



TROY COMPLETE STREETS

PLANNING & DESIGN GUIDELINES ■ 2016



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ACKNOWLEDGEMENTS

In 2015 and 2016, the Town of Troy worked with the Southwest Region Planning Commission (SWRPC) to develop these design guidelines as part of the development of a local Complete Streets Policy. The Troy Planning Board provided guidance, direction and locally relevant input to SWRPC staff throughout the process of developing this document. The Town and SWRPC are grateful for the contributions provided by members of this committee, who are listed below. The Town of Troy and SWRPC would also like to thank the following individuals, who served on the planning board until March 2016: Francis Fournier and Curtis Hopkins.

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INTRODUCTION

PROJECT BACKGROUND

Throughout the fall of 2015 and the first half of 2016, the Town of Troy worked with Southwest Region Planning Commission (SWRPC) to develop a Complete Streets policy. This policy has the Town consider all modes of transportation and the safety needs of all users, including motorists, pedestrians, bicyclists, seniors, youth, and persons with disabilities when making improvements to existing infrastructure or building new projects in the Village Center. In addition, it encourages street design that will be constructed in a manner that supports the surrounding land use and transportation context.

The policy establishes that the Town will utilize planning and design guidelines for Complete Streets. This document represents these guidelines, and serves as a resource for Town staff and officials when planning, designing, rehabilitating, constructing, reconstructing, or maintaining the public right of way. This document also serves as guidance for residents, businesses, and others to better understand Complete Streets concepts and design elements and how safety measures can be incorporated into the Town's different roadway types and land use contexts.

WHAT ARE COMPLETE STREETS?

Complete Streets are streets that are designed and operated for everyone, regardless of age, ability, or how people get around.

- **Complete Streets make it safe and easy to walk to the store, cross the street, ride a bike to school, and drive to work.** Complete Streets incorporate design elements that emphasize safety, mobility and accessibility for those using a variety of travel modes. They can include features such as wide and safe sidewalks or shoulders, clearly marked crosswalks, space for bicyclists to travel, places to sit, street trees, and more.
- **What a Complete Street looks like will largely depend on where it is and who is using it.** For example, a Complete Street in a village center will look different than a street in a more rural area. In areas where many people walk, vehicle speeds should be slower and there should be highly visible and frequent places to cross the street. These areas should also have wider sidewalks, places for people to sit and rest, and landscaping to make it a desirable place to walk. If many large trucks are using the street, travel lanes will need to be wide enough so that these vehicles can pass each other and make safe turns. If mostly cars and bicyclists are using the street, the lanes can be narrower, which will help slow down vehicle speeds and make it safer for all users.

BENEFITS OF COMPLETE STREETS

- ✓ **INCREASE SAFETY** - By designing the road for all users, Complete Streets improve safety for everyone.
- ✓ **REDUCE BARRIERS FOR SENIORS AND PERSONS WITH DISABILITIES** - Complete Streets can include curb ramps at crosswalks, audible or tactile signals that can be used by blind pedestrians, longer crosswalk times, smooth and unobstructed sidewalks, and places to sit and rest.
- ✓ **INCREASE ECONOMIC VITALITY** - People can save money when they switch to biking, walking, and taking public transportation, which allows them to spend this money in other ways. In addition the presence of sidewalks, bike paths, and other elements that make neighborhoods more walkable has been shown to increase property values, stimulate the local economy, and attract new businesses and investment, especially in retail and downtown areas.
- ✓ **IMPROVE COMMUNITY HEALTH** - Complete Streets make active living an easy option by providing safe and convenient opportunities for people to walk and ride bikes. Studies have shown that people who live in walkable areas are substantially less likely to be overweight or obese than people who live in neighborhoods where walking is unsafe.
- ✓ **REDUCE AIR EMISSIONS** - Walking and bicycling are zero-emission transportation modes, and public transportation has much lower emissions than driving in a single occupancy vehicle. This helps to reduce heat-trapping pollution and makes the air we breathe cleaner.



COMPONENTS OF COMPLETE STREETS

Complete Streets is a flexible approach to planning, designing, constructing, and maintaining roadways that takes into consideration the needs of all users of the road. Land use, functional classification of the road, predominant travel mode, building types, and right-of-way width are a few examples of contextual information that should be considered when applying Complete Streets concepts. The following is a partial list of common components of complete streets which are organized by “Roadside Zone” and “Roadway Zone.” Each component has a description and general guidance on when each design element should be considered. For more detailed design guidance, please see the “Additional Resources section of this document on page 15.

ROADSIDE ZONE

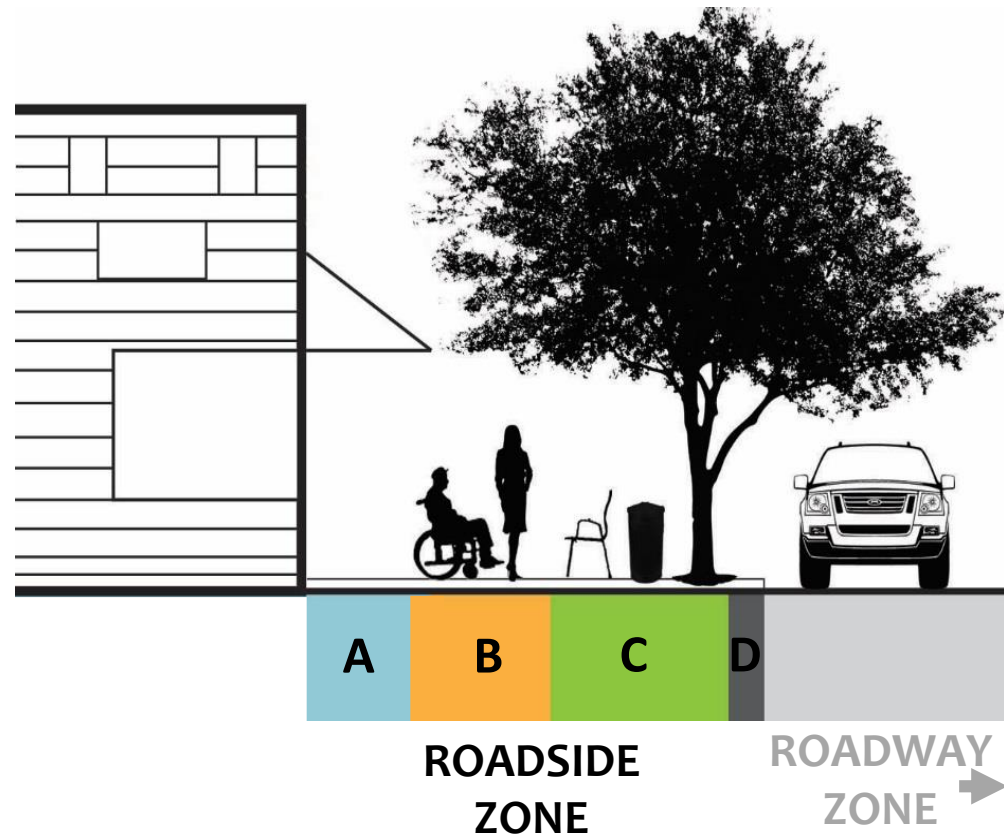
The Roadside Zone system encompasses the section of right-of-way between the curb/vehicle way and the adjacent land use. It is comprised of the following four zones:

A. FRONTAGE ZONE: The area of the sidewalk that transitions to adjacent land uses; commonly used for quasi-public activities, such as outdoor cafes.

B. PEDESTRIAN THROUGH ZONE: The area of the sidewalk that should be clear for walking.

C. FURNITURE ZONE: Area of the sidewalk where refuse receptacles, benches, utilities and other objects are best placed.

D. CURB ZONE: Curbed area between the sidewalk and the vehicle ways; usually includes drain inlets.



COMPONENTS OF COMPLETE STREETS

ROADSIDE ZONE



SIDEWALKS. Paved sidewalks provide a safe space for people on foot to travel within the right-of-way by physically separating them from motor vehicles and on-road bicycles. They help create welcoming public spaces and should be prioritized in the village centers and neighborhoods within walking distance of the village center. They should be ADA-compliant and ideally be separated from motor vehicle traffic by a buffer, curb, or both whenever possible. Sidewalks are most useful when they are located on both sides of the street, however in some cases it may be more practical to have a sidewalk on one side of the street due to expected future use, constrained right-of-way, or cost. In downtowns and village centers, sidewalks may be wider to accommodate higher volumes of pedestrian traffic.



STREET FURNITURE. Street furnishings create the setting for people to rest, eat, and interact socially within the public right-of-way. They can include anything from benches and trash cans to public art, utility boxes, and anything else that is placed in the roadside zone. Street furnishings should not obstruct entrances to buildings or the five foot pedestrian throughway. In addition to the functional aspect of street furnishings, they can also be socially significant by drawing people together in comfortable and attractive spaces. In general, street furniture should be prioritized on streets with high pedestrian volumes in downtown/village center areas or where furnishings are warranted by adjacent land use and pedestrian activity.



CURB EXTENSIONS. Curb extensions, also called “bulb-outs,” are an extension of the sidewalk into the parking or travel lane at intersections and mid-block crossings. They reallocate underutilized roadway space around street crossings to green space and widened sidewalks, increasing the available space for street furniture, plantings, and street trees. Curb extensions serve a number of purposes for both pedestrians and drivers, including: improving visibility for pedestrians and motorists, shortening the crossing distance for the pedestrians, and calming traffic by visually and physically narrowing the roadway. Curb extensions should be considered in areas with marked crosswalks or where safety of crossings could be improved by increased visibility.

COMPONENTS OF COMPLETE STREETS

ROADSIDE ZONE



STREET LIGHTING. Street lighting facilitates safe movement of traffic and provides a sense of safety and security for pedestrians, especially in the evenings and at night. Lighting designs should ensure pedestrian walkways and crosswalks are sufficiently lit, use pedestrian scale lighting (16 feet in height or lower) alone or in combination with roadway scale lighting in high-activity areas, and use uniform lighting levels. LEDs are highly recommended for all street lights as they use less energy, improve color rendering, minimize light trespass (unwanted light), and require less maintenance.



GREEN BUFFER. A green buffer is a planting strip of grass, trees, or plants that separates the sidewalk from the street. Green buffers should be used whenever possible because they increase pedestrian safety and comfort, and they provide many other useful functions such as space for street signs, snow storage, street furniture, mail boxes, fire hydrants, utility shut-offs, and poles for overhead wires. At a minimum, green buffers should be 2 feet wide for snow storage. If street trees are present, they should be at least 5 feet wide.

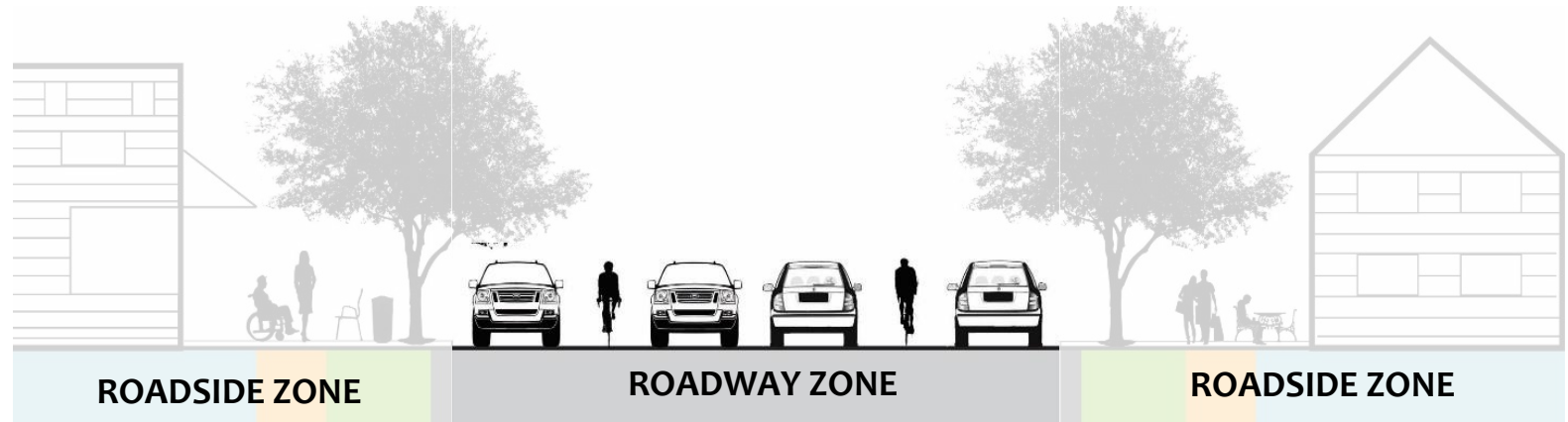


STREET TREES. Street trees provide scale and definition to the street and greatly improve pedestrian comfort. They also reduce stormwater runoff and local air pollution, sequester carbon, mitigate the urban heat island effect, provide shade for pedestrians, and provide habitat for wildlife. Trees calm traffic by reducing the apparent width of the street and can raise nearby property values. They may be placed in planting strips between the sidewalk and roadway, in tree basins in the sidewalk, and in medians. In general, street trees should be high crowned deciduous species that are tolerant of salt, pollution, soil compaction, and drought.

COMPONENTS OF COMPLETE STREETS

ROADWAY ZONE

The Roadway zone is the area dedicated to on-street vehicular travel, which includes bicycles, cars, trucks, and buses. This area may also have space dedicated to parking.



TRAVEL LANE. The travel lane is the area of the roadway used for vehicular movement, including cars, trucks, buses, and bicycles. The width of the travel lane is a critical dimension that influences vehicular speed. Narrower streets help promote slower driving speeds which, in turn, reduce the severity of crashes. In general, 10 foot travel lanes provide adequate safety while discouraging speeding, however 11 foot lanes are more appropriate for truck routes. In areas with low traffic volumes and low speeds, 9 foot lanes may be appropriate.



BICYCLE LANE. Bicycle lanes provide dedicated space for bicyclists along the roadway, and should be considered for roads with high traffic volumes and/or speeds. Typically, bike lanes move with the direction of traffic (i.e. one lane in each direction) and are placed on the curb edge of the roadway. At a minimum, marking of the bike lane should include a white line, bicycle icon, and directional arrow. Four foot lanes are a minimum; 5-6 feet is preferable where space is available. Protected bicycle lanes, also called cycle tracks, are recommended where both traffic speeds and volume are high, there is high turnover in on-street parking, or in other high-stress situations.

COMPONENTS OF COMPLETE STREETS

ROADWAY ZONE



SHARED LANE MARKINGS. Shared Lane Markings, or “Sharrows,” are painted bicycle symbols that serve as a visual reminder to motorists that bicyclists share the road. In addition, they offer an ideal ‘line’ for bicyclists to take on the street, away from the ‘door zone’ of parked cars and in areas clear of debris. Sharrows should be considered for roads with travel lanes that are too narrow for a motor vehicle and a bicycle to travel comfortably side by side within the same travel lane and where speeds are 35 mph or lower.



PEDESTRIAN CROSSINGS. Pedestrian crossings, i.e. crosswalks, alert motorists and bicyclists to look for pedestrians and guide pedestrians to preferred crossing locations. In areas with high pedestrian traffic and/or multiple destinations, frequent crossing opportunities can help reduce the number of people crossing at undesirable or unsafe locations. In general, pedestrians should not have to walk more than 300 feet to find a place to safely cross the street. Curb extensions can help reduce the crossing distance for crosswalks, which improves safety by making pedestrians more visible to motorists and shortening the distance/time it takes for people to cross the street.



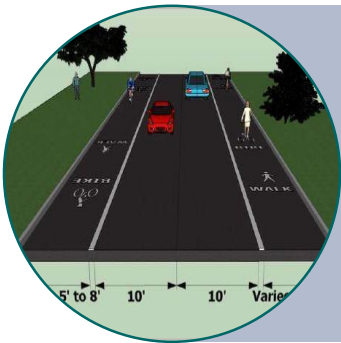
ON-STREET PARKING. On-street parking can serve several purposes, including meeting some of the parking demands of adjacent land uses, providing a buffer between pedestrians and traffic, and adding to the activity on the street. It is a form of Shared Parking, with each space serving many destinations, and can reduce the need for off-street parking. On-street parking should be considered in village centers/downtown areas with retail destinations. In areas with high bicycle traffic, Sharrows should be used to direct bicyclists away from the door zone of parked cars.

COMPONENTS OF COMPLETE STREETS

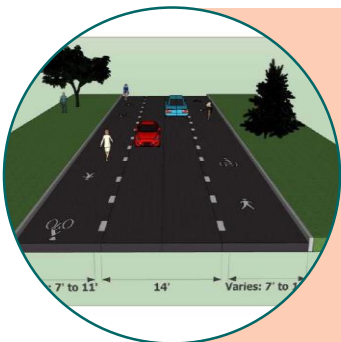
ROADWAY ZONE



PEDESTRIAN ISLAND. Pedestrian islands, also called “pedestrian refuge islands” or “pedestrian safety islands,” are above-grade islands placed within the center of the road to facilitate pedestrian crossing on busy and/or wide streets. They limit pedestrian exposure in the intersection by allowing pedestrians to cross in two shorter trips rather than one long trip, and they also serve as a traffic calming feature. While pedestrian islands may be used on both wide and narrow streets, they are generally applied at locations where speeds and volumes make crossings prohibitive or where crossings are unusually wide (i.e. more than three lanes).



BIKE-WALK SHOULDERS. Bike-Walk shoulders can be used to accommodate pedestrian traffic in areas where sidewalks are not practical, traffic volumes are relatively low, and right-of-way is available. Adding Bike-Walk shoulders visually narrows the roadway and slows traffic, which can be especially beneficial in residential areas with wide paved streets. “Bike-Walk” shoulders should ideally be at least 5 feet wide, on both sides of the road, and contain pedestrian and bicycle symbols to indicate their use as a walkway/bikeway. The space allocated to travel lanes should be at least 18 feet. On roads with insufficient paved width, advisory Bike-Walk shoulders may be a good alternative to bike-walk shoulders.



ADVISORY BIKE-WALK SHOULDERS. Advisory Bike-Walk shoulders are similar to Bike-Walk shoulders, however they have dashed white lines instead of solid white lines separating them from the travel lanes, which indicates that vehicles can use the shoulder space to pass each other. This treatment should be considered on roads where sidewalks are not practical, traffic volumes are low, and the road is too narrow for bike-walk shoulders. Advisory bike-walk shoulders should ideally be a minimum of 5 feet wide, on both sides of the road, and contain pedestrian and bicycle symbols to indicate their use as walkway/bikeway. The space allocated to travel lanes should be at least 14 feet.

TROY COMPLETE STREETS DESIGN CONSIDERATIONS

STREET DESIGN CONSIDERATIONS

The following section outlines a series of street design recommendations for Town staff, officials, and others to consider when working in the public right-of-way. The intent of these recommendations is to provide flexible guidance for accommodating and balancing the needs of multiple users of the roadway when making decisions. These considerations are intended to provide a simple and effective means to weigh and consider street design options, given a range of conditions.

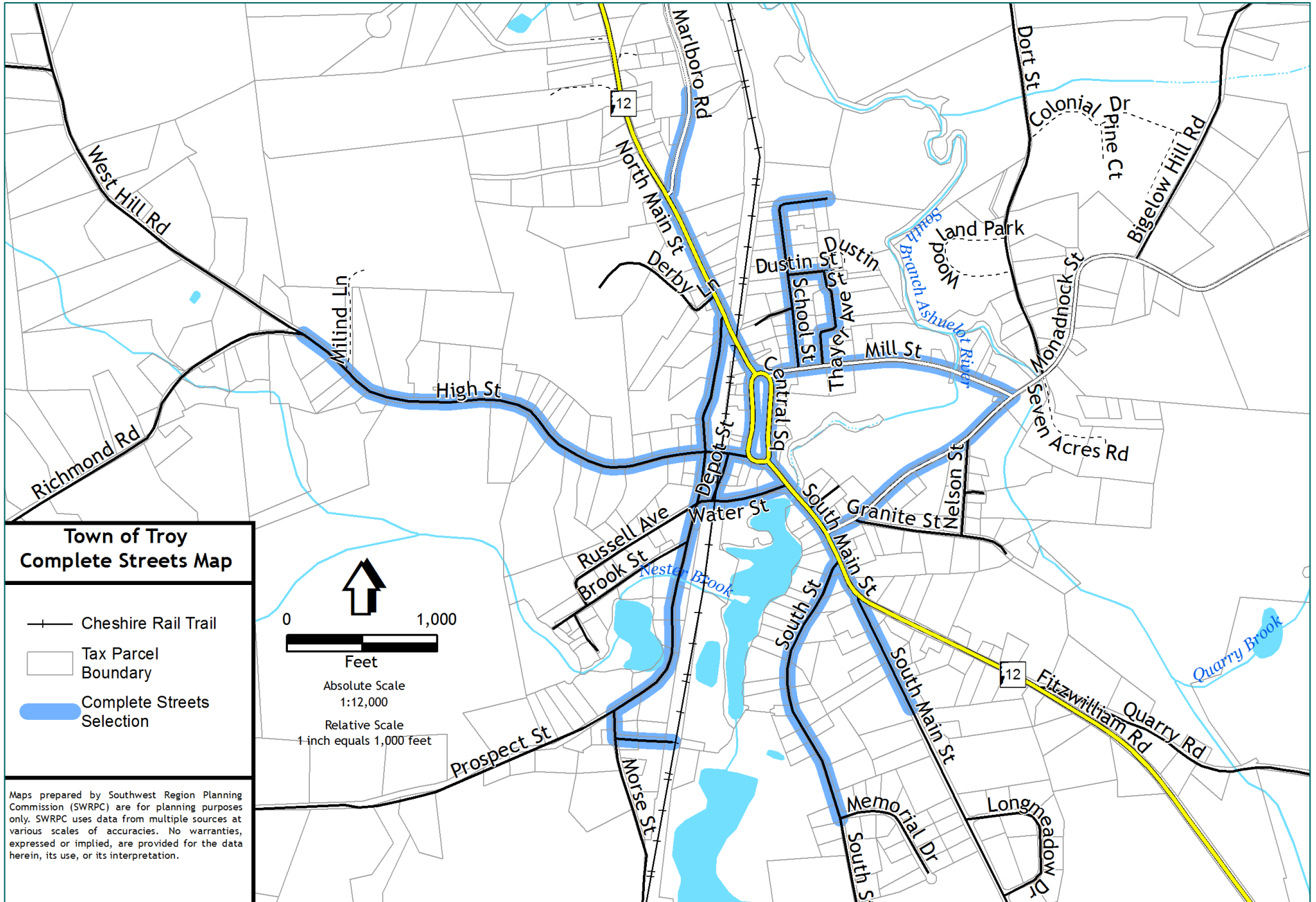
SCOPE OF APPLICABILITY

The Troy Complete Streets policy applies to streets within the Village Center of Troy and surrounding areas, as shown in blue on the map on page 12. This area includes NH Route 12 between Marlboro Road and South Main Street as well as portions of other roadways that lie within the Village Center and sections of Residential zones near the Village Center. A full list of the streets that are subject to the Troy Complete Streets policy are shown below.

- | | | |
|---|--|---|
| <input type="checkbox"/> Brickyard Road | <input type="checkbox"/> Marlboro Road* | <input type="checkbox"/> South Main Street* |
| <input type="checkbox"/> Central Square | <input type="checkbox"/> Mill Street | <input type="checkbox"/> South Street* |
| <input type="checkbox"/> Depot Street | <input type="checkbox"/> Monadnock Street* | <input type="checkbox"/> Starkey Avenue |
| <input type="checkbox"/> Dustin Street | <input type="checkbox"/> Morse Street* | <input type="checkbox"/> Thayer Avenue |
| <input type="checkbox"/> High Street* | <input type="checkbox"/> Prospect Street* | <input type="checkbox"/> Water Street |
| <input type="checkbox"/> Main Street/NH Rt. 12* | <input type="checkbox"/> School Street | |

* Denotes partial roadway segment

TROY COMPLETE STREETS SCOPE OF APPLICABILITY



DESIGN CONSIDERATIONS

ROADSIDE ZONE

SIDEWALKS

- ❑ 5' minimum width and built to state specifications; wider where feasible and pedestrian activity warrants
- ❑ 5' minimum pedestrian through zone
- ❑ Located on both sides of the roadway, right of way permitting
- ❑ Ramped at all driveway entrances and street intersections with a slope not to exceed 1:12
- ❑ Located at least 5' from edge of street pavement, right of way permitting
- ❑ Consider curb extensions at mid-block crosswalks or crosswalks on roads with on-street parking
- ❑ Concrete, asphalt, or pervious materials should be used

GREEN BUFFER

- ❑ 5' minimum for street trees
- ❑ 2' minimum clear area for snow storage
- ❑ Located adjacent to sidewalk
- ❑ 6" curb in areas where green buffer not feasible or less than 5' wide
- ❑ Consider native tree, shrub, and perennial plantings that are wet/dry/salt tolerant

STREET FURNITURE

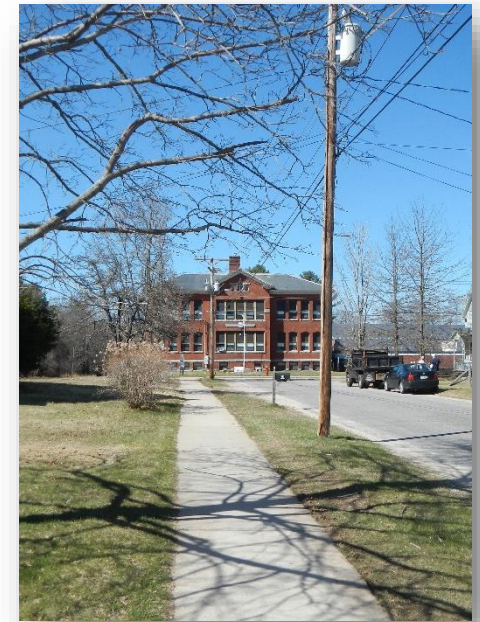
- ❑ Street furniture should be placed adjacent to parking or travel lanes (in-between pedestrian through-zone and travel lane)
- ❑ Street furniture should not obstruct the 5' pedestrian through zone
- ❑ Consider placing trash cans at intersections or near retail/restaurant locations
- ❑ Consider placing benches at mid-block crossings
- ❑ Consider placing bike racks near destinations (library, Town Hall, Retail/office locations)

LIGHTING

- ❑ Pedestrian scale fixtures (10'-16' high) placed 50' apart if space allows in high volume pedestrian areas
- ❑ Consider energy efficient lighting (e.g. LED, solar fixtures, etc.)

WAYFINDING

- ❑ Consider pedestrian and bicycle wayfinding signs that show local landmarks, access points to the Cheshire Rail Trail, and distances in terms of time (i.e. minutes walking or biking to a destination).
- ❑ Wayfinding signs should not obstruct the 5' pedestrian clear zone



DESIGN CONSIDERATIONS

ROADWAY ZONE

VEHICLE TRAVEL LANES

- ❑ 9' minimum (if conditions allow); 12' maximum

ON-STREET PARKING

- ❑ Angled parking on-street in low-speed commercial areas and where bicycle traffic is separated from motorist traffic (17' long by 8' wide at a 45 degree angle perpendicular to curb)
- ❑ Parallel on-street parking (7' minimum width, 8' preferred)
- ❑ Consider reverse (back-in) angled parking
- ❑ Consider use of pervious materials

PEDESTRIAN CROSSINGS

- ❑ 6'-10' wide
- ❑ Longitudinal ladder markings per MUTCD requirements
- ❑ Comply with ADA for smoothness and visibility
- ❑ Placed at every intersection
- ❑ Consider using special pavement treatment at high volume pedestrian intersections (e.g. integral colored pavement, special pavers, high visibility paint, curb extensions, raised, etc.)
- ❑ In areas of high pedestrian volume consider mid-block crossings if no crosswalks within 150'
- ❑ If speeds and volume warrant, consider signage
- ❑ Consider placing a landscaped median/refuge island or using curb extensions on roadways with paved widths greater than 36'

BICYCLE LANES:

- ❑ Use in areas where traffic volumes and/or speeds are high and right of way permits
- ❑ 4' minimum; 5'-6' preferred
- ❑ 5' minimum if next to a parking lane
- ❑ Use bike safe drain grates
- ❑ Minimum visibility treatment of white line, bicycle icon and directional arrow
- ❑ Place on both sides of two-way streets, right of way permitting
- ❑ Consider 3' striped buffer zone between bike lane and traffic
- ❑ Consider integrating color pavement (e.g. green) for complex areas, such as intersections

SHARED LANE MARKINGS/SHARROWS

- ❑ Consider as an alternative to bike lanes in areas where bike lanes are not feasible due to limited right-of-way
- ❑ Minimum visibility treatment of white chevron/bicycle symbol directing bicyclists to ride in the safest location within the travel lane
- ❑ Place 4' from the edge of the curb or pavement on streets without on-street parallel parking; 11' from the edge of the curb or pavement if street has on-street parallel parking; in middle of travel lane if diagonal parking is present



ADDITIONAL RESOURCES

General Resources:

- National Complete Streets Coalition: www.smartgrowthamerica.org/complete-streets
- Healthy Eating Active Living (HEAL) NH: www.healnh.org/index.php/complete-streets-policies
- American Planning Association: www.planning.org/research/streets/resources.htm
- American Association of Retired Persons (AARP): www.aarp.org/livable-communities/archives/info-2014/complete-streets.html
- U.S. Department of Transportation: www.fhwa.dot.gov/environment/bicycle_pedestrian

Recommended Street & Roadway Design Resources:

- [Urban Street Design Guide](#) and the [Urban Bikeway Design Guide](#), published by the National Association of City Transportation Officials (NACTO)
- [Walkable Urban Thoroughfares: A Context-Sensitive Approach](#), developed by the Institute of Transportation Engineers and the Congress for the New Urbanism;
- [Separated Bike Lane Planning and Design Guide](#), published by the Federal Highway Administration;
- [Guide for the Development of Bicycle Facilities \(4th edition\)](#), published by the American Association of State Highway and Transportation Officials (AASHTO).