Holmes Road, Payne Road, and Scarborough Downs Road
- Intersection of Mussey Road and Payne Road
- Segment of Gorham Road from Black Point Road to Hannaford Drive
- Intersection of Route 1 and Gorham Road/Black Point Road (Oak Hill)
- Segment of Spring Street from Mussey Road to Gallery Boulevard
- Intersection of Gorham Road and Maple Avenue
- Segment of Spurwink Road from Pleasant Hill Road to the Cape Elizabeth Town Line

Three intersections and segments that are important to note here because they are of most concern to residents are Oak Hill, the intersection of Payne Road and Mussey Road, and Maple Avenue.

Gorham Road approach at the Oak Hill intersection is a high crash location. A project has been designed and is planned for construction that will install median islands on each approach of the intersection. This will help to reduce crashes on Gorham Road by limiting the left turn movements out of driveways that significantly contribute to crashes in this location.

Section 3 • Vehicular Safety

Active and Planned Initiatives (continued)

The intersection of Payne Road and Mussey Road is a mobility concern and a high crash location. The left turn from Mussey Road onto Payne Road is challenging, resulting in delays, and is dangerous. A project is currently designed and planned for construction that will install a traffic signal at this intersection which should alleviate some of these issues.

Maple Avenue has experienced issues with vehicles speeding, making the residential road feel unsafe for kids, pets, and other multimodal users. The Town undertook a speed study in the fall of 2023 and is currently undertaking the development of a traffic calming toolbox that will assist in the design and application of traffic calming on residential streets throughout the Town of Scarborough.

High Crash Locations Selected for Corrective Action

The high crash locations selected for corrective action are summarized below including the approximate planning level cost of each improvement. The approximate costs use the following scale:

$	<$10,000
$$	$10,000 - $100,000
$$$	>$100,000

These costs do not include professional engineering, construction engineering, or right-of-way (ROW).

Section 3 • Safety

High Crash Locations Selected for Corrective Action (continued)

Segment of US Route 1 from Dunstan Avenue to Broadturn Road

This is a 0.21 mile segment with several driveway entrances to businesses, side roads, and plazas. This section of Route 1 is a four lane road with two lanes in each direction. In the three-year study period ending in 2023, this segment of Route 1 had 27 crashes and a CRF of 1.58. See **Appendix D** for crash diagram.

There is a pattern of crashes at the entrance to the Mobile station caused by vehicles attempting to turn left into and out of the southernmost driveway entrance, with several of these crashes resulting in injury.

To improve safety on this segment, left turns should be eliminated by extending the existing roadway median island to a point ~50 feet past the southernmost driveway. Additionally, the southernmost driveway entrance should be an exit only, while the northernmost driveway entrance on Route 1 should be an entrance only (**Figure 11**).

To prevent a similar issue from developing on Broadturn Road, consider realigning the Mobile entrance on Broadturn Road so that it is further from the intersection of Broadturn Road and Route 1.

Corrective Action	Cost
Extend Median Island and Convert Driveway to One-Way	$$
Realign Driveway on Broadturn Road	$$$

Figure 9 - Segment of Route 1 from Broadturn Road to Dunstan Avenue, Street View Facing South

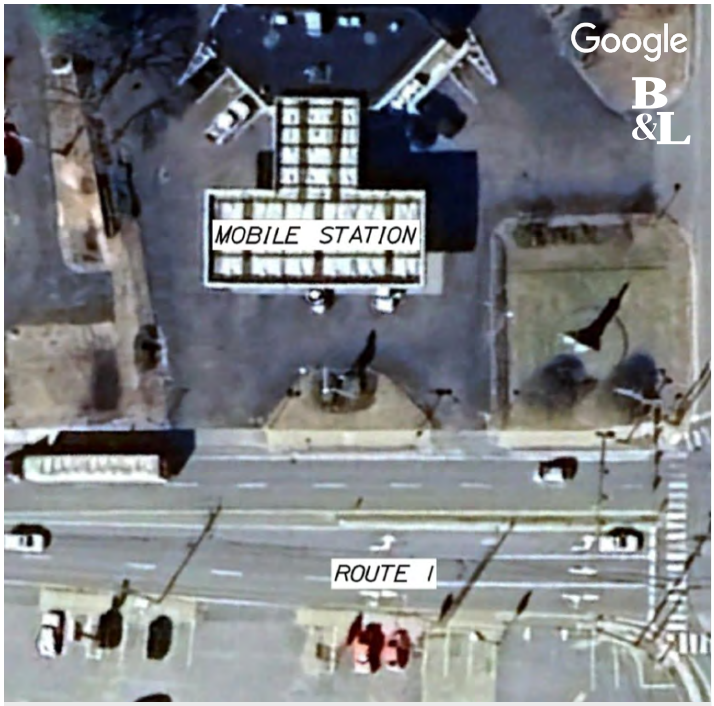


Figure 10 - Segment of Route 1 in front of Mobile Station, Existing Conditions

Section 3 • Safety

High Crash Locations Selected for Corrective Action (continued)

Intersection of Dunstan Avenue, Orchard Street, and US Route 1

This is a four-way intersection with two stop controlled approaches (Dunstan Avenue and Orchard Street), and two free flowing approaches (US Route 1 NB and SB).

Route 1 has two lanes in each direction at this intersection. There are three pedestrian crosswalks, one crossing Orchard Street, one crossing Dunstan Avenue, and one crossing Route 1 on the south side of the intersection. The crosswalk crossing Route 1 has a Rectangular Rapid Flash Beacon (RRFB). In the three-year study period ending in 2023, this intersection had nine crashes and a CRF of 1.21. See **Appendix D** for crash diagram.

Several crashes at this intersection were rear-end collisions caused by drivers failing to slow down when the vehicle in front stopped for pedestrians in the crosswalk. There is an RRFB at this intersection that is an older design with old flashers (**Figure 13**). This RRFB should be updated to the new RRFB design (**Figure 14**) to better capture drivers' attention, and should be relocated closer to the edge of the roadway to increase visibility.

In lieu of an RRFB, a higher-level pedestrian protection option is a Pedestrian Beacon, also called a HAWK Signal (**Figure 15**).

Figure 11 - Segment of Route 1 in front of Mobile Station, proposed changes to roadway median and driveway entrance and exit on Route 1

The RRFB or HAWK Signal should be paired with traffic calming measures at this intersection to reduce vehicle speeds and reduce rear end crashes. Traffic calming measures could include:

- **Install a Yield-to-Pedestrians Bollard:** Placing a bollard sign in the center of the crosswalk can slow down traffic and increase driver awareness of the crosswalk and pedestrians (Figure 15a).
- **Add Triangular Pavement Markings (Sharks' Teeth):** These markings, placed in advance of the crosswalk, help to slow down vehicles as they approach.
- **Implement Speed Bar Pavement Markings:** These markings can effectively reduce vehicle speeds as drivers approach the intersection.
- **Replace Current Crosswalk Stripes with High-Visibility Thermoplastic Markings:** Upgrading to high-visibility thermoplastic markings can increase the visibility of the crosswalk.
- **Widen Shoulder Stripes from 4 Inches to 8 Inches:** Wider shoulder stripes give the appearance of a narrower lane, which can help to slow down vehicles.

Figure 12 - Intersection of Route 1, Dunstan Avenue, and Orchard Street - Street View Facing South

- **Install Advanced Warning Signs for the Pedestrian Crossing:** Adding warning signs in advance of the pedestrian crossing can alert drivers and encourage them to reduce their speed.

Section 3 • Vehicular Safety

High Crash Locations Selected for Corrective Action (continued)

Intersection of Dunstan Avenue, Orchard Street, and US Route 1 (continued)

Several other crashes at this intersection were the result of vehicles attempting to turn right and left out of Dunstan Avenue and Orchard Street and failing to yield to through traffic. Having traffic calming measures at this intersection would help reduce this type of crash pattern.

Corrective Action	Cost
Update RRFB	$
Traffic Calming Measures	$$

Figure 13 - Existing RRFB for crosswalk across Route 1 at Dunstan Avenue

Figure 14 - New RRFB Design

Figure 15 - Example of a Pedestrian Beacon/HAWK Signal

Figure 15a - Example of a Yield-to-Pedestrians Bollard

Section 3 • Vehicular Safety

High Crash Locations Selected for Corrective Action (continued)

Intersection of Payne Road and Cummings Road

This is a three-way signalized intersection. The Payne Road NB approach has two through-lanes and a left turn lane, the Payne Road SB approach has two through-lanes and a right turn lane, and Cummings Road has two left turn lanes and two right turn lanes. In the three year study period ending in 2023, this intersection had 41 crashes, and a CRF of 1.19. See **Appendix D** for crash diagram.

The prevailing crash pattern at this intersection stems from vehicles turning left from Payne Road onto Cummings Road failing to yield to through-traffic. Left turning vehicles cross two lanes of through-traffic and a right turn lane in order to make a left turn. The left turn lane has both a protected phase and a permissive phase. During the permissive phase, the left turning vehicles must find gaps in the opposing through-traffic in order to make a left turn. To reduce these crash types, the left turn from Payne Road onto Cummings Road should be protected. This can be accomplished by reprogramming signal timing, although this option may result in longer queue lengths at this intersection. A long-term option that will require more study is to revise the existing lane-use on Payne Road NB, to a dedicated left-turn lane, a shared left-turn and through lane, and a dedicated through lane. The traffic signal phasing on Payne Road would be revised to "Split Phasing," allowing the NB approach to proceed first, followed by the SB approach. This would create protected-only left-turns from Payne Road into Cummings Road and would reduce the existing crash pattern. This would require widening of Cummings Road (**Figure 17**) to accept two inbound lanes from Payne Road NB. The two lanes would need to be carried for an appropriate distance to ensure there is adequate lane-utilization of the second left-turn lane.

Another safety issue at this intersection is that pedestrians walk along the side of Payne Road without a sidewalk. When they reach the bridge, they walk in the travel lane due to the slope of the bridge abutment (**Figure 18**). To create a safer space for pedestrians, one option is to build a raised walkway with railings under the overpass and construct a sidewalk along Payne Road (**Figures 19 and 20**).

Corrective Action	Cost
Change left turn signal phasing from protected-permissive to protected only.	$
Widen Cummings Road to accept double left from Payne Road and revise signal phasing to provide protected only left-turns via split phasing on Payne Road	$$$
Construct sidewalk on Payne Road and a raised pedestrian walkway under overpass.	$$$

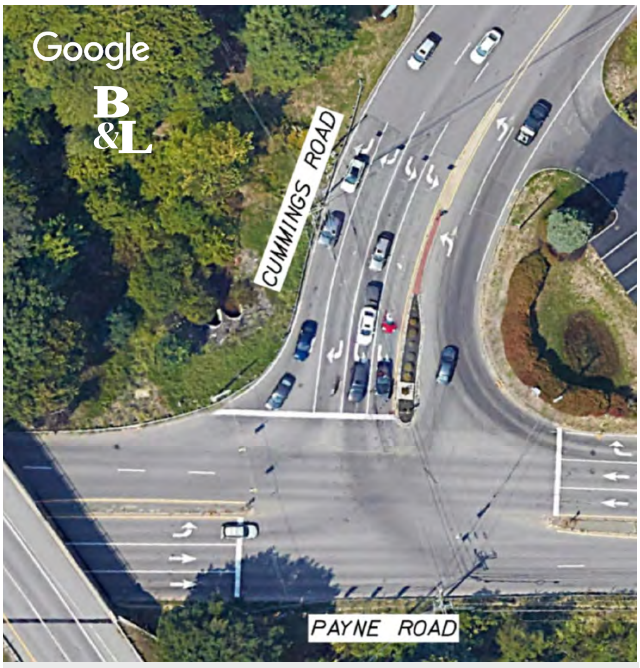


Figure 16 - Intersection of Payne Road at Cummings Road, Aerial View of Existing Conditions

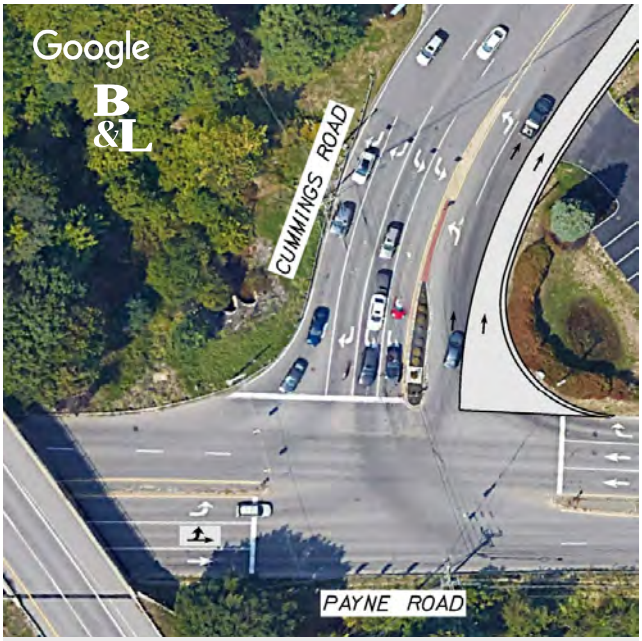


Figure 17 - Intersection of Payne Road at Cummings Road, Aerial View of Proposed Roadway Widening on Cummings Road to Accept Two Left-Turning Lanes

Section 3 • Vehicular Safety

High Crash Locations Selected for Corrective Action (continued)

Figure 18 - Worn Pedestrian Foot Path on Payne Road

Figure 20 - Example of a Raised Pedestrian Walkway underneath an Overpass, Pedestrian View

Figure 19 - Example of a Raised Pedestrian Walkway underneath an Overpass, Street View

Intersection of Broadturn Road at Burnham Road

This is a four-way intersection with two stop-controlled approaches (Burnham Road) and two free-flowing approaches (Broadturn Road). The EB approach of Burnham Road meets Broadturn Road at an acute angle, and is slightly offset from the WB approach of Burnham Road. In the three-year study period ending in 2023, this intersection had 12 crashes, and a CRF of 4.22. See **Appendix D** for crash diagram.

The majority of crashes at this intersection are the result of vehicles traveling straight through the intersection on Burnham road from the WB approach failing to yield to traffic traveling in both directions on Broadturn Road. There is a sight distance issue at this approach that limits drivers' ability to see and yield to oncoming traffic (**Figure 22**). Some trees should be removed or limbed to improve the sight distance issue and reduce these crashes. We would also recommend installing additional signs to the Burnham Road approach, including:

Section 3 • Vehicular Safety

High Crash Locations Selected for Corrective Action (continued)

Intersection of Broadturn Road at Burnham Road (continued)

- **Install "Cross Traffic Does Not Stop" Signs:** These signs inform drivers that cross traffic does not stop, helping prevent accidents.
- **Add "Stop Ahead" Signs:** Placed before the intersection, alerts drivers to an upcoming stop.
- **Install Blinking LED Lights on Stop Signs and "Stop Ahead" Signs:** Enhance visibility with blinking LED lights on existing and proposed signs can capture drivers' attention more effectively.
- **Implement a Flashing Beacon:** Flashing beacon with a red light for Burnham Road approaches and a yellow light for Broadturn Road approaches to improve visibility.

Corrective Action	Cost
Tree Limbing	$
Additional Signs	$
Flashing Beacon	$$

Figure 21 - Intersection of Broadturn Road at Burnham Road, Street View facing North

Figure 22 - Sight Distance Issue for Traffic Traveling Westbound on Burnham Road

Section 3 • Vehicular Safety

High Crash Locations Selected for Corrective Action (continued)

Intersection of Broadturn Road at Holmes Road

This is a four-way stop controlled intersection with an overhead flashing beacon. In the three-year study period ending in 2023, this intersection had 12 crashes, and a CRF of 3.09. See **Appendix D** for crash diagram.

Several crashes at this intersection were the result of vehicles failing to stop at the stop sign. The flashing beacon at this intersection is an older design (**Figure 24**), and should be updated to MaineDOT's current standard (**Figure 25**) in order to increase visibility of the flashing beacon and reduce these crash types. Additionally, consider installing "Stop Ahead" signs with perimeter blinker lights and placing 24-inch stop bars at each approach.

Another potential corrective action to consider is the construction of a roundabout (**Figure 26**). This type of intersection design could reduce the overall number of crashes and their severity and could address mobility issues.

Corrective Action	Cost
Update Flashing Beacon	$$
Construct Roundabout	$$$

Figure 23 - Intersection of Broadturn Road at Holmes Road, Street View Facing North

Figure 24 - Existing Flashing Beacon at Intersection of Broadturn Road and Holmes Road

Figure 25 - Example of a Newer Flashing Beacon Design

Figure 26 - Example of a Single Lane Roundabout Design

Section 3 • Vehicular Safety

High Crash Locations Selected for Corrective Action (continued)

Intersection of Route 1 at Hannaford Drive

This intersection is a four-way signalized intersection. The Route 1 NB approach has three lanes and the Route 1 SB approach has four lanes. The Hannaford Drive approach and the Starbucks approach each have two lanes. There is a pedestrian crosswalk on each approach.

The safety issue at this intersection results from a conflict point at this intersection between pedestrians crossing the Route 1 SB approach and the left-turning vehicles from Hannaford Drive. The Hannaford Drive approach experiences a significantly heavy left-turn volume, creating mobility and safety issues. Pedestrians hesitate to cross during the active pedestrian phase, while left-turning vehicles must wait for pedestrians in the crosswalk. This situation poses a safety risk, as many drivers eager to make the left turn quickly may drive too close to pedestrians or fail to watch for them.

To correct this issue, the sequence of the phasing should be modified. Currently there is a concurrent pedestrian phase to cross Route 1 that is active with the Hannaford Drive approach. The phasing for the side streets should be revised so there is a protected only left-turn phase followed by a second phase that only allows through- and right-turn traffic. The Route 1 concurrent pedestrian phase could be programmed to run with the second side street phase, so that there aren't any left-turns conflicting with the Route 1 crosswalks and pedestrian phases. This should significantly improve safety and mobility for pedestrians.

Another issue with the pedestrian crossing on the Route 1 SB approach is that it is long, which increases the wait time for vehicles and creates a safety issue for pedestrians. To alleviate this, a center median with a pedestrian refuge should be added on Route 1 that would allow pedestrians to cross the street in two segments. This allows the pedestrian to cross one direction of traffic at a time and has the added benefit of decreasing the cycle length at the intersection. Adding a median island will provide traffic calming in addition to creating a shorter crossing distance for pedestrians.

Intersection - Route 1 at Hannaford Drive

Pedestrian Crosswalk across Route 1 at Hannaford Drive

Corrective Action	Cost
Modify Sequence Phasing	$$
Install Median Island	$$

Barton & Loguidice

Section 3 • Vehicular Safety

High Crash Locations Selected for Corrective Action (continued)

Pedestrian Refuge

Additional Segments and Intersections for Future Study

Five intersections and road segments in the Town of Scarborough have been identified for future study. These areas are:

1. **Intersection of Highland Ave and Chamberlain Road:** The angle of this intersection is dangerous. With additional housing developments and increased traffic in the area, near misses could escalate into crashes.
2. **Intersection of Highland Ave and Pleasant Hill Road:** Drivers frequently ignore the stop sign at the northwest approach of this intersection, creating a potential for serious accidents. Further study is recommended to determine appropriate measures for reducing the number of vehicles running the stop sign.
3. **Intersection of Payne Road, Beech Ridge Road, and Scottow Hill Road:** This was a high crash location in 2023. Vehicles crossing Payne Road from the stop-controlled approaches on Scottow Hill Road and Beech Ridge Road face safety concerns due to the skewed angle of the intersection and limited sight distance. Measures to reduce speeds on Payne Road need to be studied and implemented. Additionally, the Town is considering making this intersection an all-way stop.
4. **Intersection of Black Point Road and Eastern Road:** This was another high crash location in 2023. There are concerns about unsafe vehicle speeds and the risk to pedestrians using the crosswalk and RRFB. Future studies should consider traffic calming measures and possibly installing a HAWK signal at the pedestrian crossing. It is also recommended to study the installation of additional traffic calming measures at other RRFBs throughout the Town.
5. **Segment of Scarborough Connector NB from US Route 1 to South Portland Town Line:** This segment was a high crash location in 2023. Persistent issues include high vehicle speeds and vehicles striking deer. A future study should analyze measures to reduce speed and limit animal crossings on this segment of the road.

Section 4 • Vehicular Mobility

1. Introduction
2. Public Input
3. Active and Planned Initiatives
4. Roadway Segments / Intersections Selected for Corrective Action
5. Additional Roadway Segments or Intersections for Future Study

Section 4 • Vehicular Mobility

Introduction

Roadway mobility addresses the overall capacity and delay on a roadway and how it affects traffic flow. A recent focus for the Town of Scarborough is to improve intersection mobility at signalized intersections using traffic adaptive systems. Traffic adaptive systems use sensors (detection) to adjust green light timing at intersections to fit changing traffic patterns throughout the day. This reduces negative driver experiences, such as waiting at a red light when the intersection is empty or waiting through three or four full traffic cycles before getting through the intersection.

Four intersections and segments have been identified for analysis of possible mobility improvements in this study. They include:

- Intersection of Payne Road and Gallery Boulevard
- Segment of Payne Road from Haigis Parkway to Gorham Road
- Intersection of Running Hill Road and Route 114
- Intersection of Route 1 and Broadturn Road/Pine Point Road

Additionally, three intersections and segments have been identified for future study of possible mobility improvements. They are:

- Intersection of Haigis Parkway and Route 1
- Intersection of Mussey Road and Gorham Road
- Segment of Gorham Road/Route 114 from Route 1 to Payne Road

Section 4 • Vehicular Mobility

Public Input

The Town of Scarborough sought and received public input on traffic and transportation related issues within the Town at an open house, via emailed comments, and at transportation committee meetings. The following is a summary of the concerns raised by the residents of Scarborough that relate to mobility issues within the town.

Residents were asked to identify the areas where mobility was of the greatest concern for them within the Town. The top area of mobility concern is the Oak Hill intersection (Route 1 at Black Point Road and Gorham Road), closely followed by the segment of Payne Road from Exit 42/Haigis Parkway to Gorham Road and Eight Corners (for the purposes of this study this area will include Gorham Road at Mussey Road, Mussey Road at Spring Street, and Gorham Road at Spring Street). Many of the areas of mobility concern are along three major roadways in the Town of Scarborough, Route 1, Payne Road, and Gorham Road.

Residents also commented on what specific issues concerned them about mobility within the Town. In terms of vehicular mobility:

- The Gorham Road approach at the Oak Hill intersection is of particular concern.
- Signal timing is a concern for residents in two locations, at Eight Corners and along the Payne Road corridor.
- The intersection of Payne Road and Mussey Road, and specifically turning left onto Payne Road from Mussey Road, is both a mobility and safety concern for many residents.
- There are concerns about rush hour delays in Town, especially at the Route 1 and Broadturn Road intersection.
- Residents would like additional parking at Higgins Beach.

Many residents also commented on multimodal mobility within the Town of Scarborough:

- Residents feel that the Eastern Road layout is appropriately designed to accommodate all users at the current volumes.
- The bus stop at Walmart is appreciated.
- There is a desire to have additional bicycle and pedestrian infrastructure on: Pleasant Hill Road, Black Point Road, Gorham Road, Route 1, Fogg Road, and Highland Avenue. On Route 1 in particular residents were interested in connecting gaps in the sidewalk and in providing sidewalk on both sides of the road, and on Gorham Road the Nonesuch crossing is a concern because of the width of the bridge.
- Many residents commented on the need for maintenance of bicycle and pedestrian facilities, especially plowing of sidewalks and paths in the winter.
- Residents feel that there is an opportunity to enhance transit and reduce vehicle miles traveled in the Town, and are interested in designating park and ride areas from which transit can be taken.

Section 4 • Vehicular Mobility

Active and Planned Initiatives

The following intersections and segments within the Town of Scarborough have improvements that are currently being implemented or will be implemented in the near future. It is recommended that these intersections and segments be analyzed after improvements have been made to determine what, if any, additional improvements should be made to enhance safety and mobility.

- Intersection of Gorham Road at Saco Street and Beech Ridge Road
- Intersection of County Road and Gorham Road
- Intersection of County Road and Saco Street
- Intersection of Gorham Road and Payne Road
- Intersection of Holmes Road, Payne Road, and Scarborough Downs Road
- Intersection of Mussey Road and Payne Road
- Segment of Gorham Road from Black Point Road to Hannaford Drive
- Intersection of Route 1 and Gorham Road/Black Point Road (Oak Hill)
- Segment of Spring Street from Mussey Road to Gallery Boulevard
- Intersection of Gorham Road and Maple Avenue
- Segment of Spurwink Road from Pleasant Hill Road to the Cape Elizabeth Town Line

Some topics that are important to note here because they are of most concern to residents are Oak Hill, the intersection of Payne Road and Mussey Road, signal timing changes using traffic adaptive, and the intersection of Payne Road and Gorham Road.

Oak Hill is a mobility concern, and the Gorham Road approach is a high crash location. A project has been designed and is planned for construction that will install median islands on each approach of the intersection. This will help to reduce crashes on Gorham Road by limiting the left turn movements out of driveways that significantly contribute to crashes in this location. It will also improve mobility by restricting turning movements to and from driveways that result in turning vehicles blocking traffic. In the past the Town has also considered a dual left turn from Black Point Road onto Route 1. The traffic study suggested that roadway widening may be required to achieve the desired increase in capacity, however this should be revisited after construction of the planned project to determine how the needs at the intersection have changed post construction.

The intersection of Payne Road and Mussey Road is a mobility concern and a high crash location. The left turn from Mussey Road onto Payne Road is challenging, resulting in delays, and is dangerous. A project is currently designed and planned for construction that will install a traffic signal at this intersection which should alleviate some of these issues.

The Town has begun to implement traffic adaptive systems, and is continuing to install them at intersections that have yet to be upgraded. Most of the Route 1 corridor has traffic adaptive systems installed or about to come online, and the intersections of County Road at Gorham Road, County Road at Saco Street, and Saco Street at Gorham Road are scheduled for upgrade in the near future. In addition, the Payne Road corridor from Gorham to Southborough Drive is scheduled for implementation in Late 2024. See **Appendix C** for a map of all the signalized and four-way stop intersections in Scarborough.

The Town is currently studying the intersection of Payne Road and Gorham Road to improve mobility. This study includes the exploration of options for increasing intersection capacity, such as adding a possible double left-turn lane on the westbound Gorham Road approach.

Section 4 • Vehicular Mobility

Roadway Segments/Intersection Selected for Corrective Action

The roadway segments and intersections selected for corrective action are summarized below including the approximate cost of each improvement. The approximate costs use the scale shown below:

$	<$10,000
$$	$10,000 - $100,000
$$$	>$100,000

These costs do not include professional engineering, construction engineering, or right of way.

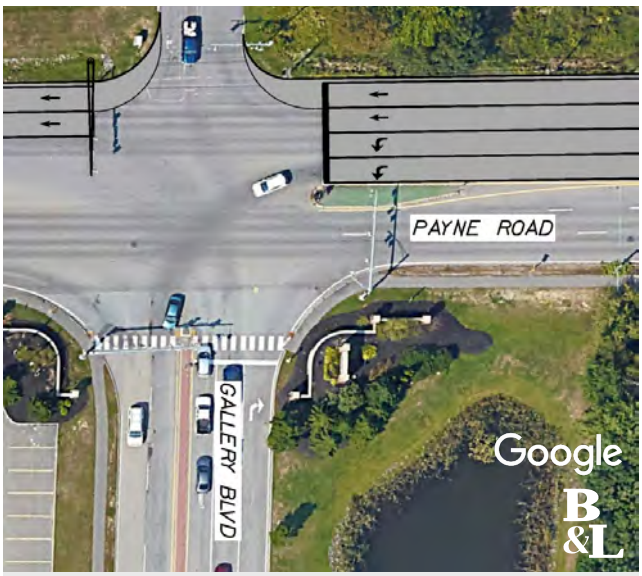
Intersection of Payne Road and Gallery Boulevard

This intersection is a four-way signalized intersection. One of the four approaches is an entrance to a shopping plaza, while the other three approaches are roadways. The intersection approach on Payne Road NB has four lanes, the approach on Payne Road SB has three lanes. The approach on Gallery Boulevard has three lanes and a pedestrian crosswalk.

Intersection of Payne Road and Gallery Boulevard

Initial analysis at the Payne Road and Gallery Boulevard intersection suggests that the best way to improve mobility is to provide a second left turn lane on Payne Road SB at Gallery Boulevard. This will alleviate the heavy volumes of left-turning traffic onto Gallery Boulevard and reduce back-ups and delays.

There are two options to provide a second left turn lane on Payne Road SB at this intersection, with both options detailed below. This intersection should undergo further detailed study to confirm the best strategy to improve mobility compared to the cost of the improvement. It is recommended that a traffic study be completed at this intersection for this purpose.



Payne - Gallery (Proposed)

The first option for providing a second left turn lane is to stripe one of the existing through-lanes as a through left lane, and provide split phasing at the intersection. Split phasing at this intersection means that Payne Road SB through-movements and left turns will get a green light, while the lights on Payne Road NB are red. Then, Payne Road NB through-movements and left turns will run while Payne Road SB is red. This option would require that signal programming and signal heads at the intersection be updated to reflect the new lane use.

The second option for providing a left turn lane is to shift existing through lanes to the west, and to construct a second left turn at the intersection. This will require widening Payne Road on both sides of the intersection in addition to updated signal programming and signal heads. Widening may impact an existing mast arm and several telephone poles may need relocation.

Section 4 • Vehicular Mobility

Intersection of Payne Road and Gallery Boulevard (continued)

Both options for adding a second left turn lane will impact lane use on Gallery Boulevard. For example, the right turn lane from Gallery Boulevard onto Spring Street will need to be re-striped as a through-right, and some areas of Gallery Boulevard will require widening to include a second lane. Further study will help determine how long the second lane on Gallery Boulevard should be and how much widening is necessary.

Corrective Action	Cost
Traffic Study	$
Change Through Lane to Through Left Lane	$$
Construct Left Turn Lane	$$$

Segment of Payne Road from Haigis Parkway to Gorham Road

This segment is the northwestern-most border of the Downs development in Scarborough. Payne Road in this area alternates between one-lane and two-lane segments with merge tapers in between. Payne Road intersects with Holmes Road/Scarborough Downs Road, Bridges Drive, and Mussey Road. Planned improvements for the Payne Road and Mussey Road intersection include installing traffic signals, traffic adaptive signal operations, and a NB Payne Road right turn lane with construction set to commence soon.

Segment of Payne Road near Warren Woods

There are several opportunities to improve mobility on Payne Road for vehicles, pedestrians, and cyclists.

Improvements for pedestrians and cyclists include widening the shoulders to five feet, constructing a 12-foot-wide shared-use path on the east side of Payne Road, and construction of a sidewalk on the west side of Payne Road. It is recommended that the sidewalk and the shared-use path be separated from the roadway by curb and esplanade. Crosswalks and pedestrian phases will be included at any intersections where necessary. These improvements will provide safer transportation options along the Payne Road corridor by providing separated pedestrian and bicycle facilities. For any cyclists who prefer to travel on the roadway, additional room will be included for those users in the five-foot shoulders.

For vehicles, it is recommended that Payne Road be widened to include two lanes in each direction with a 12-foot median island, which will increase vehicle capacity along this corridor. Adding a median island will enhance mobility and safety by restricting left-turn movements to designated breaks in the median. This change will eliminate the need for vehicles to wait in a through-lane to turn left. To accomplish these goals on Payne Road, the Town has completed Master Planning level design plans for Payne Road and implemented traffic impact fees.

See **Appendix B** sheets 1 - 12 for drawings of all the proposed changes to the Payne Road Corridor intended to improve multimodal mobility.

Corrective Action	Cost
Convert Payne Road to two lanes in each direction with a median island, five foot shoulders, a shared-use path, and a sidewalk	$$$

Section 4 • Vehicular Mobility

Intersection of Running Hill Road and Route 114

This is a four-way intersection with a flashing beacon. The two minor roads, Running Hill Road and Larrabee Farm Road, are stop controlled and are offset from one another. Gorham Road is free flowing. There is a left turn lane going from Gorham Road SB onto Running Hill Road.

The mobility issue at the intersection of Running Hill Road and Route 114 is the long queue on Running Hill Road during the afternoon peak hour. Most of the vehicles on Running Hill Road turn right onto Route 114 but find it difficult to find safe gaps to enter. A full traffic signal warrant study is required at this intersection. If the results show that a traffic signal is warranted, the intersection should be signalized. The signal should include phasing that allows concurrent left turns from Route 114 onto Running Hill Road and right turns from Running Hill Road onto Route 114.

Intersection of Running Hill Road and Route 114

Another option to relieve mobility issues at this intersection is to construct a roundabout or a traffic circle. Roundabouts reduce delays and crash severity at intersections, and are often a safer intersection design when compared to a signalized intersection. They promote lower traffic speeds and reduce conflict points, while allowing traffic to move continuously through the intersection.

Corrective Action	Cost
Signal Warrant Analysis	$
Install Traffic Signal	$$$
Construct Roundabout/Traffic Circle	$$$

Intersection of Route 1 and Broadturn Road/Pine Point Road

The intersection of Route 1 and Broadturn Road is a four-way, signalized intersection. The Route 1 SB approach has four lanes, and the Route 1 NB approach has three lanes. The Pine Point Road and Broadturn Road approaches each have two lanes. The Pine Point Road, Route 1 NB, and Broadturn Road approaches each have a pedestrian crosswalk, and the Pine Point Road approach has a channelized right-turn lane.

Intersection - Broadturn Road Route 1

The mobility issue at this intersection occurs primarily in the morning peak hour and is exacerbated by additional school-related traffic during the school year. There is a significant queue on Broadturn Road, with many vehicles on Broadturn Road turning left onto Route 1 NB. In order to alleviate delays at this intersection, a second left turn lane should be added to Broadturn Road and the left turn lanes should be lengthened. An additional left turn lane can be added in two ways - either the existing through-right lane can be striped as a left-through-right lane, or an additional lane can be constructed on Broadturn Road. A traffic study is required to determine the efficacy of these options. Traffic signal modifications will be required for either option.

The geometry of the intersection should be amended for safety and mobility. The median island and stop bar on the Route 1 SB approach should be moved away from the intersection to make the turning movements from Broadturn Road easier and more efficient. The driveway to the Mobile gas station should be limited to right turn in and right turn out only to eliminate dangerous left-turn movements into and out of the mobile station.

Section 4 • Vehicular Mobility

Intersection of Route 1 and Broadturn Road/Pine Point Road (continued)

This can be achieved by adding a median island on Broadturn Road and/or adding an island in the Mobile driveway to channelize the right in/out.

Graphic- Broadturn Road Route 1 (Proposed)

Corrective Action	Cost
Traffic Study at Intersection of Broadturn Road and Route 1	$
Change Through Right Lane to Left-Through-Right Lane	$$
Construct New Left Turn Lane	$$$

Additional Roadway Segments or Intersections for Future Study

Four intersections and segments within the Town of Scarborough have been identified for future study. They are:

1. **Intersection of Haigis Parkway at Route 1:** There are heavy vehicle queues on Route 1 SB approach. Consider studying the intersection to determine if the right turn movement from Route 1 SB onto Haigis Parkway requires a larger storage capacity.
2. **Intersection of Mussey Road and Gorham Road:** This intersection could be used as a bypass of the Payne Road and Gorham Road intersection. The Mussey Road and Gorham Road intersection should be studied after the signal goes in at the intersection of Payne Road and Mussey Road to determine the required capacity to help alleviate traffic on Payne Road at Gorham Road.
3. **Segment of Gorham Road/Route 114 from Route 1 to Payne Road:** Gorham Road was identified by the public as a corridor with future mobility concerns.

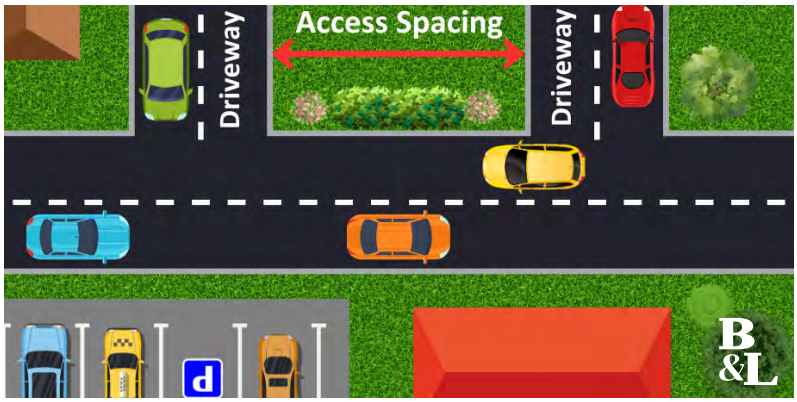
Section 5 • Vehicular Access Management and Network Connectivity

Section 5 • Access Management and Network Connectivity

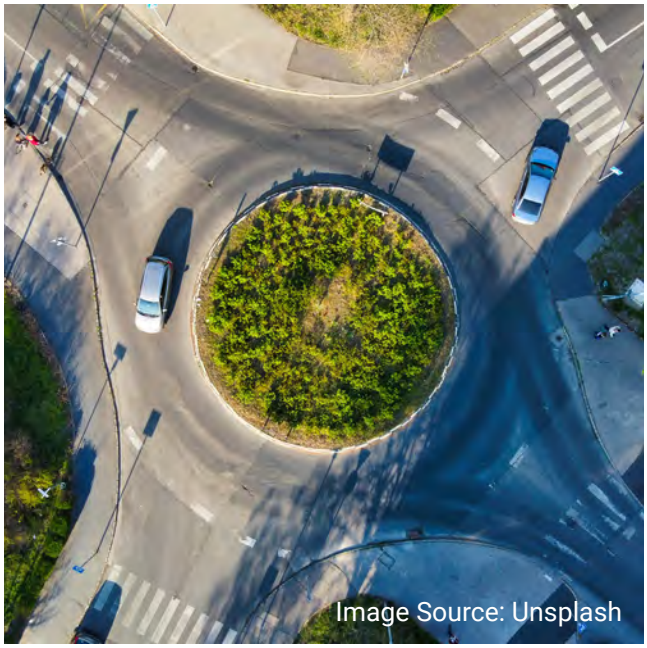
Introduction

Access management is the design, application, and control of entry and exit points along a roadway. Access management strategies include:

- Increasing the distance between traffic signals and access points, also called the access spacing, on major arterials to improve the flow of traffic.[2]



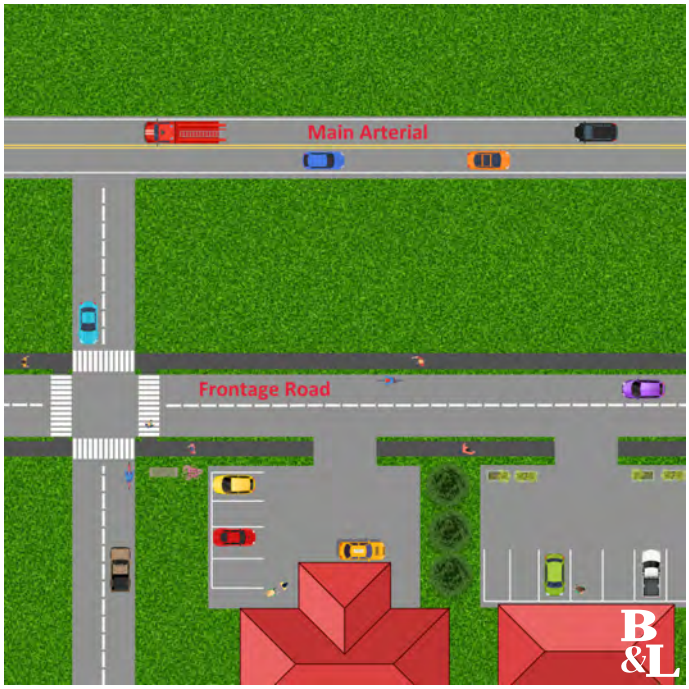
- Reducing the number of driveways on major roadways by closing, combining, or relocating existing driveways,[3] and by mandating that new driveways shall connect to an existing intersection or access point.
- Limiting turning movements at driveways to right turns in and out only.[3] Regulate left turn and across roadway movements with median treatments including two-way left-turn lanes and raised medians.[4]
- Requiring that access points be spaced a minimum distance from intersections and prohibit the installation of driveways at intersection corners.[3]
- Considering intersection designs with fewer conflict points.[3] This type of design could include roundabouts, diverging diamond interchanges, or restricted crossing u-turns.



1 "Corridor Access Management." Corridor Access Management | FHWA, highways.dot.gov/safety/proven-safety-countermeasures/corridor-access-management. Accessed 9 Apr. 2024.
2 "What Is Access Management?" Access Management: What Is Access Management? - FHWA Operations, ops.fhwa.dot.gov/access_mgmt/what_is_accsmgmt.htm. Accessed 9 Apr. 2024.
3 "Guidebook for Measuring Multimodal Network Connectivity." FHWA, www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/multimodal_connectivity/. Accessed 10 Apr. 2024.
4 Highway Driveway and Entrance Rules, Maine Dept. of Transportation, 2002.
5 "Safety Evaluation of Access Management Policies and Techniques." FHWA, www.fhwa.dot.gov/publications/research/safety/14057/001.cfm. Accessed 10 Apr. 2024.

Section 5 • Access Management and Network Connectivity

- Providing dedicated turning lanes for right-turns, left-turns, and u-turns.[4]
- Constructing backage or frontage roads, or providing other roadway connectivity off of the main roadway or other means of parcel inter-connectivity.[3]
- Planning for and constructing driveway connections between parcels.



Network connectivity, or roadway connectivity, is a measure of how easily a person can travel through a transportation system. Multimodal network connectivity considers the ease of travel through a system for cyclists, pedestrians, and transit users in addition to considering ease of travel for vehicles.

Regulations

The Town of Scarborough has some existing ordinances relating to Access Management and Network Connectivity in the Zoning Ordinance, the Site Plan Review Ordinance, and the Street Acceptance Ordinance. Currently, these ordinances use language such as “where feasible, adjacent sites shall be interconnected through the use of internal driveways” and “planned developments shall make provisions for street and driveway interconnections.” When referencing bicycle and pedestrian facilities in the Town, the ordinances recommend that “In general, sidewalks and pedestrian trails shall be designed to provide linkages and continuity,” and “Provisions must be incorporated into new developments for bicycle movement … if the scale of the project makes these reasonable.”

Proposed Revisions to Access Management and Interconnectivity Regulations

The Town of Scarborough’s Ordinances provide a solid beginning for managing interconnectivity and access management. In order to build on these and strengthen the requirements for improving interconnectivity and access management, the Town should identify corridors along which new development shall be required to comply with access management and network connectivity standards laid out by the Town. Corridors that the Town should consider identifying are explored in the Corridors Selected for Corrective Action portion of this section.

Section 5 • Access Management and Network Connectivity

Further, the Town should, in the ordinances, identify requirements based on the access management and interconnectivity strategies listed above in the introductory paragraph of this section. This could include requirements such as:

- New properties, developments, and businesses that are not corner properties, or properties for which ownership has changed, shall be limited to one access point onto a major roadway. Should an existing property with multiple driveways on the major roadway pass to new ownership, the new owner shall be required to consolidate to one access point onto the major roadway.
- Access points must be a minimum of 100 feet apart on major roadways with a speed limit of 35 mph or less, and 150 feet apart on major roadways with a speed limit of greater than 35 mph. New developments shall be required to connect to an existing access point on the major roadway if they are unable to construct a new driveway that meets the spacing requirements. Existing properties that pass to new ownership that do not meet the spacing requirements will be required to consolidate their driveways with neighboring properties.
- Corner properties shall be required to locate their driveway on the minor roadway a minimum of 100 feet from the intersection or outside of the queue length, whichever is longer. Should a property be unable to meet this requirement, the property shall use a shared access point with a neighboring property or a backage or frontage road.
- New developments and existing properties that pass to new ownership shall be required to provide connectivity to neighboring parcels for vehicles, cyclists, and pedestrians.
- New developments and existing properties that pass to new ownership shall be required to provide protected bicycle and pedestrian facilities along the major roadway, if they do not already exist, from the development or property and connecting to the nearest bicycle or pedestrian facility.

Public Input

The Town of Scarborough sought and received public input on traffic and transportation related issues within the Town at an open house, via emailed comments, and at transportation committee meetings. The following is a summary of the concerns raised by the residents of Scarborough that relate to access management issues within the town.

Residents feel that the greatest opportunity for improving access management within the Town of Scarborough is at the Oak Hill intersection and along all four approaches.

Additionally, residents identified areas of mobility concerns within the Town of Scarborough. While mobility concerns may not always be directly related to opportunities for access management, mobility on many corridors may be improved by additional access management. The primary corridors where residents identified mobility issues are Route 1, Payne Road, and Gorham Road.

Active and Planned Initiatives

The following intersections and segments within the Town of Scarborough have improvements that are currently being implemented or will be implemented in the near future. It is recommended that these intersections and segments be analyzed after improvements have been made to determine what, if any, additional improvements should be made to enhance access management.

- Intersection of Gorham Road at Saco Street and Beech Ridge Road
- Intersection of County Road and Gorham Road
- Intersection of County Road and Saco Street
- Intersection of Gorham Road and Payne Road

Section 5 • Access Management and Network Connectivity

Current Projects (continued)

- Intersection of Holmes Road, Payne Road, and Scarborough Downs Road
- Intersection of Mussey Road and Payne Road
- Segment of Gorham Road from Black Point Road to Hannaford Drive
- Intersection of Route 1 and Gorham Road/Black Point Road (Oak Hill)
- Segment of Spring Street from Mussey Road to Gallery Boulevard
- Intersection of Gorham Road and Maple Avenue
- Segment of Spurwink Road from Pleasant Hill Road to the Cape Elizabeth Town Line

It is important to note that there are planned improvements for the Oak Hill intersection. A project has been designed and is planned for construction that will install median islands on each approach of the intersection. This will help to reduce crashes on Gorham Road by limiting the left turn movements out of driveways that significantly contribute to crashes in this location. It will also help with some of the access management concerns at this intersection that have been raised by residents.

Corridors Selected for Corrective Action

There are several corridors in the Town that would benefit from implementation of access management and multimodal network connectivity strategies. They are listed below.

Route 1

The entire Route 1 corridor through Scarborough could benefit from access management and multimodal network connectivity strategies. In particular, Route 1 would benefit from the addition of bicycle and pedestrian facilities as described in the bicycle and pedestrian facilities section. Specific segments of Route 1 that should be a focus are:

- Segment of Route 1 from Old Blue Point Road to Broadturn Road/Pine Point Road – Some properties on this stretch are already interconnected through backage roads. However, this segment of Route 1 is a high crash location and would benefit from connecting the remainder of the properties along this segment to limit the number of vehicles turning into and out of driveways here. Additionally, this segment would benefit from having a median island to limit turns onto and off of Route 1 to right turns, except at designated intersections.
- Segment of Route 1 from Southgate Road to Sawyer Road – This segment has several businesses, many of which have their own driveway and no interconnectivity. This segment also has some undeveloped lots which could be developed in the future. This segment would benefit from interconnectivity and access management requirements before development continues to help guide the development in this area toward safe and easy transportation for all modes.
- Segment of Route 1 from Sawyer Road to Portland Farms Road – This segment is already well developed, and would benefit from existing access points being consolidated. Additionally, the Oak Hill Plaza along this corridor would benefit from greater interconnectivity with Hannaford Drive. Currently, a vehicle or cyclist at Walgreens in the Oak Hill Plaza must travel all the way up Plaza Drive and down Hannahford Drive to reach Pat's Pizza or the neighboring banks. The trip on Route 1 is much shorter. To encourage a vehicle or cyclist to make the trip between these locations off of Route 1, Adams Way should be extended from the Oak Hill Plaza to Pat's Pizza to make the connection.

Section 5 • Access Management and Network Connectivity

Payne Road

Specific segments of Payne Road that should be a focus are:

- Segment of Payne Road from Haigis Parkway to Gorham Road – It is anticipated that there will be a significant amount of development in this area, especially near the Haigis Parkway end of the segment, with the Downs development in the center of this area. This segment of Payne Road will benefit from the application of interconnectivity and access management regulations, especially driveway spacing, prior to development beginning in order to encourage roadway, driveway, and bike/ped facility development according to the Town's preferences. **See Appendix B for proposed roadway improvement plans.**
- Segment of Payne Road from Gorham Road to the South Portland Town Line – This segment would benefit most from providing bicycle and pedestrian infrastructure as proposed in the bicycle and pedestrian facility section of this study, and from interconnecting the existing businesses on both sides of Payne Road. Some businesses are already interconnected, for example the Payne Road Plaza containing Chia Sen and Bullmoose Music is connected to the plaza containing LeRoux Kitchen and Napa Auto Parts. However, this segment would benefit from additional connection of these plazas to Sam's Club. Similarly, it would be beneficial to connect Marden's to its neighbor, VIP Tires, La-Z-Boy and Fresco Del Forno to Sebago Brewing, and so on.

Selected Corridors for Future Study

Several corridors within the Town limits have been selected for future study of access management and interconnectivity. See Appendix C, Maps of Scarborough for figure and below list:

- County Road from Saco Street to the Gorham Town Line.
- Route 114 from Payne Road to Route 1.
- Spring Street from Payne Road to Mussey Road.
- Payne Road from Gorham Road to the South Portland Town Line.

Additionally, some areas in the Town could benefit from further analysis to determine the level of roadway connectivity. In particular, it is important to look at if a street network allows for travel between destinations by many different routes, and to determine the directness of the routes available for all modes of transportation.[5]

Payne Road from Gorham Road to South Portland Town Line

Section 5 • Access Management and Network Connectivity

Route 1 from Old Blue Point Road to Broadturn Road

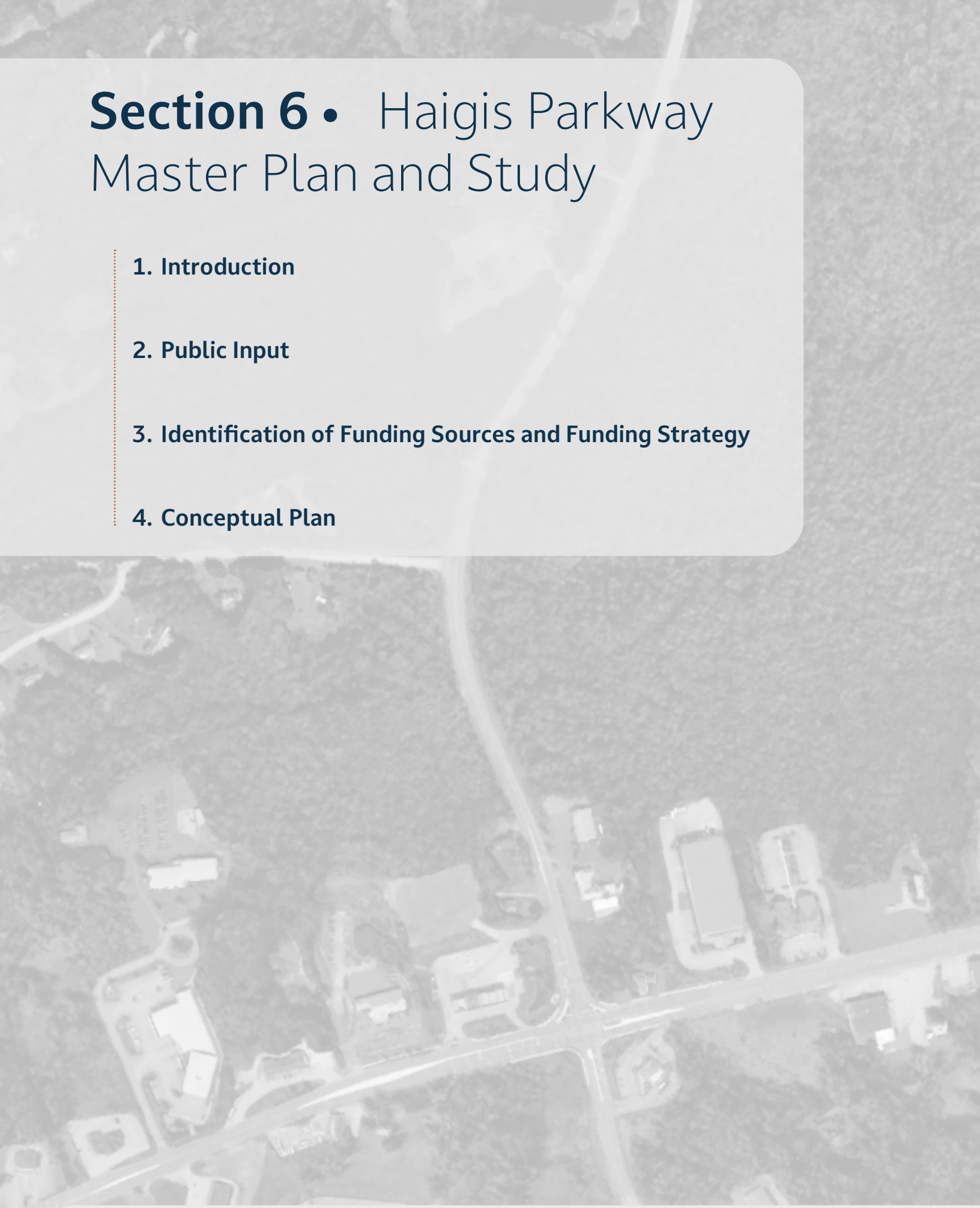
Route 1 from Sawyer Road to Portland Farms Road

Section 5 • Access Management and Network Connectivity

Route 1 from Southgate Road to Sawyer Road

Section 6 • Haigis Parkway Master Plan and Study

1. **Introduction**
2. **Public Input**
3. **Identification of Funding Sources and Funding Strategy**
4. **Conceptual Plan**



Section 6 • Haigis Parkway Master Plan and Study

Introduction

The Town of Scarborough would like to create a mobility corridor using Haigis Parkway to move traffic south from Maine Turnpike Exit 42 to Route 1 south. The Town would like to limit the traffic turning right to go south on Payne Road from Exit 42 and to move this traffic onto Haigis Parkway instead. A master plan of Haigis Parkway was created to improve safety and mobility on this corridor for vehicles, cyclists, and pedestrians. The Town wants to accomplish these goals while creating a boulevard type roadway.

Currently, Haigis Parkway is a two lane road with 12 foot travel lanes and 8 foot shoulders with some additional turning lanes at key intersections. The proposed cross section of Haigis Parkway includes two 11 foot lanes in each direction, 5 foot shoulders, a 12 foot median island with left turning lanes as needed, 10 foot esplanades, a 12 foot shared use path, and a 6 foot sidewalk.

The proposed improvements to Haigis Parkway were considered for their benefits to safety and mobility along this corridor for vehicles, cyclists and pedestrians.

For vehicles, providing two lanes in each direction will increase the capacity of the roadway and encourage vehicles to travel on Haigis Parkway to Route 1 rather than using Payne Road. This will help decrease traffic in the residential area on Payne Road south of Haigis Parkway and will in turn reduce speeds and improve safety here. The inclusion of a 12 foot median island will help keep this segment of Haigis parkway safe by eliminating dangerous left turns across multiple lanes of traffic, except at designated intersections where a left turn lane is included in the median island. This will also improve mobility for vehicles because it will allow a vehicle turning left to move out of the through lane while waiting to make the left turn.

The proposed cross section includes facilities for cyclists of multiple levels. First, the proposed cross section includes 5 foot shoulders to allow more confident cyclists and cyclists who travel at higher speeds to travel in the roadway shoulder. Additionally, the Haigis Parkway Master Plan includes a 12 foot shared use path on one side to accommodate less confident cyclists including younger cyclists, families traveling together by bicycle, and cyclists traveling at lower speeds. The 12 foot shared use path is protected from the roadway by a curb and a 10 foot esplanade to provide spacing and buffering between the cyclists and pedestrians on the path and the vehicles on the roadway.

To accommodate pedestrians, the Haigis Parkway Master Plan proposes a 12 foot shared us path on one side and a 6 foot sidewalk on the other, with pedestrian crossings on Haigis Parkway at Payne Road, Market Street, Scottow Hill Road, and Route 1. All of the proposed pedestrian crossings across Haigis Parkway are at proposed or existing signalized intersections. These facilities will allow pedestrians to travel all the way up and across Haigis Parkway safely, and will connect destinations for pedestrians including the new development at the Scarborough Downs, businesses on Route 1, and The Beacon at Gateway subdivision.

In addition to the improvements to Haigis Parkway, it is recommended that the Town consider implementing some traffic calming measures on the segment of Payne Road from Route 1 to Two Rod Road. The Town would like to discourage traffic from using this segment of Payne Road as a connection between Route 1 and Exit 42. The combined improvements to Haigis Parkway and traffic calming on Payne Road will encourage travelers to use Haigis Parkway to access Route 1 instead.

Section 6 • Haigis Parkway Master Plan and Study

Public Input

The Town of Scarborough sought and received public input on traffic and transportation related issues within the Town at an open house, via emailed comments, and at transportation committee meetings. The following is a summary of the comments from the residents of Scarborough that relate to how they would like to see Haigis Parkway develop as a transportation corridor.

- Residents are excited to have the opportunity to plan the transportation facilities on Haigis Parkway and take advantage of the large right of way available.
- The lack of sidewalks and crosswalks on Haigis Parkway currently is a concern, and residents would like to see protected bicycle and pedestrian infrastructure along this corridor, especially with the high vehicle speeds along the roadway.
- Cyclists are interested in having both a shared-use protected path and shoulders wide enough to accommodate a road cyclist so that all types of cyclists can use and feel comfortable on Haigis Parkway.
- There is a concern about traffic queueing and delays at The Beacon at Gateway drive.
- Haigis Parkway is currently a beautiful drive with all of the trees and greenery on either side. Residents see an opportunity to maintain that feeling along Haigis Parkway with a well-designed and landscaped roadway.

Possible cross-section of Haigis Parkway

Section 6 • Haigis Parkway Master Plan and Study

Identification of Funding Sources or Funding Strategy

For this study we are identifying potential funding sources to implement the recommendations of this transportation planning study. The list below is an initial funding source identification that will require a more in depth review for each one. This will require an additional study to both identify the most appropriate sources for the Town of Scarborough and to identify additional funding sources that may be available.

- **PACTS FUNDING SOURCES** • Complex Project Applications are applied for generally on a 2-year cycle basis. These projects are applied for and generally scored and compared to other projects in the PACTS Region and are selected based on a competitive basis. PACTS generally tries to ensure that Towns within it defined sub-regions propose projects that the sub-region municipalities support. These projects need to demonstrate improvements to the safety and mobility of the Region's transportation infrastructure with emphasis on regional significant projects, projects that improvement and encourage other modes of traffic (bike, ped, transit) and are inclusive of our diverse populations and all members of our community, and generally improve quality of life.
- **MAINE DOT / PACTS MPI (MUNICIPAL PROJECT INITIATIVES)** • MaineDOT and PACTS offer Municipal Partnership Initiative is intended to be a streamlined program to address municipal requests that deal with transportation infrastructure issues on state and state aid highways, encourage economic opportunities, and make improvements to infrastructure to increase its life or correct safety deficiencies.

  The program is designed to promote partnerships between MaineDOT and municipalities by leveraging additional resources on a voluntary basis to match limited state resources. The goal is to make improvements to state and state aid highways by utilizing more flexible project delivery methods.

  This Work Plan has set aside $8 million in state funding, which is anticipated to leverage another $8 million in local funds annually.
- **MAINE DOT BPI (MUNICIPAL PROJECT INITIATIVE AND BUSINESS PROJECT INITIATIVE)** • If a municipality and a local business or businesses feel that state highway or state aid highway infrastructure are impediments to them being able to reach their economic potential, this program will allow them to improve a portion of state or state aid highway to enhance the business climate, create new opportunities, or to allow for expansion. This Work Plan sets aside $2 million in state funding which anticipates leveraging another $4 million in local and business funding, annually. This program is designed to promote public/private partnerships between MaineDOT and municipalities, public utilities, private businesses, and other entities by leveraging additional resources on a voluntary basis to match limited state resources. It will make improvements to state and state-aid highways, often utilizing more flexible project delivery methods when the nature of the highway and project allows.
- **MAINE DOT BIKE AND PEDESTRIAN** • This program assists with funding sidewalks, pedestrian crossing improvements, off-road transportation- related trails, downtown transportation improvements, projects that address safety and/or ADA compliance concerns, etc. The goal of this program is to improve transportation and safety, encourage healthful activities, and promote economic development, while improving the livability and vitality of local communities MaineDOT annually allocates the Bicycle and Pedestrian Program about $3 million in federal funds for this statewide program. Each project has a 20% local match requirement with a maximum federal allocation of $720,000 per project.
- **MAINE DOT PPI (PLANNING PROJECT INITIATIVES)** • The Planning Partnership Initiative is intended to address time-sensitive, locally initiated planning and feasibility studies. This work plan sets aside $200,000 in state funding to match a like amount in local funding, annually. The approach is to study, evaluate, plan and scope transportation projects on or adjacent to the state and state aid highway system or for FHWA-eligible trail connections that are requested by a community. These are intended to be an administrative and financial partnership between the community requesting the study and MaineDOT. These are also intended to be simple, flexible, and fast-moving for new economic development and other high-priority proposals. These types of studies will be key in preparing projects for special federal funding applications such as grants under the Infrastructure Investment and Jobs Act. Some of these may be linked to future Village Partnership Initiative grant applications.

Section 6 • Haigis Parkway Master Plan and Study

- **MAINE DOT VILLAGE INITIATIVE** • The Village Partnership Initiative is designed to be available to all willing communities that have or can agree upon a local vision. Village projects can vary from small, spot improvements to large, once-in-a-lifetime investments if we can successfully partner to access federal discretionary funds. Working with other agencies, these communities should have access to broadband, as good internet connections are as important as physical connections are today.

  Village Centers and Downtowns are mixed-use areas that serve the surrounding community(ies) with goods, services, and housing; and have at least one civic or religious facility. Village Centers and Downtowns when built will be at least a half mile in length, have characteristics supporting speed limits of 30 mph or less and be built on a human scale making them walkable and bikeable for patrons and residents and have broadband available. Villages should be the focal point of a community and should reflect the personality, character, and history of that community. Some Maine municipalities may have more than one village center that serve distinct communities within the municipality.
- **FEDERAL RAISE/BUILD GRANTS** • These discretionary grants help project sponsors at the State and local levels, including municipalities, Tribal governments, counties, and others complete critical highway, freight and passenger transportation infrastructure projects. The eligibility requirements of RAISE allow project sponsors to obtain funding for projects that are harder to support through other U.S. DOT grant programs.
- **INFRA (KNOWN STATUTORILY AS THE NATIONALLY SIGNIFICANT MULTIMODAL FREIGHT & HIGHWAY PROJECTS)** • Awards competitive grants for multimodal freight and highway projects of national or regional significance to improve the safety, efficiency, and reliability of the movement of freight and people in and across rural and urban areas.
- **SMART (STRENGTHENING MOBILITY AND REVOLUTIONIZING TRANSPORTATION)** • City or community demonstration projects that incorporate innovative transportation technologies or uses of data, including coordinated automation, connected vehicles, and intelligent sensor based infrastructure. This new competitive grant program supports state, local, and tribal governments in conducting demonstration projects to advance smart city or community technologies and systems to improve transportation efficiency and safety, along with priorities like climate mitigation, resilience, and equity. SMART is a two-stage program. Stage 1(up to $2,000,000 dollars and 18 months) grants are open for any eligible entity to apply. Recipients of Stage 1 grants will be eligible to expand their projects through Stage 2 grants (up to $15,000,000 and 36 months). Applicants have received a Stage 1 grant to apply to Stage 2.
- **ATTIMD / ATTAIN (ADVANCED TRANSPORTATION TECHNOLOGIES & INNOVATIVE MOBILITY DEPLOYMENT PROGRAM / ADVANCED TRANSPORTATION TECHNOLOGY & INNOVATION)** • The Bipartisan Infrastructure Law (BIL) amended the ATCMTD grant program and renamed it the ATTIMTD Program. In implementing BIL, FHWA will refer to this program as the ATTAIN program. The program provides competitive grants to deploy, install, and operate advanced transportation technologies to improve safety, mobility, efficiency, system performance, intermodal connectivity, and infrastructure return on investment. Each Fiscal Year, 2022 through FY 2026, $60 million is authorized and the Federal share for each project may be up to 80 percent of the cost of the project.
- **S4A (SAFE STREET AND ROADS FOR ALL)** • This program will provide funding directly to local and tribal governments to support their efforts to advance “vision zero” plans and other improvements to reduce crashes and fatalities, especially for cyclists and pedestrians. Specifically, this includes projects to:
  - Develop a comprehensive safety action plan;
  - Conduct planning, design, and development activities for projects and strategies identified in a comprehensive safety action plan;
  - Or carry out projects and strategies identified in a comprehensive safety action plan.
- **OTHER USDOT PROGRAMS** • Thriving Communities Programs and Active Transportation Infrastructure Investment Program.
- **TRAFFIC IMPACT FEES** • Similar to current efforts to create traffic impacts fees for improvements to Payne Road between Exit 42 and Gorham Road as well as replace and widen the existing narrow Payne Road Bridge over the Nonesuch River, the town could create additional locations within the Town to put resources towards increasing mobility and capacity.

Section 6 • Haigis Parkway Master Plan and Study

- **TAX INCREMENT FINANCING (TIF) •** Municipal Tax Increment Financing (TIF) is a flexible finance tool used by municipalities, plantations, and unorganized territories to leverage new property taxes generated by a specific project or projects within a defined geographic district.
- **COASTAL RESILIENCY GRANTS •** Grants are available to study and design improvements to protect infrastructure for coastal communities vulnerable to long term sea level rise and impacts from increased frequency of storms bringing intense rainfalls and more frequent storms on the level of 50-year, 100-year type storm events.
- **TOWN BOUNDING/WARRANTS •** Local efforts at the Town level to plan for, design and fund large scale safety and mobility improvements for vehicular, bicyclists and pedestrian traffic within the Town of Scarborough.

Concept Plan

See **Appendix B Sheets 13-23** for the Haigis Parkway Master Plan.

Section 7

Project Priority Table

Section 7 • Project Priority Table

Number	Intersection/Segment Description	HCL in 2023	Town Way?	Safety Issue?	Mobility Issue?	Opportunity for Roadway Connectivity?	Opportunity for Bicycle Improvements?	Opportunity for Pedestrian Improvements?	Cost for Corrective Action	Ease of Implementation	Priority
1	Intersection of US Route 1 and Broadturn Road				Y		Y		$-$$$	Moderate to Difficult	High
2	Intersection of US Route 1 and Dunstan Avenue	Y		Y			Y	Y	$-$$	Easy	High
3	Intersection of Payne Road and Cummings Road	Y		Y	Y			Y	$-$$$	Difficult	High
4	Segment of Payne Road from Haigis Parkway to Gorham Road				Y	Y	Y	Y	$$$	Difficult	High
5	Segment of US Route 1 from Broadturn Road to Dunstan Avenue	Y		Y		Y	Y	Y	$$-$$$	Moderate	Medium
6	Intersection of Running Hill Road and Route 114	Y		Y	Y				$-$$$	Difficult	Medium
7	Intersection of Route 1 at Hannaford Drive			Y	Y		Y	Y	$$	Moderate	Medium
8	Segment of Route 1 from Sawyer Road to Portland Farms Road	Y		Y		Y	Y	Y	$$$	Difficult	Medium
9	Segment of Route 1 from Southgate Road to Sawyer Road					Y	Y	Y	$-$$	Moderate	Medium
10	Intersection of Payne Road and Gallery Boulevard				Y				$-$$$	Moderate to Difficult	Low
11	Segment of Payne Road from Gorham Road to South Portland Town Line				Y	Y	Y	Y	$$$	Difficult	Low
12	Intersection of Broadturn Road at Burnham Road	Y		Y					$-$$	Easy to Moderate	Low
13	Intersection of Broadturn Road at Holmes Road	Y		Y	Y				$$-$$$	Moderate to Difficult	Low

Section 7 • Project Priority Table

Bicycle and Pedestrian Improvements									Cost for Corrective Action	Ease of Implementation	Priority
Payne Road	12-Foot **Shared Use Path** on east side from Haigis Parkway to Gorham Road								$$$	Moderate	Medium
	Add **Shared Use Path** on east side from Haigis Parkway to South Portland								$$$	Difficult	Medium
	Add **sidewalk** on west side from Haigis Parkway to South Portland								$$$	Moderate	Medium
	Add **sidewalk** from Haigis Parkway to Regal Pines Drive								$$$	Moderate	Medium
Haigis Parkway: Payne Road to Route 1	12-Foot **Shared Use Path** on north side								$$$	Moderate	Medium
Scarborough Downs Road: Route 1 to Payne Road	**Bike Lanes**								$$	Easy to Moderate	Medium
Enterprise Drive: Route 1 to End	Widen sidewalk on north side for a **Shared Use Path**								$$	Easy	Low
Gorham Road	Extend **bike lanes/wide shoulders** to Payne Road								$$$	Difficult	High
	Add **sidewalk** on north side from Oak Hill Drive to Hannaford Drive								$	Easy	Medium/High
	Add **sidewalk** on northeast side to Payne Road								$$$	Difficult	Medium/High
	Add **sidewalk** from Saco Street to County Road								$$$	Moderate	Medium
Oak Hill Byway North – Maple Avenue to Route 1 North to Portland Farms Road	Maple Avenue - Shared Lanes or Advisory Bike Lanes Route 1 – Shared Use Path on west side Portland Farms Road – Shared lanes, Advisory Bike Lanes or Shared Use Path on north side								$$	Moderate	High
Oak Hill Byway South - Wentworth Drive to Municipal Drive to Durant Drive to Sawyer to Route 1 to Commerce Drive to Evergreen Farms Road to ET.	Wentworth Drive – **Shared Use Path** on north side (long term) and **Shared Lanes** (short term) Municipal Drive – widen sidewalk for **Shared Use Path** Durant Drive - widen sidewalk for **Shared Use Path** (or route through Memorial Park) Sawyer Road – widen sidewalk through Memorial Park for **Shared Use Path** to Route 1 Route 1 **Shared Use Path** to Commerce Drive Evergreen Farms Road **Shared Lanes**								$$	Moderate	High
Oak Hill Byway Central – Municipal Campus to Ward Street to White Hart Lane to Classical Lane to Federal Way	**Shared Lanes with Sharrow and signage**								$	Easy	High
Sawyer Street	**Shared Use Path** from Durant Drive to Sawgrass Drive								$$	Medium	Medium
	Add **sidewalk** from Sawgrass Drive to Gorham Road								$$	Moderate	Medium
	Add **sidewalk** from Route 1 to Durant Drive								$$	Moderate	Medium
Old Blue Point Road – Route 1 to Pine Point Road	Widen for **Bike lanes**								$$	Medium	Low
Pine Point Road	Route 1 to King Street to Avenue 5 Option 1 **Buffered Bike Lanes** Option 2 **Shared Use Path** – Long term								$ for short-term buffered bike lanes	Easy	High
	Extend **sidewalk** on north side to Snow Canning Road from the west.								$$$	Difficult	Medium
	Add **sidewalk** from Eastern Trail to the sidewalk at Dunstan Landing Road								$$	Moderate	Medium
Washington Avenue/Lincoln Avenue from Eastern Trail	**Bike Lanes**								$	Easy	High
Black Point Road	Route 1 to Scarborough Beach State Park: **Bike Lanes (with buffer where width permits).** Restripe to 11' lanes in some sections. Restripe to 10' lanes and 4-foot shoulders on section from Spurwink Road to State Park								$	Easy	High
	Extend the **sidewalk** on north side to Eastern Avenue								$$	Moderate	High

Section 7 • Project Priority Table

Bicycle and Pedestrian Improvements									Cost for Corrective Action	Ease of Implementation	Priority
Highland Avenue – Black Point Road to South Portland	10-Foot **Shared Use Path** – Black Point Road to Chamberlain Road 10-Foot **Shared Use Path** - Chamberlain Road to Pleasant Hill Road **Bike Lanes** – Pleasant Hill Road to South Portland								$$$	Medium	High
Spurwink Road – Black Point Road to Cape Elizabeth	4-Foot **Bike lanes** Restripe with 11' lanes								$$	Easy for restriping and Medium for roadway widening for bike lanes	High
Ocean Avenue – Spurwink Road to Higgins Beach	**Advisory Bike lanes/Shared Use Path** on north side/Shared Lanes								$$	Easy for shared lane markings and medium/difficult if path	Low
Pleasant Hill Road	Spurwink Road to Eastern Trail **Bike lanes**								$$	Easy for roadway north of Highland Avenue and difficult for widening because of impacts	Medium
	Add **sidewalk** from Highland Avenue to Spurwink Road								$$$	Difficult	Low
Eastern Trail – Eastern Road to South Portland	10 to 12-Foot **Shared Use Path**								$$$	Difficult	High
Jameco Mill Road to Maple Avenue	10-Foot **Shared Use Path**								$	Easy	Low
Imperial Lane to Wentworth School	8 to 10 Foot **Shared Use Path**								$	Easy	High
The Downs Utility Corridor – Haigis Parkway to Scarborough Downs Road	10 to 12-Foot **Shared Use Path**								$$$	Moderate	Low
Eastern Trail/Commerce Drive/Evergreen Farms to The Downs Connection	**Shared Use Path**								$$	Moderate	High
Route 1	Hillcrest Drive to Pleasant Hill Road **Shared Use Path** from Hillcrest Drive to Hannaford Drive to Wentworth Drive **Shared Use Path** from Hillcrest Drive to Campus Drive **Protected Bike lanes** from Campus Drive to Pleasant Hill Road								$$$	Difficult	Medium
	Add **sidewalk** on east side from City of Saco to Old Blue Point Road								$$	Moderate	Low
	Install **RRFB** at Old Blue Point Road								$	Easy	Low
	Install **RRFB** at Dunstan Avenue								$	Easy	Medium
	Add **sidewalk** on west side from Payne Road to Haigis Parkway								$$$	Difficult	High
	Provide **sidewalks** on both sides of Route 1 from Haigis Parkway to Hillcrest Avenue								$$$	Difficult	High
	Add **crosswalk/Median/RRFB** at Little Dolphin Drive								$$	Moderate	High
	Add **sidewalk** on west side from Campus Drive to Pleasant Hill Road								$$	Moderate	Low
	Add **crosswalk and RRFB** at Campus Drive								$	Easy	Low
Mussey Road	Add **sidewalk** on north side from Gorham Road to Payne Road								$$	Moderate	Medium
	Add **sidewalk** from Spring Street to Carrier Woods Apartments								$$	Moderate	Medium
Hannaford Drive	Add **sidewalk** on south side from Route 1 to Gorham Road								$$	Moderate	Low
Broadturn Road	Add **sidewalk** from Route 1 to Carpenter Court								$$	Moderate	Medium
Saco Street	Add **sidewalk** from Gorham Road to Wassamki Springs								$$$	Moderate	Low
County Road	Add **sidewalk** from Saco Street to Gorham TL								$$	Moderate	Medium
Fogg Road	Add **sidewalk** on one side								$$$	Moderate	Low

APPENDIX A

RSA Gorham Road and Payne Road

Scarborough, ME

Payne Road and Gorham Road

Road Safety Audit Report

Virtual RSA meeting: 11/17/2020, Field review: 11/18/2020

Prepared by

Issued on: 06/30/2021

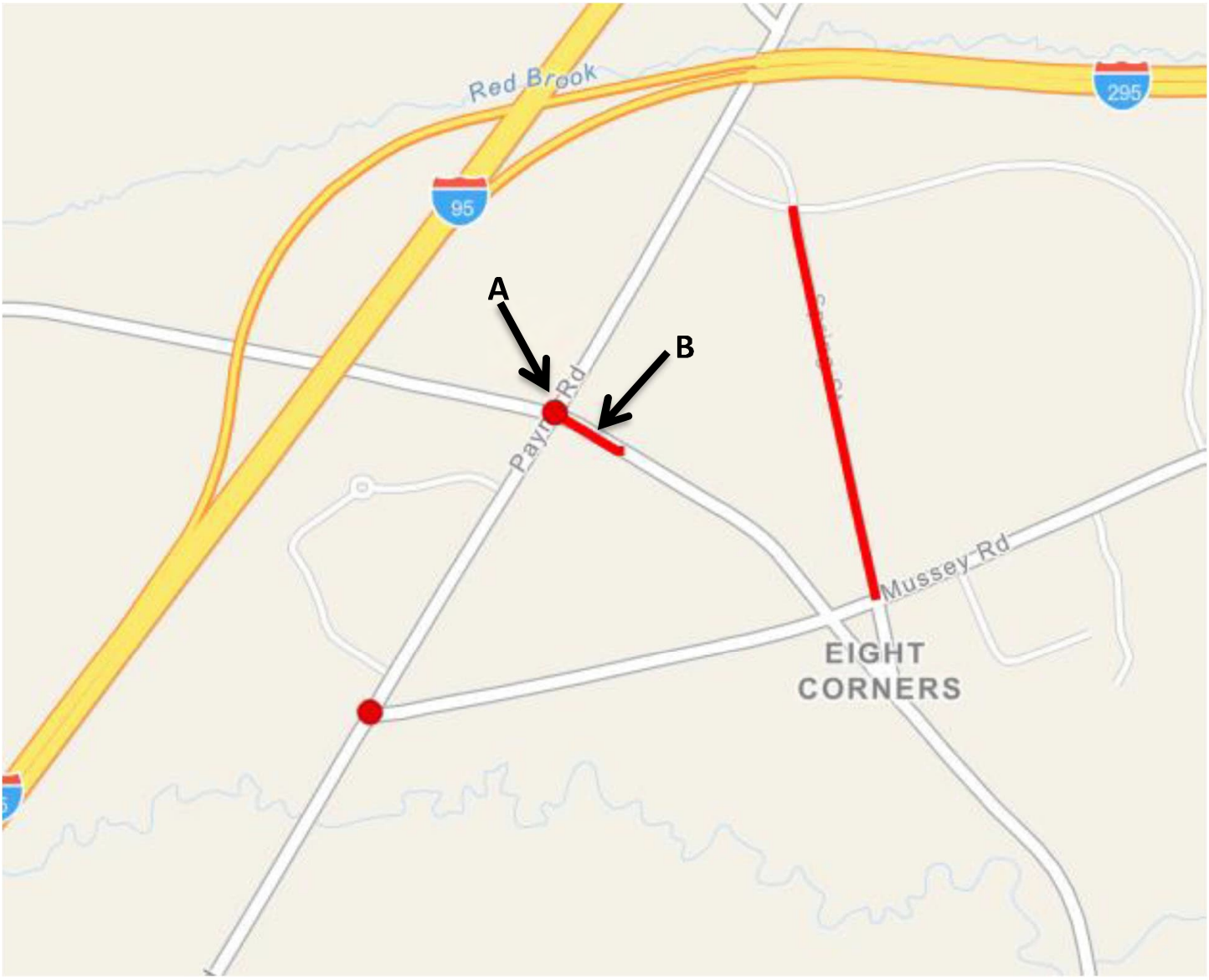
TABLE OF CONTENTS

INTRODUCTION

Background

VHB is under contract with the Portland Area Comprehensive Transportation System (PACTS) to prepare desktop assessments for 24 High Crash Locations (HCLs) within the PACTS region. After the desktop review process, 10 of these 24 sites were selected for field review and further investigation. The Gorham Road and Payne Road intersections were some of the sites selected for field review.

This RSA took place across two meetings, a virtual RSA meeting on 11/17/2020 and a field review on 11/18/2020.



Overview showing the Gorham Road and Payne Road high crash locations.

RSA SITE LOCATIONS

This site includes an intersection and a roadway segment:

A. ***Intersection of Payne Road and Gorham Road:*** This is a four-leg, signalized intersection. The Gorham Road intersection leg, on the west side, is slightly skewed relative to the other three legs, which are perpendicular to each other.

B. ***Intersection of Gorham Road and Cumberland Farms Exit:*** This is a drive on the Gorham Road northbound approach. The drive has a low-profile median island that is intended to channel vehicles to the right.

See the HCL Desktop Assessment in Appendix A for more background on these locations including crash diagrams.

RSA TEAM

Attendees – Virtual Meeting

- Tony Grande, VHB
- Ania Chandler, VHB
- Elissa Goughnour, VHB
- Elizabeth Roberts, GPCOG
- Harold Spetla, GPCOG
- John Adams, Milone and Macbroom
- Angela Blanchette, Town of Scarborough

Attendees – Field Review

- Tony Grande, VHB
- Ania Chandler, VHB
- Ethan Flynn, VHB
- John Adams, Milone and MacBroom
- John O'Malley, Scarborough Police

Potential Partners not in Attendance

- Randy Illian, MaineDOT

ASSESSMENT FINDINGS

Positive Features

The westbound receiving lanes on Payne Road do not have any crashes. The merging lanes in the adjacent segment, to the west of the Payne Road and Gorham Road intersection, had only one crash during the study period.

RSA Team Prioritization of Issues

The issues listed below were prioritized based on crash frequency, severity, and local interest in the issue:

1. Gorham Road and Payne Road intersection: Vehicles traveling westbound on Payne Road running red light crashes and rear end crashes.
2. Gorham Road and Payne Road intersection: rear end crashes Gorham Road, both approaches.
3. Cumberland farms exit: left turns into and out of Cumberland Farms.

Summary

The following section summarizes specific issues observed and discussed by the RSA team and identifies potential countermeasures to address these issues. Included in this summary is a discussion of crash modification factors (Table 1) related to the countermeasures. Additional discussion on the suggested countermeasures is included in the costs and challenges table of this report.

Some of the recommended countermeasures may require further analysis, such as a capacity analysis or warrant analysis, to confirm applicability.

Issue 1: Gorham Road and Payne Road intersection: Vehicles traveling westbound on Payne Road running red light crashes and rear end crashes.

Specific Safety Concern	Suggested Improvements	Example of Issue
• Vehicles traveling straight through the Gorham Road and Payne Road intersection westbound are running the red light, resulting in crashes with vehicles traveling southbound on Gorham Road.	***Short Range –*** • Install retroreflective backplates to improve the visibility of the traffic signals, particularly in situations like the one pictured at right where the sun obscures the traffic signals. • Explore improving the coordination of the traffic signal timing at this intersection with upstream traffic signals, including Payne Road and Sam's Club, Payne Road and Marden's, and Payne Road and Gallery Boulevard.	 Payne Road westbound approach.

Issue 2: Gorham Road and Payne Road intersection: rear end crashes on Gorham Road, both approaches.

Specific Safety Concern	Suggested Improvements	Example of Issue
• Vehicles traveling on Gorham Road, both directions, are rear ending vehicles ahead of them. • Speed is a contributor for southbound vehicle crashes, as vehicles speed down the hill to try and make it through the intersection before it turns traffic signal turns red.	***Short Range –*** • Install advanced vehicle detection on both Gorham Road approaches at the Gorham Road and Payne Road intersection. • Install a speed feedback sign at the posted speed reduction location, on southbound Gorham Road.	 Gorham Road southbound approach showing lanes and lane assignments.

Issue 3: Cumberland Farms exit: left turns into and out of Cumberland Farms.

Specific Safety Concern	Suggested Improvements	Example of Issue
• Vehicles turning left, into and out of the Cumberland Farms exit onto Gorham Road, are not yielding to through traffic on Gorham Road. • The Cumberland Farms exit is situated at the right turn lane taper before the Gorham Road and Payne Road intersection.	***Short Range –*** • Install a No Left Turn sign in the pork chop island located in the Cumberland Farms driveway. *Note: this sign likely existed here previously but may have been hit.* ***Intermediate Range –*** • Extend the median island along Gorham Road to prevent left turns into and out of the Cumberland Farms driveway. • Raise the existing porkchop island at the Cumberland Farms entrance. *Note: there is an existing porkchop island that is almost flush with the pavement.*	 Cumberland Farms entrance/exit on Gorham Road.

Costs and Challenges

Issue	Countermeasure	Challenges	Cost Range
Issue 1: Gorham Road and Payne Road intersection: Vehicles traveling westbound on Payne Road running red light crashes and rear end crashes	Install retroreflective backplates.	No challenges.	Low
	Coordinate this intersection with upstream traffic signals.	Would require further study of existing traffic signal timing.	Low
Issue 2: Gorham Road and Payne Road intersection: Rear end crashes on Gorham Road, both approaches.	Install advance vehicle detection on both Gorham Road approaches.	Would need to determine that the mast arm is not overloaded.	Moderate
	Install a speed feedback sign at the speed drop on Gorham Road southbound.	No challenges.	Moderate
Issue 3: Cumberland Farms Exit: left turns into and out of Cumberland Farms	Install No Left Turn sign in the porkchop island of driveway.	Vehicles can disregard this sign if they choose	Low
		It appears that a no left turn sign existed here previously but it was struck by a vehicle.	
	Extend median island along Gorham Road to prevent left turns into and out of Cumberland Farms at this exit.	Would require vehicles that want to travel south on Gorham Road to turn left out of Cumberland Farms on Payne Road and then left again onto Gorham Road at the intersection.	Moderate
	Raise porkchop island in Cumberland Farms drive.	Would need to ensure that a fire truck can still easily access Cumberland Farms.	Moderate

The above table summarizes the findings from the RSA conducted on 11/17/2020 and 11/18/2020. Countermeasures highlighted in green are recommended by VHB for implementation. The scale for costs is as follows:

Low	< $10,000
Moderate	$10,000 - $100,000
High	> $100,000

These costs do not include professional engineering, construction engineering, or right of way.

Crash Modification Factors

A crash modification factor (CMF) is a multiplicative factor, based on documented safety research studies, used to compute the expected number of crashes after implementing a given countermeasure at a specific site. CMFs provide some indication of the potential benefit, or lack thereof, associated with specific countermeasures.

FHWA compiles CMF data from published safety studies in the CMF Clearinghouse (http://www.cmfclearinghouse.org/index.cfm) to help practitioners select the most effective safety treatments. While CMF data is not available for all potential countermeasures, the CMF Clearinghouse provides a useful and consolidated source of data to help engineers, planners, and project owners make informed decisions. CMFs have been provided to demonstrate the effectiveness of proposed safety treatments, regardless of whether crashes can be applied to the CMF at this time. For example, some proposed treatments may reduce crash risk but do not have recent crashes directly associated with a specific location. It should be noted that as most CMFs represent the effect of a single treatment; it is difficult to accurately estimate the combined safety effects of multiple CMFs at one location. The combined effect of multiple treatments may be over-estimated if the CMFs are multiplied and engineering judgment is necessary to assess the interrelationships and independence of multiple treatments. In particular, CMFs should never be multiplied if the respective CMFs apply to different crash types and/or severities (e.g., the CMF for treatment A applies to total crashes and the CMF for treatment B applies to injury crashes) and the treatments address the same crashes (i.e., the treatments are not independent). For more information, please refer to the CMF Clearinghouse.

Table 1. Crash Modification Factor (CMF) Summary

Countermeasure	CMF (% Change in Crash Incidence)	Other Information
Issue 1: Gorham Road and Payne Road intersection: Vehicles traveling southbound on Payne Road running red light crashes and rear end crashes.		
Install retro reflective backplates.	0.85 (15%)	Applies to all crash types and severities
Explore improving the coordination at this intersection with upstream traffic signals at Payne Road and Sam's club, Payne Road and Marden's, and Payne Road and Gallery Boulevard.	F(X)	This is a CMFunction that requires inputs on the number of traffic signal cycles per hour from X to Y. The formula is $e^{-0.0444(Y-X)}$
Issue 2: Gorham Road and Payne Road intersection: rear end crashes Gorham Road, both approaches.		
Install advanced vehicle detection on both Gorham Road approaches.	N/A	
Install a speed feedback sign at the speed drop on Gorham Road eastbound.	N/A	There is a CMF for dynamic speed feedback signs but is only applicable in a rural two-lane road setting.
On Gorham Road eastbound, provide louvered signal heads to decrease distance that a vehicle sees the green light.	N/A	
Issue 3: Cumberland Farms exit: left turns into and out of Cumberland Farms.		
Install No Left Turn sign.	0.36 (64%)	Applies to left-turn crashes and all severities
	0.32 (68%)	Applies to all crash types and severities
Install median island along Gorham Road to prevent left turns into and out of Cumberland Farms.	N/A	
Raise existing median island in Cumberland Farms drive.	N/A	

For Issue 1, retroreflective backplates are shown to reduce total crashes up to 15 percent. There is a CMFunction for reducing the number of traffic signal cycles per hour, but exact values are needed to compute the CMF. For Issue 2, no CMFs exist for the proposed countermeasures. For Issue 3, installing a "No Left Turn" sign may reduce left-turn crashes and total crashes by 64 percent and 68 percent, respectively. Although there is no CMFs for restricting left-turns with a raised median, it can be assumed that a median physically restricting left-turns would eliminate all left-turn crashes.

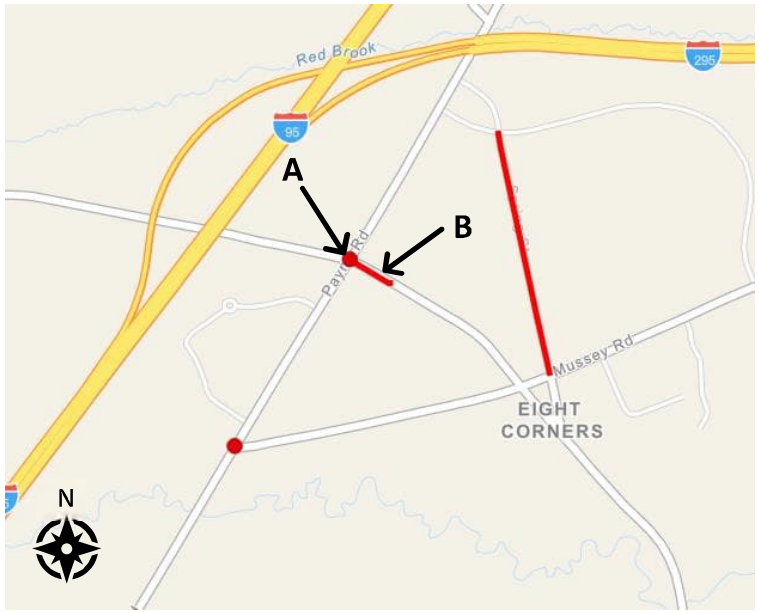
CONCLUSIONS

Given the safety and site needs at these intersections, the best opportunities for improving safety include installing retroreflective backplates at the Gorham Road and Payne Road intersection to increase signal head visibility, especially during times of day when the sun limits visibility. Additionally, a speed feedback sign should be installed at the speed decrease on Gorham Road. At the Cumberland Farms driveway and Gorham Road, it is recommended that the median island be extended along Gorham Road to restrict left turns into and out of Cumberland Farms.

APPENDIX A

HCL Desktop Assessment

SCARBOROUGH: Intersection of Payne Road and Route 114 (Gorham Road)



Overview map of HCLs reviewed in this assessment.

Aerial view of **(A)** Gorham Road and Payne Road

Assessment

This site includes an intersection and a roadway segment.

- ***A. Intersection of Payne Road and Gorham Road:*** This is a four-leg, signalized intersection. The Gorham Road intersection leg, on the west side, is slightly skewed relative to the other three legs, which are perpendicular to each other.
- ***B. Roadway Segment on Gorham Road:*** This roadway segment is the stretch of road to the east of the intersection. In the westbound direction, there is a left-turn lane, a thru lane, and a shared thru/right-turn lane. There is one lane in the eastbound direction. There is a driveway with a concrete median (A.K.A. pork chop island) to Cumberland Farms on the north side of this segment.

Recent or Pending Projects

Mill and fill Beginning at Mussey Road and extending north 0.33 of a mile to Gorham Road (PACTS Sponsored) scheduled for 2020.

Municipal Input

Noted concerns by the city include the following:

- This intersection is very large in overall width and length, and includes increased turning radii for truck traffic through the intersection.
- There are multiple turning lanes from many of the approaches, which may contribute to motorist's confusion.
- There have been reports of the eastbound Gorham Road (Rt 114) approach significantly backing up during the morning commuting hours even with dual left turning lanes onto Payne Road.
- The lane designations, and travel patterns for those commuting through the intersection should be reexamined.

SCARBOROUGH: Intersection of Payne Road and Route 114 (Gorham Road)

Street view of intersection at Payne Road and Gorham Road traveling South on Payne Road, from Google Maps

Aerial view of Payne Road and Gorham Road, from Google Maps

Safety Issues

A. Intersection of Payne Road and Gorham Road

There were 48 crashes at the intersection between 2015-2017, most of which were rear end or angle crashes. The marjoity of the crashes (28 of the 48) involved vehicles traveling eastbound on Gorham Road. Eight of the 28 involved a vehicle running a red light. There were two additional red-light-running crashes involving vehicles on other legs of the intersection. Additionally, quite a few vehicles are running the red light at this intersection. In particular this is a problem with vehicles traveling South on Payne Road.

The most prevalent crash type on both southbound Payne Road and westbound Gorham Road was rear end.

B. Roadway Segment on Gorham Road

This segment has only experienced two crashes between 2015-2017 and is not a HCL. There are a number of driveways so safety may increase through access mangement.

Recommendations

- Investigate speed of vehicles on eastbound Gorham Raod, approaching the Payne Road intersection.
- Observe conditions to note if aggressive driving is prevalent. If so, consider conducting aggressive driving enforcement and providing educational messaging.
- Consider applying high friction surface treatments on intersection approaches, particularly those in the eastbound, westbound, and southbound directions.
- Review signal cycle length and phasing, including red and yellow change intervals. Longer cycle lengths may decrease the risk of red-light-running crashes. Also, there are many signals within a short distance on the north leg of Payne Road. Consider evaluating signal timing and retiming/coordination if necessary.
- Install retroreflective borders on signal backplates and consider increasing the size of the signal heads, if possible.
- Add dotted pavement markings between the dual left-turn lanes for eastbound vehicles on Gorham Road.
- Install advance detection.

SCARBOROUGH: Intersection of Payne Road and Route 114 (Gorham Road)

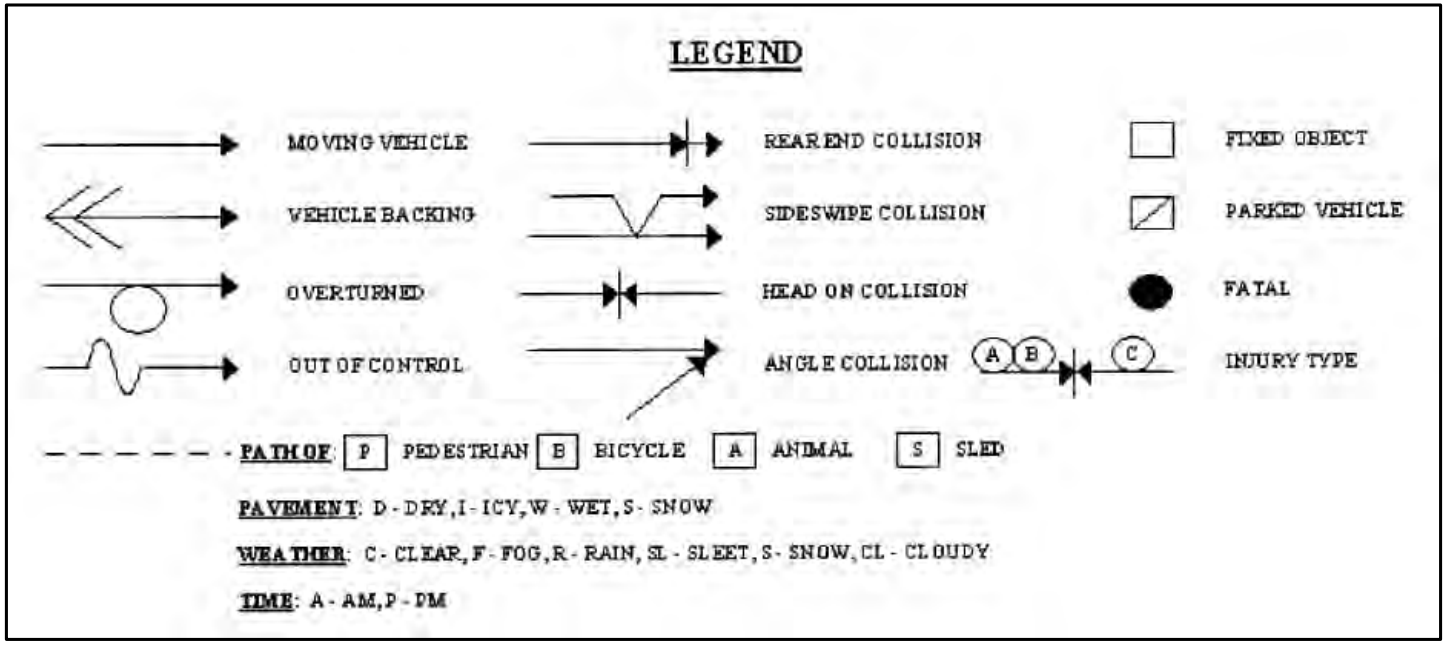
Crash Data

The crash data used for this assessment was based on 2015-2017 crash data. The following table summarizes the crash data for both locations and also shows additional crashes from 2018. The crash diagrams for both locations are shown on the following pages.

Location	HCL Node	Crashes by Year				Total Crashes (2015-18)	Percent Injury (2015-17)	Critical Rate Factor (2015-17)	Highway Corridor Priority (2015-17)	Speed Limit	Estimated AADT
		2015	2016	2017	2018						
Payne Rd and Gorham Rd	15611	14	17	17	14	62	43.8%	1.45	2	35 mph	5,000-8,500
Gorham Rd	15611-66237	1	1	-	-	2	-	-	2	35 mph	11,000

**See the abbreviations and definitions section at the beginning of this report for more information about each data point.*

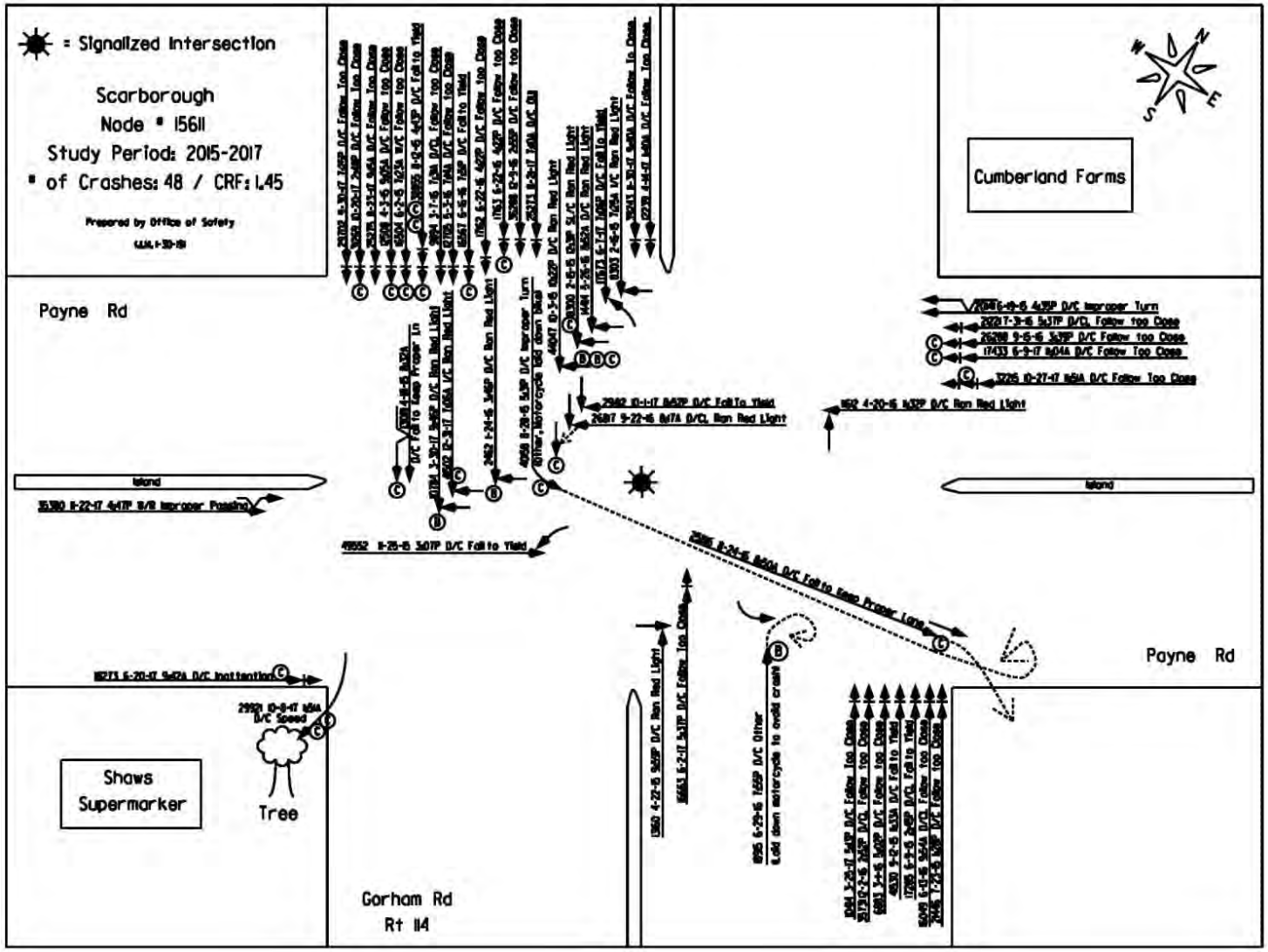
The legend below will aid in understanding the crash diagrams that follow.



SCARBOROUGH: Intersection of Payne Road and Route 114 (Gorham Road)

A. Intersection of Payne Road and Gorham Road

Note: the businesses are labeled incorrectly. Cumberland Farms should be in the southeast corner and Sam's Club should be in the northeast corner.



APPENDIX B

Conceptual Plans

The following proposed improvements are conceptual in nature and were based on existing aerial photographs. They are not construction ready, and field measurements and/or surveys to verify the existing conditions were not performed. VHB recommends the appropriate level of field review, survey, and preliminary engineering/analysis be completed prior to progressing the conceptual improvements to construction.

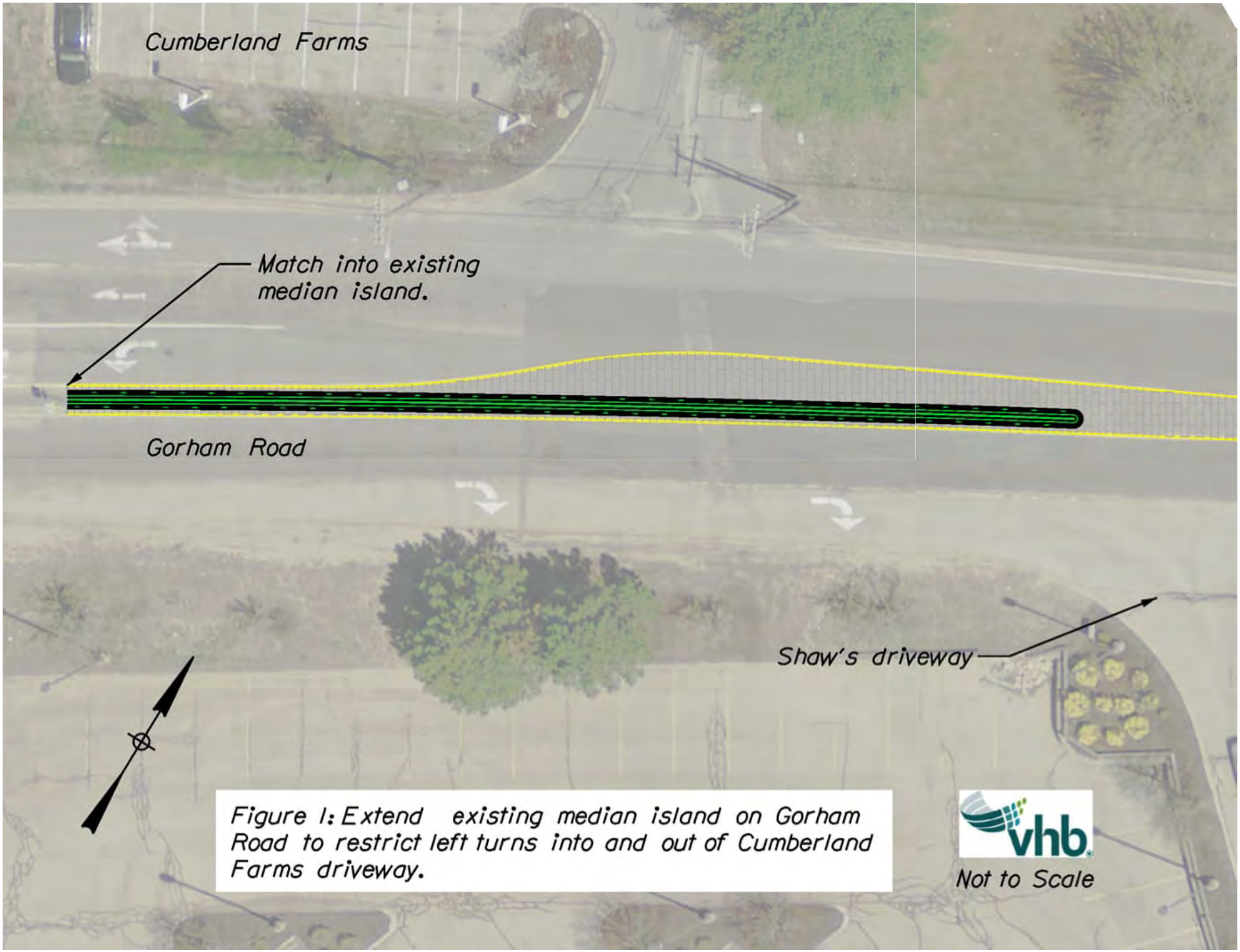


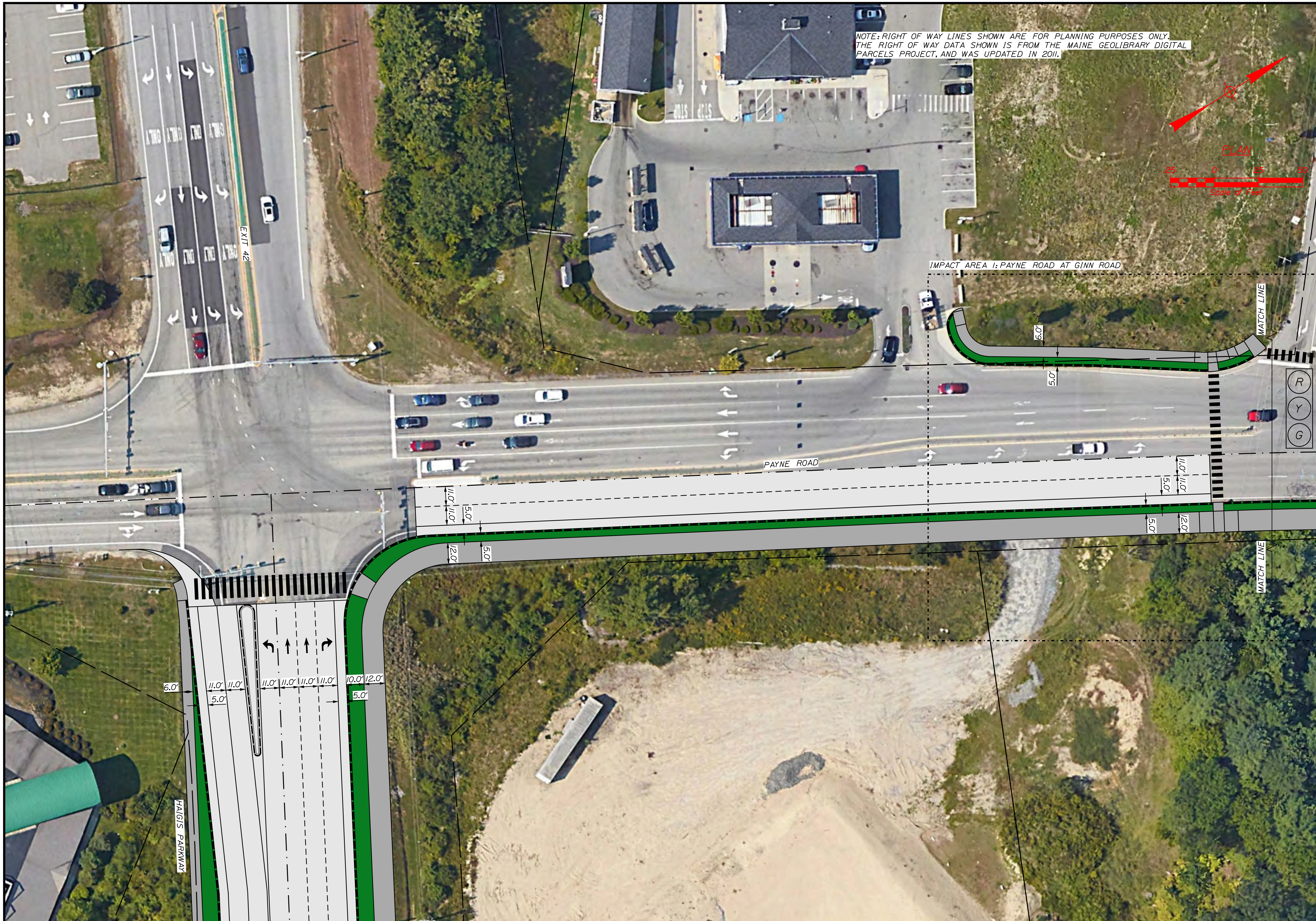
Figure 1: Extend existing median island on Gorham Road to restrict left turns into and out of Cumberland Farms driveway.

vhb

Not to Scale

APPENDIX B

Scarborough TWTS Conceptual Plan / Payne Road and Haigis Parkway



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TOWN OF SCARBOROUGH
TWTS - PAYNE ROAD

CONCEPTUAL PLAN

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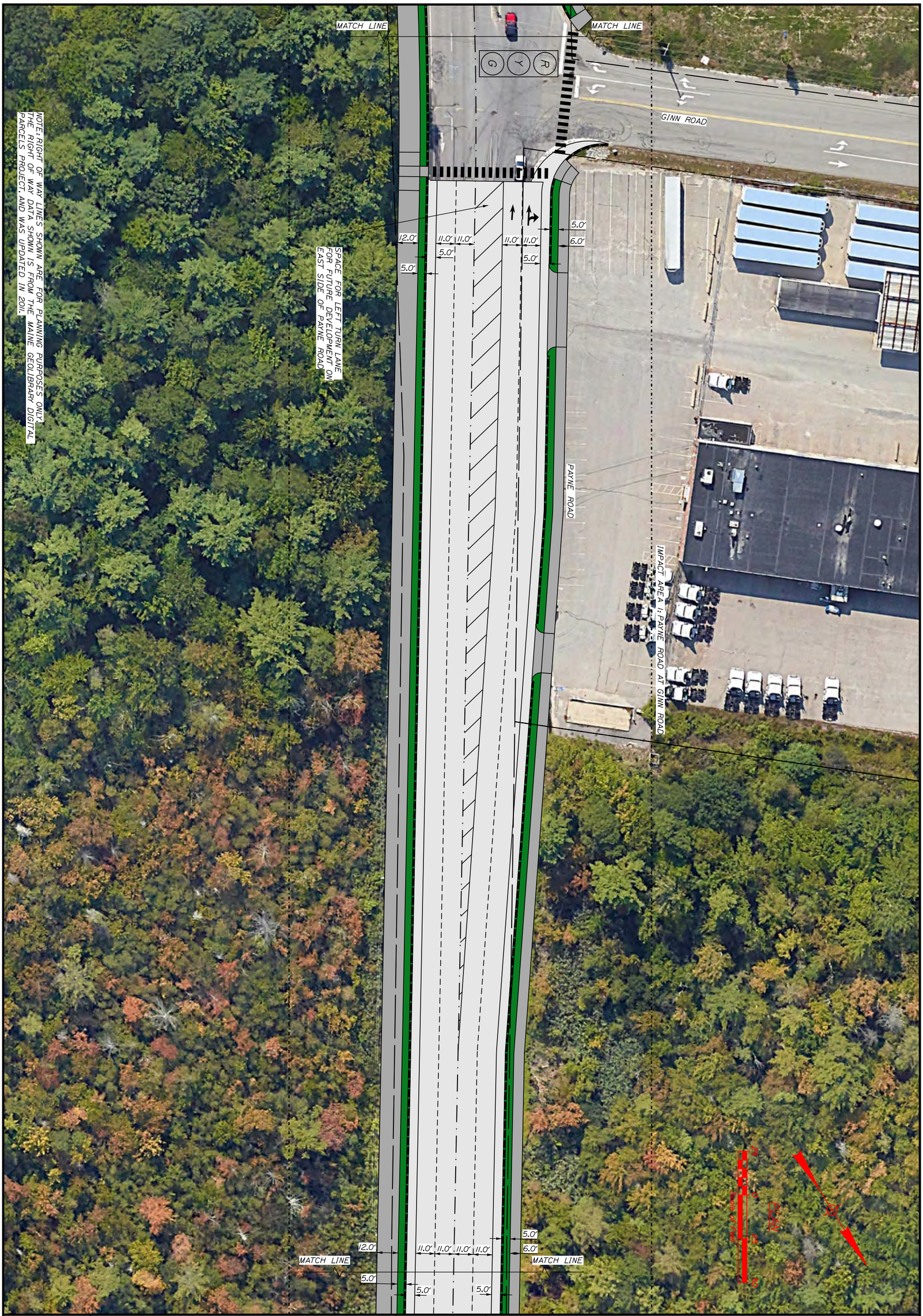

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TOWN OF SCARBOROUGH
TWTS - PAYNE ROAD

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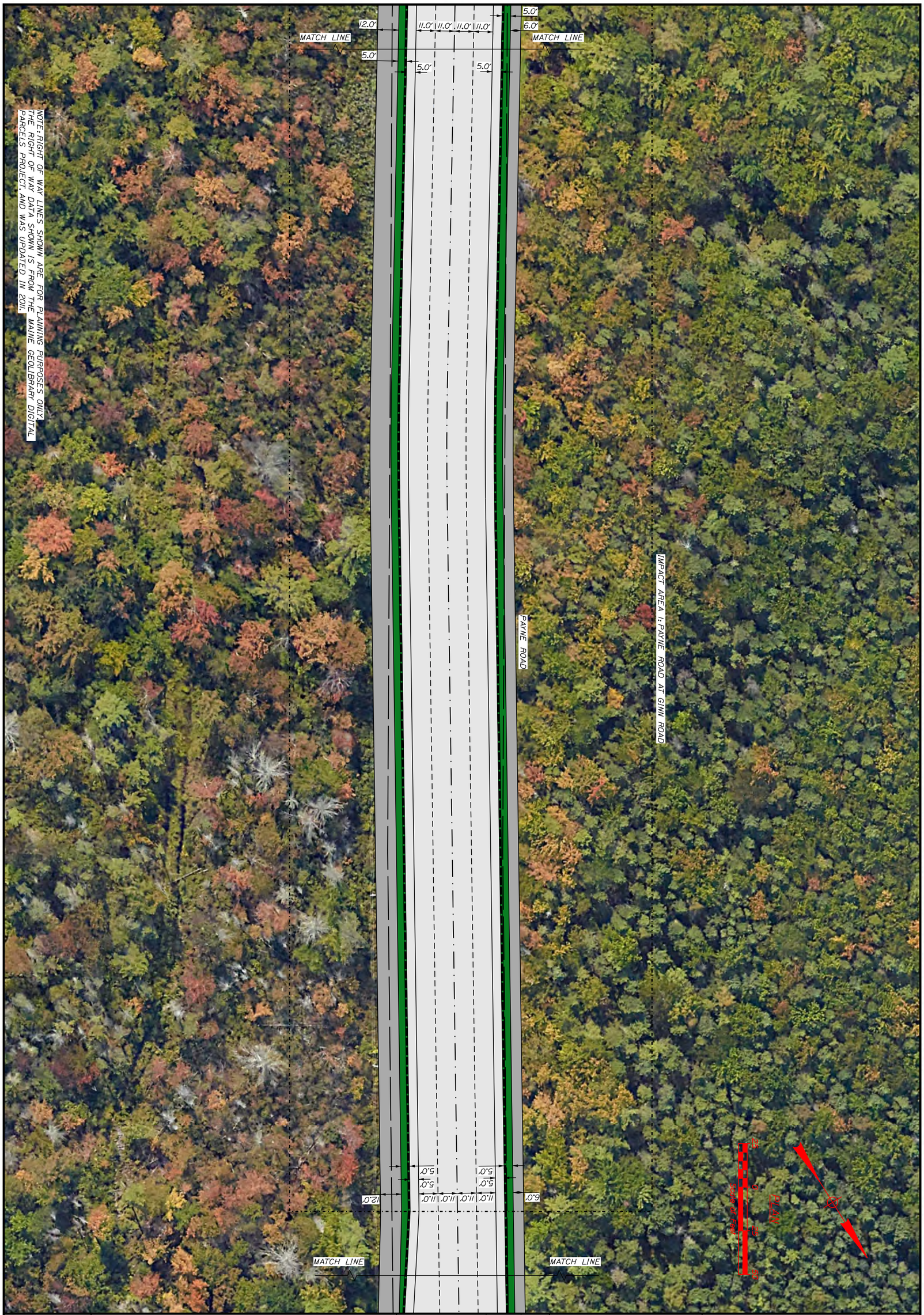

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TOWN OF SCARBOROUGH
TWTS - PAYNE ROAD

CONCEPTUAL PLAN

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TOWN OF SCARBOROUGH
TWTS - PAYNE ROAD

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TOWN OF SCARBOROUGH
TWTS - PAYNE ROAD

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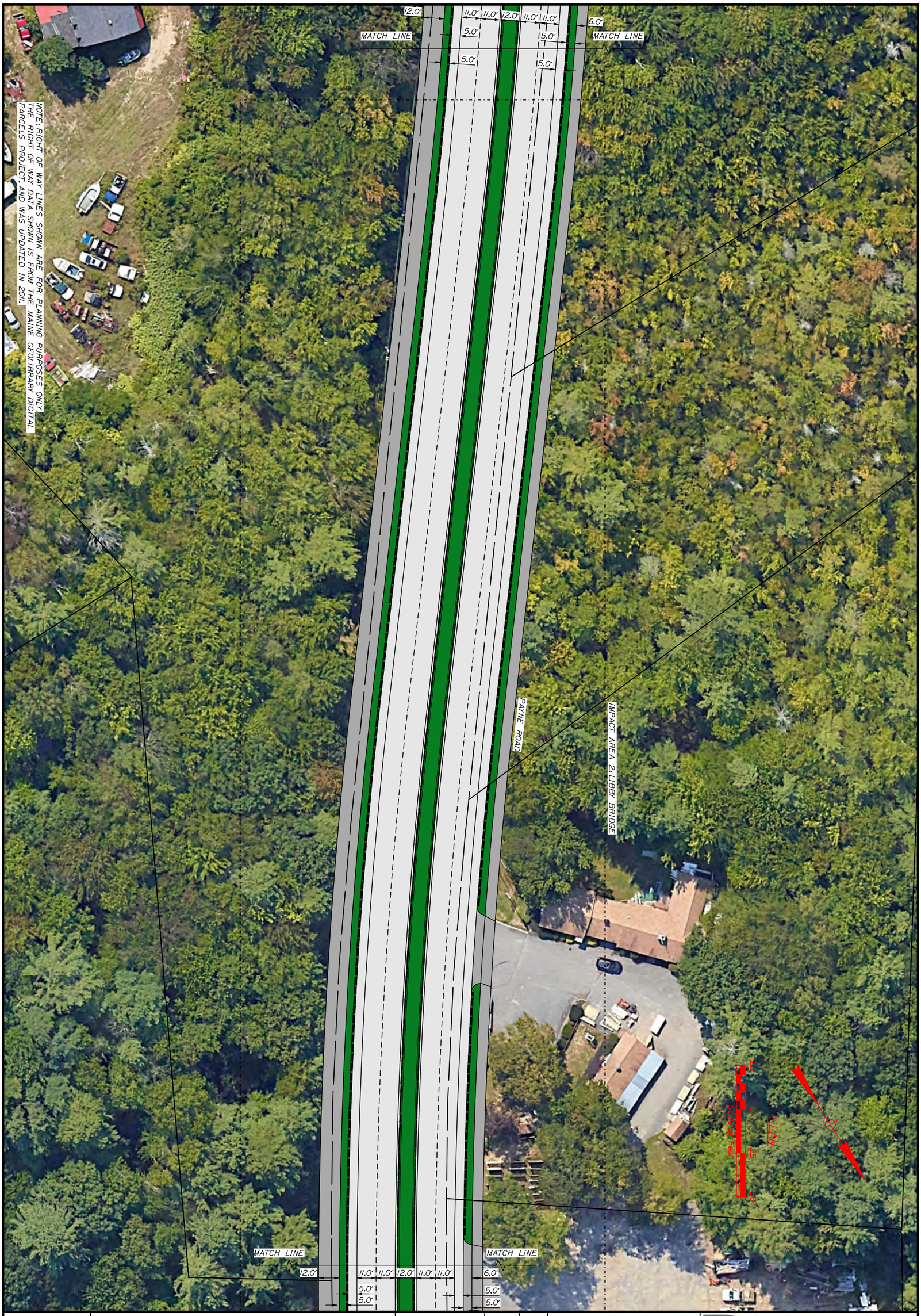

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TOWN OF SCARBOROUGH
TWTS - PAYNE ROAD

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TOWN OF SCARBOROUGH
TWTS - PAYNE ROAD

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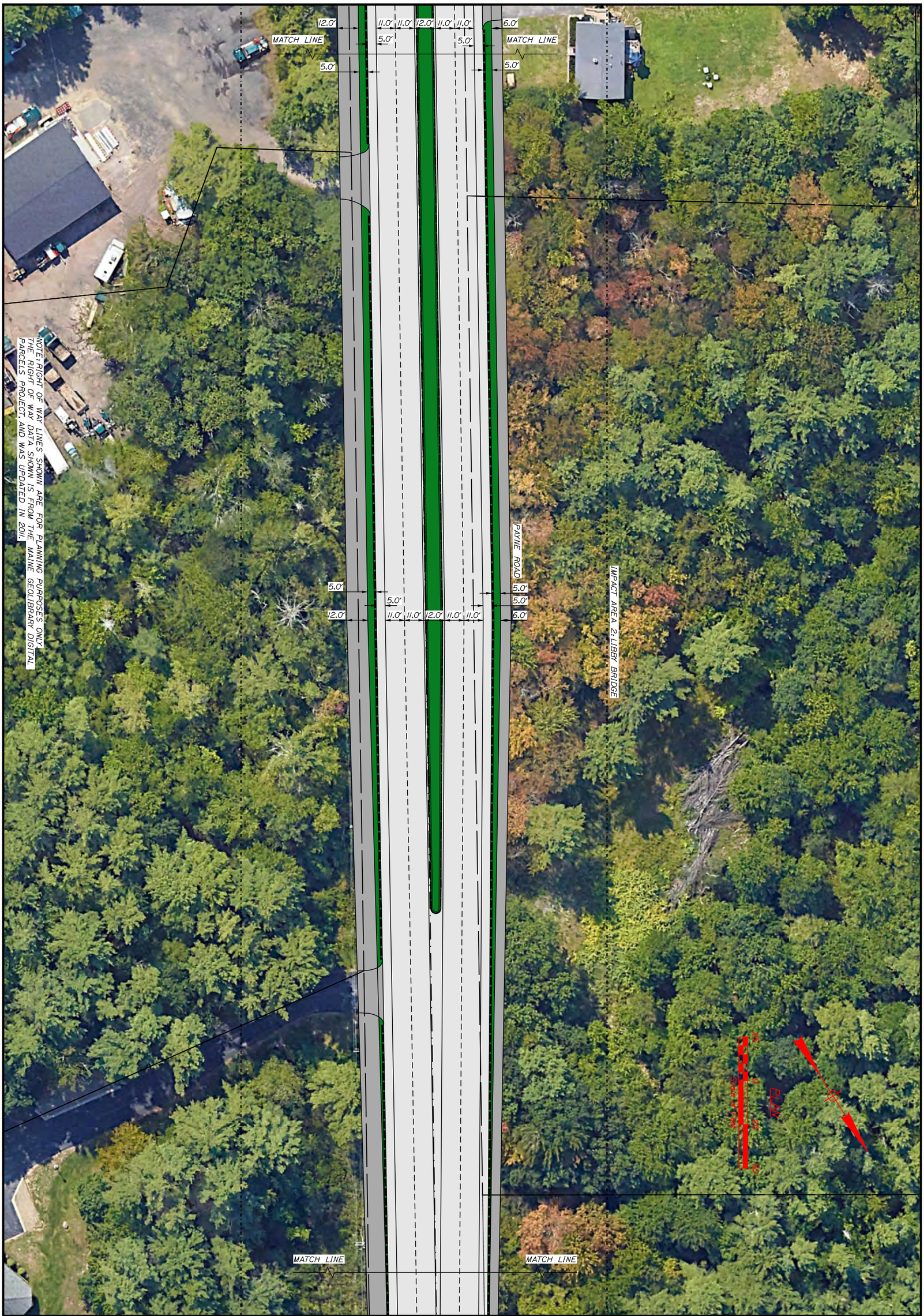
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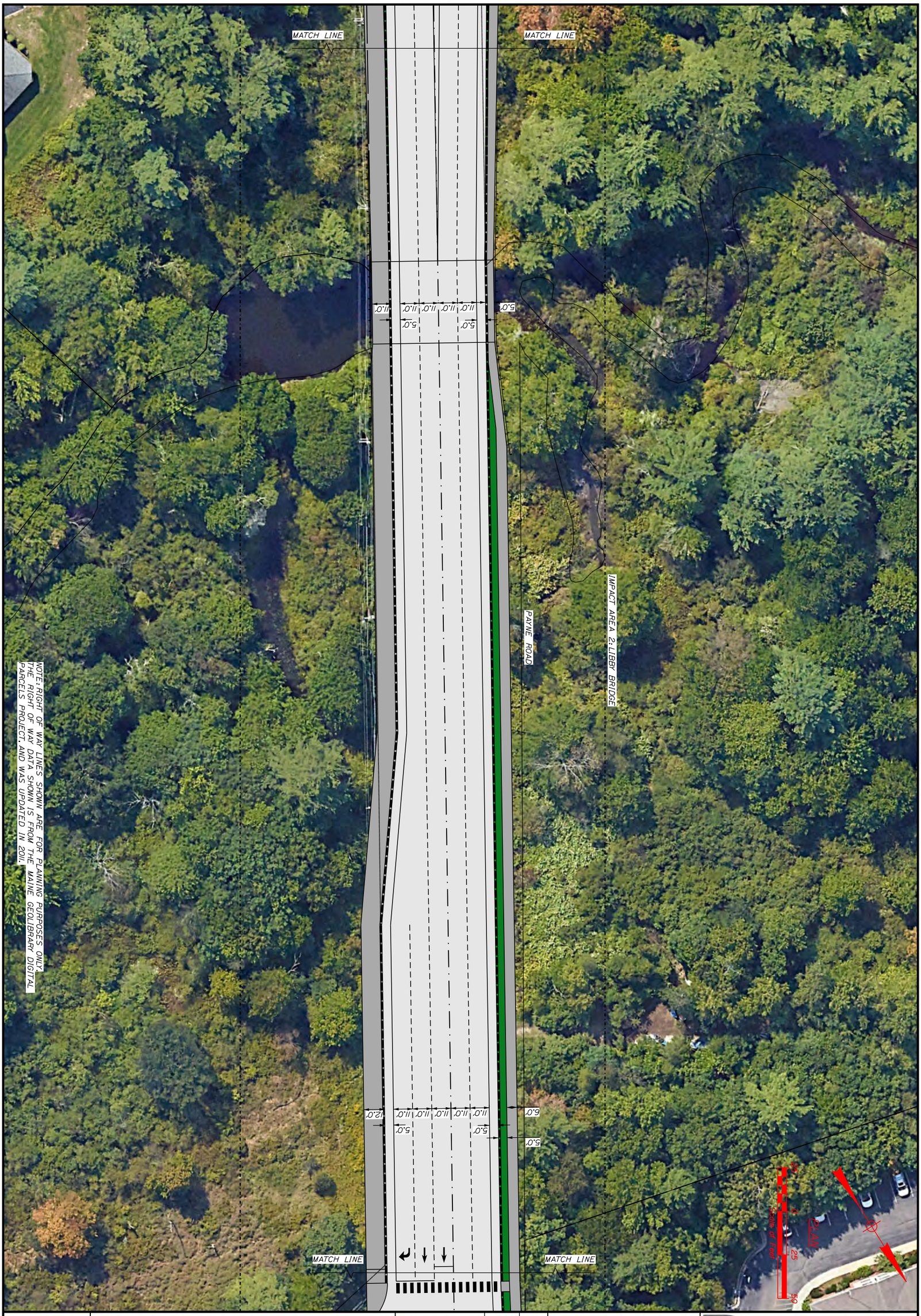

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TOWN OF SCARBOROUGH
TWTS - PAYNE ROAD

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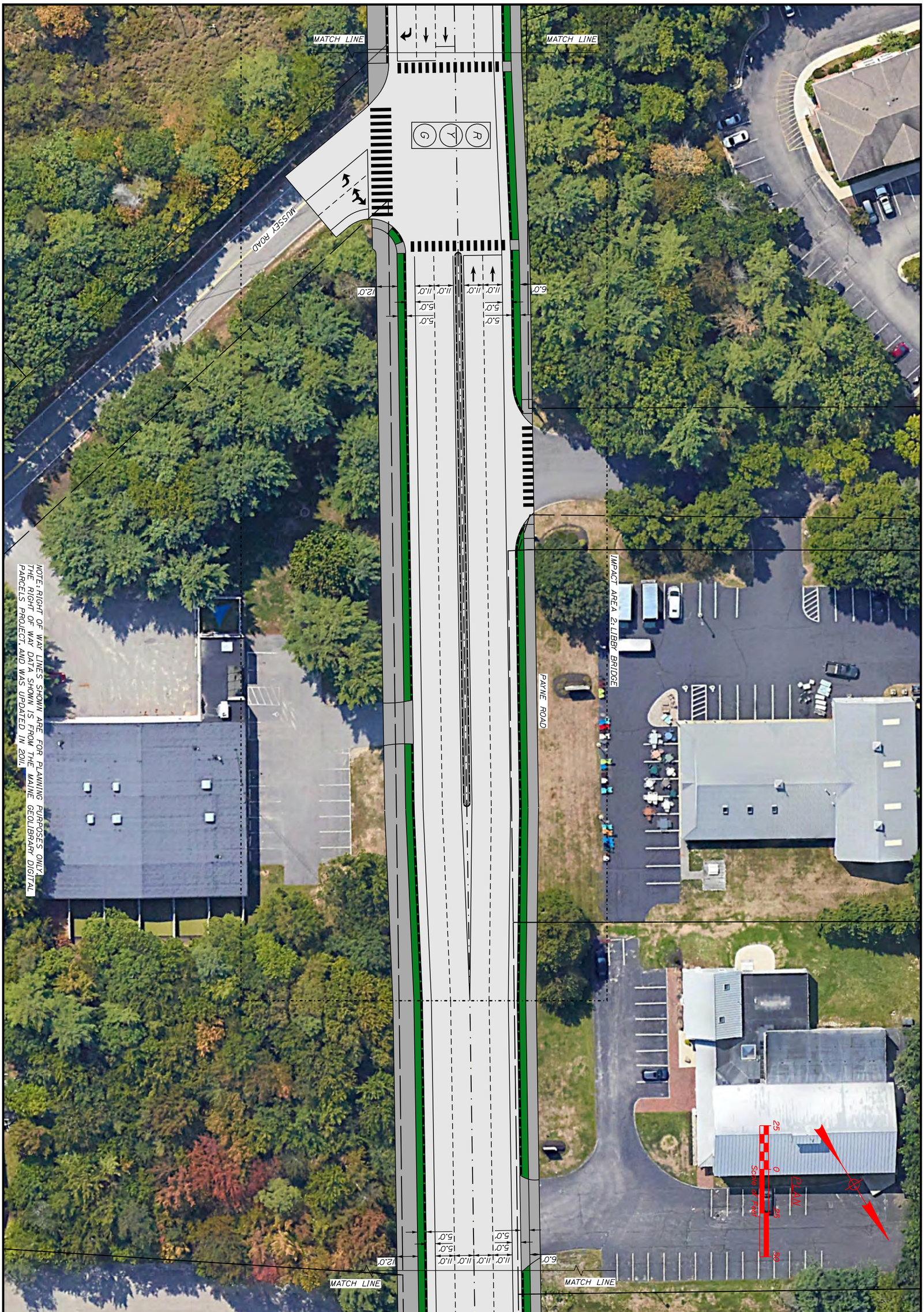

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TOWN OF SCARBOROUGH
TWTS - PAYNE ROAD

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TOWN OF SCARBOROUGH
TWTS - PAYNE ROAD

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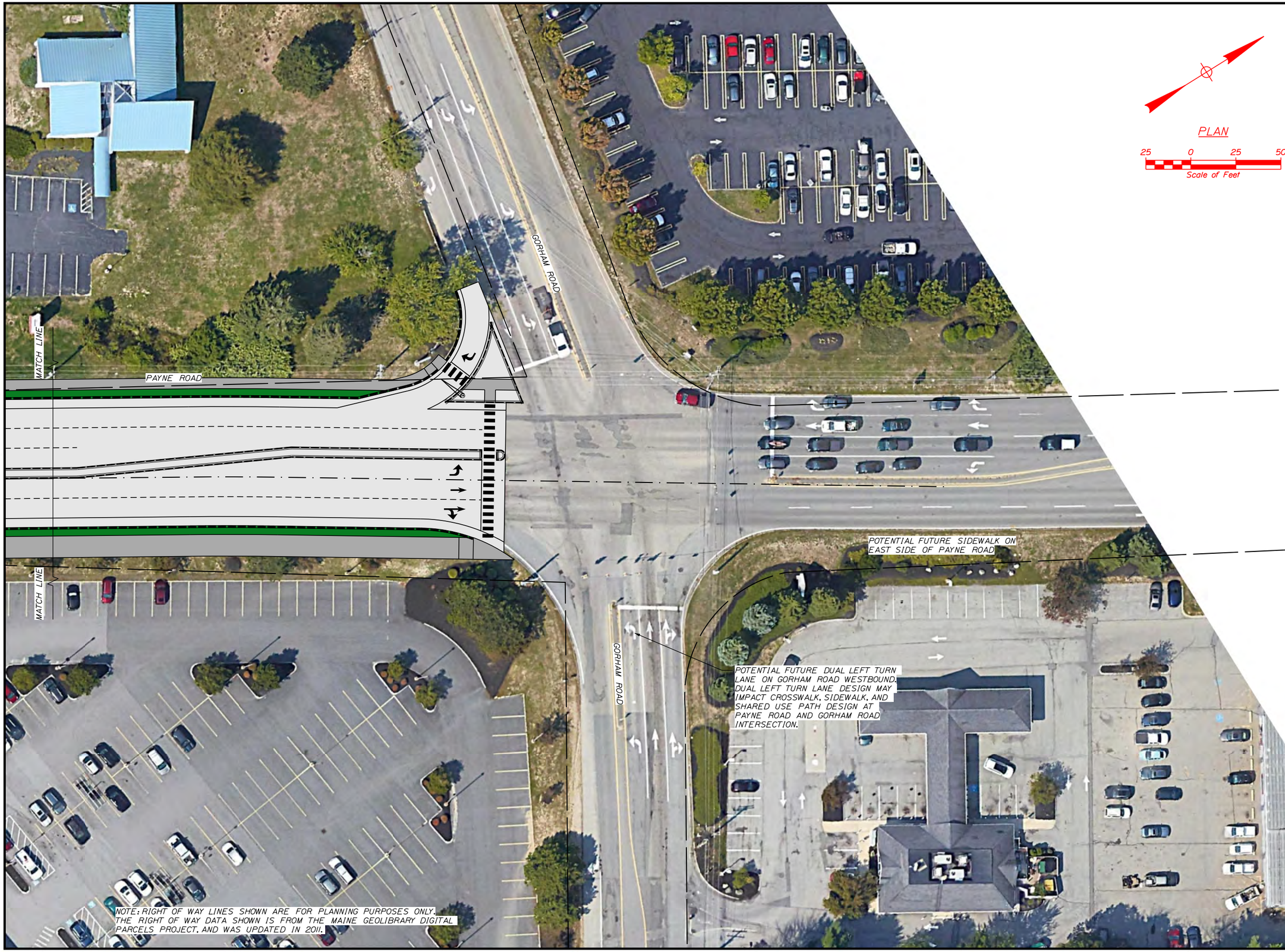

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TOWN OF SCARBOROUGH
TWTS - PAYNE ROAD

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TOWN OF SCARBOROUGH
TWTS - HAIGIS PARKWAY

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TOWN OF SCARBOROUGH
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TWTS - HAIGIS PARKWAY

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TOWN OF SCARBOROUGH
TWTS - HAIGIS PARKWAY

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TOWN OF SCARBOROUGH
TWTS - HAIGIS PARKWAY

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TOWN OF SCARBOROUGH
TWTS - HAIGIS PARKWAY

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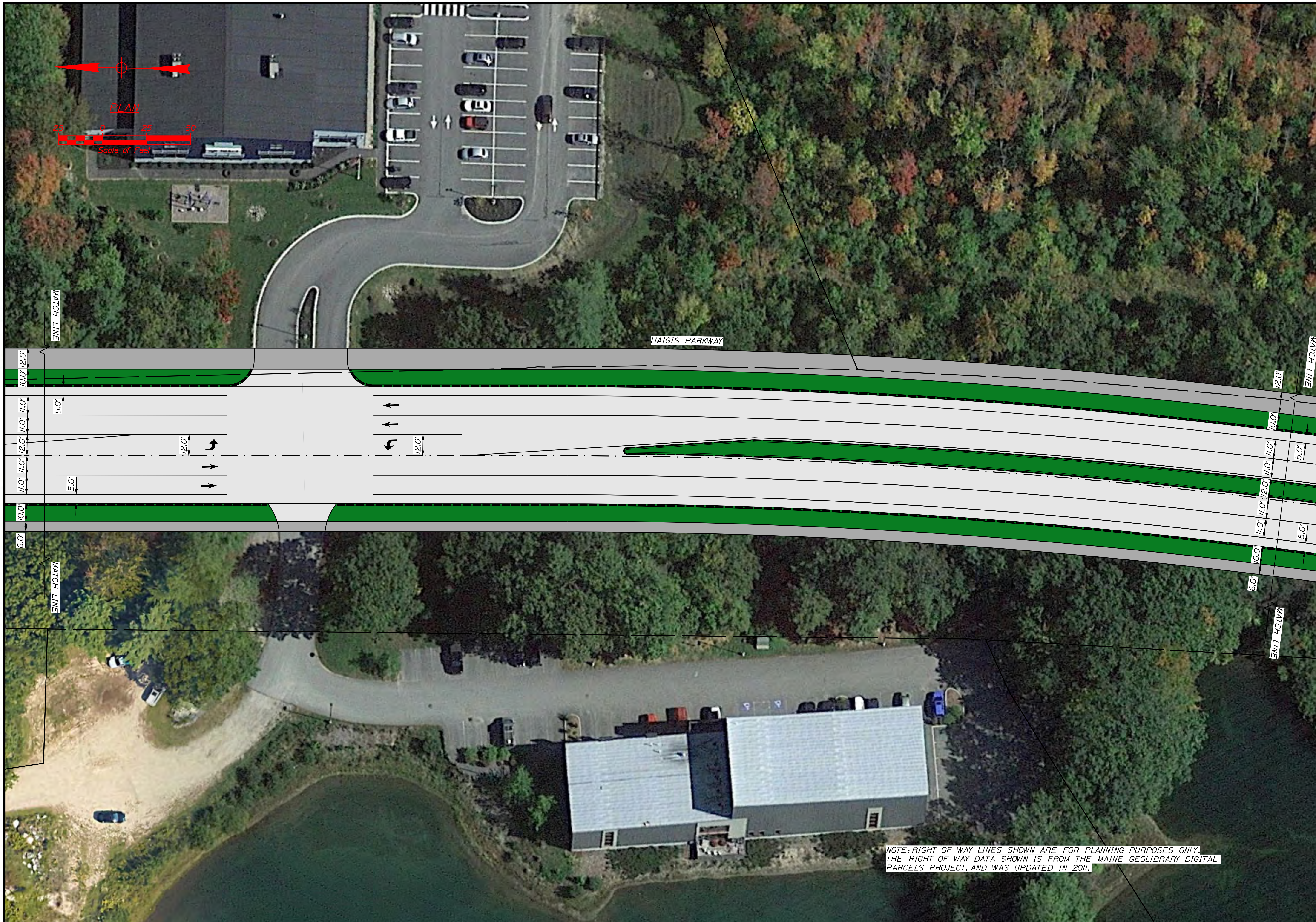

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TOWN OF SCARBOROUGH
TWTS - HAIGIS PARKWAY

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TOWN OF SCARBOROUGH
TWTS - HAIGIS PARKWAY

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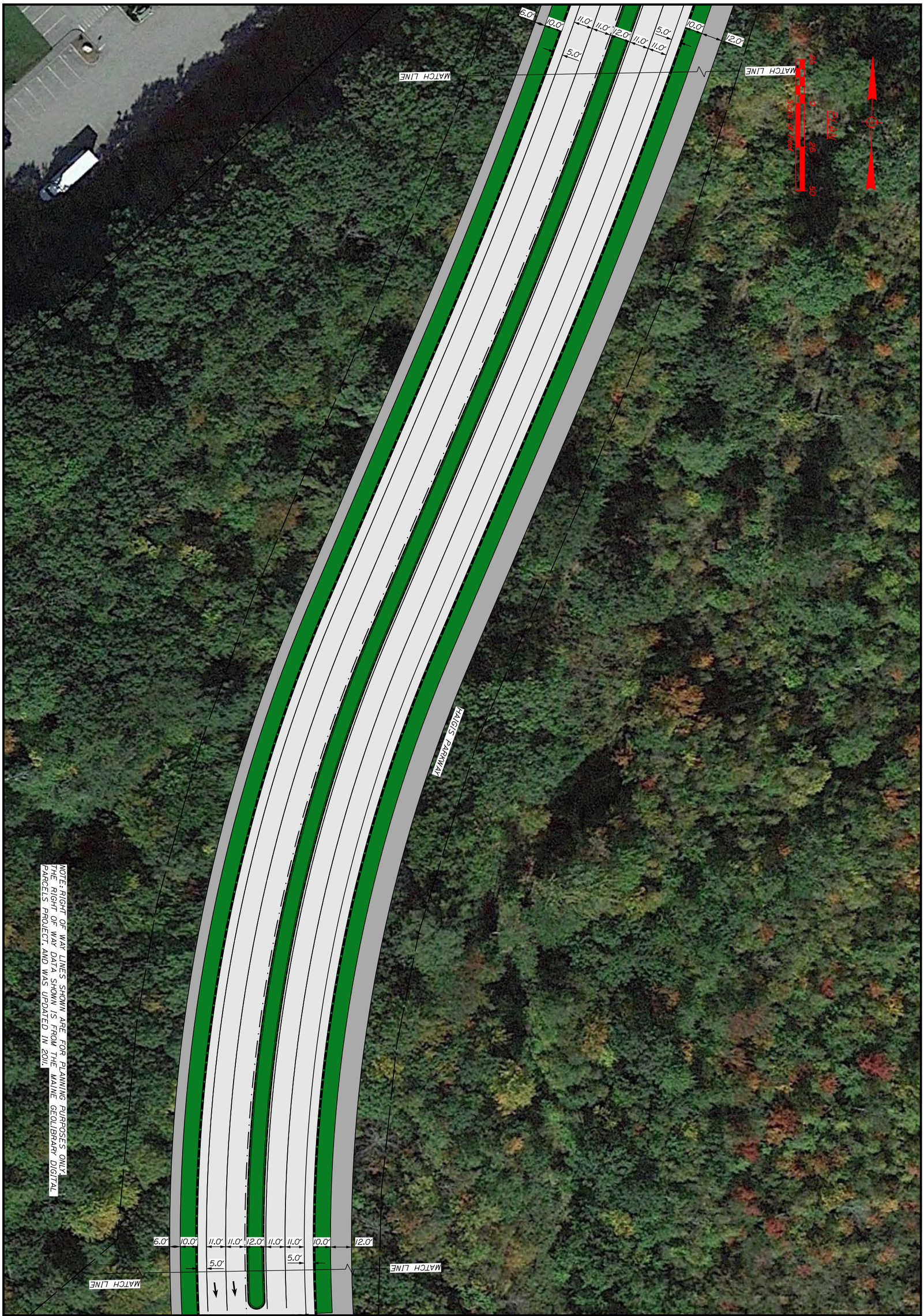

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TOWN OF SCARBOROUGH
TWTS - HAIGIS PARKWAY

CONCEPTUAL PLAN

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TOWN OF SCARBOROUGH
TWTS - HAIGIS PARKWAY

CONCEPTUAL PLAN

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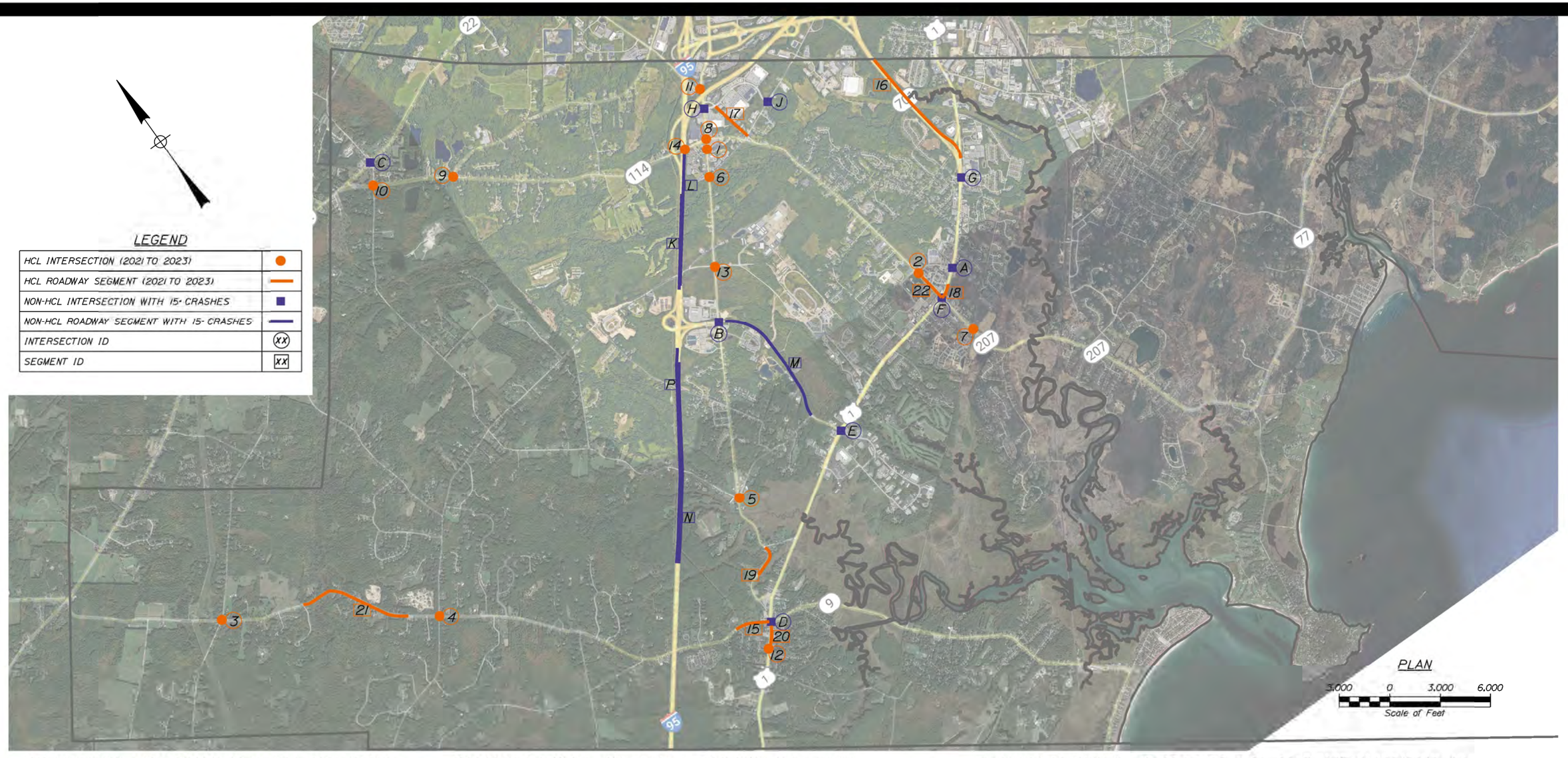
TOWN OF SCARBOROUGH
TWTS - HAIGIS PARKWAY

CONCEPTUAL PLAN

APPENDIX C
Maps of Scarborough



INTERSECTION HIGH CRASH LOCATIONS (2021-2023)

HCL ID NUMBER	INTERSECTION	TOTAL CRASHES
1.	PAYNE RD AT ROUNDWOOD DR	9
2.	GORHAM RD AT HANNAFORD DR	8
3.	BROADTURN RD AT BURNHAM RD	12
4.	BROADTURN RD AT HOLMES RD	12
5.	PAYNE RD @ BEECH RIDGE RD/ SCOTTOW HILL RD	9
6.	MUSSEY RD AT PAYNE RD	11
7.	BLACK POINT RD @ EASTERN RD	10
8.	GORHAM RD AT PAYNE RD	39
9.	GORHAM RD AT RUNNING HILL RD	10
10.	BEECH RIDGE RD/SACO ST AT GORHAM RD	34
11.	CUMMINGS RD AT PAYNE RD	41
12.	DUSTAN AVE/ORCHARD ST AT U.S. ROUTE 1	9
13.	PAYNE RD AT HOLMES RD/ SCARBOROUGH DOWNS RD	30
14.	I-295 AT I-95 NB	14

ROADWAY SEGMENT HIGH CRASH LOCATIONS (2021-2023)

HCL ID NUMBER	ROADWAY	FROM	TO	TOTAL CRASHES
15.	BROADTURN RD	MARTIN AVE	RTE 1/PINE POINT RD	9
16.	SCA CONN NB (RTE 701)	RTE 1	SO. PORTLAND CITY LINE	19
17.	SPRING ST	MUSSEY RD	GALLERY BLVD	10
18.	RTE 1	OAK HILL	PLAZA DR	8
19.	PAYNE RD	MILLIKEN RD	BROKEN RD	10
20.	RTE 1	DUSTAN AVE/ ORCHARD ST	BROADTURN RD/PINE POINT RD	27
21.	BROADTURN RD	JOSS HILL DR	BOND BROOK DR	9
18.	GORAHM RD	OAK HILL	HANNAFORD DR	14

INTERSECTIONS - 15+ CRASHES (2021-2023) (NOT CLASSIFIED AS HCL)

HCL ID NUMBER	INTERSECTION	TOTAL CRASHES
A.	U.S. ROUTE 1 AT HANNAFORD DR	15
B.	PAYNE RD AT EXIT 42/HAIGIS PKWY	17
C.	COUNTY RD AT SACO ST/BEECH RIDGE RD	20
D.	U.S. ROUTE 1 AT BROADTURN RD/PINE POINT RD	26
E.	U.S. ROUTE 1 AT HAIGIS PKWY/LINCOLN AVE	29
F.	OAK HILL (US 1 AT BLACK POINT RD/GORHAM RD)	36
G.	U.S. ROUTE 1 AT GREENACRE LN/HILLCREST AVE	33
H.	PAYNE RD AT GALLERY BLVD	15
J.	MUSSEY RD AT GALLERY BLVD	15

ROADWAY SEGMENTS - 15+ CRASHES (2021-2023) (NOT CLASSIFIED AS HCL)

HCL ID NUMBER	ROADWAY	FROM	TO	TOTAL CRASHES
K.	I-95 SB	I-295 SB ON	EXIT 42 SB OFF	26
L.	I-95 NB	EXIT 42 NB ON	GORHAM RD OVERPASS	30
M.	HAIGIS PKWY	SCOTTOW HILL RD	MEDIAN WEST OF PAYNE RD 15	
N.	I-95 NB	CROSS-OVER NORTH OF DUNSTAN RIVER	EXIT 42 NB OFF	45
P.	I-95 SB	EXIT 42 SB ON	CROSS-OVER NORTH OF DUNSTAN RIVER	52

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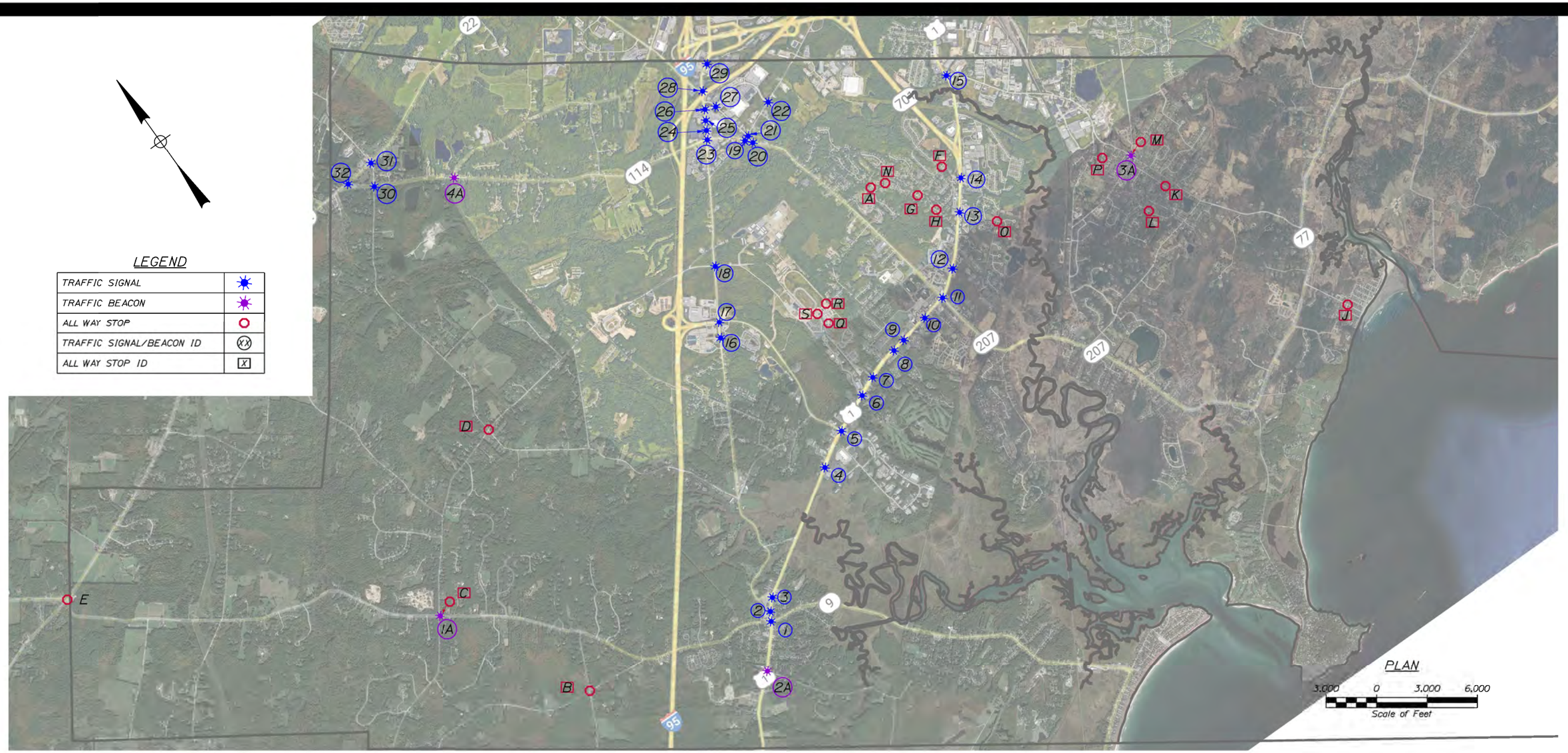
MAINEDOT HCL'S AND NON-HCL'S WITH 15+ CRASHES



TRAFFIC SIGNALS

TRAFFIC SIGNAL ID	INTERSECTION
1	ROUTE 1 @ BROADTURN RD/PINE POINT RD
2	ROUTE 1 @ HARLOW ST
3	ROUTE 1 @ PAYNE RD
4	ROUTE 1 @ SOUTHGATE RD
5	ROUTE 1 @ HAIGIS PKWY/LINCOLN AVE
6	ROUTE 1 @ ENTERPRISE RD/WILLOWDALE RD
7	ROUTE 1 @ SCARBOROUGH DOWNS RD
8	ROUTE 1 @ COMMERCE DR
9	ROUTE 1 @ SAWYER RD/BESSEY SCHOOL DR
10	ROUTE 1 @ MUNICIPAL DR/WARD ST
11	OAK HILL - ROUTE 1 @ GORHAM RD/BLACKPOINT RD
12	ROUTE 1 @ HANNAFORD DR
13	ROUTE 1 @ PORTLAND FARMS RD
14	ROUTE 1 @ GREENACRE LN/HILLCREST AVE
15	ROUTE 1 @ PLEASANT HILL RD
16	PAYNE RD @ CABELA BLVD/GATEWAY BLVD
17	PAYNE RD @ HAIGIS PKWY/I-95 EXIT 42
18	PAYNE RD @ HOLMES RD/SCARBOROUGH DOWNS RD
19	MUSSEY RD @ GORHAM RD
20	GORHAM RD @ SPRING ST
21	MUSSEY RD @ SPRING ST
22	MUSSEY RD @ GALLERY BLVD

TRAFFIC SIGNALS

TRAFFIC SIGNAL ID	INTERSECTION
23	PAYNE RD @ GORHAM RD
24	PAYNE RD @ SAMS CLUB/VIP
25	PAYNE RD @ MARDENS/PAYNE PLAZA
26	PAYNE RD @ PAYNE PLAZA/GALLERY BLVD
27	SPRING ST @ GALLERY BLVD
28	PAYNE RD @ CUMMINGS RD
29	PAYNE RD @ SOUTHBOROUGH DR/ CHRISTMAS TREE SHOP
30	GORHAM RD @ BEECH RIDGE RD/SACO ST
31	COUNTY RD @ SACO ST
32	COUNTY RD @ GORHAM RD

TRAFFIC BEACONS

TRAFFIC BEACON ID	INTERSECTION
1A	BROADTURN RD @ HOLMES RD
2A	ROUTE 1 @ OLD BLUE POINT RD
3A	HIGHLAND AVE @ PLEASANT HILL RD
4A	GORHAM RD @ RUNNING HILL RD

ALL WAY STOPS

ALL WAY STOP ID	INTERSECTION
A	MAPLE AVE @ ABIGAIL WAY
B	ASH SWAMP RD @ HEARN RD
C	BROADTURN RD @ HOLMES RD
D	BEECH RIDGE RD @ HOLMES RD
E	BROADTURN RD/COUNTY RED @ PORTLAND RD/LONG PLAINS RD
F	ELM WOOD AVE @ GREEN ACRES LN
G	MAPLE AVE @ ELMWOOD AVE
H	MAPLE AVE @ FIRST SR
J	GREENWOOD AVE @ OCEAN AVE
K	NUTTER WAY @ GUNSTOCK RD
L	GUNSTOCK RD @ POWDER DR
M	HIGHLAND AVE @ PLEASANT HILL RD
N	MAPLE AVE @ HUNNEWELL RD
O	PORTLAND FARMS RD @ EASTERN RD
P	RAMSAY TER @ ROBINSON RD
Q	PACER WAY @ PACER WAY
R	PACER WAY @ HACKAMORE AVE
S	HACKAMORE AVE @ FRONTRUNNER WAY

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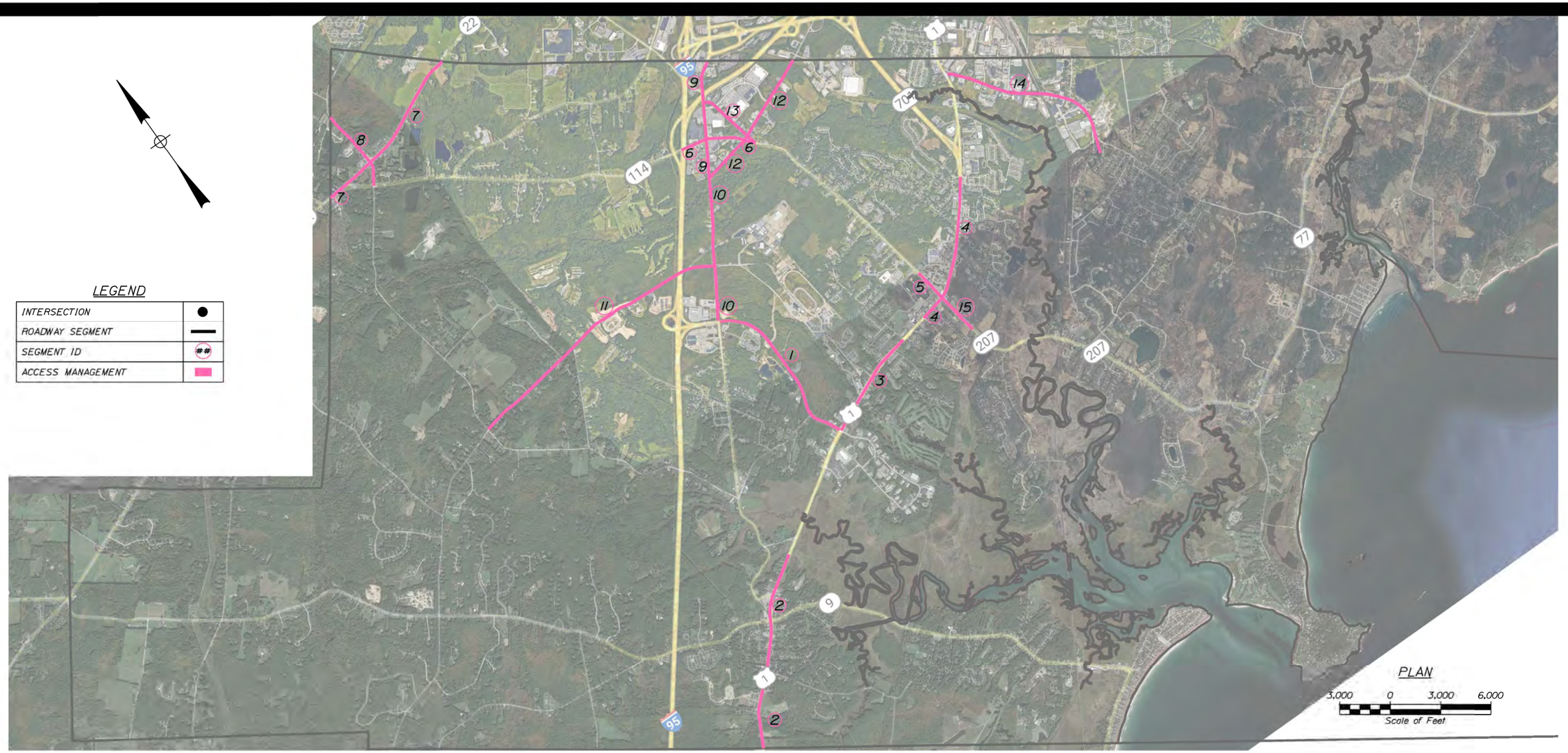
INTERSECTION TRAFFIC CONTROL ALL WAY STOPS, SIGNALS AND BEACONS



SEGMENT ID	ROADWAY	FROM	TO
1	HAIGIS PKWY	PAYNE RD	ROUTE 1
2	ROUTE 1	SACO CITY LINE	SCARBOROUGH MARSH
3	ROUTE 1	SOUTHGATE RD	SAWYER RD
4	ROUTE 1	MUNICIPAL CAMPUS	HILLCREST AVE
5	GORHAM RD	OAK HILL	HANNAFORD DRIVE
6	GORHAM RD	SPRING ST	I-95 OVERPASS
7	COUNTY RD	SMILING HILL FARM	GORHAM TOWN LINE
8	SACO ST	GORHAM RD	GORHAM TOWN LINE
9	PAYNE RD	SO. PORTLAND CITY LINE	MUSSEY RD
10	PAYNE RD	MUSSEY RD	I-95 EXIT 42
11	HOLMES RD	PAYNE RD	BEECH RIDGE RD
12	MUSSEY RD	PAYNE RD	SO. PORTLAND CITY LINE
13	SPRING ST	GORHAM RD	PAYNE RD
14	PLEASANT HILL RD	ROUTE 1	CHAMBERLAIN RD
15	BLACK POINT RD	EASTERN TRAIL	OAK HILL

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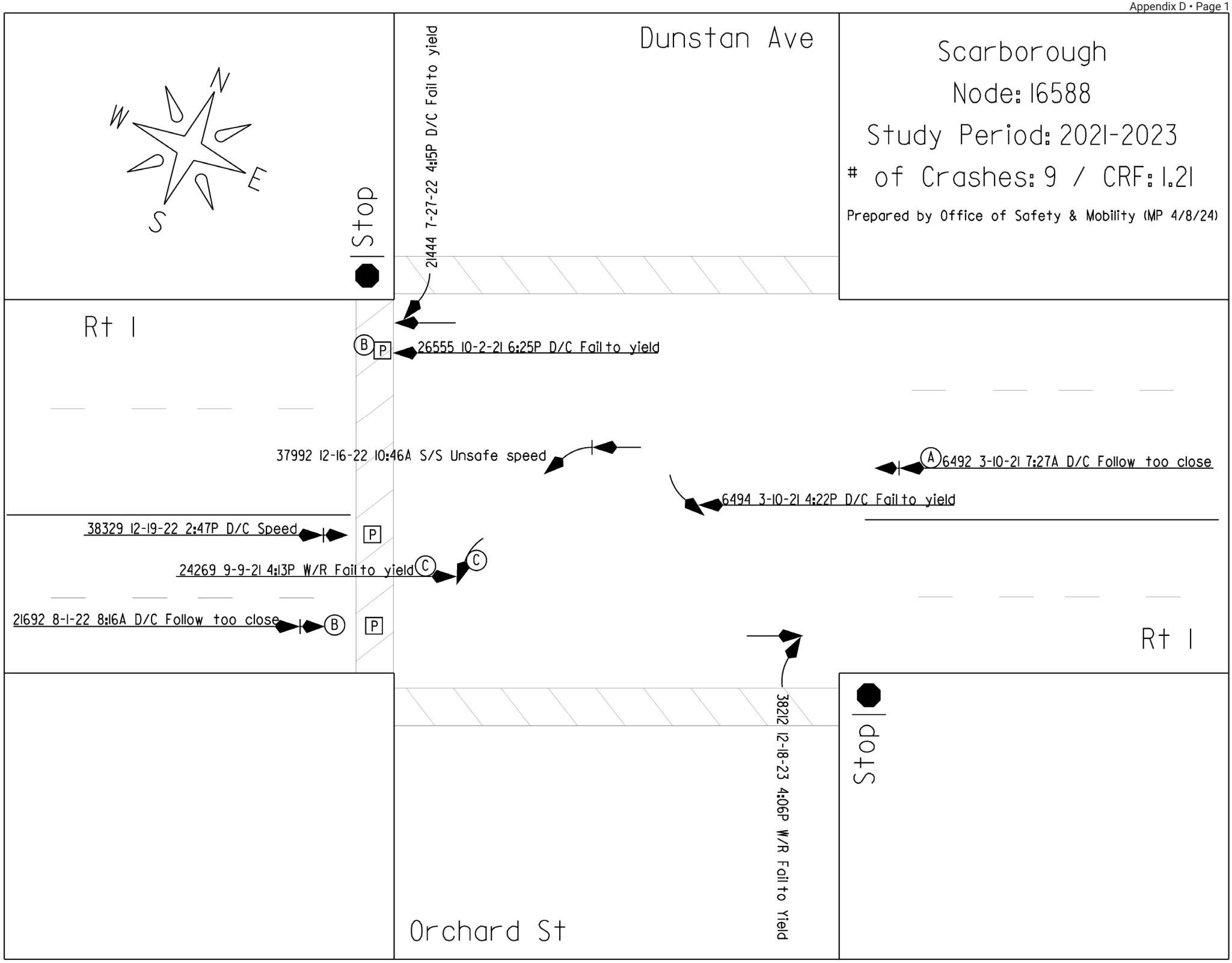
ACCESS MANAGEMENT AREAS

APPENDIX D
Crash Diagrams


Dunstan Ave
Scarborough
Node: 16588
Study Period: 2021-2023
# of Crashes: 9 / CRF: 1.21
Prepared by Office of Safety & Mobility (MP 4/8/24)
N
W
E
S
Stop
21444 7-27-22 4:15P D/C Fail to yield
Rt 1
B
P
26555 10-2-21 6:25P D/C Fail to yield
37992 12-16-22 10:46A S/S Unsafe speed
A
6492 3-10-21 7:27A D/C Follow too close
6494 3-10-21 4:22P D/C Fail to yield
38329 12-19-22 2:47P D/C Speed
24269 9-9-21 4:13P W/R Fail to yield
C
21692 8-1-22 8:16A D/C Follow too close
Rt 1
38212 12-18-23 4:06P W/R Fail to Yield
Stop
Orchard St

Prepared by Office of Safety & Mobility
(MP 4/8/24)

Scarborough

Link: 16588-69040

Element: 3505516

Study Period: 2021-2023

# of Crashes: 27 / CRF: 1.58

16588

6 Fire Sta.

Blast from the Past Diner

69040

Puffin Stop

sign

Rte. 1

36826 11-30-22 5:22P W/R Improper pass

22360 8-21-21 7:29P D/C Improper turn

4695 2-10-21 7:41A D/C Driver inattention (C)

14675 5-19-23 6:55P D/C Fail to Keep in Lane

18223 6-26-23 11:45A D/CL Fail to Yield

26661 10-1-21 2:19P D/C Follow Close

22732 8-3-22 4:23P D/C Avoiding vehicle

(A) M/C

28760 10-7-22 7:36P D/C Improper Turn (C)

(B) 13558 5-8-23 4:16P D/C Follow Too Close

9565 3-24-22 5:22P D/C Fail To Yield

10865 5-3-21 3:26P D/C Fail To Yield (C)

16837 6-15-23 5:06P D/C Fail to Yield

17663 6-22-22 11:57A D/CL Fail To Yield

11250 4-15-22 3:13P D/C Fail To Yield

12815 5-5-22 3:00P D/C Fail to keep in lane (C)(C)

13665 5-15-22 1:47P D/C Fail to yield

25528 9-1-23 3:13P D/C Fail to Yield (B)(B)(C)

7768 3-4-22 4:04P D/C Fail To Yield

13660 5-16-22 12:22P D/C Fail to yield

9320 3-23-22 7:32A D/C Improper pass

26402 9-16-22 5:27P D/C Fail to yield

29313 10-12-22 11:14A D/C Fail To Yield

20645 7-11-23 8:30A D/C Improper Turn

30461 10-20-22 1:07A D/C Unknown

15499 6-22-21 12:38P D/CL Fail To Yield

4703 2-12-21 12:49P D/C Fail to Yield

31188 10-27-23 11:43A D/C Improper Turn

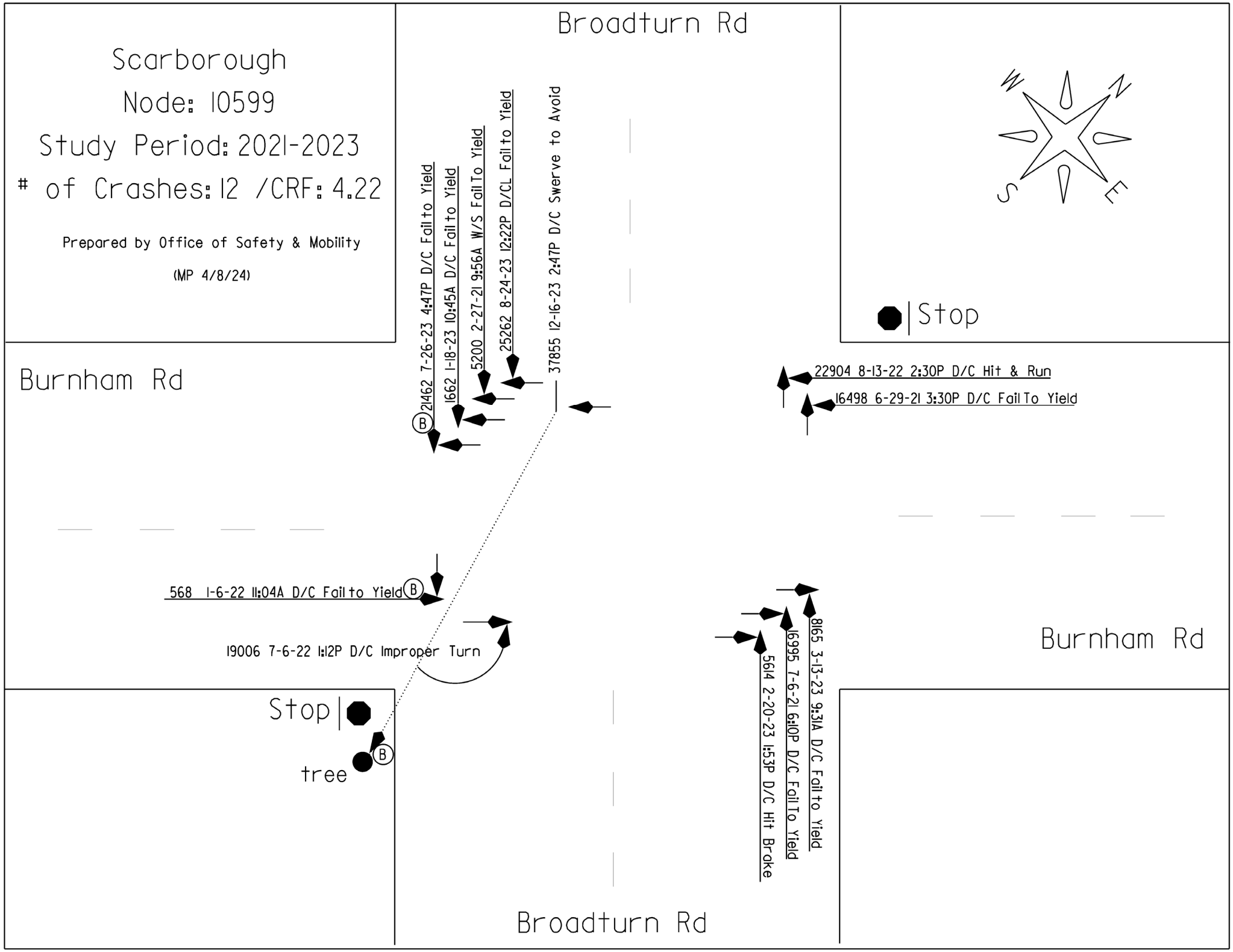
sign post

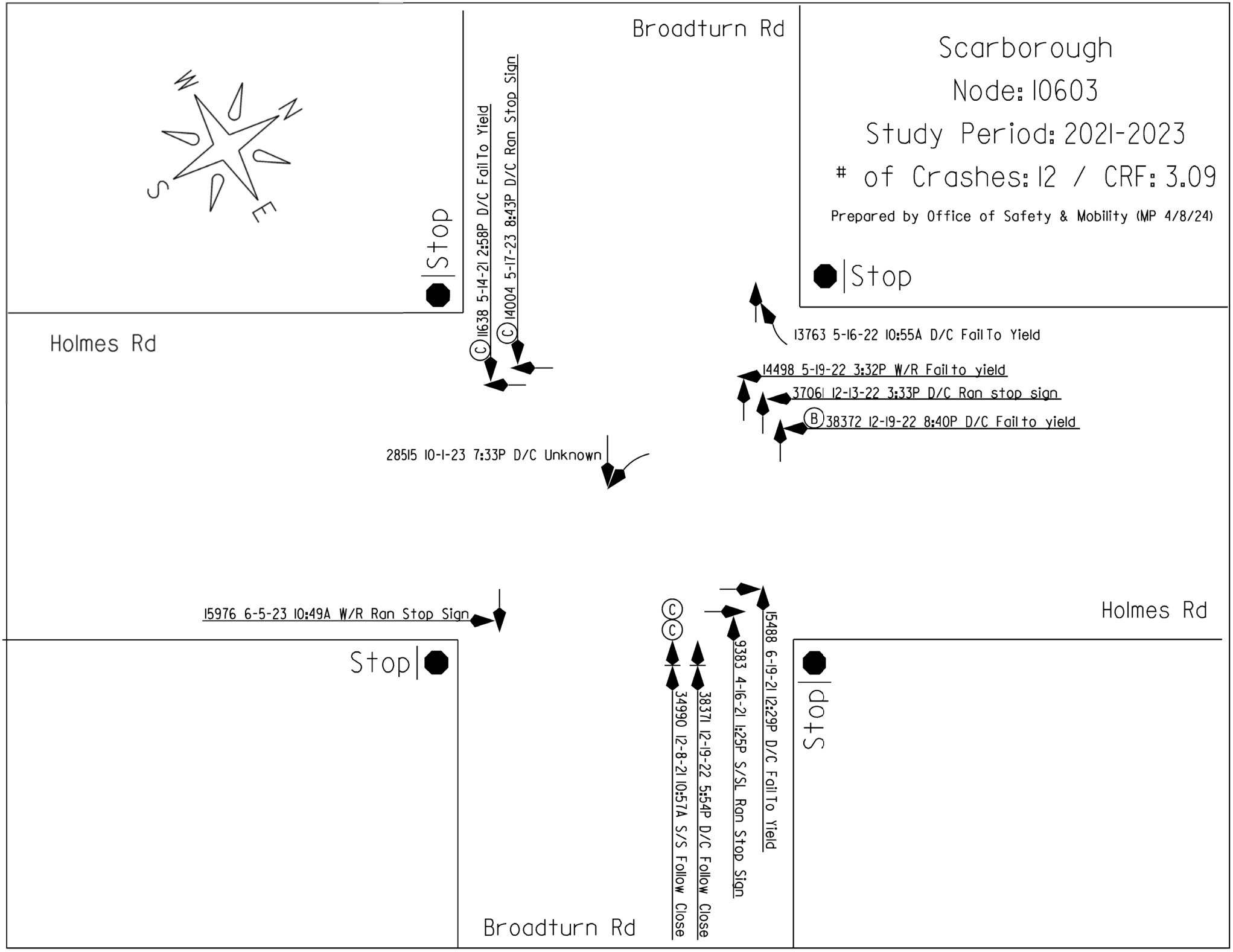
Ace Hardware

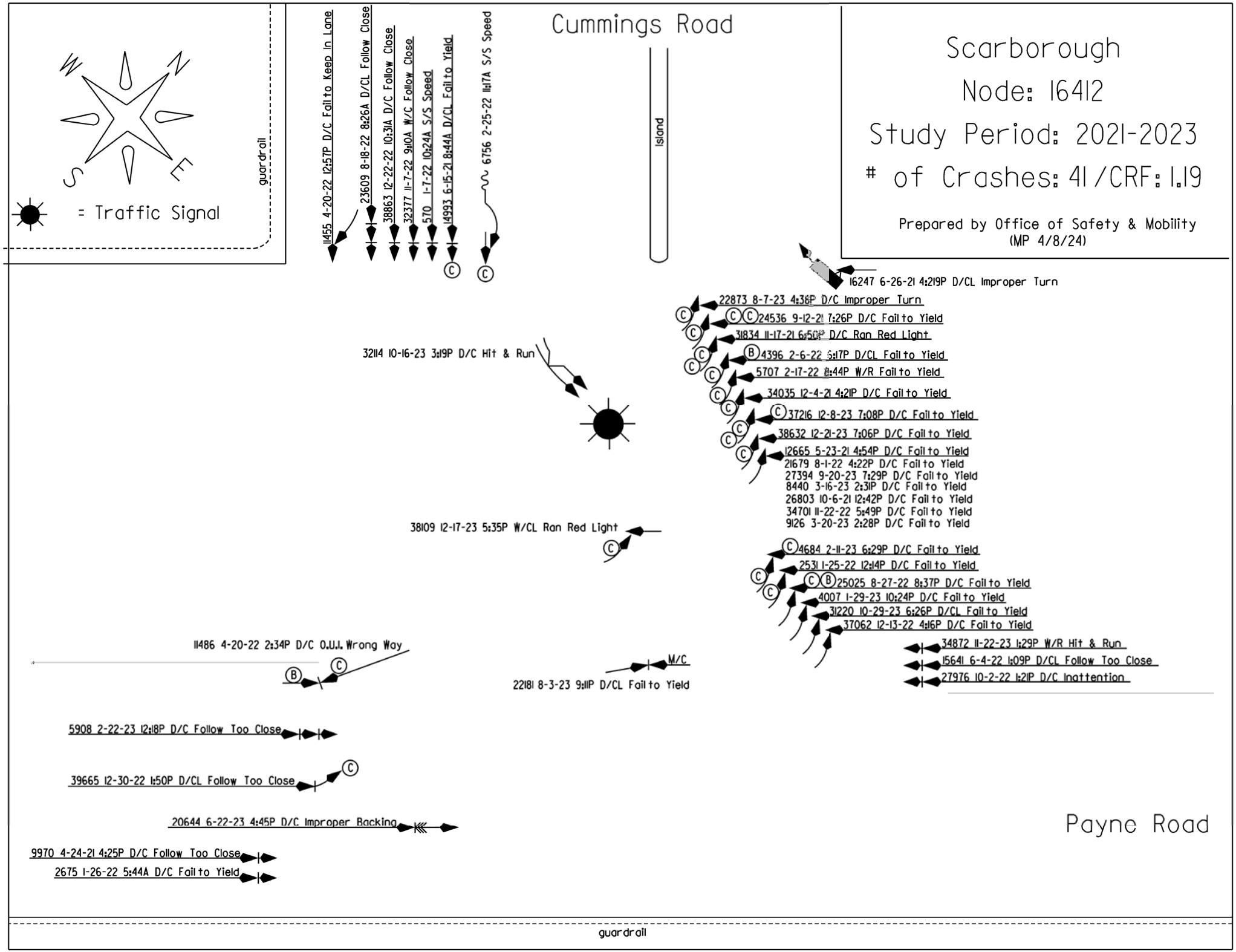
Sun Catchers

Griffin Rd.

Dunstan Plaza


Scarborough
Node: 10599
Study Period: 2021-2023
# of Crashes: 12 /CRF: 4.22
Prepared by Office of Safety & Mobility
(MP 4/8/24)
Broadturn Rd
Burnham Rd
Stop
21462 7-26-23 4:47P D/C Fail to Yield
1662 1-18-23 10:45A D/C Fail to Yield
5200 2-27-21 9:56A W/S Fail To Yield
25262 8-24-23 12:22P D/CL Fail to Yield
37855 12-16-23 2:47P D/C Swerve to Avoid
B
22904 8-13-22 2:30P D/C Hit & Run
16498 6-29-21 3:30P D/C Fail To Yield
568 1-6-22 11:04A D/C Fail to Yield
B
19006 7-6-22 1:12P D/C Improper Turn
Stop
B
tree
8165 3-13-23 9:31A D/C Fail to Yield
16995 7-6-21 6:10P D/C Fail To Yield
5614 2-20-23 1:53P D/C Hit Brake
Burnham Rd
Broadturn Rd
N
E
S
W


Broadturn Rd
Scarborough
Node: 10603
Study Period: 2021-2023
# of Crashes: 12 / CRF: 3.09
Prepared by Office of Safety & Mobility (MP 4/8/24)
Stop
Stop
Holmes Rd
C 11638 5-14-21 2:58P D/C Fail To Yield
C 14004 5-17-23 8:43P D/C Ran Stop Sign
13763 5-16-22 10:55A D/C Fail To Yield
14498 5-19-22 3:32P W/R Fail to yield
37061 12-13-22 3:33P D/C Ran stop sign
B 38372 12-19-22 8:40P D/C Fail to yield
28515 10-1-23 7:33P D/C Unknown
15976 6-5-23 10:49A W/R Ran Stop Sign
Stop
Stop
Holmes Rd
C
C
34990 12-8-21 10:57A S/S Follow Close
38371 12-19-22 5:54P D/C Follow Close
9383 4-16-21 1:25P S/SL Ran Stop Sign
15488 6-19-21 12:29P D/C Fail To Yield
Broadturn Rd


Cummings Road
Scarborough
Node: 16412
Study Period: 2021-2023
# of Crashes: 41 / CRF: 1.19
Prepared by Office of Safety & Mobility
(MP 4/8/24)
N
E
S
W
= Traffic Signal
guardrail
11455 4-20-22 12:57P D/C Fail to Keep in Lane
23609 8-18-22 8:26A D/CL Follow Close
38863 12-22-22 10:31A D/C Follow Close
32377 11-7-22 9:10A W/C Follow Close
570 1-7-22 10:24A S/S Speed
14993 6-15-21 8:44A D/CL Fail to Yield
6756 2-25-22 11:17A S/S Speed
Island
16247 6-26-21 4:21 9P D/CL Improper Turn
22873 8-7-23 4:36P D/C Improper Turn
24536 9-12-21 7:26P D/C Fail to Yield
31834 11-17-21 6:50P D/C Ran Red Light
4396 2-6-22 5:17P D/CL Fail to Yield
5707 2-17-22 8:44P W/R Fail to Yield
34035 12-4-21 4:21P D/C Fail to Yield
37216 12-8-23 7:08P D/C Fail to Yield
38632 12-21-23 7:06P D/C Fail to Yield
12665 5-23-21 4:54P D/C Fail to Yield
21679 8-1-22 4:22P D/C Fail to Yield
27394 9-20-23 7:29P D/C Fail to Yield
8440 3-16-23 2:31P D/C Fail to Yield
26803 10-6-21 12:42P D/C Fail to Yield
34701 11-22-22 5:49P D/C Fail to Yield
9126 3-20-23 2:28P D/C Fail to Yield
32114 10-16-23 3:19P D/C Hit & Run
38109 12-17-23 5:35P W/CL Ran Red Light
4684 2-11-23 6:29P D/C Fail to Yield
25311 1-25-22 12:14P D/C Fail to Yield
25025 8-27-22 8:37P D/C Fail to Yield
4007 1-29-23 10:24P D/C Fail to Yield
31220 10-29-23 6:26P D/CL Fail to Yield
37062 12-13-22 4:16P D/C Fail to Yield
34872 11-22-23 1:29P W/R Hit & Run
15641 6-4-22 1:09P D/CL Follow Too Close
27976 10-2-22 1:21P D/C Inattention
11486 4-20-22 2:34P D/C O.U.I. Wrong Way
M/C
22181 8-3-23 9:11P D/CL Fail to Yield
5908 2-22-23 12:18P D/C Follow Too Close
39665 12-30-22 1:50P D/CL Follow Too Close
20644 6-22-23 4:45P D/C Improper Backing
9970 4-24-21 4:25P D/C Follow Too Close
2675 1-26-22 5:44A D/C Fail to Yield
Payne Road
guardrail

Appendix E
Bicycle and Pedestrian Tables and Graphics

Appendix E • Bicycle and Pedestrian Tables and Graphics

TABLE 2.1
CONTEXTUAL GUIDANCE FOR SELECTING ALL AGES & ABILITIES BIKEWAYS
Source: NACTO Urban Bikeway Design Guide

Roadway Context				All Ages & Abilities Bicycle Facility
Target Motor Vehicle Speed[*]	*Target Motor Vehicle Volume (ADT)*	*Motor Vehicle Lanes*	*Key Operational Considerations*	
Any		*Any*	*Any of the following:* high curbside activity, frequent buses, motor vehicle congestion, or turning conflicts[‡]	**Protected Bicycle Lane**
< 10 mph	Less relevant	No centerline, or single lane one-way	Pedestrians share the roadway	**Shared Street**
≤ 20 mph	≤ 1,000 – 2,000		< 50 motor vehicles per hour in the peak direction at peak hour	**Bicycle Boulevard**
≤ 25 mph	≤ 500 – 1,500			
	≤ 1,500 – 3,000	Single lane each direction, or single lane one-way	Low curbside activity, or low congestion pressure	**Conventional or Buffered Bicycle Lane, or Protected Bicycle Lane**
	≤ 3,000 – 6,000			**Buffered or Protected Bicycle Lane**
	Greater than 6,000			**Protected Bicycle Lane**
	Any	Multiple lanes per direction		
Greater than 26 mph[†]	≤ 6,000	Single lane each direction	Low curbside activity, or low congestion pressure	**Protected Bicycle Lane, or Reduce Speed**
		Multiple lanes per direction		**Protected Bicycle Lane, or Reduce to Single Lane & Reduce Speed**
	Greater than 6,000	*Any*	*Any*	**Protected Bicycle Lane**
High-speed limited access roadways, natural corridors, or geographic edge conditions with limited conflicts		*Any*	High pedestrian volume	**Bike Path with Separate Walkway or Protected Bicycle Lane**
			Low pedestrian volume	**Shared-Use Path or Protected Bicycle Lane**

Appendix E • Bicycle and Pedestrian Tables and Graphics

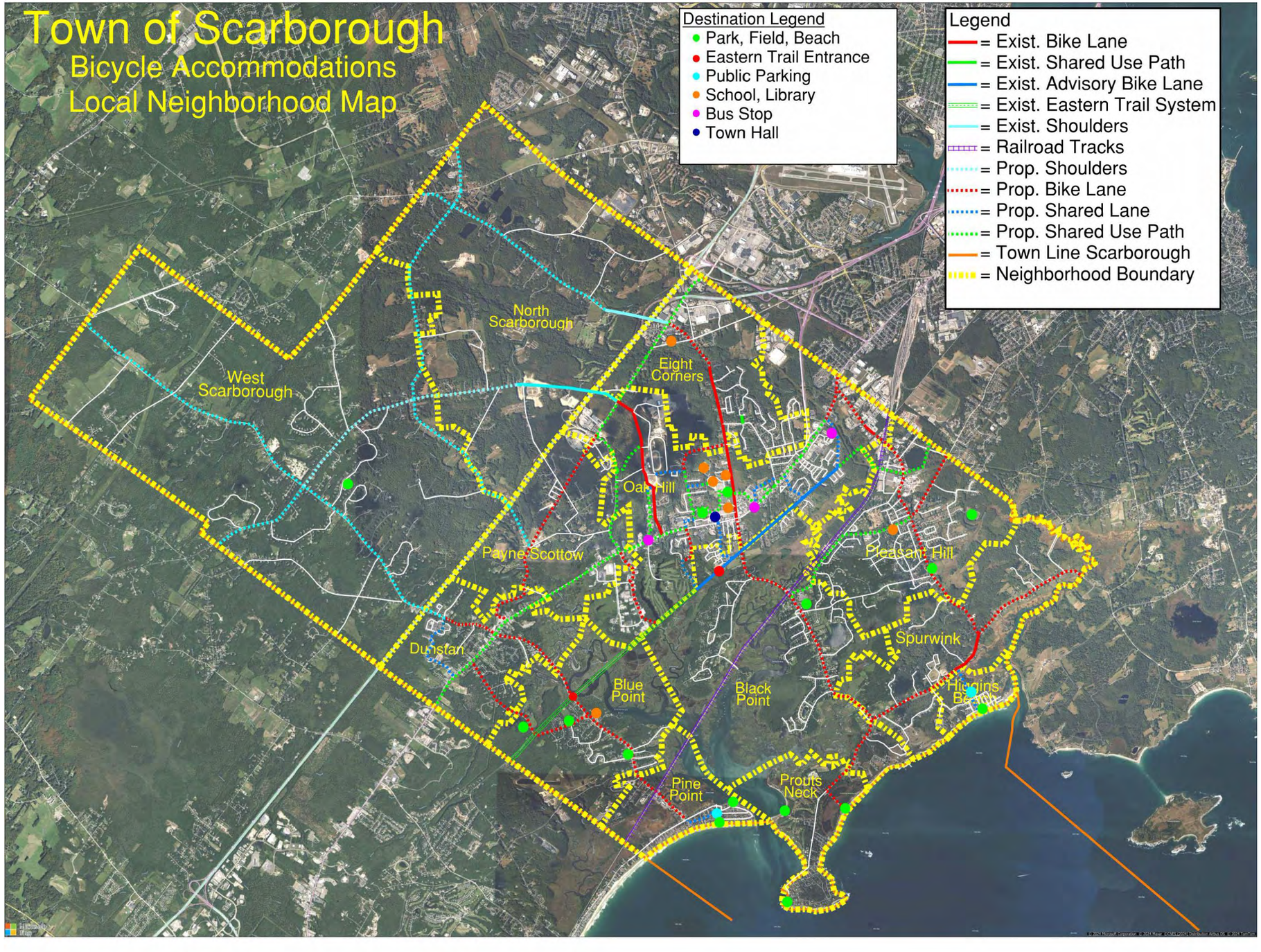
TABLE 2.3
BICYCLE AND PEDESTRIAN CRASH DETAILS

Type of crash	Injury count	Non injury	Date	Month	Day of week	Time	Type of location	Primary route name	AADT	Speed limit	Traffic control device	Light condition	Road surface	weather
Bicycle	1	2	2017-07-22	July	Saturday	09:05:00	Driveways	RD INV 05 70153	1109	25	None	Daylight	Dry	Clear
Pedestrians	1	1	2021-10-14	October	Thursday	06:15:00	Straight Road	RD INV 05 78134	12130	35	None	Dark - Not Lighted	Dry	Clear
Bicycle	1	1	2014-02-20	February	Thursday	13:47:00	Straight Road	US 1	20065	35	Advisory/Warning Sign	Daylight	Dry	Clear
Pedestrians	1	1	2022-12-13	December	Tuesday	16:34:00	Four Leg Intersection	US 1	29578.5		Traffic Signals (Stop & Go)	Dark - Lighted	Dry	Clear
Bicycle	1	0	2016-05-07	May	Saturday	17:28:00	Curved Road	RD INV 05 00489	4238	45	Curve Warning Sign	Daylight	Dry	Cloudy
Bicycle	1	1	2022-08-21	August	Sunday	15:39:00	Curved Road	ST RTE 77	5365	35	No Passing Zone	Daylight	Dry	Clear
Pedestrians	1	1	2022-07-13	July	Wednesday	09:20:00	Four Leg Intersection	US 1	29578.5		Traffic Signals (Stop & Go)	Daylight	Dry	Clear
Pedestrians	1	1	2021-04-16	April	Friday	23:17:00	Three Leg Intersection	RD INV 05 70485	23405.5		Stop Signs - Other	Dark - Not Lighted	Wet	Rain
Bicycle	1	0	2022-10-21	October	Friday	21:13:00	Straight Road	RD INV 05 00489	7100	30	None	Dark - Not Lighted	Dry	Clear
Bicycle	1	2	2013-09-16	September	Monday	12:10:00	Straight Road	US 1	20065	35	Stop Signs - Other	Daylight	Dry	Clear
Bicycle	1	1	2019-07-01	July	Monday	09:08:00	Driveways	RD INV 3200553	1200	25	Stop Signs - Other	Daylight	Dry	Clear
Bicycle	1	1	2020-09-03	September	Thursday	14:25:00	Straight Road	US 1	10970	45	None	Daylight	Dry	Clear
Bicycle	1	1	2017-06-24	June	Saturday	16:37:00	Three Leg Intersection	ST RTE 207	6823.5		None	Daylight	Dry	Clear
Bicycle	1	2	2019-06-15	June	Saturday	12:36:00	Straight Road	RD INV 3200553	1393	25	None	Daylight	Dry	Clear
Pedestrians	1	2	2022-09-30	September	Friday	18:49:00	Straight Road	RD INV 05 70485	17720	45	None	Dark - Not Lighted	Dry	Clear
Pedestrians	1	1	2016-08-12	August	Friday	17:44:00	Straight Road	US 1	26620	35	Stop Signs - Other	Daylight	Wet	Rain
Bicycle	1	0	2019-07-25	July	Thursday	14:52:00	Four Leg Intersection	ST RTE 114	28580		Traffic Signals (Stop & Go)	Daylight	Dry	Clear
Bicycle	1	6	2017-10-01	October	Sunday	14:10:00	Four Leg Intersection	ST RTE 9	5270		Traffic Signals (Stop & Go)	Daylight	Dry	Clear
Pedestrians	1	3	2021-09-30	September	Thursday	18:56:00	Straight Road	US 1	26365	35	None	Dark - Lighted	Wet	Rain
Pedestrians	0	1	2022-05-02	May	Monday	15:02:00	Straight Road	ST RTE 114	8780	35	Traffic Signals (Stop & Go)	Daylight	Dry	Clear
Pedestrians	1	3	2017-05-12	May	Friday	20:22:00	Four Leg Intersection	US 1	29578.5		Traffic Signals (Stop & Go)	Dark - Lighted	Dry	Clear
Pedestrians	1	1	2017-12-14	December	Thursday	16:59:00	Straight Road	INT 95 NB	36230	65	Other	Dark - Not Lighted	Dry	Clear
Bicycle	1	0	2018-05-20	May	Sunday	19:25:00	Straight Road	ST RTE 9	6799	35	None	Daylight	Dry	Clear
Bicycle	1	1	2021-01-07	January	Thursday	11:13:00	Straight Road	US 1	17840	45	None	Daylight	Dry	Clear
Pedestrians	1	0	2016-08-28	August	Sunday	22:40:00	Straight Road	RD INV 05 78134	12130	35	None	Dark - Not Lighted	Dry	Clear
Pedestrians	1	1	2020-10-08	October	Thursday	06:17:00	Three Leg Intersection	RD INV 05 70102	1693		Stop Signs - All Approaches	Dawn	Dry	Clear
Pedestrians	1	0	2021-04-12	April	Monday	05:27:00	Straight Road	RD INV 05 00490	4978	35	None	Dawn	Dry	Cloudy
Pedestrians	1	1	2013-07-02	July	Tuesday	16:05:00	Straight Road	US 1	13872	35	None	Daylight	Wet	Rain
Bicycle	1	1	2019-08-05	August	Monday	16:51:00	Four Leg Intersection	RD INV 05 00489	5075		Stop Signs - Other	Daylight	Dry	Clear
Bicycle	1	1	2019-08-22	August	Thursday	09:37:00	Four Leg Intersection	RD INV 05 70641	23269		Traffic Signals (Stop & Go)	Daylight	Dry	Clear
Pedestrians	1	1	2021-11-04	November	Thursday	12:20:00	Curved Road	RD INV 3200691	230	25	None	Daylight	Dry	Clear
Pedestrians	1	1	2014-04-11	April	Friday	11:15:00	Four Leg Intersection	US 1	29578.5		Traffic Signals (Stop & Go)	Daylight	Dry	Clear
Bicycle	1	1	2019-05-15	May	Wednesday	09:13:00	Straight Road	ST RTE 114	4528	35	Traffic Signals (Flashing)	Daylight	Wet	Cloudy
Pedestrians	1	4	2021-10-02	October	Saturday	18:25:00	Four Leg Intersection	US 1	20007		Other	Dark - Lighted	Dry	Clear
Bicycle	1	2	2013-07-03	July	Wednesday	17:43:00	Three Leg Intersection	ST RTE 77	5133.5		Stop Signs - Other	Daylight	Dry	Clear
Pedestrians	1	1	2017-05-01	May	Monday	20:17:00	Three Leg Intersection	US 1	20242.5		Stop Signs - Other	Dark - Lighted	Dry	Clear
Bicycle	1	1	2019-09-13	September	Friday	15:17:00	Driveways	US 1	13759	35	None	Daylight	Dry	Clear
Bicycle	1	1	2022-09-01	September	Thursday	17:16:00	Four Leg Intersection	ST RTE 9	5270		None	Daylight	Dry	Clear
Bicycle	1	1	2019-10-24	October	Thursday	18:12:00	Straight Road	US 1	10970	45	None	Dark - Not Lighted	Dry	Clear
Pedestrians	1	1	2018-11-03	November	Saturday	19:20:00	Three Leg Intersection	US 1	26634		Stop Signs - Other	Dark - Not Lighted	Dry	Clear
Bicycle	1	4	2020-06-05	June	Friday	16:57:00	Four Leg Intersection	US 1	30539		Traffic Signals (Stop & Go)	Daylight	Dry	Clear
Bicycle	1	2	2016-09-27	September	Tuesday	12:27:00	Three Leg Intersection	RD INV 05 70207	5458.5		Stop Signs - Other	Daylight	Dry	Clear
Bicycle	1	1	2013-02-15	February	Friday	18:53:00	Straight Road	RD INV 05 70005	6920	40	None	Dark - Not Lighted	Dry	Clear

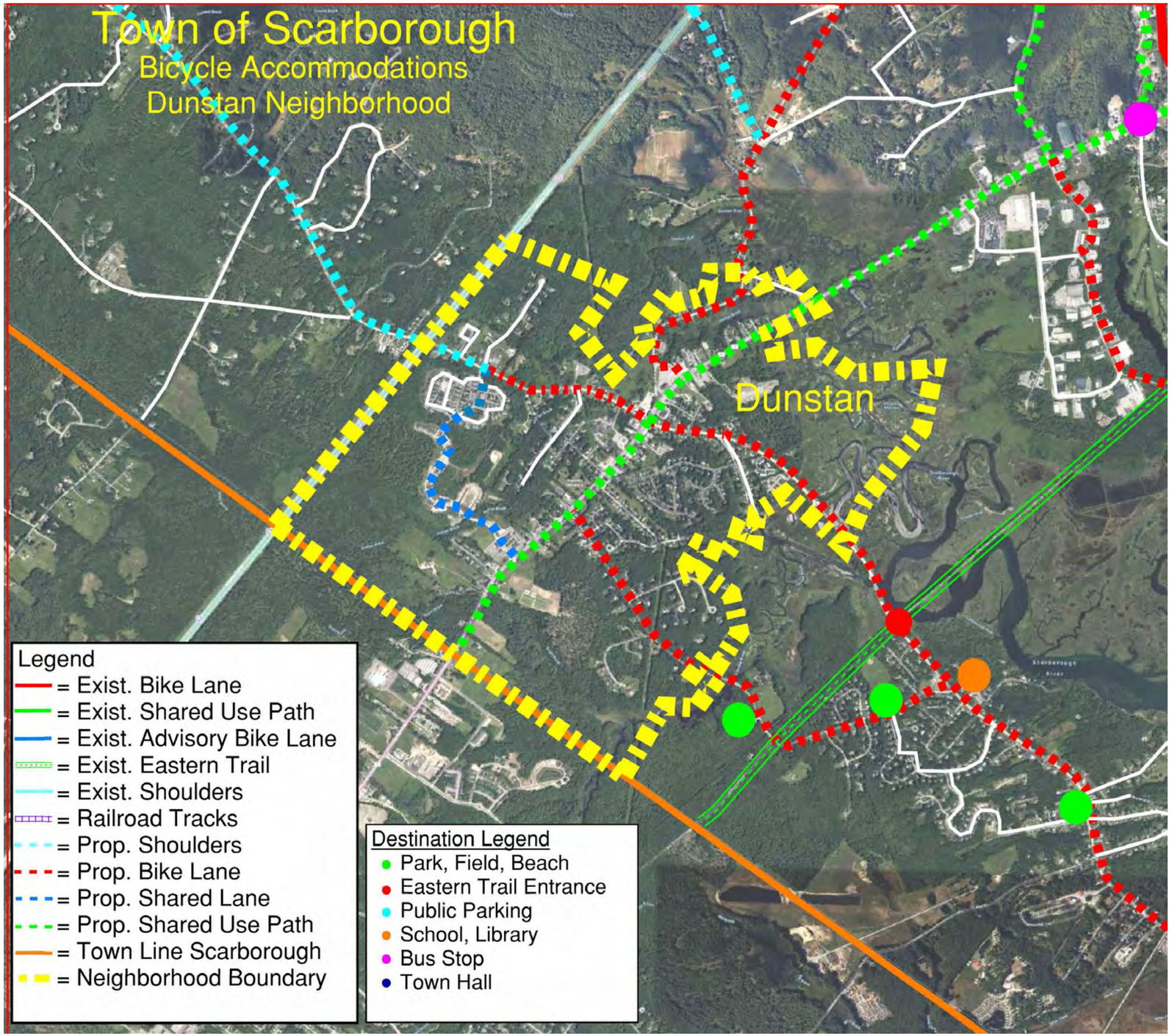
Appendix E • Bicycle and Pedestrian Tables and Graphics

TABLE 2.6
LEVEL OF TRAFFIC STRESS CRITERIA

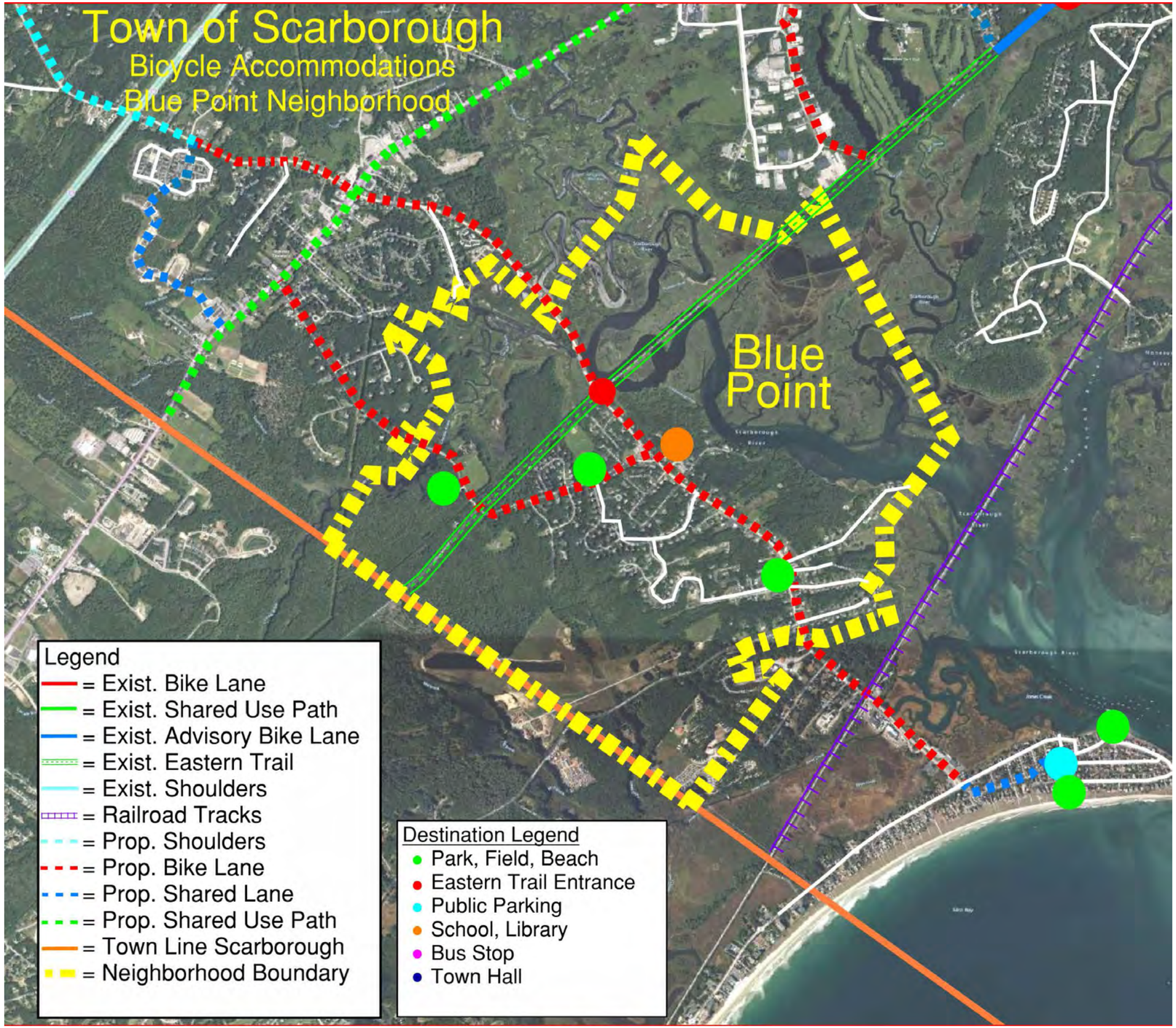
Vehicle Volumes			Posted Speed 20	Posted Speed 25	Posted Speed 30+	Conflict Factors[1]	All Ages & Abilities Treatments: Protected Bike Lane	Shared Street[2]	Neighborhood Greenway[3]
< 1,500	Bike lane	No Parking	LTS 1	LTS 1	LTS 2	Add 1 up to LTS 4	LTS 1	LTS 1	LTS 1
		Parking	LTS 1	LTS 1	LTS 3				
	No bike lane		LTS 1	LTS 2	LTS 3				
1,500 – 3k	Bike lane	No Parking	LTS 2	LTS 2	LTS 2		LTS 1	LTS 1	LTS 2
		Parking	LTS 2	LTS 2	LTS 3				
	No bike lane		LTS 2	LTS 2	LTS 3				
3k - 6k	Bike lane	No Parking	LTS 2	LTS 2	LTS 2		LTS 1	n/a	n/a
		Parking	LTS 2	LTS 2	LTS 3				
	No bike lane		LTS 3	LTS 3	LTS 4				
> 6k	Bike lane	No Parking	LTS 3	LTS 3	LTS 4		LTS 1	n/a	n/a
		Parking	LTS 3	LTS 4	LTS 4				
	No bike lane		LTS 3	LTS 4	LTS 4				



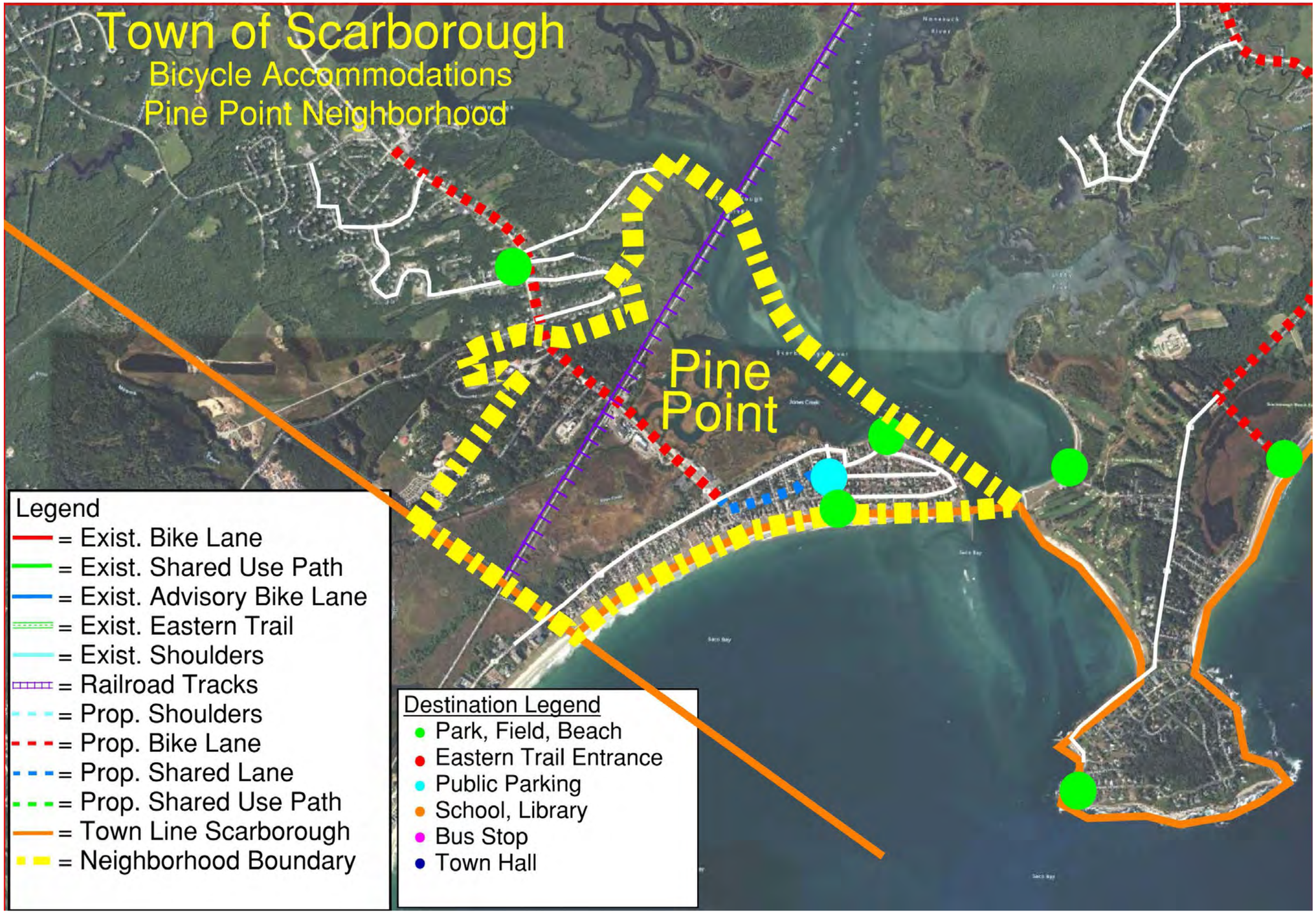
Bicycle Accommodations • Local Neighborhood Map



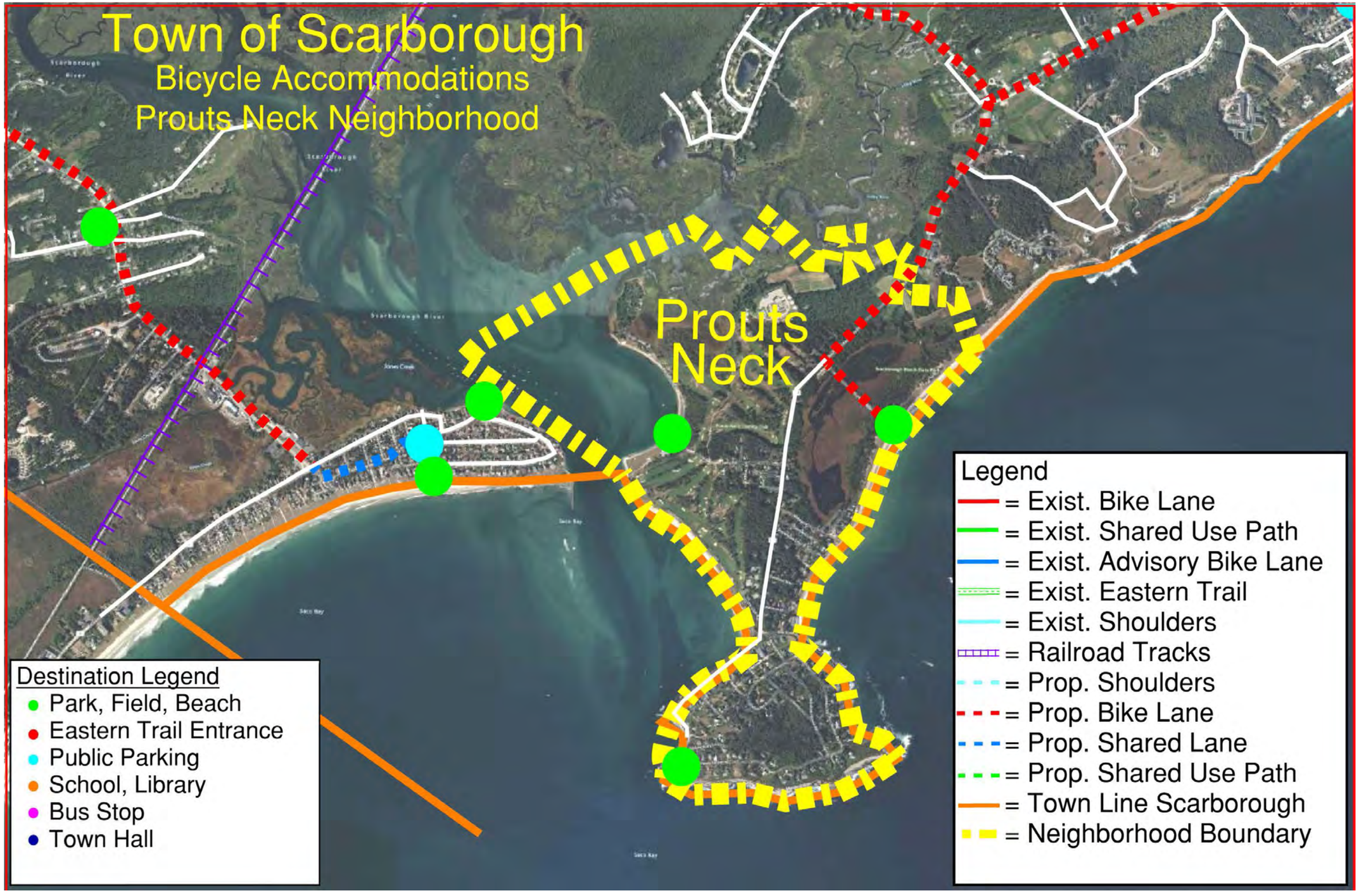
Bicycle Accommodations • Dunstan Neighborhood



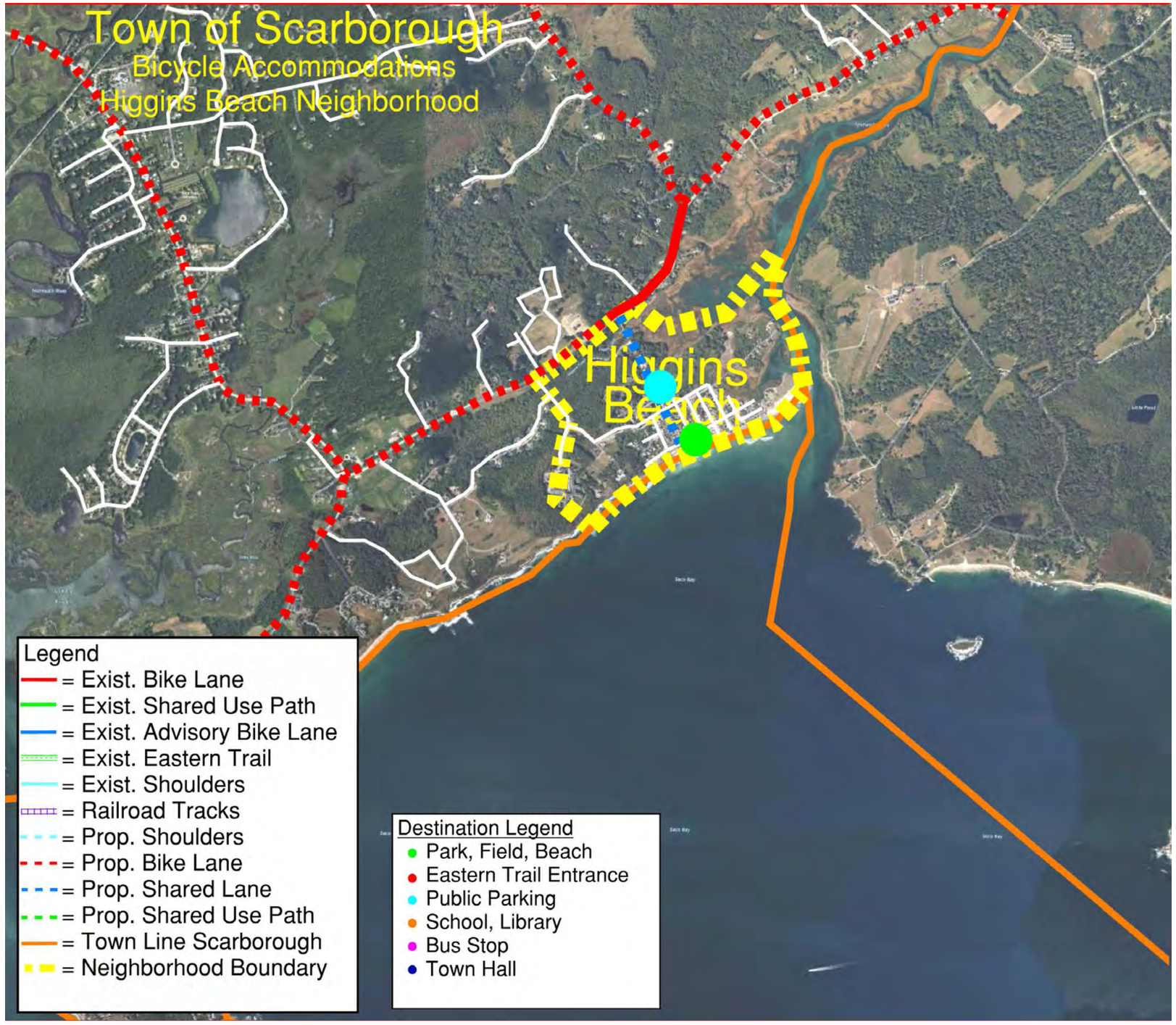
Bicycle Accommodations • Blue Point Neighborhood



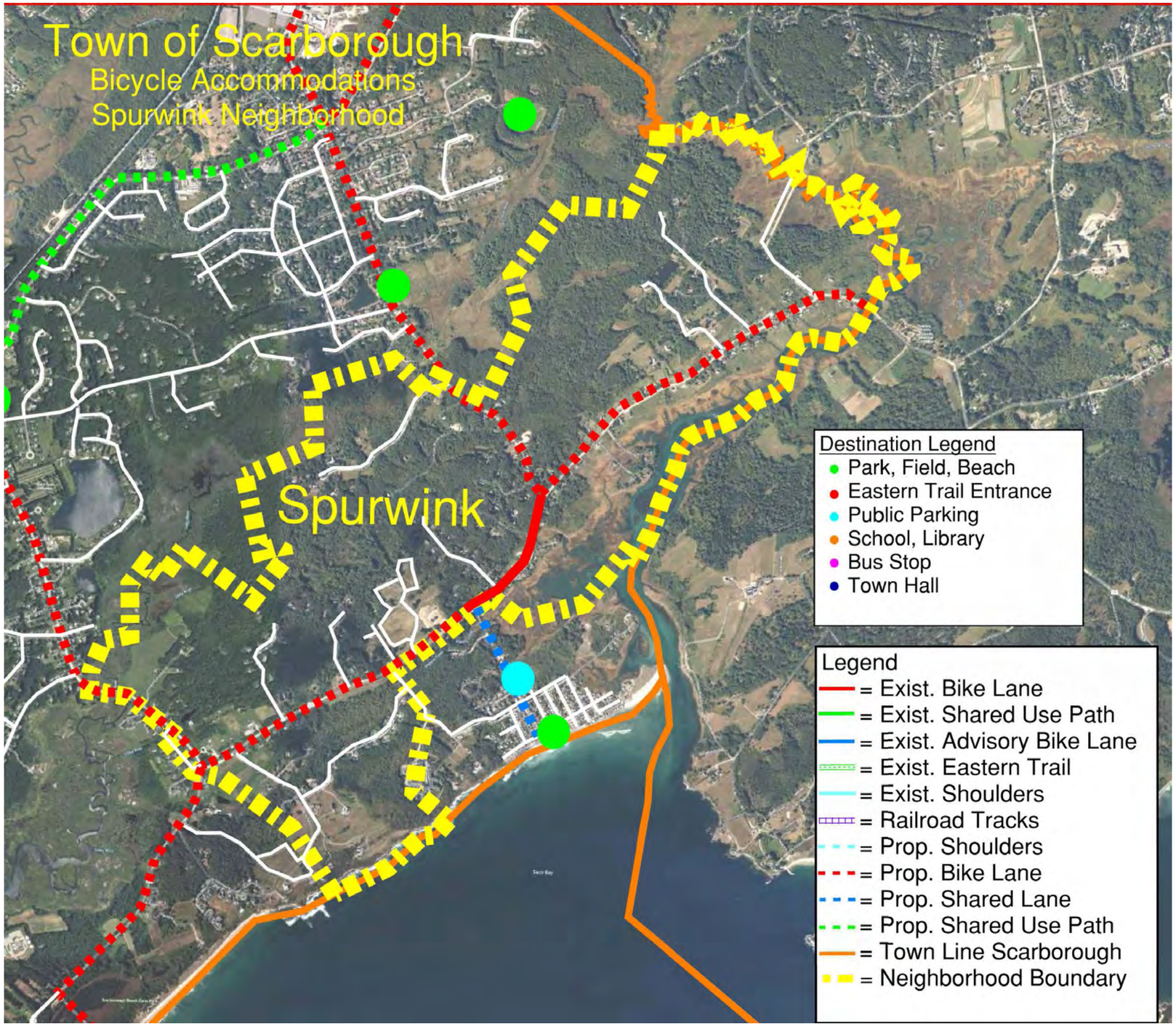
Bicycle Accommodations • Pine Point Neighborhood



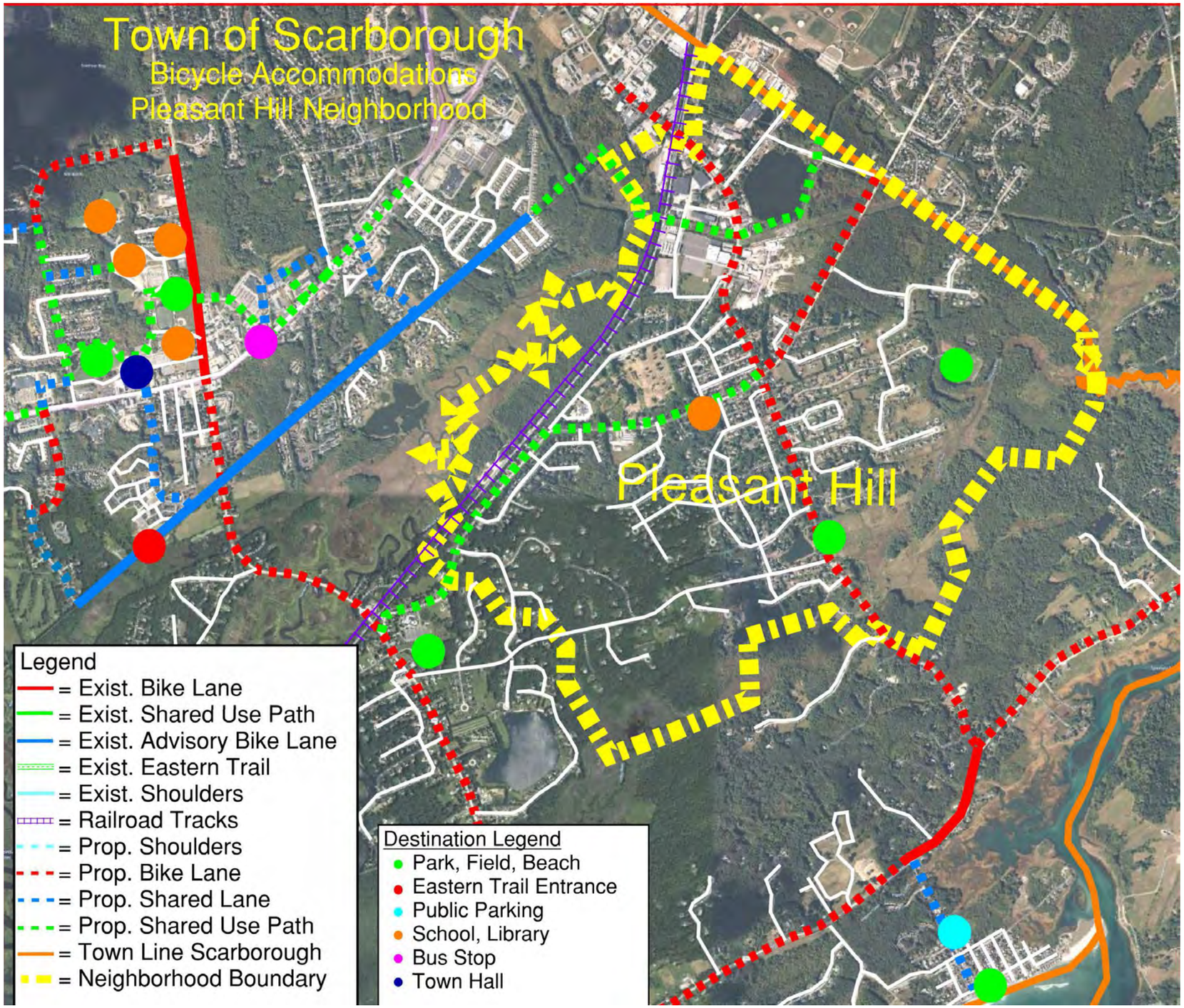
Bicycle Accommodations • Prouts Neck Neighborhood



Bicycle Accommodations • Higgins Beach Neighborhood

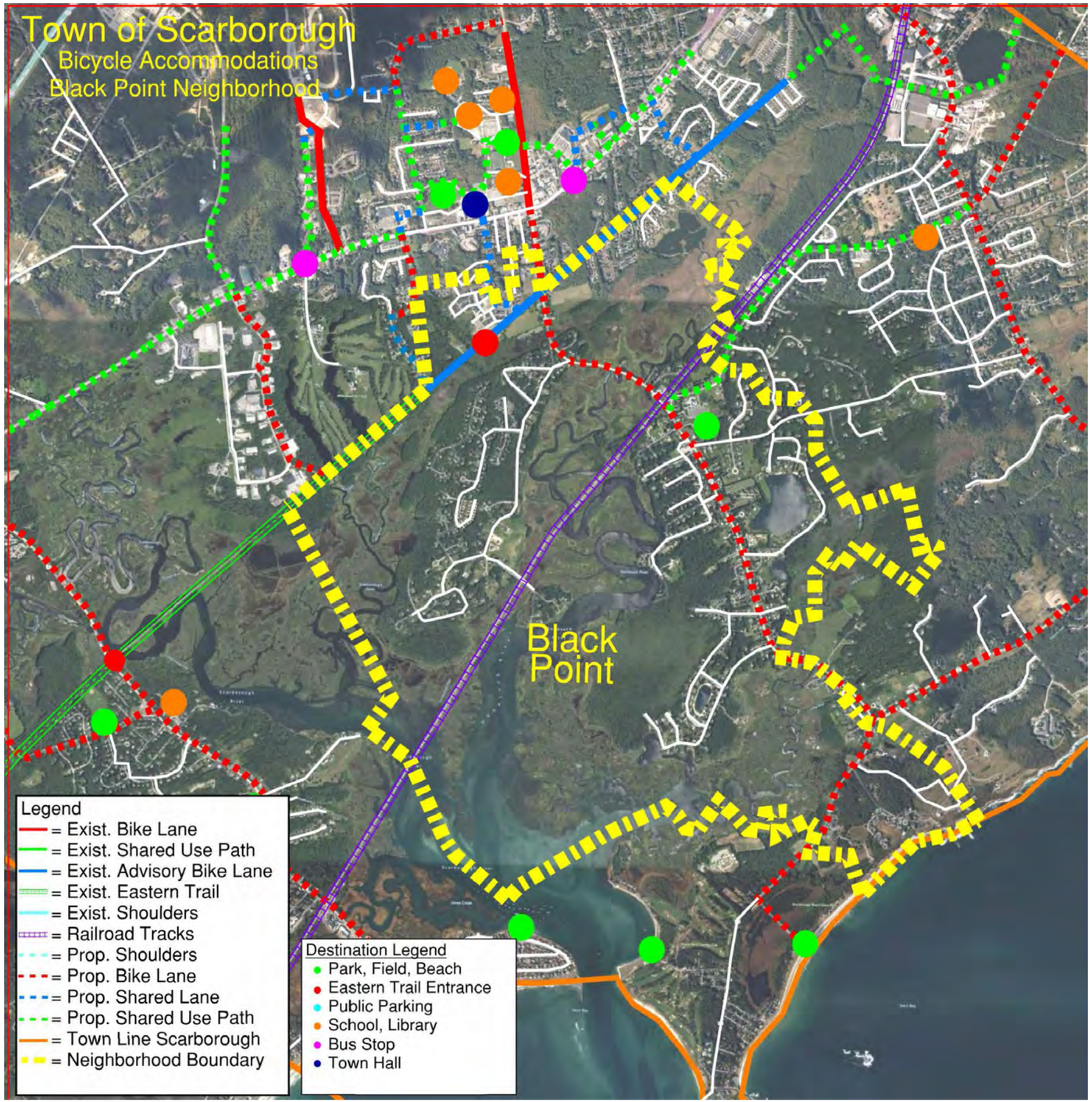


Bicycle Accommodations • Spurwink Neighborhood



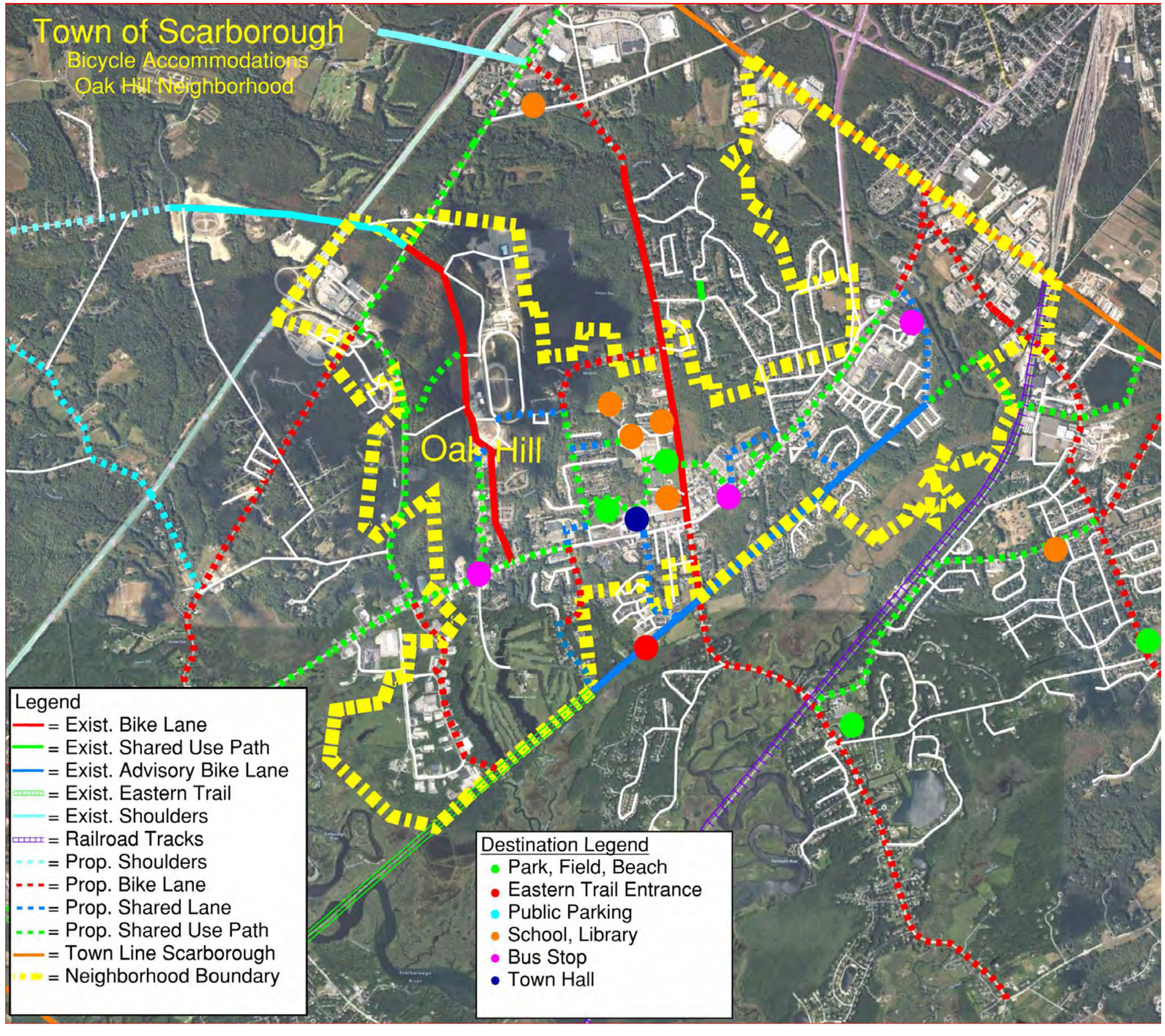
Bicycle Accommodations • Pleasant Hill Neighborhood

Appendix E • Bicycle and Pedestrian Tables and Graphics

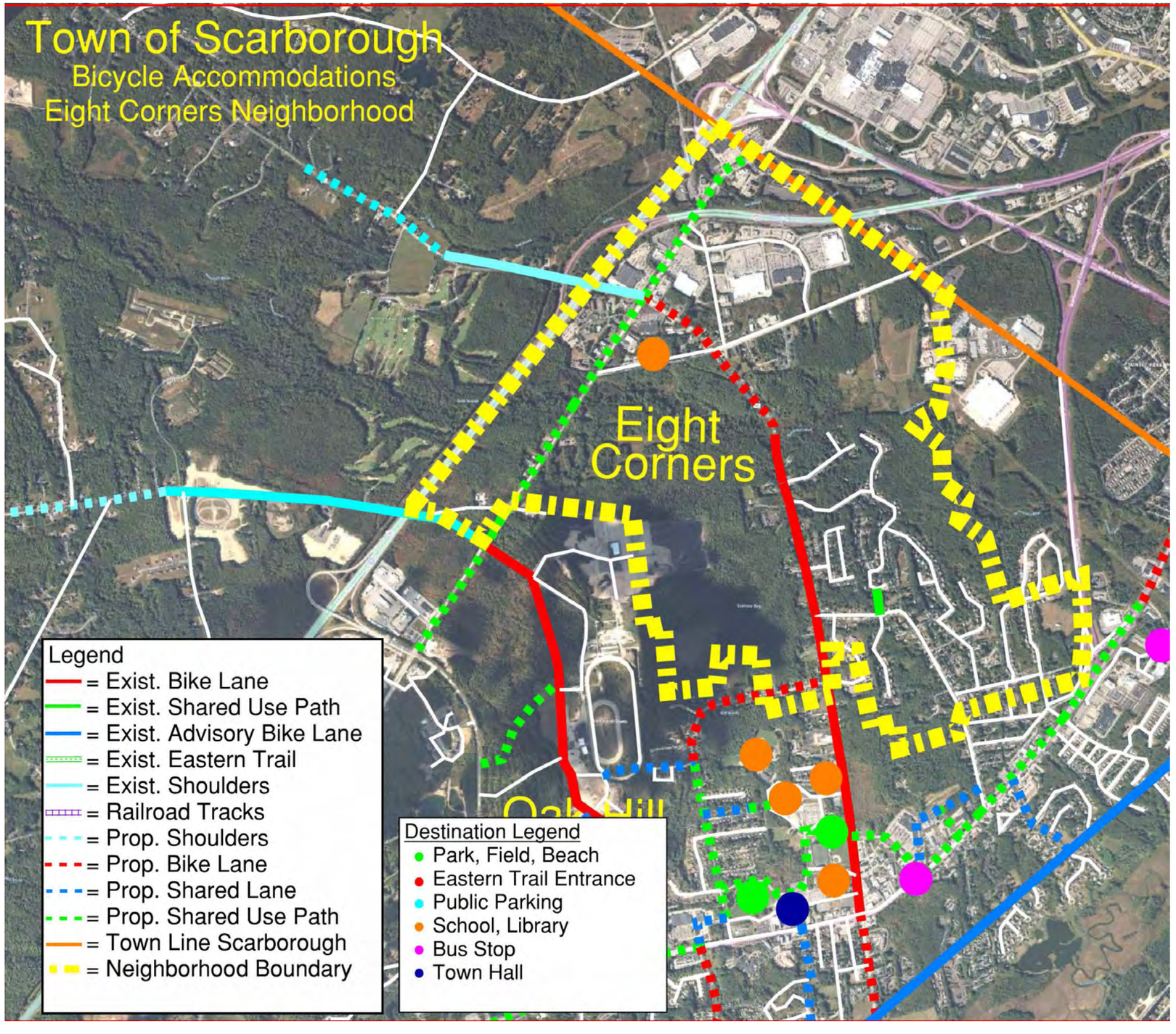


Bicycle Accommodations • Black Point Neighborhood

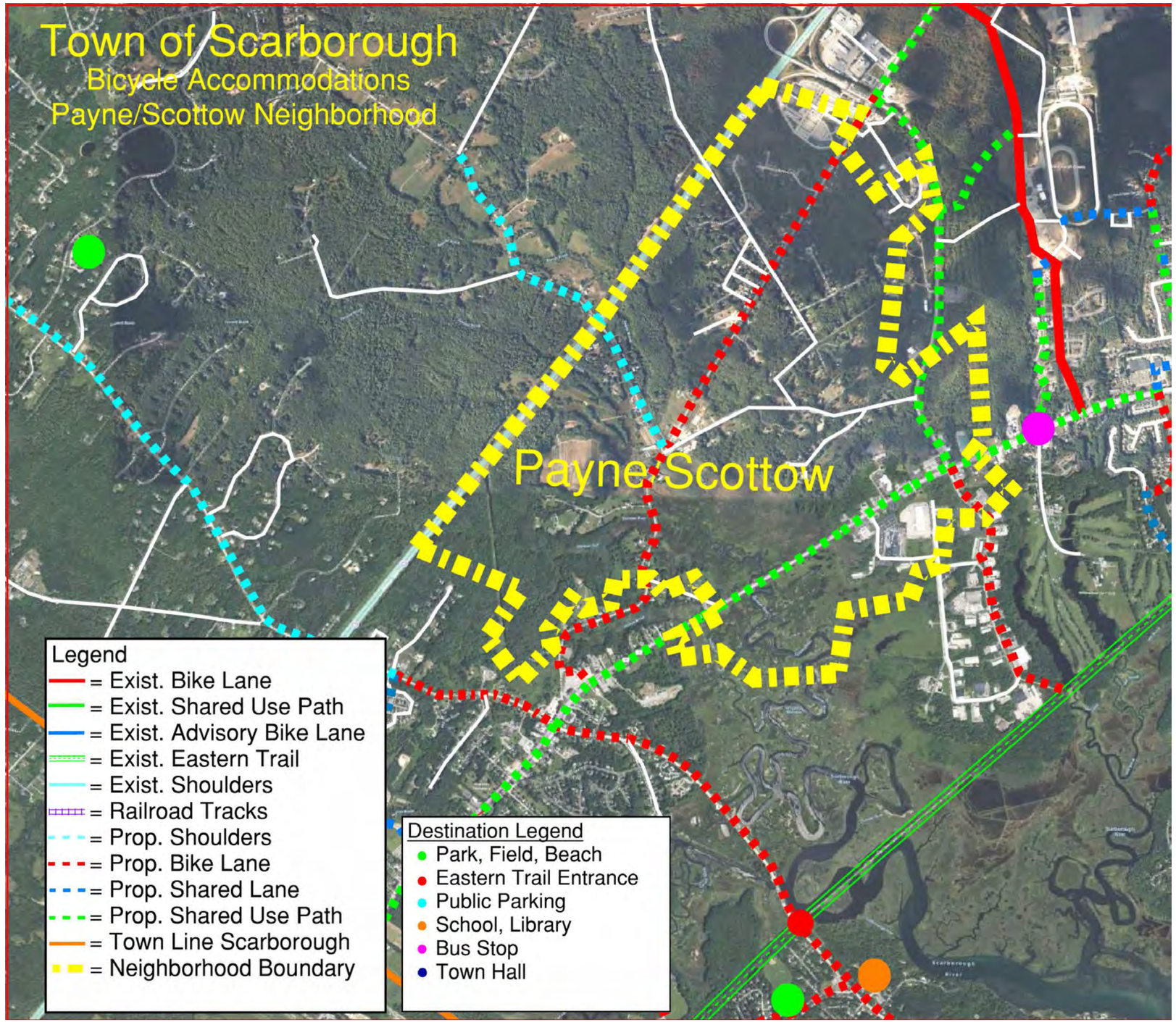
Appendix E • Bicycle and Pedestrian Tables and Graphics



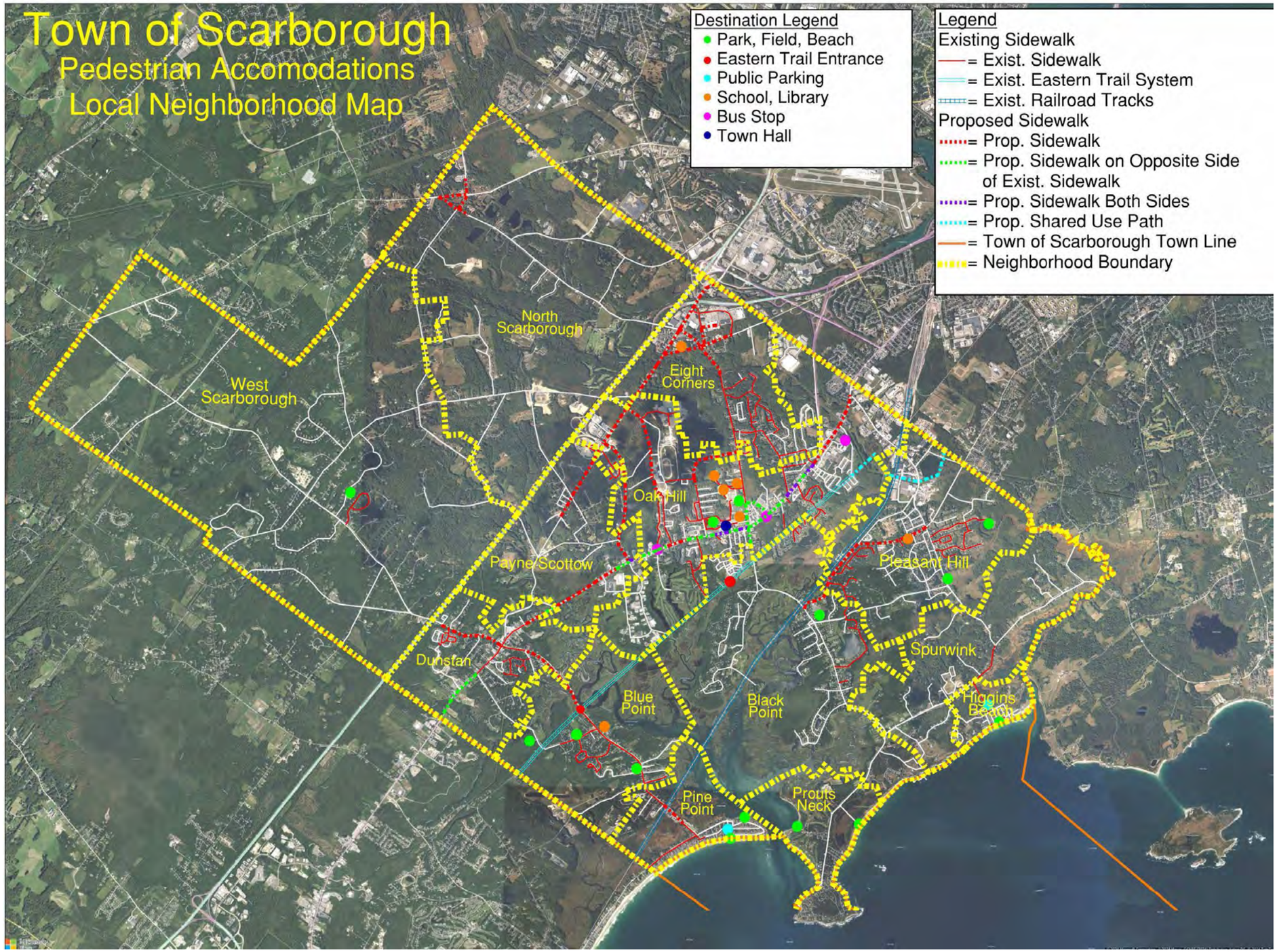
Bicycle Accommodations • Oak Hill Neighborhood



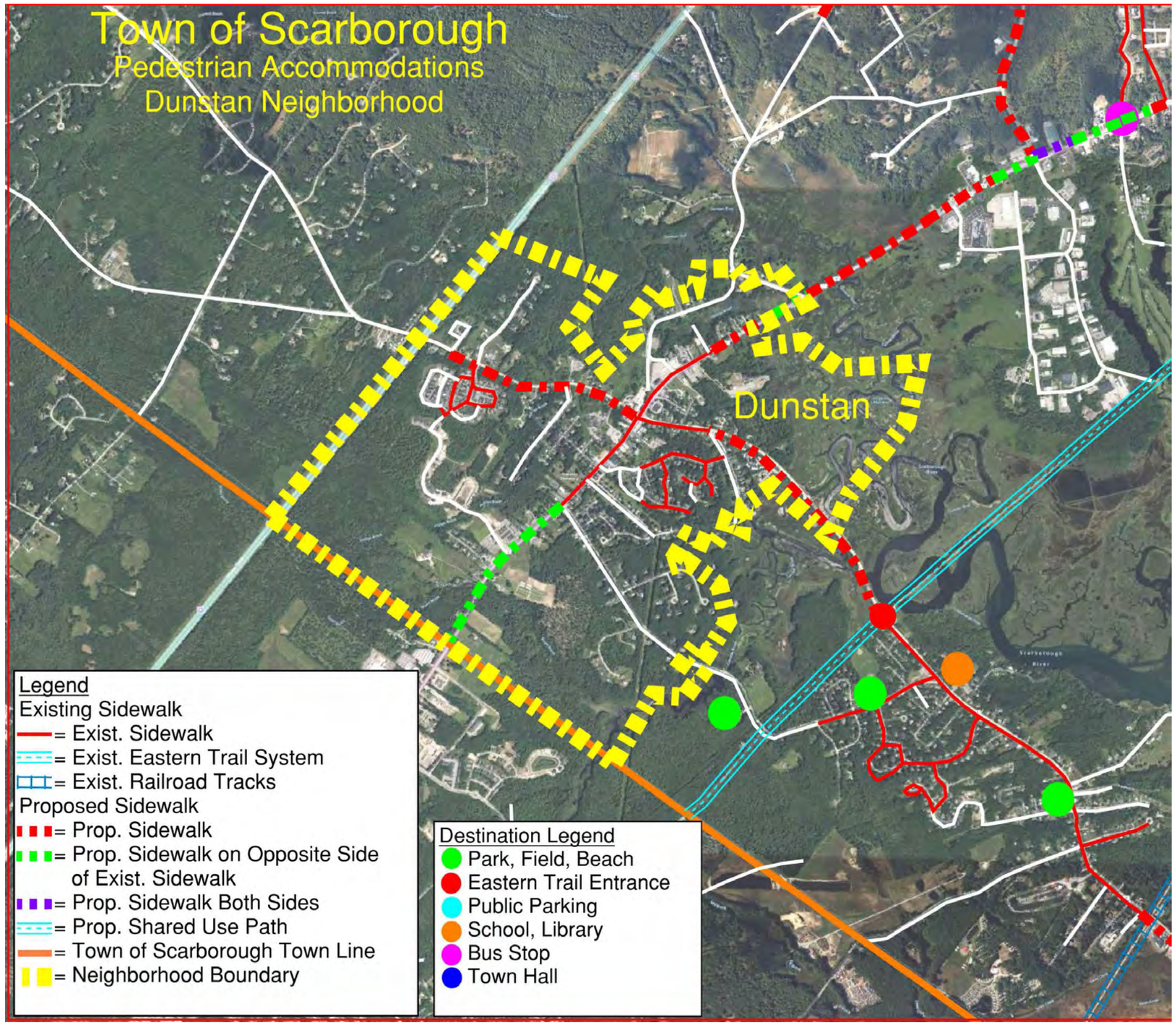
Bicycle Accommodations • Eight Corners Neighborhood



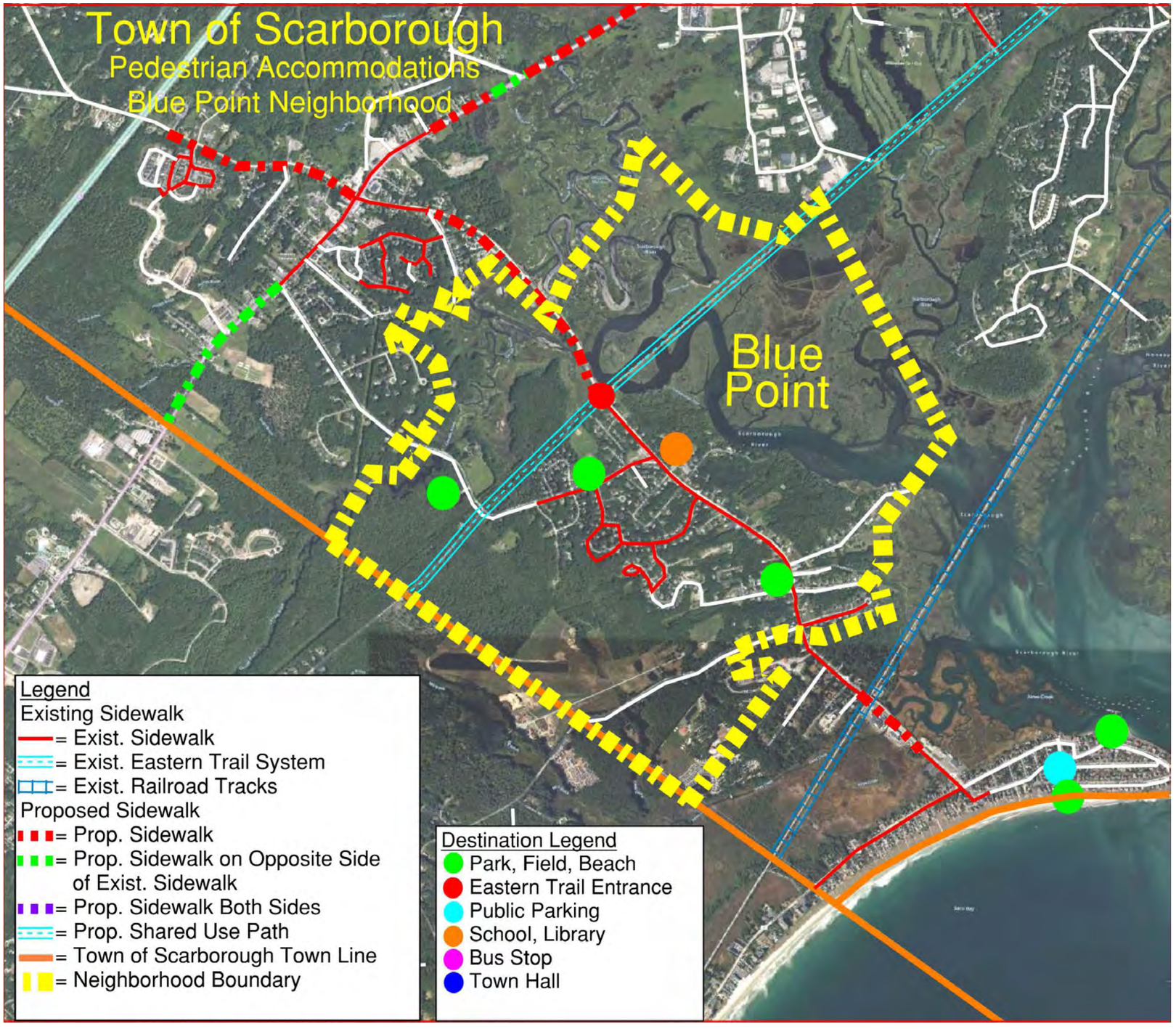
Bicycle Accommodations • Payne/Scottow Neighborhood



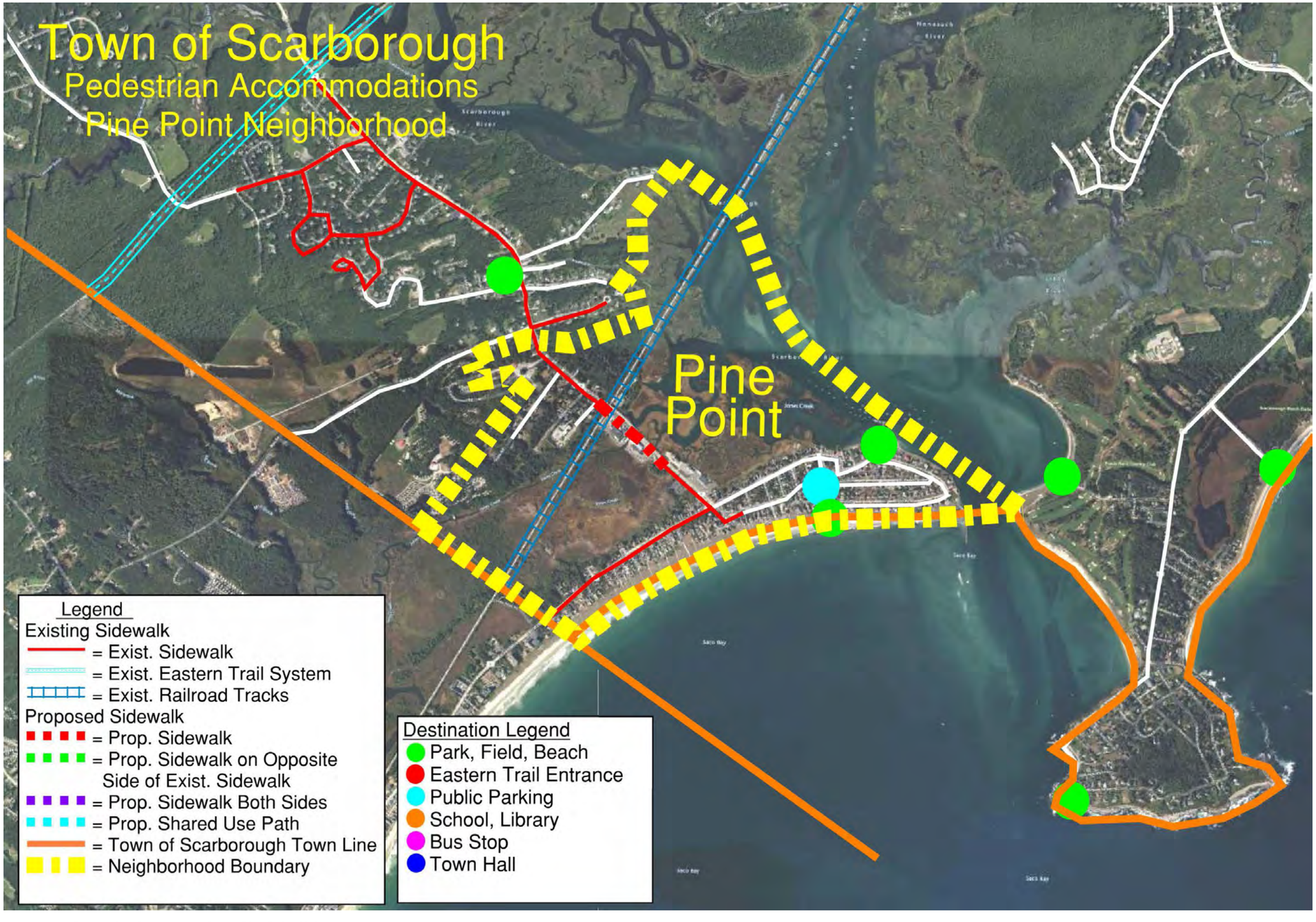
Pedestrian Accommodations • Local Neighborhood Map



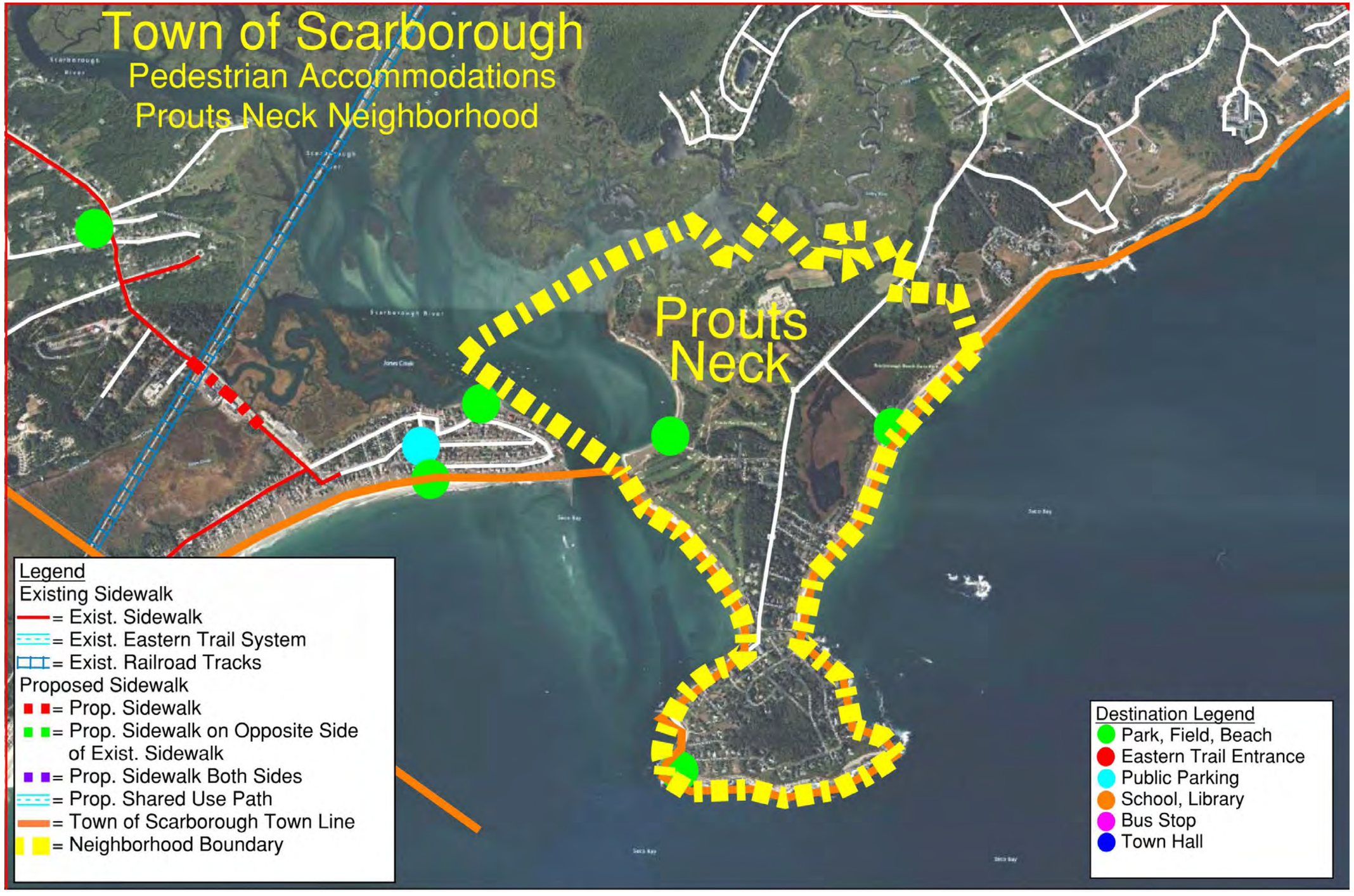
Pedestrian Accommodations • Dunstan Neighborhood



Pedestrian Accommodations • Blue Point Neighborhood

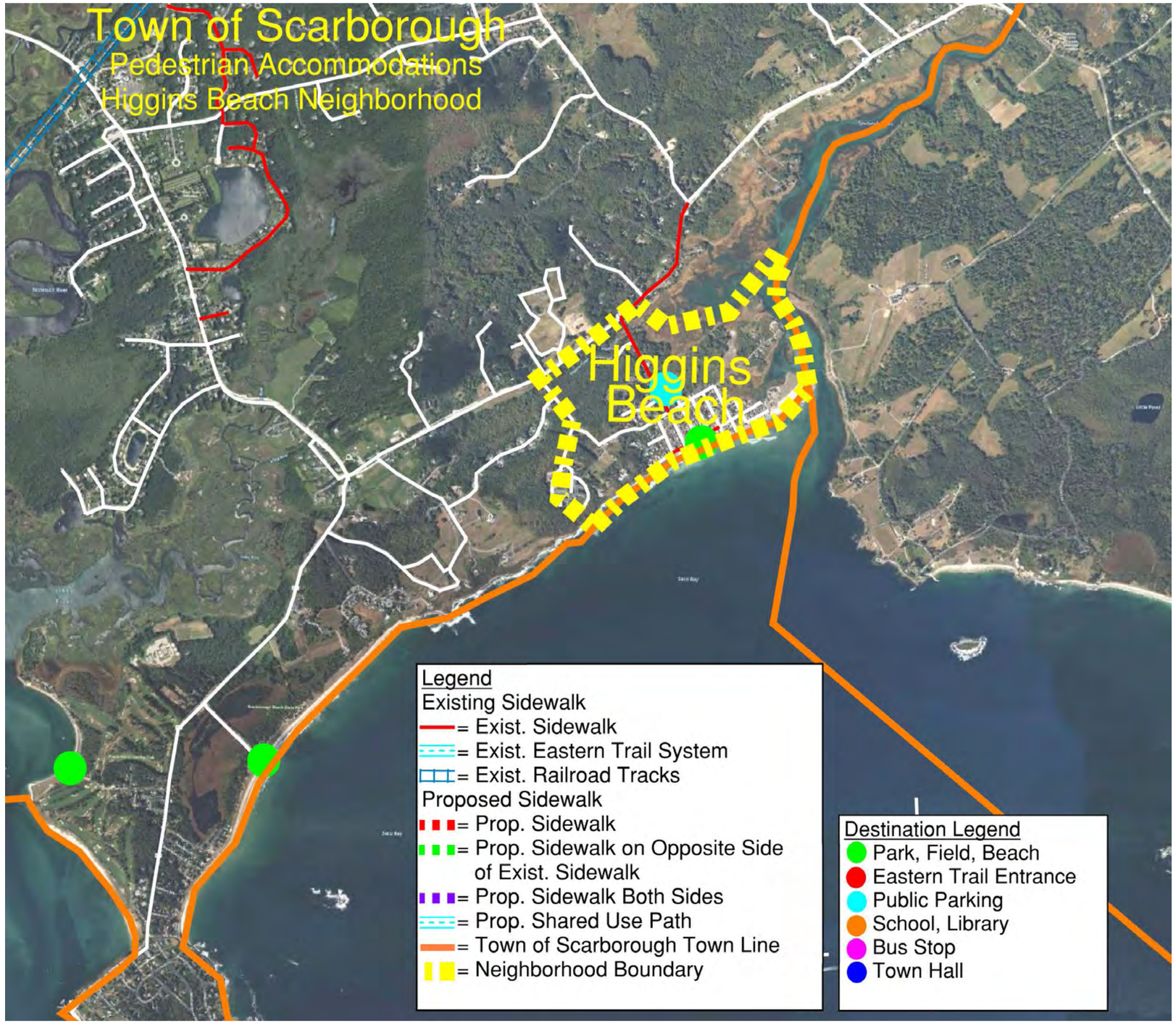


Pedestrian Accommodations • Pine Point Neighborhood

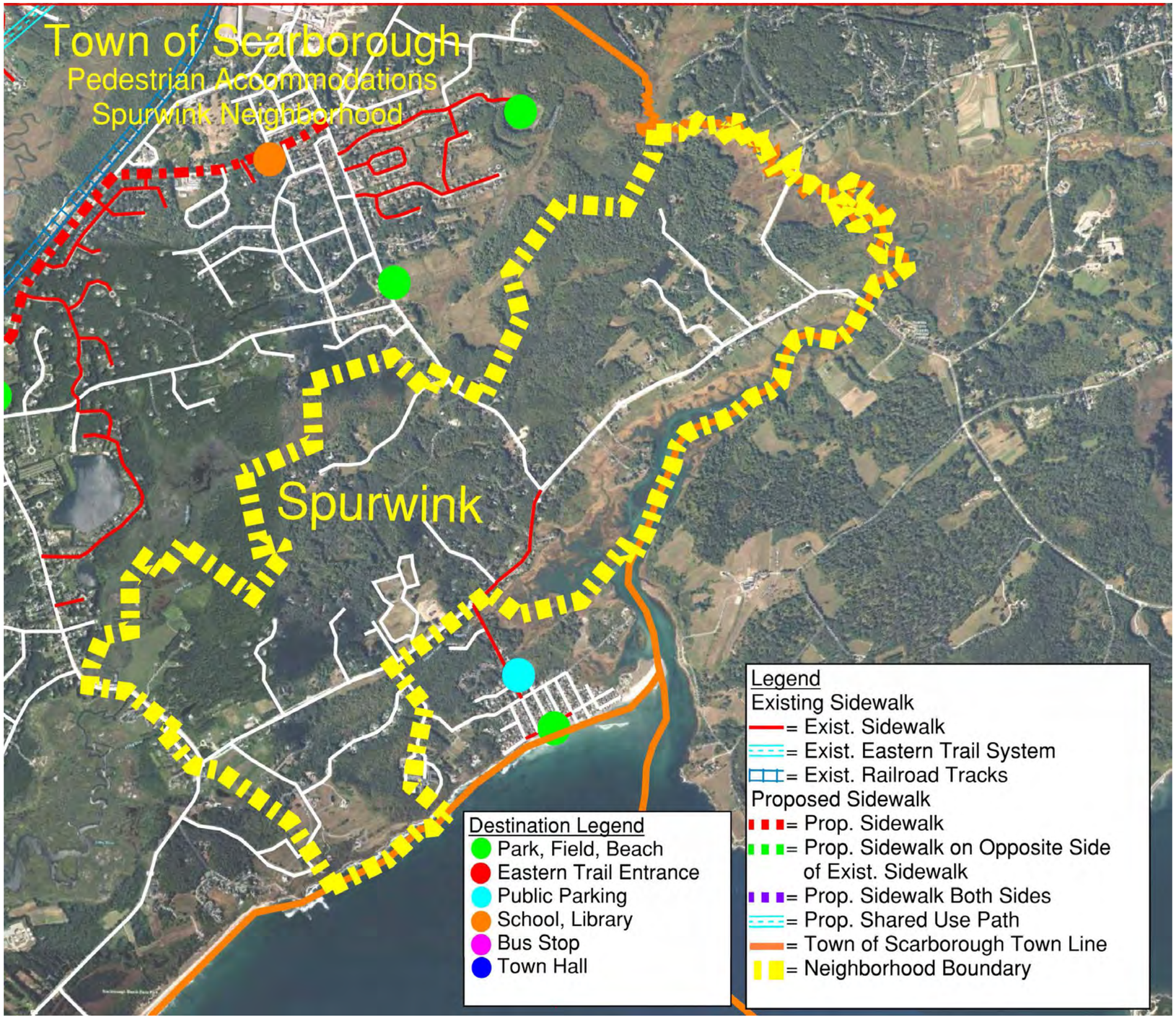


Pedestrian Accommodations • Prouts NeckNeighborhood

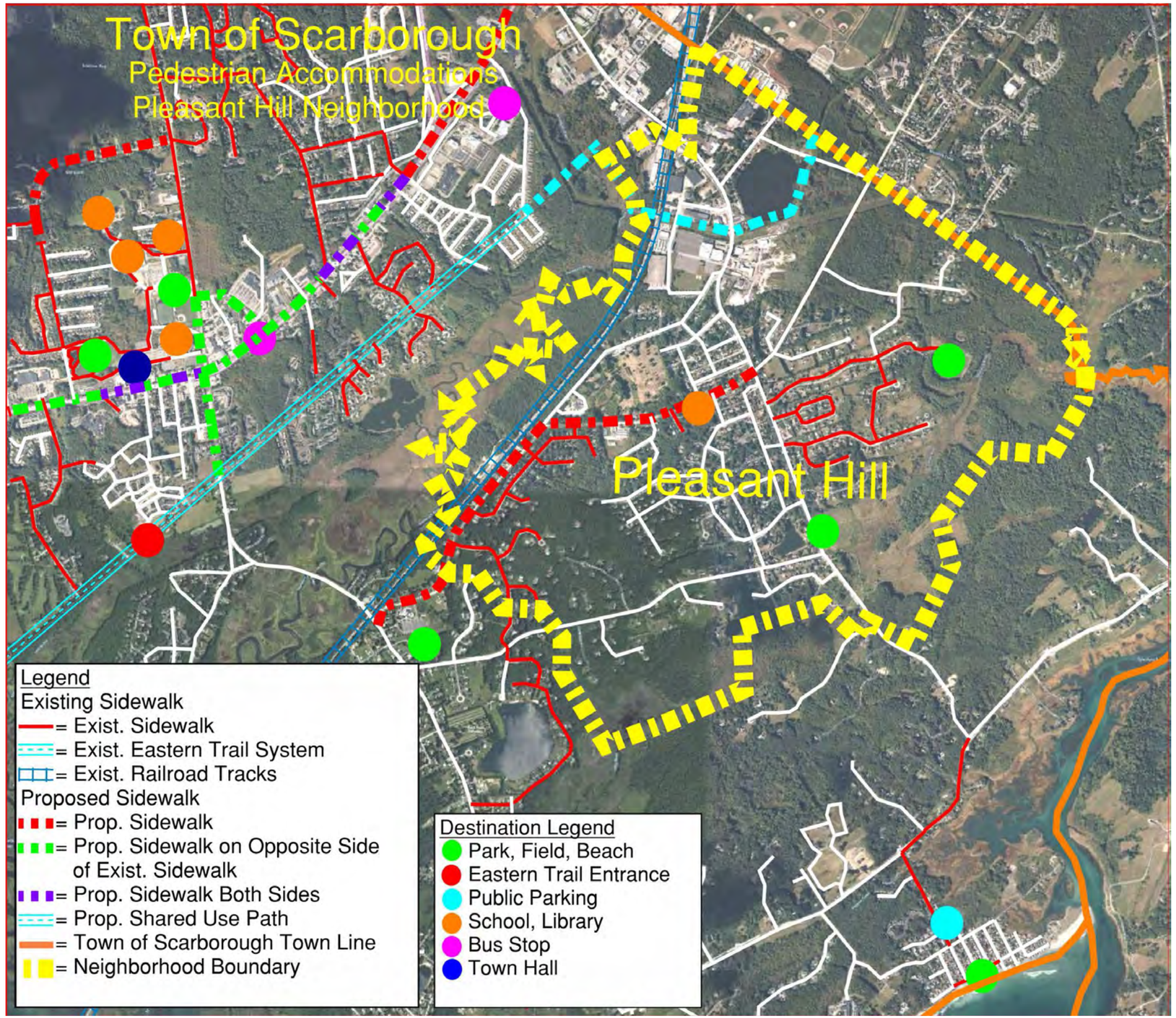
Appendix E • Bicycle and Pedestrian Tables and Graphics



Pedestrian Accommodations • Higgins Beach Neighborhood

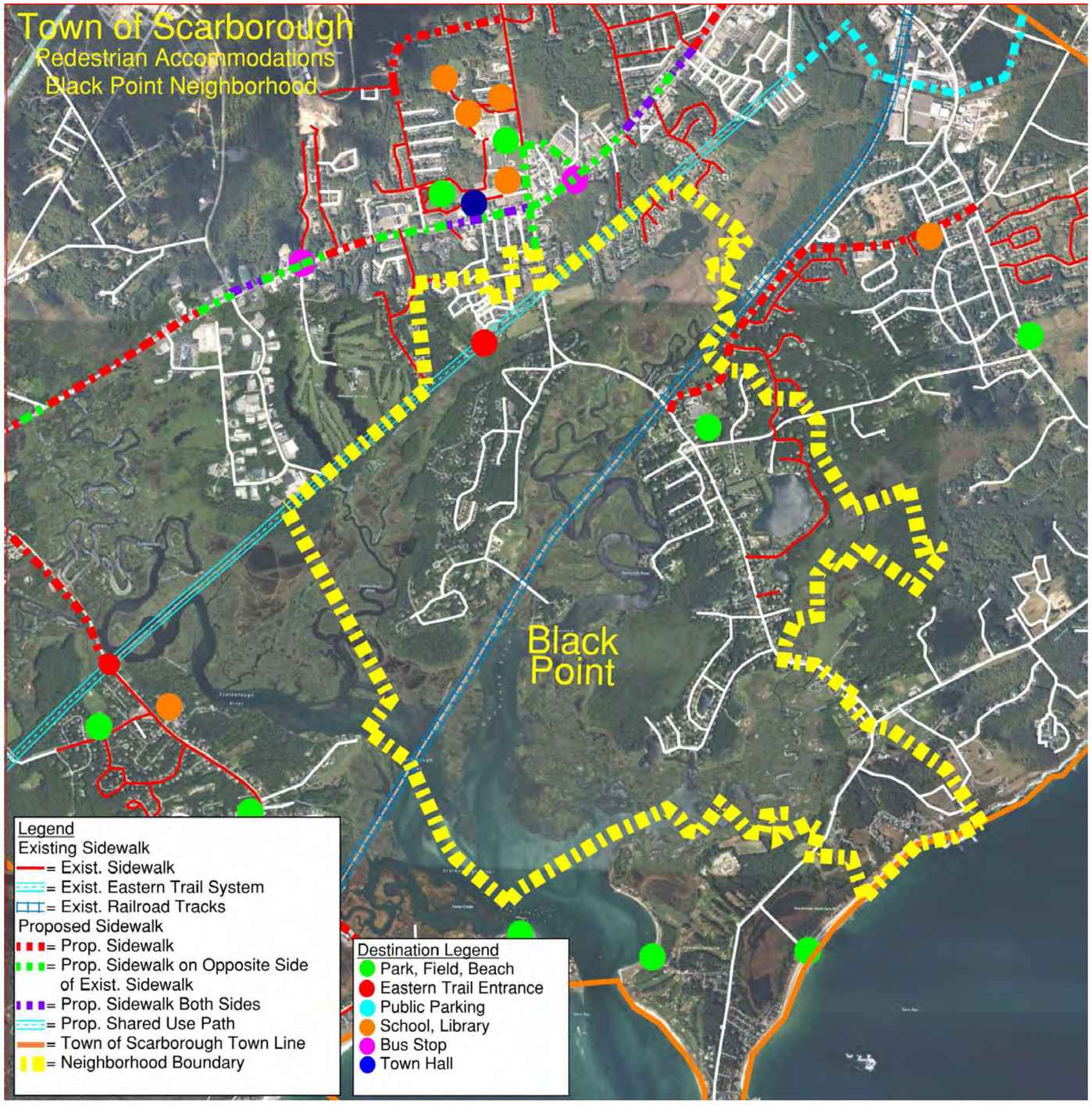


Pedestrian Accommodations • Spurwink Neighborhood



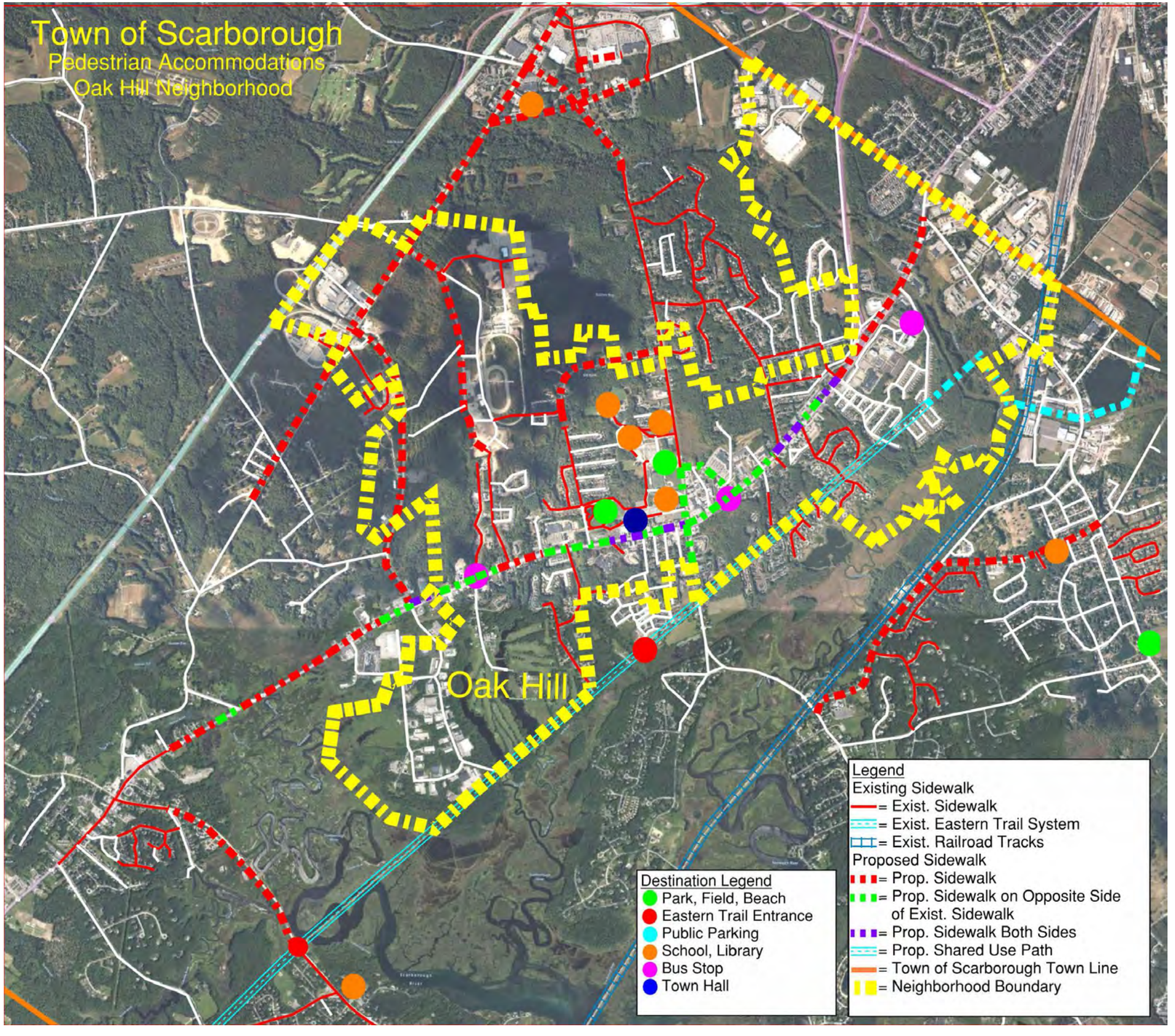
Pedestrian Accommodations • Pleasant Hill Neighborhood

Appendix E • Bicycle and Pedestrian Tables and Graphics

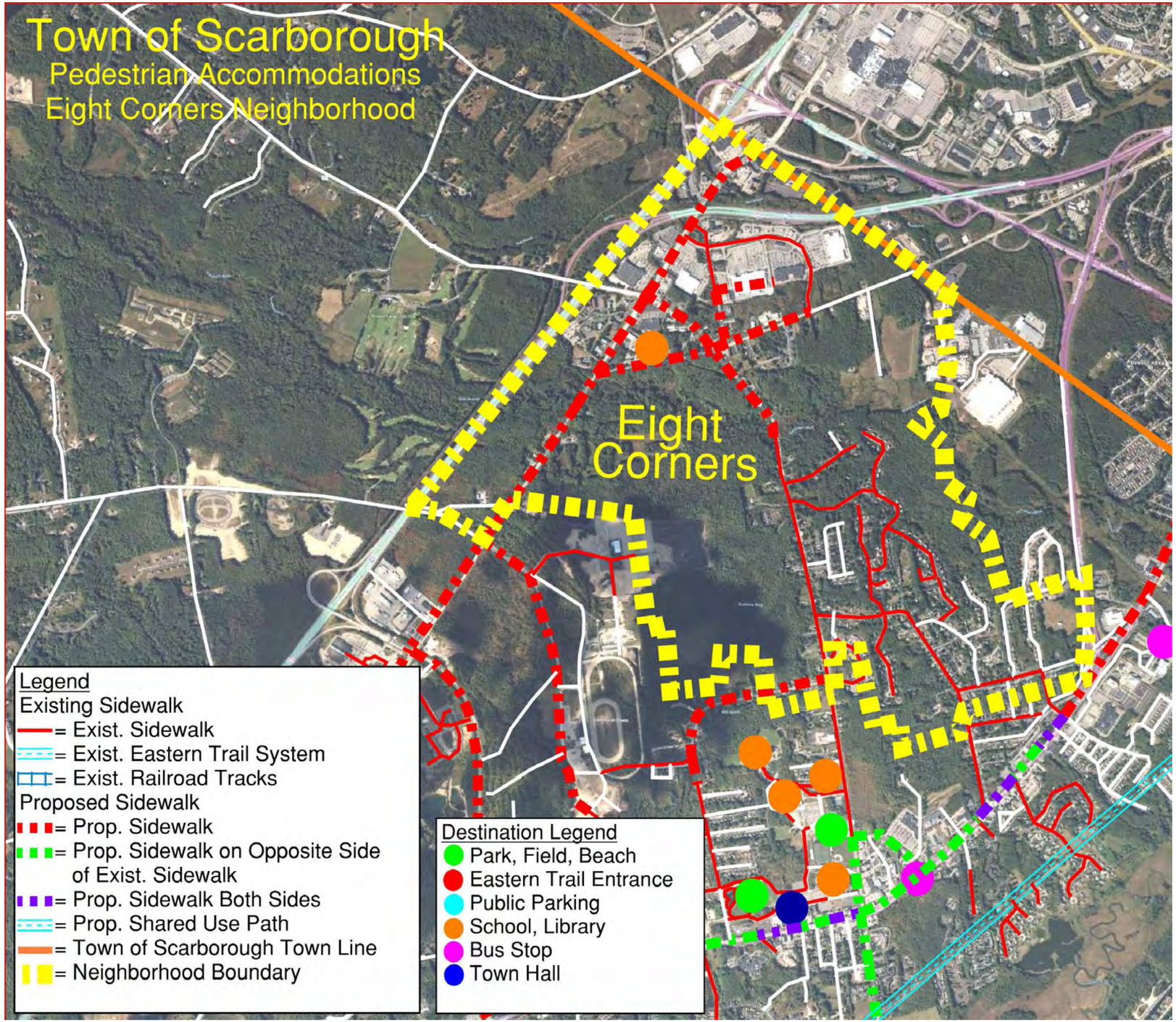


Pedestrian Accommodations • Black Point Neighborhood

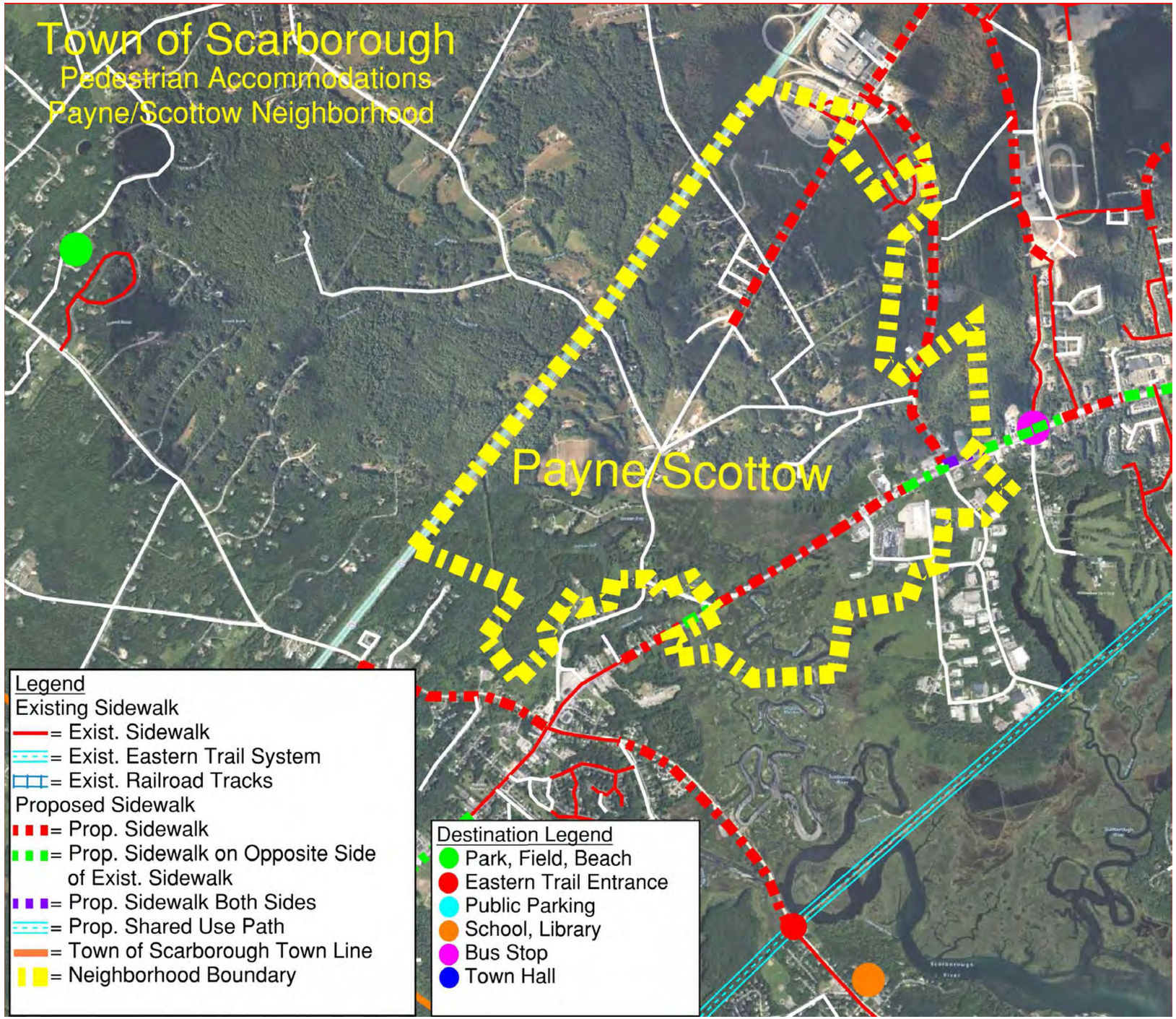
Appendix E • Bicycle and Pedestrian Tables and Graphics



Pedestrian Accommodations • Oak Hill Neighborhood



Pedestrian Accommodations • Eight Corners Neighborhood



Pedestrian Accommodations • Payne/Scottow Neighborhood

APPENDIX F
Speed Limit Table

Appendix F • Speed Limit Table

Scarborough Road Segment Name	Speed Limit
Ash Swamp Road- Scarborough/Saco Townline to Broadturn Rd	40
Beech Ridge Road- Gorham Rd(RT 114) to Payne Rd	40
Black Point Road- Route 1 to Route 77	35
Black Point Road- Starting 0.62 Miles South of Route 77 and Route 207 Junction to Chelder Point Rd	25
Broadturn Road- Ash Swamp Rd to Scarborough/Buxton Municipal Boundary	45
Broadturn Road- Route 1 to Ash Swamp Rd	40
Broadturn Road- U.S Route 1 to 0.23 Miles West	30
Burnham Road- Scarborough/Saco Townline to Scarborough/Gorham Townline	35
Chamberlain Road- Pleasant Hill Rd to 0.35 Miles Northeast of Chamberlain Rd and Highland Ave Junction	25
Connector- Chamberlain Rd to Pleasant Rd	25
Connector- Route 9W and Route 9 to 0.05 Miles of Route 9W and East Grand Ave	35
Connector- Scarborough/South Portland to 0.15 Miles North	40
Cumberland Way- Route 114 to Jameco Mill Rd	25
Cummings Road-Payne Rd to Scarborough/South Portland Townline	35
Deering Road- Route 22 to Scarborough/Buxton Townline	25
Dresser Road- Holmes Rd to Beech Ridge Rd	35
East Grand Ave- Scarborough/Old Orchard Townline to Pine Point Rd and Jones Creek Dr Junction	25
Eastern Road- Portland Farms Road In Scarborough to Route 207	35
Fogg Road- Pleasant Hill Road to 0.64 Miles West of Fogg Rd	30
Fogg Road- Route 207 to Wildrose Lane	35
Haigis Parkway- Route 1 to 250 ft Passed Scottow Hill Rd	35
Haigis Parkway- Scottow Hill Rd to Payne Rd	45
Highland Ave- Route 207 to 0.21 Miles Passed Highland Ave And Chamberlain Rd Junction	35
Highland Avenue- Highland Pine Rd to Scarborough/South Portland Municipal Boundary	45
Highland Avenue- Pleasant Hill Rd to 0.20 Miles of Highland Avenue	35
Highland Avenue- Starting 0.21 Miles Passed Highland and Chamberlain Rd Junction to Pleasant Hill Rd	25
Holmes Rd- Scarborough/Saco Townline to Two Rod Rd	35
Holmes Road- Two Rod Rd to Payne Rd	40
I-295 NB- Starting 0.41 Miles North I-95/I-295 Northbound to 0.22 Miles North of the Maine Turnpike Authority Toll Plaza	35
I-295- Starting at 0.05 Miles of South Portland/Scarborough Townline to 0.04 Miles Passed the Maine Turnpike Authority Toll Pla	35
I-295NB- Starting at I-95NB and I-295NB to 0.41 Miles North Bound	50
I-295S- Starting at 0.04 Miles South of Maine Turnpike Authority Plaza to I-295S Ramp B	50
I-95- Scarborough/Saco Townline to 0.05 Miles North Bound of I-95	65
I-95- Scarborough/South Portland Townline to Scarborough/Saco Townline	65
Jameco Mill Road- Cumberland Way to the end of Public Way	25
Milliken Mill Road- Old Blue Point Rd to Scarborough/Old Orchard Beach Municipal Boundary	45
Mitchell Hill Road- Holmes Rd to Scarborough/Gorham Townline	35
Mussey Road- Payne Rd to Spring St	25
Mussey Road- Spring St to Scarborough/South Portland Towline	40
New Road- Running Hill Rd to Route 114	35
Old Blue Point Road- Burnham Woods Dr to Route 9	30
Old Blue Point Road- Hunter Point Dr to Burnham Woods Dr	40
Old Blue Point Road- Milliken Mills Rd to 0.30 Miles South of Route 1	40
Old Bule Point Road- Route 1 to 0.30 Miles North of Old Blue Point Rd	25
Orchard Hill Road- Winnocks Neck Rd to High Point Rd	25
Payne Rd- Starting 0.06 North of Haigis Pkwy to the End of the Split Portion of the Highway	35
Payne Road- Ginn Rd to Route 1	35
Payne Road- Mussey Rd to Scarborough/South Portland Townline	35
Pine Point Road- Jones Creek Dr to Broadturn Rd	35
Pleasant Hill Road- Fogg Rd to Route 77	40
Pleasant Hill Road- Route 1 to Fogg Rd	35
Pleasant Road- Route 1 to 0.04 Miles East of the Divided Portion of Highway	35

Appendix F • Speed Limit Table

Scarborough Road Segment Name	Speed Limit
Portland Farms Road- Eastern Rd to Route 1	25
Ross Road- Scarborough/Old Orchard Beach Municipal Boundary to Route 9	35
Route 1- Route 1 and Route 1S Junction to 0.24 Miles Passed the Junction	45
Route 1- Starting 0.12 Miles North of Sawyer Rd to 1.35 Miles Route 1 Southbound	35
Route 1- Starting 0.20 Miles North of Scarborough/Saco Townline to Dolloff Dr	35
Route 1- Starting at 0.13 Miles North D.O.T. Garage Entrance to South Gate Rd	50
Route 1- Starting at 0.24 Miles North Route 1 and Route 1S Junction to Scarborough/South Portland Townline	35
Route 114- Payne Rd to 0.63 Miles North of Route 114	45
Route 114- Route 1 to 0.19 Beyond Payne Rd	35
Route 114- Tamarack Lane to Route 22	35
Route 114S/Route 22- Starting at the Junction to the end of Junction	40
Route 1S and Route 1- North of Route 1S and Route 1 to South of Route 1S and Route 1 Junction	45
Route 1S and Route 1- Northeastern Junction of Route 1S and Route 1 to Southwestern Junction of Route 1S, Route 1 and Fair	35
Route 1S- Hillcrest Ave to 0.07 Miles of Route 1S	35
Route 1S/9W- Broadturn Rd to 0.03 Miles South of Route 1S and Route 1 Junction	35
Route 1S/9W- Northeast of Route 1S/9W to Route 1S/9W and Broadturn Rd Junction	35
Route 1S/9W- Northeast of Route 1S/Route 9W to Southwest Route 1S/Route 9W	40
Route 1-South Gate Rd to Sawyer Rd	40
Route 22- Scarborough/Westbrook Townline to 0.70 Miles West of Route 22	35
Route 22-Scarborough/Gorham Townline to Deering Rd	45
Route 701- Starting at the end of I-295 Exit 2 Off Ramp to Route 1	60
Route 77- Ocean Ave to Scarborough/Cape Elizabeth Townline	35
Route 77- Ocean Ave to Stoneridge Dr	40
Route 77- Stoneridge Dr to Route 207	45
Route 9- Junction of Route 9W and Route 9 to 0.04 Miles West of Junction	35
Running Hill Road- Scarborough/South Portland Townline to Running Hill Rd and Route 114 Junction	35
Saco Street- Route 114 to Route 22	30
Saco Street- Route 22 to Scarborough/Gorham Southern Municipal Boundary	40
Saco Street- Scarborough/Westbrook Municipal Boundary to Scarborough/Gorham Townline	45
Scarborough/South Portland Connector- Starting at the Junction to Scarborough/South Portland Townline	60
Scottow Hill Road-Haigis Pkwy to Payne Rd	35
Spring Street- Mussey Rd to the End of the Divided Portion of the Highway.	35
Spring Street- Route 114 to Payne Rd	35
Two Rod Road- Holmes Road to I-95	35
Two Rod Road- Scottow Hill to I-95	25
West Beech Ridge Road- Starting W Beech Ridge Rd to Beech Ridge Road	30
Winnocks Neck Road- Blackpoint Rd to the End of Winnocks Neck Rd	30