



Let's Walk!

A Pedestrian Safety Plan

for the **Naugatuck Valley Council of Governments**

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Executive Summary

Walking is the most basic form of transportation. Most New England towns and cities were initially developed around walking, and many of these locations retain the basic elements supportive to pedestrians. Nearly **all people are pedestrians** of some form during most trips, be it walking to the car, to the bus stop, or directly to their destination. Walking also tends to be the most accessible form of transportation: no special equipment is typically required.¹

Walking, jogging, and running are also healthy habits people can incorporate into daily routines. The Department of Health and Human Services recommends all adult Americans maintain thirty minutes a day of physical activity,² and adding a brisk walk into one's day is for many the easiest way to accommodate this level of activity.

Research shows that **people walking** in business districts are more likely to spend more time and **spend more money** in local establishments,³ partly because it is easier to make impulse buys at multiple stores and partly because they would need to change travel modes to reach destinations outside of the business district. Further, the mix of uses that walkable environments usually feature often improve property values and small business profitability.

Despite these benefits, the NVCOG region has the lowest proportion of pedestrian commuters of all Councils of Government in the state, including the non-urbanized Councils.⁴ The NVCOG region is also the second-most dangerous COG region for pedestrians, and the Waterbury Urbanized Area (UZA) is the **most dangerous urbanized area** for pedestrians.⁵ NVCOG sees 20% of statewide fatalities, despite only having 12% of statewide pedestrian injuries, and only 7% of statewide pedestrian commuters. The City of Waterbury alone has seen 18 pedestrian fatalities in the five-year study period: 11% of the statewide total, and significantly more than peer cities.⁶ To address these shortcomings and gain the above benefits, the NVCOG has developed *Let's Walk!*, which aims to identify program improvements and potential projects to save pedestrian lives region-wide.

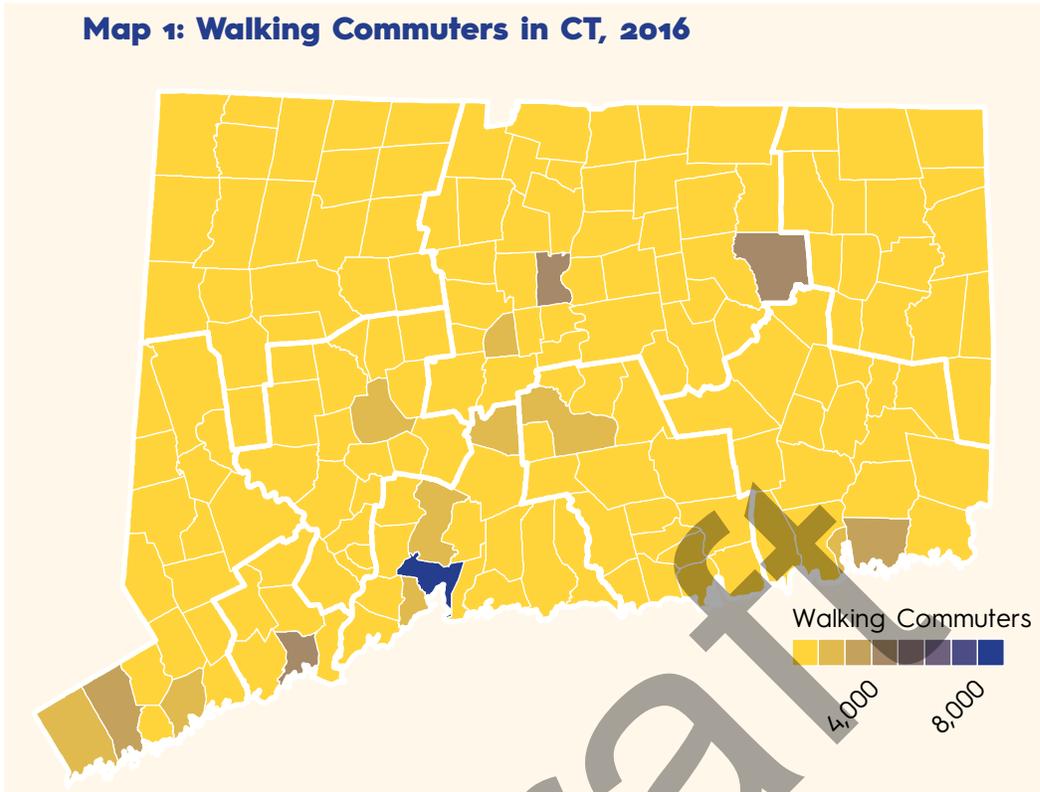
Urbanized Areas (UZAs) are set by the Census, and are adjusted every 10 years.



Ped deaths in the NVCOG, compared to CT.

- 1 Of course this does not apply to persons unable to walk without assistance. People dependent upon wheelchairs or other means of assistance are also considered pedestrians in this plan.
- 2 Physical Activity Guidelines for Americans, DHHS 2008
- 3 Consumer Behavior and Travel Mode Choices, Clifton et al, 2012
- 4 American Community Survey 5-year estimates 2012–2016 Table #B08301
- 5 UCONN Crash Data Repository, 2012–2016. Comparison is made using the Pedestrian Danger Index (PDI). Measures made from Census Data & UCONN Data by NVCOG staff. The PDI is a measure developed by Smart Growth America. Methodology is available in an Appendix.
- 6 UCONN Crash Data Repository, 2012–2016

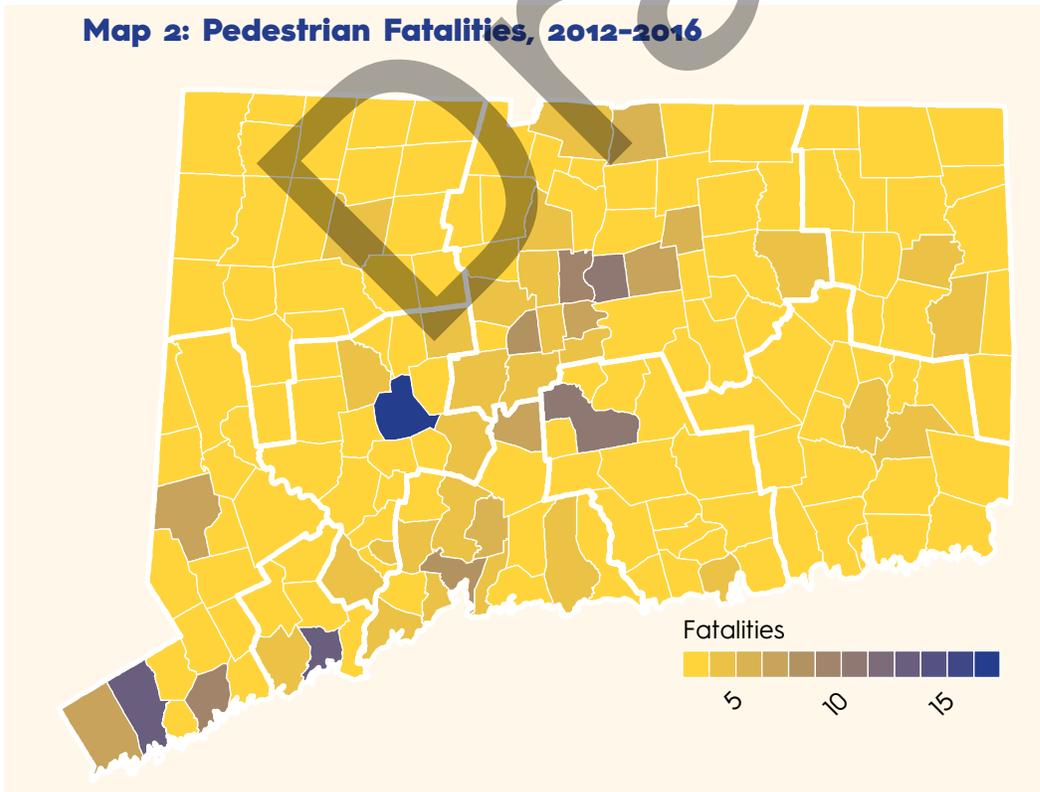
Map 1: Walking Commuters in CT, 2016



The NVCOG region has high ped. volumes in some areas, most notably in downtown Waterbury & downtown Bristol, but there are very few areas where residents can regularly walk to work.

Source: US Census Bureau ACS 2016

Map 2: Pedestrian Fatalities, 2012-2016



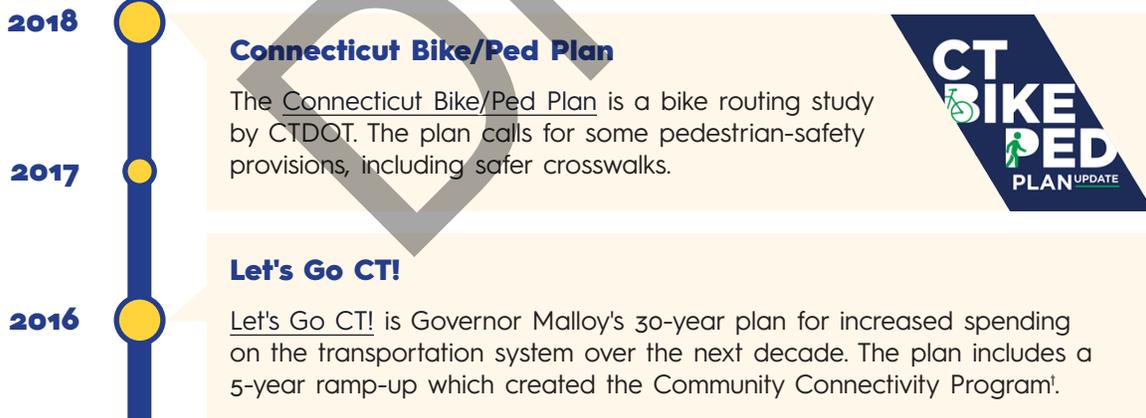
Waterbury has by far the highest number of ped. fatalities statewide, at 18 for the study period. This number has been consistently high for at least the past decade.

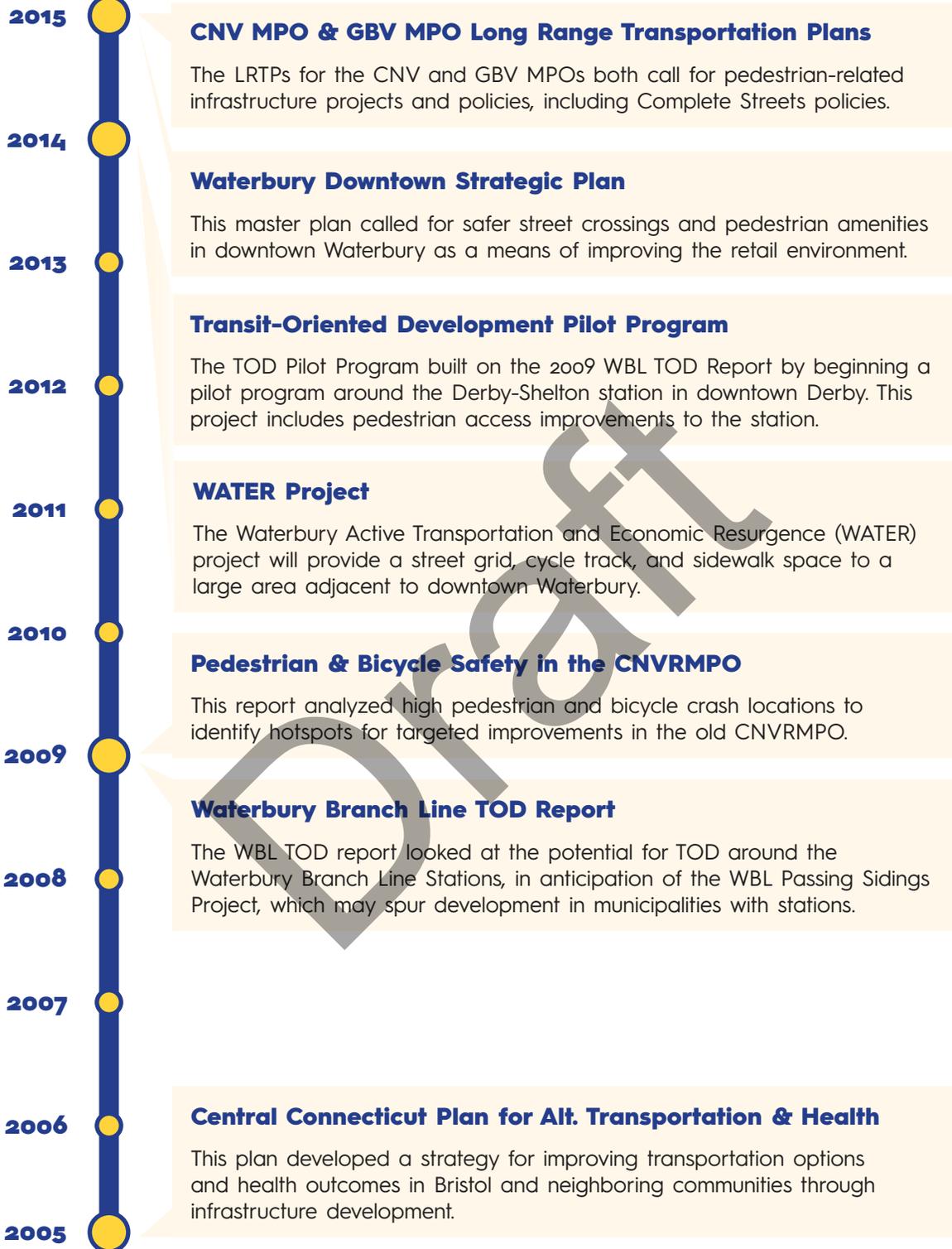
Source: UCONN Crash Data Repository

Structure of *Let's Walk!*

- 1.** This pedestrian plan will review the current conditions affecting pedestrians in the NVCOG region. The plan will develop indices to represent likely areas of pedestrian activity and likely pedestrian safety concerns. Using these indices, the NVCOG will be able to identify high priority projects—both on the federal aid network and on local road networks, analyze internal funding mechanisms, and identify funding opportunities for pedestrian projects on roads serving all functions.
- 2.** Additionally, this plan will identify some potential improvements to the pedestrian environment. This will include a review of pedestrian-oriented infrastructure options and best practices, as well as a review of funding streams through the NVCOG and through the state which affect transportation in the region. A punch list of physical and programmatic improvements will be created.
- 3.** Finally, this plan will identify performance measures that will be used in updates to this plan to analyze progress towards a more walkable region.

Previous & Existing Plans





Data Sources & Collection

The development of this plan relies heavily on the most recent data from the U.S. Census Bureau and the American Community Survey for demographic data, the CT911 road networks for roadway data and to construct the demand and deficiencies indices, the UCONN Crash Repository for pedestrian crashes, and the NVCOG 2014 sidewalk inventory for sidewalk availability. Significant work was done through GIS analysis, and through spreadsheet and database analysis, to arrive at the conclusions in this plan. Methodologies were gleaned from the City of Portland Pedestrian and Deficiency Indices⁷, as well as follow-up efforts from other cities and regional governments.



Pilot Tabling Project

NVCOG performed a pilot public outreach session to collect sidewalk and route data from residents in Bristol and Plymouth.

This pilot involved tabling at the Bristol Mum Fest and providing residents and neighbors an opportunity to highlight where they wanted to walk and where they felt unsafe walking.

The data developed through this process was unfortunately not of high-enough quality to justify the cost of the format.

All data used in the formulation of this plan are available to the public by request. Demand and Deficiencies Indices are available at the NVCOG website.

Public Outreach

Drafts of the Pedestrian Indices in this plan were presented to the NVCOG Regional Planning Commission, Transportation Technical Advisory Commission, the NVCOG Board, and to multiple towns on an individual basis for feedback.

Additionally, a cursory public data collection session was conducted at the Bristol Mum Fest in November of 2016 (as described in the sidebar).

A final draft was circulated to all member municipalities of the NVCOG in early 2017 for review. The final Plan will undergo a rigorous public process in accordance with the NVCOG Public Outreach Policy, including public hearings, outreach to neighborhood organizations, and pop-up outreach sessions with residents and pedestrians in popular pedestrian areas.

7 Portland, OR Pedestrian Plan, 1990

Goals

- ▶ to **increase the safety and well-being** of residents of the Naugatuck Valley region who walk for work or for play by improving infrastructure and transportation policies;
- ▶ to encourage more residents of the Naugatuck Valley to walk for work or for play by **improving infrastructure and land use policies**;
- ▶ to build a more resilient, equitable, and economically vibrant transportation system by **providing more balanced modal choice**⁸; and
- ▶ to **develop consistent policies** for the future development and planning of pedestrian-related projects and programs.

Draft

8 "Modal choice" refers to the ability of travelers to choose their preferred travel mode for a particular trip, rather than being relegated to a single option by policy or infrastructure.

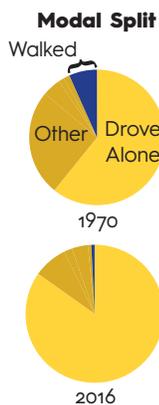
Current Conditions

This chapter will summarize the current conditions of the region, including outlining the Demand and Deficiencies Indices the NVCOG will be using in the future to identify and prioritize pedestrian projects, describing existing areas of high pedestrian activity, and describing the current regulatory framework for sidewalks and other pedestrian amenities across the region. The chapter will also identify areas where data is lacking in order to identify future data collection priorities.

Commuting & Employment Trends

As a whole, only 2.69% of Waterbury commuters and 1.51% of Bristol commuters get to work on foot.

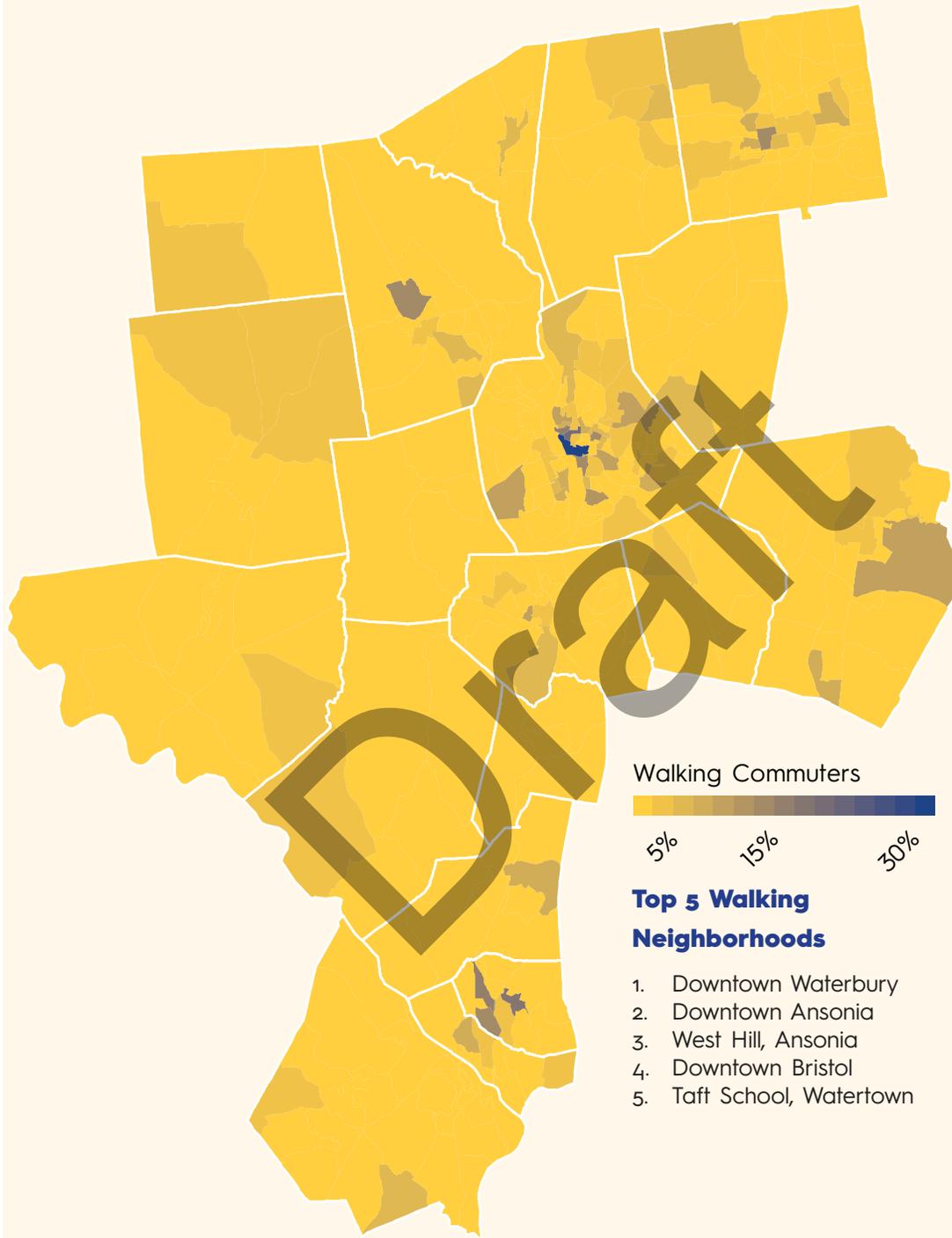
The areas with the highest concentration of residents who commute by walking are the urban cores of Waterbury and Bristol, where the proportion of working residents commuting as pedestrians is higher than 30% in some block groups, more than most neighborhoods nationally. There are also several smaller concentrations of pedestrian commuters spread across the region, primarily around large employers with abutting residential neighborhoods, and in a few downtowns.



The proportion of workers walking to work has been in decline in the NVCOG region for several decades, from a high of 6.75% of all workers in 1970 to 1.28% in 2010. In fact, there has been a reduction in nearly all modes of travel (transit, walking, bicycling, carpooling, etc.) over the past fifty years, with the exception of working from home. The more recent American Community Survey data on commuting shows a mostly stagnant mode share for pedestrian commuters, from 1.28% in 2010 to 1.44% in 2016, but occasionally running higher or lower. Projections of mode share at current rates of change (2009-2016) show walking making up only 3% of all commutes by 2040: greater than current rates but still less than half the 1970 pedestrian share.

Further, the NVCOG has the lowest rate of pedestrian commuters of all COGs in Connecticut, including non-urbanized COGs. This is due in part to local economic and land use policies encouraging large and expanding employers to site workplaces outside of walkable neighborhoods.

Map 3: Walking Commuters in NVCOG, 2016



The NVCOG region sees high walking commute numbers throughout much of the region, including several areas in Ansonia and in Waterbury with greater than 15% of the population walking to work.

Across NVCOG, only 1.4% of the population walks to work.

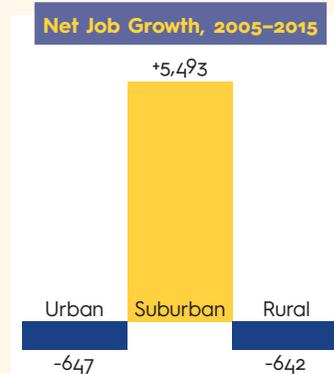
The highest pedestrian volumes are near large employers or employment centers: downtown Ansonia, Bristol, and Waterbury, the Taft School in Watertown, Cheshire Academy in Cheshire, Griffin Hospital in Derby and Ansonia, the office parks in southern Shelton, and

Source: US Census Bureau ACS 2016

Continuing Suburban Job Growth

Net Job Growth

Despite large shifts in the regional economy over the past decade, net job growth for the region has only been 2.8% due to the Great Recession. That growth has been concentrated in suburban neighborhoods.⁹



From the 2014 Regional Economic Profile, it is apparent that many large job centers in the region are located in suburban office parks and shopping centers, with little access to residents via means other than the private automobile.⁹ These trends have been exacerbated by the recovery from the Great Recession, which has seen total jobs in urban and rural neighborhoods slightly decrease, while net job gains have all occurred in suburban neighborhoods.¹⁰

Due to this shift of job locations, and land use policies largely containing residential development to already-developed areas, the traditional urban centers of the Naugatuck Valley region have become net exporters of workers. This shift has lessened the proportion of commutes which can be made on foot. This trend also contrasts somewhat with neighbors in Connecticut, which have seen an increase in the number of jobs leaving suburban neighborhoods, and a somewhat small increase in the number of jobs locating in urban centers such as New Haven and Hartford.¹¹

Data Gaps

While decent data exists for pedestrian commuting patterns through the US Census Bureau, there is no similar dataset for non-commute walking activity. Due to the aforementioned trends, it is likely that an increasing proportion of pedestrian activity is in the form of non-commuting trips: for shopping, for errands, and for recreation. Some travel studies have begun to address this gap, most notably the CT Household Travel Survey that wrapped up in 2017.

To assist in better understanding non-commute walking trips, however, NVCOG would need to perform more routine pedestrian counts on both the street network and the growing regional trail network.

⁹ NVCOG Regional Economic Profile, <http://nvcogct.org/sites/default/files/RegionalEconomicProfile-2014.pdf>

¹⁰ Based on NVCOG analysis using LODES On the Map data through the US Census Bureau, 2005–2015.

¹¹ "Jobs Are Returning to the City," Mark Abraham and Mary Buchanan, DataHaven. New Haven Independent. http://www.newhavenindependent.org/index.php/archives/entry/jobs_are_returning_to_the_city/. Note that in this analysis, the urban centers in Ansonia, Derby, and Shelton are included in the suburban ring of New Haven.

Pedestrian Safety Trends

Pedestrians in Crashes by Municipality, 2012-2017

Municipality	2012	2013	2014	2015	2016	2017	Trend	Total
Ansonia	4	6	0	4	8	3		22
Beacon Falls	1	1	1	1	0	1		4
Bethlehem	0	0	0	0	1	0		1
Bristol	18	21	10	22	21	18		92
Cheshire	1	2	2	3	2	5		10
Derby	3	7	5	10	9	4		34
Middlebury	0	1	2	2	1	3		6
Naugatuck	4	1	7	13	9	8		34
Oxford	1	0	0	0	0	1		1
Plymouth	2	0	0	0	3	0		5
Prospect	2	3	1	2	1	1		9
Seymour	2	4	4	4	1	1		15
Shelton	5	2	6	4	11	6		28
Southbury	3	2	2	1	3	1		11
Thomaston	2	0	0	1	0	0		3
Waterbury	93	90	90	103	92	119		468
Watertown	6	4	2	1	4	1		17
Wolcott	1	1	2	0	3	1		7
Woodbury	0	1	2	2	1	1		6
Total	148	146	136	173	170	174		773

Source: UConn Crash Data Repository, 2012-2017

While the core urbanized areas in the region do tend to have higher numbers of pedestrians, they also have disproportionately high numbers of pedestrian-related crashes. This is particularly true of Waterbury, which has seen the largest number of pedestrian fatalities statewide over the past few years. Urban areas in the Naugatuck Valley region often lack key pedestrian amenities such as clearly marked crosswalks, pedestrian signals, and complete sidewalks. Further, many local streets are in a general state of disrepair due to local and statewide financial strains, which makes the transportation experience—regardless of mode choice—a harried one.

While over the long-term pedestrian crashes and fatalities have been decreasing, the past two years have seen an uptick in the number of pedestrian crashes and fatalities both in Connecticut and nationally.

This uptick is also visible regionally, and is largely dependent on increases in pedestrian crashes outside of Waterbury.

A detailed map of pedestrian accidents and fatalities across the region is in the next chapter, on page 28.

Typical Pedestrian Crash Locations

There are two typical locations for a pedestrian crash in the region: suburban-style shopping streets and high-vehicle-traffic urban streets.

Suburban-style shopping centers, particularly ones with transit access, contribute an outside proportion of pedestrian crashes given their pedestrian activity. These areas typically show poor access management onto primary roadways, a lack of sidewalks and safe crosswalks, and high automobile crash volumes.

High-vehicle-traffic urban streets have high absolute numbers of pedestrian accidents, but also contain the overwhelming majority of pedestrian activity in the region. Dangerous urban streets and their intersections typically have wide turning radii, confusing signalization, poorly marked transit stops, and poorly delineated road markings.

Cinema owner struck in hit-and-run
Watertown

Victim suffered life-threatening injuries

\$5,000 REWARD FOR
HIT-AND-RUN INFO

FRIDAY, JANUARY 20, 2017 • FINAL \$1
Republican American

M REP-AM.COM



Tragedy on a sidewalk

Waterbury woman killed by car near work in New Haven

Safer Streets through ADA Accessibility Improvements

CTDOT is presently installing curb ramps on several of their roadways with pre-existing sidewalks in the region as part of their ADA¹² Transition Plan¹³. Several municipalities in the NVCOG region have ADA Transition Plans of their own, though implementation of these plans has been mixed with regards to pedestrian accessibility. While the NVCOG is not itself develop an ADA Transition Plan under federal law, the NVCOG is involved in funding capital projects that should trigger the need to ensure ADA compliance. Further, any pedestrian-related planning should be inclusive to all pedestrians, regardless of ability status.

ADA Triggers

An ADA trigger is an event that requires a local government to ensure a facility is accessible. In general, an alteration to a facility qualifies as an ADA trigger, and requires the entity performing the alteration make any changes necessary to bring the facility into compliance with the Americans with Disabilities Act and associated Department of Justice guidelines.

The Federal Highways Administration (FHWA)—in response to several ADA-based lawsuits—developed guidance as to what roadway projects qualify as alterations versus maintenance projects. All alterations that cross a crosswalk (marked or unmarked) require the municipality to ensure curb ramps and the crosswalk are fully accessible.

Source: ADA Requirements when Roads are Resurfaced, FHWA & DOJ Webinar, https://www.fhwa.dot.gov/civilrights/programs/ada_resurfacing_webinar.pdf

Alterations

- ▶ Addition of new layer of asphalt
- ▶ Cape Seals
- ▶ Hot In-Place Recycling
- ▶ Microsurfacing / Thin-Lift Overlay
- ▶ Mill & Fill / Mill & Overlay
- ▶ New Construction
- ▶ Open-graded Surface Course
- ▶ Rehabilitation and Reconstruction

Maintenance

- ▶ Chip Seals
- ▶ Crack Filling & Sealing
- ▶ Diamond Grinding
- ▶ Dowel Bar Retrofit
- ▶ Fog Seals
- ▶ Joint Crack Seals
- ▶ Joint Repairs
- ▶ Pavement Patching
- ▶ Scrub Sealing
- ▶ Slurry Seals
- ▶ Spot High-Friction Treatments
- ▶ Surface Sealing

12 ADA stands for Americans with Disabilities Act, a long-standing federal law requiring local, state, and federal governments to ensure public services are accessible to those with disabilities. ADA also often serves as shorthand for accessibility issues more broadly.

13 A final draft of the state ADA Transition Plan can be found here: http://www.ct.gov/dot/lib/dot/documents/ddbe/1-18_ada_transition_plan.pdf. Implementation of the plan may be on hold due to the state budget.

Data Gaps

Assessing accessibility in the public right-of-way is difficult without very detailed data covering the exact locations of curb ramps, pedestrian push-buttons and pedestrian signal heads, utility poles, entryway ramps, bus shelters, and other facilities. The NVCOG has collected some of this data, most notably the locations of curb ramps across the region, but the majority of this data is currently unavailable. To better understand the state of pedestrian accessibility in the region, the NVCOG should prioritize developing a better understanding of the present state of pedestrian-related infrastructure regionally.

POTENTIAL FUTURE STUDIES

- ▶ **Transit Accessibility Study:** Analyze the accessibility of high-use and high-frequency transit stops in the local bus system(s)
- ▶ **NVCOG LOCHSTP:** Analyze service provision and barriers to transit access for seniors and disabled residents
- ▶ **Regional ADA Transportation Transition Plan:** Analyze barriers to accessibility on federal aid roadways to identify high priority accessibility projects
- ▶ **Downtown Accessibility Studies:** Analyze the accessibility of high-density or high-pedestrian activity areas regionally, either as individual studies or as a region-wide program
- ▶ **Sidewalk Quality Assessment:** Update the 2014 sidewalk and curb ramp inventory with qualitative information for towns' use in ADA Transition Plan updates

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Pedestrian Demand Across the Region

For a more nuanced view of pedestrian activity in the region, NVCOG is adopting a form of the City of Portland, OR's paired Pedestrian Potential and Pedestrian Deficiencies Indices for identifying high pedestrian demand and safety-related barriers to walking.¹⁴ Under this framework, NVCOG will maintain two separate datasets: a **Pedestrian Demand Index** identifying locations of high pedestrian demand or potential demand, and a **Pedestrian Deficiencies Index** identifying locations with poor, incomplete, or unsafe pedestrian infrastructure or environments.

The Pedestrian Demand Index looks at various factors known to increase the likelihood of walking in order to identify roadways where there is a high demand for walking. Using this index can help NVCOG staff, municipal leaders, and local advocacy groups better understand where there are likely to be pedestrians currently, and where small improvements to the streetscape or the zoning code may increase the number of pedestrians.

Pedestrian Demand factors are divided into:

- ▶ **Policy factors:** areas where current stated municipal and regional policy emphasizes pedestrian activity;
- ▶ **Proximity factors:** areas where there are walkable destinations and infrastructure to support pedestrian activity; and
- ▶ **Environmental factors:** areas where existing densities are above a threshold to support pedestrian activity.

¹⁴ The Pedestrian Priorities and Pedestrian Deficiencies Indices were first put in practice by the City of Portland in their 1998 [Pedestrian Master Plan](#) as a means of identifying priority projects.

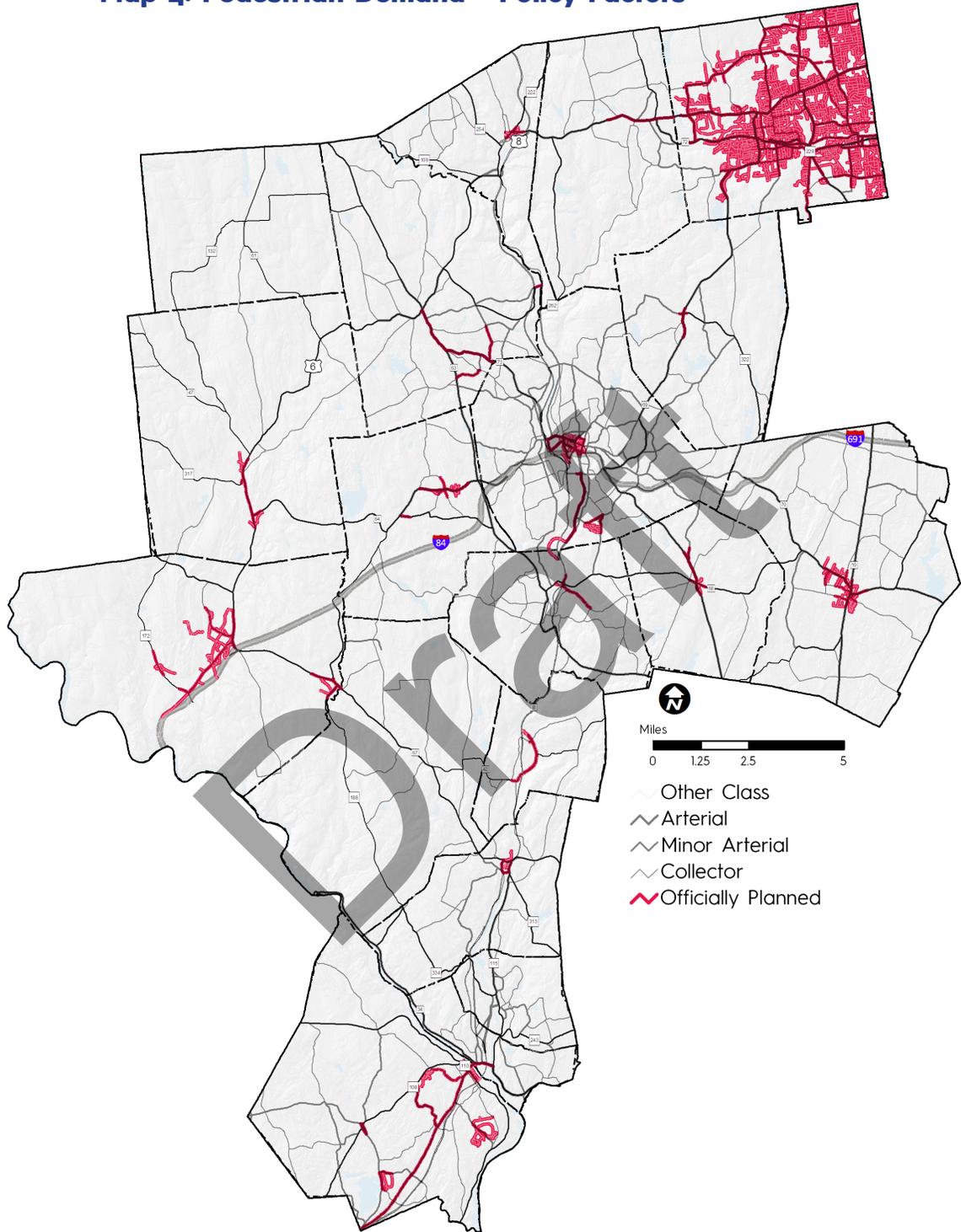
Table 2: Pedestrian Demand Index factors and data sources

Quality	Score	Data Sources
Policy Factors (maximum score of 35)		
Identification in Plans	+20	Municipal PoCDs, assorted plans
Arterial	+15	CTDOT Functional Classification Map
Minor Arterial	+10	
Collector	+5	
Proximity Factors (maximum score of 35)		
Schools	+10	CT Education Directory
EJ Communities	+10	NVCOG Environmental Justice Policy
Popular Transit Stops	>350 uses/week: +5 >700 uses/week: +10	WATS, CROG Transit Study, GBT
Complete Sidewalks	+10	NVCOG Sidewalk Survey 2014
Environmental Factors (maximum score of 30)		
>500 intersections/mi ² : ¹	+10	CT911 Roads / NVCOG Analysis
>20 persons/ha ² :	+10	US Census Bureau ACS 2014
>20 jobs/ha:	+10	US Census Bureau LODES 2014

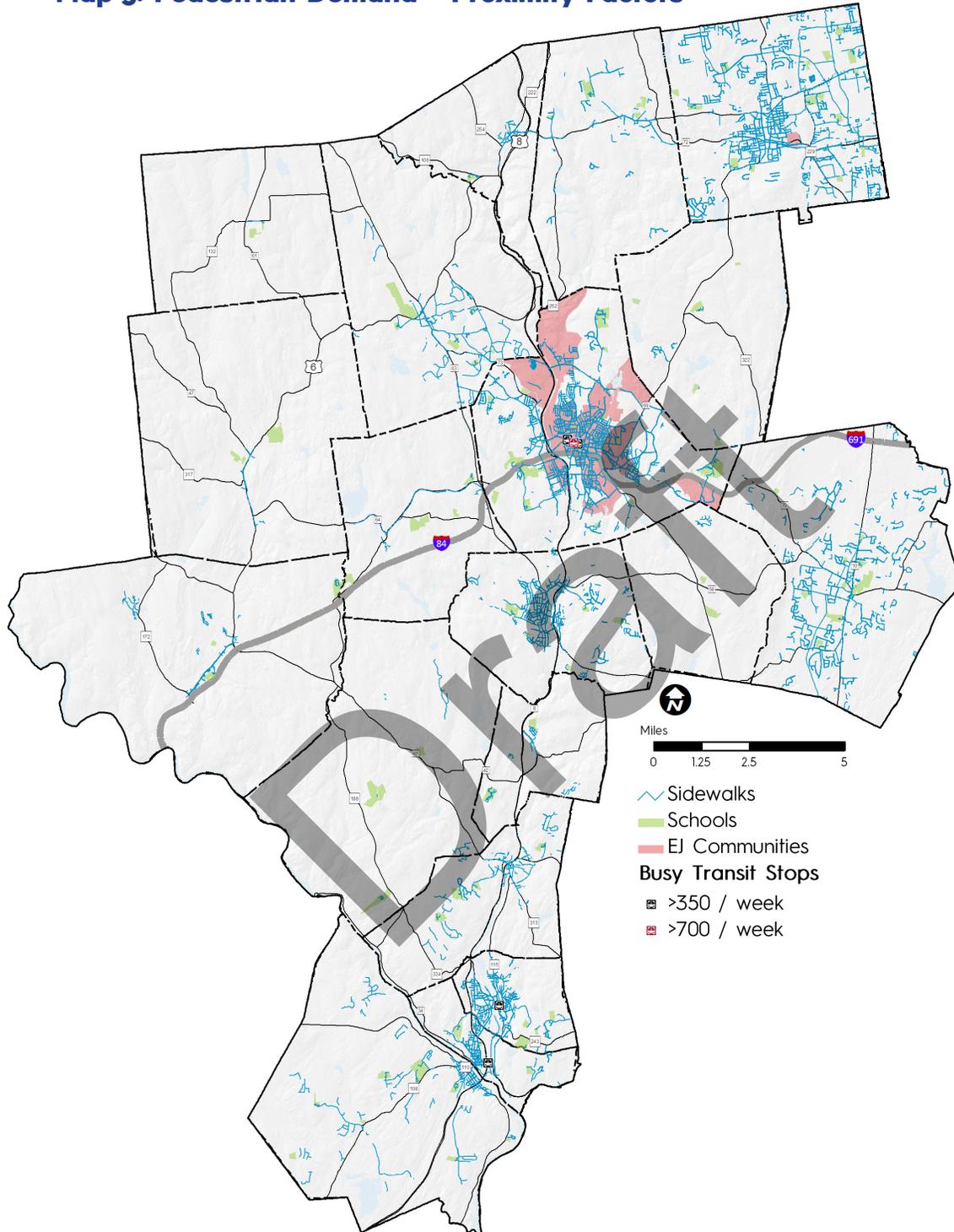
For a more detailed description of the factors making up the Pedestrian Demand Index, see the Appendix.

The following maps show each of the factors used to develop the Pedestrian Demand Index in greater detail, followed by a map of the Pedestrian Demand Index for all roads in the NVCOG region. The Demand Index indicates several high-priority pedestrian areas in the region, mostly in the historic cores of NVCOG towns. Of particular note are the historic cores of Waterbury and Bristol, which score the highest and have multiple locations with a score of 100. Town-by-town maps of the Demand Index and related factors are available in the Appendix.

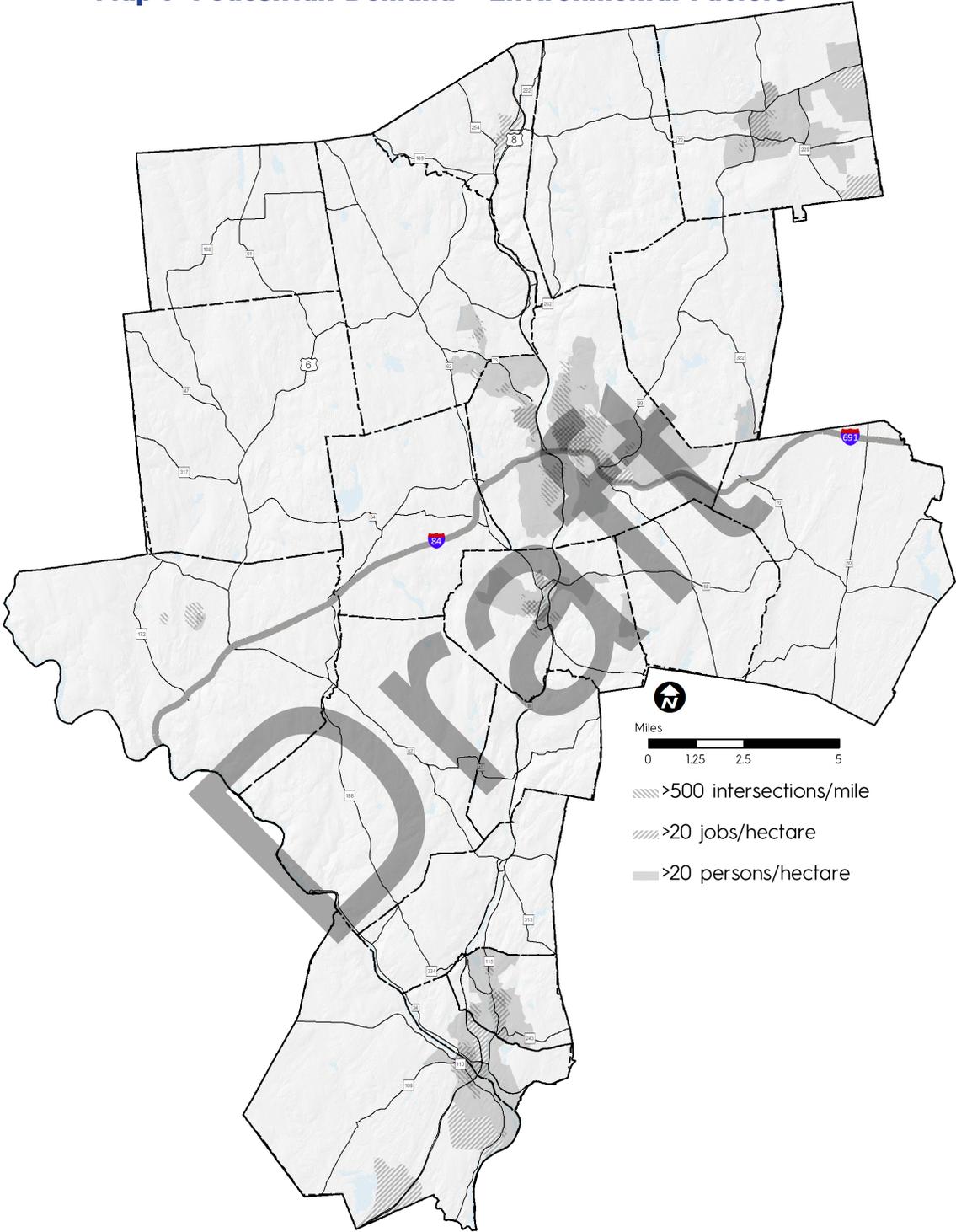
Map 4: Pedestrian Demand - Policy Factors



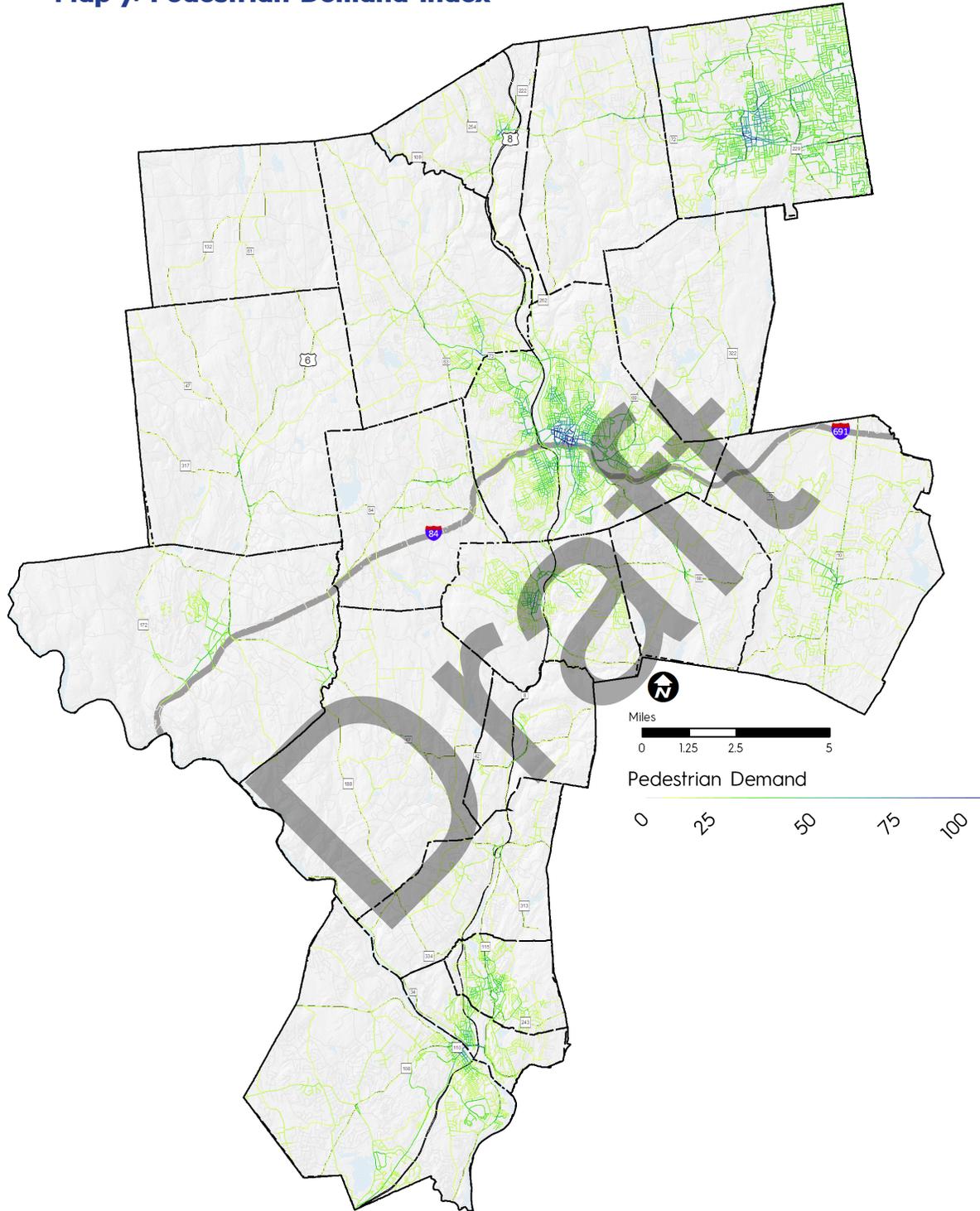
Map 5: Pedestrian Demand - Proximity Factors



Map 6: Pedestrian Demand - Environmental Factors



Map 7: Pedestrian Demand Index



Pedestrian Deficiencies Across the Region

The complement to the Pedestrian Demand Index is the Pedestrian Deficiencies Index. The Deficiencies Index looks at factors known to increase the danger of serious injury or death for pedestrians, in order to highlight areas where there is a demonstrated need for safety improvements. When compared with the Pedestrian Demand Index, NVCOG staff and municipal officials, planners, and residents of the NVCOG region can see where there is both a high probability of people walking and a demonstrated need for safety improvements. This comparison will help NVCOG staff allocate region-wide pedestrian resources on the areas with the most need for immediate improvements.

Pedestrian Deficiencies factors consider three primary dangers to pedestrians:

- ▶ **Speed factors**, broken out by speed;
- ▶ **Sidewalk factors**, broken out by the availability and continuity of the sidewalk network; and
- ▶ **Safety factors**, defined as proximity to pedestrian-related crashes.

Unlike the Priority Index, the current Deficiencies Index does not have a single road segment that reaches 100 points (which would indicate a roadway with a speed greater than 45 mph, a sidewalk gap with no sidewalks between two existing sidewalks, and a nearby fatal pedestrian crash in the past 5 years). This is likely due to the difficulty in measuring the quality of the pedestrian environment, and the lack of a large pedestrian population. For example, a 5-foot sidewalk with a grass buffer may be safe in a suburban context, but may be too small for safe pedestrian use on a downtown street. Other factors, such as signal timing, visibility, snow plowing practices, or the availability of marked crossings also contribute to pedestrian crashes but are difficult to measure. Further, the NVCOG's sidewalk quality data does not include measurements of

accessibility, widths, slopes, or quality, limiting its use. The low rates of walking in the region also contribute to the low scores on Pedestrian Deficiency, as it is difficult to identify high-rate crash locations with few pedestrian-related crashes in absolute terms. However, there are multiple locations with deficiencies scores between 50 and 75, which still indicate a roadway of great danger to pedestrians.

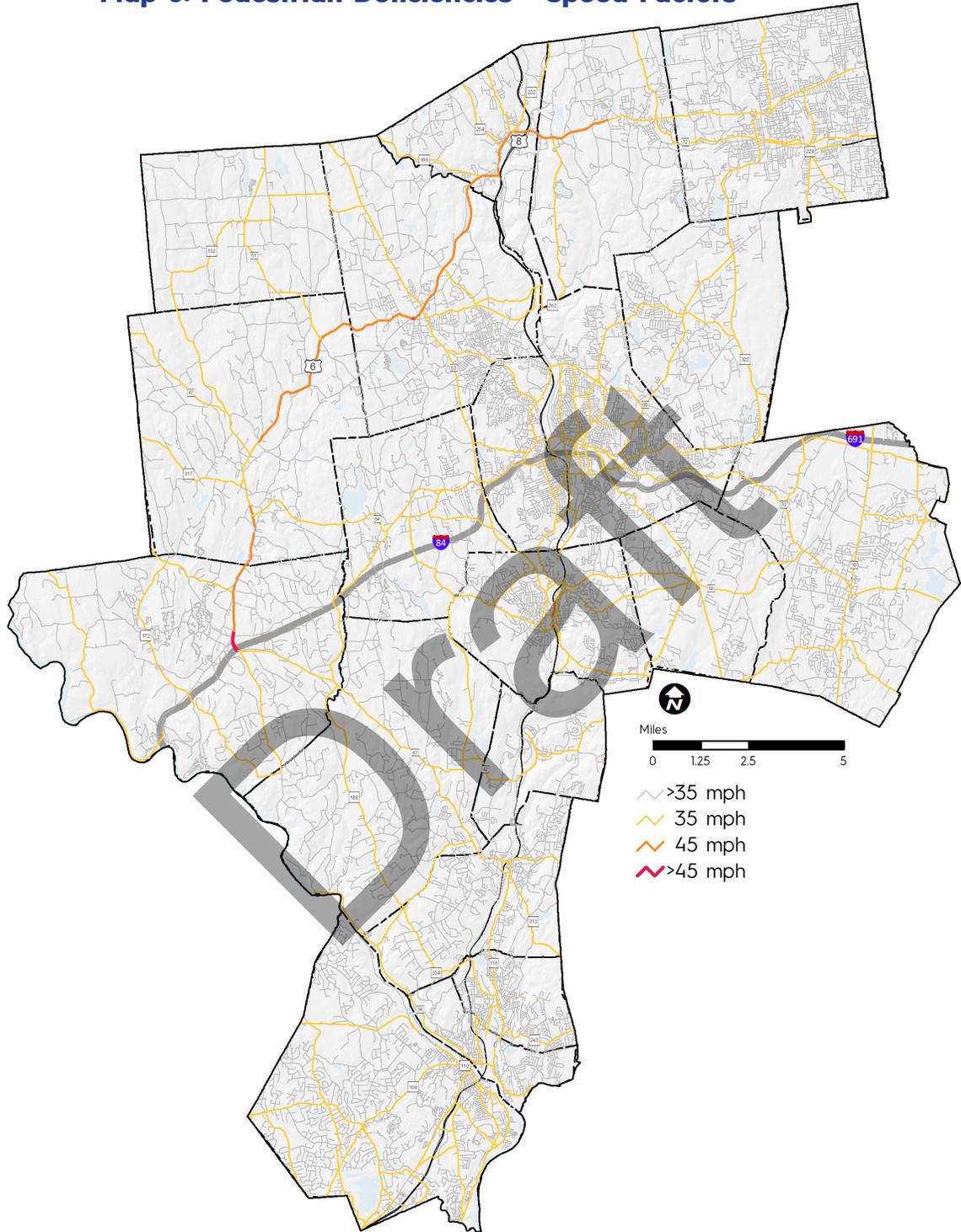
Town-by-town maps of the Deficiencies Index are available in the Appendix.

Table 5: Pedestrian Deficiencies Index factors and data sources

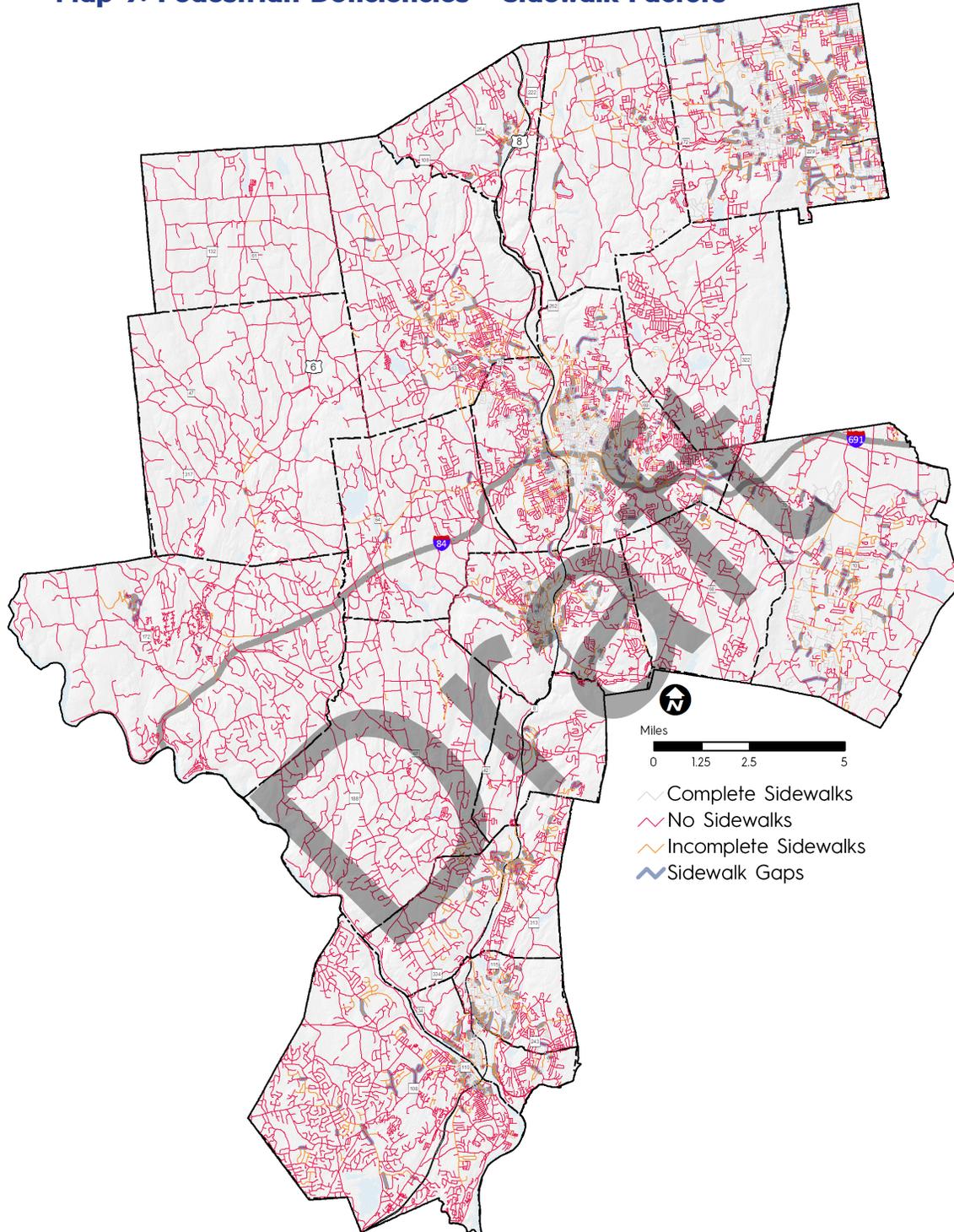
Quality	Score
Speed factors (max 35)	
Less than 35 mph	0
35 mph	-13
45 mph	-24
Greater than 45 mph	-35
Sidewalk factors (max 35)	
No Sidewalk	-10
Incomplete Sidewalk	-5
Sidewalk Gap	-25
Safety factors (max 30)	
Pedestrian-involved crash within 250'	-20
...that resulted in a fatality	-10

Source: CT911 Road Networks, NVCOG Sidewalk Survey 2014, UCONN Crash Data Repository

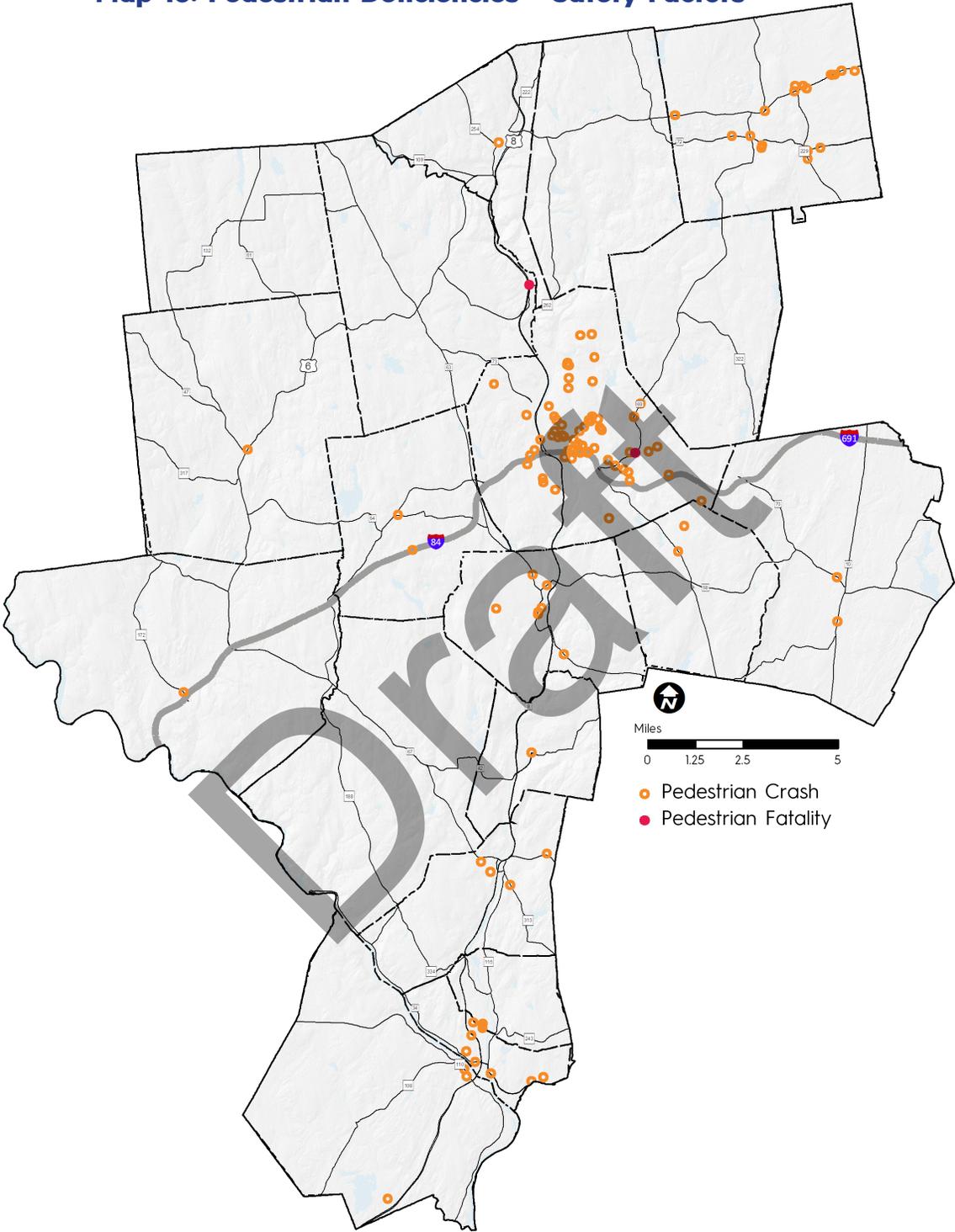
Map 8: Pedestrian Deficiencies - Speed Factors



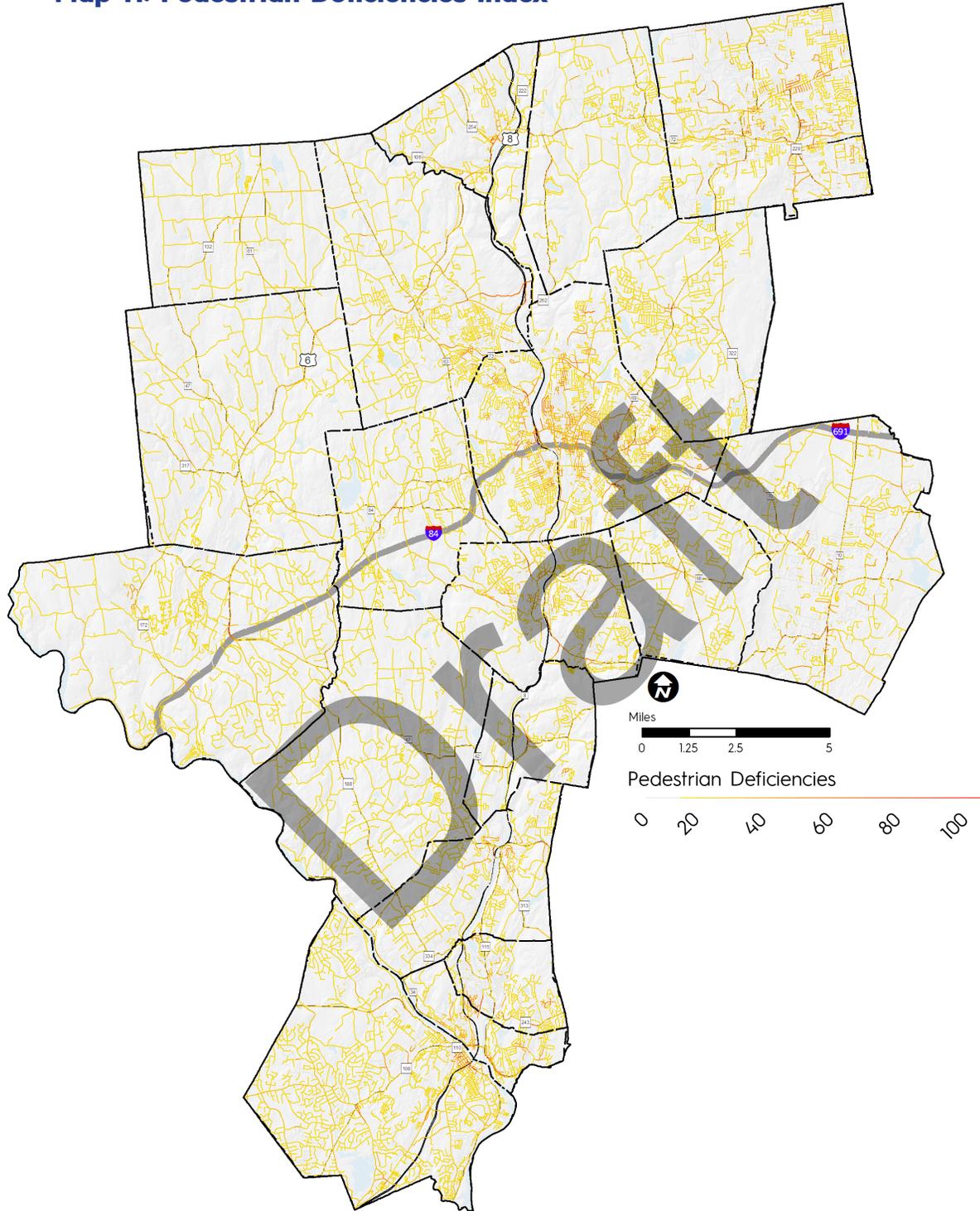
Map 9: Pedestrian Deficiencies - Sidewalk Factors



Map 10: Pedestrian Deficiencies - Safety Factors



Map 11: Pedestrian Deficiencies Index



Making Improvements

The NVCOG is responsible for determining long-term transportation priorities in its planning region. The NVCOG aims to use existing and potential funding streams to align financing with necessary projects to improve the health, safety, and welfare of people who live or work in the region. The Pedestrian Demand and Deficiencies Indices are tools to be used to assist in identifying future projects and to rate the importance and potential impact of proposed projects.

This chapter will discuss future infrastructure and policy priorities of the NVCOG as they relate to making improvements to the pedestrian experience in the region. A key emphasis will be ways to incorporate the Pedestrian Demand and Deficiency Indices to assist with project identification and prioritization.

Federal-Aid Network?

The **federal-aid network** is the nation's primary highway system, made up of the Interstate Highway System, primary highways and secondary local roads.

Designation as a portion of the federal-aid network is dependent upon a road's **functional classification**.

A road's functional classification is dependent upon its primary use.

Arterials are typically for faster travel and have low accessibility to destinations along them. **Collectors** are typically connections between local roads and arterials, and offer a balance between access and speed. **Local roads** are typically for non-through traffic.

Infrastructure Improvements

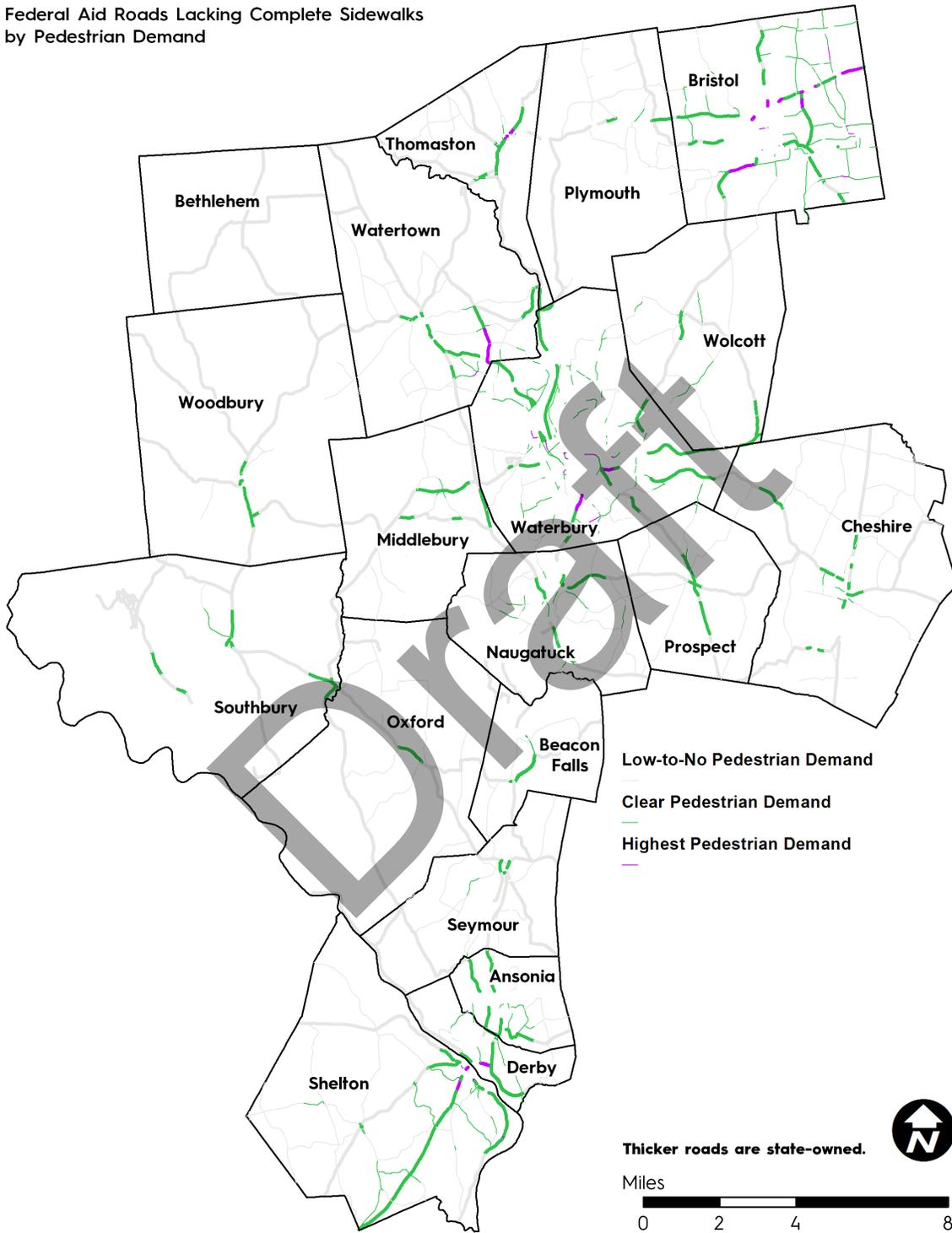
The most visible improvements to the pedestrian environment are the provision of sidewalks, crosswalks, trails, and other pedestrian connections and amenities. The NVCOG primarily works with roadways on the **federal-aid network**, so only roadways on the federal-aid network are used as example projects in this section unless specifically noted. However, pedestrian traffic is typically independent of this system. Plenty of good and impactful projects exist on solely local roads, however the NVCOG has little authority to impact these roads directly under its normal program.

Sidewalk Projects

Often the best approach to improving pedestrian access is to expand the pedestrian network by building new sidewalks. The following map shows roads on the federal aid network that lack complete sidewalks.¹⁵

15 As a reminder, "complete" sidewalks are sidewalks without gaps along both sides of a road segment. In some situations, topography or land use presently prohibit the placement of a sidewalk on one side. These segments are still included in the "incomplete" category, as it may be possible or necessary in the future to include sidewalks on both sides of these segments.

Federal Aid Roads Lacking Complete Sidewalks
by Pedestrian Demand

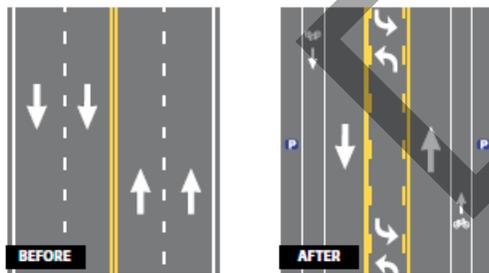


Expanding sidewalks can be done through stand-alone sidewalk projects, though more often sidewalks are added as part of a larger roadway project. The NVCOG encourages municipalities working on their regular paving and road maintenance schedule to check the Pedestrian Demand and Deficiency Indices and to consider including or upgrading sidewalks where needed. On projects that the NVCOG has a review or a funding function, NVCOG staff will always consider inclusion and upgrading of sidewalks.

Sidewalk Gaps

The 2014 NVCOG sidewalk inventory found 404 sidewalk gaps.

Some sidewalk gaps or needed extensions are too small to fund as a stand-alone project. Addressing sidewalk gaps is typically done ad hoc., but a methodical approach of identifying their locations and sourcing funding for construction would allow for quicker improvements. NVCOG municipalities could choose to develop a regional sidewalk construction program to tackle this issue, either through existing federal funding or some other means. An alternative approach would be to provide member municipalities with detailed information about sidewalk gaps and encourage them to prioritize these projects internally. There are also precedential TIP line items involving “general signalization improvements” or “general highway improvements,” indicating there may be a possibility of creating a “general sidewalk construction” line item for gaps on the federal aid network through coordination with CTDOT.



Road Diets & Neckdowns

Road Diets are projects where excessively wide roads are reduced in lanes to accommodate sidewalks, bicycle elements, clearer lane markings, bus stops, traffic calming, or green infrastructure. Typically, road diets are developed with a **Complete Streets**¹⁶ vision.

A typical road diet reduces a four-lane road to a two-lane road with a turn lane, bike lanes, and on-street parking.

Source: FHWA Road Diets Guidance, https://safety.fhwa.dot.gov/road_diets/case_studies/

Roads diets may be included as part of a resurfacing or rehabilitation project within existing curb lines, such as restriping two lanes into a single lane and a bike lane as pictured at right. At other times, road diets are performed as standalone projects

16 Complete Streets is a broadly-used transportation planning philosophy that encourages surface roadways to be designed for all users, regardless of ability, age, income, or mode of transport.

that incorporate transit lanes, bicycle lanes, extended sidewalks, rain gardens, and other streetscape elements using updated curb lines.

Neckdowns are smaller-scale projects where a roadway is modestly reduced in width as the roadway approaches an intersection or bus stop, in order to provide shorter pedestrian crossings. Neckdowns are typically developed as standalone local projects covering a neighborhood or corridor, or as a standard part of repaving projects.

Low-Cost and Interim Curb Line Adjustments

Both road diets and neckdowns can be accomplished through interim striping, paint, planters, and flexible delineators in situations where the cost of moving curbs, drains, and other street infrastructure is prohibitive. These low-cost projects may be designed and executed in-house by municipalities in anticipation for more permanent improvements. New York, San Francisco, Minneapolis, and other larger cities have begun using these techniques to test designs before committing to permanent improvements.^{17,18}

The NVCOG should include road diet and neckdown elements into standard reviews of NVCOG-assisted projects. A Design Manual would be an ideal home for defining best practices for NVCOG-assisted projects.¹⁹

What's a Sneekdown?

A sneekdown is a neckdown informed by snowfall! When snow falls on public streets, cars driving can dig desire lines, similar to well-worn foot paths, but in the road. By going into the field to view roadway usage after heavy snows, planners can identify areas currently designated for vehicle travel that are unnecessary, particularly at intersections.



At left is an example of painted curb extension from NYC. Painted curb extensions may be used to quickly expand pedestrian infrastructure at low cost via traffic paint, flexible delineators, and truncated dome pads for the visually-impaired. When more funds become available, towns can alter curb lines and drainage to fit the new pedestrian-friendly design.

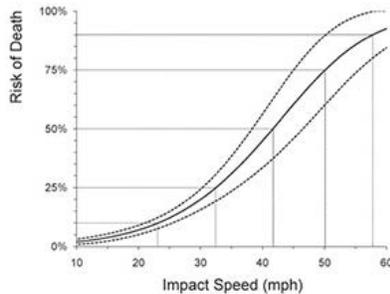
17 <http://www.minneapolismn.gov/pedestrian/projects/WCMS1P-151213>

18 While these projects are inexpensive, it is important to note that municipalities are still responsible for ensuring street crossings are ADA compliant in the interim and in any final permanent design.

19 Developing a Design Manual unique to the NVCOG region is one method of creating minimum standards and demonstrating tried-and-true methods to improve streetscapes for all users, but there are also myriad manuals already in existence NVCOG and its members can rely upon in the interim. Many of these manuals focus on urban cores, but states also maintain design manuals for local and rural roads.

Traffic Calming

Traffic calming is the process of slowing and potentially reducing vehicular traffic to encourage a safer pedestrian environment. When it comes to pedestrian safety, **any reduction in speed improves safety outcomes**.



Risk of pedestrian death by impact speed in miles per hour. The outside lines indicate error margins.

A study by AAA found that the average risk for severe injury changes from 25% at 23mph to 75% at 39 mph, and for death from 10% at 23 mph to 50% at 42 mph.²⁰ Thus, the difference between a vehicle traveling at 25 mph and at 40 mph can be life or death for a struck pedestrian.

Examples of traffic calming infrastructure include improved access management, formal striping of the outside edge of traffic lanes, longitudinal rumble strips, pedestrian refuge islands on large streets, and lane and road diets to reduce crossing widths and decrease speed.²¹ Other strategies include signal improvements, neckdowns and curb extensions, and developing shared streets.

Traffic calming example photos with location and credits

The type of traffic calming elements appropriate for a roadway ranges broadly depending on the importance of the roadway in the transportation network, typically represented by its functional classification. A primary arterial, for example, will likely require more vehicle flow than a residential street. Planners and engineers must balance the needed

²⁰ Severe injuries source. AAA study

²¹ FHWA Proven Safety Countermeasures. <http://safety.fhwa.dot.gov/provencountermeasures/>

automobile capacity of the roadway with the use of the roadway by other modes and as public space.

Recommendations

- ▶ Reduce design speeds for NVCOG-assisted projects where feasible
- ▶ Identify a geography and a funding source for a traffic calming pilot program

Transit Access Improvements

In transit-accessible areas, pedestrian safety and transit usage go hand-in-hand. Transit users in the NVCOG are more likely to be elderly or disabled than the general population. Improving bus stop environments reduces the burden on these users, and serves to improve the transit ridership experience for all users.²²

Examples of transit accessibility improvements include ADA-accessible shelters and bus stops; clear accessible pathways from popular destinations to transit locations; curb extensions, bus bays, and bus bulbs to improve boarding times and passenger visibility; and clearly marked crosswalks to transit stops.

These types of improvements don't only serve transit users: families with strollers and businesses pushing carts for deliveries are served by curb extensions and safe ramps, and pedestrians looking to cross the street are served by increased visibility provided by neckdowns and improved crosswalks. And local businesses with increased sidewalk space can put out street signs or sidewalk dining.

Before and after bus stop drawing

22 A XXXX study found that bus stops with nicer environments reduce the perceived wait time for the buses, making transit users happier and potentially encouraging more frequent transit usage. REFERENCE

The NVCOG region contains transit stops for five fixed-route public bus agencies, one commuter rail line, and multiple inter-city bus companies. Despite this, the region as a whole contains only about a dozen bus shelters.

To identify necessary transit accessibility projects, key high transit corridors in the region should be identified and studied closely. Current NVCOG research shows highly utilized transit stops across the downtowns of Waterbury, Bristol, Derby, and Shelton. Other highly utilized transit stops are located in other neighborhoods of Waterbury and Bristol, and in suburban shopping centers across the region. However, the data used to identify these transit stops comes from a variety of sources, using incompatible methodologies. To more accurately identify high priority transit stops, a bus stop improvement program should be developed between the NVCOG, CTDOT, NVCOG municipalities, and transit providers in the region.

Recommended Study & Project Priorities

- ▶ CTtransit Waterbury Transit Accessibility Survey
- ▶ East Main Street Waterbury Pulse Improvements Project
- ▶ CTtransit Bristol/New Britain Accessibility Survey
- ▶ Implementation of Bristol Route 6 pedestrian improvements
- ▶ Completion of Valley Transit District Bus Shelter Project
- ▶ Incorporation of Transit Accessibility assessments into NVCOG-assisted projects and grant applications
- ▶ Coordination with CTDOT to clarify Section 5310 and Section 5307 authority and eligible activities, particularly with respect to construction of accessible and safe bus stops

Trails & Off-Street Projects

Trail projects have historically had high levels of support within Connecticut and the NVCOG region. The primary trail project underway is the Naugatuck River Greenway (NRG), which will ultimately connect most of the towns in the NVCOG region. Additional trails currently in existence or under development include the historic Larkin horse trail, the Middlebury Greenway, Quarry Walk, and the Steele Brooke Greenway.

There are large networks of blazed forest trails in state forests across the region, primarily used for hiking and recreation. Finally, there exist numerous important off-street pedestrian connections in the region, particularly within Bristol, Shelton, and Waterbury.

Utility Transmission Lines

A future avenue for trails are the transmission line rights of way throughout the region. Other regions have seen success in building formalized trails within the rights of way of utility-company-owned transmission lines. These rights of way are generally very direct, and often connect otherwise disparate residential areas. The NVCOG should explore partnerships with utility companies to bring these rights of way into public use.

Recommended Priorities

- ▶ Continue development on the Naugatuck River Greenway
- ▶ Identify priorities for improving other current and improved off-street trails such as the Larkin Trail, the Middlebury Greenway, Quarry Walk, and the Steele Brooke Greenway.
- ▶ Open discussions with utility transmission line rights of way owners

Funding Programs

Below is a short description of the major and minor current funding programs available for transportation projects, and their relationship to pedestrian planning. This section is a helpful reference for the project categories above, and for formulating new projects based on the priorities of state and federal legislation.

State Programs

The following programs are funded and administered by the State of Connecticut. These programs are currently the most supportive for construction of pedestrian-related infrastructure. It is important to note that as of publication of this plan, the Connecticut budget situation makes some or all of these programs at risk of closure. At-risk programs are marked with a cross symbol (†).

*LOT*CIP†

The Local Transportation Capital Improvement Program (LOT*C*IP) is a state grant program administered by the NVCOG to fund work on portions of the regional network which are not owned by the state. This program is used instead of the typical STPB*G* program in Connecticut due to the high proportion of roads in the regional network owned directly by the state. By utilizing our Pedestrian Priority and Deficiency indices, the NVCOG can identify portions of the LOT*C*IP eligible network which may require more consideration for pedestrians, and help municipalities prioritize these projects.

Note that LOT*C*IP Project Eligibility guidelines stipulate that a maximum of 15% of LOT*C*IP funding may be used for standalone sidewalk projects or pavement preservation or rehabilitation.²³

*Lo*CIP†

The Local Capital Improvement Program (Lo*C*IP), administered by the Office of Policy Management (OPM), is a local aid program that provides municipalities with funds for public works. Lo*C*IP is managed directly

23 This restriction is more stringent than FHWA funding standards for the replaced STB*G* funds, though the NVCOG has not been in a position where the cap was burdensome.

between municipalities and the state, and is often used for mill and paves and improvements to publicly-owned facilities.

The LoCIP guidelines are proscriptive, but they do include sidewalk and pavement improvements as eligible projects. LoCIP funding is also possible for the “establishment” of greenways, though the details on this are slim. Municipalities should consider using LoCIP funds to fill smaller gaps in their municipal sidewalk networks, as these projects are fairly self-contained and can have major impacts with small investments.

Unfortunately, as of December 29, 2016, OPM is no longer accepting applications for LoCIP funding due to budget cutbacks and uncertainties.²⁴ Municipalities should watch to see if this funding source is reinstated in the future.

Community Connectivity Grant Program[†]

The Community Connectivity Program is administered by CTDOT. This program is relatively new, and as of yet has only provided Road Safety Audits (RSAs), where professionals audit a potential project area for potential safety concerns. The 2017 cycle offered capital funding for projects ranging from \$75,000 to \$400,000, capped at one (1) submission per municipality. Minor adjustments are expected after the first round of funding. This program is proposed to be cut to meet budget priorities.

Small Town Economic Assistance Program

The Small Town Economic Assistance Program (STEAP) is a grant program to fund municipal capital projects using state bond funds. Eligible projects for STEAP can include constructing or reconstructing sidewalks, trails, and other pedestrian infrastructure. In the 2016 funding cycle, over 35% of funds outlaid through STEAP went to projects that would enhance pedestrian infrastructure.²⁵ The following towns are eligible for STEAP:

Beacon Falls*	Middlebury	Southbury	Watertown
Bethlehem	Oxford	Seymour*	Wolcott*
Cheshire	Prospect	Thomaston*	Woodbury

*indicates an opt-in town

24 Status of available funding for the Local Capital Improvement Program (LoCIP), Memo to Municipal Chief Executive Officers and Chief Financial Officers, 12/29/16

25 Governor Malloy Announces State Grants to Assist Sixteen Small Towns with Capital Improvement Projects, Press Release, Office of the Governor, 9/26/2016

Urban Action Bonds & Public Investment Communities

In addition to STEAP funds, OPM and other state agencies maintain a number of other municipal assistance grant programs which are available to the state’s Public Investment Communities (PIC). PICs are determined by comparing municipalities’ per capita income, adjusted equalized net grand list per capita, equalized mill rate, per capita aid to children receiving Temporary Family Assistance benefits, and unemployment rate.²⁶ These communities may request direct set-asides from the state legislature for infrastructure projects. The following NVCOG municipalities qualified as PICs for 2017:

Ansonia	Derby	Seymour
Beacon Falls*	Naugatuck	Thomaston*
Bristol	Plymouth	Waterbury

*indicates grandfathered in to PIC

Due to the current budgeting situation at the state, it is unlikely that many projects would be funded through this mechanism.

Local Road Accident Reduction Program

The Local Road Accident Reduction Program (LRARP) is one of the few sources of state funds for locally-owned roads not on the federal aid network. LRARP funds can also be expended on locally-owned segments of the federal aid network, though that is not recommended. The amount of funding available per project is minor: between \$50,000 and \$500,000, so this program rarely provides enough funds for a full redesign of an intersection. However, these funding levels are appropriate for the expansion of sidewalks, formalization of travel lanes, adjustments to traffic control signals, or other projects that have net benefits both on safety and on pedestrian access.

Recreational Trails

Recreational Trails funding is provided by the USDOT to CT DEEP, rather than to CTDOT. Funds for recreational trails primarily fund greenway projects. Projects which primarily serve transportation functions, or are part of a roadway, are not eligible for this funding program. Locally,

26 OPM PIC Index Page: <http://www.ct.gov/opm/cwp/view.asp?a=2985&q=383122>

recreational trails funding has primarily been secured for the Naugatuck River Greenway and related projects.

There are opportunities for closing pedestrian-related gaps using recreational trails, funding, however. Many useful potential pedestrian shortcuts pass through preserved open spaces or connect with current or proposed greenway projects. As the recreational network improves, opportunities for projects which are mutually beneficial for recreational and for transportation purposes are possible.

Federal Programs

Transportation Alternatives Set-Aside

The Transportation Alternatives Program (TAP) is the primary dedicated source of federal funds for the construction of pedestrian and bicycle infrastructure. TAP is administered by CTDOT, which solicits applications annually from COGs and municipalities. TAP funds can be used for larger-scale pedestrian projects which require a good deal of coordination and design, such as road diets, trail extensions through difficult environments, or large-scale sidewalk construction.

TAP funding is very flexible, but is limited to a small amount each year. In the most recent solicitation, the amount allocated to all small urban areas in CT combined was about \$500,000.

SAFE ROUTES TO SCHOOL

Safe Routes to School (SRTS) is a program that began as a nonprofit advocacy program and grew into a federally-funded program. Under MAP-21, SRTS is no longer formally funded, but states have the option of continuing funding the program under TAP. Connecticut has not maintained a separate funding pool for SRTS. SRTS projects include both the provision of classes and amenities to students and teachers, and the construction of improved pedestrian and bicycle infrastructure around schools. The most successful projects involve a combination of improving school accessibility via infrastructure development and improving awareness through education and walking and bicycling incentives. Several SRTS programs have been completed in the NVCOG region, including the improvement of sidewalks, crosswalks, and bicycle racks around Gilmartin School in Waterbury and the purchase of bicycles, helmets, and safety vests in the Plymouth Public School District. The NVCOG's UPWP highlights a regional SRTS program as a task for staff planning and resources.

FTA Capital Programs

FTA Capital Programs are fairly supportive of pedestrian projects, but projects funded under these programs can take many years to complete.

The Federal Transit Administration (FTA) administers multiple programs to improve pedestrian accessibility of transit corridors and facilities. While much of the NVCOG region has little transit access, the urban centers of Waterbury, Bristol, Derby, Shelton, Ansonia, Seymour, and Naugatuck all have bus stops, several near active passenger train stations. Improving pedestrian access to these transit stops will typically also serve the non-transit-using pedestrian population.

SECTION 5307

Section 5307 funds improvements to the pedestrian environment within a ½ mile radius of transit stops. Funding under this program competes with other transit capital projects, meaning pedestrian projects under this program should be significant enough to warrant using this program for pedestrian infrastructure rather than for more typical transit capital projects. Examples of potential pedestrian-oriented projects under this program include system-wide bus stop procurements and improvements, corridor-length transit stop improvements, and similar scaled transit-related pedestrian projects. This program has a 10% non-federal share for ADA-related improvements.

SECTION 5310

Section 5310 funds enhanced mobility projects for seniors and the disabled. Typically this program is used to procure and to replace mini-buses and other small transit vehicles for senior centers, private non-profits, and public dial-a-ride programs. Several other FTA funding programs have been folded into Section 5310 funding over the previous few years, expanding the types of projects eligible for funding. Non-Traditional Section 5310 projects may include accessibility improvements between popular locations for seniors and the disabled and transit pickup locations, either off-street or on-street.²⁷ A maximum of 45% of all funding is allowed for Non-Traditional projects under Section 5310.

27 This interpretation of "Non-Traditional" is supported by Section 5310 spending programs in several states, but at present CTDOT does not allow the use of Section 5310 funds for these projects. Coordinating with CTDOT on the use of Section 5310 funds for increased accessibility to the fixed route system should be an ongoing priority of the NVCOG.

SECTION 5339

Section 5339 focuses on improving transit provision and transit facilities. For pedestrians, Section 5339 funds may be used for improving bus stops, providing shelters and benches, and upgrading crosswalks.

Section 5339b is a new competitive funding program for transit improvements above and beyond the typical formula funding handled through CTDOT. Section 5339b funds may be applied for through NVCOG and CTDOT, and projects compete nationally for funding.

Development of Regional Programs

At present, the NVCOG does not have any specific programs for the construction of sidewalks in the region. But opportunities exist to develop regional sidewalk improvement programs.

TIP Line Item Program

Through working with CTDOT, the Central Naugatuck Valley MPO may be able to set aside a portion of the federal Surface Transportation Program Block Grant (STPBG) funds allocated to the MPO for a pedestrian-specific funding program with an annual budget. Similar line items exist for systematic safety improvements throughout the state, and for other bridge and safety programs. Develop a funding program through this means would be the most stable for the CNV MPO's municipalities, but would require a level of coordination with CTDOT that is unlikely given the current fiscal situation.

LOTICIP Program

Similarly, NVCOG could coordinate with CTDOT to develop an annual LOTICIP-funded sidewalk improvement program. Such a program would require buy-in from NVCOG municipalities that would otherwise be able to apply for standalone sidewalk projects, buy-in from CTDOT as the funder of the program, and likely standard drawings approved by CTDOT.

Regional Funding Pool / Sidewalk Construction Shared Service

The quickest avenue for developing a regional sidewalk program would be to develop it as a shared service within NVCOG. Interested municipalities could opt-in to a program wherein they could pay into an annual budget, to be used to close sidewalk gaps, construct trails and expand existing sidewalks, and fund other pedestrian-oriented small projects. This type of program would allow municipalities to have complete control over the design and construction of sidewalks in the program, potentially allowing for lower costs and for projects that would otherwise be too small to fund and too expensive to design.

There are currently no similar shared service transportation capital programs in the state, but other shared services exist within the region, largely connected to waste management and to public works departments.

Draft

Transportation Program Improvements

Improved CTDOT Coordination

There is some confusion regarding the construction and maintenance of pedestrian infrastructure on state-owned roadways. The NVCOG should work to clarify the relationship between CTDOT, the NVCOG, and individual municipalities regarding sidewalk construction and maintenance. In particular, there has been hesitation on CTDOT's part regarding providing funding for the provision of Complete Streets elements such as adequate sidewalks, visible crosswalks, appropriate pedestrian signals, and the like. Further, there is a lack of coordination with municipalities when CTDOT designs roadways, typically resulting in the maintenance of the status quo. The NVCOG should work to encourage CTDOT to be proactive rather than reactive in proposing and installing sidewalks on state-owned roads, in keeping with the CTDOT Complete Streets policy.

Updated Municipal Sidewalk Ordinances

While many municipalities in the NVCOG have sidewalk ordinances detailing when sidewalks are necessary, who constructs and pays for them, and when they must be replaced, these ordinances are often inconsistent or do not follow best practices. In particular, many member municipalities do not specify design standards to ensure ADA compliance, and do not have clear policies for where sidewalks are required. To address this issue, NVCOG staff have reviewed all existing municipal sidewalk ordinances and developed a model ordinance (*see Appendix*) for municipalities to consider or amend to their own needs.

Crosswalk Provision

The State of Connecticut defines a crosswalk as any intersection with a sidewalk on either side, regardless of markings.²⁸ The combination of a relative dearth of sidewalks throughout much of the NVCOG region and an emphasis on not marking crosswalks at uncontrolled intersections²⁹ in the past has led the NVCOG region to be short on marked legal crossings. Additionally, many of the marked crossings that exist are in need of

28 CGS § 14-297(2) defines a crosswalk as including "that portion of a highway ordinarily included within the prolongation or connection of the lateral lines of sidewalks at intersections" in addition to marked crosswalks.

29 An uncontrolled intersection is one where there is no traffic signal and no stop sign requiring motorists to consistently stop moving before crossing. There are differing opinions on the provision of marked crosswalks at uncontrolled locations due to safety concerns, but recent research encourages the use of crosswalks at all appropriate legal crossings with an Average Daily Traffic (ADT) of less than 12,000. The research is more mixed on roadways with greater ADT, suggesting that marked crosswalks alone introduce more danger without additional safety and traffic calming measures. (Zegeer, Stewart, et al. 2001) For roadways nearing or surpassing the 12,000 ADT, and where there is a demonstrated history of pedestrian safety issues, it is recommended to provide Yield to Pedestrians signs and advanced yield bars to signal drivers to give pedestrians the right of way. (Van Houten, McCusker, et al. 2008)

repainting, lack curb cuts and other amenities, and may have visibility issues. CTDOT has recently embarked on a system-wide uncontrolled crosswalk upgrade program through the safety improvements program. NVCOG assisted multiple municipalities with identifying the locations of crosswalks, and CTDOT has begun repainting and properly signing the crosswalks they were provided.

The NVCOG should incorporate properly marking and improving legal crossings into its processes for project development and approval.

Corridor Studies

One approach to improving pedestrian infrastructure is to consider full corridors connecting neighborhoods. A full corridor analysis typically provides project concepts or preliminary engineering that can then be used to seek funding. CTDOT typically solicits proposals for corridor studies on an annual basis.

LOTICIP Program Adjustments

The current LOTICIP program provides a great deal of flexibility to COGs on administration, project selection, and project development. The NVCOG's approach can be described as "first-come-first-served." This approach has been valuable for getting projects moving, working out kinks in the program, and developing capacity at the municipal and the COG level. Downsides of this style are 1) projects are not necessarily representative of regional priorities, and 2) the capacity of member municipalities to submit and complete projects does not always align with the distribution of LOTICIP-eligible roadways.

While it is of great value to allow flexibility in the design of locally-owned roads, these regionally-significant roads would be well-served by some standard set of available design options, particularly when considering Complete Streets elements such as sidewalks, trails, and bicycle access. Standard drawings contained in an easy-to-use manual for municipalities should be adopted to ensure projects are up to standard. For a good example, see FHWA's recent multimodal design guide.³⁰

30 https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/multimodal_networks/fhwahep16055.pdf

In addition, the NVCOG should better incorporate accessibility into LOTCIP projects. A key issue in maintaining accessibility on LOTCIP-funded projects is to maintain an accessible route during the construction process. While the construction of LOTCIP-funded projects is supervised by the municipalities, the NVCOG should work to inform municipalities of their obligations under ADA.

Recommended LOTCIP Program Improvements

- ▶ Development or adoption of standard drawings for curb ramps, curb extensions, crosswalks, sidewalks, and other pedestrian infrastructure
- ▶ Development of a complete streets checklist for use in reviewing project concepts and preliminary designs for accommodation of all users
- ▶ Implementation of a review process to ensure ADA-accessible routes are provided during construction, in accordance with federal & state law
- ▶ Discussion with Transportation Technical Advisory Committee and with CTDOT regarding development of a sidewalk construction program

Analysis of TIP Amendments

The Transportation Improvement Program (TIP) details all federal transportation-related obligations for the MPOs for which the NVCOG plans. While the full TIP development process has paid very close attention to the needs of pedestrians in the past, a process does not presently exist to analyze individual TIP amendments for their impacts.

The NVCOG Environmental Justice Policy proposes performing Environmental Justice analyses on TIP amendments and presenting any important findings to the NVCOG Board before requesting endorsement.³¹ This Pedestrian Plan proposes performing a similar analysis of TIP amendments, likely using a single Pedestrian and Bicycle Needs Assessment Form. Importantly, this could provide opportunity for the NVCOG to maintain accessibility for pedestrians during construction projects and to propose improvements to new or updated projects in the TIP.

31 NVCOG Environmental Justice Policy 2016

Signalization

One issue facing pedestrians is poor signal timing at many intersections across the NVCOG region, on both locally-owned and state-owned roadways. Many high-traffic intersections in the region are large, lack adequate pedestrian signals and crosswalks, and provide very little or no timing between or during cycles for pedestrians to cross the street.

Best practices for incorporating pedestrian needs into signal timing include:

- ▶ **Permanent pedestrian cycle** Providing the 'Walk' signal during every signal phase ensures that both pedestrians and drivers expect a pedestrian cycle. This reduces pedestrian and driver uncertainty.
- ▶ **Concurrent pedestrian signals** Concurrent pedestrian signals give pedestrians the right-of-way when crossing in the same direction as moving traffic. Providing concurrent signals, as opposed to an exclusive pedestrian phase as is common in Connecticut, reduces the amount of time both pedestrians and motorists wait at intersections, which in turn reduces the likelihood of pedestrian darts and dashes at opportune moments in the traffic flow. This style of signalization also keeps pedestrian traffic moving through multiple intersections smoothly, rather than requiring pedestrians to stop and wait at every intersection.
- ▶ **Leading pedestrian intervals** Providing additional time at the beginning of each phase for the parallel pedestrian traffic to move into the intersection allows pedestrians to safely enter the intersection without worry of drivers attempting to cut them off as the light changes to green. This also ensures visibility for pedestrians, which is particularly of use in more densely developed areas where visibility may be hindered. Leading pedestrian intervals have been found to effectively reduce pedestrian crashes by up to 60% at intersections.

The Connecticut Manual of Traffic Control Signal Design is the primary guide for signal design and timing. The manual is very light on consideration for pedestrians, particularly when considering the unique needs of pedestrians at signalized intersections. Further, the manual seems to lack an awareness of recent research on best practice when designing for pedestrians at intersections. The NVCOG would recommend that the

State update its signal design manual to be more in line with best practice, including guidance from the Manual of Uniform Traffic Control Devices (MUTCD), which is the professed basis of the Connecticut Manual.

Awareness Campaigns & Signage

One component of many successful pedestrian programs are awareness campaigns, both to improve drivers' deference to pedestrians and to increase awareness of easy walking distances for daily tasks. While this program plan does not advocate for any particular awareness campaign, the NVCOG and its member municipalities should consider this tool when programming transportation dollars. The following campaigns have been useful in other regions and towns:

- ▶ **Silhouette Campaign** Placing silhouettes representing pedestrian deaths in areas where safety is a major concern.
- ▶ **"Everyone is a Pedestrian"** Advertising campaign aimed at reminding residents that all are pedestrians for some portion of their trip
- ▶ **Right of Way & Crosswalk Awareness** Advertising campaign aimed at reminding residents of the rules of rights of way as they regard to pedestrians
- ▶ **Wayfinding** Signage campaign showing walking distances to nearby destinations to encourage walking

Pedestrian Count Program

To improve our analysis of our programs, to provide a more nuanced Pedestrian Demand Index, and to better identify priority projects, NVCOG should commence a regular pedestrian counting program.

A typical program will require dedicated counters, in-person counts for calibration, regular counts of archetypical streets for assisting staff modeling efforts, and more specific counts of anticipated projects. The first step in this effort is to identify physical counters to procure and develop adjustment factors using in-person comparison counts.

Implementation Table

Project	Priority	Responsibility
Research & Data Analysis		
Identify potential traffic calming pilot	Medium	NVCOG, Municipalities
CTtransit Bristol Accessibility Survey	Medium	NVCOG, CRCOG, Bristol
CTtransit Waterbury Accessibility Survey	High	NVCOG, Municipalities, GWTD
Identify non-accessible crosswalks	Medium	NVCOG, Municipalities
Identify Local Signals	Low	NVCOG, Municipalities
Safety Campaign	Medium	NVCOG, Non-Profits, Municipalities
Procurement of Pedestrian Counters	High	NVCOG
Sidewalk Inventory Update	High	NVCOG
Sidewalk Quality Survey	Medium	NVCOG, Municipalities
Off-Road Trail Network Shapefile	High	NVCOG
Pilot Projects		
Traffic Calming Pilot	Low	NVCOG, TTAC, Municipalities
Interim Pedestrian Improvements	Medium	NVCOG, TTAC, Municipalities
Coordination Needs		
Transit funding eligibility	High	NVCOG, CTDOT
LOTICIP program development options	Medium	CTDOT
Regional sidewalk construction program	Medium	NVCOG, TTAC, Municipalities
Utility transmission lines ROW	Low	Energy companies
Program Adjustments		
Incorporate Pedestrian Indices into LOTICIP Review	High	NVCOG, TTAC, Municipalities
LOTICIP Construction Review	High	NVCOG, TTAC, Municipalities

Complete Streets Checklist	Medium	NVCOG
TIP Impacts Review	Low	NVCOG
Municipal Ordinance Updates	Medium	NVCOG, RPC, Municipalities
Adopt standard drawings or a design manual for projects	Medium	NVCOG, TTAC, CTDOT
Formalize LRARP Project Selection Criteria	High	NVCOG, TTAC
Design Speed Policy	High	NVCOG
New Plans & Programs		
Waterbury Pedestrian Safety Plan	Medium	NVCOG, Waterbury
Pedestrian Counting Program	High	NVCOG, UConn
Coordinated Human Services Transportation Plan	Medium	NVCOG, GWTD, VTD
Regional ADA Transition Plan	Medium	NVCOG, Municipalities
Priority Capital Pedestrian Improvements		
East Main Street Waterbury Pulse Improvements	High	NVCOG, Waterbury, CTDOT
Valley Transit District Bus Shelter Program	High	NVCOG, VTD, GBT, CTDOT
Bristol Route 6 Study Implementation	High	NVCOG, Bristol, CTDOT
High Priority Sidewalk Gap Closures	Medium	NVCOG, Bristol, Waterbury
Waterbury Downtown Signal Coordination	High	NVCOG, Waterbury, CTDOT
Naugatuck River Greenway	Medium	NVCOG, Municipalities
Quarry Walk, Oxford	Medium	NVCOG, Oxford
Derby-Shelton Bridge Project	High	NVCOG, Derby, Shelton, CTDOT

Measuring Success

Key to any long-term plan is developing a framework for success. Setting up performance measures can aid in identifying new strategies, understanding the failings of existing strategies, and ultimately holding the NVCOG accountable for following through on the goals identified in *Let's Walk!*.

Performance Measures

Performance measures can take two forms: direct measurement of the achievement of goals, and indirect measurement of the impacts. For example, measuring the mileage of sidewalks added through NVCOG programs each year is a direct measurement of work being done by the NVCOG to improve pedestrian infrastructure regionally, while measuring the proportion of the population walking to work is an indirect measurement looking for particular outcomes. Direct measurements are likely to show positive movement before indirect ones, but indirect measures are more likely to show long-term positive change.

The NVCOG proposes using the following direct and indirect performance measures to identify achievement of the goals of this program:

- ▶ **Sidewalk Miles Added**
- ▶ **Proportion of the Population Walking to Work**
- ▶ **Adoption of Updated Sidewalk Ordinances**
- ▶ **Sidewalk Gaps Closed**
- ▶ **Pedestrian Danger Index (PDI)**

Sidewalk Miles Added per Year

Perhaps the most straightforward measure, sidewalk miles, is difficult to prepare. The primary obstacle is a lack of regularly-updated data regarding the locations and quality of sidewalks across the NVCOG region. To address this issue, the NVCOG recommends **1)** using the recent procurement of aerial imagery to update the existing NVCOG sidewalk inventory with the most recently-constructed sidewalk facilities, and **2)** setting up a formal, periodic process for sidewalk data requests from member municipalities.

For towns without sidewalk data, the NVCOG can assist in developing the data. This can also be used by towns to ensure developers add or replace needed sidewalks during new construction.

Using our most up-to-date data (from 2014), the NVCOG has 859.21 miles of sidewalk facilities. Our high priority sidewalk areas (*Pedestrian Demand Index greater than or equal to 50*) contain 24.11 miles of roadway on the federal aid network lacking sidewalks.³² **To complete these sidewalk areas through 2025 would require roughly 3.5 miles of sidewalks to be constructed per year.**

Proportion Walking to Work

The proportion of the population commuting on foot is an easier measure to assess, provided the continuation of the American Community Survey 5-year estimates. Complete commuting data is typically released in mid-December of each year. Trends over the past eight years (the years for which we have ACS data) have shown negligible change in this measure.

Table : Proportion of workers residing in the NVCOG who walk to work

2009	2010	2011	2012	2013	2014	2015	2016	Trend
1.43%	1.28%	1.51%	1.48%	1.62%	1.74%	1.72%	1.44%	

Source: US Census Bureau ACS Table B08301

The NVCOG aims to increase this proportion through its pedestrian program, so a decent reach goal would be 2% of residents commuting to work by walking by 2025. **To achieve that figure, the NVCOG aims to see an average change of 0.07% in the commuting data released by the U.S. Census Bureau each year.** That equates to roughly 1,400 residents changing to a walking commute per year.

32 This number is calculated by adding up the length of segments with a Pedestrian Demand Index greater than 50 and an incomplete sidewalk flag with two times (for both sides of the streets) the length of segments with a Demand Index greater than 50 and a no sidewalk flag. The exact number of missing sidewalk miles for road segments in this Demand category is likely somewhat smaller.

Sidewalk Ordinance Updates

The rate of adoption of updated sidewalk ordinances and incorporation of pedestrians' needs into zoning regulations should be a helpful temporary performance measure. This plan provides a model ordinance for adoption in the Appendix, but municipalities may be interested in making individual changes to existing policies, or in creating their own updates to better suit their towns' needs. The NVCOG will keep track of updates to existing sidewalk ordinances and adoption of new sidewalk ordinances and zoning regulations, and will report on progress improving municipal policies to be more supportive of pedestrians and of walking through interaction with the RPC.

The NVCOG is not developing a particular goal for this measurement, as conversations about local zoning ordinances should be held at the local level. Rather, the **NVCOG will report changes or updates made to sidewalk or other pedestrian-related ordinances each year**.

Sidewalk Gaps

Sidewalk gaps are technically easy to close, but individual gaps can be difficult to identify and to fund. Of particular issue: these projects are typically too small individually to warrant grant applications, and filling gaps *ad hoc* is difficult to justify at the local level if towns do not have existing programs building sidewalks.

To reduce all gaps in the NVCOG region through 2025 would require approximately 60 gaps be filled every year: a Herculean task! The majority of these gaps are concentrated in a few NVCOG municipalities, most notably Bristol and Waterbury. The proposed performance measure is to count the number of sidewalk gaps closed each calendar year and compare that number to previous years as data develops.

Pedestrian Safety

The NVCOG region has very high rates of pedestrian crashes and fatalities relative to the proportion of the population regularly walking. While Connecticut develops multiple long-range transportation safety plans with

There are 6 identified gaps on roads with Demand scores over 50:

Bristol
Laurel Pl
Route 69 (East Rd to Norris Dr)
Redstone Hill Rd (Emmett St to Birch St)
Washington St (Church Ave to Central St)

Waterbury
Lawlor St
Route 73 (Eastern Ave to the Old Pin Shop)

goals related to pedestrian safety, the NVCOG would benefit from a more regionally-targeted program to alleviate this issue.

A primary marker of pedestrian safety is the Pedestrian Danger Index (PDI), which produces a score based both on the proportion of the population walking on a regular basis and the number of pedestrian traffic fatalities in the region. Further, this marker is easily comparable against other towns, urbanized areas, and COGs in the state, and is used by national non-profits advocating for pedestrian safety.

PDI by COG	
NECOG	85.78
NVCOG	85.59
RiverCOG	69.75
CRCOG	56.47
WestCOG	51.03
MetroCOG	33.99
SCCOG	25.41
SECOG	18.22
NWCOG	15.85

The NVCOG will use the PDI as a measure for pedestrian safety, as it appropriately couches absolute pedestrian fatalities within the context of population and pedestrian activity. The NVCOG will also report the absolute number of serious injuries and fatalities.

Reporting

To ensure the NVCOG is following through on measuring performance, an annual Pedestrian Report will be developed identifying progress (or lack thereof) on the identified performance measures, progress on the items in the Implementation Table, and any other pertinent information regarding pedestrian access, activity, and safety.