Complete Street Prioritization Plan

Chelmsford, Massachusetts

Prepared for
Town of Chelmsford, Massachusetts

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Introduction

Encouraging walking and biking is a priority for the Town of Chelmsford. When residents can replace shorter driving trips with active transportation, it helps lower traffic congestion and improves public health and the livability of the Town. This Prioritization Plan enables the Town to access resources from the Commonwealth's Complete Streets Funding program that can help build sidewalks, bike paths, safer crossings, and many other improvements that can improve our daily lives.

The First Parish Church in Chelmsford Center, the Town's most walkable neighborhood.

A Complete Street is one that provides safe and accessible travel alternatives for all modes—walking, biking, transit, and motorized vehicles. Complete Streets designs contribute towards safety, health, and economic vitality that can be enjoyed by people of all ages and ability. Having multi-modal options to travel between home, work, schools, recreation, and retail destinations is essential in promoting more livable communities.

Complete Streets improvements may be large scale – such as a corridor-wide improvement – or focused on the needs of a single mode – such as a bus shelter for a highly used bus stop. Each improvement must meet current Americans with Disabilities Act (ADA) and the Massachusetts Architectural Access Board (AAB) guidelines.

The Massachusetts Department of Transportation (MassDOT) recognizes the importance of projects which provide thorough, context-sensitive design, multi-modal transportation options. As a way to promote this, MassDOT issued the Healthy Transportation Policy Directive in 2013. This directive, while focused on state and federally-funded roadways, needed to extend to local roads at the

municipal level. It was through the creation of the Complete Streets Funding Program that this was realized.

MassDOT Complete Streets Funding Program

The MassDOT Complete Streets Funding Program was created by legislative authorization through the 2014 Transportation Bond Bill. The intent of this program was to reward municipalities that demonstrated a commitment to Complete Streets both in policy and in practice. This was also a great opportunity to continue to build on the relationship between the Baker-Polito administration and municipalities which had started earlier through the Community Compact Cabinet.

The reward to municipalities that choose to participate includes funding for technical assistance in the development of a Prioritization Plan, and funding for construction of Complete Streets projects selected from the prioritization plan.

The eligibility requirements are designed to demonstrate a municipality's commitment to embedding Complete Streets in policy (Complete Streets Policy) and plan (Complete Streets Prioritization Plan).

The Complete Streets Funding Program is structured with three Tiers.

- Tier 1 – Complete Streets Training and Policy Development
- Tier 2 – Complete Streets Prioritization Plan
- Tier 3 – Project Construction Funding

The Town of Chelmsford completed Tier 1 by passing its Complete Streets Policy on March 9, 2017. This document describes the process used to create the Tier 2 document – Complete Streets Prioritization Plan, which qualifies the Town to submit Tier 3 documents – applications for construction funding for complete streets projects.

The Town of Chelmsford

Chelmsford's varied history as a rural farming community, an early industrial center, and a residential suburb with two major highways dividing it into four unequal parts has given it an equally varied walking and biking environment. It benefits from two historic business centers that are rich in opportunities for walking – Chelmsford Center Village and Vinal Square – and two commercial areas that grew up in the 50s, 60s, and 70s, and are thus more attuned to travel by car – Chelmsford Mall just north of 495 and Drum Hill Road just north of Route 3 in the Westlands neighborhood. Also more attuned to travel by car is the Golden Triangle between Turnpike Road and Billerica Road – a home to dozens of large employers.

Chelmsford's Bruce Freeman Trail

The majority of Chelmsford's housing stock and many of its residential streets that make up the rest of the Town sprung up in the 50s, 60s, and 70s as well, giving many streets a suburban design intended to be for local circulation only. The use of dead end streets and cul-de-sacs is a common feature, as is circuitous routes that can make for a pleasant, park-like experience.

One of the Town's strongest walking and biking assets is the rail-to-trail conversion – the Bruce Freeman Rail Trail – which provides an off-road bicycle and pedestrian connection to Lowell in the north and Acton to the southwest. The existing trail stretches for 6.8 miles, including from border to border in Chelmsford. Phased extensions are underway in various levels of construction, design, and planning that would extend the trail from Framingham in the south to Downtown Lowell in the north.

Chelmsford Center is at the crossroads of four numbered state routes and Westford Street. The same confluence that sometimes earns it a reputation for problematic traffic also creates a place where local businesses can thrive. The center's streetscape has a great variety, with some sections recently paved with brick, some sidewalks in asphalt, and some sidewalks still nonexistent – the

public right of way instead serving as part of parking lots for local businesses. Chelmsford Center's many historic buildings and unique street patterns have many strong opportunities for improving its walkability and enhancing its existing strengths.

Vinal Square sits at the crossroads of Route 3A and Route 40 in North Chelmsford near the Merrimack River and is home to a variety of charming small businesses in close proximity. North Chelmsford has long been discussed as a location for a commuter rail station as part of a more ambitious plan to link Nashua, New Hampshire and Lowell, Massachusetts by train. A number of interesting sightlines and older buildings on oddly-shaped lots to fit skewed roadways also make Vinal Square a great opportunity for making a more walkable town center. Vinal Square also benefits from the higher residential density of North Chelmsford, and the main arterial streets in this section of Town are often wider than in other parts of the town, making bike infrastructure easier to provide.

At the southern edge of North Chelmsford lies the Drum Hill area. Drum Hill is home to Chelmsford High School and McCarthy Middle School, in addition to many larger "big box" businesses and some large employers. Much of the streetscape in this area, especially the interchange over Route 3, is extremely challenging to navigate on foot or on bike.

On the east side of Town, the Golden Triangle's many employees make use of a series of connected parking lots to get from place to place and also frequent Alpha Road – a dead-end for cars that allows people to walk through to Turnpike Road. Often, small crowds of workers can be seen walking up Turnpike Road – which is without sidewalks – to the Center Village.

Four transit routes serve the Town as part of the Lowell Regional Transit Authority (LRTA). Route 5 serves Drum Hill and Lowell. Route 15 serves Chelmsford Center, extending further into Westford to the west and Lowell to the east. Route 16 serves Drum Hill, Chelmsford Center, and the Cross Point complex on the Lowell/Chelmsford border, and terminates in Downtown Lowell. Route 17 connects North Chelmsford and Downtown Lowell. Service is provided six days a week, from approximately 6 AM to 8:30 PM on weekdays and from 8 AM to 5 PM on Saturday at mostly hour intervals, with some half hour and hour and a half intervals. The LRTA website offers a page that tracks the buses in real time. However, many of the existing bus stops are unmarked and very few if any have seating for people awaiting their bus.

The Town has an ambitious plan to build and repair sidewalks Town-wide, released in 2010. In addition, the Chelmsford's Bicycle and Pedestrian Advisory Committee (BPAC) released a Town-wide bicycle and pedestrian plan in 2017 that identified numerous opportunities to improve walking, bicycling and transit facilities. Other relevant plans and studies include the 2010 Chelmsford Master Plan, the 2010 Open Space and Recreation Plan, the 2011 Affordable Housing Plan, the 2013

Historical and Cultural Preservation Plan, the 2013 Center Village Master Plan, and the Vinal Square Master Plan.

Projects on the State's Transportation Improvement Plan (TIP) either underway or in planning include all of the Town's crossings of I-495, including at Hunt Road, Westford Street, Route 4/North Road, and Route 3A/Gorham Street. Two new traffic signals are slated for installation at the intersections of Route 110/Chelmsford Street and the I-495 ramps, and the two intersections adjacent to the North Road/Route 4 and I-495 crossing are slated to be rebuilt. In addition, design work is underway to reconfigure the intersection of Riverneck Road and Route 129/Billerica Road, and the intersection of Boston Road/Route 4, Concord Road, and Parker Road.

The Prioritization Plan

The prioritization process mapped out the conditions of Chelmsford's current biking and walking infrastructure, proximity to local points of interest, environmental justice areas, concentrations of residents with disabilities, and more to weigh the importance of over 70 different proposed projects. It brings together existing data, new field observations, and online and in-person feedback from Town residents. Each project was created to help promote biking, walking, or transit ridership in the Town. A full explanation of the methodology is included in the Methodology section of this report.

Trends and Patterns

Using the inputs described above and in the Methodology section, we looked most carefully at areas with overlapping indicators (for instance, an area near many points of interest with low levels of pedestrian and/or bicycle comfort and high levels of crashes), and explored potential interventions that would increase safety and comfort.

In broad strokes, Chelmsford is in need of basic pedestrian and bicycle infrastructure: sidewalks, bike lanes, bus stops, and stronger crossings. Traffic calming, signal-cycle adjustments, and more safety-conscious design is also needed at certain intersections. In a few specific cases, bicycle wayfinding for routes with less traffic volume can help popularize existing but unknown bike route alternatives to busy streets, particularly when paired with improvements that connect a pair of dead-end streets for pedestrians and bikes. These can happen at a low cost. An existing example of this clever way to prioritize walking and biking can already be found in the path that currently connects Abbot Lane and Livery Road, but would be more useful at places like Kensington Drive to

Watershed Lane and other shared-use paths listed in the plan. This route would formalize what is likely already a safe way for students to commute to the South Row School. Finally, Chelmsford's Center Village and Vinal Square hold opportunities to become more walkable with well-designed streetscape improvements.

Many of these projects are on state-controlled roadways and are therefore not eligible for Complete Streets Funding. Aside from the Vinal Square Streetscape Improvements, the majority of these projects do not justify large projects but rather smaller fixes, such as the addition of a crossing or addition of bike lane markings. It's recommended that the Town discuss these smaller fixes with MassDOT to determine a useful strategy for achieving them.

The Town is steadily building a system of sidewalks in a number of mid-century neighborhoods that were originally built without them. The lack of sidewalks is most notable near village centers or areas with significant employment, though there are only a few gaps left in Vinal Square and Center Village, most notably Dunstable Road and Westford Street. Also, sidewalks around schools and ballfields are highlighted. At the same time, a number of existing facilities lack ADA compliant curb ramps, which means they are not wide enough to allow access for a wheelchair or have portions of deteriorating pavement.

A pedestrian can be seen travelling along Westford Street, which has a high walking propensity level, but no facility.

Outside of Chelmsford's village centers, many major streets lack sidewalks. This includes streets such as Acton Road, Boston Road, Concord Road, and parts of Groton Road and Old Westford Road. Requests for facilities on these streets, in addition to others, were made via the WikiMap, at a public meeting, from Town staff, and the Pedestrian and Bicycle Advisory Committee 8-Year Plan. Major destinations people interest in reaching included Roberts Field on the west side of Town, nature preserves on the southern side of Town such as Thanksgiving Ground Forest and Great Brook Farm State Park, and the Carlisle Street Fields on the eastern side of Town.

The Town of Chelmsford has committed to increasing sidewalk mileage town-wide. Facilities mentioned as a high priority for Town staff, along with those mentioned by residents, are included in

the plan. For a full map of pedestrian improvements projects, including sidewalk construction, see **Figure 3.**

Improved crossings for these sidewalks were also identified in the plan for several locations, including some simple signal cycle improvements that would create an easier and quicker crossing for students crossing Route 3 to get to Drum Hill Road.

One project in the plan proposes to improve several key bus stops. Daily ridership on Chelmsford's LRTA bus routes to Chelmsford is low, but providing a bench on which customers can comfortably wait can help increase those numbers, as well as popularizing the LRTA's bus tracker app for smart phones. When a bench is also in a village center or other heavily trafficked area, it can serve as a place for pedestrians to rest momentarily. Seating is an important element in creating vibrant town centers.

Chelmsford's need for new sidewalks has the potential to eclipse the call for bike facilities in the public forum, but for families and children in the Town, some basic biking improvements could have a significant impact when used to expand upon Chelmsford's greatest biking asset such as the Bruce Freeman Rail Trail. Most crossings of the trail have been improved, although two in Center Village have been noted as a high priority in the plan. If these crossing improvements are paired with other bicycle safety improvements in Chelmsford Center Village – such as bike lanes that help users of the trail circulate to local businesses – the Town will be well-situated to become a destination for path users in the future, particularly as extensions are added to the rail trail. Bicycle wayfinding can also help local families and visiting cyclists unlock Chelmsford's other great natural assets using streets that already feel safe and comfortable to ride on.

Chelmsford's Center Village and Vinal Square call for more than basic sidewalks. Chelmsford Street deserves special attention. The section of Chelmsford Street between the Lowell City line and Chelmsford Center was home to the highest number of bicycle and pedestrian crashes in three years of data examined. This included four bicycle crashes and six pedestrian crashes. In addition, due to the high number of mentions the corridor received from various stakeholders, along with its proximity to major points of interest, such as Chelmsford Center Village, Chelmsford Mall, and the Bruce Freeman Rail Trail, projects in this

Existing sidewalks in Chelmsford Center.

corridor received high priority. Projects include improvements of the Bruce Freeman Rail Trail crossing at Chelmsford Street and at Central Square, sidewalk improvements along Chelmsford Street, improved connections between the roadway and the Bruce Freeman Trail, bicycle wayfinding signs directing users to the trail, bike lanes along Chelmsford Street from I-495 to the Lowell City Line, and signal improvements at Chelmsford Street and Glen Avenue, the last two of which lie on state-owned roadway. Lastly, but most importantly, sidewalks in Center Village, if widened and designed to prioritize pedestrian comfort, could help popularize the local business area.

Vinal Square holds the same opportunity, but is largely on state-controlled Tyngsboro Road. In combination with a bike lane on Princeton Street, a sidewalk widening in Vinal Square could reap significant benefits for the local business community, and spark investment and new development.

Project Selection and Prioritization

Based on the analysis described in the Methodology section and community input, a ranked list of projects was generated. HSH's analysis not only fulfills MassDOT's prioritization requirements, but also adds information that can be useful to the Town in other ways, such as notable mitigation needs that can be fulfilled by new developers or a better understanding of existing biking and walking networks.

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Table 1. *MassDOT Prioritization Plan*

MassDOT Complete Streets Funding Program Project Prioritization Plan (Revised 3/31/16)

Municipality Chelmsford
MassDOT District 4
Date 4/7/2017
Name/Title Steve Jahnle/Assistant Director of Public Works

Project Details			EJ	Complete Streets Location			Project Origin and Type		Complete Streets Needs								Complete Streets Funding Request			Construction Schedule	
Rank	**Project Name**	**Project Description**	**Environmental Justice Population**	**Project Limits**	**Project Start Location: X,Y Coordinates** (MA State Plane meter)	**Project End Location: X,Y Coordinates** (MA State Plane meter)	**Complete Streets Project Origin** (planning documentation or supporting analysis)	Complete Streets Project Type (refer to the Eligible Projects Worksheet)	Safety	ADA Accessibility	Pedestrian Mobility	Bicycle Mobility	Transit Operations and Access	Vehicular Operations	Freight Operations	**Will this project be in Coordination with other Communities?** (list, if applicable)	**Total Estimated Project Cost**	**Complete Streets Funding Requested**	**Other Funding Source(s) and Amount** (if applicable)	**Anticipated Construction Duration** (number of months)	**Desired Construction Start Date** (month/year)
1	Bruce Freeman Trail -- Chelmsford Street Crossing Improvements	Narrowing Chelmsford Street from 38-41 feet to 32 feet to widen 6 foot sidewalk to 12+ foot wide shared path on west side of Chelmsford South of Fletcher to Bruce Freeman Rail Trail, also Narrowing Chelmsford Street from 41 feet to 32 feet to accommodate 10' shared use path on either side of the crossing north of Fletcher, and a 10-12 foot wide path on the east side of Chelmsford street to connect again to Bruce Freeman Rail Trail. Note drainage and telephone pole moves. Upgrade Signal Equipment to include bike crossing signal for crosswalk area south side of Chelmsford/Fletcher intersection. Possible signal moves and/or upgrades to accommodate path widenings above.	No	Chelmsford Street from Wilson Street to Alpine Road	212419.265188, 927709.312504	212544.624931, 927891.812595	CS Needs Assessment	S1, B1, B10, B12, P1, P5	x	x	x	x				No	$188,200	$188,200	Chapter 90 Funds	3	07/2018
2	Chelmsford St Sidewalk Improvements	Install sidewalks on west side of Chelmsford ST from Bruce Freeman Rail Trail to Central Square (Billerica Rd) (Allow Strip Malls to guide pedestrians to sidewalks along store frontages to allow existing nose-in parking, establish narrow curb cuts for larger lots), on East side of Chelmsford Street from Bruce Freeman Rail trail to Alpine Lane, and one short (100') section north of Alpine St on the west side of 110. Pedestrian indicators should be added where missing at Alpine Lane. Town recommends brick accent on sidewalk landscaping zone. Add one crosswalk with pedestrian crossing signage across Chelmsford St (110) at Alpine Road.	No	Chelmsford Street from Alpine Road to Billerica Road	212606.671612, 927982.062541	212191.687405, 927385.187715	CS Needs Assessment	P1, P10	x	x	x					No	$378,800	$378,800	Chapter 90 Funds	2	07/2018
3	Bruce Freeman Trail -- Central Square Crossing Improvements	Narrowing travel lanes in Central Square (route 4) to accommodate bike lanes in either direction. (See connecting routes on Chelmsford St, Acton Rd, Billerica Rd). Extend Southern part of Bruce Freeman Path across parking lot to connect to shared use path (take one parking space do so). Widen Pedestrian Refuge opening to include a bike-crossing to ped refuge, and another from ped refuge to Northern part of Bruce Freeman Path's refuge. Increase size of this ped refuge (between parking lot curb cuts) from 12 feet wide to 38 feet wide to accommodate bikes and peds from ped refuge in center of central square. Existing signal phase includes an all walk, which could be used to also provide a bicycle crossing between the crosswalks if signal heads are included.	No	Littleton Road at North Road	212120.859364, 927400.83014	212134.495954, 927400.201154	CS Needs Assessment	S1, S10, B1, D2, B10, P10	x	x	x	x				No	$55,400	$55,400	Chapter 90 Funds	2	07/2019
4	Vinal Square Streetscape and Safety Improvements (See Figure) and North Town Hall Crossing Improvements	T-up Dunstable Road to create new mini-plaza for North Chelmsford Hardware access, with loading zone. T-up Groton Rd to Princeton Street to create new mini-plaza in front of 17 Vinal Square. Includes shortening of pedestrian crossing distance and signal improvements to include APS and LPI.. New stamped pavement crosswalks at crossing of Wotton Street, at crossing of Princeton St at Wotton St., and at crossing of Groton St. Add one bench and bus stop in front of Veneto, add one bench and bus stop in front of consignment corner on Groton Rd. T-up Middlesex St to Princeton St creating new plaza and increased streetside parking for 40 Vinal Square and Pickens Insurance Building. Add one bus stop with one bench at existing stop across from Shaw Street. . Install new sidewalk from Shaw Street to 300 feet northwest. Created stamped pavement crosswalks across Princeton at Shaw, across Shaw, and across middlesex in two locations, one existing and one new at Princeton. Relocate existing crosswalk to South Side of Washington/Cottage Row (mid-block crossing) and install bumpouts and RRFB Crossing.	No	Dunstable Road at Groton Road to Princeton Street at Gay Street	209502.424744, 932125.587978	209747.1188, 931888.570827	CS Needs Assessment	S13, S14, S17, P2, P5, P8, P13, P14, T1, T3, TO	x	x	x					No	$373,600	$0	MassDOT	6	TBD
5	Chelmsford Street North Buffered Bike Lanes	Buffered Bike Lanes on Chelmsford Street from Stedman Street to Glen Avenue.	No	Chelmsfrom Street from Stedman Street to Glen Avenue	212909.156042, 928489.375102	213809.874642, 929103.562599	CS Needs Assessment	B2	x			x				No	$44,400	$0	MassDOT	1	TBD
6	Crosswalk across North Road at Parkhurst	One additional crosswalk is needed to line up with existing sidewalks on adjacent streets. Will require changes to traffic island, new ramps, changes to the signal cycle and additional ped heads for the existing signal.	No	Parkhurst Road at North Road	210322.940599, 931217.450895	N/A	CS Needs Assessment	P2, P9	x	x	x					No	$35,000	$35,000		1	07/2017

Table 1. ***MassDOT Prioritization Plan Continued...***

MassDOT Complete Streets Funding Program Project Prioritization Plan (Revised 3/31/16)

Municipality Chelmsford **Date** 4/7/2017
MassDOT District 4 **Name/Title** Steve Jahnle/Assistant Director of Public Works

Project Details			EJ	Complete Streets Location			Project Origin and Type		Complete Streets Needs								Complete Streets Funding Request			Construction Schedule	
Rank	**Project Name**	**Project Description**	**Environmental Justice Population**	**Project Limits**	**Project Start Location: X,Y Coordinates** (MA State Plane meter)	**Project End Location: X,Y Coordinates** (MA State Plane meter)	**Complete Streets Project Origin** (planning documentation or supporting analysis)	Complete Streets Project Type (refer to the Eligible Projects Worksheet)	Safety	ADA Accessibility	Pedestrian Mobility	Bicycle Mobility	Transit Operations and Access	Vehicular Operations	Freight Operations	**Will this project be in Coordination with other Communities?** (list, if applicable)	**Total Estimated Project Cost**	**Complete Streets Funding Requested**	**Other Funding Source(s) and Amount** (if applicable)	**Anticipated Construction Duration** (number of months)	**Desired Construction Start Date** (month/year)
7	Central Square Sidewalk expansion	Widening sidewalks at Central Square in Chelmsford Center using excess space from roadway.	No	Acton Road from Billerica Road to Bartlett Street	212134.495954 ,927400.201154	212215.203 ,927008.8124	CS Needs Assessment	S2, P1, P5	x	x	x					No	$236,000	$236,000	Chapter 90 Funds, Town Capital Funds	2	07/2019
8	Bruce Freeman Trail - Chelmsford Cyclery Connection	Create an access point behind the Chelmsford Cyclery to allow bike and pedestrian access to parking lots on either side.	No	Chelmsford Street at 30 Chelmsford Street	211927.810798, 928264.938901	212020.666712, 927822.626577	CS Needs Assessment	B1, P5	x	x	x	x				No	$5,000	$5,000		1	07/2018
9	Chelmsford Center Bike Access Improvements	Bike Lanes added to North Road to the north and Billerica Road to the east for a 3,500 feet distance out from Chelmsford Center, added to Chelmsford Street for 3,000 feet north, and added to Route 4 from the center to Summer Street. Also adding Sharrows to Summer street and Fletcher Street.	No	North Road from Billerica Road to Dalton Road, Chelmsford Street from Billerica Road to I-495 Ramp, Billerica Road from Chelmsford Center to Turnpike Road. Academy and Fletcher Street.	(212191.687405 ,927385.187715), (212191.687405 ,927385.187715), (212134.495954 ,927400.201154)	(212625.4527 ,928019.3125), (213065.124527 ,927669.562777), (212215.203 ,927008.8124)	CS Needs Assessment	B2	x	x		x				No	$123,300	$123,300		4	07/2019
10	Tyngsborough Road Sidewalks	Sidewalks on Tyngsborough Road from Williamsburg Condominiums to Vinal Square.	No	Tyngsborough Road from Vinal Square to Wellman Avenue	211354.084243, 927071.88091	208496.275122, 925368.484732	CS Needs Assessment	P5	x			x				No	$501,200	$0	MassDOT	3	TBD
11	Littleton Road Multimodal Improvements	Sidewalks on Littleton Road/Route 110 from end of existing facility at 115 Littleton Road to Westford Town Line.	No	Littleton Road from 115 Littleton Road to Town Line	212077.698805, 927449.064297	211917.812412, 927539.062705	CS Needs Assessment	P5	x	x	x	x				No	$2,151,900	$0	MassDOT	9	TBD
12	Town Common Pedestrian Improvements	Sidewalk on south side of Westford Street between Bridge Street and First Parish United Church, approximately 400 feet. Intall crosswalk at Academy Street and Westford Street with pedestrian crossing signage.	No	Westford Street from Bridge Street to First Parish Unitarian Church	212026.542421, 927248.325897	212309.117998, 927246.209241	CS Needs Assessment	P5, P9	x	x	x					No	$88,200	$88,200	Chapter 90 Funds, Town Capital Funds	1	07/2020
13	Formalize Beaver Brook Path from Boston Rd/Acton Rd to Summer Street/Brook Street	This path could connect to other paths to the west (Cushing Place to the Bruce Freeman Trail) and a calm network of streets to the east. It would help create a Chelmsford Center that incorporates open space and parks.	No	Cushing Place to Bruce Freeman Trail	213806.133505, 929109.408803	213812.647111, 929094.642921	Master Plan	B1	x	x	x					No	$161,100	$161,100		2	TBD
14	Chelmsford Street/Glen Avenue/East Gate Plaza	Signal heads are missing for pedestrians at this location. Pedestrian indicators with countdown clocks should be installed.	No	Chelmsford Street at Glen Avenue and East Gate Plaza	212191.687405, 927385.187715	212925.281025, 927643.437417	CS Needs Assessment	S16	x	x	x			x		No	$8,600	$0	MassDOT	1	TBD
15	Billerica Road Sidewalk	Sidewalk and ADA improvements from Chelmsford Center School.	Yes	Chelmsford Center School to Chelmsford Center	210905.833237, 930309.015431	211017.928424, 930120.855432	CS Needs Assessment	P5	x	x	x					No	$108,000	$108,000	Chapter 90 Funds, Town Capital Funds	2	07/2017
16	Drum Hill Rotary Pedestrian Safety Enhancements	Signal changes at the Drum Hill Rotoary would allow concurrent movements and reduce pedestrian delays. Crosswalks over the chanelized right turns could be made pedestrian actuated.	No	Drum Hill Rotary	210905.833237, 930309.015431	210734.982803, 930698.250125	CS Needs Assessment	S3	x	x	x			x		No	$5,000	$0	MassDOT	1	TBD
17	North Road Sidewalk Installation (State)	Sidewalks on North Road between Drum Hill Rotary and Technology Drive. State owned and operated portion. Note: lots of space.	No	North Road from Drum Hill Rotary to Technology Drive	211085.572337, 930253.330309	211492.14904, 930615.499327	CS Needs Assessment	P5	x	x	x					No	$290,000	$0	MassDOT	1	TBD
18	Drum Hill Road	Install sidewalk on south side of Drum Hill Road from Drum Hill Rotary to Lowell city line to match existing sidewalk on the north side.	No	Drum Hill Road from just after Drum Hill Rotary to Lowell City Line	211488.294645, 930612.643216	211194.312392, 929504.937935	CS Needs Assessment	P5	x	x	x					No	$353,900	$353,900	Chapter 90 Funds, Town Capital Funds	3	07/2022
19	Parkhurst Road Multimodal Improvements	Sidewalks on Parkhurst Road from Drum Hill Road to the Route 3 crossing. Use minimum lane width on Parkhurst Road. The road is 30 feet wide, 10.5 foot wide travel lanes allow for 4.5 foot shoulders. 10 foot wide travel lanes allow for 5-foot wide bike lanes (preffered)	No	Parkhurst Road from Drum Hill Road to Route 3 Crossing	213643.436487, 929060.158743	213646.396591, 929055.198608	CS Needs Assessment	B2, P5	x	x	x	x				No	$358,000	$358,000	Chapter 90 Funds, Town Capital Funds	2	07/2020
20	Chelmsford Street and Dalton Road intersection safety improvements	Safety improvements at the intersection of Dalton Road and Chelmsford Street. Would including tightening the intersection, while maintaining access to all local driveways and adding crosswalks where possible.	No	Chelmsford Street at Dalton Road	211194.312392, 929504.937935	211941.282543, 928236.748677	CS Needs Assessment	S14, S16, P5, P9	x	x	x	x		x		No	$67,400	$0	MassDOT	1	TBD
21	Princeton Street and North Road Intersection Improvements	Recommend planning study for redesign of intersection.	No	Princeton Street at North Road	213704.103882, 928797.766271	212124.757701, 927409.05611	CS Needs Assessment	S14, S16, P5, P9	x	x	x	x	x	x		No	TBD	$0	MassDOT	12	TBD
22	Bicycle Wayfinding Chelmsford Mall-Chelmsford Center	Bicycle Wayfinding that utilizes Bruce Freeman Rail Trail between Chelmsford Mall and Chelmsford Center.	No	Chelmsford Mall to Chelmsford Center	212143.56554, 927280.059298	212018.585048, 927325.293	CS Needs Assessment	B7	x			x				No	$7,800	$7,800		1	07/2018

Table 1. ***MassDOT Prioritization Plan Continued...***

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Project Details			EJ	Complete Streets Location			Project Origin and Type		Complete Streets Needs									Complete Streets Funding Request			Construction Schedule	
Rank	**Project Name**	**Project Description**	**Environmental Justice Population**	**Project Limits**	**Project Start Location: X,Y Coordinates** (MA State Plane meter)	**Project End Location: X,Y Coordinates** (MA State Plane meter)	**Complete Streets Project Origin** (planning documentation or supporting analysis)	Complete Streets Project Type (refer to the Eligible Projects Worksheet)	Safety	ADA Accessibility	Pedestrian Mobility	Bicycle Mobility	Transit Operations and Access	Vehicular Operations	Freight Operations	**Will this project be in Coordination with other Communities?** (list, if applicable)	**Total Estimated Project Cost**	**Complete Streets Funding Requested**	**Other Funding Source(s) and Amount** (if applicable)	**Anticipated Construction Duration** (number of months)	**Desired Construction Start Date** (month/year)
23	Bicycle Wayfinding Cushing Place to Bruce Freeman Rail Trail	Using Sharrows and bicycle wayfinding signage, connect Cushing Place and the crosswalk at Boston/Rd and Acton Road to the Bruce Freeman Rail Trail.	No	Cushing Place to Bruce Freeman Trail	207520.202925, 931135.250316	208842.187537, 931908.687779	CS Needs Assessment	B7, B9	x			x				No	$4,500	$4,500		1	07/2018
24	Groton Road Bike Lanes and sidewalk installtion	Bike lanes from town limit to Vinal Square. Sidewalk installation from town limit to Doris Drive, Lynn Ave to Willis Drive	No	Groton Road from Lynn Avenue to Willis Drive	210690.045623, 929942.873996	210989.969126, 929930.561383	CS Needs Assessment	B2, P5	x	x	x	x				No	$767,000	$400,000	Chapter 90 Funds, Town Capital Funds	5	07/2021
25	Crossing Improvements at McCarthy School	RRFB across Old Westford Road at existing crosswalk just south of Olde North Road. Create ped refuge islands on either side with 5 foot clear between ped refuge and existing curb to maintain shoulder ROW for bikes. Street is 44 feet wide, 5-6-11-11-6-5 with 6 being the ped refuges.	No	Old Westford Road at McCarthy Middle School and North Road at McCarthy Middle School	211982.31212, 927504.250211	209117.484177, 928472.312742	CS Needs Assessment	P7, P12	x	x	x					No	$70,600	$70,600	Chapter 90 Funds, Town Capital Funds	1	07/2022
26	Westford Street sidewalks	Roberts Field to Town Center.	No	Westford Street from Chelmsford Center to Roberts Field	209545.812191, 932119.18789	208148.147898, 933498.951622	CS Needs Assessment	P5	x	x	x					No	$2,013,000	$400,000	Chapter 90 Funds, Town Capital Funds	7	TBD
27	Tyngsborough Road Bike Lanes	From Vinal Square to Tyngsboro town line. 34 feet wide allows for 5 foot wide bike lanes but preferred for traffic calming would be narrowing traffic lanes to 10.5 feet wide with 5.5 foot bike lanes. The narrower lanes will help slow traffic.	No	Tyngsborough Road from Vinal Square to Tyngsborough Town Line	211205.827823, 929491.937716	210393.687194, 929652.62529	CS Needs Assessment	B2	x			x				No	$95,000	$0	MassDOT	1	TBD
28	Davis Road Sidewalks	Sidewalk reconstruction and ADA improvements on the length of Davis Road.	No	Davis Road from North Road to Graniteville Road	212087.56239, 927544.31272	212058.077935, 927665.937782	CS Needs Assessment	P1	x	x	x					No	$221,000	$221,000		2	TBD
29	North Road Sidewalks South	Sidwalk reconstruction with brick from Fletcher Street to Academy Street.	No	North Road from Academy Street to Fletcher Street	213087.280838, 927664.12533	214797.546694, 925730.437521	CS Needs Assessment	P1	x	x	x					No	$73,200	$73,200		1	07/2023
30	Turnpike Road Sidewalks	Sidewalks on Turnpike Road for its entire length.	Yes	Turnpike Road from Billerica Road to Mill Road	210860.652221, 930092.259204	209451.765409, 929621.875124	CS Needs Assessment	P5	x	x	x					No	$948,000	$400,000	Chapter 90 Funds, Town Capital Funds	4	07/2023
31	Parker and McCarthy School Zone Signage	Install school zone signage at Parker and McCarthy Schools.	No	Parker Middle School and McCarthy Middle School	210230.195396, 931318.644642	209936.296635, 929862.000036	CS Needs Assessment	S7	x	x	x	x		x		No	$2,400	$2,400		1	TBD
32	Richardson Road Multimodal Improvements	Sharrows from Princeton Street to Edgelawn Avenue, and from Harrington Elementary to Crooked Spring Road. Bike lanes from Edgelawn Avenue to Harrington Elementary, and from Crooked Spring Road to Granitveville Road. Sidewalks from Edgelawn Ave to Princeton Street.	No	Richardson Road from Princeton Street to Graniteville Road	213268.421827, 927596.125103	216209.234121, 929062.062537	CS Needs Assessment	B2, B8	x	x	x	x				No	$515,600	$400,000	Chapter 90 Funds, Town Capital Funds	1	07/2017
33	Riverneck Road multimodal improvements	Buffered Rumble strip Bike Lanes on Riverneck Rd from Orleans Street to Canal Street. Installation of sidewalks from Billerica Road to Gorham Street	No	Riverneck Road from Billerica Road to Gorham Street	210970.359046, 926811.874716	210886.65623, 926904.250211	CS Needs Assessment	B2, P5	x	x	x	x				No	$2,425,200	$400,000	Chapter 90 Funds, Town Capital Funds	12	TBD
34	Lime Quarry-Bruce Freeman Connection	Create a bike path connecting Littleton Road and the Bruce Freeman Rail Trail, create crossing with yield signs. Path would connect the existing Lime Quarry entrance and parking lot to the Bruce Freeman Trail with a crossing of Beaver Brook. (See Open Space Map at http://www.townofchelmsford.us/DocumentCenter/View/266)	No	Bruce Freeman Trail to Lime Quarry via Littleton Road	208722.933387, 924331.029405	209749.359318, 924534.999893	CS Needs Assessment	B1, B10	x	x	x	x				No	$84,200	$84,200	Chelmsford Land Trust	2	TBD
35	Parkerville Road	Install sidewalks along Parkerville Road from Westford town line to Maple Road.	No	Parkerville Road from Westford Town Line to Maple Road	209942.748348, 929883.17233	209965.624504, 929854.937495	CS Needs Assessment	P5	x	x	x					No	$696,000	$400,000	Chapter 90 Funds, Town Capital Funds	2	TBD
36	Sully's-Parker School Crossing of Richardson Road	This crossing is frequented by students of the Parker School and others in the neighborhood, yet turning radii are overly generous and there is no existing crosswalk. This project would change turning radii to minimum needed and add a crosswalk over Richardson Road that would have a shorter crossing distance.	No	Richardson Road at Parker School	209543.734007, 928983.875023	208043.866278, 927697.364931	CS Needs Assessment	S13, P9	x	x	x					No	$31,600	$31,600		1	TBD

Table 1. ***MassDOT Prioritization Plan Continued...***

MassDOT Complete Streets Funding Program Project Prioritization Plan (Revised 3/31/16)

Municipality Chelmsford **Date** 4/7/2017
MassDOT District 4 **Name/Title** Steve Jahnle/Assistant Director of Public Works

Project Details			EJ	Complete Streets Location			Project Origin and Type		Complete Streets Needs								Complete Streets Funding Request			Construction Schedule	
Rank	**Project Name**	**Project Description**	**Environmental Justice Population**	**Project Limits**	**Project Start Location: X,Y Coordinates** (MA State Plane meter)	**Project End Location: X,Y Coordinates** (MA State Plane meter)	**Complete Streets Project Origin** (planning documentation or supporting analysis)	Complete Streets Project Type (refer to the Eligible Projects Worksheet)	Safety	ADA Accessibility	Pedestrian Mobility	Bicycle Mobility	Transit Operations and Access	Vehicular Operations	Freight Operations	**Will this project be in Coordination with other Communities?** (list, if applicable)	**Total Estimated Project Cost**	**Complete Streets Funding Requested**	**Other Funding Source(s) and Amount** (if applicable)	**Anticipated Construction Duration** (number of months)	**Desired Construction Start Date** (month/year)
37	Old Westford Road Sidewalks	This project complements existing sidewalks on Old Westford Road between Graniteville Road and Arbutus Avenue and between Baldwin Road and Thomas Drive. It would build a new sidewalk between the end of the existing facility at Arbutus Avenue and Baldwin Road and between Thomas Drive and the Westford Town Line.	No	Old Westford Road from end of existing sidewalk at Arbutus Avenue to Baldwin Road and from Thomas Drive to Westford Town Line	209618.06201, 932045.562823	211167.946413, 931663.035323	CS Needs Assessment	P5	x	x	x					No	850,600	$400,000	Chapter 90 Funds, Town Capital Funds	4	TBD
38	Middlesex Street Buffered Bike Lane	Vinal Square to Lowell City Line.	No	Middlesex Street from Vinal Square to Lowell City Line	215040.663708, 926601.397096	212981.812404, 925541.937543	CS Needs Assessment	B2	x	x		x				No	$85,500	$85,500		1	TBD
39	Mill Road sidewalks	Raymond Road to Elizabeth Drive.	Yes	Mill Road from Raymond Road to Elizabeth Drive	210062.890203, 924536.625025	210147.184278, 924551.324046	CS Needs Assessment	P5	x	x	x					No	$1,330,500	$400,000	Chapter 90 Funds, Town Capital Funds	5	TBD
40	Kate's Corner Sidewalk Improvements	Reduce turning radii by creating a larger at SW corner of Maple Rd and Acton Rd (preserving one parking space away from intersection, eliminating turning lanes, and T-up Common Street to reduce traffic speeds through intersection. (School area) Crosswalk would be relocated to become more visible to turning traffic, and crosswalk warning signage added.	No	Kate's Corner, Maple Road at Acton Road	211198.812405, 927844.374893	211927.810798, 928264.938901	CS Needs Assessment	S7, S13, S14, P9	x	x	x	x		x		No	$34,000	$34,000		1	TBD
41	North Road Sidwalk Construction Orchard Lane to Dalton Road	Sidewalk reconstruction from Orchard Road to Dalton Road.	No	Orchard Lane to Dalton Road	210322.940599, 931217.450895	210384.194806, 931201.32141	CS Needs Assessment	S14, P1	x	x	x					No	$324,400	$324,400		3	TBD
42	Boston Road Sidewalks Cambridge Street to Mill Road.	This section of sidewalk would connect South Row School students and churchgoers to local shops and to the existing sidewalk on Boston Road. Many people walk here, according to community comments. 8 feet wide preferred for shared use accommodation.	No	Boston Road from Cambridge Street to Mill Road	209545.812191, 932119.18789	212077.698805, 927449.064297	CS Needs Assessment	P5	x	x	x					No	$978,000	$400,000	Chapter 90 Funds, Town Capital Funds	4	TBD
43	Bicycle wayfinding, Vinal Square to Chelmsford Center	Vinal Square - Princeton St--Richardson Road--Graniteville Road--Pilgrim Road--Old Westford Road--Brentwood Rd--Westford Road - Chelmsford Center	No	Vinal Square - Princeton St--Richardson Road--Graniteville Road--Pilgrim Road--Old Westford Road--Brentwood Rd--Westford Road - Chelmsford Center	212010.21784, 927142.363558	212116.279002, 927051.26542	CS Needs Assessment	B7	x			x				No	$153,000	$153,000		2	TBD
44	Bartlett-Bruce Freeman Connection Phase I	Blaze a walking path from Bruce Freeman Rail Trail to Acton Road via the Bartlett Woodlot, include a RRFB crossing to Bartlett Park.	No	Bruce Freeman Trail to Acton Road	212389.755135, 929851.057314	212414.812428, 929862.999902	CS Needs Assessment	B10, P12	x	x	x	x				No	$72,600	$72,600	Chelmsford Land Trust	1	07/2021
45	Bartlett-Bruce Freeman Connection Phase II	Blaze a walking path from Acton Road to Adams Avenue (and the library) via Bartlett Park.	No	Acton Road to Adams Avenue	212013.015238, 927854.99994	212027.624645, 927793.18772	CS Needs Assessment	B10	x	x	x	x				No	$5,000	$5,000	Chelmsford Land Trust	1	07/2018
46	Crossing improvements at Stedman Street and Smith Street	Advanced Pedestrian Crossing Signage at the following locations: Along Stedman Street just east and west of Smith Street; at Crosswalk on Smith Street near Chelmsford Arms.	No	Smith Street at Chelmsford Arms to Smith Street at Stedman Street	209117.484177, 928472.312742	207938.984098, 929779.062681	CS Needs Assessment	P8, P9	x	x	x					No	$2,400	$2,400		1	TBD
47	Bike Racks	Addition of bike racks to sidewalk locations in Vinal Square (2), Chelmsford Center (6) and Chelmsford Mall (2), Addition of bike racks to the following facilities and parks: Senior Center, MacKay Branch Library, Community Education Building, Varney Park (3), Robert's Field (3), Southwell Field, Murphy Field, Graniteville Road Athletic Fields (2), Highland Field, Chelmsford Country Club/Golf Cource, North Town Hall.	No	Townwide	209577.359, 932089.3127), (212119.7923, 927425.4406), (213600.2654, 929039.9999), (208944.2029, 932154.5), (209515.7808, 931889.2502), (212987.406, 928978.0003), (209243.9436, 931799.6164), (209066.5204, 928430.5915), (209799.7027, 932364.0001), (213943.4058, 925196.0001), (210393.6872, 929652.6253), (210266.9841, 931523.6254), (210747.0445, 924842.1308), (209747.1188, 931888.5708)	N/A	CS Needs Assessment	B3			x	x				No	$52,000	$52,000		1	TBD

Table 1. ***MassDOT Prioritization Plan Continued...***

MassDOT Complete Streets Funding Program Project Prioritization Plan (Revised 3/31/16)

Municipality Chelmsford
MassDOT District 4
Date 4/7/2017
Name/Title Steve Jahnle/Assistant Director of Public Works

Project Details			EJ	Complete Streets Location			Project Origin and Type		Complete Streets Needs								Complete Streets Funding Request			Construction Schedule	
Rank	**Project Name**	**Project Description**	**Environmental Justice Population**	**Project Limits**	**Project Start Location: X,Y Coordinates** (MA State Plane meter)	**Project End Location: X,Y Coordinates** (MA State Plane meter)	**Complete Streets Project Origin** (planning documentation or supporting analysis)	Complete Streets Project Type (refer to the Eligible Projects Worksheet)	Safety	ADA Accessibility	Pedestrian Mobility	Bicycle Mobility	Transit Operations and Access	Vehicular Operations	Freight Operations	**Will this project be in Coordination with other Communities?** (list, if applicable)	**Total Estimated Project Cost**	**Complete Streets Funding Requested**	**Other Funding Source(s) and Amount** (if applicable)	**Anticipated Construction Duration** (number of months)	**Desired Construction Start Date** (month/year)
48	School Street Sidewalks	Graniteville Road to Robert's Field.	No	School Street from Graniteville Road to Robert's Field	209491.281104, 932042.000317	209438.640342, 931957.437831	CS Needs Assessment	P5	x	x	x					No	$653,400	$400,000	Chapter 90 Funds, Town Capital Funds	3	TBD
49	Princeton Street Buffered Bike Lanes	At 34 feet wide, Princeton Street is wide enough to accommodate buffered bike lanes that are 5 feet wide with one foot of buffer. These bike lanes would extend from Vinal Square to Richardson Road. Princeton Street has had two bike crashes on it in three years, making it one of Chelmsford's most dangerous.	No	Princeton Street from Vinal Square to Richardson Road	207938.984098, 929779.062681	207621.829781, 929543.468404	CS Needs Assessment	B2	x			x				No	$51,500	$0	MassDOT	2	TBD
50	Bus Stops, bike racks and Streetscape Improvements	13 Benches and 13 Bike Racks and signage & route information where applicable at the following bus stop locations near local business centers for Route 5 (20 Drum Hill Road), for Route 15 (10 Billerica Road Outbound, 47 Billerica Road inbound), For Route 16 (34 Central Square(266), Fletcher Street (317 & 724), 10 Summer St.(11), Chelmsford & Glen Ave (235 & 225), McCarthy Middle School), and for Route 17 (3 stops in Vinal Square)-- (Also suggest encouraging private benches at Walmart and Kohl's)	No	Townwide	(211456.9372, 930589.3754), (212415.8906, 927423.3752), (212468.0624, 927468.3749), (212153.5208, 927275.7702), (213809.874642, 929103.562599), (211012.8278, 929845.4378), (212037.273688, 927527.457284), (209629.205074, 932032.338856)	N/A	CS Needs Assessment	B3, P1, T1	x	x	x	x	x			No	$64,400	$64,400		2	TBD
51	Main Street Improvements West	Sidewalk reconstruction and ADA improvements from School Street to the Westford line. Narrow Travel Lanes to 10.5 or 11 feet to provide wider shoulder for speed reduction and bike access.	No	Main Street from School Street to Westford Town Line	212726.171794, 925799.250277	212101.67631, 923509.677953	CS Needs Assessment	S15, P1	x	x	x	x				No	$51,500	$51,500		1	TBD
52	Main Street Improvements East	Sidewalk construction on Main Street from School Street to Groton Road. Narrow Travel Lanes to 10.5 or 11 feet to provide wider shoulder for speed reduction and bike access.	No	Main Street from Groton Road to School Street	215962.968344, 926897.187744	216422.265544, 928233.687444	CS Needs Assessment	S15, P1	x	x	x	x				No	$1,347,600	$400,000	Chapter 90 Funds, Town Capital Funds	5	TBD
53	Concord Road Sidewalks	Boston Road to Town Limit (Preserve 32-34 foot width for potential bike lanes).	No	Concord Road from Boston Road to Carlisle Town Line	212280.8102, 927568.755835	212287.448989, 927568.990166	CS Needs Assessment	P5	x	x	x					No	$1,490,000	$400,000	Chapter 90 Funds, Town Capital Funds	6	TBD
54	Brick Kiln Road	Install sidewalks on Brick Kiln Road from Carlisle Street to Moore Street.	No	Brick Kiln Road from Carlisle Street to Moore Street	212010.21784, 927142.363558	211891.843899, 927245.447909	CS Needs Assessment	P5	x	x	x					No	$314,200	$314,200		1	TBD
55	Byam School - Bruce Freeman Rail Trail Connection	Improve Bruce Freeman Rail Trail Connection to Byam School with raised crosswalk, improved sidewalks on Maple Road, and improved raised crosswalk across school's driveway.	No	Maple Road from Bruce Freeman Trail to Byam School	209778.062033, 924538.875311	209820.397803, 924553.781594	CS Needs Assessment	P1, P9	x	x	x	x				No	$5,000	$5,000		1	TBD
56	Lakeside Avenue Crosswalk	Crosswalk across Elm Street at Lakeside Avenue.	No	Elm Street at Lakeside Avenue	209674.658185, 923940.470026	209686.837391, 923935.466433	CS Needs Assessment	P9	x	x	x					No	$3,000	$3,000		1	TBD
57	Bicycle Wayfinding Thanksgiving Ground Forest-Alpha Road	Alpha Road --Hickory Lane--Lauderdale Rd--Kensington Dr--Watershed Lane-Mill Road- Boston Road- Janet Road- Thanksgiving Ground Forest	No	Alpha Road --Hickory Lane--Lauderdale Rd--Kensington Dr--Watershed Lane-Mill Road-Boston Road- Janet Road- Thanksgiving Ground Forest	213995.406032, 926806.687618	213276.32763, 924068.249999	CS Needs Assessment	B7	x			x				No	$90,000	$90,000		1	TBD
58	Biycle Wayfinding Alpha Road to Chelmsford Center	This relatively calm bike route connects Chelmsford's biggest conglomeration of employers and its downtown by bike, but it is likely unknown. Sharrows added to the route, along with signage directing people to and from Chelmsford Center, may increase business in the town center.	No	Alpha Road -- Turnpike Road -- Warren Ave. -- Rivermeadow Drive -- Brook Street -- Summer Street	213995.406032, 926806.687618	212187.600633, 927115.911613	CS Needs Assessment	B7	x			x				No	$51,600	$51,600		1	TBD
59	Pine Hill Road Sidewalks	Installation of sidewalks on Pine Hill Road from Westford Street to Hunt Road.	No	Pine Hill Road from Westford Street to Hunt Road	210819.156233, 927807.625082	209918.234334, 926825.687426	CS Needs Assessment	P5	x	x	x					No	$952,800	$400,000	Chapter 90 Funds, Town Capital Funds	5	TBD
60	Carlisle Street Sidewalks	Sidewalks on Carlisle Street from Riverneck Road to Gorham St.	No	Carlisle Street from Riverneck Road to Gorham Street	216422.265544, 928233.687444	215887.593706, 929002.687922	CS Needs Assessment	P5	x	x	x					No	$716,200	$400,000	Chapter 90 Funds, Town Capital Funds	3	TBD

Table 1. ***MassDOT Prioritization Plan Continued...***

MassDOT Complete Streets Funding Program Project Prioritization Plan (Revised 3/31/16)

Municipality Chelmsford **Date** 4/7/2017
MassDOT District 4 **Name/Title** Steve Jahnle/Assistant Director of Public Works

Project Details			EJ	Complete Streets Location			Project Origin and Type		Complete Streets Needs								Complete Streets Funding Request			Construction Schedule	
Rank	**Project Name**	**Project Description**	**Environmental Justice Population**	**Project Limits**	**Project Start Location: X,Y Coordinates** (MA State Plane meter)	**Project End Location: X,Y Coordinates** (MA State Plane meter)	**Complete Streets Project Origin** (planning documentation or supporting analysis)	Complete Streets Project Type (refer to the Eligible Projects Worksheet)	Safety	ADA Accessibility	Pedestrian Mobility	Bicycle Mobility	Transit Operations and Access	Vehicular Operations	Freight Operations	**Will this project be in Coordination with other Communities?** (list, if applicable)	**Total Estimated Project Cost**	**Complete Streets Funding Requested**	**Other Funding Source(s) and Amount** (if applicable)	**Anticipated Construction Duration** (number of months)	**Desired Construction Start Date** (month/year)
61	Bicycle Wayfinding Chelmsford Center - Great Brook Farm State Park	Central Square- Billerica Road-Summer Street- Brook Street-Rivermeadow Drive-3rd Street-E-Putnam Ave- Putnam Ave-Hall Road-Parker Road-Stage Road- San Rosa Way-Old Stage Road-Tuttle Road- Proctor Road---- (multiple routes from here to the Carlisle Line)	No	Central Square- Billerica Road-Summer Street-Brook Street-Rivermeadow Drive-3rd Street-E-Putnam Ave- Putnam Ave-Hall Road-Parker Road-Stage Road- San Rosa Way-Old Stage Road-Tuttle Road- Proctor Road---- (multiple routes from here to the Carlisle Line)	212191.687405, 927385.187715	211985.446093, 923469.966213	CS Needs Assessment	B7	x			x				No	$99,000	$99,000		2	TBD
62	Brentwood Road Pedestrian imrpovements	Installation of sidewalks between end of existing facility to Westford Street, approximately 1,500 feet	No	Brentwood Road from approximately 42 Brentwood Road to Westford Street	210852.541109, 928453.939594	211083.000005, 927820.750223	CS Needs Assessment	P5	x	x	x					No	$323,600	$323,600		2	TBD
63	Crooked Spring Road	Sidewalk reconstruction on Crooked Spring Road from Richardson Road to Meadowbrook Road.	No	Crooked Spring Road from Richardson Road to Meadowbrook Road	209843.595318, 929967.591197	208900.171537, 929971.750319	CS Needs Assessment	P1	x	x	x					No	$710,000	$400,000	Chapter 90 Funds, Town Capital Funds	3	TBD
64	Stedman Street	Shared Lane Markings on Stedman Street.	No	Stedman Street from Lowell City Line to Chelmsford Street	212159.298676, 930246.506433	212909.156042, 928489.375102	CS Needs Assessment	B8	x			x				No	$6,000	$6,000		1	TBD
65	Golden Cove Road	Shared Lane Markings on Golden Cove Road.	No	Golden Cove Road from Chelmsford Road to Billerica Road	212909.156042, 928489.375102	213065.124527, 927669.562777	CS Needs Assessment	B8	x			x				No	$3,600	$3,600		1	TBD
66	Bruce Freeman Trail - Chelmsford Swim & Tennis Club Connection & Blaisdell Road	Formalize and pave access point between the path and the swim & tennis club to also access Robin Hill Rd. and Blaisdell Road.	No	Blaisdell Road to Chelmsford Swim & Tennis via Bruce Freeman Trail	209931.453126, 925484.062615	210003.859605, 925433.602934	CS Needs Assessment	B10, P5	x	x	x	x				No	$5,000	$5,000		1	TBD
67	Formalize Watershed Lane-Kensington Drive shared use path connection	Pave a shared use path between these two neighborhood streets, and provide better access for pedestrians and bicyclists.	No	Watershed Lane to Kensington Drive via transmission line	213271.359198, 925865.687434	213256.999618, 925780.00012	CS Needs Assessment	B10, P5	x	x	x	x				No	$28,700	$28,700		1	TBD
68	Porter Road to Woodhead Road Path	Pave a shared use path between these two neighborhood streets, and provide better access for pedestrians and bicyclists. May involve easement on private property, ROW needs to be established.	No	Porter Road to Woodhead Road via transmission line	213645.696279, 926018.707944	213737.395423, 925923.734444	CS Needs Assessment	B10, P5	x	x	x	x				No	$28,700	$28,700		1	TBD
69	Old Stage Road - San Rosa Road Shared Use Path	This small neighborhood path connection helps create a quiet, safe alternative to Concord Road for people walking or biking north-south.	No	San Rosa Road to Old Stage Road via transmission line	212177.165491, 925456.745903	212176.093442, 925390.187376	CS Needs Assessment	B10, P5	x	x	x	x				No	$10,800	$10,800		1	TBD
70	Narrow Travel Lanes on Con	Concord Road is 30 feet wide and uses 24 of those feet for travel lanes. Narrowing the lanes to 10.5 feet in each direction would slow traffic and provide safer refuge for cyclists.	No	Concord Road from Boston Road to Carlisle Town Line	212101.947643, 923510.504341	212725.015193, 925822.875003	CS Needs Assessment	S15	x	x	x	x		x		No	$123,000	$123,000		1	TBD
71	Bicycle Wayfinding to Archer Meadow Preserve	Using Sharrows and wayfinding, note the presence of the Archer Meadow Preserve to pedestrians and cyclists (who may walk their bike through the preserve) as a way to access Fenwick Drive and Boston Road.	No	Fenwick Drive to East Putnam Avenue	212739.687145, 926259.000176	212766.381216, 926480.671126	CS Needs Assessment	B7	x			x				No	$6,900	$6,900		1	TBD
72	Parker Road Sharrows	Shared Lane Markings on Parker Road.	No	Parker Road from Concord Road to Acton Road	212725.015193, 925822.875003	211199.796421, 925743.812545	CS Needs Assessment	B8	x			x				No	$3,000	$3,000		1	TBD

Table 2. ***Complete Streets Eligible Project Worksheet***

If a project or element does not appear in this list it may still be eligible for funding. The applicant should provide justification for the decision based upon the classification of comparable projects.

S - Traffic & Safety	**B - Bicycle Facilities**	**P - Pedestrian Facilities**	**T - Transit Facilities**
S1. Pavement markings or signage that provides a new separate accommodation for bicycle, pedestrian or transit modes	**B1**. Improvement of shared use paths (non-safety related)	**P1**. Sidewalk repairs (tree roots, uplifted panels, etc.)	**T1**. Improving transit connections for pedestrians, including: ramps, providing and/or moving crosswalks, signing
S2. Removal of protruding objects (pedestrian path of travel, bicycle, vehicular or transit facility)	**B2**. Designated bicycle lanes	**P2**. Providing ADA/AAB compliant curb ramps	**T2**. Improving transit connections for bicyclists, including: providing secure bicycle parking, signing
S3. Pedestrian signal & timing (minor updates)	**B3**. Bicycle parking fixtures and/or shelters at transit and other locations	**P3**. Detectable warning surfaces	**T3**. Transit shelter
S4. Changing pedestrian signal timing (i.e., lead pedestrian interval)	**B4**. On-street bicycle parking	**P4**. Pedestrian wayfinding signs	**T4**. Transit signal prioritization
S5. Radar speed feedback ("Your Speed") signs	**B5**. Provide bicycle-safe drain grates and other hardware	**P5**. Providing new sidewalks	**T5**. Bus pull-out areas
S6. Reducing corner radii to lower vehicle speeds and/or decrease pedestrian crossing distances	**B6**. Bicycle boulevards	**P6**. Providing pedestrian buffer zones	**T6**. Railroad grade crossings improvements (signs, flange way fill, etc.)
S7. Additional regulatory signing (for existing regulations)	**B7**. Bicycle wayfinding signs	**P7**. Pedestrian Refuge Islands	**T7**. Transit contra-flow lanes
S8. Speed humps/speed tables	**B8**. Shared lane markings (sharrows)	**P8**. Curb extensions at pedestrian crossings	**T8**. Park-n-ride facilities
S9. Street lighting	**B9**. Bike route signs	**P9**. Crosswalks	**T9**. Transit-only lanes
S10. Road diets	**B10**. New shared use paths	**P10**. Widening existing sidewalks	**TO**. Tansit Facilities - Other
S11. Speed attenuation devices	**B11**. Designated Separated Bicycle Lane	**P11**. Accessible pedestrian signals	
S12. Roadway resurfacing or micro surfacing if restriping for new bicycle lanes	**B12**. Elimination of hazardous conditions on shared use paths	**P12**. New or improved crossing treatments at intersections, midblock, etc. including RRFB's and HAWK signals	
S13. Intersection reconstruction – reducing complexity and crossing distance	**B13**. Intersection treatments (bicycle signals, bicycle detection, bike lane extensions, turn boxes)	**P13**. New pedestrian accommodations at existing traffic signals	
S14. New curbing or edging on uncurbed streets.	**BO**. Bicycle Facilities - Other	**P14**. Interim public plazas	
S15. Addition of or widening of shoulders		**P15**. Traffic re-routing to create pedestrian zones	
S16. Intersection signalization (major updates/upgrades & new Installation)		**P16**. Providing medians with ADA/AAB-compliant design	
S17. Traffic calming measures		**PO**. Pedestrian Facilities - Other	
S18. Roundabouts			
SO. Traffic & Safety - Other			

Source: Accommodating Bicycle and Pedestrian Travel: A Recommended Approach; United States Department of Transportation Federal Highway Administration, May 7, 2012.

Table 3. Complete Streets Needs Comparison Table: MassDOT vs HSH

MassDOT	Howard Stein Hudson
Environmental Justice Populations	Environmental Justice Factors
	Persons with Disabilities
Safety	Pedestrian and Bicycle Crashes
ADA Accessibility	ADA Accessibility
Pedestrian Mobility	Latent Pedestrian Demand
	Pedestrian Level of Comfort – Sidewalk Design, Vegetation, Traffic Impacts
	Proposed Change in Pedestrian Level of Comfort – Sidewalk Design, Vegetation, Traffic Impacts
Bicycle Mobility	Latent Bicycle Demand
	Bicycle Level of Comfort
	Proposed Change in Bicycle Level of Comfort

The prioritization criteria outlined by MassDOT are expanded upon by Howard Stein Hudson to provide a more nuanced analysis of proposed projects. Table 3 outlines the criteria assessed by Howard Stein Hudson as compared to MassDOT.

Project Descriptions

The following describes types of projects that are included in the Prioritization Plan, including details on some of the highly-ranked projects. It also includes those that are scheduled for the first five years of the plan. A series of maps of projects separated by mode can be found in **Figures 1 through 4.**

CROSSING AND INTERSECTION IMPROVEMENTS

Pedestrian crossing improvements are proposed throughout the Town and include treatments such as ADA curb ramp construction/reconstruction, installation of high visibility crosswalks, curb extensions, "Yield to Pedestrian" signage, Rectangular Rapid Flashing Beacons (RRFBs) and school zone signage.

BRUCE FREEMAN RAIL TRAIL – CHELMSFORD STREET CROSSING IMPROVEMENTS

The existing Bruce Freeman Rail Trail crosses Chelmsford Street near the intersection with Fletcher Street. The rail trail intersects Chelmsford Street at an acute angle and requires bicyclists and pedestrians to use Chelmsford Street for approximately 450 feet to access the two ends of the trail. Bicycle facilities along Chelmsford Street at this location are nonexistent, and the sidewalk is only four feet wide. The existing crosswalk at Fletcher Street and Chelmsford Street has no markings or signage to indicate the presence of a trail crossing.

The Bruce Freeman Rail Trail disappears leading up to Chelmsford Street, making it a difficult crossing for all users.

This project would narrow the roadway and widen the existing path/sidewalk south of Fletcher Street heading towards to the trail to a 12-foot shared-use path, and construct a 10-foot shared-use path north of the Fletcher Street intersection on the left side. This would tie into the existing sidewalk approximately 275 feet north of the intersection and a 10-12 foot path to connect to the existing entrance to the Bruce Freeman Rail Trail on the right side. In addition, existing signal equipment would be rebuilt to include both bicycle and pedestrian indicators.

BRUCE FREEMAN RAIL TRAIL – CENTRAL SQUARE CROSSING IMPROVEMENTS

This project seeks to improve the existing crossing of the Bruce Freeman Rail Trail at Central Square in Chelmsford Center. From the south, the existing trail empties into the parking lot near Brickhouse Pizza, where riders and walkers must traverse the parking lot and utilize two sets of crosswalks to negotiate the intersection. This project would formalize a crossing of the parking lot and street, and widen the existing refuge island at the other side of the intersection to provide space for both pedestrians and bicyclists. Narrowing travel lanes on Route 4/North Road to include bike lanes in either direction would help those who are navigating from and to the path. A bicycle signal would also be added.

CROSSWALK ACROSS NORTH ROAD AT PARKHURST

One additional crosswalk would be added to this intersection to meet pedestrian demand. The improvement will require changes to an existing traffic island, new pedestrian ramps, changes to the signal cycle, and additional pedestrian signals.

TOWN COMMON PEDESTRIAN IMPROVEMENTS

This small improvement would increase access to the Town Common and also help connect pedestrian traffic through part of Chelmsford Center Village. It includes a new sidewalk on the South side of Westford Street between Bridge Street and First Parish United Church, and a crosswalk over Westford Street at Academy Street with pedestrian crossing signage.

DRUM HILL ROTARY PEDESTRIAN SIGNAL TIMING ENHANCEMENTS

The Drum Hill Rotary poses a significant barrier for pedestrians and bicyclists crossing between Chelmsford Center and North Chelmsford. This project would change the signal timing at each of the Rotary's four signals to reduce pedestrian delay, thus reducing the likelihood of people crossing against the signal. Pedestrian signals would be adjusted to show green at all times when traffic along the conflicting vehicular movement is stopped. This series of intersections are state owned and thus not eligible for funding through the Complete Streets Program.

CHELMSFORD STREET AND DALTON ROAD INTERSECTION SAFETY IMPROVEMENTS

This project would tighten the existing intersection of Dalton Street and Chelmsford Road and, where possible, install a crosswalk between the sidewalk on the north side of Dalton Road and the south side of Chelmsford Street. Chelmsford Street at this location is under state jurisdiction.

PRINCETON STREET AND NORTH ROAD INTERSECTION IMPROVEMENTS

This project would rebuild the existing intersection of Princeton Street and North Road. Crosswalks at the intersection are long, poorly marked, and missing signal indicators. Slip lanes allow vehicles to travel through turns at fast speeds. The intersection is under state control and this plan

recommends MassDOT undertake further study of the intersection to examine possible short and long term improvements to make the intersection safer for pedestrians.

CROSSING IMPROVEMENTS AT MCCARTHY SCHOOL

This project would make enhancements to the existing crosswalk located next to the McCarthy Middle School on Old Westford Road. It would include the construction of a pedestrian refuge island and the installation of a RRFB. Five feet of width would be maintained between the travel lane and the curb on either side to maintain width for bike lanes.

SULLY'S PARKER SCHOOL CROSSING OF RICHARDSON ROAD

This crossing is frequented by students of the Parker School and others, yet turning radii are overly generous and there is no existing crosswalk. This project would change turning radii to minimum needed and add a crosswalk over Richardson Road with a reduced crossing distance.

KATE'S CORNER SIDEWALK IMPROVEMENTS

This project recommends improvements to sidewalks and crosswalks in Kate's Corner and near the Byam School. This includes the construction of a raised crossing across the Byam School driveway at Maple Road, placing pedestrian warning signs at all existing crosswalks, and tightening the intersection of Acton Road, Maple Road, and Common Street to improve the visibility of motorists and pedestrians. It will also provide an ample sidewalk for the local store.

LAKESIDE AVENUE CROSSWALK INSTALLATION

This project was identified through the Town's pedestrian and bicycle advisory committee. It would add a crosswalk to Acton Road and Lakeside Avenue in the southwest corner of Town. There is an existing crosswalk on Acton Road along the northbound side of the roadway. Lakeside Avenue provides quick access to the Bruce Freeman Rail Trail on the other side. The installation of a crosswalk would allow people using the existing sidewalk on Acton Road to more safely access the trail.

STREETSCAPE AND SIDEWALK IMPROVEMENTS

VINAL SQUARE STREETSCAPE AND SAFETY IMPROVEMENTS

Multiple regional roadways converge at Vinal Square, including Middlesex Street, Princeton Street, Tyngsborough Road, Dunstable Road, and Groton Road. This high number of converging roads sends a high amount of traffic through the Square, in addition to creating complicated turning movements. Crosswalks are not consistently provided throughout the Square and many require long crossing distances. This project would T-up existing intersections to shorten crossing distances, while still maintaining all turning movements. Excess pavement in front of 17 Vinal Square and 10 Middlesex Street would be reallocated to provide seating and public space for customers of local

businesses. All crosswalks would be marked with stamped brick, benches added to existing bus stops, and bike racks would be installed throughout the Square. A short segment of sidewalk would be added to Shaw Street to connect to the square and crossing improvements would be made to the existing crosswalk at North Town Hall, including the installation of bump outs and an RRFB. This project area is under state jurisdiction.

CHELMSFORD STREET SIDEWALK IMPROVEMENTS

This project would install sidewalks on west side of Chelmsford Street from Bruce Freeman Rail Trail to Central Square (Billerica Road), on the east side of Chelmsford Street from Bruce Freeman Rail Trail to Alpine Lane, and one short (100') section north of Alpine Street on the west side of Route 110. Design will be needed to maintain some nose-in or angle parking on abutting land, taking advantage of some existing sidewalks at storefronts. Pedestrian indicators should be added where missing at Alpine Lane. The Town recommends brick accent on sidewalk landscaping zone. Add one crosswalk with pedestrian crossing signage across Chelmsford Street (Route 110) at Alpine Road.

Lack of defined sidewalks on Chelmsford Street paired with extensive parking and long curb cuts creates a hazardous situation for pedestrians who may also want to access local businesses.

CENTRAL SQUARE SIDEWALK EXPANSION

This project would widen the sidewalk between Billerica Road and Cushing Place on Acton Road, maximizing the pedestrian space and improving the streetscape in front of local businesses.

NORTH ROAD SIDEWALKS SOUTH

This project would include sidewalk Reconstruction from Fletcher Street to Academy Street using brick.

TYNGSBOROUGH ROAD SIDEWALKS

Sidewalks on Tyngsborough Road from Wellman Avenue (which accesses Williamsburg Condominiums) to Vinal Square would be added as part of this project.

BILLERICA ROAD SIDEWALKS

This project would include sidewalk and ADA improvements form Chelmsford Center School to Central Square.

DRUM HILL ROAD SIDEWALKS

This project would install a new sidewalk on the south side of Drum Hill Road from Drum Hill Rotary to Lowell city line to match existing sidewalk on the north side.

GROTON ROAD BIKE LANES AND SIDEWALK INSTALLATION

Bike lanes from the Town limit to Vinal Square, and sidewalk installation from the Town limit to Doris Drive, and Lynn Avenue to Willis Drive would be included as part of this project.

TURNPIKE ROAD SIDEWALKS

To help accommodate working people in the Golden Triangle who often walk down to Chelmsford Center or elsewhere, this project would add sidewalks to all of Turnpike Road.

RICHARDSON ROAD MULTIMODAL IMPROVEMENTS

This project makes improvements for bikes to highlight this relatively safer section of a north-south route by adding sharrows from Princeton Street to Edgelawn Avenue, and from Harrington Elementary to Crooked Spring Road. From Edgelawn Avenue to Harrington Elementary, and from Crooked Spring Road to Granitveville Road, the street is wide enough to accommodate bike lanes. Sidewalks will also be installed from Edgelawn Avenue to Princeton Street.

BICYCLE LANES AND SHARED LANE MARKINGS

Bicycle lanes, buffered bicycle lanes, and sharrows are all used where appropriate to help tie together the bicycle network in Chelmsford so that comfortable options are available to users of all ages and abilities. The Bruce Freeman Rail Trail provides a low stress, crosstown bike route for those with destinations along the path. This plan provides residents with more low stress connections across Town and to the Bruce Freeman Rail Trail, in addition to making existing cross town streets safer for people on bikes.

Traditional five-foot bicycle lanes are proposed along with sidewalk construction and crossing improvements on Tyngsborough Road, Groton Road, North Road, Riverneck Road, Billerica Road, and Boston Road. Buffered bike lanes are recommended on Middlesex Street, Chelmsford Street, and Princeton Street, the last two of which are state roads. The installation of bike lanes not only provides people on bikes with a safer place to ride, but allows aids in traffic calming by narrowing traffic lanes.

In places where travel lanes cannot be restriped to provide space for a bike lane, it is recommended that those travel lanes still be restriped to 11 feet or 10.5 feet while expanding the shoulder for both bicycles and as space for vehicles to use to make room for emergency vehicles. These locations include Main Street and Concord Road. In addition, shared lane markings, or sharrows, are

recommended on five streets, including Golden Cove Road, Summer Street, Fletcher Street, Parker Road, and Stedman Street.

BICYCLE WAYFINDING ROUTES

In addition, the plan proposes cross town bike routes marked with wayfinding signage and sharrows to direct people to safe, comfortable routes that access destinations town-wide. Proposed wayfinding routes include Chelmsford Mall to Chelmsford Center, Vinal Square to Chelmsford Center, Alpine Road to Chelmsford Center, Cushing Place in Chelmsford Center to the Bruce Freeman Rail Trail, Thanksgiving Ground Forest to Alpha Road, Chelmsford Center to Great Brook Farm State Park, and pedestrian wayfinding on Fenwick Drive and East Putnam Avenue directing people to the presence of the Archer Meadow Preserve.

Wayfinding signage is a creative way to foster a sense of place throughout the Town.

Many of these routes are made possible through the formalization of existing short connections between neighborhoods. Examples include the paving of a path for pedestrians and bicyclists between Kensington Drive and Watershed Lane, between Woodhead Road and Porter Road, and between San Rosa Way and Old Stage Road using the Town's easement of the existing transmission line.

Other proposed local connections include the construction of a connection between the Bruce Freeman Rail Trail and Lime Kiln Quarry across both Beaver Brook and Littleton Road; the formalization of a path along Beaver Brook in Chelmsford Center as identified in the Chelmsford Center Master Plan; a connection between the Bruce Freeman Rail Trail and Chelmsford Street behind the Chelmsford Cyclery; a walking path constructed in two phases between the Chelmsford Library, Acton Road, and the Bruce Freeman Rail Trail; and a connection across the Bruce Freeman Rail Trail between Blaisdell Road and the Chelmsford Swim & Tennis Club.

BIKING AND WALKING PATHS

A few projects highlight ideas from former planning efforts, the Chelmsford Land Trust, and those generated by the project team. Several shared use path projects are small connections between roadways that are elements of the wayfinding routes described above. A few are more involved include the following:

FORMALIZE BEAVER BROOK PATH FROM ACTON ROAD TO SUMMER STREET

This idea, formalized in the Chelmsford Center Master Plan, would connect to paths in Bartlett Park and the Bartlett Woodlot to create an additional off-road walking and biking option in the center of Town. It would also connect a calm network of streets to the east.

BARTLETT – BRUCE FREEMAN RAIL TRAIL CONNECTION PHASE I AND II

These two projects would connect the existing Bruce Freeman Rail Trail to the Beaver Brook via the Bartlett Woodlot and Bartlett Park. It would also add a RRFB crosswalk between these two open space resources.

LIME QUARRY – BRUCE FREEMAN RAIL TRAIL CONNECTION

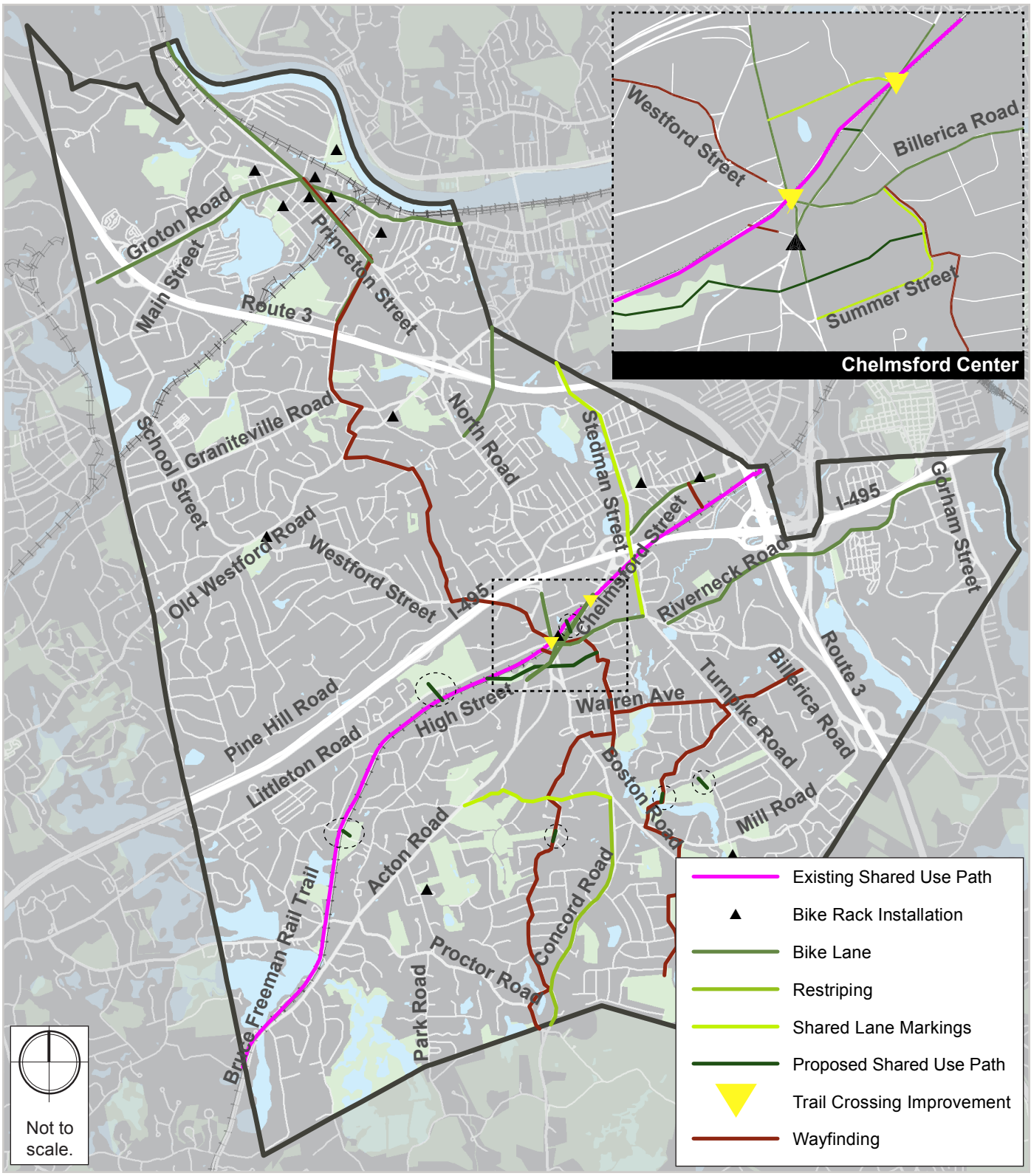
This idea would create a shared use path connection to Littleton Road and a marked crossing with yield signs that would provide a recreational destination for the existing Bruce Freeman Rail Trail. Adding destinations to shared use paths help increase their utilization.

BUS STOP IMPROVEMENTS

Four Lowell Regional Transit Authority (LRTA) buses serve Chelmsford. This includes Route 5 serving Drum Hill and Lowell; Route 15 serving Westford, Chelmsford Center and Lowell; Route 16 serving Drum Hill, Chelmsford Center, and Lowell; and Route 17 serving Vinal Square, Drum Hill, and Lowell. All buses terminate at the Gallagher Transit Terminal in Downtown Lowell. Bus stop improvements including ADA accessibility improvements, benches, and bike racks are proposed at 13 bus stops town-wide with the highest ridership. A map of these locations is provided in **Figure 4.**

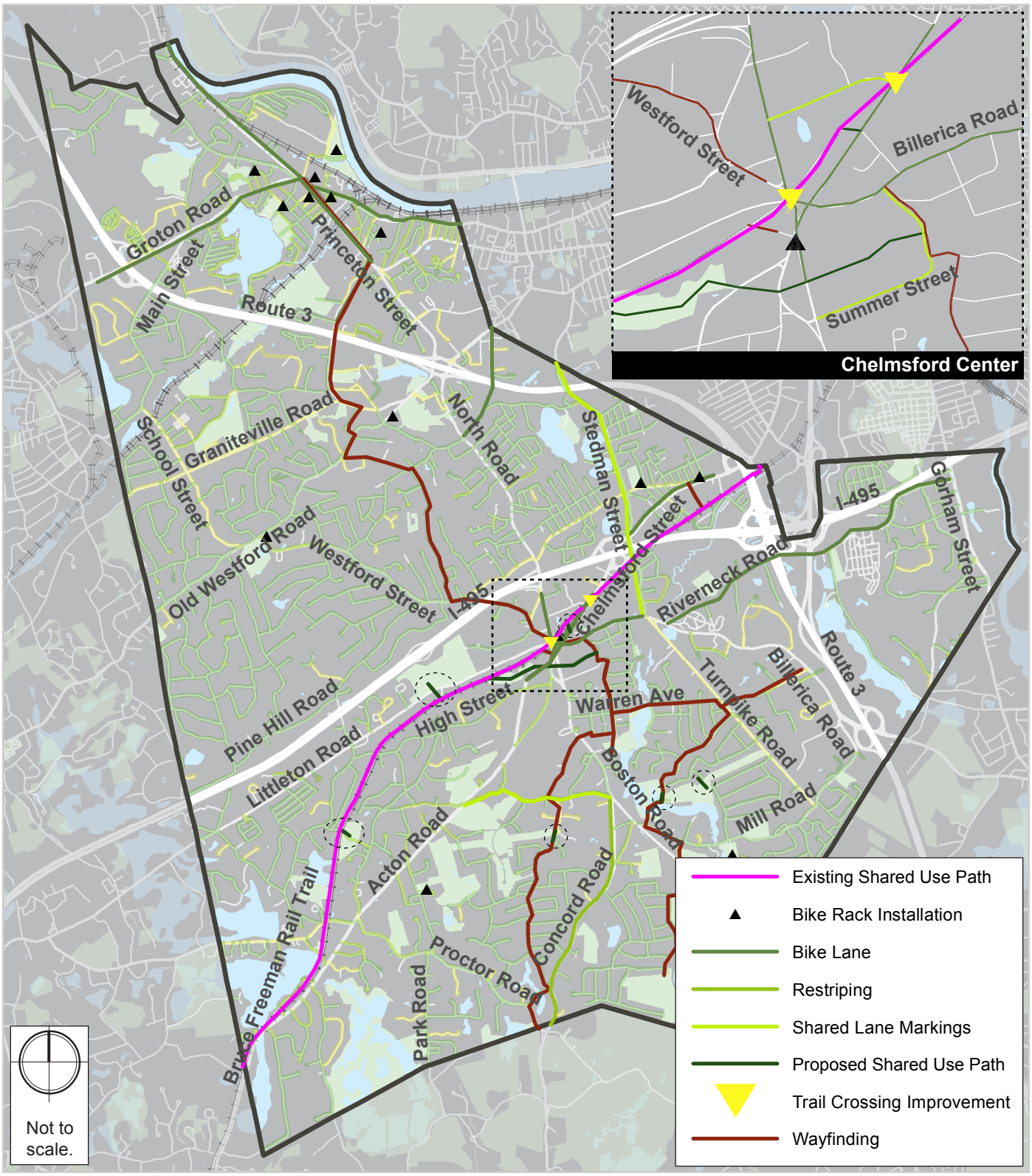
An example of a bus shelter with accessible landing zone and bicycle parking.

Figure 1. ***Proposed Bicycle Projects***



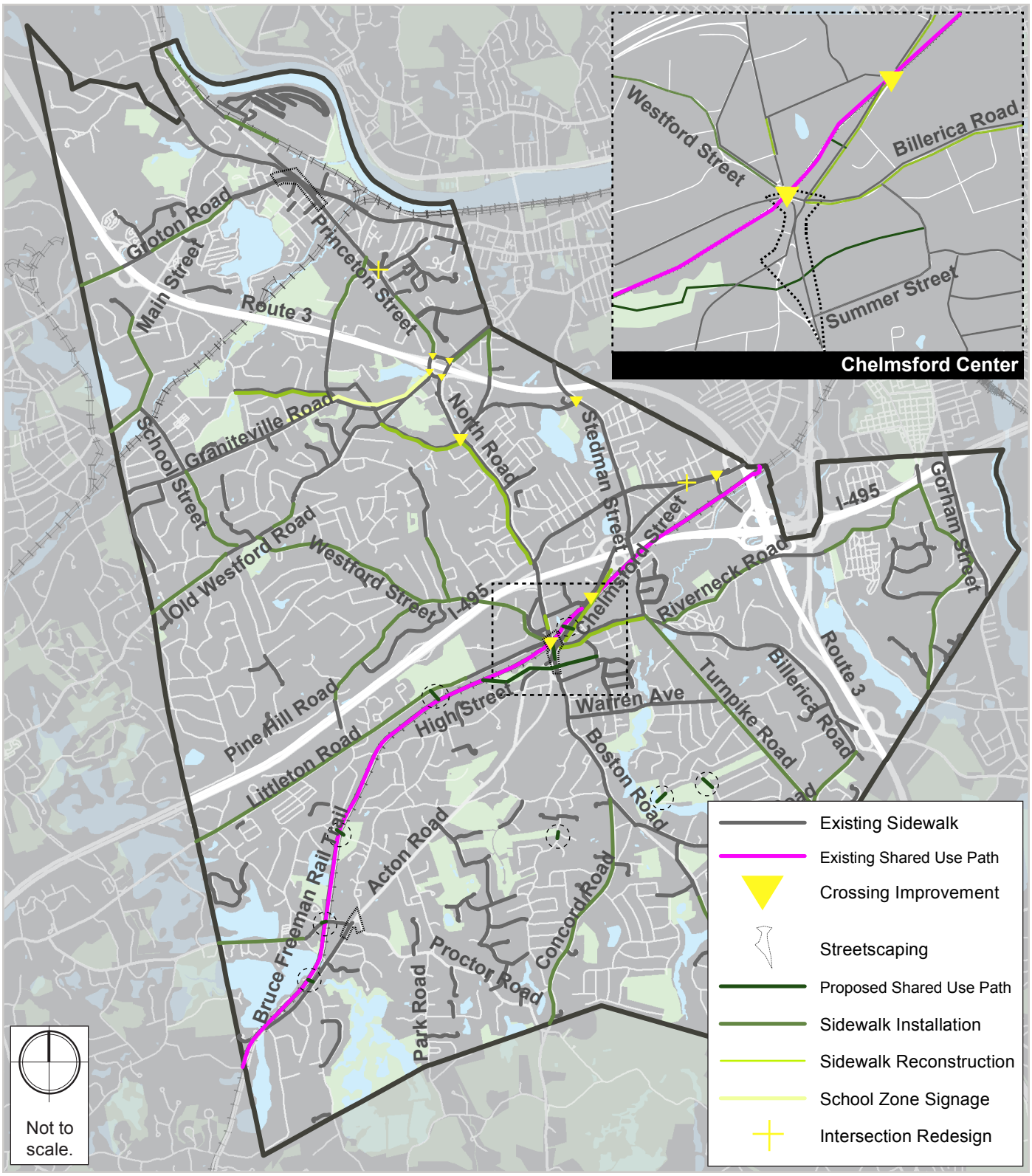
Data Source: HSH, MassGIS

Figure 2. ***Proposed Bicycle Projects with High Level of Comfort Routes***



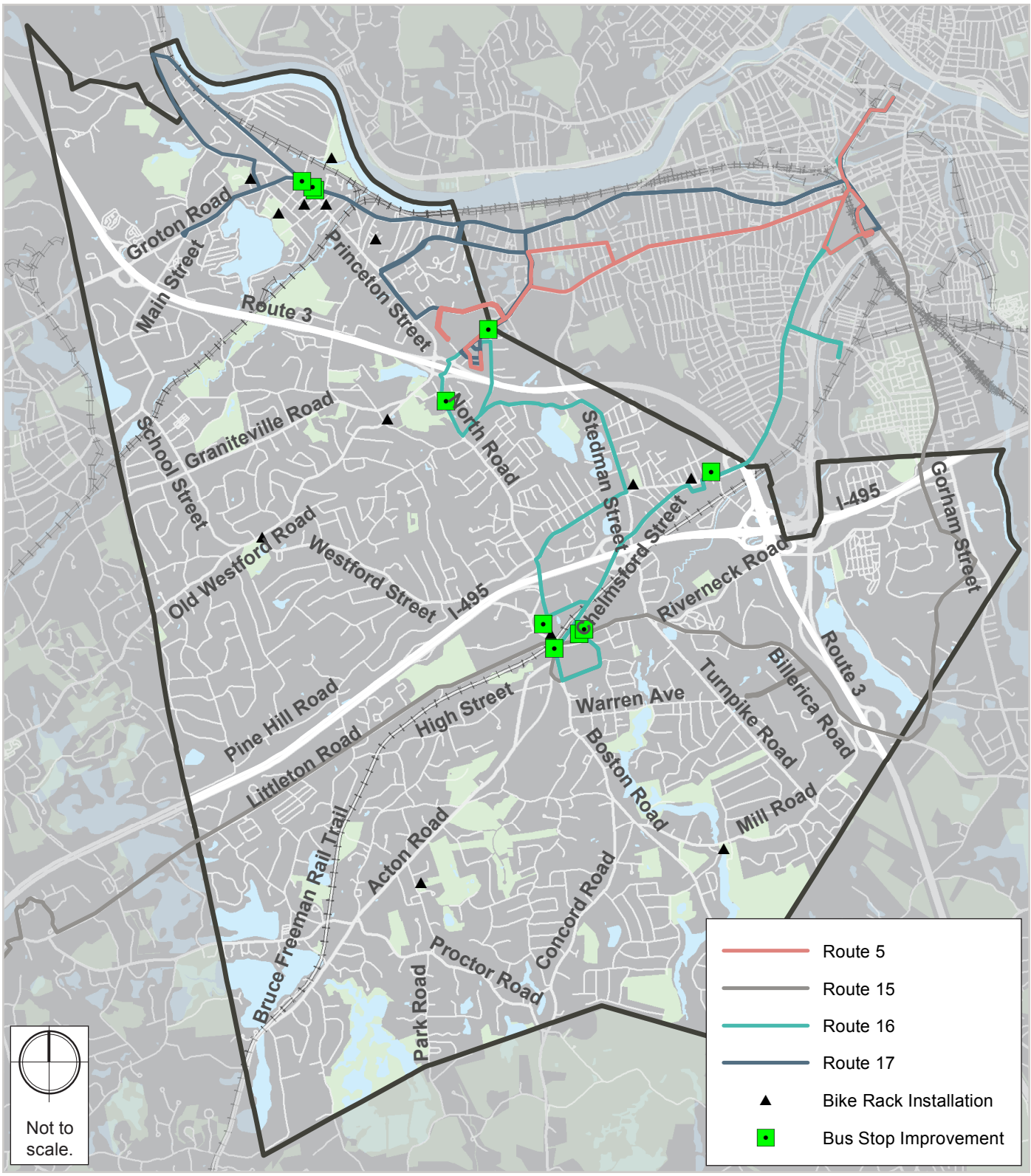
Data Source: HSH, MassGIS

Figure 3. ***Proposed Pedestrian Projects***



Data Source: HSH, MassGIS

Figure 4. ***Proposed Transit Projects***



Data Source: HSH, MassGIS

Methodology

At Howard Stein Hudson (HSH), we believe that the Complete Streets Prioritization process is an opportunity for a comprehensive and holistic look at the unique needs of each community. We utilize a number of innovate tools to better understand existing conditions and the effect proposed projects will have. Together, these tools allow us to answer three key planning questions: Where are existing conditions deficient? What are the community's priorities? And finally, where is there demand?

With a focus on pedestrians, bicyclists, and transit users, our data collection and analysis develop a complex understanding of where conditions are unsafe, uncomfortable, or inaccessible, as well as where safe and comfortable routes can be best utilized to expand the pedestrian and bicycle networks. Community and municipal input contribute local expertise to the project selection process and inform an understanding of the community's values. Equity assessments hone in on the neighborhoods most in need of transportation network and facility improvements. Finally, measures of network latent demand provide an understanding of project opportunities and are another important factor for consideration within the prioritization process.

Each set of analysis used to select and prioritize the project list is data driven, transparent, and easily communicated through visual tools. These tools are designed to be living documents that can assist in the Complete Streets Prioritization process today and moving forward. In the next section, we describe each tool and the existing conditions found in Chelmsford.

Tools to Determine Deficient Conditions

In order to determine the locations where complete streets improvements are desirable and necessary, HSH uses a series of data, including crash locations and pedestrian and bicyclist level of comfort. These tools show where there may be gaps in connectivity that deter people from walking and bicycling.

SAFETY

The safety of all modal users is a top concern for the Complete Street Prioritization process. Bicycle and pedestrian crashes are taken from MassDOT Crash Reports from 2012 to 2014, the last three available years. The past three available years are used for a larger set of data points and to get a better sense of patterns in crashes. Areas with pedestrian or bicycle crashes indicate that intersection or roadway projects can help improve safety conditions and hold a higher level of priority within our project rankings. Decreasing crossing distances with curb bump outs or installing RRFBs are possible project options for reducing crashes involving pedestrians. Providing

dedicated bicycle facilities, such as consistent shoulders or dedicated bicycle lanes, as well as intersection treatments like bike boxes and two-stage left-turn boxes can help reduce crashes involving bicyclists.

EXISTING CONDITIONS – BICYCLE CRASHES

The bicycle crash map **(Figure 5)** reflects the concentration of bicycle crashes in the Town. From 2012 to 2014, Chelmsford saw 14 bicycle crashes distributed evenly throughout the major roads that have a strong presence of vehicular traffic. With an exception to residential areas such as Byam Road and Drexel Road, **Figure 5** shows these crashes along Princeton Street, North Road, Acton Road, Chelmsford Street, and Concord Road. Chelmsford Street and North Road are two of the busiest, highly-utilized streets in the Town carrying large amounts of cars per day, and have narrow shoulders; these characteristics make for a dangerous condition for cyclists. Fortunately, the severity of all the crashes was either "non-fatal" or "none-injured." Although the Town saw an increase in the number of crashes from three to five in 2013 to 2014, there was an overall decrease in the three year span. Although the number of bike crashes decreased in 2014 from 2012, the rate in which it did is too low to assume any trends that could have influenced the drop. The Town needs to focus on achieving zero bike crashes through an improved network of bicycle facilities, especially along these highly utilized streets.

EXISTING CONDITIONS – PEDESTRIAN CRASHES

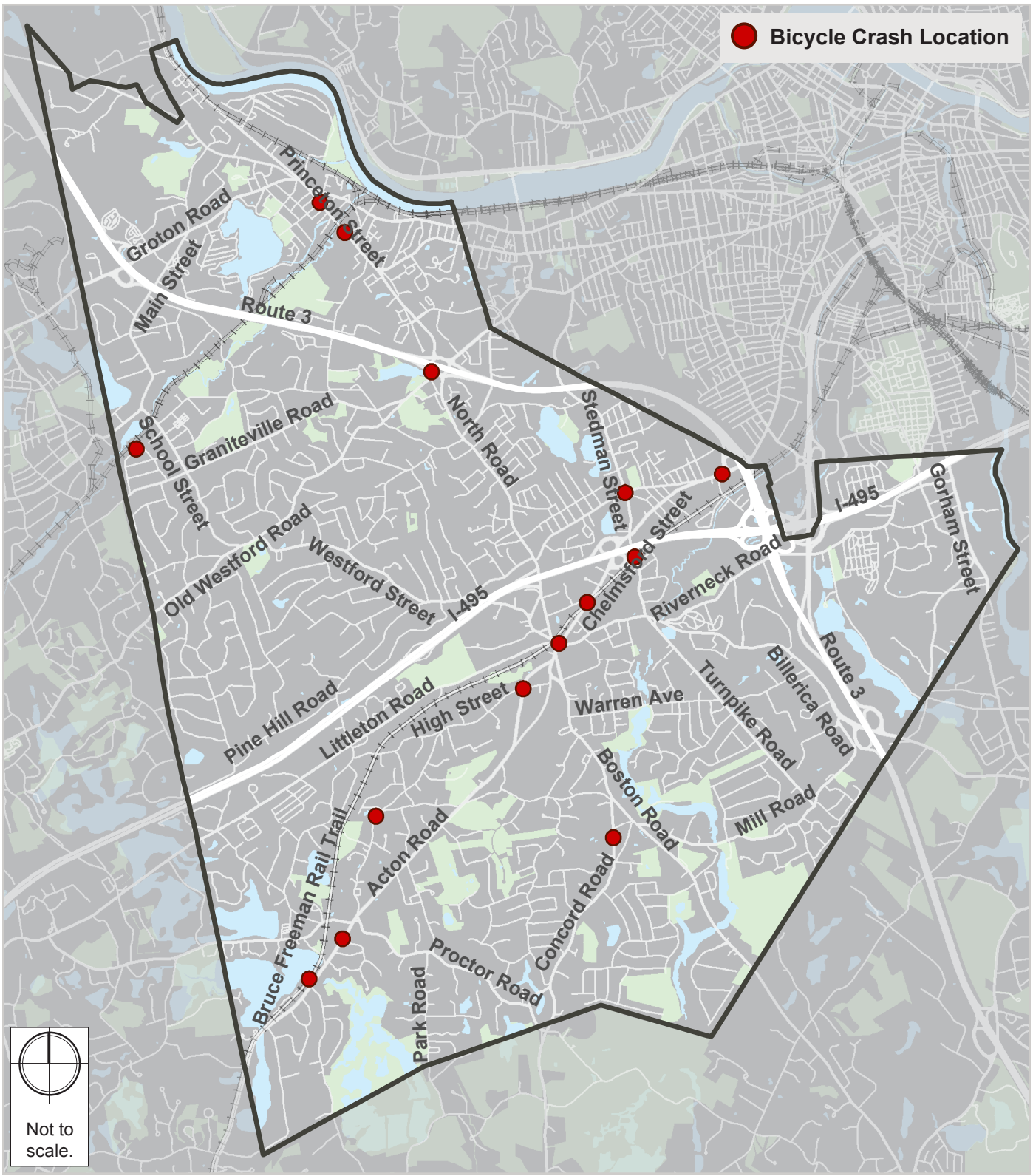
The pedestrian crash map (**Figure 6**) reflects the number of crashes involving pedestrians in the Town. From 2012 to 2014, Chelmsford saw 20 pedestrian crashes distributed evenly throughout the Town. Although a good number of them are located along major roads such as Dalton Road, Boston Road, and Chelmsford Street, there are a few along residential streets such as Parkhurst Road, Newfield Street, and Thomas Drive. The Drum Hill area and Chelmsford Center have a much higher density of pedestrian crashes than other sections of the Town, a reflection of each area's high pedestrian volumes and high daytime activities. Also, similar to bicycling data, the number of pedestrian crashes shows an overall incidence of high crash numbers in 2012, then drops in 2013, and rises again in 2014.

The Drum Hill Area is one of Chelmsford's main retail and business districts. The main roadway that runs through the area, Drum Hill Road, is classified as an urban arterial with high traffic volumes. The Chelmsford Center is the community's historic downtown business district and contains a mix of business, residential, institutional, and government uses. From the 20 pedestrian crashes that occurred, one fatal crash was reported in 2013. The fatal accident occurred in June 2013 on the northbound side of Route 495 near Exit 34 where the pedestrian was hit by a truck[1].

[1] http://www.wickedlocal.com/x2037485099/Fatal-pedestrian-accident-in-Chelmsford

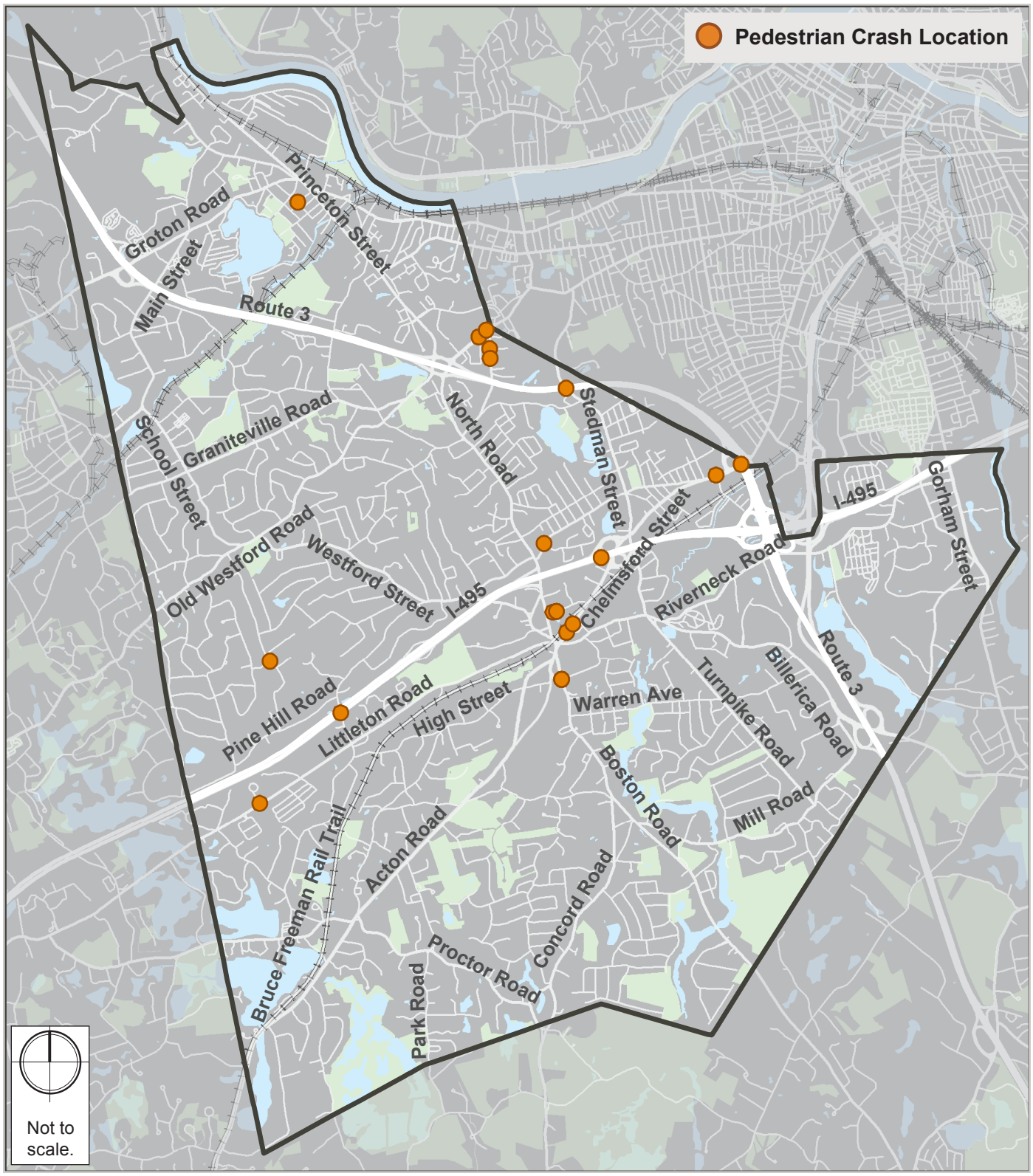
Installation of significant pedestrian facility improvements in critical areas can have a significant impact on the frequency and characteristics of pedestrian crashes in the Town.

Figure 5. ***Bicycle Crashes, 2012-2014***



Data Source: Massachusetts Department of Transportation, MassGIS

Figure 6. ***Pedestrian Crashes, 2012-2014***



Data Source: Massachusetts Department of Transportation, MassGIS

LEVEL OF COMFORT

In an effort to improve and create excellent active transportation environments, we assess both bicycle and pedestrian level of comfort. Level of comfort addresses not only whether a sidewalk or bicycle accommodation is provided, but also other factors, such as the presence of high-speed traffic, proximity to green space, separation from the roadway, and the presence of an on-street parking lane. These factors contribute not only to the physical safety of vulnerable road users, but also to the overall comfort of the roadway, which is a major factor of whether pedestrians and bicyclists will use it.

Areas with low comfort are targeted for project selection. During the prioritization process, projects with low bicycle or pedestrian comfort receive greater priority as well as projects that would increase the level of comfort most. Fixing a small, low-comfort segment can often bridge two neighborhoods with a network of high-comfort streets, substantially expanding the bicycling network in both neighborhoods.

BICYCLE LEVEL OF COMFORT

The Bicycle Level of Comfort (BLOC) methodology is based on analysis originally carried out by Professor Peter Furth of Northeastern University. His team developed a set of criteria to determine the level of traffic stress for every road segment, which correspond to the type or ability of bicyclist who would be willing to ride on that segment. The types of riders relate to categorizations first presented by Roger Geller, Bicycle Coordinator at the Portland Bureau of Transportation in Oregon, which classified cyclists into four categories: "No Way No How," encompassing around 30% of the population of Portland, OR, who are not interested in bicycling at all; the "Interested but Concerned" group, which makes up 60% of the population; "Enthused and Confident" riders who make up about 7% of the population; and "Strong and Fearless" riders who make up less than 1% of the population.

Wide surface widths and undefined lane markings can lower bicycle level of comfort.

We have based our analysis for the Town of Chelmsford on the same methodology with minor adjustments to produce a town-wide BLOC map, ranging from high to low. In general, those in the 60% population range who are interested but concerned would likely be willing to ride on the most comfortable routes, thus falling into the "High" and "Medium-High" comfort categories in our analysis. These routes typically include low-speed residential roads that are often without centerlines, physically separated bicycle facilities, and off-street trails. Confident and enthused

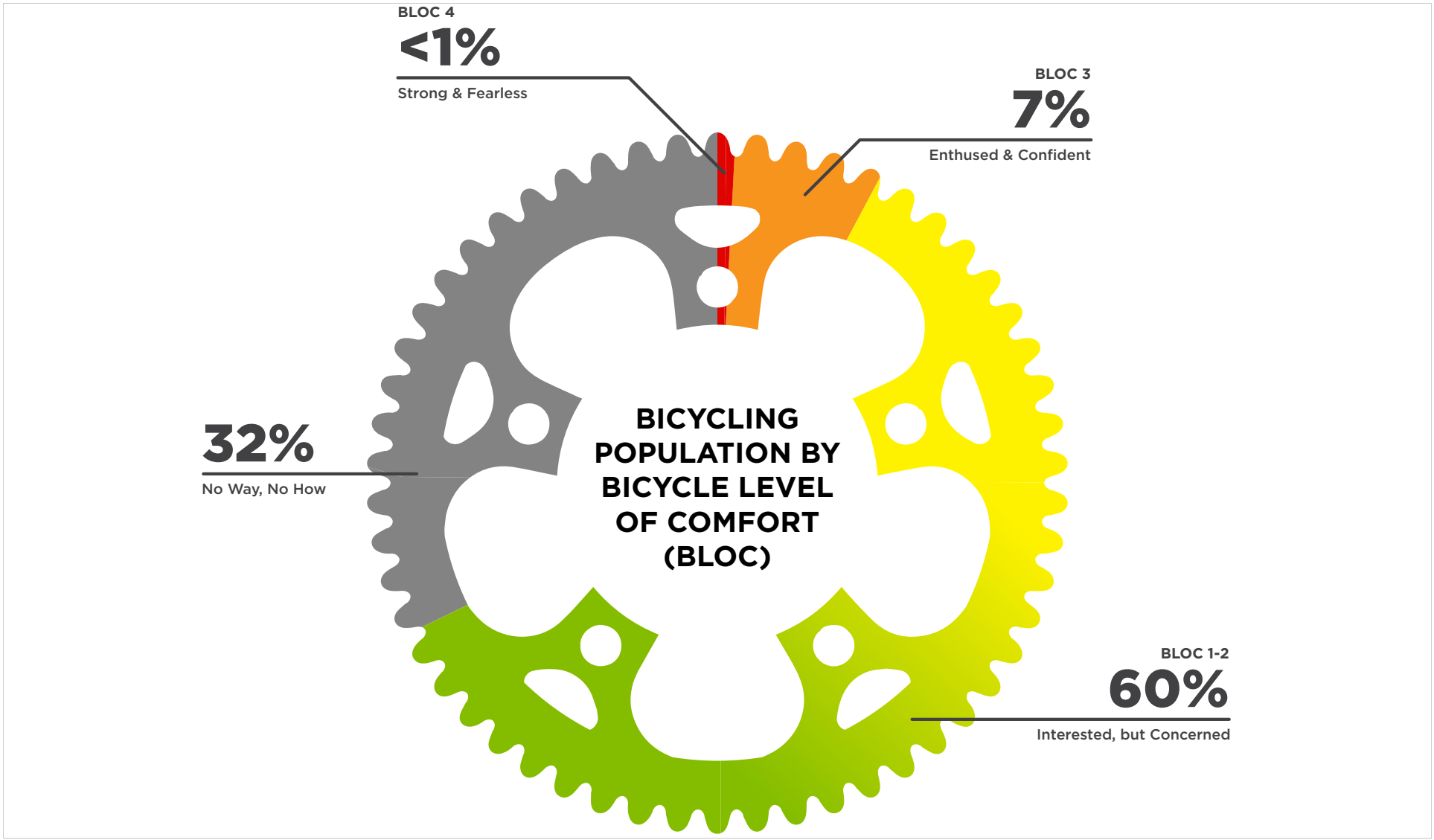
riders would likely be willing to ride on road segments that fall into the "Medium-Low" comfort category, and strong and fearless bicyclists would fall into the "Low" comfort category. A low-stress cycling network is one where the majority of the population would feel comfortable riding; as such, we consider high and medium-high comfort routes to dictate the usable cycling network.

Existing Conditions – Bicycle Level of Comfort

The BLOC map shows locations where people would and would not feel safe riding, as well as helps identify projects that would most benefit modal shift towards cycling. Major, high-traffic roadways have the lowest levels of bicycle comfort such as Acton Road/Chelmsford Street, Concord Road, Princeton Street/North Road, and Groton Road. The majority of the roadway network is marked green, implying that residents who are "interested, but concerned" about cycling would be willing to ride along this network of high level of comfort.

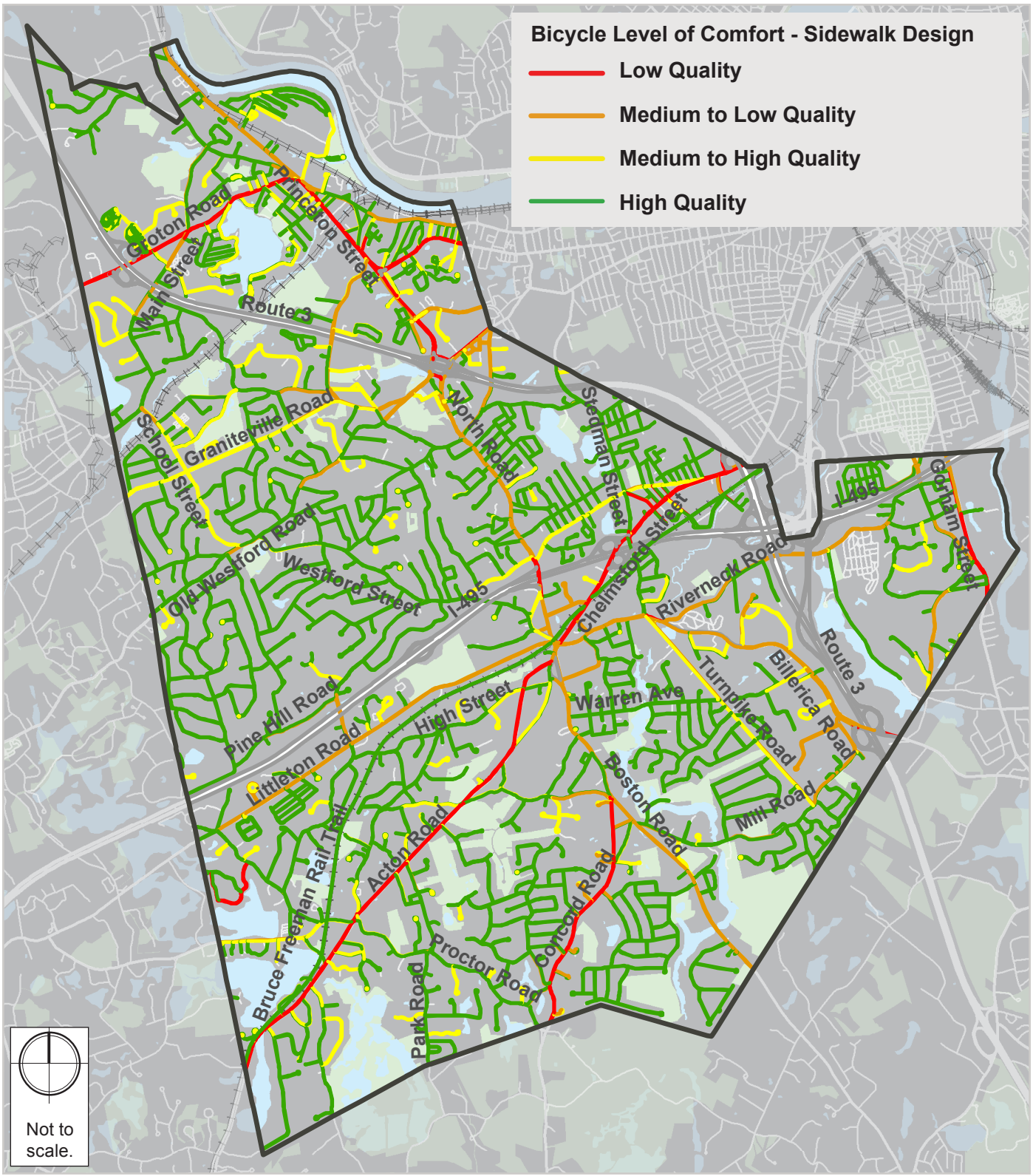
Notable areas that show low levels of comfort are Chelmsford Center, Vinal Square, and Drum Hill area. These three areas are known to be Chelmsford's areas of high commercial and business activity, bringing in traffic from the town and adjacent areas. Because these areas bring in a large influx of people per day, either for employment or personal reasons, improving roadway conditions is vital in improving living conditions in Chelmsford.

Figure 7. *Four Types of Transportation Cyclists in Portland by Proportion of Population*



Data Source: Portland Office of Transportation

Figure 8. ***Bicycle Level of Comfort***



Data Source: HSH, Peter Furth, MassGIS

PEDESTRIAN LEVEL OF COMFORT

HSH developed a similar measure of pedestrian level of comfort (PLOC) to complement the BLOC analysis. Variables included are intended to reflect the pedestrian experience in terms of safety and amenity. The analysis is divided into sidewalk design, traffic impacts, and vegetation level of comfort.

Sidewalk design level of comfort includes measures such as the width of each sidewalk, as well as the narrowest point, including blockage by utility poles or other obstacles that may inhibit the passage of persons with disabilities. Other criteria include whether the sidewalk is grade separated, whether it is an island, and whether it provides a continuous connection to the rest of the network.

The criteria used to evaluate the level of comfort resulting from traffic impacts include adjacent roadway conditions such as the average daily traffic per lane, number of lanes, posted speed limit, roadway lane width, the segments proximity to the highway (if roadway is within a 1/10 mile of highway), length of vertical buffer, length of lateral buffer, and shoulder widths.

The pedestrian experience is also affected by street trees and other vegetation that are planted along the street (often between a roadway and a sidewalk or walkway in the buffer). Street trees and vegetation serve many purposes, such as creating a humanly scaled environment, increasing an areas aesthetic asset, and increasing property values. HSH's PLOC evaluation includes vegetation because if designed appropriately and presented in large amounts, it can provide visual interest and can be a traffic calming tool (by narrowing a driver's field of vision, thus encouraging lower vehicle speeds).

As eligible projects must be under $400,000 or have additional alternate funding, and must be completed within one year, changes to the surroundings are generally out of the scope of a complete streets project funded through this program. Changes to facilities are more feasible. Dividing the analysis into these three parts allows us to best identify projects where appropriate facilities can bridge network gaps and target routs with amenable surroundings. For both bicycle and pedestrian analyses, we use the road edge as the basis for geographic information systems (GIS) analysis rather than the centerline. This allows us to have directionality for each segment and add subtleties such as one-sided on-street parking, one-way routes, or intersection crossings for each direction.

MassGIS roadway data is used to assign road speed, average daily traffic (ADT), number of adjacent lanes, the presence and width of a median, and roadway surface width values to each segment, as well as the roadway characteristics for intersection crossings. Manual data entry for each segment recorded the type and width of bicycle facilities, the presence of a centerline, right-turn lane characteristics at signalized intersections, and the presence of on-street parking, including whether

the parking is long-term (generally residential) or short-term (commercial zones), to determine the frequency of bike lane blockage.

Existing Conditions – Pedestrian Level of Comfort

The series of PLOC maps essentially show where sidewalks are present or missing. Additionally, they show the quality of the sidewalks that are identified. Where sidewalks are provided, the maps show the extent to which the pedestrian environment is comfortable or uncomfortable, based on either sidewalk design **(Figure 9)**, traffic impacts **(Figure 10),** or vegetation **(Figure 11).** Roadways with facilities that have a "low quality" value are often sidewalks that are discontinuous, have narrow widths, or have existing obstructions. These qualities disallow a wide range of people, including people with disabilities, to not be able to rely on the pedestrian network for their daily travel. Road segments that are partially or fully low-quality designed are Princeton Street, Middlesex Street, Groton Road, Sierra Drive, Main Street, Windsor Street, and Horseshow Road. By improving these low-comfort segments to achieve medium-to-high or high comfort segments, they would be fully accessible and enable people with various degrees of mobility and disability to get around town. Examples of improvements would include moving existing obstructions or sidewalk construction that would connect segments with no sidewalk to segments with sidewalks.

Roadways with "high impact" segments have the lowest level of comfort since these sidewalks are adjacent to roadways with a combination of a high average daily traffic volume, high speed limit, high number of travel lanes, narrow (or nonexistent) shoulder width, length of lateral and vertical buffers, and close proximity to the highway (if roadway is within a 1/10 mile of a highway). A combination of these factors would inhibit the ability of a pedestrian to safely walk around Town. As shown in **Figure 10,** segments with the lowest level of comfort ("high" and "medium-to-high" impacts) are located along Groton Road, Middlesex Street, Billerica Road, Riverneck Road, Old Westford Road, Dalton Road, Chelmsford Street, and North Road. Residential roads that may have low traffic and/or speed limits are marked by red or orange segments due to a combination of being within 1/10 of a mile to Route 3 or Interstate 495, narrow (or nonexistent) shoulders, and a small vertical and lateral buffer length. Main roads that scored well, or resulted in "low impact" segments, are Acton Road, Boston Road, and Warren Avenue. The Bruce Freeman Rail Trail also received a "low impact" score.

The areas of the town that contain sidewalk also have a large presence of vegetation. **Figure 11** shows a significant amount of green segments, meaning that more than 90 percent of the segment will contain vegetation. For example, main roads such as Chelmsford Street, North Road, Groton Road, Boston Road, Billerica Road, Main Street, and Acton Road have a large presence of vegetation. Yellow segments on the map indicate that 25 to 90 percent of the segment will contain vegetation; orange segments indicate less than 25 percent of the segment contain vegetation; and red segments

represent fragments of the sidewalk that do not contain vegetation. Overall, the Town has an abundant amount of vegetation relative to segments with sidewalks.

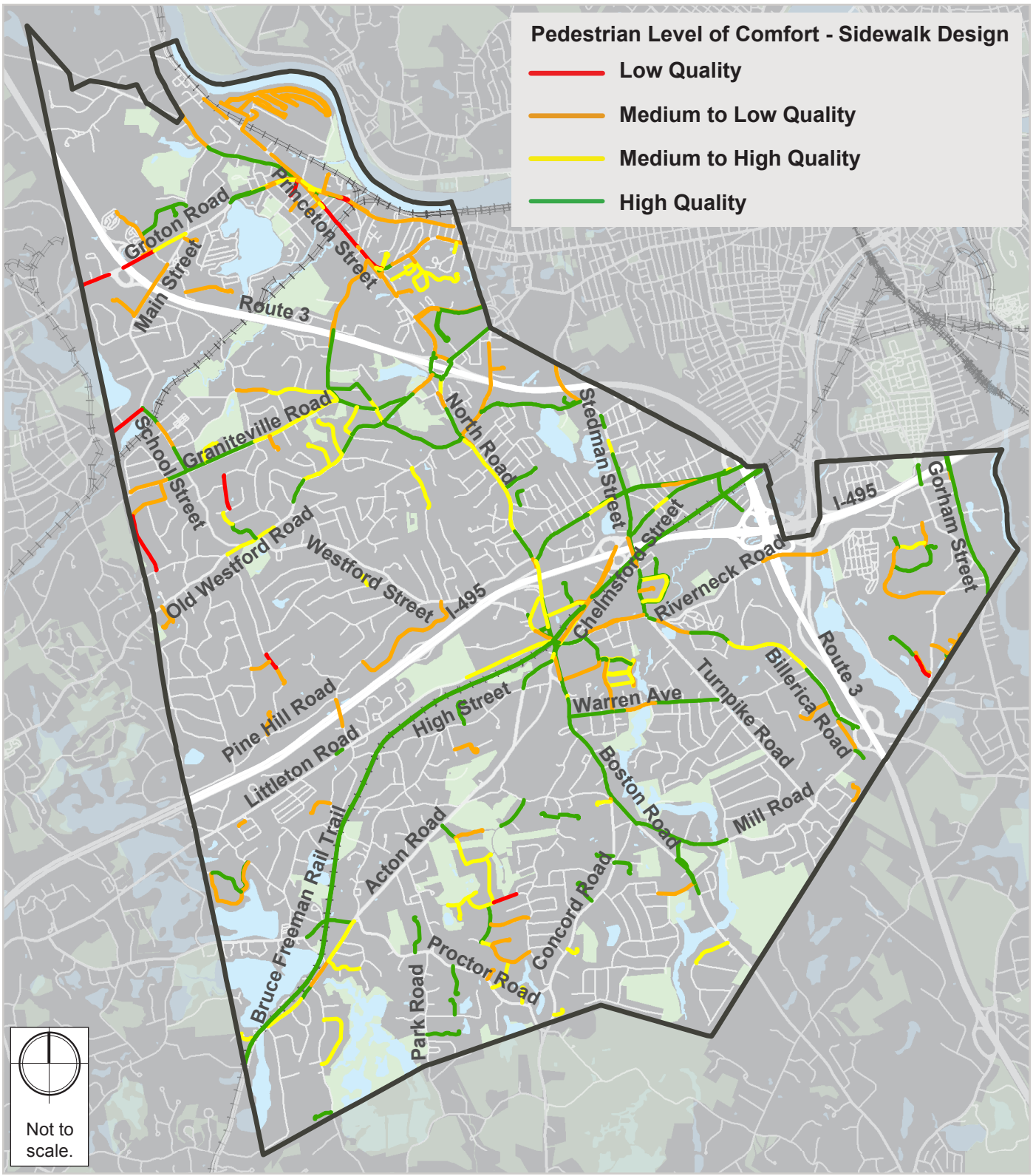
PEDESTRIAN DELAY

The longer a pedestrian has to wait for a crossing signal at a signalized intersection, the more likely there will be a pedestrian crossing without a signal. Average pedestrian delay is used in the prioritization plan, assuming that longer wait times are both unpleasant and less safe.

EXISTING CONDITIONS- PEDESTRIAN DELAY

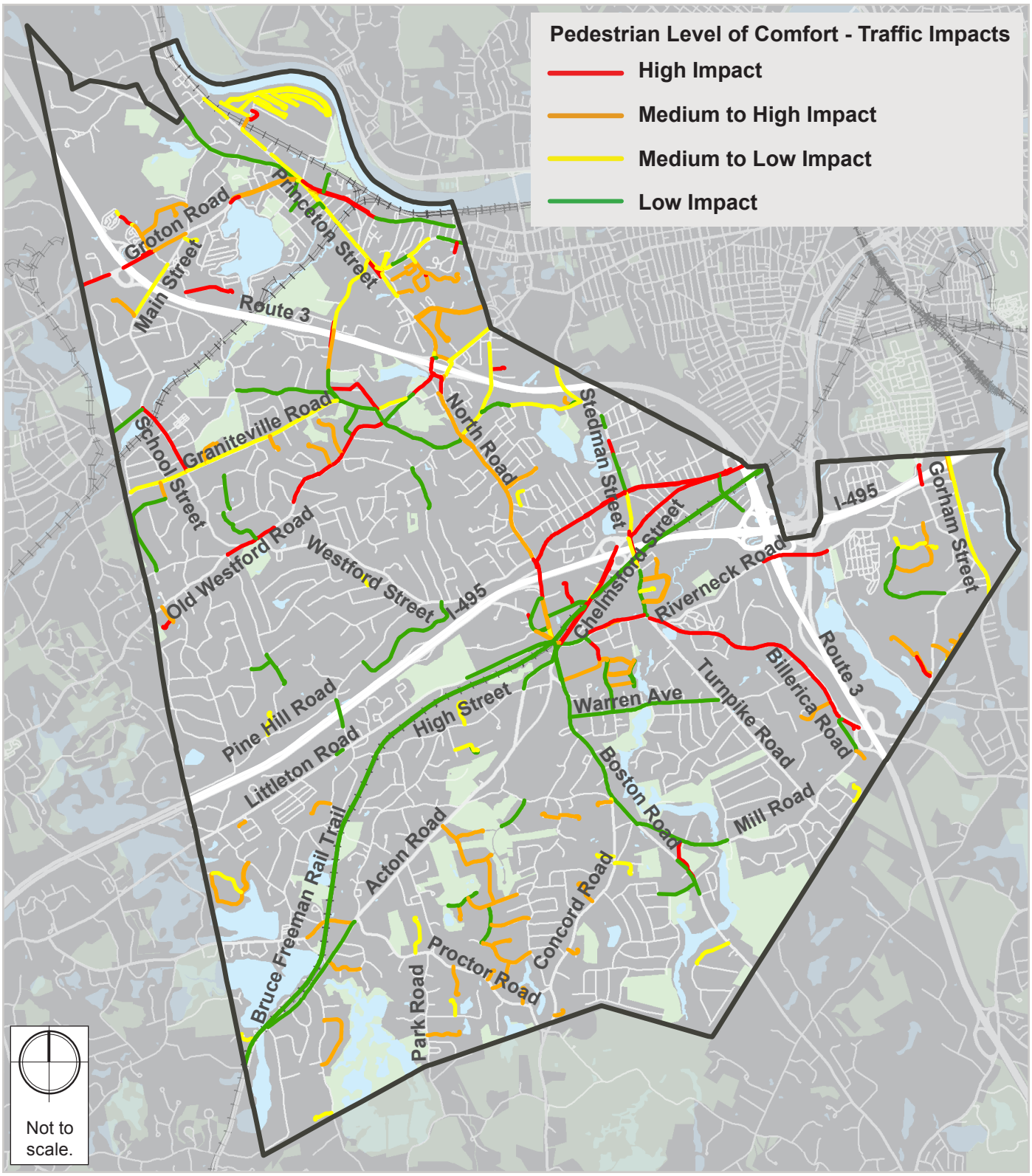
Pedestrian signals along Tyngsborough Road, North Road, Boston Road, Billerica Road, Drum Hill Road, Dalton Road, Chelmsford Street, and Littleton Road were evaluated to produce the Pedestrian Delay Map (**Figure 12**). The Pedestrian Delay Map shows zero pedestrian signals that have an average pedestrian delay that last greater than 60 seconds; however, there are six pedestrian signals that received a "Level of Service E," meaning the average pedestrian delay is 40 to 59 seconds. These six pedestrian signals that would result in a high likelihood of pedestrian noncompliance are located on Tynsgsborough Road, Drum Hill Road, North Road, Dalton and North Roads, Stedman and Chelmsford Streets, and Turnpike and Billerica Roads. The pedestrian signal in Vinal Square is one of the six that received a "Level of Service E," indicating the wait time for that signal is unpleasant and would result in a high chance of pedestrian noncompliance. The Drum Hill rotary has four pedestrian signals, two in which have a 30-39 second delay time and another two that have a 10-19 second delay time; the likelihood of pedestrian noncompliance for these four pedestrian signals is "moderate to low." The pedestrian signals in Chelmsford Center have an average pedestrian delay of 10-19 seconds, thus the likelihood of pedestrian noncompliance is low.

Figure 9. *Pedestrian Level of Comfort - Sidewalk Design*



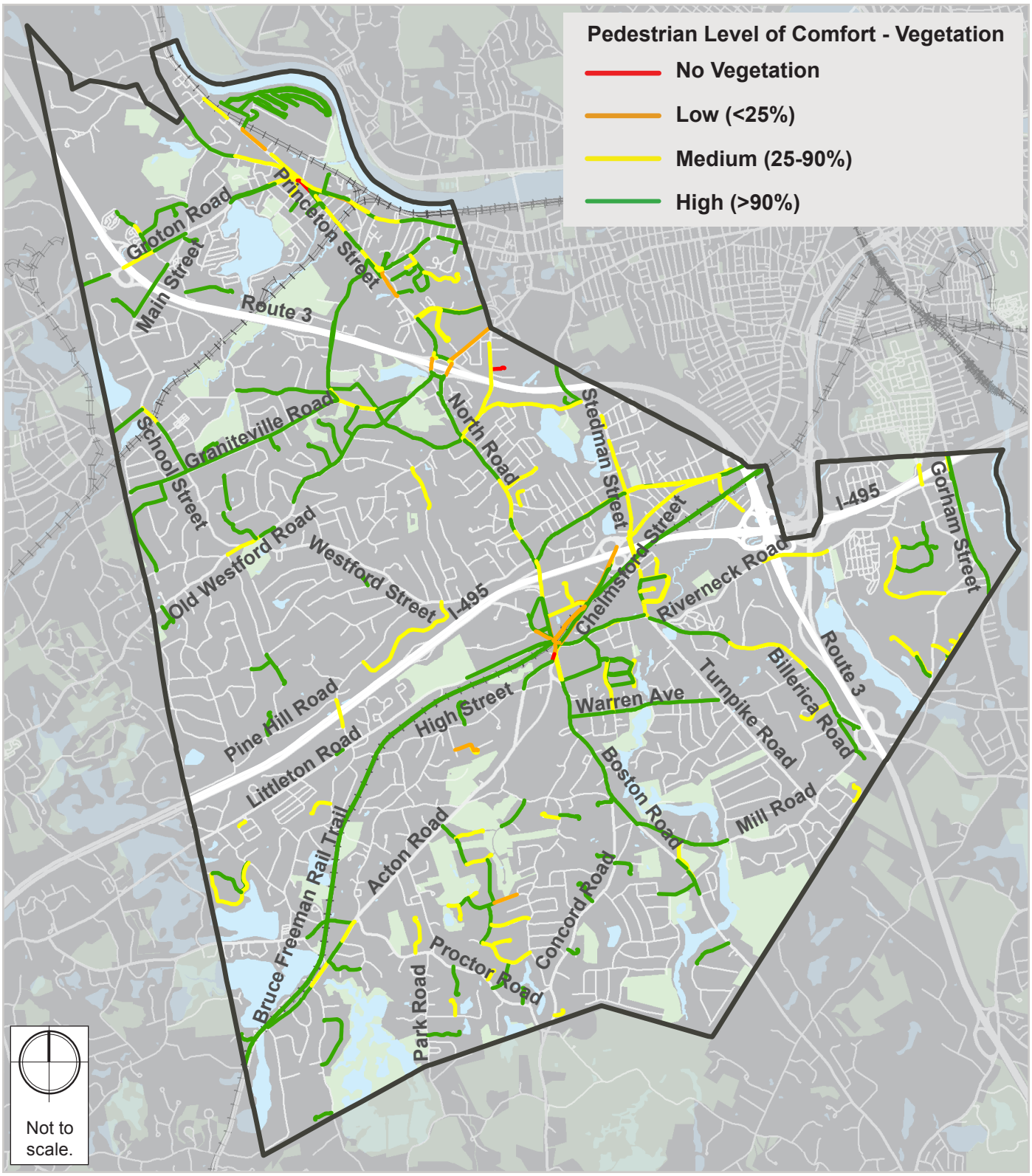
Data Source: HSH, MassGIS

Figure 10. ***Pedestrian Level of Comfort - Traffic Impact***



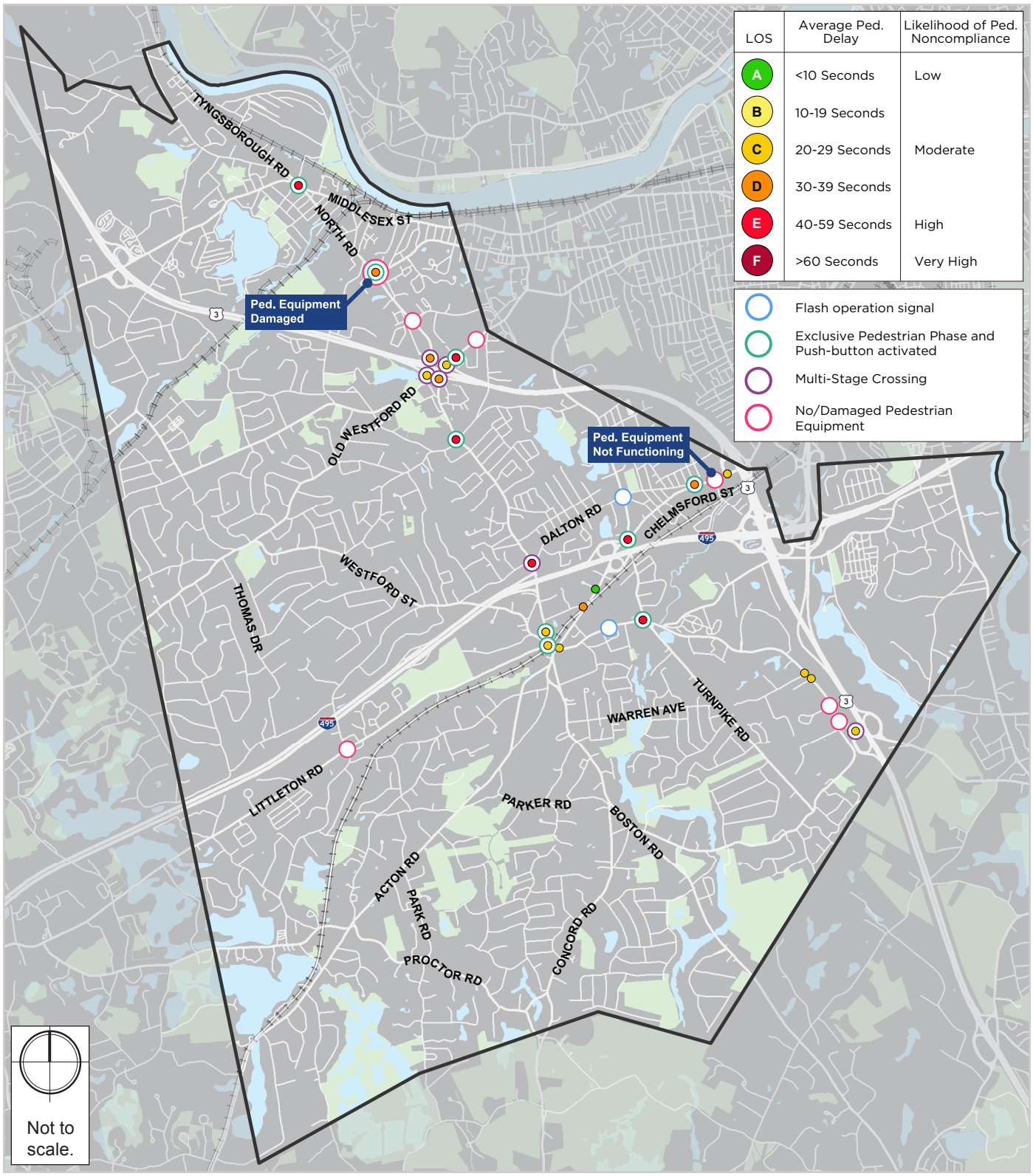
Data Source: HSH, MassGIS

Figure 11. ***Pedestrian Level of Comfort - Vegetation***



Data Source: HSH, MassGIS

Figure 12. ***Pedestrian Delay***



Tools to Assess Demand

POINTS OF INTEREST

HSH considers the proximity of health care services, schools, including technical schools, pre-schools, and colleges, and public services, such as a town hall, library, or police station. The analysis also considers the ability of cyclists and pedestrians to access the three main centers in Chelmsford: Vinal Square, Drum Hill area and Chelmsford Center.

EXISTING CONDITIONS – PEDESTRIAN PROXIMITY ANALYSIS

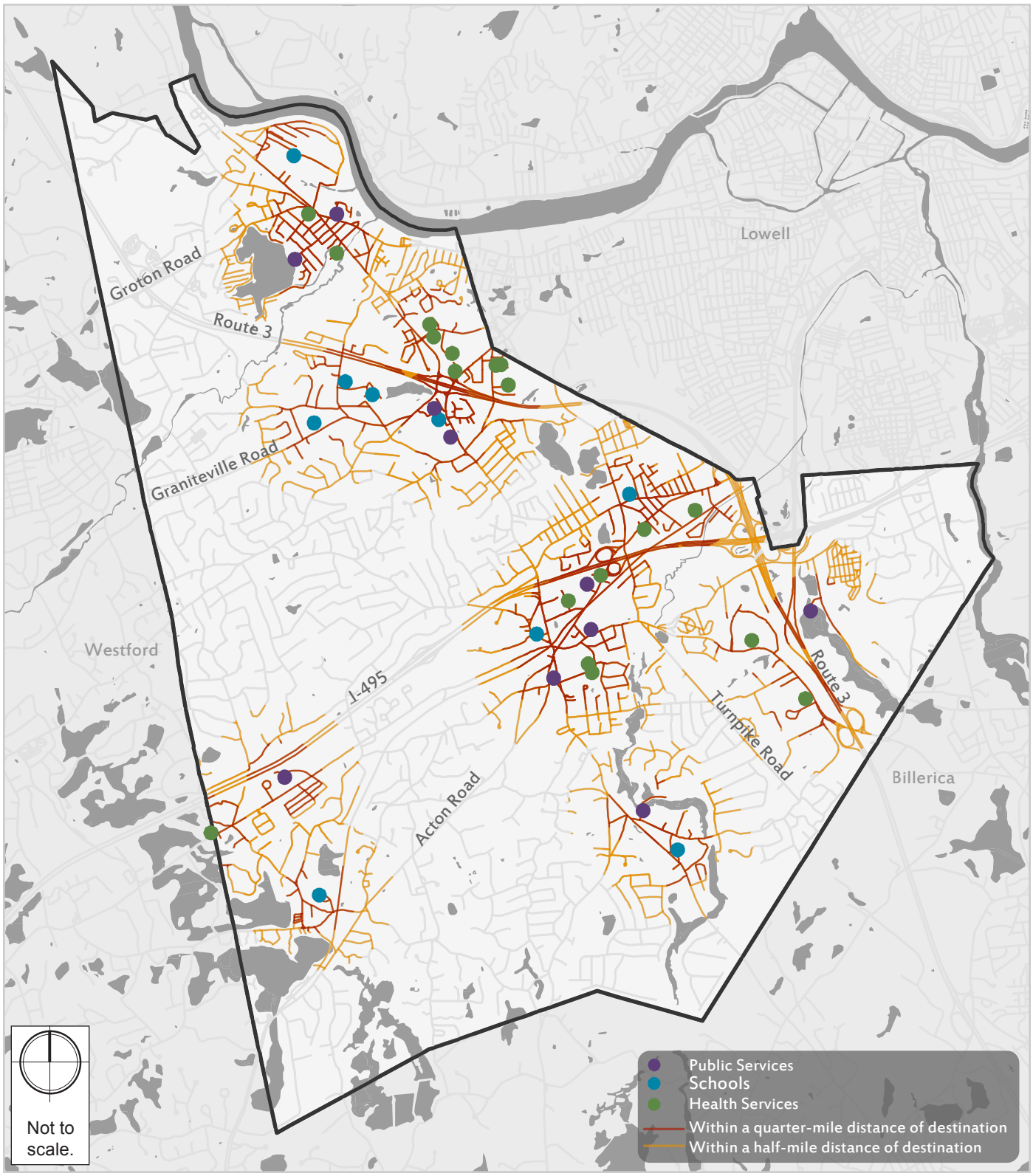
The pedestrian proximity maps **(Figures 13 and 14)** illustrate the roadway network that is within a reasonable walking distance of a quarter to half mile distance from important destinations. The points of interest that are identified in this analysis are: public services, schools, health services and the commuter rail station in Lowell. A significant number of destinations are located in the surrounding areas of Vinal Square, the Drum Hill area and Chelmsford Center. Within a quarter-mile distance of Vinal Square, residents have access to the North Chelmsford Water District, U.S. Post Office, Chelmsford Family Practice, and Greater Lowell Psychiatric Associates. Similar to Vinal Square, the Drum Hill Rotary, and Chelmsford Center areas also have clusters of health and public services within their respective areas. Chelmsford schools are located throughout the Town with the Byam Elementary School being the furthest away from the three centers, and the ABC Nursery School located in the Chelmsford Center area. Although having an area with a cluster of destinations is ideal because it reduces the walking time for residents to get to one destination to another, an area with a variety of uses is as important. Chelmsford Center is an example of an area that offers a variety of services. Since residents can reach three health services (the Chelmsford Town Hall, the Chelmsford Public Library, and the ABC Nursery School) within a reasonable walking distance from each other, residents would be encouraged to walk to these different amenities.

EXISTING CONDITIONS – BICYCLE PROXIMITY ANALYSIS

The bicycle proximity maps **(Figures 15 and 16)** show a comprehensive network of roads that residents can use to access different points of interest throughout the Town. A reasonable cycling distance of one to two miles is ideal for a wide range of residents who use their bicycles for recreational use or to get around town. A majority of the town's local destinations are located along high-traffic roads, which would make it difficult for cyclists to use the roadway if it didn't have a network of bicycle facilities to bring people safely from one destination to another. For instance, Tyngsborough/North Road and Chelmsford Street are roadways that run along the three town centers and accommodate more than half of the destinations that are shown on the map. Unlike the pedestrian proximity analysis, the bicycle proximity analysis indicates a larger network of

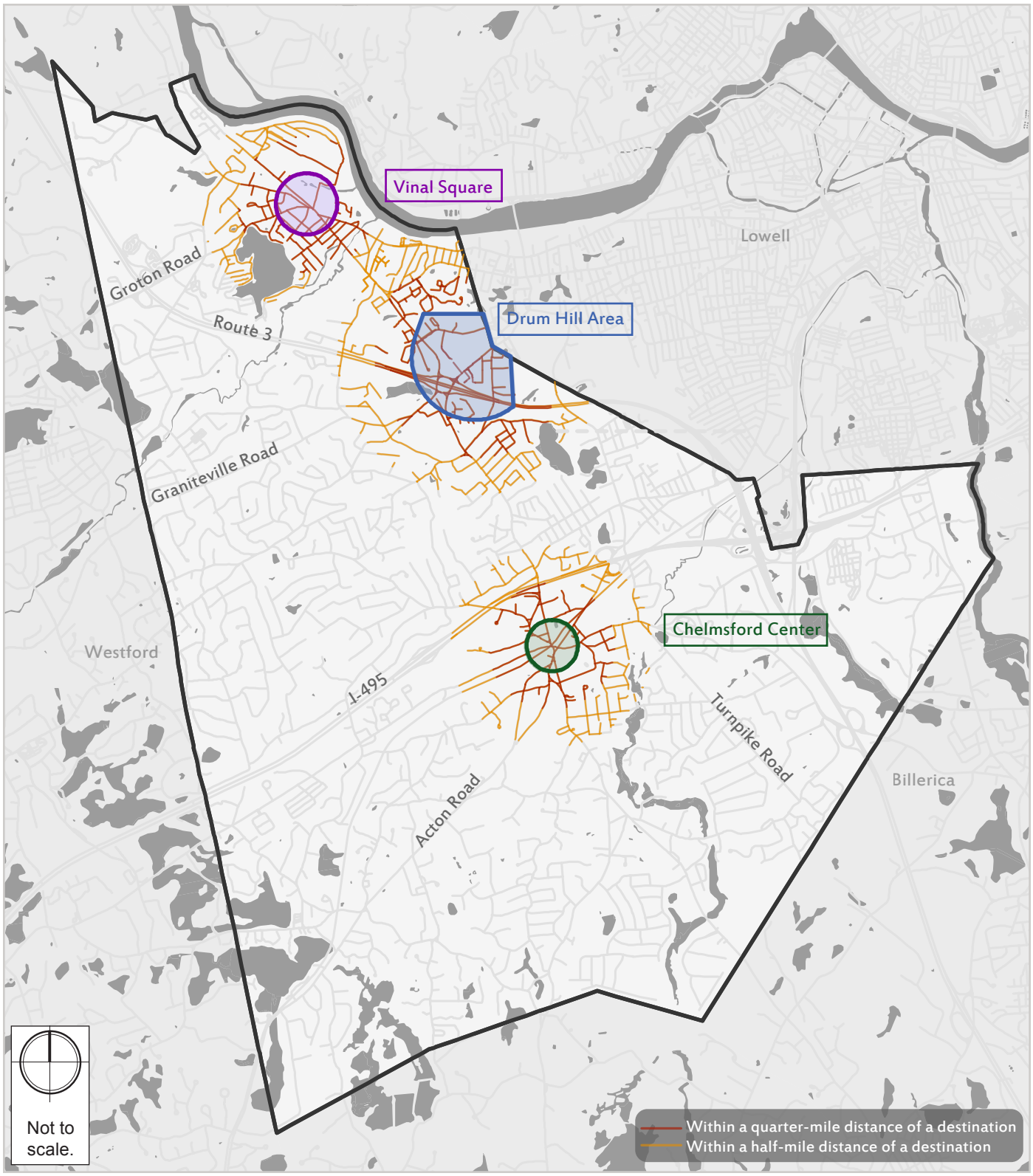
residential neighborhoods that would be able to access the different points of interest and three town centers.

Figure 13. ***Pedestrian Proximity Analysis - Schools, Public Services, Health Services***



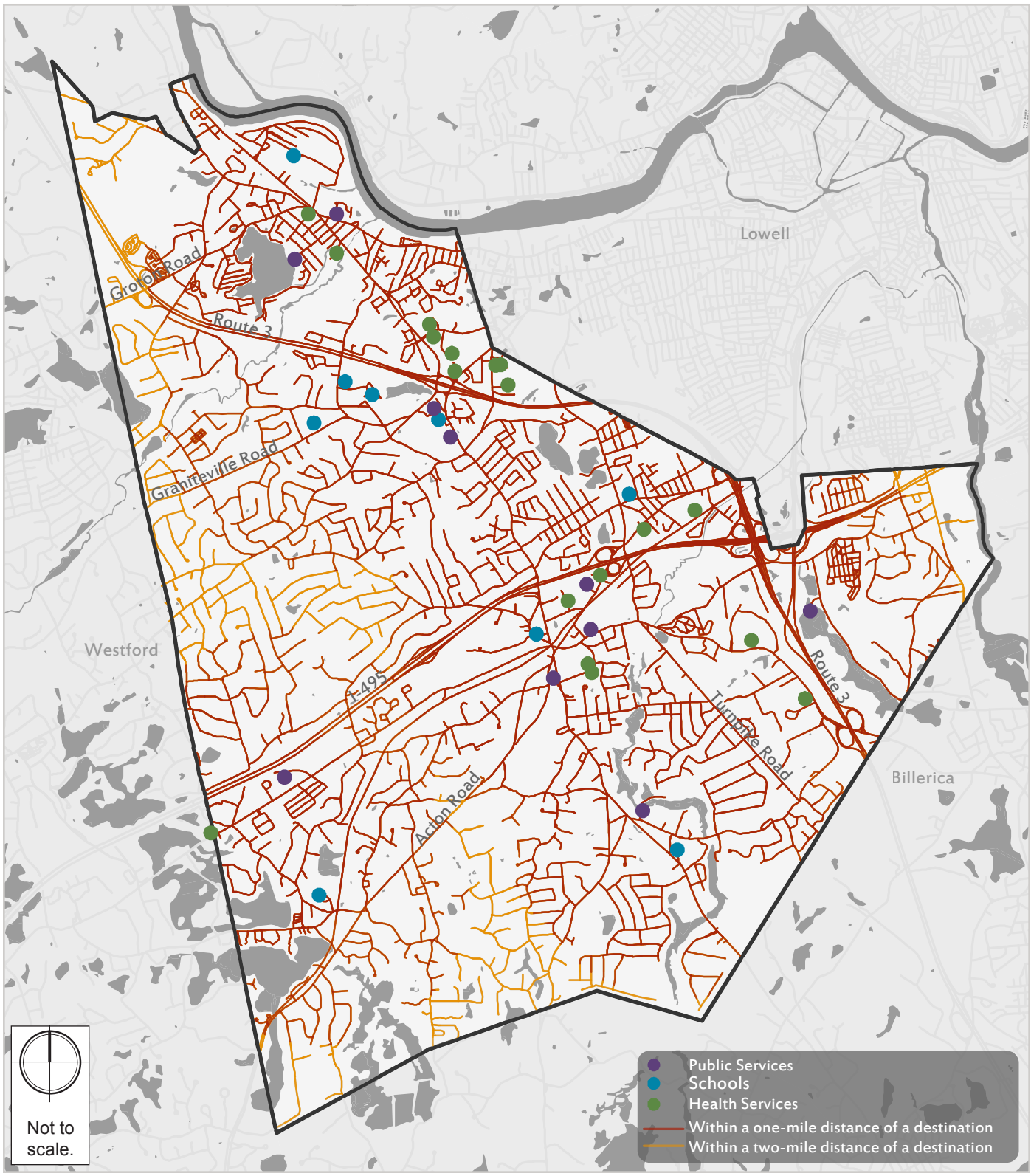
Data Source: HSH, MassGIS

Figure 14. ***Pedestrian Proximity Analysis - Chelmsford Centers***



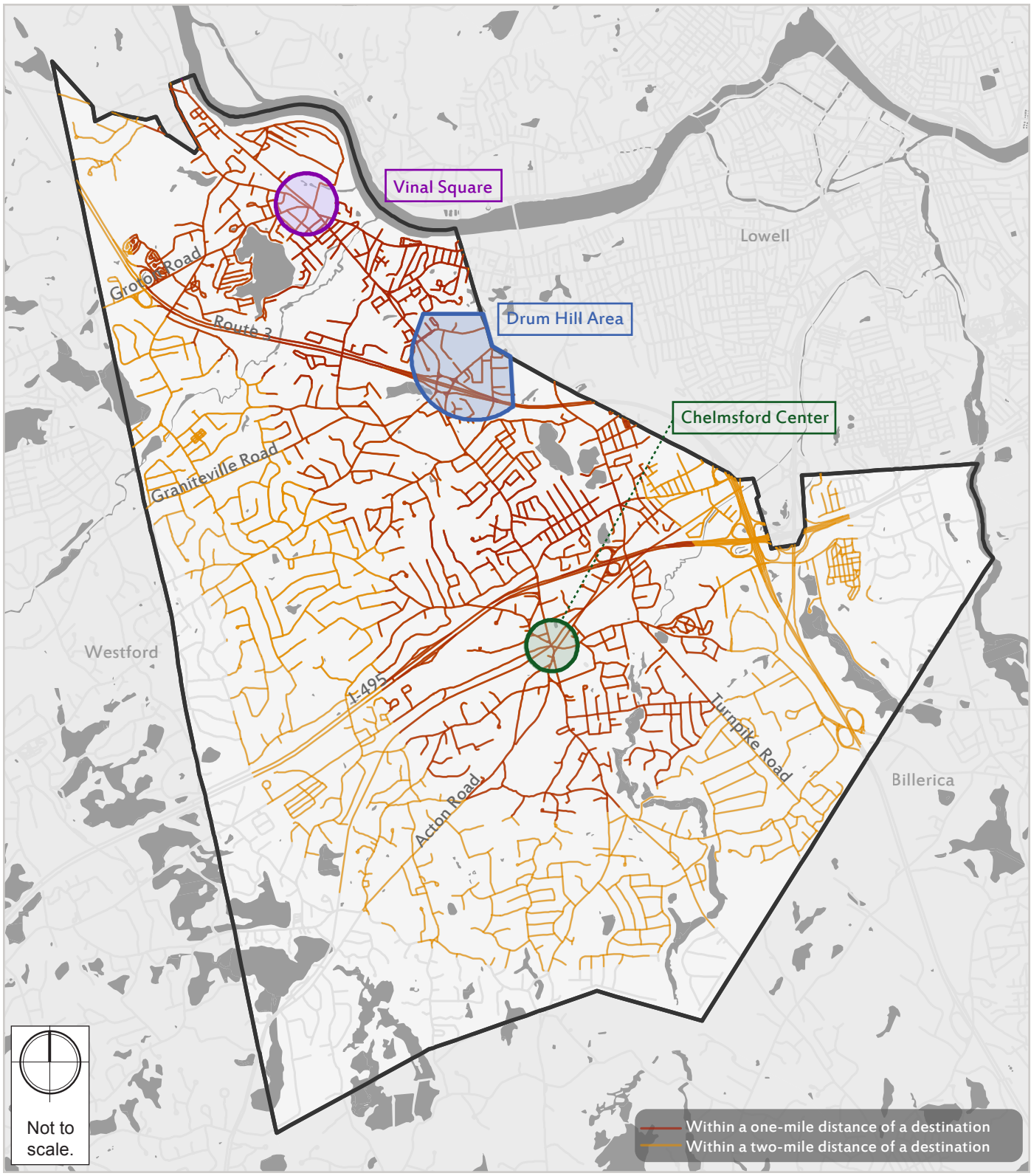
Data Source: HSH, MassGIS

Figure 15. ***Bicycle Proximity Analysis - Schools, Public Services, Health Services***



Data Source: HSH, MassGIS

Figure 16. ***Bicycle Proximity Analysis - Chelmsford Centers***



Data Source: HSH, MassGIS

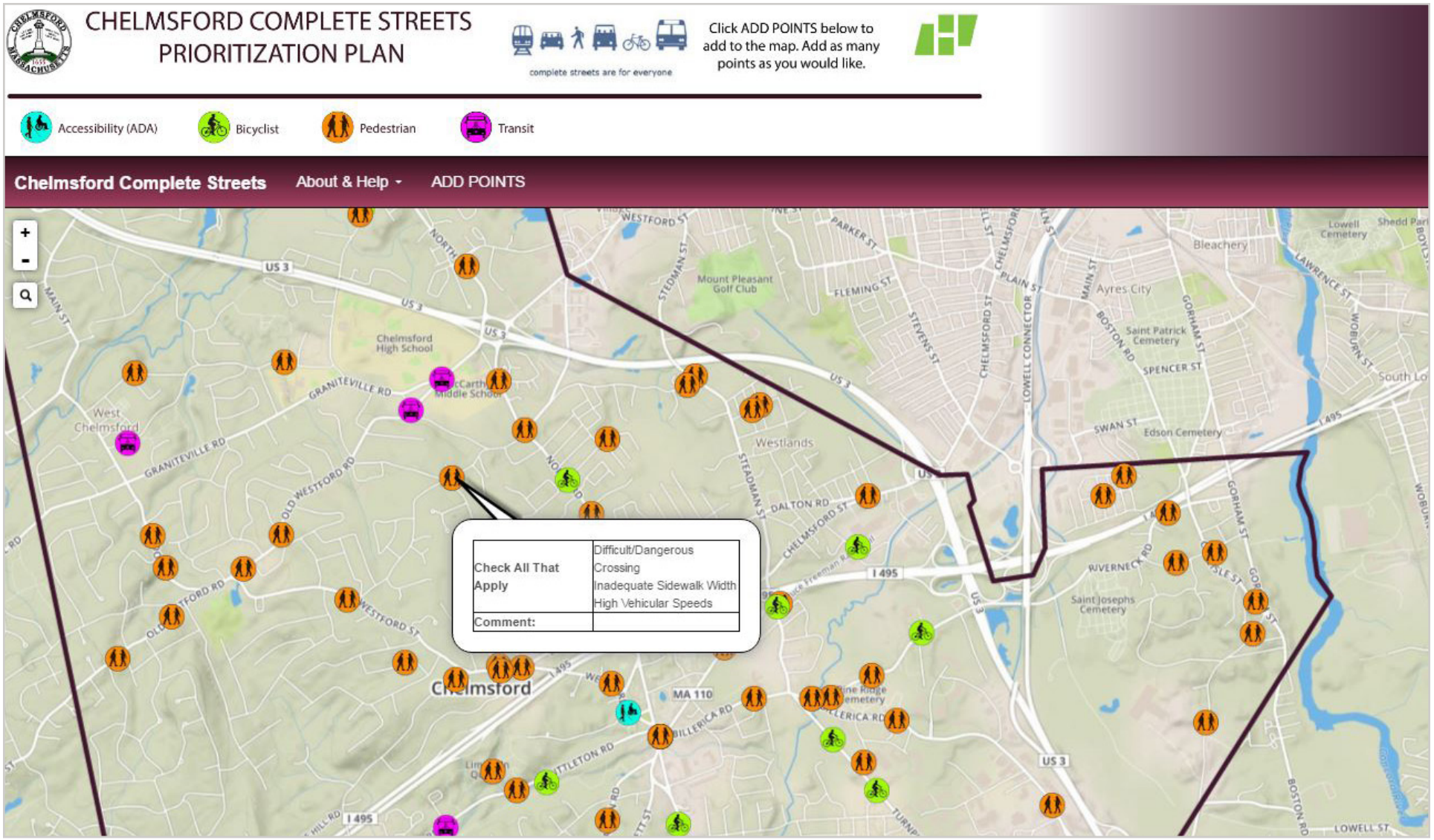
STAKEHOLDER INPUT

Finally, the prioritization plan seeks to incorporate the many ideas and visions of community members. A public forum was held to inform the community of the Complete Streets funding program and to solicit comments on where problem areas are located for pedestrians, cyclists, transit users, or those with disabilities, as well as ideas and project suggestions. In addition to the public forum, an online WikiMap was posted on the Town's Facebook page to gather input from a broad reach of the community. Community members were encouraged to identify and comment on locations where they saw issues or opportunities.

EXISTING CONDITIONS – STAKEHOLDER INPUT

The comments received from various stakeholders throughout Town tended to agree with one another. WikiMap respondents, Town officials, the Chelmsford Bicycle and Pedestrian Advisory Committee, and attendees at the public meeting all agreed on the importance of interconnected town wide sidewalk network. In addition, numerous intersections were mentioned as needing a comprehensive reevaluation for bicycle and pedestrian safety. This included the intersection of Princeton Street and North Road, the center of Vinal Square, the crossing of the Bruce Freeman Rail Trail at Central Square, and the Drum Hill Rotary. Funding needs have been identified for various improvements at all of these intersections, and for those under Town control, funding has been requested. For Vinal Square and the Drum Hill Rotary, which are under state jurisdiction, project ideas and funding needs are being assessed for future implementation on the state level.

Figure 17. ***Stakeholder Input Collected via Online WikiMap***



Data Source: http://WikiMapping.com/WikiMap/Chelmsford.html

Tools to Assess Equity Concerns

To ensure an equitable distribution of resources for those who may greatly benefit from improved street conditions, we consider environmental justice neighborhoods and the population reported as having a disability. 2010 Census data is used to determine census blocks that exceed environmental justice thresholds for elderly populations, limited English households, households with no vehicle ownership, minority populations, and low income households. Using the American Community Survey (ACS) 5-Year estimates, the percentage of persons with disabilities was calculated for each census block group. ACS is a continuous data collection effort led by the U.S. Census Bureau to measure the dynamic social and economic characteristics of the U.S. population. Since ACS replaced the decennial Census long-form, there is no disability data in the 2010 Census and thus is used to report population estimates for persons with disabilities. Unlike the U.S. Census, ACS only provides self-reported information and so represents a sample of the total population. The locations of assisted living facilities are also considered, as residents may have limited mobility.

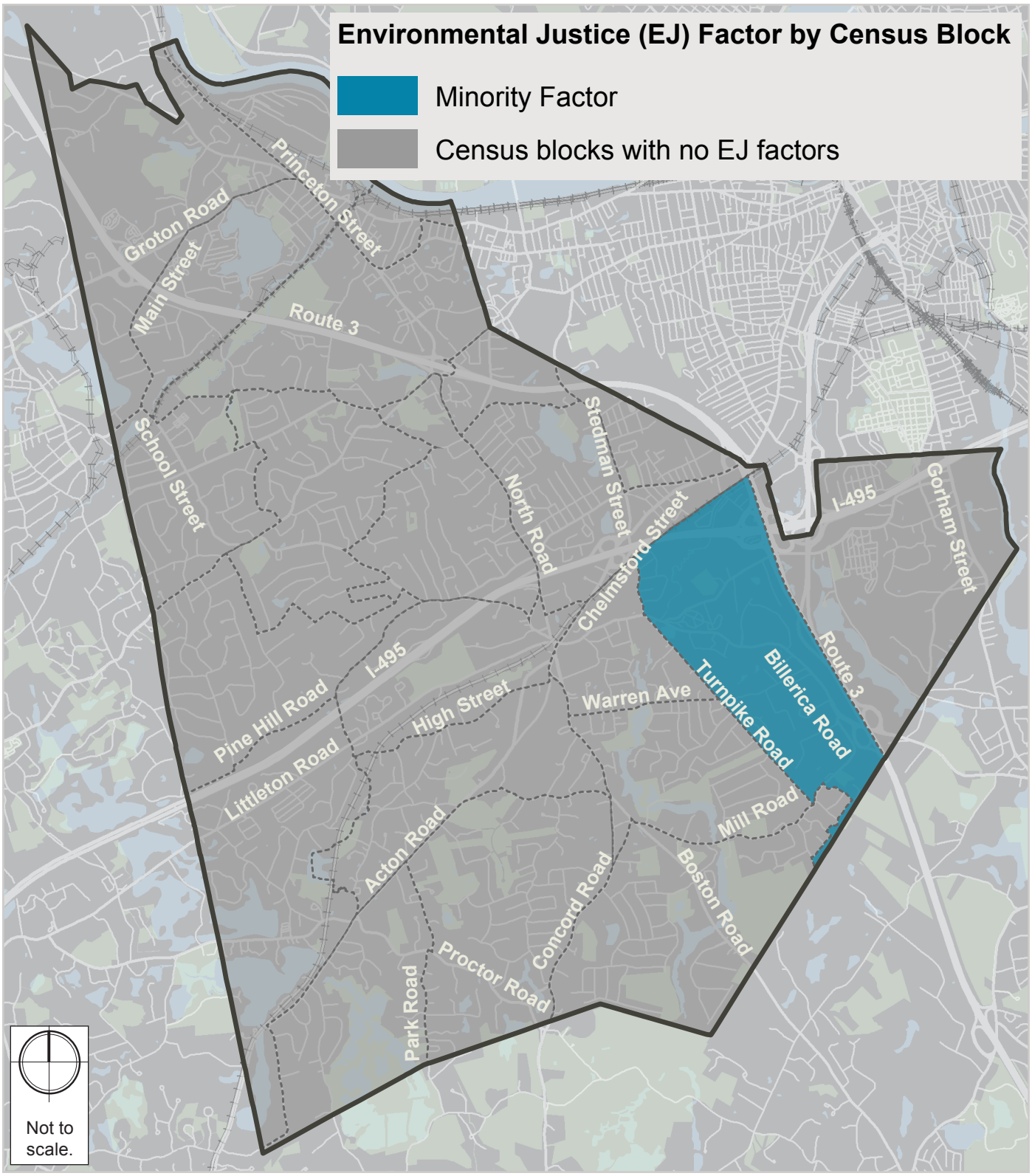
ENVIRONMENTAL JUSTICE COMMUNITIES

The Town of Chelmsford has one census tract area that exceeds the threshold for environmental justice population. This is the area bounded by Route 3 to the east, the Town line to the south, Turnpike Road to the west, and the Bruce Freeman Rail Trail to the north.

PERSONS WITH DISABILITIES

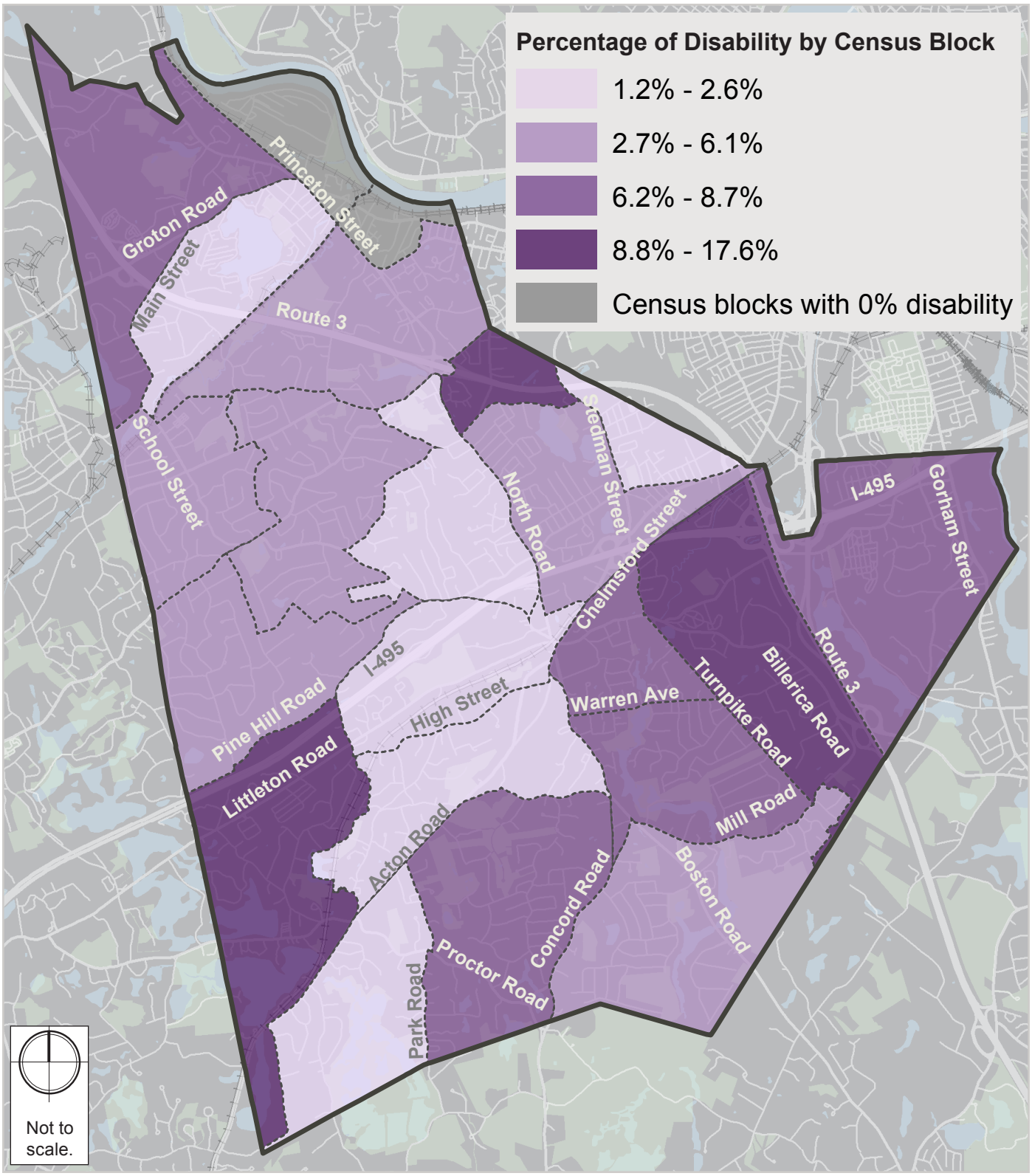
Figure 18 shows that rates of disability vary throughout Town. Areas with residents that self-reported having a disability include census tracts in the southeast of town, northwest of town, and in the area close to Drum Hill.

Figure 18. ***Environmental Justice***



Data Source: 2010 US Census

Figure 19. ***Persons with Disabilities***



Data Source: 2014 ACS Survey

Project Selection

Each tool for measuring existing conditions and pedestrian and bicycle demand contributes to an understanding of the existing conditions in Chelmsford. Using these tools to determine potential project locations, we use aerial imagery, field observations, and discussions with Town officials to create a list of potential projects for consideration. Projects range from low-cost, low-design projects like restriping bicycle lanes and crosswalks, and the installation of tactile strips on curb ramps, to projects which may require more design, such as construction of new sidewalks, road diets, and new or extensions of existing multi-use paths. These projects are discussed with the Town and refined.

Project Prioritization

The prioritization process was completed by assessing each project based on the extent to which it addresses a range of concerns to help with the selection of projects for the first year of Complete Streets funding. HSH's analysis mirrors MassDOT's prioritization requirements while adding an additional layer of nuance to the prioritization of projects. The remainder of the projects will remain as options for future Complete Streets funding cycles.

For each proposed project site, values reflecting existing and, where appropriate, proposed conditions are recorded to generate a ranked list of projects. To normalize the values, each variable is scaled between zero and ten such that a higher scaled score relates to higher priority. Weights are used to reflect the desired influence of each variable in the prioritization process. Notes explaining the methodology for assigning values to each category are listed below:

NETWORK CONNECTION

Each project is assessed on whether it creates a new connection within the existing pedestrian or bicycle networks, categorized as "Full," "Partial," or "None." A full connection either connects existing acceptable pedestrian or bicycle conditions or extends the usable network. A partial network connection is one that does not connect to existing acceptable pedestrian or bicycle conditions or only closes a network gap in conjunction with other proposed projects. Projects that require phasing over multiple years are considered to provide partial network connections. A categorization of "None" would be used for a project that does not create a new facility, such as sidewalk reconstruction, or one that creates a new link unconnected to the existing sidewalk or low-stress bicycle networks.

HIGHEST ADJACENT BICYCLING AND WALKING PROPENSITY LEVEL

Each project is ranked on a scale of one to three based on the propensity of people to walk or bike at that location. Locations within a mile of one of Chelmsford's three critical areas were ranked as

having a high bicycling propensity level. Those within a half mile were ranked as having a high walking propensity level. Projects between a mile and two miles of a critical area were given a medium biking propensity level and those between a half mile and a mile were given a medium walking propensity level. In addition, projects within a mile of another point of interest outside of one of the Town's three critical areas were given a medium biking propensity level, and those within a half mile were given a medium walking propensity level. This includes points of interest such as Roberts Field and Byam Elementary School. Maps of proximity are available in **Figures 13 through 16**.

ON TRANSIT ROUTE

Projects located along a transit route were given credit for improving access to transit. For example, a sidewalk repair project located along a road with transit improves alighting and boarding operations, in addition to providing local walking connectivity.

PROXIMITY TO CRITICAL AREA

In addition to measuring propensity level, projects were given priority for being located within a mile of Chelmsford's three critical areas for biking, and within a half mile for walking. These areas have significantly higher levels of walking and biking than other points of interests spread throughout Town.

NUMBER OF PEDESTRIAN AND BICYCLE CRASHES ADJACENT TO PROJECT

This criterion counts the number of bicycle and pedestrian crashes that occurred between 2012 and 2014 in the immediate project area.

EXISTING BICYCLE LEVEL OF COMFORT AND EXISTING PEDESTRIAN LEVEL OF COMFORT

Using HSH's bicycle and pedestrian level of comfort maps, the different projects are assigned either an average bicycle and pedestrian level of comfort value for corridors to account for corridor length, or, in the case of projects at intersections, the worst condition present is chosen. Three separate pedestrian level of comfort factors were measured, including level of comfort as it relates to sidewalk design, vegetation and traffic impacts.

PROPOSED CHANGE IN BICYCLE LEVEL OF COMFORT AND PROPOSED CHANGE IN PEDESTRIAN LEVEL OF COMFORT

Projects are assigned a proposed level of change in level of comfort, ranging from no improvement to high. If the project improvements are minor or the existing level of comfort is already high, the project is considered to have a "low" impact. If project improvements for bicycle and pedestrian comfort are anticipated to be significant, they are considered to have "medium" or "high" impact. For

pedestrian level of comfort, the degree to which the project improved pedestrian level of comfort as it relates to sidewalk design, vegetation, and traffic impacts were measured separately. For example, a sidewalk reconstruction project would improve the impact of sidewalk design and vegetation but would only improve the impact of traffic if it was being built further from the existing travel lane.

PEDESTRIAN DELAY

The average pedestrian delay for projects located at signalized intersections with a pedestrian phase is recorded as a grade, where a delay of less than 10 seconds would receive an "A" and a delay of greater than 60 seconds would receive an "F."

CROSSING IMPROVEMENT

The crossing improvement criteria is intended to prioritize projects that improve the safety for pedestrians at intersections, whether through the installation of crosswalks or RRFBs or by shortening crossing distances with curb bump outs. Each project is assigned either "yes," it improves the crossing condition for pedestrians, or "no," the project has no impact on any intersections.

NUMBER OF ENVIRONMENTAL JUSTICE CENSUS BLOCK GROUPS

The number of census blocks within a quarter mile of a project, equivalent to about a five minute walk, is recorded.

PERCENT OF PERSONS WITH A DISABILITY

Using ACS's 5-Year estimates, the percentage of persons with a disability within a quarter mile distance from the project site was calculated and used to prioritize projects with higher proportions of disabled residents. Census tracts in Chelmsford varied, with the lowest having between 1.2% and 2.6% of people with disabilities, to the highest, with between 8.7% and 17.5% of people with disabilities. Projects were given a score of 1 to 5 based on the disability rate of the census tract where that project is located. Projects spanning multiple census tracts were given the average of the census tracts it passed through.

STAKEHOLDER INPUT

Input from the public meeting, WikiMap, and any email communications with community members were incorporated into the list of proposed projects. In addition, priorities of the Chelmsford Department of Public Works (DPW) and Chelmsford Pedestrian and Bicycle Advisory Committee (BPAC) were taken into consideration. Projects were scored based on the number of mentions it received in each of these contexts.

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2) GIS Data Layers
   a) Level of Comfort CSP Data Dictionary (excel)
   b) Chelmsford Complete Streets Prioritization HSH0916 (geodatabase)
      - Bicycle Crashes, 2012-2014
      - Pedestrian Crashes, 2012-2014
      - Bicycle Level of Comfort
      - Pedestrian Level of Comfort – Sidewalk Design
      - Pedestrian Level of Comfort – Traffic Impacts
      - Pedestrian Level of Comfort – Vegetation
      - Environmental Justice
      - Persons with Disabilities

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