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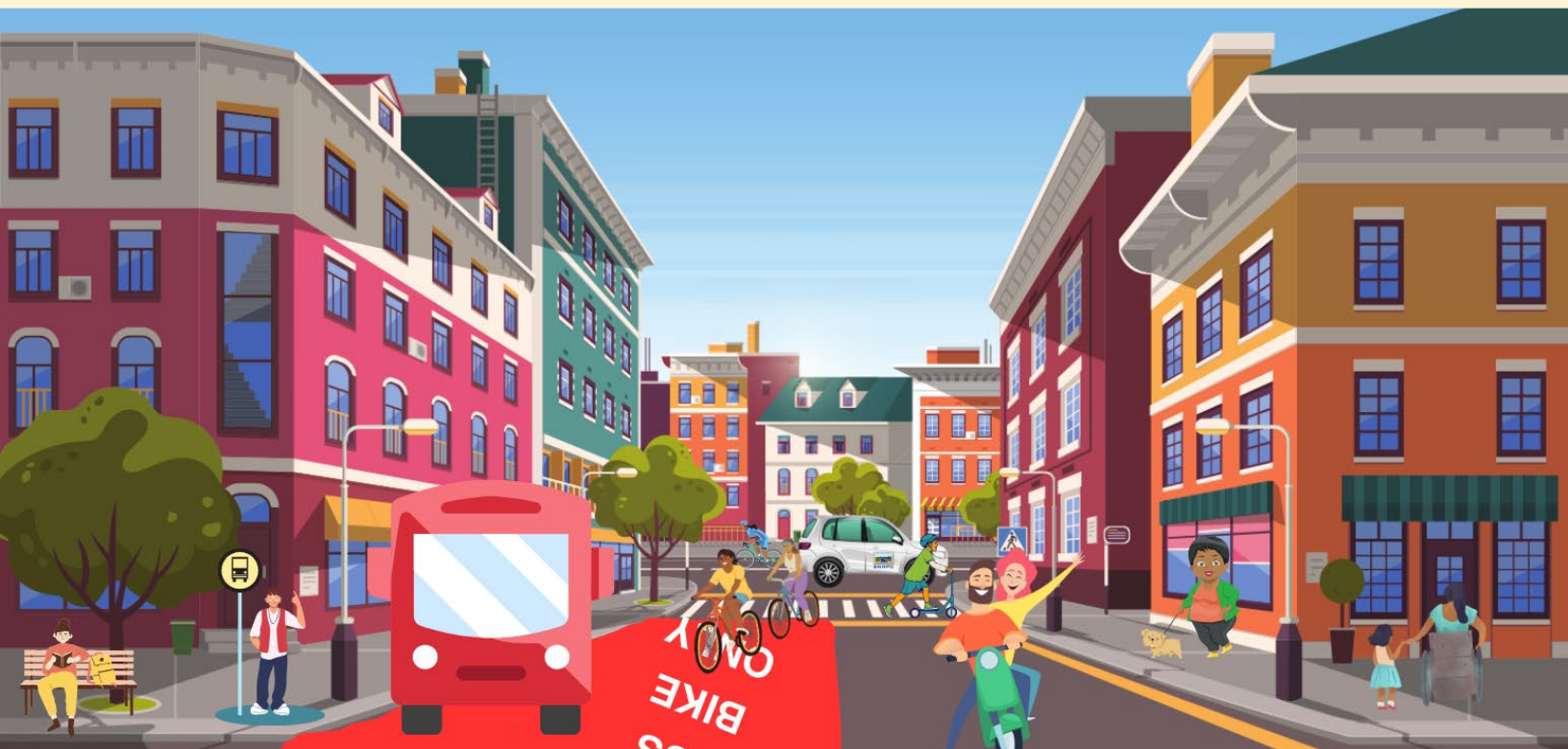
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SECTION 1: INTRODUCTION

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 - Benefits to Complete Streets
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Section I: Complete Streets Toolkit and Project Introduction

In its capacity as MPO (Metropolitan Planning Organization) for the region, the Southern New Hampshire Planning Commission (SNHPC) is pleased to provide this Complete Streets Toolkit. The primary goal for this work is to develop and publish a resource guide for how to implement Complete Streets principles, policies, and projects for communities within the SNHPC Region and beyond.

This toolkit was originally published in January 2017. In this 2023 update, you will find the most current best practices and new and innovative design solutions from around the world. You'll also see updates on Complete Streets policies and projects from our region and beyond.

Communities within the SNHPC region are as diverse as the street networks that weave through their landscapes, ranging in population (1,500 to over 115,000), resources, and character. One of the unique attributes of this toolkit is the recognition that rural, suburban, and urban communities may require very different solutions in making their streets systems friendly to all users. These three community distinctions are seen throughout the toolkit. Additionally, an abundance of examples are provided in each section, including hyperlinks to websites and other resources.

The SNHPC staff has put together a comprehensive guide of resources on a variety of Complete Streets topics including:

- Section I: Complete Streets Toolkit and Project Introduction
- Section 2: Planning & Policy
- Section 3: Design & Engineering

This section provides an overview of Complete Streets, an introduction of the topic and its elements, including: what they are and their history, why communities should consider incorporating them into their transportation planning, and a variety of examples of the type of projects happening in New Hampshire and elsewhere. Some of these topics are described in more detail in other sections of the toolkit and are referenced as such.

We hope you find this toolkit useful and welcome your feedback. Please note that the contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation or the New Hampshire Department of Transportation. Also, please thank our past and current funding providers as they could provide additional resources towards Complete Streets Projects in the future: Federal Highway Administration Funds administered and allowed through New Hampshire Department of Transportation (NHDOT) as well as the New Hampshire Endowment for Health.

A. WHAT ARE COMPLETE STREETS?

The Basic Definition:

According to *Smart Growth America*: *Complete Streets are streets for everyone.* A Community or Agency that adopts a *Complete Streets* approach to transportation planning is serious about their commitment to planning, engineering, and maintenance resources in creating and maintaining a street system for all users. It ensures safe access, convenience, and comfortable travel for pedestrians, bicyclists, motorists and transit riders of *all ages and abilities*. Complete Streets make it easy to cross the street, walk to shops, and bicycle to work.¹

B. COMPLETE STREETS HISTORY: WALKABILITY COMES FULL CIRCLE

Historical Perspective - Back in The Day

If you Google "life before the automobile", you will be fascinated by photos from the late 1800s and early 1900s. This *stepping back in time*, pardon the pun, will remind us all that prior to the automobile, the street system, though not perfect, was originally built and used by all users. There was a time when walkers were the most prevalent users of the street network.



Figure 1: Los Angeles, 1900. Source: [http://waterandpower.org/museum/Early_City_Views%20\(1900%20-%201925\)_Page_1.html](http://waterandpower.org/museum/Early_City_Views%20(1900%20-%201925)_Page_1.html)

Since the 1930s, transportation planning has been one-dimensional, focused primarily on motorized vehicles. During this time, the proliferation of automobiles meant that the needs of pedestrians and

¹ National Complete Streets Coalition. (n.d.). Retrieved from <https://smartgrowthamerica.org/program/national-complete-streets-coalition/>

cyclists were often relegated to the back burner. Most of the nation’s policy, planning, and engineering of the transportation infrastructure developed into roads for able-bodied adults in automobiles. While these policies helped shape the character of our urban, suburban, and rural communities, they’ve often failed to recognize the needs of all travelers, including people of all ages and abilities as well as those who travel by transit, bicycle, and on foot.

According to the [NJ Bicycle & Pedestrian Resource Center](#), since the 1970s, advocacy groups have responded by championing the idea of “routine accommodation” in which the needs of cyclists and pedestrians would be considered during all roadway projects. In the 1970s and 80s the states of Oregon and Florida were the first to embrace this idea and, on a federal level, routine accommodation was incorporated into initiatives including the Americans with Disabilities Act (1990), the Transportation Equity Act of the 21st Century (1998), and policy guidance issued by the Federal Highway Administration and the U.S. Department of Transportation.²

The NJ Bicycle and Pedestrian Resource Center also reported that in 2003, bicycle advocates suggested replacing the technical phrase “routine accommodation” with a more powerful and inclusive term: Complete Streets. Representatives from the [League of American Bicyclists](#) subsequently formed the Complete Streets Task Force, which garnered active participation from groups such as AARP, the American Planning Association (APA), and the American Heart Association (AHA). The Task Force initially focused on lobbying for a Complete Streets policy in the subsequent federal transportation bill, SAFETEA-LU (2005), but soon widened its goal to state and local policy change. In 2005, the Task Force Steering Committee formed the [National Complete Streets Coalition](#), which continues to advocate for the adoption of Complete Streets policies at all levels of government. According to the Coalition, over 1,700 US jurisdictions have adopted Complete Streets policies as of 2023.

Finally, the NJ Bicycle and Pedestrian Resource Center stated that in 2010, the U.S. Department of Transportation issued a policy statement that declares “...DOT policy is to incorporate safe and convenient walking and bicycling facilities into transportation projects” and state and local governments, public agencies, and other organizations should adopt similar policies. Additionally, in 2011, bills were introduced in both chambers of Congress that would have required state DOTs and MPOs to consider “safety and convenience” of all roadway users during transportation projects but did not pass committee review.

Complete Streets Present-Day Within New England

The desire for walkable communities

For the last seventy years urban planning in the United States has focused almost exclusively on passenger vehicles as the primary transportation mode choice for people to commute to work, running errands and enjoying recreational activities. This car-centric mindset to planning has left the country with

² History of Complete Streets in the United States. (n.d.). Retrieved from <http://njbikeped.org/services/history-of-complete-streets-in-the-united-states/>

an under-developed public transit system and few safe alternatives for those who choose to partake in other forms of transportation other than single occupancy vehicles to move around. A shift in real estate preferences and pricing as well as survey response trends show that many Americans are expressing a desire to live in a community that offers them multiple safe and reliable mode choices.

Surveys like the [*National Association of Realtors 2020 Community and Transportation Preference Survey*](#) shows that interest in walkable communities has been growing among respondents. The 2020 Community and Transportation Preference Survey polls residents in Americas' fifty largest metropolitan areas. The survey is normally conducted every few years, but in 2020, a survey was conducted in February and a second survey was conducted in July of 2020 as the impact of the COVID-19 pandemic was felt throughout the Nation. Results of the survey showed a general decrease in the quality of life between the February and July survey as residents felt the impact of the pandemic in their daily lives, especially among younger families with school aged children. Adults over 55 years of age and those with higher incomes showed an increased interest in walkability and respondents that felt that their neighborhoods offered a variety of walkable destinations reported a higher quality of life rating. As the memory of the ordeals that the public had to endure under COVID-19 fades from the collective consciousness it will be interesting to see if the July 2020 survey is the outlier.

[*Smart Growth America's 2023 Foot Traffic Ahead*](#) report shows how commercial and residential real estate prices are growing at a faster rate in walkable urban areas over alternative areas that require a resident to have a vehicle to get around. This data is derived from research of the real estate market and consumer preferences determined by analyzing commercial rents, multifamily rental rates and the prices of homes that are on the market.

Below is an example of how the City of Burlington, Vermont took a few city blocks dedicated to vehicular traffic and turned it into a vibrant pedestrian marketplace that hosts events and is a focal point of the city.

Church Street Marketplace, Burlington Vermont



The Church Street Marketplace is a pedestrian mall and business improvement district located in Burlington, Vermont. Located between the shores of Lake Champlain and the University of Vermont campus, the marketplace is considered to be a premier destination for all that visit Burlington and was named one of the [*America's "Great Public Spaces" by the American Planning Association in 2008.*](#)

There was a time that Church Street Marketplace was just another street running through the heart of downtown Burlington. Cars and buses transported people along its throughfare, and trucks made deliveries to the businesses and shops that comprised the four city blocks that would one day become the marketplace. In 1962 Bill Truex was a student traveling through Europe when he witnessed the Stroget shopping area in Copenhagen transform from a traditional downtown street dominated by vehicular traffic into a successful pedestrian mall. Years later Bill Truex was serving as chair of the Burlington



Figure 2: Church Street Marketplace before and after
Source: churchstmarketplace.com/history

Planning Commission and enlisted the support of the chair of the Street Commission, Pat Robbins, together they promoted the idea of a pedestrian district in the city. This idea began to take shape in 1970 when the city held a one day "street-fair" on Church Street. In 1971 this was extended to a weeklong event and proved to be very popular and helped crystalize the concept of a permanent pedestrian mall. The Church Street Marketplace District and the Marketplace Commission were established in 1979 and federal funding was secured which allowed local officials to move forward

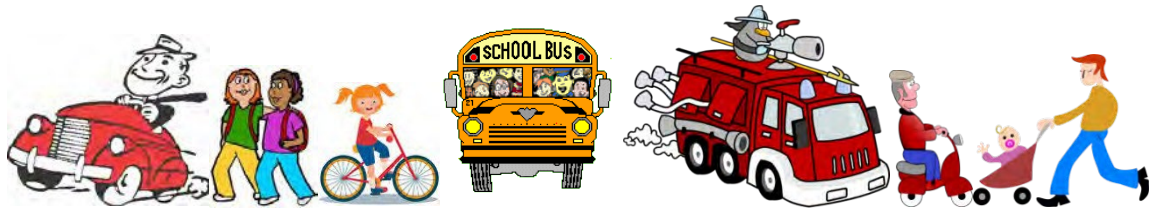
with the project. The project was completed, and the Church Street Marketplace opened in the month of September 1981.

Today the Church Street Marketplace is home to a wide variety of shopping and dining options as well as being the site of many of Burlington's festivals and outdoor events. It is also proving that pedestrian malls can thrive when good planning and design coupled with an engaged community of citizens and business owners comes together.

C. COMPLETE STREETS OVERVIEW

For Whom Are Complete Streets Designed?

The Driver, The Walker, The Bicyclist, The Transit Rider, The Trucker, The Emergency Vehicle Driver, The Wheelchair User, or The Motorized Scooter User, The Dad with Stroller.



We all know when streets are not designed for users other than vehicles. Put yourself in the place of someone trying to get from Point A to Point B, perhaps your home to a local shop, the library, or a park.



Figure 3: Deerfield, NH. Summer 2016

A typical rural or suburban setting may mean you are traveling on a road with *no designated lanes*, just a linear sea of pavement with no painted center line and no fog lines, (the white line along the road shoulder on each side of the road). Depending on the characteristics of the road, such as width and shoulder allowance, curvature, how flat or hilly it might be, available lighting, typical driver speed, and other nuances, it is likely your choices for the mode of how you travel are very limited. For many, it may be that vehicle travel is the only safe alternative, and for some, especially the elderly, this too may be limited to daytime travel due to the reluctance to drive at night.

Again, depending on the lighting and other road characteristics, many, especially older adults, have trouble seeing the edge of the road. Considering the aging of our population, growing number of older adults, and the few transit options that might allow older adults to retire from driving, the issue of making roads safer for all users, including night-time driving will become more prevalent.

Conversely, if you are lucky enough to have your two points connected by a *Complete Streets system*, a system with designated lanes and other design elements for various users, you could have multiple options because the road was designed and maintained for vehicles, bicyclists, and walkers; you would feel safe utilizing any of those modes. (See Section 3: Design & Engineering *for more details*)

Complete Streets: A Commitment in Approach

Avoiding conflicts in road systems is difficult, but reducing risks can be done through a Complete Streets approach. Staff at SNHPC has come to realize that Complete Streets require commitments on multiple levels including policy, design, and maintenance. Whether on the local level or state level, the first commitment must be a mindset that recognizes multiple modes of transportation deserve to utilize the road systems safely, efficiently and comfortably. This recognition not only differentiates modes of travel, but different abilities as well. For example, not every bicyclist wears spandex and can pump out a century ride (100 miles) and not every walker can also jog down to the corner store in under five minutes. Suffice it to say, the many ways in which we travel, and our varied abilities must first be recognized.

From that recognition comes the commitment to create a Complete Streets Policy. According to [Smart Growth America](#), "These laws, resolutions, agency policies, and planning and design documents establish a process for selecting, funding, planning, designing, and building transportation projects that allow safe access for everyone, regardless of age, ability, income or ethnicity, and no matter how they travel."³ (*Complete Streets Policy, Resolution and Ordinance are all covered in Section 2: Planning & Policy*)



Figure 4: A student traverses a busy intersection on their way to school.

From policy, comes the commitment to incorporate Complete Streets design elements and engineering standards, taking into consideration the existing features of the road system (if it's to be redesigned), the Complete Street elements to be incorporated, the goals of the community or agency, and the resources available. (*Complete Streets elements in design and engineering of roads systems is covered under Section 3: Design & Engineering.*)

Lastly, the commitment to maintain the road system so that all users can enjoy the Complete Street system as planned, designed, and implemented is essential. This may include snow removal, annual painting, ensuring signage and lighting are functioning properly, and a host of other maintenance items. This report does not expand on this topic, but recognizes it as a needed commitment to the success of Complete Streets.

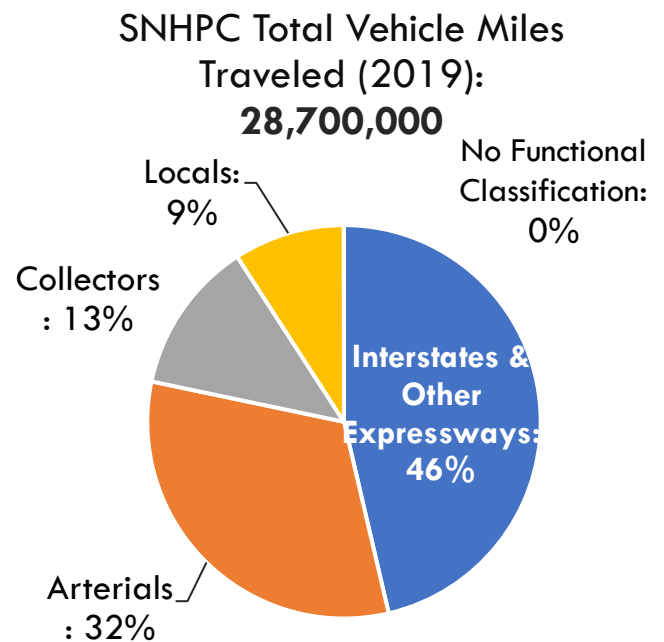
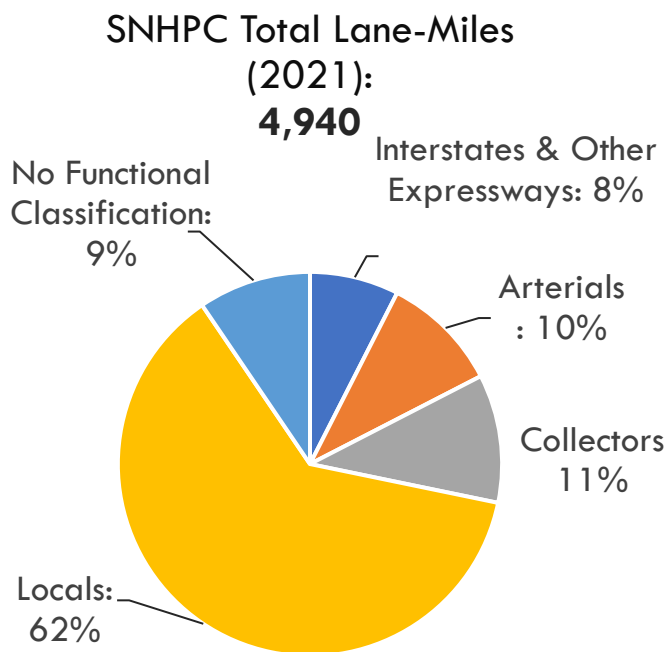
³ Research. (n.d.). Retrieved from <http://old.smartgrowthamerica.org/national-complete-streets-coalition-home/research/>

Why In New Hampshire

Complete Streets is a topic that could arise at the meeting tables of almost any state department including Departments of Health and Aging, Transportation, Economic Development, Tourism, Planning, and even our Military Agencies. Why?... because it's about people of all ages, of all abilities, making connections, keeping healthy, promoting robust communities, and improving the quality of life for this and future generations. **Traveling is not just getting from one place to another; it's about actively experiencing the way we get there and the places along the way. To have choices in modes of transportation and feeling safe in walking, biking, and driving will ensure vibrant communities, vibrant regions, and a vibrant state.**

When we focus on NH's transportation system, suffice it to say that the state has a relatively robust local, regional, and state network. Typically, the discussion of Complete Streets is centered around local and sometimes regional road networks: roads which were designed for speeds of 40 mph or less.

According to the NH Department of Transportation, over 70% of the region's road network consists of collectors and local roads.⁴ This provides the Complete Street Planner and Designer with ample opportunity for creating a Complete Streets network.



Source: NHDOT

Figure 6: SNHPC Total Lane-Miles (2021)

Figure 5: SNHPC Total Vehicle Miles Traveled (2019)

⁴ The Highway System - Our Nation's Highways - 2000. (n.d.). Retrieved from <https://www.fhwa.dot.gov/ohim/onh00/onh2p5.htm>

Why In SNHPC Communities

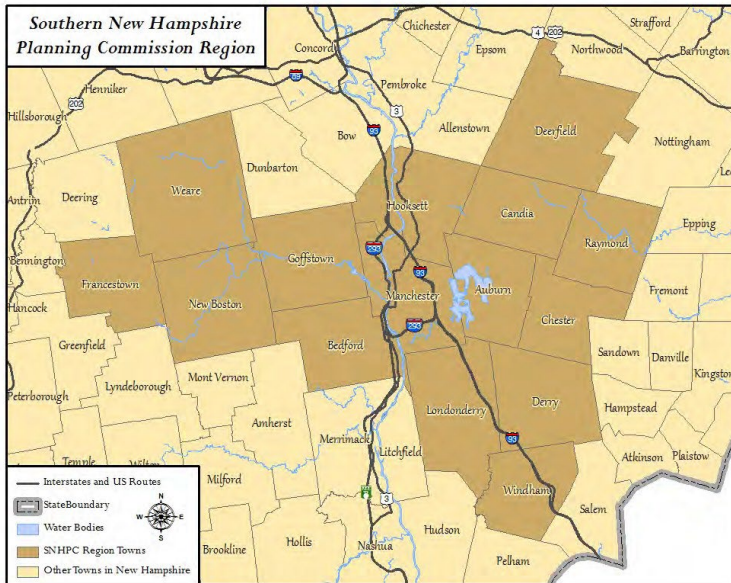


Figure 7: Map of SNHPC Region

In 2016, the SNHPC team met with Planning Boards from each of the region's fourteen communities: Auburn, Bedford, Candia, Chester, Derry, Deerfield, Francestown, Goffstown, Hooksett, Londonderry, Manchester, New Boston, Weare, and Windham. To be sure, the range in settings varied widely, providing the team with challenges in rural, suburban, and urban street patterns. There were many commonalities in the communities' street systems - especially in their lack of Complete Streets features. These features include design elements that would provide safe usage of the road by walkers, bicyclists, and other non-motorized users.

One overarching theme in the region's road network was the need for decision makers to recognize that there are multiple users for most road systems. When assessing the road network as a whole afar, there appears to be common issues throughout. For example, many road systems lacked wayfinding signage to let the traveler know if the town center was nearby or pointing the way to a neighboring community. User signage, such as an indication that pedestrians may cross at a certain juncture or that a bicyclist may be sharing the lanes, was also missing. Many roadways, whether in village centers or neighborhood cul-de-sacs, experienced traffic at speeds that exceeded comfort levels of community residents. Finally, and almost universally, road systems lacked lane markings of any kind: center lines, fog lines, bicycle lanes, or crosswalks.

Although no communities in the region have a complete streets *policy*, several complete streets projects have been completed since 2016.

Maple Street Road Diet (Manchester)

Temporary bike lanes on NH 28N/Maple Street (between Bridge and Webster) in Manchester were tested in Summer 2019 and became permanent later that year. The effort included a considerable amount of community engagement which led to a road diet and reduction of vehicle travel lanes from two to one lane, reducing potential conflicts between drivers and others. It also resulted in lower average speeds along the Maple Street corridor, which was praised by residents looking for more favorable neighborhood walking conditions. Future projects may focus on ensuring the provision of bike lanes in disadvantaged areas (i.e. extending bike infrastructure south of Bridge Street) which would also make strides in addressing equity issues.



Figure 8: Maple Street shown in October 2015 and again in October 2022, before and after its road diet.

Lane width reduction in Goffstown (2018)

In 2018, the Town of Goffstown undertook a series of traffic calming improvements including bump outs (see Figure 9) to improve pedestrian safety and access along Main Street.



Figure 9: Looking north along NH Route 13, Goffstown (Main Street), Sept. 2013/August 2018

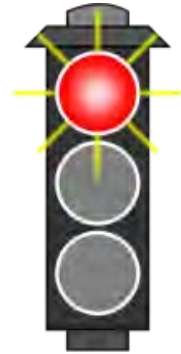
For more specifics of SNHPC's Community findings, see Appendix: Pilot Project (2016).

Limitations to Existing Street Design in SNHPC Communities:

Lesson 1: Overall need for traffic calming and improved safety

Lesson 2: Lack of designated lane space: no fog lines, center lines, or bicycle lanes

Lesson 3: Lack of markings on roadways for bicyclists or pedestrians: no crosswalks or sharrows



Benefits To Complete Streets

Do a Google search on "[benefits to Complete Streets](#)" and you will find ample evidence of benefits, even calculated in savings from using transit, walking, or biking verses driving. Although reviewed in detail in Section 2B: What Are The Benefits?, the Complete Streets benefits most often reported includes:

- Improves Safety for All Users
- Encourages Economic Development
- Improves Quality of Life
- Provides Choices
- Increases the Attractiveness of the Community
- Improves Health by Encouraging Walking and Biking

As mentioned in Section 2: Planning & Policy, our 2016 Stakeholder Team was a critical component of the development of the toolkit. These representatives from our communities, agencies and special interest groups came to understand these benefits on a personal level. Kristi St. Laurent, a volunteer Planner on the Windham Planning Board, contributed this statement:

The beauty of the Tool Kit, and the Complete Streets concept, is that it is not a one-size-fits-all idea. It can be expansive and comprehensive, or it can be as simple as some paint and community outreach. The goals are the same, to increase utilization of our streets by more than just cars while increasing safety, community and physical activity.

At first I didn't see how Complete Streets could be of use in our rural town with little appetite for infrastructure spending, or for spending of any kind. Then, once I saw how designating bike-ped lanes on some of our wider residential streets could be done at minimal cost with existing infrastructure, I was hooked. Moving forward, the concept can be considered as new streets are planned in town. Complete Streets is kind of a mindset, of looking at streets holistically as a way to move people not just from point a to b, but move them to get outside, stretch their legs and experience their community as a whole, not just their destination. Planning for this engagement means it is safer for people in cars or not. It really is a win-win to get the most bang for the infrastructure buck.

There are multiple resources available online; three are included here, chosen in part because of the range in scope and scale of information.

1. The first is a one-page fact sheet created by SNHPC:
https://www.snhpc.org/sites/g/files/vyhli5006/f/uploads/complete_streets_fact_sheet_0.pdf
2. The second, also New Hampshire based, is a short but good cost/benefit analysis done for Concord's Downtown Main Street project. [Concord NH benefit/cost analysis](#)
3. The third, Safer Streets, Stronger Economies, a very extensive study done by Smart Growth America in March 2015, reviewed costs and return on investments for 37 Complete Streets projects. <https://smartgrowthamerica.org/resources/evaluating-complete-streets-projects-a-guide-for-practitioners/>

In this study, Smart Growth America found that Complete Streets projects tended to improve safety for everyone, increased biking and walking, and showed a mix of increases and decreases in automobile traffic, depending in part on the project goal. **Compared to conventional transportation projects, these projects were remarkably affordable, and were an inexpensive way to achieve transportation goals. In terms of economic returns, the limited data available suggested Complete Streets projects were related to broader economic gains like increased employment and higher property values.**⁵

Section 2: Planning & Policy *of this Toolkit provides a much more in-depth view of Complete Streets benefits.*

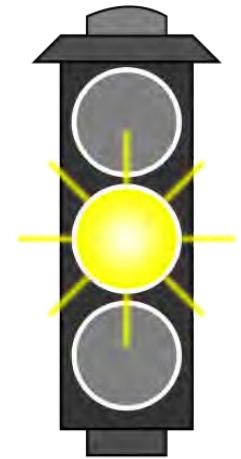
⁵ Anderson, G., & Searfoss, L. (March 2015). *Safer Streets, Stronger Economies Complete Streets: Project Outcomes From Across the Country* (p. iv, Rep.). Smart Growth America; National Complete Streets Coalition.

Lessons Learned:

Lesson 1: Complete Streets are not one-size fits all; they are flexible solutions

Lesson 2: Complete Streets can begin with demonstration projects

Lesson 3: Complete Streets is a mindset, allowing a community to get the biggest bang out of the infrastructure buck



D. WHO IS INCORPORATING COMPLETE STREETS?

Programs And Projects Within New Hampshire

Communities across New Hampshire have incorporated Complete Streets principles into innovative programs and revitalizing roadway projects. Opportunities arise as communities are restriping, resurfacing, and reconstructing their street systems, or when developing incorporating new streets through subdivision approvals. Urban, suburban, and rural communities alike are realizing the benefits of making streets safe for all users. The following highlights several examples both on the regional and community level.

Manchester

First, the Rebuilding American Infrastructure with Sustainability and Equity, or RAISE Discretionary Grant program, is allowing the City of Manchester to connect the Millyard to South Elm Street. The project will add new roadways, a pedestrian bridge over Granite Street, a bike path along the railroad from Queen City Avenue and Elm Street and a peanut-shaped roundabout around Queen City Avenue and South Willow Street.

Second, through the Federal Highway's Transportation Alternatives Program (TAP) the City will be applying a "road diet" to Canal Street. The proposed project would reduce the number of travel lanes to one in each direction with turn lanes at intersections and provide a grade-separated bicycle and pedestrian facility.

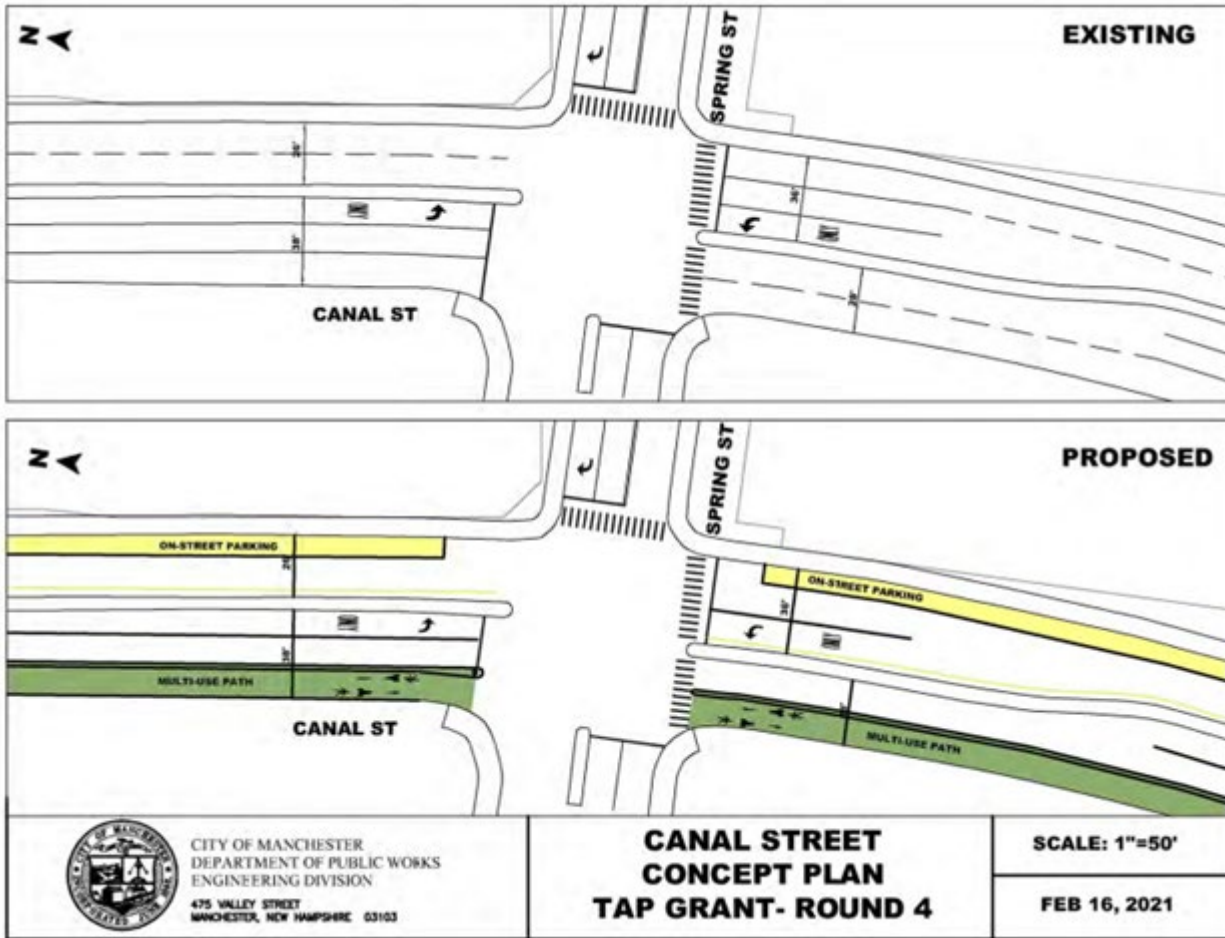


Figure 10: The City of Manchester received an award of \$1,000,000 for their "Canal Street Complete Streets" project.

The following is a statement provided by City's Traffic Engineer Kristen Clarke in May 2023:

The City of Manchester understands the benefits that "Complete Streets" can bring to health, safety, the environment, and the economy in our municipality and we continuously work to incorporate these concepts in our design and construction efforts. By balancing the needs of different modes and considering design alternatives based on the premise that transportation choices should be safe, convenient, reliable, affordable, and accessible, Complete Streets allow us to meet the needs of our residents and visitors. The Southern New Hampshire Planning Commission's Complete Streets Toolkit has and will continue to provide the City with an abundance of resources to continue the development of Complete Streets throughout our municipality and provide safe transportation options for all users.

Derry

Derry has begun their efforts through a crosswalk signage program to make pedestrians more visible to vehicles, especially in their busy downtown area. This program was in response to multiple accidents.

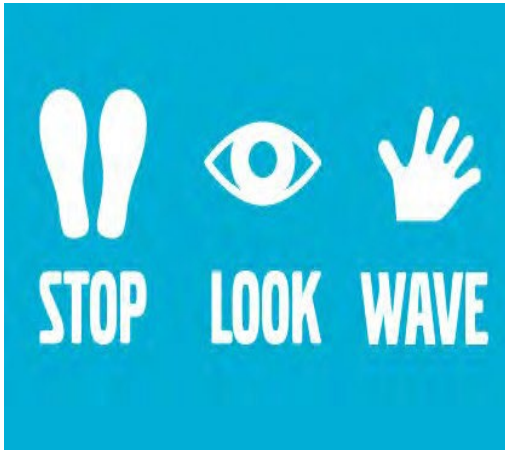


Figure 11: Photo courtesy of Elizabeth Robidoux, Town of Derry

Since the 2017 Toolkit was published, pedestrian beacons have been added in two locations along the Derry Rail Trail- one at Bowers Road and one at South Avenue.

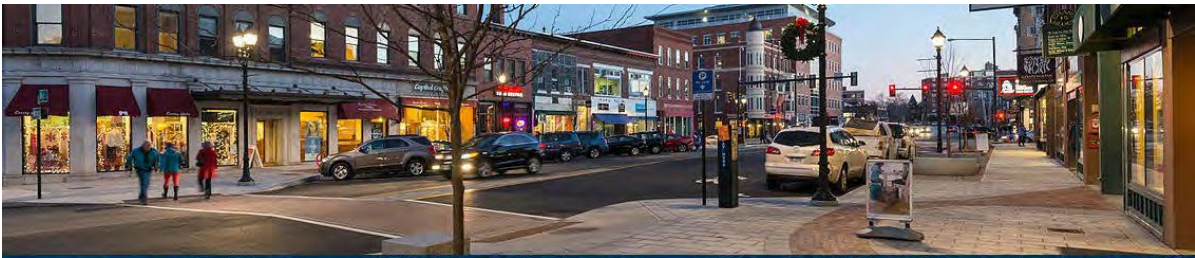
In June 2023, the Greater Derry Arts Council and Town Department of Public Works began working on adding details to the highly used crosswalk between the Derry Homegrown Farm & Artisan Market and Sabatino's North Restaurant on Broadway.



Figure 12: A work in progress. A crosswalk in downtown Derry is getting an update. Photo Credit: Donna LaPorte

Concord

The Concord Downtown Complete Streets Improvement Project was planned to generate significant benefits to the downtown and the central NH region by providing a safe, reliable, and accessible multimodal transportation system. It was anticipated that by providing a more efficient and attractive transportation corridor, the project would increase commerce to the downtown core, revitalizing an underutilized downtown business and residential district and increasing adjacent property values.



[Concord Downtown Complete Streets Improvement Project Benefit/Cost Analysis](#) Upon its completion, the Complete Streets project converted the existing 4-lane Concord Main Street to a 2-lane roadway promoting multi-modal use and offering more transportation choices, all while improving livability, safety, and providing a reliable transportation network. Innovative improvements to traffic signals, sidewalks, and accessibility has reduced traffic congestion and improved pedestrian safety.

Plan4Health Nashua project

The goal of the Plan4Health Nashua project was to advance street planning and design to support safer and easier ways to get around for pedestrians and bicyclists. One of the unique features about the Plan4Health project was its approach in analyzing existing conditions. The program utilized [Level of Traffic Stress](#) (LTS) and [Level of Walkability](#) (LoW) analyses to evaluate bicycle and pedestrian infrastructure. A method first used as part of a pilot project in 2014 by the New Hampshire Department of Transportation, the LTS process involves assigning a numerical value to every street and intersection to help determine how easy or difficult it is for bicyclists with varying degrees of experience to navigate. LTS considers how stressed people might feel bicycling on the road and takes into consideration various factors including: the presence of bike lanes, shoulder width, traffic speed, traffic signals, the presence of a median or pedestrian island and parking.

The LoW was developed as a separate formula from the LTS to analyze various attributes of the built environment to gain a sense of the community's walkability. Attributes analyzed during the LoW process include the presence of sidewalks, buffers between sidewalks and streets, shoulder width, and traffic speed.

Results of these analyses coupled with public and partner feedback resulted in a more realistic understanding of the navigability of Nashua's streets and informed where improvements were most needed.



Figure 13: Photo courtesy of Nashua RPC

Demonstration Projects Within New Hampshire

With funding from AARP, SNHPC acquired a pop-up planning kit consisting of faux turf, plastic bollards, chalk/paint, and planter boxes. Through a short application process, communities can request to borrow the kit and host a demonstration project.

Pandemic Parklets- Derry

During the 2020 COVID pandemic, the Town of Derry allowed the development of temporary parklets in downtown parking spaces (both parallel and perpendicular). The town formalized its [parklet design guidelines](#) in July 2020, which includes guidance on safety, traffic barriers, setbacks, maintaining a visual connection to the street, stormwater runoff, etc. An annual parklet application was also developed, with a deadline of February 15 for the following warm-weather season.

Park(ing) Day- Manchester

In 2021 and 2022, SNHPC assisted the City of Manchester and non-profit organization Queen City Bike Collective celebrate Park(ing) Day. Using SNHPC pop-up planning materials, staff worked together with the City and QC Bike to transform parking for motorized vehicles into space for people and community for one day. Enthusiasm from community members and downtown businesses continues to grow each year.



Figure 14: City of Manchester Park(ing) Day 2021

Pleasant Street, Concord

(Narrative Courtesy of Concord Public Works Staff)



In the early days of Concord's Complete Streets efforts, trial by design became an effective tool for development of its policy. In this example, in 2008/2009, Concord reviewed Pleasant Street's lane use and width as part of the resurfacing program. The goal was to maximize shoulder width for bicyclists while minimizing impacts to right-of-way and costs. Engineering and General Services staff, in collaboration with the Transportation Policy Advisory Committee (TPAC), tested narrowing the lane widths. The 2-year process allowed users to experience various lane and shoulder widths along the corridor for eventual final marking. These pragmatic efforts garnered early support for Complete Streets solutions and led to the development of Concord's Complete Streets policy. Figure 15 documents two years of "trying on for size" the narrowing of through-road lanes from 14-15 feet down to 11 feet.

Figure 15: Circa 2010, Pleasant Street, Concord, NH Photo: City of Concord, NH

Southwest Region Planning Commission Work

(Narrative Courtesy of SWRPC)

Throughout 2015 and 2016, Southwest Region Planning Commission (SWRPC) and the [Monadnock Alliance for Sustainable Transportation](#) (MAST) worked with several communities, including Swanzey, Keene, Hinsdale, and Troy to develop local Complete Street policies. To support the development of these policies and creatively engage members of the public in the planning process, SWRPC, MAST, the local municipalities, and over thirty community groups and partners worked together to coordinate four "Complete Street Demonstration" events. Funded by a population health initiative called "Partnerships to Improve Community Health" (PICH), these events provided opportunities to actively demonstrate how space within the public right-of-way can be reallocated to promote safety for all users while enhancing sense of place.

Swanzey Complete Streets demonstration project (8/29/15)

The Swanzey Complete Streets demonstration event took place on Saturday, August 29, 2015 in front of Whitcomb Hall on Main Street in West Swanzey. The event, which coincided with the Whitcomb Hall Committee's Annual Chicken BBQ, showcased street design elements such as narrowed travel lanes, curb extensions at pedestrian crosswalks, artistic crosswalks, street trees, pedestrian-scale lighting, shared lane markings (i.e. "sharrows"), improved landscaping and green buffers, and other traffic calming measures. The Town collected feedback throughout the event. This feedback was taken into consideration during the re-design of Main Street, which was completed in the fall of 2016.

Keene Complete Streets demonstration project (9/19/15)

The Keene Complete Streets demonstration event took place on Saturday, September 19, 2015 on Marlboro Street. The event featured narrowed travel lanes, protected bike lanes and a pedestrian island, improved landscaping and green buffers, new pedestrian crossings, and other traffic calming measures. In addition, creative elements such as public art, benches made of recycled bicycle parts, mini golf courses, and more were incorporated to help stimulate discussion about how to reactivate this section of town. Activities included bicycle tours of downtown Keene, a bike art and kinetic sculpture exhibition, free yoga, free bicycle tune-ups, a special City Express bus route, live music, and food trucks. Volunteers and staff solicited input throughout the event from the public, which will be used to inform future capital improvement projects along the Marlboro Street corridor.

Hinsdale Complete Streets demonstration project (7/10/16)

On Sunday, July 10, 2016 a section of Main Street in Hinsdale was transformed to showcase ideas for making the Town Center a more walkable, bikeable, and vibrant place. The demonstration was an opportunity for the town to test out various streetscape elements, including a traffic



Figure 16: A parklet in Hinsdale

pinch point, curb extensions, parklets, enhanced landscaping, shared lane markings (i.e. "sharrows"), a protected bicycle lane, and marked pedestrian crossings. This event helped spark conversations in town about how to slow traffic and reactivate the Town Center, ultimately resulting in the formation of a town beautification committee.

Troy Complete Streets Demonstration (9/10/16)

On Saturday, September 10, 2016 the Town of Troy and Southwest Region Planning Commission made temporary changes to the streetscape near the Troy Town Common to showcase examples of pedestrian- and bicycle-friendly street design. These changes included two temporary crosswalks and a bicycle lane. Comment boxes were used to collect feedback from the public throughout the demonstration. Although this demonstration was not organized as an event, the Town was able to collect useful feedback that was shared with Town officials.



Figure 17: Source: Southwest Region Planning Commission

Keene



Figure 18: September, 2015, Keene, New Hampshire, Materials Comparison Photo: S. von Aulock, SNHPC

[Keene](#) has been making streets safer for all users for years. One unique program their Public Works department conducted was a comparison of materials utilized for crosswalks under various conditions. They found that depending on the type of traffic and number of vehicles, various applications may or may not work, depending on the situation.

The demonstration projects (also known as pilot projects, or pop-up planning projects) that were conducted as part of the 2017 toolkit in three of SNHPC's region (Deerfield, Frankestown, and Windham) are described in detail in Appendix: Pilot Project (2016).

Within New England

Across New England and the United States are innovative and successful examples of Complete Streets programs and projects. The following are a few examples of Complete Streets work going on in neighboring states as well as beyond our New England boundaries. Section 2: Planning & Policy and Section 3: Design & Engineering provide additional examples that will interest the reader.



Figure 19: Thanks to the use of flex-posts, a police vehicle utilizes a temporary bus only lane to quickly respond to an incident.

Boston, MA

In August 2022, one of Boston's critical commuter train lines was forced to shut down for 30 days.⁶ One strategy to alleviate the resulting traffic stress was to deploy "pop-up" bike/bus only lanes along key travel corridors in the city. By reducing the number of travel lanes for personal vehicles, buses can navigate the streets more efficiently, allowing for quicker travel times and higher frequency of service to meet the increased demand. Creating more space for bicyclists encourages more people to utilize bicycles for short trips within the city.

Burlington, VT

The City of Burlington has a longstanding commitment to provide a range of interconnected, safe, affordable, efficient and convenient transportation choices for residents, visitors and employees alike. Recently, this commitment has been formalized through state and local policies, but the real challenge is still ahead of us as we implement these policies -- making every Burlington street "complete."

Maine

The Maine Department of Transportation (MaineDOT) has a long history of providing for the needs of all modes of travel in the planning, programming, design, rehabilitation, maintenance, and construction of the state's transportation system. In partnership with municipalities, Metropolitan Planning Organizations, Regional Planning Organizations, Federal Highway Administration and other federal agencies, MaineDOT develops and implements a safe, comprehensive transportation system that balances the needs of all users.

⁶ MBTA Releases Diversion Plan Ahead of Orange Line Closure Beginning August 19.
<https://www.mbta.com/news/2022-08-12/mbta-releases-diversion-plan-ahead-orange-line-closure-beginning-august-19>

Beyond

Innovative approaches to retrofitting existing roadway design and improving present design standards are seen in this country and far beyond our shores. Heating sidewalks and crosswalks to eliminate the need for snow plowing, using various means to light up travel ways, and designing new methods to help travelers recognize they share space with a variety of users are being incorporated into downtowns and local streets. These techniques range in costs and complexity but with the desire to make streets safe for all users. Innovators and willing communities are showing us new ways to create Complete Streets.

England

One of the latest and very exciting improvements is the use of glow-in-the-dark style illumination for sidewalks and trails. Cities in Europe such as [Cambridge, England](#) are experimenting with various methods, and companies in the US and Canada are also manufacturing glow-in-the-dark gravel, blocks, and sand. Regardless of the technique, the result is not only safer sidewalks and trails, but also beautifully “lit” walkways and trails.



Figure 20: A glow-in-the-dark pathway illuminates at night

Denmark

The City of Copenhagen, Denmark is known as one of the world leaders in bicycle and pedestrian friendly design. New bicycle paths, bridges, and innovative solutions are designed every year to improve the infrastructure for cyclists. By providing separate infrastructure for people on bicycles, people on foot, and people in cars, all travelers can move through the city with minimal conflict.

Here are some examples of innovative complete streets design from the publication “[Focus on Cycling – Copenhagen Guidelines for the Design of Road Projects](#)” that could be adapted for use in the SNHPC region.

Signalized intersections minimize conflict between road users and promote better visibility of people on bicycles.

Left: Pre-green for cyclists.
Frederikssundsvej/Frederiksborgvej intersection.

Right: Green right-turn arrow for cars at the end of the phase (in accordance with the Road Standards) to prevent conflict between right-turning cars and cyclists waiting at the corner.
Frederikssundsvej/Frederiksborgvej intersection.



Bike boxes and set back stop-lines for cars give people on bicycles a head start through intersections.



Top left: Bike box (white marked) in T-intersection. Njalsgade/Islands Brygge intersection.

Bottom left: Bike box (blue marked) in front of the inner lane of a 4-legged intersection. Amagerbrogade/Vejlands Allé intersection.



Top right: Up to two blue cycle crossings are an option in signalized Copenhagen intersections. Tagensvej/Blegdamsvej intersection.

Bottom right: Minimal international cycle crossing in which the cycle crossing is only marked halfway into the intersection and only on the cyclist's left, thereby marking only the point of potential conflict. Vester Fælledvej/Ny Carlsbergvej intersection.

Technology can help make cycling faster and more convenient than driving- therefore encouraging more people to travel by bike. The “green wave” allows cyclists traveling at a specified speed to make every green light, eliminating the extra energy expended by constantly stopping and starting again. This is particularly appreciated by people riding heavier cargo bikes!



Top left: Video detection of cars prevents cyclists from having to stop unnecessarily when there are no cars in the right-turn lane. Langebro at Artillerivej.

Top right: “Your speed” counter helps cyclists maintain travel speed in the green wave. Nørre Farimagsgade.



Bottom left: New type of barrier material that resembles a crash barrier separates cyclists from motor traffic and may be used in addition to the more traditional concrete barriers.

Bottom right: Modular LED running lights help cyclists maintain proper travel speed so that with just a little more effort they don't have to stop at the red light. Øster Farimagsgade.

E. EDUCATION, OUTREACH AND TRAINING

Within New Hampshire

Over the past several years there has been a concerted effort by Regional Planning Commissions, multiple agencies, communities, and various stakeholders to join forces and provide training and workshops throughout the state.

New Hampshire Complete Streets Conference

In October 2018, the New Hampshire Complete Streets Conference was held at NH Department of Environmental Services (DES). Session topics included age friendly communities, accessibility and inclusion, FHWA’s STAR Guide, lessons learned on complete streets projects, and bikeshare.



Figure 21: SNHPC staff participated on the Planning Team for the Statewide Complete Streets Conference in 2018.



Figure 22: Planners and Engineers from around NH experience Manchester's non-motorized infrastructure at the Designing for Bicyclist Safety training, held September 2022.

Designing for Bicyclist Safety

In September 2022, FHWA and NHDOT hosted a two-day training in Manchester on Designing for Bicyclist Safety. The training included one full day in the “classroom” and one NHDOT-led bicycle field trip to allow engineers and planners to experience the City’s bicycle infrastructure firsthand.

The Bike-Walk Alliance of New Hampshire (BWANH) is a member of the Statewide Trail Advisory Committee, advising the NH Bureau of Trails, as well as the Complete Streets Advisory Committee (CSAC). BWANH offers a multitude of [educational classes](#) for children and adults to become safe, confident cyclists.

At the organization’s 2021 Annual Meeting, Captain Chris Buchanan, Amherst Fire Department, Educational Technologist with the NH Fire Academy & EMS, and chairperson of the Amherst Bicycle & Pedestrian Advisory Committee, shared his expertise on lessons learned from over a decade responding to motor vehicle collisions along Route 101 in the Amherst, Milford, and Wilton areas, a corridor that has a 250% higher mortality rate than other corridors. He discussed the ways that some roadways are currently “dangerous by design” and the variety of methodologies that can be applied to keep roads safer for all users.

Outreach And Training Within New England and Online

Many local, regional, state, and national agencies in the fields of Planning, Health, and Transportation have created factsheets and training sessions on the topic of Complete Streets. Conduct an online search on these topics and you will be wowed by the volume of relevant information there is on these topics. The sheer number of good works occurring across the globe is an excellent barometer of the concerns

and dedication these stakeholders have regarding making street systems safe and useable for everyone. The following are a handful of examples for both outreach and training available on-line.

Metro Boston

Many Massachusetts cities and towns are considering their streets as something more than simply thoroughfares for vehicles. These municipalities have joined a growing national movement for “complete” streets: roadways that are safe, comfortable, and accessible for everyone, regardless of age, ability, income, or how they choose to travel.

The Metropolitan Area Planning Council (MAPC) has developed a [framework](#) for measure the effectiveness of Complete Streets policies.

Smart Growth America has a program in which communities that want a better understanding of Complete Streets can join forces and apply for technical assistance. Information for this program can be found [online](#).

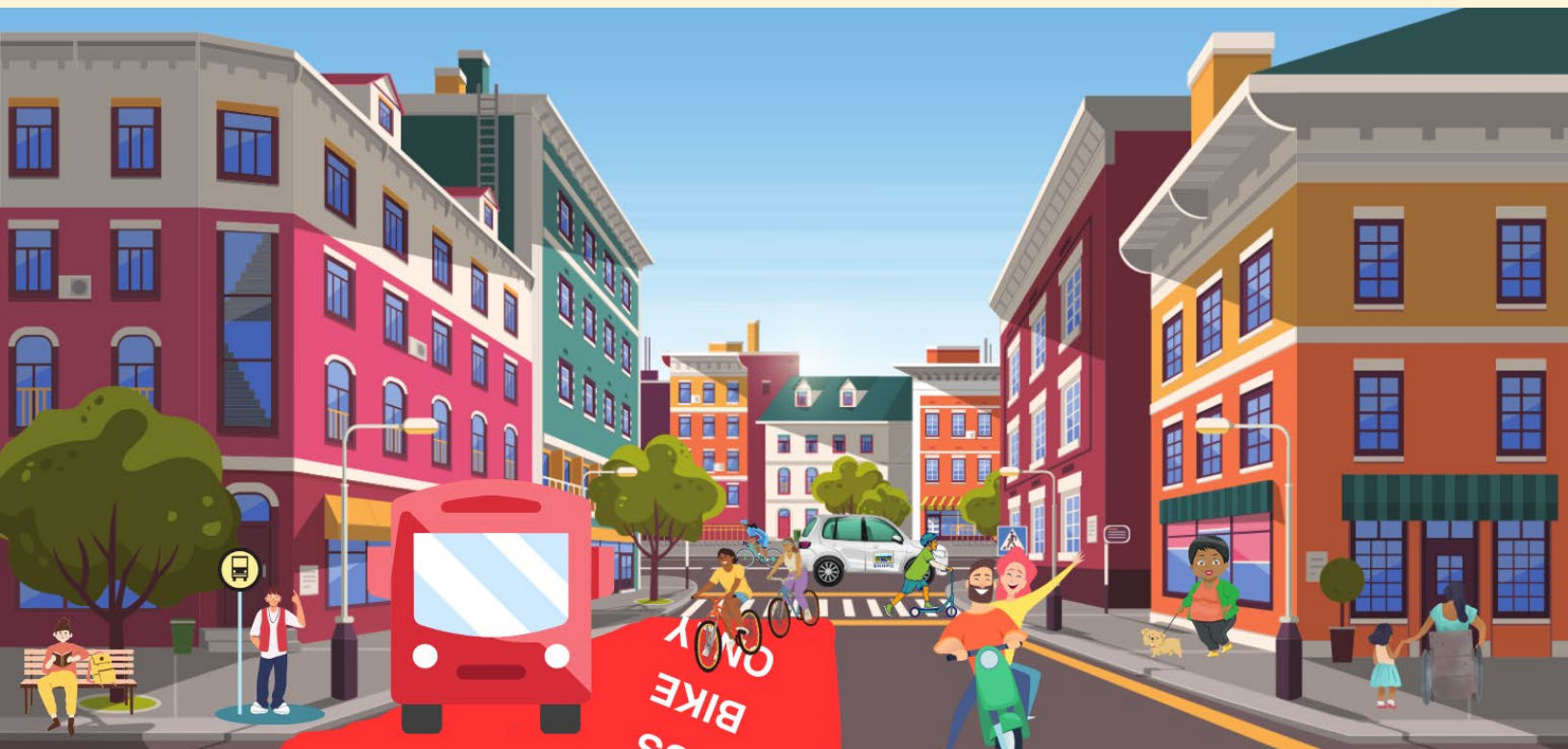
The **National Association of City Transportation Officials (NACTO)** offers a variety of conferences, events, trainings and workshops through their [website](#). Topics range from Vision Zero, to transit/multimodal safety, and project implementation.



Figure 23: Keynote speakers at the 2022 NACTO Designing Cities Conference, Boston, MA

SECTION 2: PLANNING & POLICY

- **What's a Complete Streets Policy?**
- **What are the Benefits?**
- **Reaching Out**
- **Policies in New England**
 - Lessons Learned
- **Interested in Adopting?**
 - Rural
 - Suburban
 - Urban
- **Recommended Steps on Developing and Implementing Complete Streets Design Guidelines**
- **Resource Guide**



Section 2: Planning & Policy

One hundred years ago, streets were shared by all; prior to the age of the automobile, streets were alive, literally and figuratively, with individuals walking to work, going to market, and exchanging pleasantries. Thanks to the innovation and mass production ideas of Henry Ford, the age of motorized transportation dawned brightly, empowering millions and making countless travel dreams come true. Despite automobiles' many benefits, though, they became the focal point of transportation policy for over a half-century, often to the detriment of folks attempting to get around without one.

Over the last decade, however, transportation policy has begun to come full circle with the development of the Complete Streets philosophy, at its foundation a desire to ensure all members of society get from origin to destination safely and efficiently. There is a wide range of policies, and many states, cities and towns have laid a bold framework for their customization and development. This section will also address Complete Streets' many benefits.

A. WHAT'S A COMPLETE STREETS POLICY?

Complete Streets policies can take many forms and are dependent on what works best for a given community. Comprehensive Complete Streets policies are best developed after taking into consideration existing transportation regulations, policies, and community standards including standards outlined in site and subdivision regulations. Complete Streets can be accomplished through ordinances and resolutions as well as municipal policies including design guidelines.⁷

Ordinances

Complete Streets ordinances legally require the needs of all users be addressed in transportation projects and change city code accordingly. Ordinances may also apply to private developers by changing zoning and subdivision requirements. Ordinances require strong support from the community and elected officials and are enforceable by law, making them difficult to overlook. City/town departments volunteer boards, and committees often develop and approve ordinance language before final approval by community officials.

Resolutions

Issued by a community's governing body, resolutions are non-binding, official statements of support for approaching community transportation projects as a way to improve access, public health, and quality of life. Resolutions are often a very helpful first step, providing the political support for a Complete Streets approach.

⁷ Smart Growth America: National Complete Streets Coalition (2013). Complete Streets Local Policy Workbook [PDF file]. <http://www.smartgrowthamerica.org/documents/cs-local-policy-workbook.pdf>.

Community-wide Policies



A community's governing body may also take action by adopting a Complete Streets policy as official municipal policy. Generally, this means that a Complete Streets policy is developed by an internal group of stakeholders, which may include representatives from planning, engineering, public works, economic development, health, and/or elected officials, as well as residents and other community stakeholders. This document is then taken to the full governing body for discussion and a vote. Complete Streets policies tend to be lengthier and more detailed than resolutions or

ordinances, and can foster partnerships between agencies, community members, and decision makers in a more robust way than resolutions or ordinances.

Smart Growth America recommends all Complete Streets policies contain comparable elements that address the characteristics that define a Complete Street. According to the National Complete Streets Coalition, a robust policy should include the following elements:

1. **Vision:** The policy establishes a motivating vision for why the community wants Complete Streets: to improve safety, promote better health, make overall travel more efficient and equitable, improve the convenience of choices, or for other reasons.
2. **All users and modes:** The policy specifies that "all modes" includes walking, bicycling, riding public transportation, driving trucks, buses and automobiles and "all users" includes people of all ages and abilities.
3. **All projects and phases:** All types of transportation projects are subject to the policy, including design, planning, construction, maintenance, and operations of new and existing streets and facilities.
4. **Clear, accountable exceptions:** Any exceptions to the policy are specified and approved by a high-level official.
5. **Network:** The policy recognizes the need to create a comprehensive, integrated and connected network for all modes and encourages street connectivity.
6. **Jurisdiction:** All other agencies that govern transportation activities can clearly understand the policy's application and may be involved in the process as appropriate.
7. **Design:** The policy recommends use of the latest and best design criteria and guidelines, while recognizing the need for design flexibility to balance user needs in context.
8. **Context sensitivity:** The current and planned context—buildings, land use, transportation, and community needs—is considered when planning and designing transportation solutions.
9. **Performance measures:** The policy includes performance standards with measurable outcomes.
10. **Implementation steps:** Specific next steps for implementing the policy are described.⁸

⁸ Smart Growth America: National Complete Streets Coalition. The Ten Elements of a Complete Streets Policy (2016). <https://smartgrowthamerica.org/program/national-complete-streets-coalition/>.

A Complete Streets policy may include guidelines for incorporating complete street elements into design and engineering best practices. A Complete Streets policy would not necessitate creating new design guidelines. Rather, communities may look to nationally- supported design standards, such as the National Association of City Transportation Officials ([NACTO](#)), the American Association of State Highway Officials ([AASHTO](#)), state Departments of Transportation, the Institute of Transportation Engineers ([ITE](#)), the Americans with Disabilities Act ([ADA](#)), the Public Right-of-Way Accessibility Guidelines ([PROWAG](#)), or the Model Design Manual for Living Streets ([MDMLS](#)), and incorporate design standards which best fit the character of the community’s roads. A Complete Streets policy should suggest that engineering, planning, and public works departments reference one of the aforementioned design resources.

Like resolutions, such policies are not legally binding; however, the community, political, and agency support for change tends to be very high, resulting in a shared, lasting push for implementation of the policy.

Context-sensitive Complete Streets

In 2012, SNHPC developed a policy guidance matrix as a part of the Livable Walkable Toolkit. The matrix recommends the following strategies to fit the needs of the region’s rural, suburban, and urban communities:

Strategy	Rural	Suburban	Urban
Ensure transportation planning includes car sharing, bike plans, centrally located civic centers and connections to schools.	X		
Increase bicycling and walking facilities, and include connections that can be used during the winter for cross-country skiing and snowshoeing.	X		
Create long-range transportation strategies with strong partnerships between city and county officials.	X		
Facilitate greater collaboration between environmental and public health agencies, planning organizations, regional councils of government and state and local transportation agencies.	X		
Adopt the Safe Routes to School model to encourage students to walk and/or bike safely to school.	X	X	X
Locate parks and recreational amenities within walking distance of residences and schools. Incorporate trails, sidewalks and pedestrian wayfinding signage.		X	X
Coordinate with and support regional and state efforts to raise awareness of relationships between land use and transportation issues.		X	X

Strategy	Rural	Suburban	Urban
Examine street design guidelines to ensure policies are designed to “move people” and have an emphasis on multimodal transportation. “Road diets” are also recommended to include bicycling and transit opportunities.		X	X
Design streets with pedestrians and bicyclists in mind, considering better transit stop design, street furniture, bike racks, building frontage, sidewalk width and landscaping.		X	X
Provide safe means of travel for pedestrians and bicycles, including sidewalks and bike paths that are safely removed from automobile traffic. Generate right-of-way laws that support this concept and provide clear wayfinding.			X
Provide a public transportation system and enhance access to public transit to reduce dependence on automobiles. Ensure transportation stops that are visible, clean, and sheltered from the elements where possible.			X

B. WHAT ARE THE BENEFITS?

There are several measurable benefits from implementing Complete Streets:

- Encourages outdoor engagement
- encourages economic development,
- increases the attractiveness of the community,
- provides community members with more transportation choices,
- improves quality of life and safety for all users,
- mode shift away from single occupancy vehicles can significantly reduce greenhouse gas emissions and
- improves the overall health of the community by enabling healthier transportation options like walking and cycling

Safety

Each year, more than 42,000 people — the population of a small city — are needlessly killed on American streets and thousands more are injured. We call this suffering traffic “accidents” — but, in reality, we have the power to prevent traffic collisions.⁹

The U.S. Department of Transportation Federal Highway Administration suggests making complete streets the default approach to street design.¹⁰ Applying Complete Street principles is also an essential component of any successful [Vision Zero](#) program. Vision Zero is a strategy to eliminate all traffic fatalities and severe injuries, while increasing safe, healthy, equitable mobility for all. First implemented in Sweden in the 1990s, Vision Zero has proved successful across Europe — and now it’s gaining momentum in major American cities.¹¹

Case Study: Zero Traffic Deaths in Hoboken, New Jersey

Thanks in part to the implementation of Hoboken’s robust [Vision Zero Action Plan](#) and [Complete Streets Design and Implementation Plan](#) the City has achieved **zero traffic deaths in four years!**

Source:

<https://www.npr.org/2022/08/01/1115001897/how-a-new-jersey-city-has-achieved-0-traffic-deaths-in-4-years>



Figure 24: Vision Zero is not a slogan, not a tagline, not even just a program. It is a fundamentally different way to approach traffic safety. Source: Vision Zero Network

⁹ Vision Zero Network. What is Vision Zero. <https://visionzeronetwork.org/about/what-is-vision-zero/> (Accessed 6/16/23)

¹⁰ U.S. Department of Transportation Federal Highway Administration. Make Complete Streets the Default Approach. <https://highways.dot.gov/complete-streets/make-complete-streets-default-approach> (Last accessed March 22, 2023)

¹¹ Vision Zero Network. What is Vision Zero. <https://visionzeronetwork.org/about/what-is-vision-zero/> (Accessed 6/16/23)

According to Smart Growth America, in most cases, collision rates declined after Complete Streets projects were built, and created by the Complete Streets projects analyzed in the report avoided a total of \$18.1 million there were fewer injuries as well.¹² SGA’s report [Safer Streets, Stronger Economies](#) examined 37 Complete Streets projects across the U.S. and found that safety improvements can also have financial value. The safer conditions in collision and injury costs in one year alone.

Environment

The transportation sector generates the largest share of greenhouse gas emissions in the United States. Greenhouse gas emissions from transportation primarily come from burning fossil fuel for our cars, trucks, ships, trains, and planes.¹³ Eighty seven percent of daily trips in the United States take place in personal vehicles.¹⁴

When road design is auto-centric, more unnecessary automobile trips are made. While most short-distance trips could easily be made on foot or by bike, about 65 percent of trips of less than one mile are made by the automobile in the United States (Collia, Sharp & Giesbrecht, 2003). Switching to carbon-neutral transportation modes such as biking or walking can provide significant environmental benefits. If each person switched from automobile travel to walking or bicycling, an individual’s carbon dioxide emissions could be reduced by 4,800 pounds per year (National Complete Streets Coalition, 2010). Converting short car trips to travel by walking, biking, or public transit can decrease the carbon footprint of daily vehicle travel, minimize the generation of greenhouse gases, and improve air quality.¹⁵

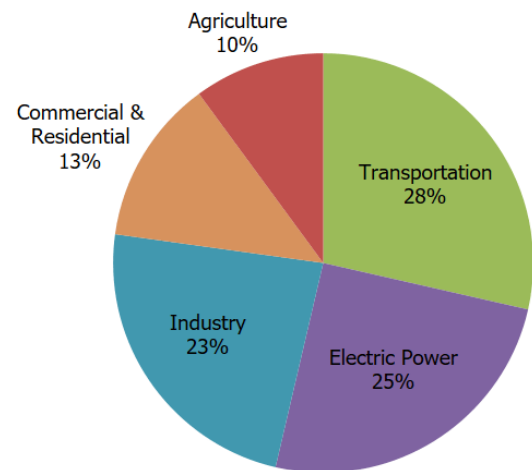


Figure 25: Total U.S. Greenhouse Gas Emissions by Economic Sector in 2021.

Source: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2021.

¹² Smart Growth America: National Complete Streets Coalition. Safer Streets, Stronger Economies (2015). <https://smartgrowthamerica.org/resources/evaluating-complete-streets-projects-a-guide-for-practitioners/>.

¹³ United States Environmental Protection Agency. Sources of Greenhouse Gas Emissions. <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions> (Last accessed 6/16/23)

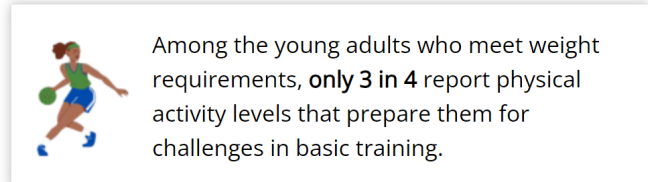
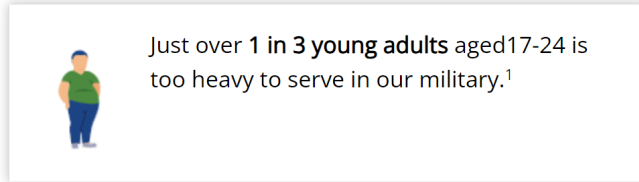
¹⁴ United States Department of Transportation. Bureau of Transportation Statistics. <https://www.bts.gov/statistical-products/surveys/national-household-travel-survey-daily-travel-quick-facts> (Last accessed 6/16/23)

¹⁵ Complete Streets in Delaware: a Guide for Local Governments. What are the Benefits of Complete Streets (2011). <http://www.ipa.udel.edu/healthyDEtoolkit/completestreets/sectionPDFs/chapter3.pdf>.

Health

According to the Centers for Disease Control and Prevention (CDC), obesity and physical activity are impacting national security, among other things.¹⁶

Approximately **1 in 5 children** and **2 in 5 adults** in the United States have obesity.



Consequently, **only 2 in 5 young adults** are both weight-eligible² and adequately active.³

Figure 26: Only 2 in 5 young adults are both weight-eligible and adequately active enough to join the U.S. military. Source: <https://www.cdc.gov/physicalactivity/resources/unfit-to-serve/index.html>

Livable streets encourage walking, running, and biking. We already know that modest increases in physical activity can extend our lives and make us healthier. The Centers for Disease Control and Prevention recommend livable streets design as a means of reducing obesity rates by increasing active living alternatives.¹⁷ Walkability has a direct and specific relation to the health of residents. A comprehensive study of walkability has found that people in walkable neighborhoods did about 35–45 more minutes of moderate-intensity physical activity per week, and were substantially less likely to be overweight or obese than similar people living in low-walkable neighborhoods.¹⁸ An additional resource can be found on FHWA's [website](#).

Economy

As more Americans — especially Millennials and Generation X-ers— gravitate towards urban centers, many city neighborhoods are seeing massive population influxes. With space at a premium, people need [robust transportation systems](#) to move from home to work to shops. Low-stress bike networks can help relieve pressure on the street system. By making biking safe and pleasant for a broader range of people, bike lanes are bringing more residents, employees, and customers to neighborhoods without swamping streets with traffic. They help free the street system for buses, freight, and essential car trips. And as city dwellers prioritize dog-walking and bike-riding over sitting in traffic, investment is flowing toward streets that are [built for connectivity and comfort](#).¹⁹

¹⁶ Centers for Disease Control and Prevention. Unfit to Serve. <https://www.cdc.gov/physicalactivity/resources/unfit-to-serve/index.html> (Last accessed 6/16/23)

¹⁷ Mid-America Regional Council (2010). Livable Streets Health Benefits [PDF file]. <http://www.marc.org/Transportation/Special-Projects/assets/Livable-Streets-health-benefits-flier.aspx>.

¹⁸ Neighborhood built environment and income: Examining multiple health outcomes (2009). Sallis, James F, et al. www.completestreets.org.

¹⁹ People for Bikes and Alliance for Biking and Walking (2014). Protected Bike Lanes Mean Business. [PDF file]. http://b3cdn.net/bikes/123e6305136c85cf56_0tm6vjeuo.pdf.

Four Ways Protected Bike Lanes Boost Economic Growth



Fueling redevelopment to boost real estate value. As city populations grow, motor vehicle congestion increases. New roads are rarely an option in mature cities. Protected bike lanes bring order and predictability to streets and provide transportation choices while helping build neighborhoods where everyone enjoys spending time. By extending the geographic range of travel, bike lanes help neighborhoods redevelop without waiting years for new transit service to debut.



Making workers healthier and more productive. From D.C. to Chicago to Portland, the story is the same: people go out of their way to use protected bike lanes. By creating clear delineation between auto and bike traffic, protected bike lanes get more people in the saddle—burning calories, clearing minds, and strengthening hearts and lungs. As companies scramble to lower health care costs, employees who benefit from the gentle exercise of pedaling to work help boost overall hourly productivity and cut bills.



Helping companies score talented workers. Savvy workers, especially millennials and members of generation X, increasingly prefer downtown jobs and nearby homes. Because protected bike lanes make biking more comfortable and popular, they help companies locate downtown without breaking the bank on auto parking space, and allow workers to reach their desk the way they increasingly prefer: under their own power.



Increasing retail visibility and sales volume. In growing urban communities, protected bike lane networks encourage more people to ride bikes for everyday trips. And when people use bikes for errands, they are the ideal kind of retail customers: regulars. They stop by often and spend as much or more per month as people who arrive in cars. Plus, ten customers who arrive by bike fit in the parking space of one customer who arrives by car.

Source: Text verbatim from "Protected Bike Lanes Mean Business," by PeopleforBikes and the Alliance for Biking & Walking.

Figure 27: Four Ways Protected Bike Lanes Boost Economic Growth

Performance Measures

While transportation planning literature agrees on the benefits provided by Complete Streets, communities can observe the many advantages of adopting Complete Streets policies by establishing a set of performance measures to track the overall outcomes of the policy. These may include travel times, traffic volumes, crash and injury rates, and speeding data. It is important to collect this data for all modes of travel (motorized and non-motorized).

Performance measures let public agencies align their decisions at each phase of project development and delivery with established community goals. The adage “what gets measured gets done” clarifies how performance measures affect results. **Conventional transportation measures, focused on automobile movement, have resulted in projects that expand roadway capacity and speed. Success in a Complete Streets paradigm means adopting different measures of success—what we want to get done must get measured.** This shift requires agencies to embrace measures that:

- reflect the quality of place and environment
- better relate to how people interact with and understand their community
- direct investments toward creating transportation systems that are comfortable and convenient for accessing jobs, health care, education, and civic life by foot, bicycle, and transit in addition to the automobile.²⁰

²⁰ AARP, Smart Growth America, Complete Streets Coalition: Evaluating Complete Streets Projects: a guide for

C. REACHING OUT

To ensure the adoption of a Complete Streets policy, several steps are recommended to ensure all stakeholders understand the community's concept of the policy. For example, staff would benefit from education and training to learn how to incorporate alternative transportation facilities into existing road projects. Planners, engineers, consultants, and other agencies may want to develop new procedures when working with developers who are planning new road systems through site and subdivision proposals. Elected officials will appreciate engagement opportunities especially with staff to understand how general policy goals will translate into projects on the ground. Finally, dialogue among staff, town officials and the public is encouraged so the community can come together and identify goals for the many aspects of the road system.

Many communities employ a workshop approach to help public works staff, road agents and planning staff understand and embrace the intention behind Complete Streets. A workshop approach may include...

- Consistent work with elected officials, involved stakeholders, and the public Transportation staff and Complete Streets supporters should be able to communicate how the proposed projects benefit the community and nearby residents and businesses, and how incomplete streets deleteriously affect mobility and access to schools, offices, and shops.
- Regularly update stakeholders on goals and successes. "Experiential" learning, through activities such as walking audits and bicycle tours, has been very helpful in building support and solidarity among staff, elected officials, and community members. Some have also produced or shared short videos that focus on the health, economic, and safety benefits of changing street design.²¹

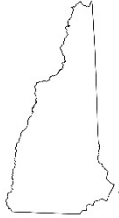
practitioners (2015). <http://www.aarp.org/content/dam/aarp/livable-communities/documents-2015/evaluating-complete-streets-projects.pdf>

²¹ Smart Growth America: National Complete Streets Coalition (2013). Complete Streets Local Policy Workbook [PDF file]. <http://www.smartgrowthamerica.org/documents/cs-local-policy-workbook.pdf>.

D. POLICIES IN OUR REGION

Although there are no municipalities in the SNHPC region with a Complete Streets Policy as of 2023, there are a few examples in New Hampshire as outlined below.

New Hampshire, New England and Beyond



New Hampshire

New Hampshire began its Complete Streets journey by formalizing a public involvement approach to NHDOT project development and design called the [Context Sensitive Solutions \(CSS\)](#) approach. NHDOT defines this approach as, “a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility.”

In 2005, the Town of Dublin began looking at ways to address traffic and pedestrian safety concerns in its Village District. Around that same time NHDOT began implementing the CSS approach to project development and the project in Dublin was deemed a candidate to be added to NHDOT’s CSS list of pilot projects. NHDOT and Dublin Town Officials identified a list of stakeholder categories as well as a list of individuals for each category. A Working Group of volunteers comprised of residents, local stakeholders, NHDOT and the Southwest Regional Planning Commission served an advisory role. Input was gathered by way of public meetings with the Working Group and the Stakeholders, with each group having specific tasks to accomplish. Once a task was accomplished, each group presented their findings and solicit comments which were evaluated. Eventually, a mutually acceptable concept and recommendations were put forth.

Starting in 2016, New Hampshire stakeholders joined forces to highlight the need for a statewide Complete Streets policy. A Coalition of communities, Regional Planning Agencies, Bike/Walk Coalition, TransportNH, and others worked to have the State Legislature recognize the need for Complete Streets. Tours across NH showcasing various modes of transportation were provided to state legislators to provide the need for multimodal consideration. In the end, legislators deemed NH DOT’s CSS approach was adequate for NH communities. Some of that work and the agencies supporting the effort can be found [here](#). NH DOT does not currently have an official Complete Streets policy, but the department has expressed a willingness to support communities in developing Complete Street policies at the municipal level.

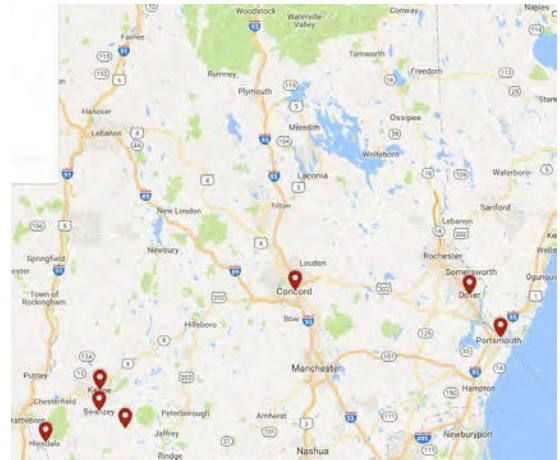


Figure 28: NH Municipalities with a Complete Streets Policy



The City of Portsmouth, along with Concord and Keene were among the first communities to adopt Complete Streets policies in New Hampshire. Beginning with Portsmouth, its policy was born out of a 2005 Master Plan objective written to “ensure that all transportation projects in Portsmouth provide for full consideration of all modes (automobile, truck, bicycle, pedestrian, transit) in their design, as appropriate.” Portsmouth adopted a [Complete Street Policy](#) in 2013 that stated as its Vision statement that “Streets and roadways in the City of Portsmouth will be convenient, safe and accessible for all transportation users, including pedestrians, bicyclists, transit vehicles and riders, children, the elderly, and people with disabilities.” The policy relied on published design guidance manuals and implementation practices such as the American Planning Association (APA) *Complete Streets: Best Policy and Implementation Practices (2010)*. In 2017 the City of Portsmouth adopted its own [Complete Streets Design Guidelines](#) which identified design options based on a street classification system that takes into account surrounding land uses and how people move along different types of streets within the city. The City of Portsmouth’s commitment to being a multi-modal community can be demonstrated by their earning of a bronze level for bike friendly status from the [League of American Bicyclists](#) and a Silver-level walk friendly status from [WalkFriendly.org](#). Check out their [planning and sustainability website](#) for more information.

The City of Keene adopted their complete streets resolution and guidelines in 2015. Since then, they continue to support a [bicycle/pedestrian path advisory committee](#) which advise the Planning Board and plays an integral role in advocating bike/ped improvements. The website identifies nine functions and guidelines of the advisory committee, including the following:

- (1) Coordinate and assist the planning department and the state department of transportation in the coordination of the preliminary and final design of the downtown bike path and other bike/pedestrian pathway facility projects as they may be developed in the future.

- (2) Assist the planning department and the planning board in the preparation and adoption of an up-to-date bicycle/pedestrian path master plan to be inserted as an official element of the city's master plan.
- (3) Promote communication and exchange of ideas and concerns among users of the city's bicycle/pedestrian paths, city staff and the city council.
- (4) Make reports and recommendations to the city council and city staff with respect to the development and management of bicycle/pedestrian paths.

For all nine functions and guidelines go to: <https://keenenh.gov/bicycle-pedestrian-path-advisory-committee/more-about-bicycle-pedestrian-path-advisory-committee>

The City of Concord also adopted a [comprehensive transportation policy and resolution](#) in 2015. They continue to support a transportation policy advisory committee, a bike/ped subcom., and a Transportation Policy Advisory Committee.

The Town of Jaffrey is one of the more recent communities to implement a Complete Street resolution and design guidelines, adopting both in 2017. Jaffrey worked with the Southwest Region Planning Commission in 2016 and 2017 to develop a Complete Streets resolution which directed Jaffrey to consider all forms of transportation as well as the needs of all users when making improvements to existing infrastructure or the development of new transportation related projects. The development of the resolution guided the development of [Jaffrey's Complete Streets Planning and Design Guidelines](#).

The Jaffrey Planning and Design Guidelines, much like the guidelines developed in Portsmouth, used a classification system to organize street types by roadway function and surrounding land use context to develop design options for the Town to consider when developing projects or improving existing infrastructure that would benefit from a Complete Streets approach.

According to [Smart Growth America's February 2023 index of policies](#), no New Hampshire municipalities have adopted a new policy in the last six years.



Maine

The Maine Department of Transportation, (MaineDOT) began development of its Complete Streets Policy in 2013 with approval taking place in 2014 and a revision in [2019](#). The objective of the policy is to ensure that all users of the transportation system, regardless of age, ability or mode choice have access to a safe multimodal transportation system. The development of the policy which started in 2013 and continued into 2014 was reviewed and discussed with internal and external stakeholders and at each stage of the process stakeholders' input was discussed and a consensus was reached before the process would move forward. The MaineDOT documented the development timeline and the stakeholders involved in the crafting of the 2014 policy, which can be found [here](#).

The cities of [Auburn](#) and [Lewiston](#) Maine both adopted Complete Streets policies in 2013 and in 2017 formed a joint [Complete Streets Committee](#). The committee is comprised of an equal number of Auburn

and Lewiston residents as well as a representative of a public health and wellness organization with meetings held in both communities. According to the Lewiston Complete Streets Committee website the purpose of the Complete Streets Committee is as follows:

- "Promote and advise the development of public infrastructure which supports a multi-modal transportation system for all users, not strictly motor vehicles, and includes the best design practices for enhancing safety as well as community and economic development."
- "Develop and recommend policies to the respective governing bodies and planning agencies that address and supports all modes of transportation in Lewiston Auburn;"
- "Advise the respective public works and engineering departments on how all modes of travel can be accommodated in street, highway, trail and open space projects."

The Chair of the Auburn/ Lewiston Complete Streets Committee, Jeremiah Bartlett, spoke about the benefits of a joint committee in an email to SNHPC dated April 4th, 2023. In that email Mr. Bartlett stated:

"One of the benefits of having this committee work in two communities is to seek ways to provide some coherency and consistency in the process of creating transportation projects. Another benefit is that in the case of Lewiston-Auburn, they comprise the majority of the ARTC MPO area and population, allowing for opportunities to seek planning outcomes via the UPWP process."

The coalition that Auburn and Lewiston have created with this committee is an excellent model for New Hampshire communities and reinforces the idea that transportation corridors and the people that use them do not stop at the municipal border.

The town of Topsham is currently in the process of [drafting a Complete Streets Policy](#) for its community. According to the Topsham 2019 Comprehensive Plan, the creation of safer roadways was identified as one of the top issues that needed to be addressed to improve the quality of life for residents. The design and adoption of a Complete Streets policy will be one tool that the town can utilize to realize the transportation system envisioned in the 2019 Comprehensive Plan. The draft policy states the vision and goals of the policy while identifying criteria that may exempt a project from being considered for Complete Streets. The draft policy also emphasizes the need to reach out to other governments, organizations, and businesses, when appropriate, to improve multi-modal connectivity and safety within Topsham and the surrounding communities.



Vermont

In Vermont, no municipal policies exist (as of June 2023), though [Complete Streets have been codified in Act 034 \(H. 198\) Chapter 2 of state statutes in 2011](#). The [Vermont Agency of Transportation Complete Streets Guidance](#) document was designed to develop internal guidance for staff regarding Act34 and builds upon the flexibility in design and context sensitive solution practices that have been implemented since 1997 when the Vermont State Standards were established.²²

²² Vermont Agency of Transportation (2012). Complete Streets Guidance.

The Vermont Department of Health also produced a Complete Streets document titled: [Complete Streets: a guide for Vermont communities](#) in 2012. This document was developed to be a tool for municipalities to address local requirements under Act 34, outlines a planning process and puts forth a process for considering Complete Street principles.

Even though Vermont does not have any municipal Complete Street policies in place, local communities have embraced and implemented Complete Street principles during the design and construction of many transportation projects. These range from the [Burlington: Transportation Plan and Street Design Guidelines](#), which identifies a plan for a network of Complete Streets throughout the city as well as design criteria for the design of shoulder improvements to rural roadways that will allow for a much safer environment for pedestrians and bicyclists to use rural roadways at a much lower price point than the installation of a sidewalk network.

Other Initiatives in Vermont:

One of Vermont's statewide initiatives on safe active transportation is its local motion movement:

<https://www.localmotion.org/>

One of the most recent efforts has been in Brattleboro, who put together a walk/bike action plan which came out in 2023: [https://www.brattleboro.org/vertical/Sites/%7BFABA8FB3-EBD9-4E2C-91F9-C74DE6CECFD%7D/uploads/2023.03.09 - Brattleboro Walk Bike Action Plan \(1\).pdf](https://www.brattleboro.org/vertical/Sites/%7BFABA8FB3-EBD9-4E2C-91F9-C74DE6CECFD%7D/uploads/2023.03.09 - Brattleboro Walk Bike Action Plan (1).pdf)

In 2017, Burlington, Vt. Published its first comprehensive plan for walking, biking, and active mobility. https://www.burlingtonvt.gov/sites/default/files/PlanBTVWalkBike_MasterPlan_final-PlanOnly.pdf

In Montpelier, Vt., staff and City Officials organized Montpelier in Motion, an effort focusing on bike/ped planning. <https://www.montpelier-vt.org/518/Montpelier-in-Motion>



Massachusetts

The Massachusetts Department of Transportation is a major proponent of Complete Streets with Statewide policies, opportunities for training, materials and funding to assist communities. In 2006, MassDOT Highway Division became one of the first state transportation agency to adopt a Complete Streets approach with the release of the [Project Development and Design Guide](#). This resource remains the guiding design manual for roadway projects under MassDOT jurisdiction or oversight. More recently, during the 2015 Moving Together Conference, MassDOT released its [Separated Bike Lane Planning and Design Guide](#). First of its kind by a state transportation agency, the design guide is a resource for considering, evaluating and designing separated bike lanes as part of a Complete Streets approach for providing safe and

<http://vtrans.vermont.gov/sites/aot/files/highway/documents/publications/Complete%20Streets%20Guidance%20Document.pdf>

comfortable accommodations for all roadway users.²³

The Complete Streets Funding Program was created in 2014 to reward communities that showed a commitment to incorporating Complete Streets into their policies and practices. The program assists eligible MA communities with the implementation and construction of bicycle and pedestrian facilities. For a community to become eligible for this program the community must advance through three program tiers that will help municipalities advance Complete Street initiatives from policy to plan and ultimately to project. The [MassDOT Complete Streets Funding Program Guidance](#) describes the tiers as:

- **Tier 1 – Complete Streets Training and Policy.** Tier 1 municipalities must develop and pass a Complete Streets policy and a municipal representative attends a MassDOT Complete Streets training.
- **Tier 2 – Complete Streets Prioritization Plan.** Tier 2 has municipalities develop a Complete Street prioritization plan. A municipality will be considered eligible to receive Complete Streets funding after progressing through tier 1 and 2.
- **Tier 3 – Complete Streets Project Construction Funding.** The municipality identifies a project from their Prioritization Plan and submits an application for funding to aid in the construction. MassDOT selects approved projects for funding.

According to the [MassDOT Complete Streets Funding Program Participation portal](#), the Bay State has 288 municipalities registered in the Complete Streets program. Of the 288 registered municipalities, 258 have approved Complete Streets Policies and 229 with approved Prioritization Plans.

Highlighting Tier 1, 2 & 3 communities in Massachusetts.

Wareham is a town located in the southeastern section of Massachusetts and as of winter 2023 is classified in Tier 1 of the MassDOT Complete Streets Funding program structure. Wareham is in the process of approving a Complete Streets policy and is working towards a Complete Streets Prioritization Plan. Additional information on Wareham’s Complete Street progress can be found [here](#).

Amherst, MA is a Complete Streets Tier 2 community located in western Massachusetts. The Town of Amherst adopted a municipal Complete Street policy in 2018 which elevated the community from Tier 1 to Tier 2 of the MassDOT Complete Streets Funding Program. Additional information about Amherst’s Complete Streets policy can be found [here](#).

The Town of Tewksbury is classified as a Tier 3 Complete Streets community with a Complete Streets project approved for 2023. Tewksbury passed their Complete Streets Policy in 2017 and had a Complete Street Project Prioritization Plan approved by MassDOT in 2018. The town constructed their first project in 2020 using Complete Street funds and has had another [Complete Streets project approved for funding in 2023](#).

²³ Massachusetts Department of Transportation (2006). Project Development and Design Guidance. <http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms/ProjectDevelopmentDesignGuide.aspx>.



Rhode Island

The Rhode Island General Assembly enacted General Law 24, Chapter 16: Safe Access to Public Roads in June 2012, which requires that road construction projects that use either state or federal funds have to consider other modes of transportation other than single occupancy vehicles during the design process. The overarching goal of this law was to increase safety for all users of Rhode Island’s roadways and to promote alternative forms of transportation which will have a positive impact on the health of the public and the environment while reducing vehicle congestion on roadways.

The Rhode Island Department of Transportation (RIDOT) ,with the help of community partners, published Rhode Island’s Complete Street Action Plan in 2015. The report highlights transportation projects that have resulted in bikeways being constructed, improved non-motorized connections between transportation hubs and roadway designs that made the roadways safer for all users. The report also emphasized the importance of coordination between community partners and the RIDOT as well as community engagement as being paramount to the program’s success.

The Town of Barrington along with the cities of Central Falls, Providence and Newport are among a handful of communities within the state that have adopted a Complete Streets policy in recent years. Barrington’s Complete Street Policy was adopted by Town Council in 2019 and in October 2022, the Town Council adopted the Barrington Complete Streets Plan. The Plan identifies key roadways and transportation corridors as well as bridge crossing that make up the roadway network within the community. An action plan was developed within the report that identified policies, strategies, and infrastructure projects that Barrington could implement with the goal of making the community safer with increased access for all users of the roadway network regardless of mode choice. A public input campaign was conducted in August 2022 by the Town during the development of the plan. The public input was comprised of an [online survey](#) that asked residents to identify frequently used sidewalks/roadways, pick infrastructure projects that would directly benefit the respondent and to suggest infrastructure projects that residents would like to see the Town undertake to improve safety and mobility. In person information sessions were conducted in public spaces around Barrington as well as an [online information session](#) with a video recording that was posted on the Town’s website.



Connecticut

Connecticut became the 10th state to adopt a Complete Street Policy with the signing of its Complete Streets Policy in October 2014. The policy was crafted with the intent of promoting safety and access to a connected multi-modal transportation network that will be designed for bicyclists, pedestrians, transit as well as motorists. The policy authorized the forming of a Complete Streets Standing Committee that is responsible for providing guidance related to the implementation of the Complete Streets program.

The Town of Madison’s Complete Street Policy was written by the Madison Bicycle and Pedestrian Advisory Committee and approved in 2018. The policy was recognized by Smart Growth America as being one of the top ten Complete Streets policies adopted in 2018. Madison also publishes a Complete Streets Improvement Report which details funding spent on Complete Streets improvements, grant funds and

highlights improvements and new projects made to the roadway network that are designed to improve multi-modal travel, such as sidewalks, traffic calming measures and bicycle amenities.



United States

The National Complete Streets Coalition is a program of Smart Growth America that brings transportation officials and public interest organizations together to promote, develop and implement Complete Streets policies and practices at the national, state and local level. To do this the Coalition advocates for Complete Street policies and practices, provides training to communities to help develop those policies, establishes, and maintains standards and best practices and provides resources pertaining to Complete Streets. According to the National Complete Streets Coalition, over 1,700 Complete Street policies have been passed in the United States which includes adoption in 37 states, Puerto Rico, and the District of Columbia. A list of state and municipalities that have adopted Complete Streets policies, plans or have crafted legislation related to Complete Streets can be found [here](#). To promote as models for other communities to model the Coalition also publishes an annual report that lists and highlights the best Complete Street policies adopted in the last year. The Coalition scores the policies on a 100-point scale and uses ten elements to evaluate the policies. The ten elements that the Coalition uses to evaluate Complete Streets policies can be found in the following section- Interested In Adopting?



International examples of Complete Street Policies

India is a rapidly growing global economy and one of the most populous countries in the world with a population of over 1.4 billion people in 2022. Increases in the economy, population and expansion of dense urban area has led to an increase in vehicular ownership in India. The increase in vehicular ownership and usage has led India to experience an increase in levels of air pollution, gridlock, and vehicular crashes.

To combat this problem, non-profit organizations like the Institute for [Transportation and Development Policy \(ITDP\)](#) began working with cities in India to develop policies that would allow for a more equitable street for all users. In 2011, ITDP published [Better Streets Better Cities: A guide to street design in Urban India](#), which implored planners to consider alternatives that would prioritize the needs of bicyclists and pedestrians when designing streets.

The Ministry of Housing and Urban Affairs along with the Solutions Exchange for Urban Transformation of India (SMARTNET) and the ITDP began publishing several guides that explains policy design, implementation, best practices and evaluation metrics for the design, construction and evaluation of Complete Streets projects.

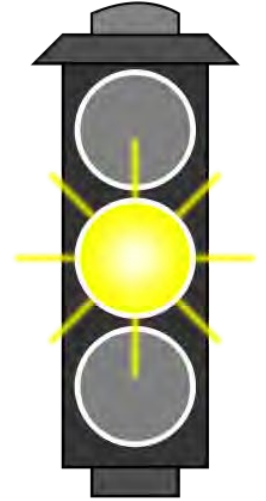
The city of Coimbatore in collaboration with the Indian and German governments, has implemented a streetscape improvement project for two streets in the city: Big Bazar Road and Cross Cut Road. The streets were studied, and designs were drawn up that would yield a safer and more equitable distribution of street space for all users. This included crosswalks, protected bike lanes and delineated spaces for

street vendors. To learn more about the Coimbatore Complete Streets project click [here](https://www.ibigroup.com/ibi-projects/cross-cut-road-complete-streets-transformation/).
<https://www.ibigroup.com/ibi-projects/cross-cut-road-complete-streets-transformation/>

Lessons Learned in Adopting Policies

Lessons learned:

- Listen to communities and focus on addressing local issues when creating complete street policies.
- Create connections between Complete Streets and other programs or projects such as the Master Plan, tourism, economic development...
- CS can have a rural application utilizing a context-sensitive approach
- Implement projects incrementally
- Find low- or no-cost solutions such as repainting narrower roadway lanes
- When a community has an adopted CS policy, infrastructure projects may become more attractive to funding sources.
- Communities need to share their vision for their road systems with NHDOT and work with the state to implement their vision



E. INTERESTED IN ADOPTING?



A Complete Streets policy codifies a community's commitment to planning, designing, and maintaining streets that are safe and comfortable for users of all ages and abilities. SNHPC is available to provide technical assistance to municipalities and partner agencies that are interested in advancing Complete Streets. In the coming years, SNHPC will be developing a model Complete Streets policy template tailored to the needs of the Greater Manchester region and will offer support to

communities that are interested in adapting the policy to suit their unique context and local priorities.

F. RECOMMENDED STEPS ON DEVELOPING AND IMPLEMENTING COMPLETE STREETS DESIGN GUIDELINES

In many areas of New Hampshire, municipalities look to highway design manuals for designing their streets. Older guidelines, which when originally published, didn't consider all users of the road, and instead focused mainly on vehicles. These older manuals might have been barriers to implementing Complete Streets. Therefore, utilizing the most updated design guidelines is vital in the effort of creating complete streets. (See AASHTO's "Green Book", NACTO's Urban Street Design Guide.)

While some communities may choose to rewrite their design manuals, others may turn to existing design templates such as the [Model Design Manual for Living Streets and Complete Streets](#). Florida's Broward County is one example of a Planning Commission/MPO adopting [such design templates](#) to provide a template for their participating communities.

According to the National Complete Streets Coalition, the design guidance used on city-initiated projects should be incorporated into the review and approval process for streets modified or built by private developers. Doing so ensures all new roadways and planned developments are aligned with the community's Complete Streets goals. Trainings, changes to procedure, and creating an inclusive process are vital complements to design manuals.²⁴

For example, a community may first update their design guidelines as a great first step in moving towards complete streets. Once completed, the community's Public Works Department in concert with the Planning Board will want to adopt the guidelines into land use and new street construction regulations. This will ensure that new roadways constructed as part of a community's growth, whether from new housing or commercial uses will follow the guidelines.

In the resource guide below, you can find links to resources which cover, in depth, various design and engineering manuals, federal resources, case studies, and more.

How NH Regional Planning Commissions Can Help Communities Implement Complete Streets

The nine New Hampshire Regional Planning Commissions (RPCs) are a valuable resource to municipalities in the area of transportation planning. RPCs could be called on to help implement Complete Streets by assisting with administering complete streets programs, including assistance with assessing roadway standards, education and training, and implementing complete streets demonstrations. Similarly, RPCs encourage communities to request RPCs to facilitate a local task force to help guide the process including writing policies and resolutions, as well as developing comprehensive performance measures which would help municipalities quantify the impacts of complete streets.

G. RESOURCE GUIDE

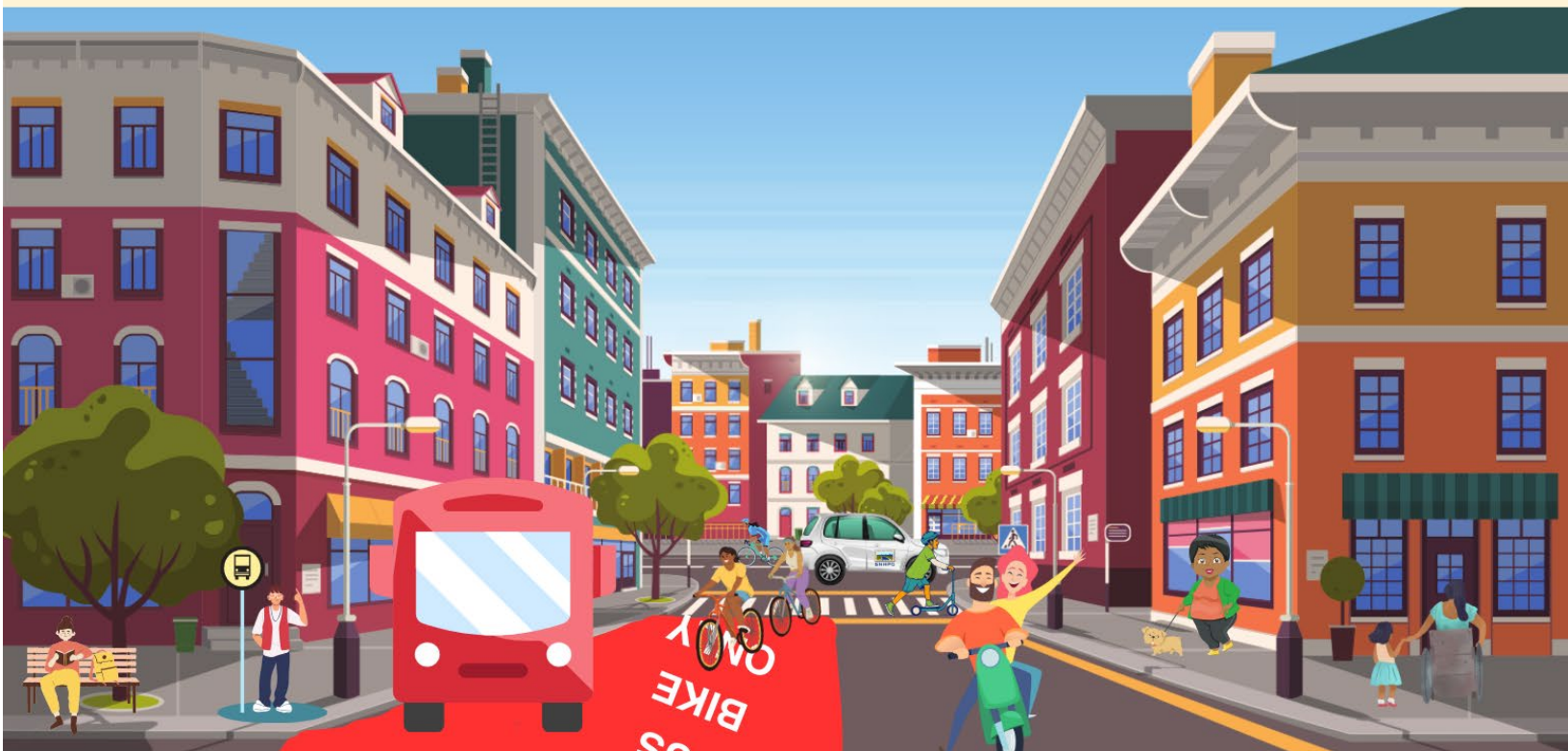
Many of the best resources available for Complete Streets can be found on Smart Growth America's website. Specifically, their ['Best Complete Streets Policies of 2018'](#) outlines which US communities passed policies in 2018, and which did so with the most exceptional language. It also gives an annual update as to where Complete Streets are most prominent and offers best practices.

²⁴ AARP: Complete Streets in the Southeast. Retrieved from <http://www.aarp.org/content/dam/aarp/livable-communities/documents-2014/Complete-Streets-Southeast-Tool-Kit-aarp.pdf>

SECTION 3:

DESIGN & ENGINEERING

- Design Needs
- Utilizing Green Infrastructure in Complete Streets
- Flexibility in Design/Context-Sensitive Solutions
- Design Process in Constrained Rights of Way
- Conventional vs. Complete Street Design
- Transportation/Land Use Connections
- Current Design Elements/Engineering Standards



Section 3: Design & Engineering

A. DESIGN NEEDS

Designing roads for all users requires an understanding of street elements that accommodate the various methods of travel. This section briefly highlights several roadway features that make up a complete street. Many organizations including National Association of City Transportation Officials (NACTO), the American Association of State Highway and Transportation Officials (AASHTO), and The Federal Highway Administration (FHWA) have done the heavy lifting in terms of defining these elements and articulating their best uses. Thus, this section will serve to highlight basic elements of complete streets, focusing on the needs of bicycles, pedestrians, vehicles, and transit. Links and resources can be found throughout this section.

Bicycle Facilities

The Federal Highway Administration Bikeway Selection Guide identifies four categories of bicyclists: Interested but Concerned, Somewhat Confident, and Highly Confident (see Figure 29). A fourth category not shown is the “No Way, No How” group, which make up the remaining 28% of the population. In order to encourage the use of bicycles for transportation, FHWA recommends that infrastructure should be designed to accommodate the Interested but Concerned riders, which constitute 51-56% of the total population.

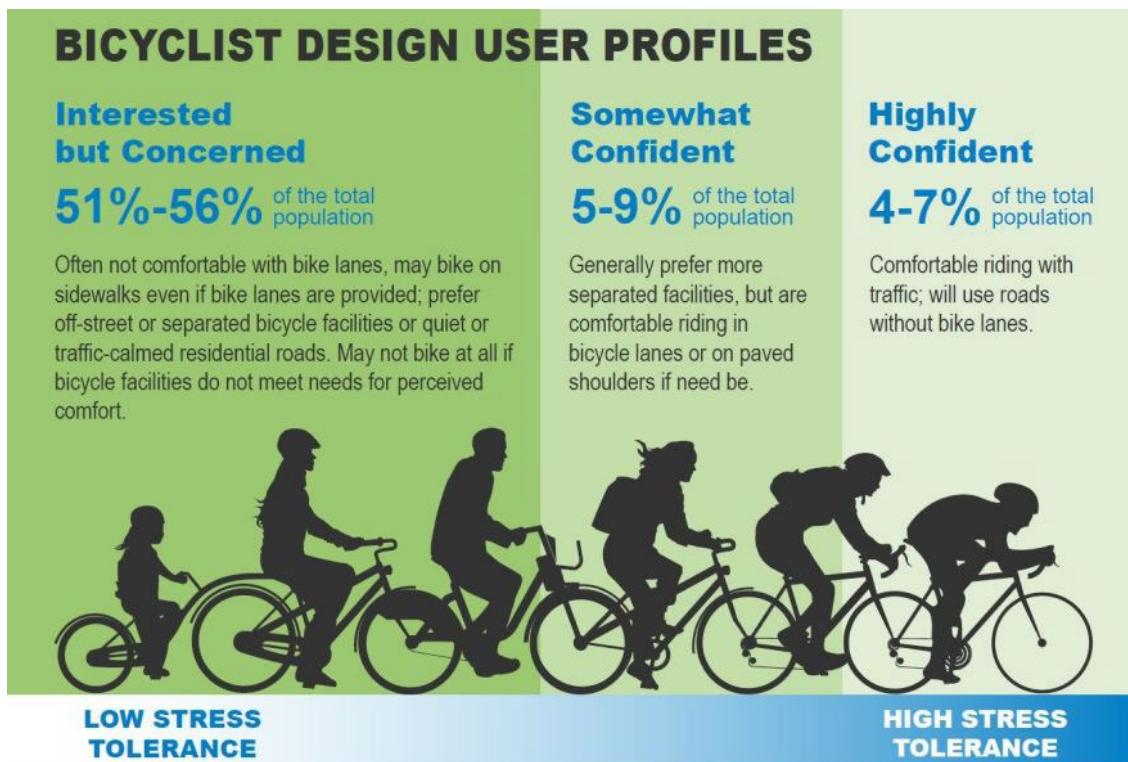


Figure 29: Bicyclist Design User Profiles from the FHWA Bikeway Selection Guide

People who are “interested but concerned” prefer off-street or separated bicycle facilities or quiet or traffic calmed residential roads. The Federal Highway Administration Bikeway Selection Guide offers guidance for accommodating different user groups in Figure 30 and Figure 31.

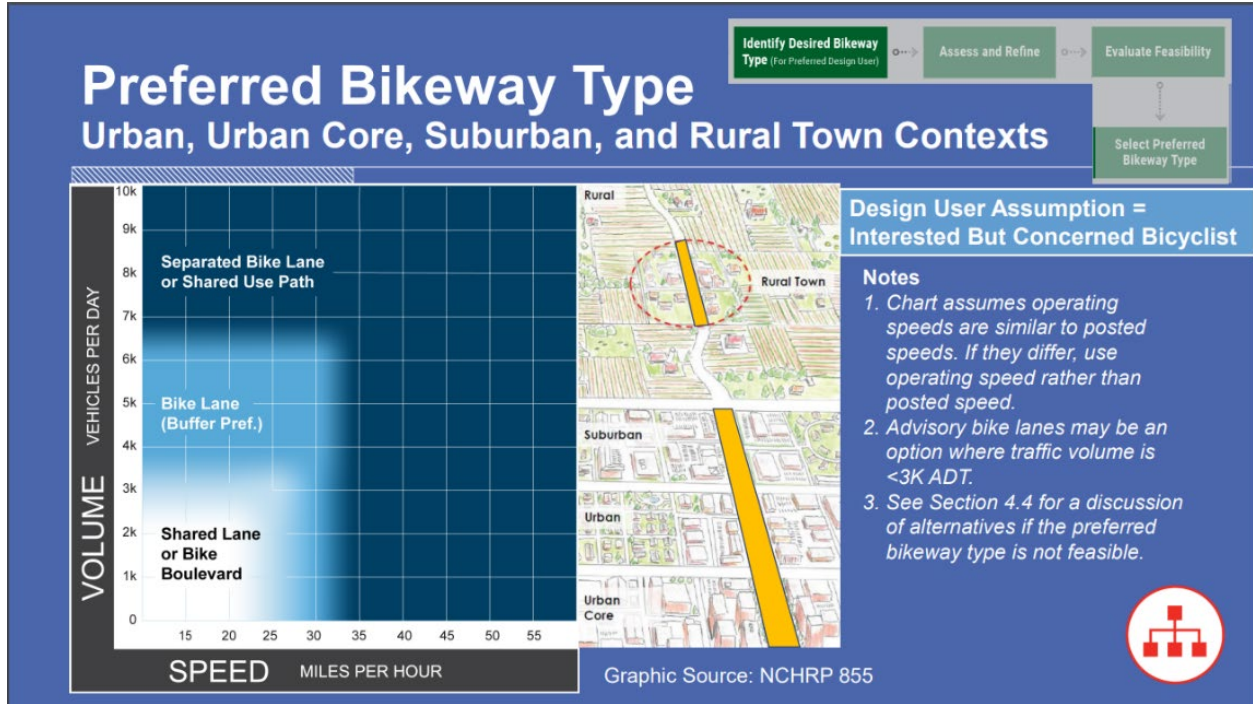


Figure 30: Preferred Bikeway Type guidance for “Interested but Concerned” bicyclists

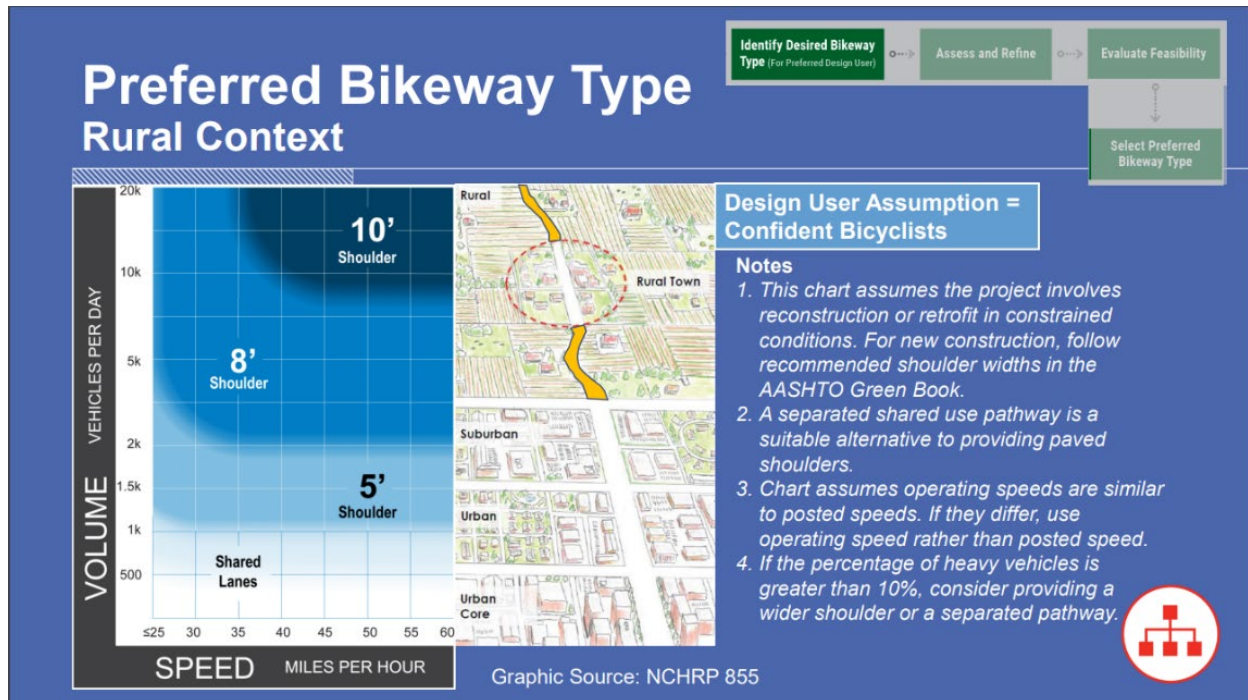
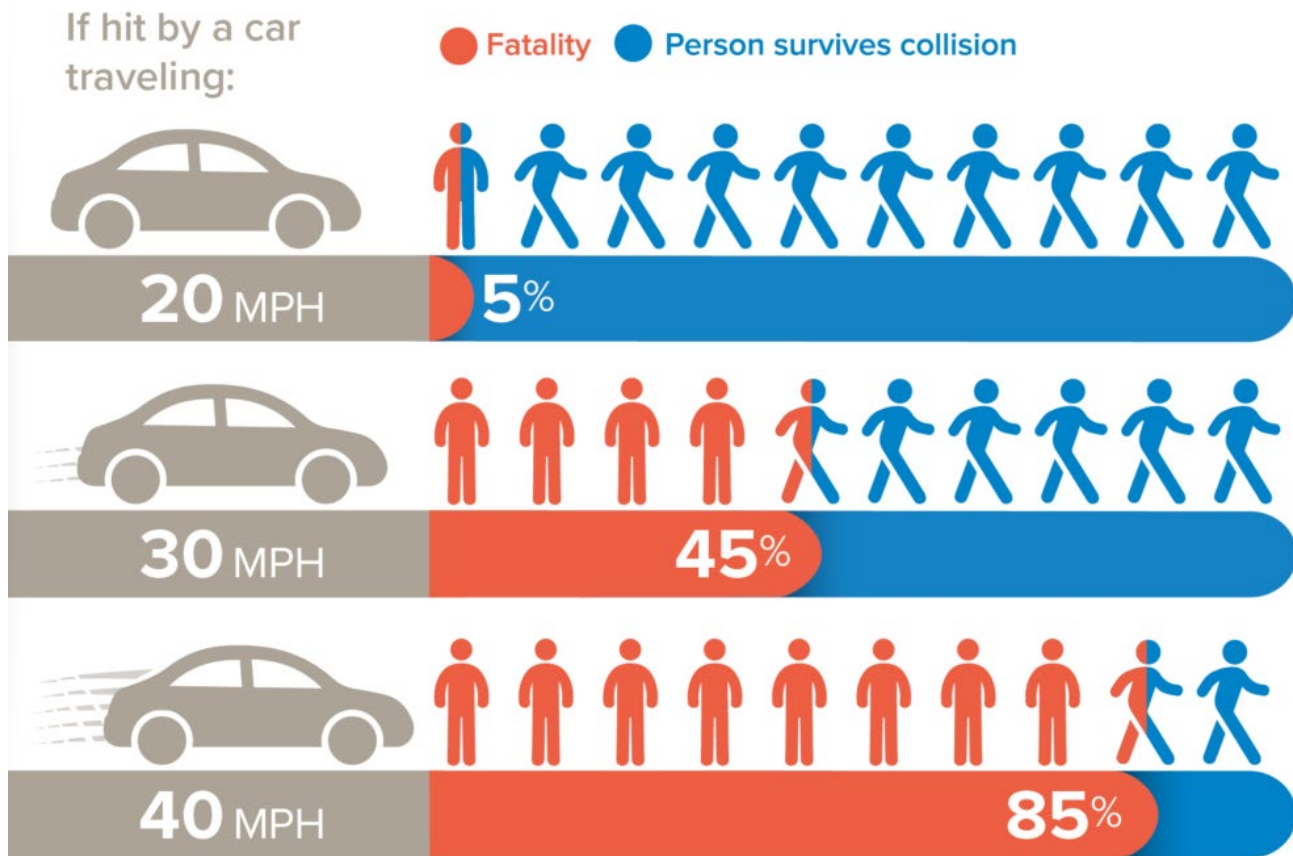


Figure 31: Preferred Bikeway Type guidance for confident bicyclists in a rural context

It is suggested that traffic volume and operating speeds be considered when choosing a bikeway type in urban, suburban and rural contexts. For example, a traditional bike lane may be a comfortable option for most riders when traffic volume is 4,000 vehicles per day and vehicles travel at 30mph. However, when operating speeds are above 30mph, a separated bike lane or shared use path is recommended. According to the National Traffic Safety Board, a person who is hit by a car traveling at 30mph has a 55% chance of surviving.



National Traffic Safety Board (2017) Reducing Speeding-Related Crashes Involving Passenger Vehicles. Available from: <https://www.nts.gov/safety/safety-studies/Documents/SS1701.pdf>

Figure 32: Speed is a predictor of whether or not a collision will result in an injury or a death.

Bikeway type selection primarily depends on the traffic volume and operating speed characteristics of the roadway, which are often implied by their functional classification (arterial, collector, local) within various land use contexts. The land use context will likely have a big impact on the available right-of-way, the mix of roadway users, property access, traffic operating speeds, road operations and safety performance, and community goals—all of which will inform trade-off decisions.

Bike Lane

A Bike Lane is defined by the National Association of City Transportation Officials (NACTO) as a portion of the roadway that has been designated by striping, signage, and pavement markings for the preferential or exclusive use of bicyclists. **Bike lanes enable bicyclists to ride at their preferred speed without interference from prevailing traffic conditions and facilitate predictable behavior and movements between bicyclists and motorists.** The configuration of a bike lane requires a thorough consideration of existing traffic levels and behaviors, adequate safety buffers to protect bicyclists from parked and moving vehicles, and enforcement to prohibit motorized vehicle encroachment and double-parking. Bike Lanes may be distinguished using color, lane markings, signage, and intersection treatments.²⁵

Bike Lane Width

According to the NACTO Urban Bikeway Design Guide, the desirable bike lane width adjacent to a curbface is 6 feet. The desirable rideable surface adjacent to a street edge or longitudinal joint is 4 feet, with a minimum width of 3 feet. In cities where illegal parking in bike lanes is a concern, 5 foot wide bike lanes may be preferred.

Bike lanes should be made wider than minimum widths wherever possible to provide space for bicyclists to ride side-by-side and in comfort.²⁶

Bike Lane Buffers

A buffer is a zone that provides protection and separation between bicycle and motor vehicle traffic. Buffered bike lanes are allowed per Manual on Uniform Traffic Control Devices (MUTCD) guidelines. These guidelines include specifications for roadway markings such as arrows and symbols. MUTCD requires two solid white lines buffering the bicycle lane from the traffic lane.



Figure 33: Bike lane on South Mammoth Road, Manchester, NH. Photo from Bike Manchester



Figure 34: Striped bike lane in Traverse City, MI. Photo from traversetrails.org

²⁵ National Association of City Transportation Officials. Bike Lanes - National Association of City Transportation Officials. Retrieved from <http://nacto.org/publication/urban-bikeway-design-guide/bike-lanes/>

²⁶ National Association of City Transportation Officials. Urban Bikeway Design Guide. Retrieved from <https://nacto.org/publication/urban-bikeway-design-guide/bike-lanes/conventional-bike-lanes/>

Maintenance

Just as a municipality would maintain a roadway, bike lanes should be kept clear of debris and vegetation in order to ensure a safe environment for non-motorized vehicles. Local departments and transportation agencies should include the frequent cleaning of bike lanes and other bicycle facilities in their maintenance policies.

Signage and Roadway Markings



Figure 36: MUTCD 2009 Edition Chapter 9B. Signs

Bike Lanes at Intersections

Like conventional intersections, special considerations should be paid to the configuration of bike lanes at intersections. Roadway markings should reduce any potential conflict between bicyclists and vehicle, and should intend to heighten visibility, denoting the right-of-way, and create an awareness of the various modes of transportation. Some examples of these configurations may include bike boxes, intersection crossing markings, median refuge islands, through bike lanes, and combined bike and turn lanes. A [leading bike interval \(LBI\)](#) is another strategy that gives people on bikes a head start in front of turning vehicles, providing a priority position in the right of way.

More information can be found in NACTO's [Urban Bikeway Design Guide](#) and [Don't Give Up at the Intersection](#) guide.



Figure 35: Photo from [bikesiliconvalley.org](#)

Bike lanes should include signs and/or bicycle symbols on the pavement indicating that they are for bicycle use, and not a convenient space to park your car. Signage should alert motorists of the presence of bicyclists and should direct bicyclists to follow traffic laws. Proper signage should be consistent with Chapter 9B of the MUTCD standards, which can be found [online](#).



Figure 37: Photo from NACTO's [Urban Bikeway Design Guide](#)

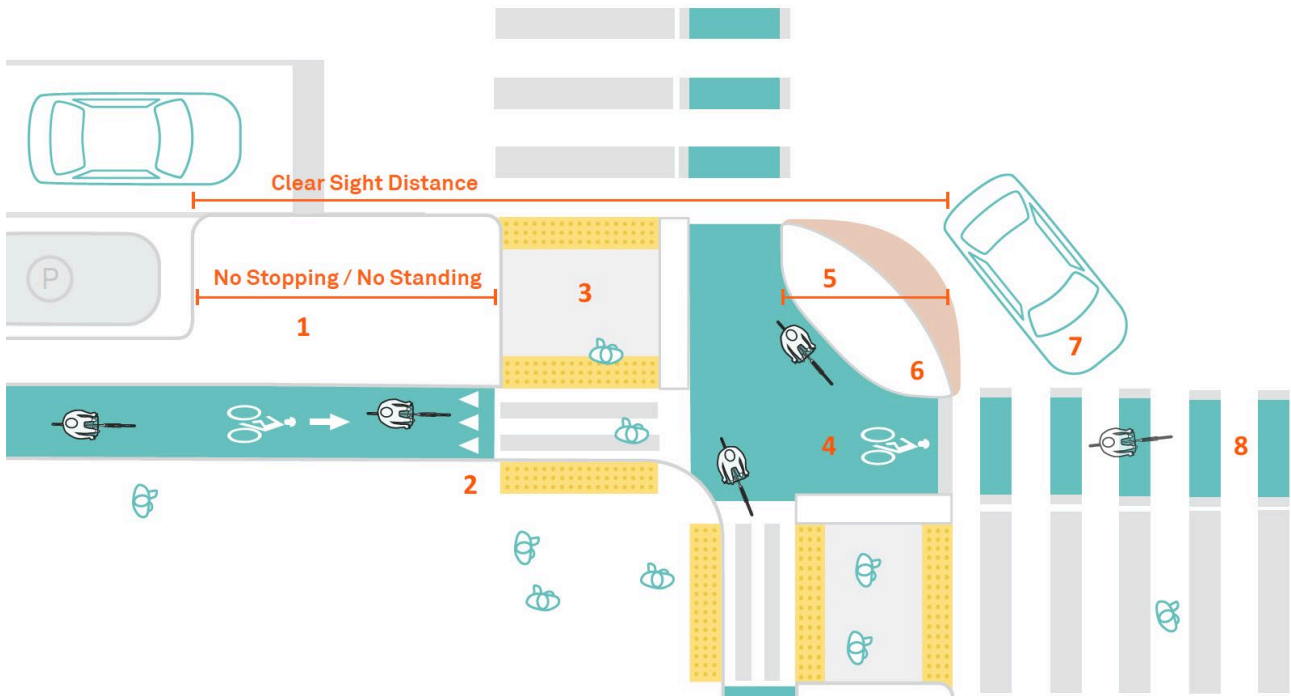


Figure 38: Protected Intersection Diagram from NACTO's *Don't Give Up at the Intersection* guide

Non-conventional Types of Bike Lanes

Contra-Flow Bike Lanes

Contra-flow bicycle lanes are bicycle lanes designed to allow bicyclists to ride in the opposite direction of motor vehicle traffic. They convert a one-way traffic street into a two-way street: one direction for motor vehicles and bikes, and the other for bikes only. Contra-flow lanes are separated with yellow center lane striping.



Figure 39: Photo from NACTO's *Urban Bikeway Design Guide*

Buffered Bike Lanes

- Provides greater shy distance (the area of the bike lane that cyclists tend to avoid) between motor vehicles and bicyclists.
- Provides space for bicyclists to pass another bicyclist without encroaching into the adjacent motor vehicle travel lane.
- Encourages bicyclists to ride outside of the door zone when buffer is between parked cars and bike lane.
- Provides a greater space for bicycling without making the bike lane appear so wide that it might be mistaken for a travel lane or a parking lane.
- Appeals to a wider cross-section of bicycle users.
- Encourages bicycling by contributing to the perception of safety among users of the bicycle network



Figure 40: Photo from NACTO's *Urban Bikeway Design Guide*

Barrier-Protected Bike Lanes

Barrier-separated bike lanes are separated from the lanes of motorized traffic by a physical barrier, such as a line of poles, bollards, a low wall, or a fence. These bike lanes can encourage bicycling by providing additional protection.

Various Bicycle Infrastructure

Bike Boulevards

Bicycle boulevards are streets with low motorized traffic volumes (typically less than 3,000 Annual Average Daily Traffic (AADT)) and speeds, designated and designed to give bicycle travel priority. Bicycle Boulevards use signs, pavement markings, and speed and volume management measures to discourage through trips by motor vehicles and create safe, convenient bicycle crossings of busy arterial streets.²⁷

Designing bike boulevards requires the planning and managing of routes, identifying the best signage, managing speed and vehicle volume, enabling safe and convenient crossings and navigations.

Shared Lane Markings

Shared lane markings, also known as “sharrows” (“share” + “arrow”), indicate the presence of bicyclists to motorists, guide bicyclists to utilize the middle of the lane, and discourage wrong-way bicycling using arrow markings. They are appropriate on roadways with traffic volumes up to 1,000 AADT. Sharrows were added to the MUTCD in 2009.

Advisory Bike Lanes

Also known as an “Advisory Shoulder” or “Dashed Bicycle Lane”, an Advisory Bike Lane allows motorists and people on bicycles to share a narrow street (most often used on low volume residential roadways).



Figure 41: Photo from NACTO's Urban Bikeway Design Guide



Figure 42: Photo from NACTO's Urban Bikeway Design Guide



Figure 43: Sharrow Marking on Chestnut Street Manchester, NH. Photo from bikemanchester.org

²⁷ Home - National Association of City Transportation Officials. Bicycle Boulevards - National Association of City Transportation Officials. Retrieved from <http://nacto.org/publication/urban-bikeway-design-guide/bicycle-boulevards/>



Figure 44: An Advisory Bike Lane on Valley Rd. in Hanover, NH. Source: *Lessons Learned: Advisory Bike Lanes in North America*



Figure 45: Piscataquog River Rail Trail Bridge, Manchester, NH. Photo from myggm.org

Unlike dedicated bicycle lanes, which prohibit motor vehicle use, an Advisory Bike Lane overlaps with the motor vehicle travel area and it is expected that motorists will regularly encounter meeting or passing situations where driving in the bike lane is necessary and safe.²⁸

Paved Shoulders

Paved shoulders provide a recovery area for errant motor vehicles and lengthen the lifespan of the roadway by providing pavement structure support, reducing edge deterioration, and improving drainage. Paved shoulders significantly reduce maintenance costs and are proven to reduce crashes. Paved shoulders provide space for pedestrian and bicycle travel, which facilitates safer passing behaviors and improves comfort for all users.

Paved shoulders serve many purposes. According to FHWA, all users should be considered to develop the most appropriate design given the intended use of the shoulder. Designers have flexibility in determining when to pave shoulders, as well as on factors such as shoulder width and rumble strip design and placement.²⁹

Separated Facilities: Shared-Use Paths

A shared-use path serves as part of a transportation circulation system and supports multiple recreation opportunities, such as walking, bicycling, and inline skating. A shared-use path typically has a surface that is asphalt, concrete, or firmly-packed crushed aggregate. The 1999 AASHTO Guide for the Development of Bicycle Facilities defines a shared-use path as being physically separated from motor vehicular traffic with an open space or barrier (AASHTO,

²⁸ Lessons Learned: Advisory Bike Lanes in North America. Alta Planning + Design. August 2017.

²⁹ Home | Federal Highway Administration. Paved Shoulders. Retrieved from http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/multimodal_networks/8_paved_shoulders.pdf

1999). Shared-use paths should always be designed to include pedestrians even if the primary anticipated users are bicyclists.

There are various surface materials that can be used in outdoor environments. Shared-use paths are generally paved with asphalt or concrete but may also use prepared surfaces such as crushed stone or soil stabilizing agents mixed with native soils or aggregates. High use trails passing through developed areas or fragile environments are commonly surfaced with asphalt or concrete to maximize the longevity of the shared-use path surface and promote bicycle and inline skating use.³⁰ Another benefit to utilizing asphalt or concrete is that wheelchair or scooter users will likely feel more confident to utilize the trail.

Pedestrian Facilities

Sidewalks

Sidewalks are one of the most important elements of a complete street. Without sidewalks, public rights-of-way are inaccessible to all pedestrians, including people with disabilities. When sidewalks are not available, the roadway design forces pedestrians to share a street with motorists as well as limits pedestrians' access to public transportation.³¹

When designing sidewalks, it is important to consider a variety of elements, including proper width, clearance zone, curbs, buffer space, cross slope and incline, lighting, drainage, and other streetscape elements. Various elements are described in the following sections.

Sidewalk Width

While prevailing design guidelines recommend a minimum 5' width for sidewalks, many communities adopt wider standards to improve accessibility and encourage walking by making it more attractive.³²



Figure 46: Photo from NACTO's Urban Street Design Guide



Figure 47: Sidewalk Snowplow in Manchester, NH. Photo from Union Leader

³⁰ Federal Highway Administration. Part II of II: Best Practices Design Guide - Sidewalk2 - Publications - Bicycle and Pedestrian Program - Environment - FHWA. Retrieved from http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks214.cfm

³¹ FHWA: Designing Sidewalks and Trails for Access. Chapter 4 - Sidewalk Design Guidelines and Existing Practices

³² NACTO Urban Street Design Guide. <https://nacto.org/publication/urban-street-design-guide/street-design-elements/sidewalks/>

Winter Sidewalk Maintenance

New Hampshire is subject to significant amounts of snow and ice during approximately five months out of each year. During this time period, special attention should be paid to the maintenance of pedestrian facilities. Icy conditions may cause injury from slipping, while walking in the roadway increases a pedestrian's risk of being hit by a vehicle. Hardships for pedestrians that have no other options other than walking, including wheelchair users, older adults, and children can be especially at risk if sidewalks are not adequately maintained. Some communities have ordinances requiring property owners to keep their sidewalks clear. However, in New Hampshire, sidewalks on public roads must be maintained and repaired by the municipality at no additional cost to the abutters.³³ Project sponsors are responsible for maintenance on all Local Public Agency (LPA) projects.³⁴

Wayfinding Signage

Signage shouldn't solely focus on driver and cyclist behavior. In many instances, cities have incorporated wayfinding signage as a means of communicating the local geography to pedestrians. These signs may tell you how far you are from a grocery store, or how many minutes it will take to walk to the nearest park. Wayfinding signage is important not only because it gives pedestrians a sense of direction, but proper signage can help build a sense of place. In addition, signage may be a lifesaver to those with mental illness, cognitive or memory challenges, or newcomers in which English is a second language.

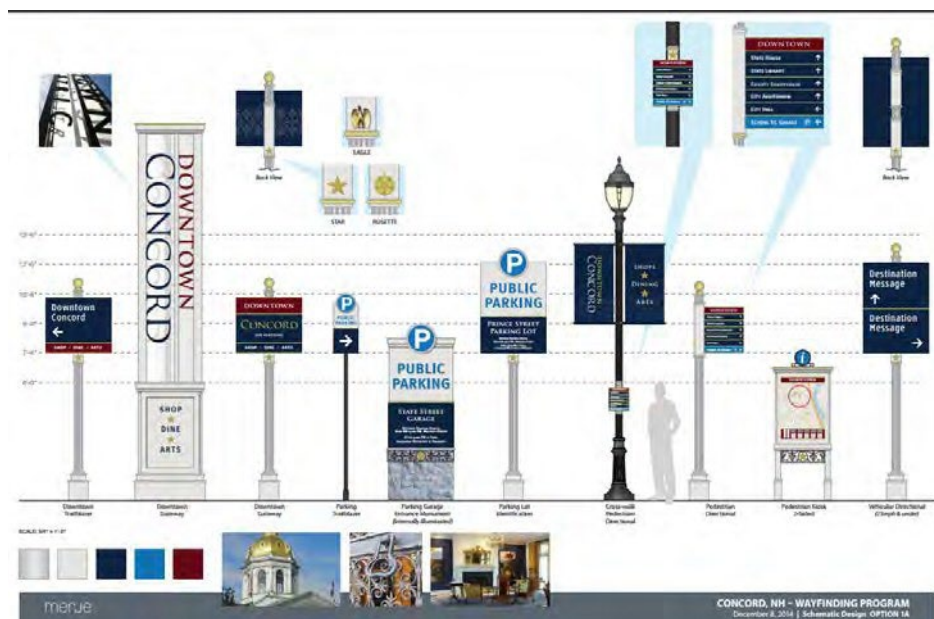


Figure 48: Renderings of Wayfinding Signage in Concord, NH. Photo from www.concordmainstreetproject.com/public-downloads

³³ Town Must Keep Sidewalk Clear of Snow and Ice Under ADA. <https://www.nhmunicipal.org/court-updates/town-must-keep-sidewalk-clear-snow-and-ice-under-ada>

³⁴ Local Public Agency Manual for the Development of Projects, Section 29. <https://mm.nh.gov/files/uploads/dot/remote-docs/lpa-manual.pdf>

The design, scale and quality of buildings, streets and landscaping can create areas that are pleasant places to walk, bike, relax and attract people. Pedestrian safety and comfort are crucial to the success of healthy and safe streets for all users.

The following provides examples of pedestrian scale design features:

- Streets that are interconnected and small block patterns provide good opportunities for pedestrian access and mobility
- Narrower streets, scaled down for pedestrians and less conducive to high vehicle speeds (note: street trees at the sides of streets create the perception of a narrower roadway)
- Traffic calming devices to slow traffic or if appropriate, reduced speed limits
- Median refuge islands to provide a refuge area for crossing pedestrians
- Public spaces and pedestrian “pockets” adjacent to the main pedestrian travel way, that provide a place to rest and interact (sidewalk cafes, benches, etc.)
- Awnings/covered building entrances that shelter pedestrians from weather
- Planting buffers, with landscaping and street trees that provide shelter and shade without obstructing sight distances and help to soften the surrounding buildings and hard surfaces
- Street lighting designed to pedestrian scale (shorter light poles with attractive fixtures that are effective in illuminating the pedestrian travel way but glare resistant)
- Wide and continuous sidewalks or separated walkways that are fully accessible

Street Crossings

Signalized Crosswalks at Intersections

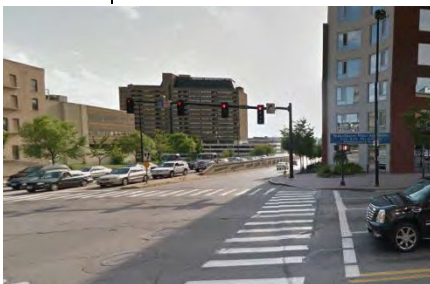


Figure 49: Signalized Crosswalk at the Intersection of Elm St. and Bridge St. in Manchester, NH. Photo from Google Street View

All intersections “should be designed with the premise that there will be pedestrians present, that they should be able to cross the street, and that they need to do so safely” (AASHTO, 2004a).

According to AASHTO, turning motorists, especially those turning right on red when allowed, can present a danger to pedestrians using the intersection crossing. If the street is wide and creates a longer crossing time, median islands should be provided to decrease the individual crossing distance, even if the intersection is signalized. Crosswalks should be provided on all sides of the intersection. ADA-compliant pedestrian countdown timers should be provided at all signalized intersections.

Leading Pedestrian Intervals

A leading pedestrian interval (LPI) gives pedestrians the opportunity to enter the crosswalk at an intersection 3-7 seconds before vehicles are given a green indication. Pedestrians can better establish their presence in the crosswalk before vehicles have priority to turn right or left. [FHWA's Handbook for Designing Roadways for the Aging Population](#) recommends the use of the LPI at intersections with high turning vehicle volumes.

Mid-Block Unsignalized Crosswalks

Mid-block unsignalized crosswalks are crosswalks away from intersections that do not have a signal, but have striping and signs. Mid-block unsignalized crosswalks can provide convenient crossings for pedestrians when the nearest intersection is a significant distance away, or when major destination points are in the middle of the block.

According to a report by FHWA, pedestrians who cross at midblock account for as much as 26 percent of all motor vehicle-pedestrian crashes, according to a 1996 review of 5,000 pedestrian crash reports from six different states. Thus, communities should install advanced warning signage prior to the unsignalized crossing. Public Works or Highway staff should look to MUTCD for guidelines on appropriate warning signage.



Figure 50: Mid-Block Unsignalized Crossing in Keene, NH. Photo from Southwest Regional Planning

Mid-Block Signalized Crosswalks

For added safety, signals can be installed at mid-block crosswalks. One increasingly popular option for this is the Pedestrian Hybrid Beacon, or HAWK signal (High-intensity Activated cross-Walk). HAWK signals are pedestrian-activated signals suspended above the roadway. When activated, the HAWK signal cycles through six phases, proceeding from flashing yellow to steady red, instructing motorists to stop. HAWK signals have been shown to improve safety, especially when installed at previously unsignalized crosswalks on high-traffic streets where motorists' failure to yield has been a concern. One study found that HAWK signals achieved up to a 69 percent reduction in pedestrian crashes.³⁵



Figure 51: Mid-Block Signalized Crossing on Route 125 in Epping, NH. Photo from

³⁵ Federal Highway Administration. Part II of II: Best Practices Design Guide - Sidewalk2 - Publications - Bicycle and Pedestrian Program - Environment - FHWA. Retrieved from

Raised Crosswalks

Raised crosswalks are ramped speed tables spanning the entire width of the roadway, often placed at midblock crossing locations. The crosswalk is demarcated with paint and/or special paving materials. These crosswalks act as traffic-calming measures that allow the pedestrian to cross at grade with the sidewalk. In addition to their use on local and collector streets, raised crosswalks can be installed in campus settings, shopping centers, and pick-up/drop-off zones (e.g., airports, schools, transit centers).

Speed Cushions

Speed cushions are either speed humps or speed tables that include wheel cutouts to allow large vehicles to pass unaffected, while reducing passenger car speeds. They can be offset to allow unimpeded passage by emergency vehicles and are typically used on key emergency response routes.

Speed cushions extend across one direction of travel from the centerline, with longitudinal gap provided to allow wide wheel base vehicles to avoid going over the hump. More information on speed cushions can be found in Traffic Calming.

Pedestrian Traffic Signals

The MUTCD contains warranting procedures for conventional pedestrian traffic signals based on automobile and vehicle traffic volumes to help determine if a pedestrian signal is appropriate. These conventional signals are typically considered when there are over 130 pedestrians an hour crossing a roadway.

Rectangular Rapid Flash Beacons

The Federal Highway Administration states that Rectangular Rapid Flash Beacons (RRFB) can enhance public safety by reducing crashes between vehicles and pedestrians at unsignalized intersections and at mid-block pedestrian crossings by increasing driver awareness of potential pedestrian conflicts (see Figure 52 of an existing RRFB mid-block crossing located within the Town of Marlborough, NH along NH Route 101). According to the FHWA:



Figure 52: An existing RRFB located in the Town of Marlborough, NH crossing NH 101

- RRFBs are user-actuated amber LEDs that supplement warning signs at unsignalized intersections or mid-block crosswalks. They can be activated by pedestrians manually by a push button or passively by a pedestrian detection system.
- RRFBs use an irregular flash pattern that is similar to emergency flashers on police vehicles.
- RRFBs can be installed on either two-lane or multi-lane roadways.
- RRFBs are a lower cost alternative to traffic signals and hybrid signals that are shown to increase driver yielding behavior at crosswalks significantly when

supplementing standard warning signs and markers.

- An official FHWA-sponsored experimental implementation and evaluation conducted in St. Petersburg, Florida found that RRFBs at pedestrian crosswalks are dramatically more effective at increasing driver yielding rates to pedestrians than traditional overhead beacons.
- The novelty and unique nature of the stutter flash provides a greater response from drivers than traditional methods.

HAWK Beacons

Hybrid Beacons (HAWK beacons) may also be considered and the MUTCD contains warranting guidelines that utilize automobile traffic, pedestrian traffic, automobile speeds, and pedestrian crossing distance. The MUTCD recommends the following placement requirements for pedestrian hybrid beacons:

- The pedestrian hybrid beacon should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs,
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk, or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance,
- The installation should include suitable standard signs and pavement markings.³⁶



Figure 53: Photo from NACTO's Urban Street Design

Pedestrian Refuge Areas

Pedestrian refuge areas or pedestrian safety islands are designed to reduce the exposure time experienced by a pedestrian in the intersection. According to NACTO, pedestrian refuge areas may be used on both wide and narrow streets and could be applied where speeds and volumes make crossings prohibitive, or where three or more lanes of traffic make pedestrians feel exposed or unsafe in the intersection.³⁷

Curb Extensions

According to the FHWA, curb extensions extend the sidewalk or curb line out into the parking lane, reducing the street width and pedestrian crossing distances. Curb extensions can also improve the ability of pedestrians and motorists to see each other. The FHWA lists the following considerations for curb extensions:



Figure 54: Photo from NACTO's Urban Street Design

³⁶ Manual on Uniform Traffic Control Devices (MUTCD) - FHWA. Chapter 4F - MUTCD 2009 Edition - FHWA. Retrieved from <http://mutcd.fhwa.dot.gov/html/2009/part4/part4f.htm>

³⁷ National Association of City Transportation Officials. Pedestrian Safety Islands - National Association of City Transportation Officials. Retrieved from <http://nacto.org/publication/urban-street-design-guide/intersection-design-elements/crosswalks-and-crossings/pedestrian-safety-islands/>

- Curb extensions should typically be used where there is a parking lane, and where transit and cyclists would be traveling outside the curb edge for the length of the street.
- Curb extensions should typically be used where there is a parking lane, and where transit and cyclists would be traveling outside the curb edge for the length of the street.
- Where intersections are used by significant numbers of trucks or buses, the curb extensions need to be designed to accommodate them. However, it is important to take into consideration that those vehicles should not be going at high speeds, and most can make a tight turn at slow speeds. It is also not always necessary for a roadway to be designed so that a vehicle be expected to turn from right lane to right lane -i.e., the vehicles can often encroach into adjacent lanes safely where volumes and/or speeds are slow. Keep in mind that speeds should be slower in a pedestrian environment.³⁸

Accessible Accommodations

The Americans with Disabilities Act (ADA) of 1990 requires sidewalks and other pedestrian facilities to be accessible to persons with disabilities.

ADA Ramps

Curb ramps are critical to providing access between the sidewalk and the street for people who use wheelchairs and other mobility devices. Curb ramps are most commonly found at intersections, but they may also be used at other locations such as on-street parking, loading zones, bus stops, and midblock crossings. The implementing regulations under Title II of the ADA specifically identify curb ramps as requirements for existing facilities, as well as all new construction. Curb ramps for existing facilities must be included in Transition Plans. According to the Title II implementing regulations, priorities for the installation of curb ramps in existing facilities should include access to government facilities, transportation, public accommodations, and for employees to their place employment. ADA ramps enable people with disabilities to use the same infrastructural facilities.

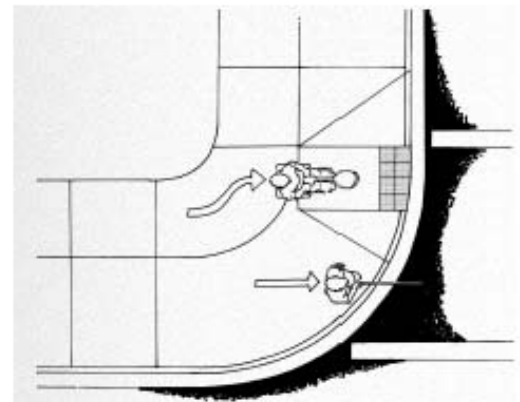


Figure 55: Example of a well-designed ADA Curb Ramp.

ADA ramps are curb ramps compliant with the ADA Accessibility Guidelines for Buildings and Facilities (ADAAG). Curb ramps provide “an accessible route that people with disabilities can use to safely transition from a roadway to a curbed sidewalk and vice versa”.³⁹

³⁸ Safety | Federal Highway Administration. Curb Extensions. Retrieved from <http://safety.fhwa.dot.gov/saferjourney1/Library/countermeasures/23.htm>

³⁹ Federal Highway Administration. Part II of II: Best Practices Design Guide - Sidewalk2 - Publications - Bicycle and Pedestrian Program - Environment - FHWA. Retrieved from http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks207.cfm

In addition to ADA, there are a number of design features that can accommodate people who are blind. Accessible Pedestrian Signals, Detectable Warnings and Temporary Traffic Control (messages for audible information devices) can be used to help those with visual impairments safely travel throughout their community.⁴⁰

Vehicle Considerations

Lane Width

According to NACTO, the width allocated to lanes for motorists, buses, trucks, bikes, and parked cars is a sensitive and crucial aspect of street design. Lane widths should be considered within the assemblage of a given street delineating space to serve all needs, including travel lanes, safety islands, bike lanes, and sidewalks.

Each lane width discussion should be informed by an understanding of the goals for traffic calming as well as making adequate space for larger vehicles, such as trucks and buses.⁴¹

AASHTO also provides guidance for widening lanes through horizontal curves to provide for the off-tracking requirements of large trucks. Lane width does not include shoulders, curbs, and on-street parking areas. The table below summarizes the range of lane widths for travel lanes and ramps.^{42 43}

Table 1: Ranges for Lane Width

Source: A Policy on Geometric Design of Highways and Streets, AASHTO

Type of Roadway	Rural		Urban	
	US (feet)	Metric (meters)	US (feet)	Metric (meters)
Freeway	9-12	3.6	12	3.6
Ramps (1-lane)	12-30	3.6-9.2	12-30	3.6-9.2
Arterial	11-12	3.3-3.6	10-12	3.0-3.6
Collector	10-12	3.0-3.6	10-12	3.0-3.6
Local	9-12	2.7-3.6	9-12	2.7-3.6

⁴⁰ Accessible Design for the Blind. <https://accessforblind.org/>

⁴¹ Lane Width - National Association of City Transportation Officials. Retrieved from <http://nacto.org/publication/urban-street-design-guide/street-design-elements/lane-width/>

⁴² 2011. American Association of State Highway and Transportation Officials: A Policy on Geometric Design of Highways and Streets, 6th Edition. Retrieved from https://bookstore.transportation.org/collection_detail.aspx?ID=110

⁴³ Mitigation Strategies For Design Exceptions - Safety | Federal Highway Administration. Retrieved from http://safety.fhwa.dot.gov/geometric/pubs/mitigationstrategies/chapter3/3_lanewidth.cfm

Shoulder Width

According to the New Hampshire Department of Transportation, a wide enough shoulder may be used as a breakdown area for stranded motorists, offering a safe area in which to assess damage and request assistance. In the absence of designated parking, the shoulder may be used as an alternative parking area in certain (especially rural) areas, as well as access points for Emergency Services vehicles.

The following table from AASHTO's *A Policy on Geometric Design of Highways and Streets* summarizes the ranges for minimum shoulder width.

Table 2: Ranges for Minimum Shoulder Width

Source: *A Policy on Geometric Design of Highways and Streets*, AASHTO

Type of Roadway	Rural		Urban	
	US (feet)	Metric (meters)	US (feet)	Metric (meters)
Freeway	4–12	1.2–3.6	4–12	1.2–3.6
Ramps (1-lane)	1–10	0.3–3.0	1–10	0.3–3.0
Arterial	2–8	0.6–2.4	2–8	0.6–2.4
Collector	2–8	0.6–2.4	2–8	0.6–2.4
Local	2–8	0.6–2.4	–	–

On-Street Parking

According to the FHWA, on-street parking can be both a benefit and a detriment to pedestrians. On-street parking does increase the "friction" along a street and can narrow the effective crossing width, both of which encourage slower speeds; parking can also provide a buffer between moving motor vehicle traffic and pedestrians along a sidewalk.

On-street parking can also create a visual barrier between motorists and crossing pedestrians. The FHWA recommends that where there is on-street parking, curb extensions should be built where pedestrians cross, and at least 20 feet of parking should be cleared on the approaches to crosswalks.



Figure 56: On-Street Parking on Main Street, Concord, NH. Photo from www.concordmainstreetproject.com/public-downloads

Design Vehicles

Design vehicles are selected motor vehicles with the weight, dimensions, and operating characteristics used to establish highway design controls for accommodating vehicles of designated classes. For purposes of geometric design, each design vehicle has larger physical dimensions and a larger minimum turning radius than most vehicles in its class. The design of an intersection is significantly affected by the

type of design vehicle, including horizontal and vertical alignments, lane widths, turning radii, and intersection sight distance.⁴⁴

Corner Radii

According to NACTO, corner radii directly impact vehicle turning speeds and pedestrian crossing distances. Minimizing the size of a corner radius is critical to creating compact intersections with safe turning speeds. While standard curb radii are 10–15 feet, many cities use corner radii as small as 2 feet.

In urban settings, smaller corner radii are preferred and actual corner radii exceeding 15 feet should be the exception.

NACTO recommends turning speeds should be limited to 15 mph or less. Minimizing turning speed can help increase pedestrian safety as corners are areas where vehicles and pedestrians are most likely to meet. The following is an image from NACTO's Urban Street Design Guide which shows a formula for calculating turning speed.⁴⁵

Table 3: Turning Speed

Source: NACTO's Urban Street Design Guide, Corner Radii

TURNING SPEED

The formula for calculating turning speed is:

$$R = \frac{V^2}{15 (.01E + F)}$$

R = Centerline turning radius (effective)

V = Speed in miles per hour (mph)

E = Super-elevation. This is assumed to be zero in urban conditions.

F = Side friction factor

V (MPH)	E	F	R (FT)
10	0	0.38	18
15	0	0.32	47
20	0	0.27	99
25	0	0.22	174

Transit

Transit refers to mass public transportation such as passenger rail and bus services. Transit is an important element of Complete Streets as it allows pedestrians to access greater distances without

⁴⁴ National Association of City Transportation Officials. Design Vehicles and Turning Radii. Retrieved from http://nacto.org/docs/usdg/design_vehicles_turning_radii_washburn.pdf

⁴⁵ National Association of City Transportation Officials: Urban Street Design Guide. Corner Radii. Retrieved from <http://nacto.org/publication/urban-street-design-guide/intersection-design-elements/corner-radii/>

stepping foot in a single-passenger vehicle, thus reducing the overall number of vehicles on the road, and increasing pedestrian safety.

According to FHWA, fixed route transit are services provided on a repetitive, fixed schedule basis along a specific route with vehicles stopping to pick-up and deliver passengers to specific locations; each fixed route trip serves the same origins and destinations, such as rail and bus (MB); unlike demand responsive (DR) and vanpool (VP) services.

NACTO's *Transit Street Design Guide* provides design guidance for the development of transit facilities on city streets, and for the design and engineering of city streets to prioritize transit, improve transit service quality, and support other goals related to transit. The *Transit Street Design Guide* sets a new vision for how cities can harness the immense potential of transit to create active and efficient streets in neighborhoods and downtowns alike.

Shared Bus- Bike Lane

The shared bus-bike lane is not a high-comfort bike facility, nor is it appropriate at very high bus volumes. However, buses and bicycles often compete for the same space near the curb. On streets without dedicated bicycle infrastructure, curbside bus lanes frequently attract bicycle traffic, prompting some cities to permit bicycles in bus lanes.

Shared bus-bike lanes can accommodate both modes at low speeds and moderate bus headways, where buses are discouraged from passing, and bicyclists pass buses only at stops. In appropriate conditions, bus-bike lanes are an option on streets where dedicated bus and separate high-comfort bicycle facilities cannot be provided.⁴⁶



Figure 57: A family uses a bus-bike lane on Washington Street in Boston.
Source: NACTO Transit Street Design Guide

⁴⁶ National Association of City Transportation Officials. Transit Street Design Guide. Retrieved from <https://nacto.org/publication/transit-street-design-guide/transit-lanes-transitways/transit-lanes/shared-bus-bike-lane/>

First Last Mile



Figure 58: All MTA buses are equipped with bike racks, making it easy for riders to start and end their trip by bike.

An individual's trip is understood as the entire journey from origin to destination. Individuals may use several modes of transport to complete the journey; they may walk, drive, ride a bicycle, take a train, or in many cases combine a number of modes. Public transportation agencies typically provide bus and rail services that may frame the core of such trips, but users must complete the first and last portion on their own; they must first walk, drive or roll themselves to the nearest station. This is referred to the first and last mile of the user's trip despite the length of the trip.

Bus

The most common type of transit in New Hampshire is by bus. A bus may be up to 41 feet in length, and the fuel can vary from diesel gasoline to biodiesel, to hybrid electric. Buses may have front and center doors, which are typically used in frequent-stop services.

The two primary types of bus service are local and express. Local bus service makes frequent stops, picking up and delivering passengers to a rapid transit station or express bus stop or terminal. Express bus service operates a portion of the route without stops or with a limited number of stops.⁴⁷

Types Of Bus Stops

When planning for a transit stop, three types of locations can be considered: near-side, far-side, and mid-block. A number of factors affect the decision of bus stop location, including transfer situations, space availability, and traffic volumes. As a result, there are trade-offs associated with each type of location, and the exact location should be based on adjacent land uses and likely paths of travel to and from the stop.

Near-side bus stops are located immediately before an intersection. Placing the stop prior to an intersection minimizes walking distances to connecting transit service and can create a safer path for traveling pedestrians. Near-side stop locations do have the tendency to slow vehicles behind stopped buses at intersections. Limited visibility of crossing pedestrians is another potential disadvantage associated with near-side stops. Pedestrians who cross in front of a bus are not able to see around the bus, and also are not seen by motorists in the adjacent lane.

Far-side bus stops are located immediately after an intersection. According to NACTO's Transit Street

⁴⁷ APTA (American Public Transit Association). (1994). Glossary of Transit Terminology. Washington, D.C. www.apta.com/resources/reportsandpublications/Documents/Transit_Glossary_1994.pdf

Design Guide, far-side in-lane stops are generally the preferred stop configuration where transit lanes or transit ways are present. At intersections where transit vehicles turn, use far-side stops to simplify transit turns and allow pedestrians to better anticipate turning movements. However, far-side stop locations can create a backup of vehicles behind a stopped bus into an intersection.⁴⁸

Mid-block stops are located between intersections. NACTO recommends that signalized or traffic-calmed pedestrian crossings should be provided at mid-block stops.

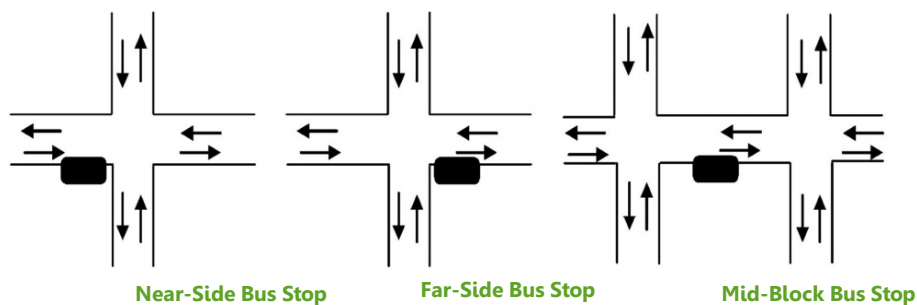


Figure 59: Examples of Bus Stop Locations

Rail

Rail types may include heavy rail, light rail, commuter rail, high-speed rail, monorail and more. Currently, there are three passenger rail stations in Eastern New Hampshire (Exeter, Durham, and Dover) serviced by Amtrak, connecting Brunswick, Maine to Boston, Massachusetts. Additionally, there is an existing Amtrak station in Claremont – the only New Hampshire stop on the Vermonter – which runs daily from Washington, D.C. to St. Albans, VT.

Both active and abandoned rail lines can be hazards for people on bicycles and people who use mobility devices. NACTO's [Transit Streets Design Guide](#) recommends directing bicyclists and other users to cross the tracks at a high angle (90-degree crossings are preferred) to avoid bicycle tires getting stuck in rail flanges.

⁴⁸ National Association of City Transportation Officials: Urban Street Design Guide. Stop Placement & Intersection Configuration. Retrieved from <http://nacto.org/publication/transit-street-design-guide/stations-stops/stop-design-factors/stop-placement-intersection-configuration/>



Figure 60: Tree Box Filter in Portsmouth, NH. Photo

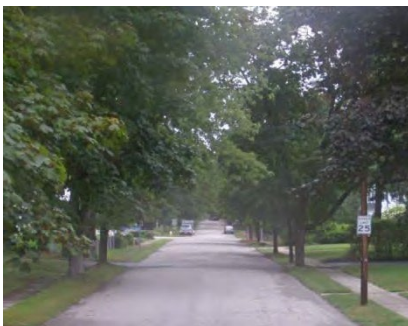


Figure 61: Tree Lining in Nashua, NH. Photo from Google



Figure 62: Heated Sidewalk Installation on Main St., Concord

B. UTILIZING GREEN INFRASTRUCTURE IN COMPLETE STREETS

Complete “green” streets manage the needs of diverse users while also attenuating storm water. A balanced design approach considers cost, maintenance & sustainability, carbon footprint, horticultural needs of plants, aesthetics, and economic prosperity.

Tree Box Filters

Tree box filters are based on an effective and widely used “bioretention or rain garden” technology with improvements to enhance pollutant removal, increase performance reliability, increase ease of construction, reduce maintenance costs and improve aesthetics.

The system consists of a container filled with a soil mixture, a mulch layer, under-drain system and a shrub or tree. Local stormwater runoff drains from impervious surfaces through a filter media and treated water that is not absorbed by the tree, flows out of the system through an under drain connected to a storm drainpipe / inlet or into the surrounding soil.⁴⁹

Tree Lining

Street trees can be used to serve a variety of urban design functions. Based on their location, arrangement and spacing, trees can help to define and highlight spaces, emphasize linearity, provide shade and filter light, as well as slow down and calm traffic. They can also reduce the urban heat island effect, improve air quality and biodiversity.

Heated Sidewalks

Maintaining sidewalks during winter months consumes a great deal of resources for snow removal, hauling and storage. Some communities have risen to the challenge by utilizing unique ways to maintain their sidewalks. In Concord, NH, the City installed steam-heated sidewalks which has helped to reduce maintenance costs and decreased the amount of applied salt on the sidewalk.

⁴⁹ Low Impact Development (LID) Urban Design Tools. Tree Box Filters. Retrieved from http://www.lid-stormwater.net/treeboxfilter_home.htm



Figure 63: A buffered bike lane incorporates grasses in Seattle, WA. Image source: <https://www.theurbanist.org/2017/12/29/work-seventh-avenue-protected-bike-lane-begin-early-2018/>



Figure 64: A buffered bike lane in Boston allows water to flow around and underneath.

“Green” Bike Lane Buffers

All impervious surfaces including paved bike lanes must have stormwater management systems associated with them, otherwise even protected bike lanes can become dangerous due to flooding during heavy rain events. Incorporating bioretention strips with appropriate grasses and other vegetation into the buffer between people on bicycles and people in motorized vehicles can help manage rain water, add to the aesthetics of a street, and offer extra protection for bicyclists. Where space is limited, concrete wheel stops can be used as a buffer, and gaps between each section can allow runoff to flow freely between or underneath them into a tree box filter or catch basin as the space allows.

C. FLEXIBILITY IN DESIGN AND CONTEXT SENSITIVE SOLUTIONS

Many states and communities have adopted a process known as Context Sensitive Solutions (CSS), which is a means to address the many different needs of a community and their roadways. It should be noted that CSS is an approach to making decisions on roads, and does not always result in a Complete Street. While having a collaborative process like CSS can be beneficial, recognizing that streets should be designed for all users will likely result in safer, more complete streets. The following language is from the New Hampshire Department of Transportation.

Context Sensitive Solutions (CSS) to help ensure that streets are “complete” in the sense of being appropriate for the area in which a project is implemented. As defined by FHWA and the American Association of State Highway and Transportation Officials, CSS is a collaborative, interdisciplinary approach that involves all stakeholders in providing a transportation facility that fits its setting. CSS leads to preserving and enhancing scenic, aesthetic, historic, community, and environmental resources, while improving or maintaining safety, mobility, and infrastructure conditions.

Transportation officials can apply CSS early in the planning process and throughout project development and delivery. Some of the major elements of CSS include the following:

- Early and frequent consultation and collaboration with stakeholders and the community during planning and design, and using communications tools, such as design visualization, that help citizens better understand project proposals.
- Use of an interdisciplinary team to oversee and manage project development.

- Emphasis on enhancing and retaining the sense of place or uniqueness of an area and its valued resources and features.
- Consideration of multiple alternatives with the goal of building consensus on a final project, which might include elements of the various alternatives.
- Minimization of disruptive impacts on the community.

The New Hampshire DOT has internalized the CSS approach. Numerous NHDOT engineers, planners, project managers and community relations representatives, as well as consultants and community leaders have been trained in CSS techniques: flexible design, respectful communication, consensus- building and community participation, negotiation, and conflict resolution.

The NHDOT takes certain steps to ensure a comprehensive approach in designing context sensitive solutions. The NHDOT CSS steps typically include a placemaking workshop, developing a problem and vision statement, screening criteria, developing alternatives, screening alternatives, identifying preferred alternatives, and holding a public hearing.

D. DESIGN PROCESS IN CONSTRAINED RIGHTS-OF-WAYS

Traffic Calming

The Institute of Transportation Engineers organizes traffic calming into four categories: vertical deflections, horizontal shifts, roadway narrowing, and closures (ITE, 2011).

Vertical Deflection

Speed Humps are parabolic vertical traffic calming devices intended to slow traffic speeds on low volume, low speed roads. Speed humps are 3–4 inches high and 12–14 feet wide, with a ramp length of 3–6 feet, depending on target speed. Speed humps reduce speeds to 15–20 mph and are often referred to as “bumps” on signage and by the general public.

According to ITE, the following are the potential impacts of speed humps:

- No effect on non-emergency access.
- Speeds determined by height and spacing; speeds between humps have been observed to be reduced between 20 and 25 percent on average.
- Based on a limited sample of sites, typical crossing speeds (85th percentile) of 19 mph have been measured for 3½ inch high, 12 foot humps and of 21 mph for 3 inch high, 14 foot humps; speeds have been observed to rise to 27 mph within 200 feet downstream.
- Speeds typically increase approximately 0.5 mph midway between humps for each 100 feet of separation.
- Studies indicate that traffic volumes have been reduced on average by 18 percent depending on alternative routes available.

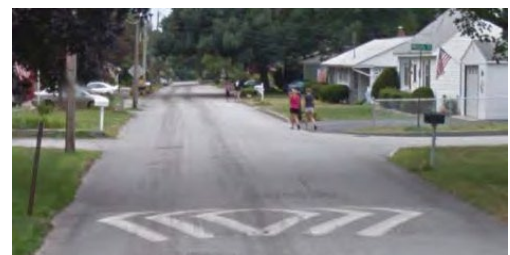


Figure 65: Speed Hump on Kenberma St, Manchester, NH. Photo

- Studies indicate that collisions have been reduced on average by 13 percent on treated streets (not adjusted for traffic diversion).
- Most communities limit height to 3-3½ inches, partly because of harsh ride over 4-inch high humps.
- Possible increase in traffic noise from braking and acceleration of vehicles, particularly buses and trucks.

Although speed humps can be utilized to calm traffic, they are not without their problems. ITE lists the following problems with speed humps relating to emergency response:

- Concern over jarring of emergency rescue vehicles.
- Approximate delay of between 3 and 5 seconds per hump for fire trucks and up to 10 seconds for ambulance with patient.⁵⁰

Speed cushions could be an effective alternative. Speed cushions don't go all the way across the road, allowing emergency vehicles (which have a wider wheelbase than passenger vehicles) to get through without any issue or need to slow down.⁵¹

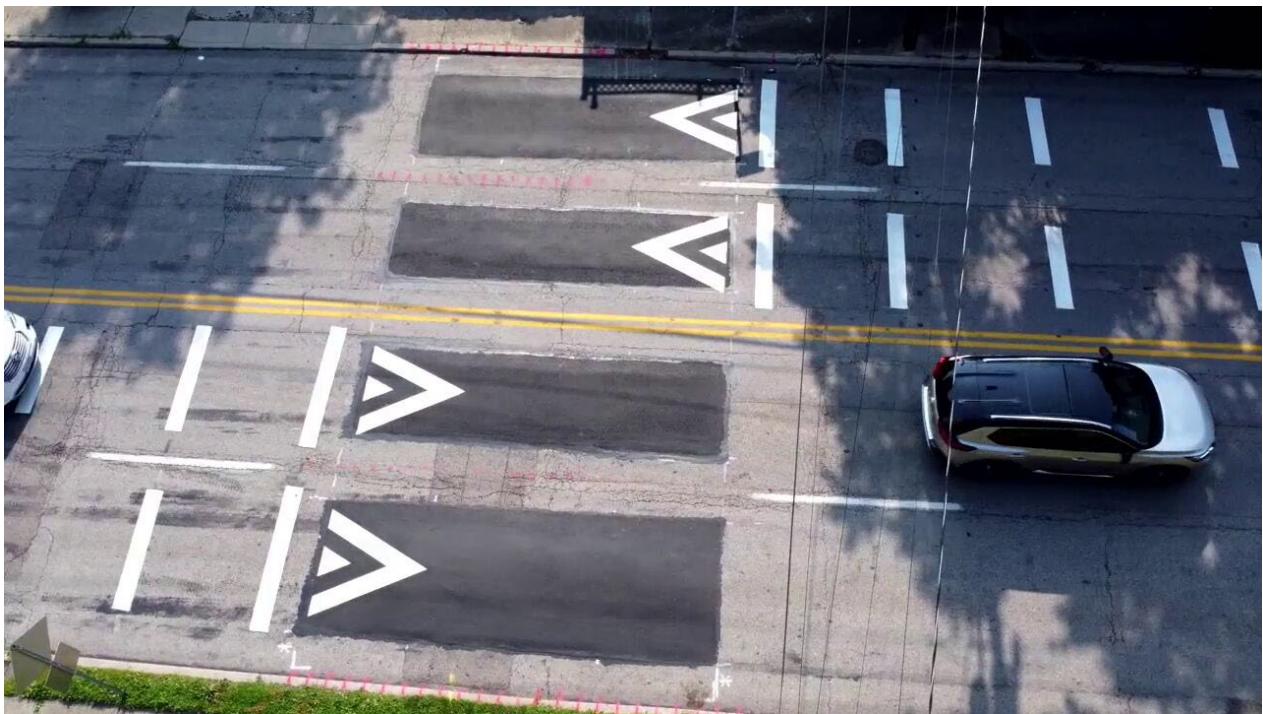


Figure 66: The first permanent speed cushion was installed in Cincinnati in 2022 Image Source: <https://local12.com/newsletter-daily/cincinnati-installs-first-permanent-speed-cushion-11-more-neighborhoods-up-next>

⁵⁰ Institute of Transportation Engineers -- ITE. Traffic Calming Measures - Speed Hump. Retrieved from <http://www.ite.org/traffic/hump.asp>

⁵¹ Local 12. Cincinnati installs first permanent speed cushion, 11 more neighborhoods up next. <https://local12.com/newsletter-daily/cincinnati-installs-first-permanent-speed-cushion-11-more-neighborhoods-up-next> (last accessed March 22, 2023).

Speed Tables (Raised Crosswalks). A speed table is a raised surface above the roadway, usually 3-3.5 inches high and can be 22 feet long. Speed tables reduce traffic speed and can increase the visibility of pedestrians.

Intersection Tables (Raised Intersection). A raised intersection is similar to a speed table but for an entire intersection. According to the FHWA, construction involves providing ramps on each intersection approach and elevating the entire intersection to the level of the sidewalk. Speed tables can be built with a variety of materials, including asphalt, concrete, or pavers. Crosswalks on each approach should also be elevated to ensure pedestrians cross the road at the same level as the sidewalk. Raised intersections may prove to be burdensome for winter maintenance.⁵²

Horizontal Shift

Roundabouts. A roundabout is a type of circular intersection, but is quite unlike a neighborhood traffic circle or large rotary. Roundabouts have been proven safer and more efficient than other types of circular intersections.

Roundabouts can provide lasting benefits and value in many ways. They are often safer, more efficient, less costly and more aesthetically appealing than conventional intersection designs. Furthermore, roundabouts are an excellent choice to complement other transportation objectives – including Complete Streets, multimodal networks, and corridor access management – without compromising the ability to keep people and freight moving through our towns, cities and regions, and across the Nation. The FHWA Office of Safety identified roundabouts as a Proven Safety Countermeasure because of their ability to substantially reduce the types of crashes that result in injury or loss of life. Roundabouts are designed to improve safety for all users, including pedestrians and bicycles.⁵³

Mini Roundabouts are suitable options at minor intersection crossings and are ideal for uncontrolled intersections.

Roadway Narrowing

Roadway narrowing is another form of traffic calming designed to slow speeds by reducing roadway width.



Figure 67: Example of a Speed Table. Photo from NACTO's Urban Street



Figure 68: Example of a Raised Intersection. Photo from NACTO's Urban Street Design Guide



Figure 69: Roundabout in Keene, NH. Photo from NHDOT

⁵² Safety | Federal Highway Administration. Raised Intersection & Pedestrian Crossing. Retrieved from <http://safety.fhwa.dot.gov/saferjourney1/Library/countermeasures/29-30.htm>

⁵³ Safety | Federal Highway Administration. Intersection Safety: Roundabouts and Mini Roundabouts. Retrieved from <http://safety.fhwa.dot.gov/intersection/innovative/roundabouts/>

Curb Extension. As noted previously in this section, curb extensions extend the sidewalk or curb line out into the parking lane, reducing the street width and pedestrian crossing distances and improve pedestrian visibility.

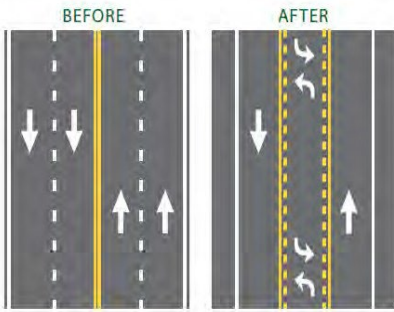


Figure 70: Image of a road diet. Image from FHWA

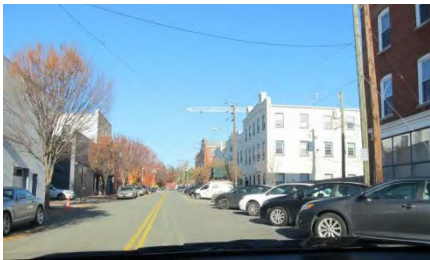


Figure 71: Diagonal Parking in Virginia. Photo from SNHPC

Road Diet. According to an informational guide developed by FHWA, four-lane undivided highways have a history of relatively high crash rates as traffic volumes increase and as the inside lane is shared by higher speed through traffic and left-turning vehicles. One option for addressing this safety concern is a “Road Diet.” A Road Diet involves converting an existing four-lane undivided roadway segment to a three-lane segment consisting of two through lanes and a center two-way left-turn lane (TWLTL). The reduction of lanes allows the roadway cross section to be reallocated for other uses such as bike lanes, pedestrian refuge islands, transit stops, or parking.⁵⁴

Diagonal Parking. Diagonal parking can be used to slow motor vehicles, as drivers will slow down as they anticipate parked vehicles backing out. While diagonal parking can slow traffic, its design can be burdensome on bicycles where bicycle lanes are provided. For instance, drivers backing out have poor visibility of oncoming bicycles. Although not typically used, designing for back-in only diagonal parking is one potential solution.

Conventional Street Design Versus Complete Street Design

The difference between complete street design and conventional street design is that Complete Streets account for more users of the road. In doing so, street design has to find innovative ways to design safe areas of the road for these newly-incorporated users.

This section illustrates the differences between conventional and Complete Streets design using photos of urban, suburban, and rural areas of New Hampshire, and uses complete street renderings of the same locations to visualize what those locations may look like if they accounted for more users of the road.

Manchester (Urban)

Manchester, the state's largest city, according to the 2020 census, population was 115,644. The City has 3,496 persons per square mile of land area, the state's highest population density. Manchester contains 33.08 square miles of land area. Manchester is an urban area with over 400 miles of public streets, 250 miles of sidewalks, 9,000 street lights, and 150 traffic signals (2017). Pictured in Figure 72 is Bremer Street, a local road with an Average Annual Daily Traffic (AADT) between 5,800 to 8,200. The street is currently 28ft wide with some on-street parking. Additionally, Bremer Street has sidewalks on both sides of the

⁵⁴ Safety | Federal Highway Administration. Road Diet Informational Guide. Retrieved from http://safety.fhwa.dot.gov/road_diets/info_guide/rdig.pdf

road, with no marked crossings. SNHPC asked Knowles Design to develop an illustration of Bremer Street with Complete Street elements. The potential fixtures include marked lanes, a designated bicycle lane on the north side of the street, marked non-signalized intersection crossings, and ADA curb ramps.



Figure 72: Top: Bremer St. in Manchester. Bottom: Complete Streets illustration by Knowles Design

Goffstown (Suburban)

Pictured below is Goffstown's Main Street, NH 13, which crosses the Piscataquog River. Currently, there are multiple local shops, a church, restaurants, a pharmacy, and many more businesses and public buildings on Main Street, making it the hub of downtown Goffstown. Main Street had an Average Annual Daily Traffic (AADT) of 15,000 in 2015. The street is as wide as 30ft in some areas to allow for on- street parking, with travel lanes varying in width. The street does have sidewalks, and a midblock unsignalized crossing pictured below.

SNHPC asked Knowles Design to develop an illustration of Main Street with Complete Street elements. The potential fixtures include duplicate brick-edge sidewalk treatments, trees, pavers (or Resin Stamped Crossings) in areas where there are expanses of pavement along parking, and sharrow markings.



Figure 73: Top: Main St. in Goffstown. Bottom: Complete Streets illustration by Knowles Design

Fracestown (Rural)

Pictured below is Fracestown's town center, a 5-legged intersection including the following roads:

- Heading north from the intersection towards Bennington, is route 47.
- Heading south from the intersection is the town road, the 2nd New Hampshire Turnpike South.
- Crossing through town, east to west, is route 136 coming in on the west from Greenfield and the east from New Boston.
- The fifth road is a town road, Poor Farm Road, that heads Northeast between 136E and 47N.

Pictured is the middle of the unsignalized intersection on NH 136. In 2015, NH 136 had an Average Annual Daily Traffic (AADT) of 1400. Currently, the street does not have any marked crossings for pedestrians who occasionally cross from the near side of the street pictured below, to the Old Meeting House across the street. The illustration of NH 136 with Complete Streets design elements is pictured below with descriptions of the improvements. While not pictured in the illustration, a complete street in this location would also include advance warning signage, described in the Street Crossing subsection.



Figure 74: Unsignalized intersection on NH 136 in Fracestown.



- Create Safer Pedestrian/Cyclist Travel
- Create crosswalk
- Fix stop bar – perpendicular to the road, stencil “STOP”, cover extended yellow line
- Add fog lines, keeping lane width at 10 ½ feet as exists in Village Center
- Reduce radius around right hand turn on route 136 and SW corner 2nd NH Turnpike
- Better define travel lanes vs. non-travel area

Figure 75: Complete Streets illustration by Knowles Design

E. TRANSPORTATION AND LAND USE CONNECTIONS

Street Patterns

Street form refers to the organization or layout of streets. A Complete Streets pattern will enable the most amount of connectivity for all users. For instance, a grid pattern is designed to allow high connectivity with short blocks and intersections. More well-connected streets can also reduce traffic congestion by dispersing traffic and offering more travel options.⁵⁵

Where street patterns are established, a community may have a hard time increasing the connectivity of their streets. When building new roads and sidewalks, communities will need to consider how the road and sidewalk network will connect not only to existing but to possible future roads and sidewalks.

⁵⁵ Smart Growth America. Implementing Complete Streets: Networks of Complete Streets. Retrieved from <http://www.smartgrowthamerica.org/app/legacy/documents/cs/factsheets/cs- networks.pdf>

Zoning

There are several types of zoning codes, including Euclidean, form-based, flexible or discretionary, and inclusionary zoning. Each approach has strengths and weaknesses and is best applied under a particular set of circumstances or with a particular goal in mind. Zoning codes, subdivision and site plan regulations can all become platforms for narrower streets, sidewalks, trails, or other pedestrian connections. The following will highlight form-based code and how it could be used to help implement Complete Streets.

Form-Based Code

Form-based codes use the physical form to establish predictable built results and a high-quality public, rather than separation of uses, as the organizing method for the code. Form-based codes address the relationship between building facades and the public realm, the form and mass of buildings in relation to one another, and the scale and types of streets and blocks. They are regulations, not mere guidelines that would need to be adopted into municipal law. Form-based codes could be used as a tool to help implement Complete Streets. For example, code could require sidewalk installation as a component of development. Similarly, the code could include incentives for reducing vehicle parking and incentivize bicycle and pedestrian accommodations.

LEED-ND

LEED-ND stands for Leadership in Energy and Environmental Design – Neighborhood Development. LEED-ND is a program administered by the U.S. Green Building Council, a private, non-profit organization, which evaluates and certifies green buildings across the U.S. Ultimately, LEED-ND applies the LEED certification to entire neighborhoods instead of just buildings. LEED-ND contains a set of measurable standards that can identify if a proposed development can be named environmentally friendly as well as identify if the roadway patterns and building techniques are sustainable and efficient. More information can be found at www.usgbc.org.

Transit-Oriented Development (TOD)

Transit Oriented Development (TOD) refers to a method of regulating land use that concentrates commercial and residential growth around transit centers to maximize access to transit and encourage the use of non-motorized transportation. TOD is a strategy that has broad potential in both large urban and small communities using bus or rail transit systems. It focuses compact growth around transit stops, thereby capitalizing on transit investments by bringing potential riders closer to transit facilities and increasing ridership.



Figure 76: Illustrative Example of TOD and Complete Streets. Image from Smart Growth America

TOD can be described as development, generally within half a mile of a transit station that provides sufficient densities, mixes of activities and convenient pedestrian linkages to support significant transit ridership. Focusing development in proximity to transit stations can create interesting and functional urban centers, diminish environmentally damaging urban sprawl, and play a major role in realizing regional development strategies.

In 2019, the Southern New Hampshire Planning Commission published the [Manchester Transit-Oriented Development Plan](#). The plan identifies a mobility-focused revitalization strategy for the South End of Elm Street in Downtown Manchester. The TOD plan creates a framework for how to create new places to live, work, and play by building safe and attractive options to walk, bike, or take transit to a variety of daily destinations. The Manchester TOD plan envisions over \$500 million worth of private real estate investment in the form of new condos, apartments, offices, shops, parks, and plazas all within a 5 to 10-minute walk of a new shuttle service, a bus hub, and a future rail station.

F. CURRENT DESIGN ELEMENTS AND ENGINEERING STANDARDS

Existing Standards and Guidelines

The design of Complete Streets encourages creativity and innovative uses of roadway space. Using efficient roadway design can enable a cost-efficient road project that increases safety for all users. This section highlights engineering standards and guidelines from national organizations and showcases engineering guidelines from cities and municipalities from all over the U.S.

Table 4: Existing Standards and Guidelines

DOCUMENT	DESCRIPTION	LAST UPDATED	LINK
AASHTO Policy on Geometric Design of Highways and Streets, 7 th edition	Roadways, including non-highway roads, with application to road diets.	2018	Link
AASHTO Guide for the Development of Bicycle Facilities, 4 th edition.	Bicycle facilities.	2012	Link
AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2 nd edition.	Pedestrian facilities.	2021	Link
Manual on Uniform Traffic Control Devices (MUTCD).	Signals, signage, markings, etc. on roads and paths.	2022	Link
Americans with Disabilities Act Accessibility Guidelines (ADAAG).	Provisions of ADA related to buildings and building entrances.	2004	Link
Public Rights-of-Way Accessibility Guidelines (PROWAG).	Provisions of ADA specific to public rights-of-way.	2011	Link
Designing Sidewalks and Trails for Access.	Provisions of ADA related to sidewalks and trails.	2001	Link
Designing Walkable Urban Thoroughfares: A Context Sensitive Approach, An ITE Recommended Practice	Roadways in urban and suburban contexts.	2010	Link
Designing Streets for Kids (Global Designing Cities Initiative)	Putting people first, with a focus on the specific needs of babies, children, and their caregivers as pedestrians, cyclists, and transit users	2020	Link

DOCUMENT	DESCRIPTION	LAST UPDATED	LINK
National Association of City Transportation Officials: Urban Street Design Guide	Roadway design focusing on all users.	2013	Link
National Association of City Transportation Officials: Urban Bikeway Design Guide, Second Edition	Roadway design focusing on bicycle facilities.	2012	Link

State And Local Design Guidance

The following are examples of complete street design resources from municipalities all over the United States. From Connecticut to San Francisco, many of these communities have developed comprehensive design guidelines which articulate best practices for designing safer streets.

**COMMUNITY PLANNING GUIDE:
COMPLETE STREETS POLICIES**



DEFINITION	DESIGN EXAMPLES
<p>Complete Streets are streets that are designed and operated to provide safe access for all users.</p> <p>Communities wishing to increase the safety and accessibility of their streets may consider adopting Complete Streets policies. By having Complete Streets policies in place, communities can help ensure that safe and accessible design measures are implemented during roadway improvement projects and maintenance activities.</p>	<p>Curb bump-outs help calm traffic and create a safer environment for pedestrians.</p>
<p>INCREASED SAFETY & ACCESSIBILITY</p> <p>Complete Streets incorporate design features which allow all users of the street to be safer.</p> <p> Pedestrian safety is increased by having shorter crossings, well-marked crossings (signage, flashing beacons, brightly colored crossings), adequate sidewalk widths, and increased driver awareness.</p> <p> Cyclist safety is increased by introducing bike lanes and using traffic calming measures to slow down drivers.</p> <p> The safety of those with mobility challenges is increased by incorporating design features which remove barriers and allow them to maneuver independently.</p> <p> To reduce the chance of safety risks associated with flooding and natural disasters, the incorporation of green infrastructure can be considered as part of Complete Streets policies.</p>	<p>Curb ramps allow those with mobility challenges to access sidewalks and roads easier.</p>
<p>GREEN INFRASTRUCTURE</p> <p>is the practice of integrating plants and other natural features, or permaculture, into the built environment to better manage stormwater. The incorporation of green infrastructure reduces the strain that heavy storms can have on stream crossings, culverts, and combined sewer overflows.</p>	<p>Paved shoulders are able to provide space for bike lanes in suburban and rural contexts.</p>

North Country Council Regional Planning Commission, NH

North Country Council is one of nine regional planning commissions in New Hampshire. The NCC region encompasses the northern third of New Hampshire and is made up of 50 communities and 25 unincorporated places. In spring of 2020 NCC published [*Community Planning Guide: Complete Streets Policies*](#). This guiding document provides communities in the NCC region with a blueprint to incorporating Complete Streets into their municipalities by highlighting design features, policy creation and planning and funding resources.

Keene, NH

The City of Keene Planning and Public Works Departments worked with the Southwest Region Planning Commission to develop complete street design guidance in 2015, which can be found [online](#). The document was meant to be a resource for City staff,

residents and businesses to better understand Complete Streets concepts, design elements and safety measures could be utilized within Keene’s public right of ways. The document classifies streets into six categories based on roadway function and surrounding context, which includes land use, predominant travel modes, right of way and types of buildings found along the corridor. The streets that fit within the categories were identified in the document and then Complete Streets design elements and considerations were highlighted for each street type.

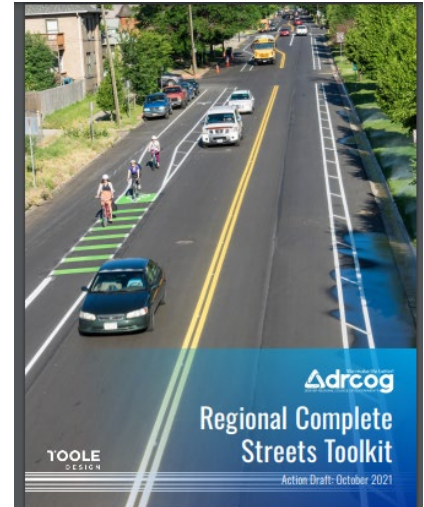


Boston

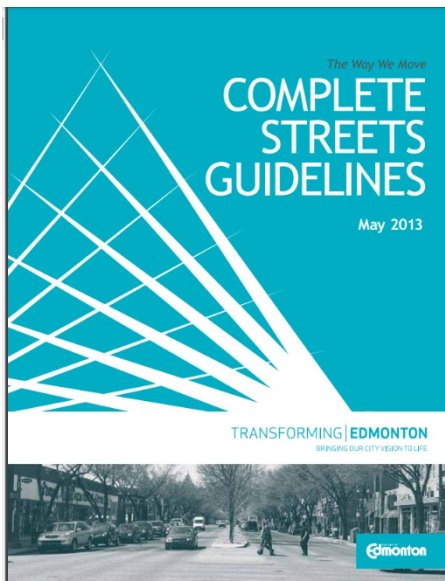
The Boston Complete Streets initiative seeks to improve the quality of life for Boston residents by designing transportation projects and improvements that elevate pedestrians and bicyclists to the same level of importance when designing roadways as motorized vehicles. The 2019 updated Boston Complete Streets Report provides policy and design guidelines and can be found online [here](#).

Denver Regional Council of Governments

The Denver Regional Council of Governments, (DRCOG), developed and adopted a [Complete Streets Toolkit](#) in October 2021. The toolkit was developed with the help of community input to gauge interest and expectations among potential users. This was accomplished through the publication of an online, interactive map and questionnaire. According to data found in the Complete Streets Toolkit, that outreach resulted in 725 comments on the interactive map, and 375 questionnaire responses from 571 individuals. DRCOG also worked with and solicited input from a Complete Streets Steering Committee which was made up of representatives from local jurisdictions across the region.



City of Edmonton, Alberta, Canada



In the spring of 2013 Edmonton became the fourth city in Canada to approve a Complete Streets policy. That same spring Edmonton's [The Way We Move: Complete Streets Guidelines](#) was published as a document that would help propel forward the ideals presented in Transportation Master Plan adopted in 2009. In 2018 Edmonton released the [Complete Streets Design and Construction Standards](#) which was updated again in [2021](#). This document builds upon existing content from previous publications such as *The Way We Move: Complete Streets Guidelines* and [Edmonton's Main Streets Guidelines](#).

Designing Walkable Urban Thoroughfares: A Context Sensitive Approach (ITE)

The ITE Recommended Practice advances the successful use of context sensitive solutions (CSS) in the planning and design of major urban thoroughfares for walkable communities. It provides guidance and demonstrates for practitioners how CSS concepts and principles may be applied in roadway improvement projects that are consistent with their physical settings. The report's chapters are focused on applying the principles of CSS in transportation planning and in the design of roadway improvement projects in places where community objectives support walkable communities-compact development, mixed land uses and support for pedestrians and bicyclists, whether it already exists or is a goal for the future.⁵⁶

⁵⁶ <http://www.ite.org/css/>

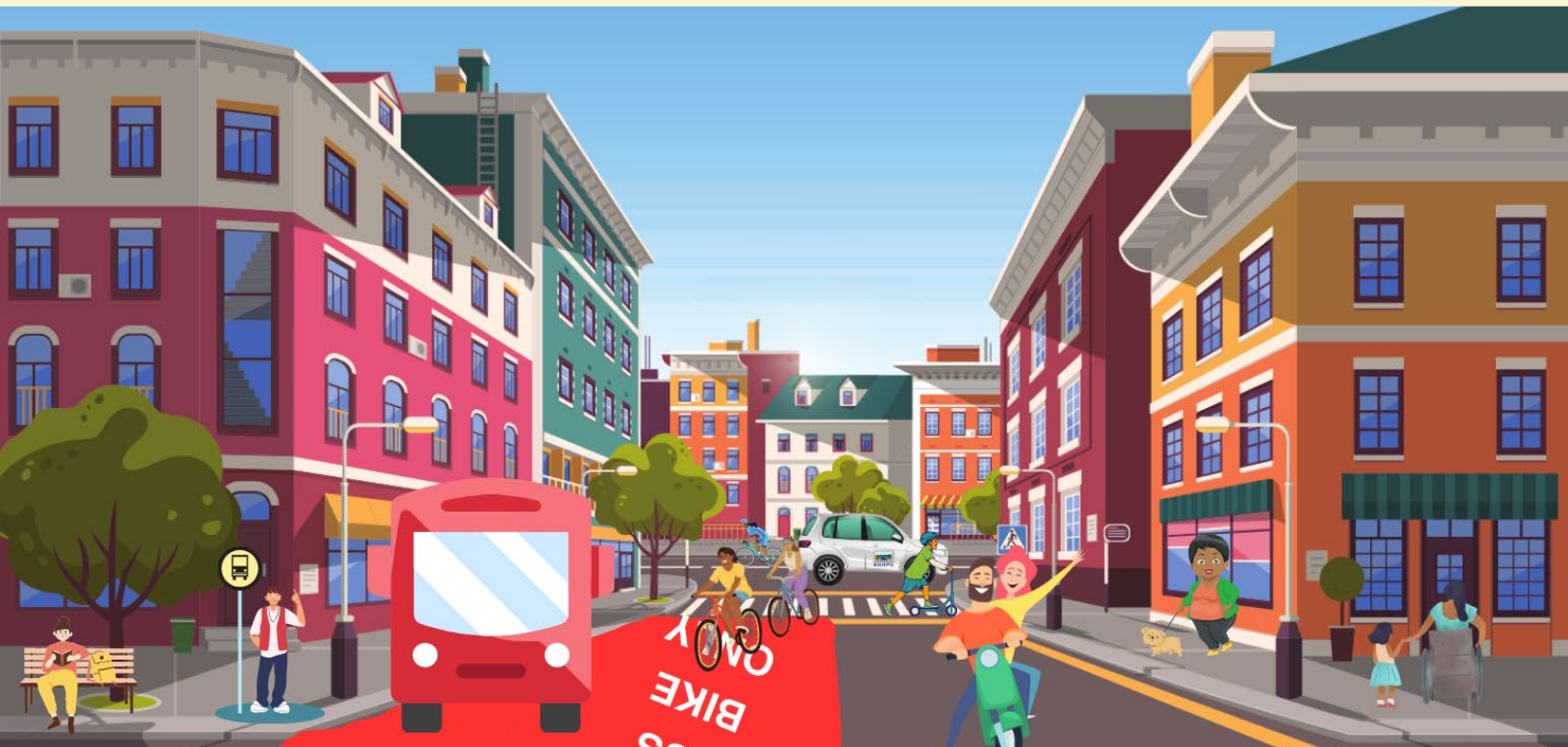
Design Tools

Obtaining design software can be expensive. While a community should intend to have a professional engineer design a roadway, planners, local decision makers, and members of the public should have opportunities to envision what their roadways could look like if they were 'complete'. [Streetmix](#) is a tool that allows you to design, remix, and share your neighborhood street – all in your browser! Add trees or bike paths widen sidewalks or traffic lanes, and learn how your decisions can impact your community.



APPENDIX: PILOT PROJECTS (2016)

- **Before we begin**
- **Who will it be?**
- **Fracestown**
 - Location, Outreach, Demonstration, Results
- **Windham**
 - Location, Outreach, Demonstration, Results
- **Deerfield**
 - Location, Outreach, Demonstration, Results
- **Limitations**
- **Reflections**



Appendix: Pilot Projects (2016)

In mid-2016, SNHPC staff reached out to every Planning Board within the region, providing them with a brief presentation on Complete Streets and the benefits of a pilot program aimed at implementing elements of Complete Streets into their communities. The pilot program was intended to provide three communities in the SNHPC region with an opportunity to develop Complete Street Standards with elements of Complete Streets, education and outreach, or pursue a pop-up planning demonstration in their community.

Although each community and its projects had distinguishing features, there were many commonalities among the projects requested. There was a basic need for recognition that there are multiple users on most road systems. These project areas exhibited a lack of fog lines, center lines, and cross walks. Each situation called for a need for traffic calming and improved safety.

While there were vastly different reactions to the pilots among the three towns, the program was enlightening for all involved. It is our intention to implement more pilot projects for other SNHPC towns in the near future.

Originally, the project was designed to assist three communities, one urban, one suburban, and one rural community with developing and implementing a Complete Streets policy. However, the stakeholder group wanted a more robust pilot program. At their first meeting the Stakeholders requested more flexibility in the selection of project types. As a result, the Commission developed a Community Application Form that included a description of possible projects types: a Complete Streets policy, assistance with revising roadway standards or site and subdivision regulations to reflect Complete Streets principles, or a pop-up planning or demonstration project such as designing and implementing temporarily bike lanes.

A. BEFORE WE BEGIN

Over the course of two months, staff reached out to all participating communities in the SNHPC region, scheduling a short presentation on Complete Streets, project details, and the pilot program. Presentations were made to each community's Planning Board and attending staff (note, each community was different ranging from no staff to several staff from Planning and Public Works Departments). During the presentation, examples were shown of projects within New Hampshire and outside the state in a variety of settings. Discussion often ensued about potential projects with many questions including:

- what was feasible for a pilot program,
- would there be any cost to the community,
- what could be done for their community,
- how would NHDOT be involved if the roads were state maintained
- what was the cost of painting fog lines along roadways
- could there be rural and suburban applications for Complete Streets including Complete Streets policies

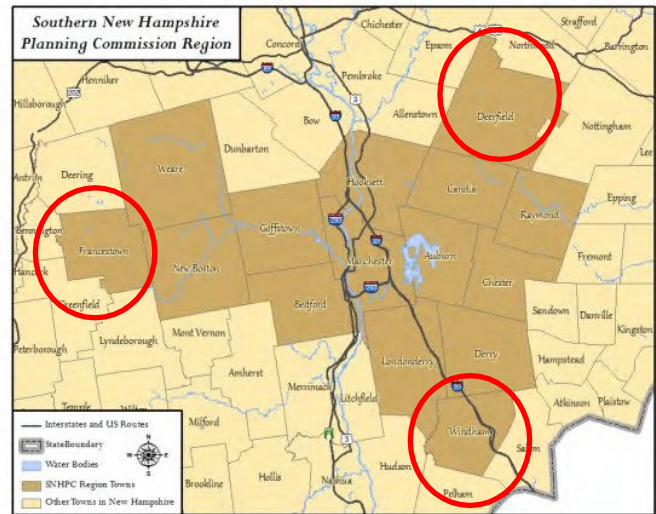
B. WHO WILL IT BE?

Three communities submitted applications the rural communities of Francestown and Deerfield, and the suburban community of Windham.

Although the communities and their projects all had distinguishing features, there were many commonalities among the projects requested. First and foremost it was noted that there was a basic need for the communities to recognize that there are multiple users for most road systems.

For all projects there was a lack of fog lines, center lines, and crosswalks. Each situation called for a need for traffic calming and improved safety.

Another common feature was the need for wayfinding signage.



C. FRANCESTOWN

Background

In mid-2016, SNHPC staff reached out to every Planning Board within the 15-community region providing them with a brief presentation on Complete Streets and the benefits of a pilot program aimed at implementing elements of Complete Streets into their communities. The pilot program was intended to provide three communities in the SNHPC region with an opportunity to develop a Complete Streets policy, develop design standards with elements of Complete Streets, education and outreach, or pursue a pop-up planning demonstration in their community.

Francestown applied to request a pop-up planning demonstration in their town center to give residents an opportunity to see and evaluate public realm improvements during the planning process and showcases temporary installations of possible improvements for Francestown's central roadway intersection. The following highlights the results of the planning demonstration.

Planning Demonstration Location

Francestown applied to have a planning demonstration in a 5-legged intersection, including the following roads:

- Heading north from the intersection towards Bennington, is route 47.
- Heading south from the intersection is the town road, the 2nd New Hampshire Turnpike South.
- Crossing through town, east to west, is route 136 coming in on the west from Greenfield and the east from New Boston.
- The fifth road is a town road, Poor Farm Road, that heads Northeast between 136E and 47N.



Community Outreach

On August 17th, the Southern NH Planning Commission (SNHPC) organized a “brain storming” session in Francetown to look at options to make our five-way intersection safer for pedestrians, bikers and traffic. There was a wide range of people in attendance: Police Chief Douglas, Road Agent Gary Paige, Selectman Henry Kunhardt, DOT representatives, Fire Chief Kullgren, as well as members of the Heritage Commission, Planning Board, Old Meeting House, FHIS, landscape artists and interested town residents.



Figure 77: Northbound on NH 136

A second meeting with town officials and NH DOT was organized on August 31st to follow up on the discussion from the first meeting and to create a list of temporary improvements to be installed for the planning demonstration.

As a result of the meeting, the group decided that the following temporary improvements would be implemented in Francetown center's intersection:

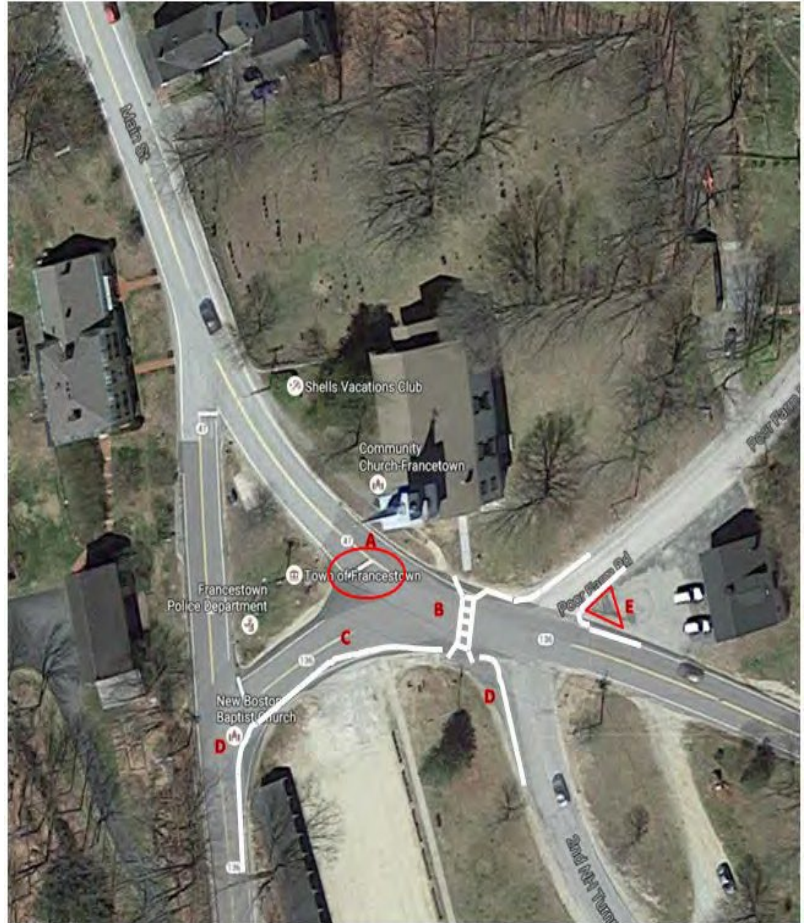


Figure 78: Community Meeting August 17, 2016

Demonstration Project Temporary Improvements:

- A. Fix stop bar – perpendicular to the road, stencil “STOP”, cover extended yellow line
- B. Create crosswalk
- C. Add fog lines, keeping lane width at 10 ½ feet as exists in Village Center
- D. Reduce radius around right hand turn on route 136 and SW corner 2nd NH Turnpike (consider utilizing cones)
- E. Better define travel lanes vs. non-travel area (consider utilizing traffic cones)

Measuring Results Prior To Demonstration

As a part of the demonstration, SNHPC, NH DOT, and community members decided to measure driver behavior before and during the demonstration. Community volunteers recorded vehicles at the stop sign at the intersection of NH 43 and NH 136, as local residents were concerned that drivers were reluctant to stop at the stop bar. The following table reflects the vehicle behavior at the mentioned stop sign.



Figure 79: View of NH 136 Looking East

Vehicle Movements at Stop Sign at Intersection NH43/NH136: September 21, 2016

Time	7-8 AM	8-9 AM	3-4 PM	4-5 PM	5-6 PM	
Vehicle Movement						Total
Full Stop	46	35	35	32	32	180
Rolling Stop	31	24	20	15	7	97
Slight Pause	10	0	6	3	0	19
Double Stop	1	0	1	1	2	5

While the majority of vehicles came to a full stop, a total of 97 vehicles rolled through the stop sign. Additionally, community volunteers measured vehicle reaction to pedestrians attempting to cross NH 136. The following table reflects the vehicle behavior during attempted pedestrian crossings.

Vehicle Behavior at Crosswalk on NH 136: September 21, 2016

Time	7-8 AM	8-9 AM	3-4 PM	4-5 PM	5-6 PM	Total
Vehicle yielded to pedestrians	13	14	27	29	35	118
Vehicle did not yield to pedestrians	31	14	42	43	90	220

The data collected by community volunteers shows that more vehicles did not yield to pedestrians. This was an expected result as no crosswalk exists in the intersection.

Planning Demonstration

On September 28th, SNHPC staff assisted town officials and community volunteers in the implementation of the temporary roadway markings using temporary chalk-paint and a hand-held marking wand. The following day, community volunteers used traffic cones, reflective white duct tape and a pedestrian crossing sign to mark a crosswalk on NH 136. Similarly, black roadway paint was applied on top of the yellow centerlines on the NH 47 SB approach so that the center line would stop at the stop bar. Prior to the temporary markings, the centerlines extended past the stop bar.

Planning Demonstration Results



Figure 80: Jamie Pike, Frankestown Town Administrator Applying Shoulder Markings



Figure 81: Temporary Pedestrian Crossing on NH 136

Community volunteers measured the same vehicle

behavior during the planning demonstration

to see if the temporary road markings influenced driving behavior.

**Vehicle Movements at Stop Sign at Intersection NH43/NH136:
September 29, 2016**

Time	7-8 AM	8-9 AM	3-4 PM	4-5 PM	5-6 PM	
Vehicle Movement						Total
Full Stop	45	24	45	30	32	176
Rolling Stop	39	28	11	15	18	111
Slight Pause	4	1	2	3	12	22
Double Stop	0	0	0	2	2	4

As illustrated in the table above, vehicle behavior did not change as a result of covering the extended centerlines of the Southbound NH 47 approach's stop bar. Community members felt that future improvements could include a stenciled "STOP" marking on the road as well as a larger stop sign.

Vehicle Behavior at Crosswalk on NH 136: September 29, 2016

Time	7-8 AM	8-9 AM	3-4 PM	4-5 PM	5-6 PM	
Vehicle yielded to pedestrians	31	15	60	58	53	217
Vehicle did not yield to pedestrians	4	1	23	29	15	72

As illustrated in the table above, the temporary pedestrian crossing markings and signage was effective in increasing the number of vehicles that yielded to pedestrians as well as decrease the number of vehicles that did not yield to pedestrians. While these results do show that roadway markings can have an impact on pedestrian safety, there are limitations to the demonstration and the intersection as a whole. For instance, there is a sight distance problem on NH 136 heading west towards the intersection. Without more signage warning vehicles of an approaching pedestrian marking, vehicles would need to come to a more abrupt stop when a pedestrian is using the cross-walk.

The results show that roadway markings can have an impact on vehicle behavior. SNHPC recommends that further discussion should be held between town officials, SNHPC and NH DOT to develop strategic roadway solutions for Frankestown's town center.

D. WINDHAM

Background

Windham submitted an application requesting a pop-up planning demonstration on Squire Armour Road in an effort to give residents an opportunity to see and evaluate public realm improvements during the planning process. Specifically, it was hypothesized that a four-foot bike/ped shoulder carved out of the 28' existing road width would calm traffic and allow local residents a safer space to exercise and gain better access to nearby Griffin Park (pictured, top right).



Planning Demonstration Location

Windham applied to have a planning demonstration on the westernmost 1,000' of Squire Armour Road, a subdivision road off of NH 111A/Range Road.

Community Outreach

On August 31, the SNHPC organized a "brainstorming" session/site visit to summarize the Complete Streets movement and its potential application on Squire Armour Road. There was a wide range of stakeholders in attendance: Town Administrator, Police and Fire Department reps, Community Development Director, NH DOT, as well as members of the Planning Board, Board of Selectmen, and interested town residents.

Timeline

- 8/31: Initial meeting and site visit with town officials/interested parties
- 9/26: Presentation to Board of Selectmen re: Complete Streets background and pilot project
- 10/11: Pilot project begins with staff applying temporary chalk lines
- 11/4: Survey ends, results tabulated

Planning Demonstration

On October 7 and 11, SNHPC staff, assisted by Windham Highway Department, painted dual 4' bike-ped lanes on the first 1000' of Squire Armour Road with temporary chalk-paint and a hand-held marking wand.



Figure 82: Initial Site Visit – August 31, 2016

As a result of the meeting, the group decided that the following temporary improvements would be implemented:

Proposed Temporary Demonstration Project (Squire Armour Road) – October 2016



Demonstration Project Temporary Improvements:

- A. Add fog lines 4 ft. from edge of pavement (in keeping with AASHTO recommendations, leaving a total vehicle lane width of 20 feet)
- B. Consider bicycle/pedestrian stencil on shoulder to show designation of bike/ped lane





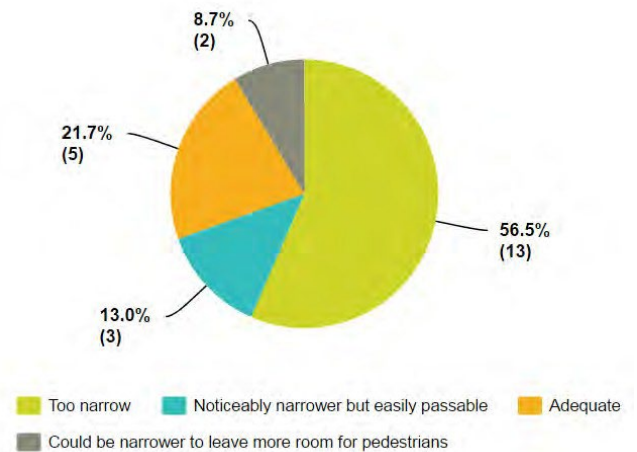
Figure 83: Measuring for Shoulder Markings – October 7, 2016



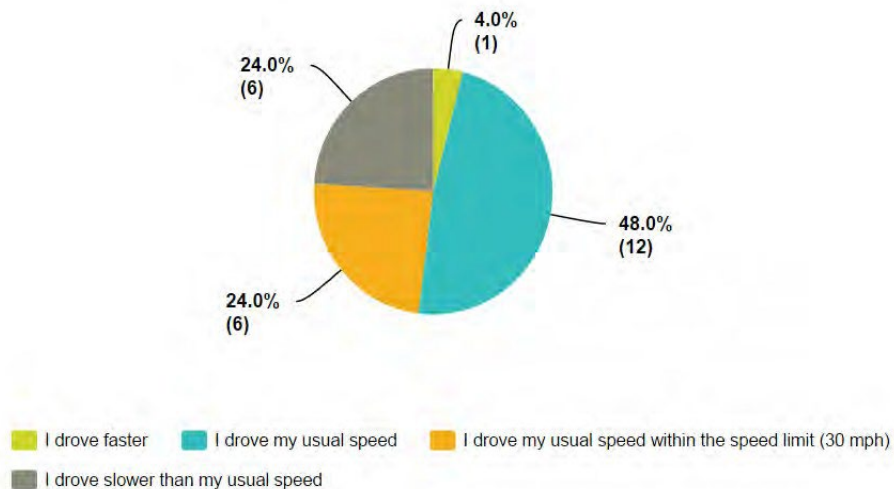
Figure 84: A Pedestrian in the Lane – October 11, 2016

Survey Results

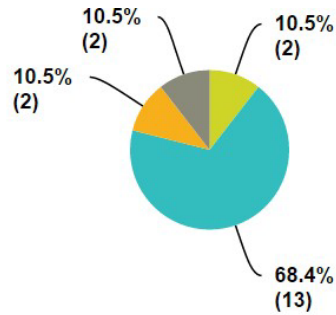
Community residents took part in an online survey via Survey Monkey; after nearly a month's window to participate, there were 25 responses. A few samples of the survey results are below:



- **57% (13 of 23) motorists found the lanes too narrow; 22% (5) found them adequate**
- **72% (18 of 25) motorists drove their usual speed through the project area; 6 drove slower than usual; 1 drove faster than usual**



- **68% (13 of 19) felt no difference in safety while using the marked lane; 4 felt safer or significantly safer; 2 felt less safe**



- I felt less safe in the marked lane than on an unmarked roadside
- I felt no difference when using the marked lane
- I felt a little safer when using the marked lane
- I felt significantly safer when using the marked lane

There were generally very negative attitudes toward the painted lines, with those surveyed claiming they were unnecessary and a poor use of resources. Anecdotally, they did not change driver behavior either.

E. DEERFIELD

Background

Deerfield submitted an application requesting a pop-up planning demonstration on Church Street in an effort to give residents an opportunity to see and evaluate public realm improvements during the planning process. Specifically, the town applied to lay temporary striping on Church Street in order to narrow the traffic way and provide space for bicycling and walking on the road in Deerfield Center.



Deerfield applied to have a planning demonstration on the first 1,000' of Church Street, a 26' to

Planning Demonstration Location

30' wide, town-owned road, intersecting with NH 107/NH 43 and Candia Road. The 2015 annual average daily traffic (AADT) volume on Church Street is 590 vehicles, a relatively low traffic volume compared to the AADT of 5700 vehicles on NH 107/NH 43.

Community Outreach

On August 25, the SNHPC organized a "brainstorming" session/site visit to summarize the Complete Streets movement and its potential application on Church Street. There was a wide range of stakeholders in attendance: Town Administrator, Police and Fire Department reps, Town Planner, NH DOT, as well as

members of the Planning Board, Board of Selectmen, Welfare reps, and interested town residents. Additionally, SNHPC distributed a press release to The Forum, a local newspaper which covers the towns of Deerfield, Candia, Northwood, and Nottingham in order to gather feedback through an online survey.

2016 Timeline

- 8/25: Initial meeting and site visit with town officials/interested parties
- 9/26: Presentation to Board of Selectmen re: Complete Streets background and pilot project
- 10/26: Pilot project begins with staff applying temporary chalk lines on Church Street
- SNHPC staff developed a survey for town residents, and requested for residents to take the survey through The Forum, a local newspaper. The Survey was administered through an online survey platform.
- 11/10: Survey ends, results tabulated

As a result of the meeting, the group decided that the following temporary improvements would be implemented:

Planning Demonstration



Figure 86: Initial Site Visit – August 28, 2016

On October 26, SNHPC staff, assisted by Deerfield Highway Department, painted dual 4' bike- ped lanes on the first 1000' of Church Street with temporary chalk-paint and a hand-held marking wand. Additionally, with insight and help from the Philbrick-James Library, staff painted four parking spaces for library visitors. SNHPC staff and the Highway Department also painted a cross-walk at the end of the demonstration area, where students from the local preschool cross the street to the playground behind the Deerfield Town Hall.



Figure 85: Marking Shoulders – October 26, 2016



Figure 87: Pedestrian Crossing – October 26, 2016

Survey Results

Community residents took part in an online survey via Survey Monkey; after nearly a month's window to participate, there were 13 responses. The majority of survey respondents felt that the newly narrowed lanes were adequate and that the narrowing slowed down traffic. Sixty-six percent of respondents stated that they would support the installment of wider shoulders and/or bike-ped lanes on Deerfield's streets to be added during future roadway improvements.

ped lanes on Deerfield's streets to be added during future roadway improvements.

Survey Highlights



88.89% (8 of 9) motorists found the lanes to be adequate; 11.11% (1) found them noticeably narrower but easily passable.

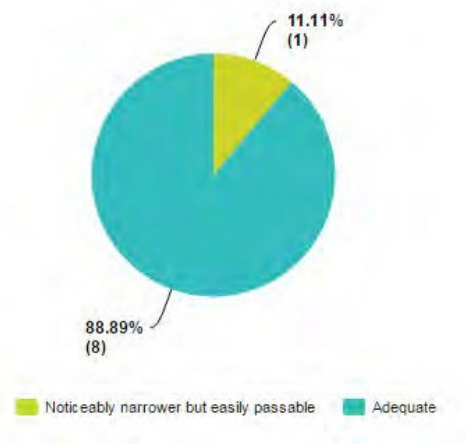
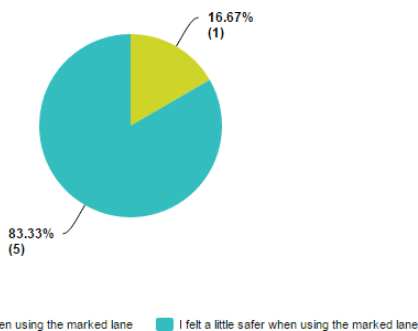
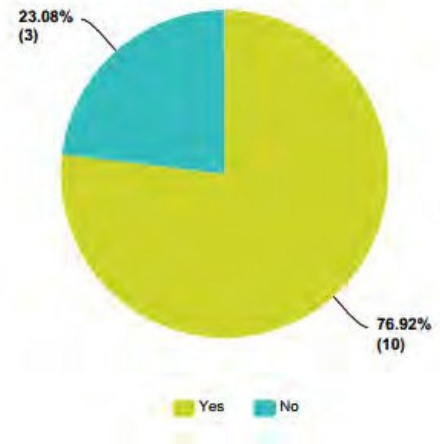
50% (6 of 12) motorists drove slower than their usual speed within the demonstration area; 33.33% (4) drove their usual speed within the speed limit (30mph); and 16.67% drove their usual speed.

83.33% (5 of 6) of pedestrians felt a little safer using the marked shoulder when a vehicle passed; and 16.67% (1) felt no difference.

76.92% (10 of 13) felt that the temporary crosswalk was in a good location; and 23.08% (3) felt that it was not in a good location.

Note: One respondent who chose "No" stated that while they liked the location of the temporary crosswalk, they would like to have another crosswalk on Church Street.

Another respondent who chose "No" wished the crosswalk existed when their children used to cross the road at that location in the past.



F. DEMONSTRATION PROJECT LIMITATIONS/REFLECTIONS

While the primary focus of this temporary planning demonstration was to educate the town, town residents on the benefits of Complete Streets, there were limitations to this demonstration. Due to the limited time-window of the temporary demonstration, the volume of feedback was ultimately lower than if the demonstration had been implemented for a longer period of time. Similarly, poor weather conditions shortened the demonstration due to rain washing away the temporary chalk-paint. Additionally, the demonstration materials were not MUTCD compliant which may have impacted the



feedback from Deerfield residents. For example, shoulder widths should be 4" wide, when the lines applied for the demonstration were only 2" wide. The chalk-paint was also non-reflective, making the paint almost invisible for vehicles traveling into the sun's location. Lastly, because the demonstration took place in late fall instead of summer, it is likely that more bicycle and pedestrian users of Church Street did not use the extended shoulders at all and thus missed an opportunity to provide feedback on the demonstration.

At a minimum, the demonstration projects were educational. They inspired the communities to talk about the concept of Complete Streets, to share concerns about their community's traffic concerns and road safety, and brought the community together to test out ideas.

Materials

Demo projects were carried off with a minimal use of materials: specifically, industrial choice temporary chalk paint and a rolling applicator wand that allowed participants to apply paint in a fairly straight, uniform manner. The cost of 12 cans of paint was approximately \$42. Manchester DPW loaned SNHPC an applicator wand, which ordinarily would have cost approximately \$23.

Overall limitations of demo projects:

Materials – 2 inch width line vs. 4 inch standard, spray chalk to ensure non-permanence but susceptible to weather conditions, spray chalk is non-reflective whereas standard road paint is reflective

No signage – We were unable to obtain “STOP” or bicycle stencils that would have enhanced the demonstrations

Weather – Unfortunately, rain came directly after application of both Deerfield’s and Windham’s demonstrations

Seasonal Uses – As all the pilot programs were installed in the fall, fewer bicyclists and walkers were able to “test” the demonstration sites than might have if applied in the summer.

