CITY OF MONTPELIER

COMPLETE STREETS DESIGN REPORT

ACKNOWLEDGMENTS

CITY STAFF

Mike Miller, AICP, CFM
Director, Department of Planning & Community Development

Kevin S. Casey
Community Development Specialist, Department of Planning & Community Development

Corey Line
Project Management Director, Department of Public Works

PROJECT TEAM

Stu Sirota, AICP
Principal, Alta Planning + Design

Laura Byer
Planner, Alta Planning + Design

JUNE 2018

City of Montpelier PLANNING & COMMUNITY DEV.

alta PLANNING + DESIGN

TABLE OF CONTENTS

CHAPTER 01: INTRODUCTION

CHAPTER 02: EXISTING CONDITIONS

CHAPTER 03: COMPLETE STREETS TREATMENTS

CHAPTER 04: ROAD TYPOLOGIES & APPLICATIONS

CHAPTER 05: IMPLEMENTATION

1. INTRODUCTION

1. INTRODUCTION

THE CITY

Montpelier, the state capital of Vermont, has a unique and rich character. Its historic downtown is vibrant and walkable, supported by its streetscape, institutions, traditional urban fabric, and architectural landmarks that reinforce a strong sense of place.

The streetscape is an attractive mix of government buildings, shops and restaurants, street trees, parklets, natural features, the river, etc., making for an interesting place to stroll, ride a bike, or just sit and relax.

The Winooski River and North Branch are central features running through downtown. The railroad parallels the river. Traditional development patterns typical of the 19th century, illustrative of victorian character the buildings downtown core (face onto) constructed up to the sidewalk and right-of-way, while residential buildings are set further back from the street.

The city sits in a valley in the middle of the Green Mountains. The street network in and beyond the downtown that leads to green, leafy neighborhoods are oriented in an irregular fashion as a response to the topography and ecology of the city, including its rivers and hills.

FOUNDATION OF THIS PLAN

Montpelier is committed to providing safe and accessible modes of transportation for every citizen and visitor. Planning for multiple modes of transportation and developing a Complete Streets Plan has been a goal of the Montpelier City Council since the City adopted its Master Plan in 2010, and re-adopted in 2015 and 2017.

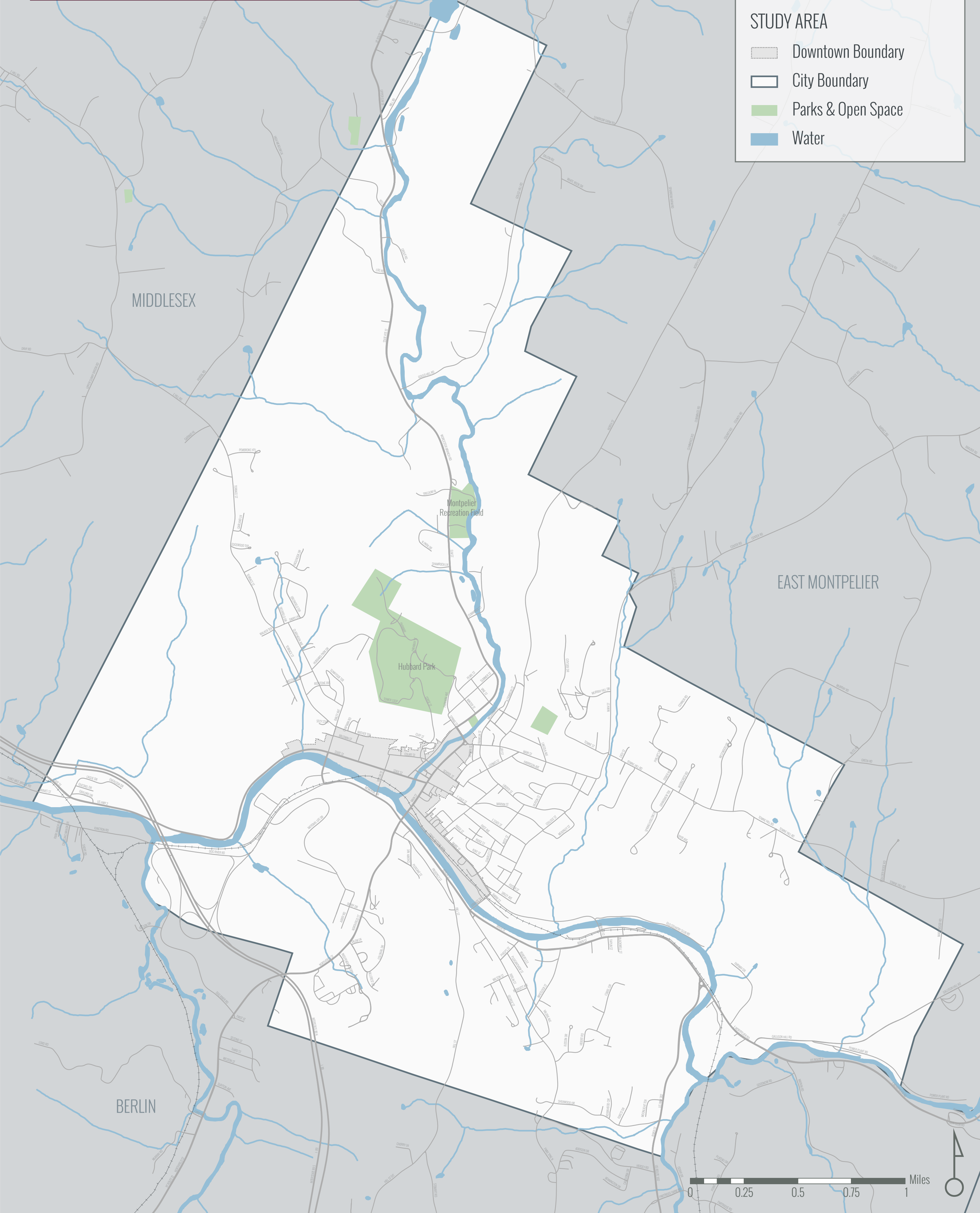
The City of Montpelier has limited resources, multiple needs, and a high level of citizen participation. It is a community that is dedicated to improving the experience of residents, visitors, and daytime employees and working toward the goals of recent complete streets legislation.

The City aspires to develop a plan that looks at all users and balances conflicting needs (such as on-street parking and bike lanes) which, when built, will create a complete street system. Each year the City has taken active steps to develop the foundation of a plan to address bicycles, pedestrians, vehicles, and public transportation opportunities while addressing stormwater management opportunities to increase the City's resilience.

Montpelier's complete streets plan will build off of numerous prior planning efforts and policy directives, that have laid the groundwork for this complete streets plan. These include:

The Montpelier in Motion Pedestrian and Bicycle Master Plan, which will make the City of Montpelier a cohesive, safe, and convenient multi-modal transportation network inclusive of transit, trails, sidewalks, and bicycle facilities accessible to people of all ages and abilities that fosters both activity and community all while preserving and enhancing the natural environment.

CITY OF MONTPELIER STUDY AREA



The City of Montpelier Master Plan (Adopted 2010), which includes numerous goals and objectives for making the city more pedestrian, bicycle, and transit friendly.

The Vermont Complete Streets Law (Act 34) is "an act relating to a transportation policy that considers all users." (Act 34) The law was approved on May 18, 2011 and went into effect on July 1, 2011. This law states:

"The purpose of this bill is to ensure that the needs of all users of Vermont's transportation system—including motorists, bicyclists, public transportation users, and pedestrians of all ages and abilities—are considered in all state and municipally managed transportation projects and project phases, including planning, development, construction, and maintenance, except in the case of projects or project components involving unpaved highways. These "complete streets" principles shall be integral to the transportation policy of Vermont." (Act 34)

The Montpelier Stormwater Master Plan and Stormwater Opportunity Prioritization Recommendations, which Identify high priority water resource concerns and develop conceptual solutions that will guide the design and implementation of future projects aimed to improve stormwater management across the City.

The Alternate Transportation Fund (ATF), which consists of 5% of the city's annual parking meter revenue. This equates to approximately $45,000 per year dedicated to bicycle infrastructure improvements, such as adding bike racks and bike lanes, to make Montpelier a more bicycle-friendly city.

EPA Greening Americas Capitals & ORW. The City of Montpelier identified five sites to explore design concepts towards achieving a more pedestrian and bicycle-friendly downtown while incorporating green infrastructure to treat stormwater, improve water quality, and create attractive public spaces. These include:

1. Barre Street from the recreation center to Main Street
2. Main Street and Barre Street intersection
3. Heney and Jacobs parking lots
4. Taylor Street from the Winooski River to State Street
5. State Street and Main Street intersection

This plan will incorporate stormwater drainage treatments into street designs to mitigate potential flooding issues while transforming Montpelier's street infrastructure to cater to all users.

UNDERSTANDING COMPLETE STREETS

A majority of roadways in the United States have been designed with the primary function of connecting places via automobile travel. Roadways designed in this fashion typically function as efficient conduits for motor vehicles, but are often poor connectors for other modes of transportation.

Streets have the ability to function as both a connection and a social space by establishing a

relationship to the places where people live, work and play. The complete streets design philosophy is an approach that enhances current streets by enabling safe, convenient, and comfortable travel and access for users of all ages and all abilities regardless of their transportation mode. It is a person-oriented design philosophy that seeks to facilitate safe travel and a sense of place for those walking, bicycling, driving an automobile, or riding public transportation.

The concept of complete streets also includes the idea of "multimodal networks.," which recognize that streets which are designed to be "complete" in the fashion described herein, should not be only considered in isolation merely as individual segments, but rather as an interconnected systems of pedestrian, bicycle, motor vehicle, and public transit facilities.

Such multimodal networks should be cohesive with routes that are well-distributed and connected to destination centers. They should be direct as possible, in order to provide convenient access to destinations and should also provide multiple route choices and alternatives.

In aggregate, complete streets:

- Provide safe and accessible multi-modal transportation environments for users of all ages and abilities;
- Transform streets into active, healthy corridors for all modes of travel;
- Connect residents and visitors to local destinations;
- Enhance public space;
- Stimulate investment in shared aims of private interests and in service to the public good;
- Integrate green infrastructure across the transportation network.

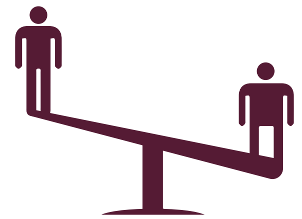
The following pages present quantitative data on the demonstrated health, economic, and safety benefits of complete streets for communities.

HEALTH BENEFITS OF COMPLETE STREETS

OBESITY IS RISING

The average American is more than 24 pounds heavier today than in 1960, and the negative health outcomes associated with obesity are rising. To maintain a healthy weight and physiology, humans need to be active. Increasing rates of active transportation and recreation is a key step to improving health outcomes in our communities

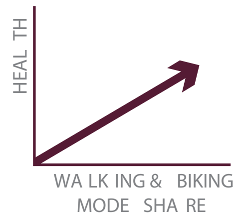
50 Years



+24 lbs

(source: Ogden, 2013)

ACTIVE TRANSPORTATION SUPPORTS HEALTHY LIVING



The eight US cities with the highest active transportation mode share have 20 percent less occurance rates of obesity and diabetes when compared to other US cities.

(source: Ogden, 2013)

GOOD FOR THE HEART

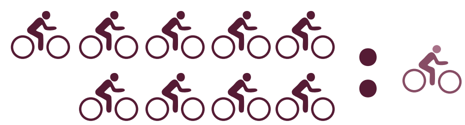
Those who are physically active generally live longer and have a lower risk for heart disease, stroke, Type 2 diabetes, depression, some cancers, and obesity.

(Source: CDC, 2015)

SAFER THAN SITTING ON A COUCH

Bicycling health benefits outweigh safety risks **9 to 1**

(Source: de Hartog, 2011)

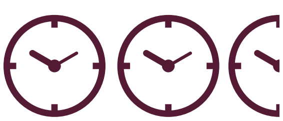


The average person spends over **200 hours per year commuting to work.** 200 hours of bike commuting would expend about 68,000 calories, which could result in

(Sources: ACS 2014 5-Year Estimate; ILoveBicycling.com, 2014)

Based on a 180-lb bicyclist riding at a moderate effort level

150 MINUTES



(Source: CDC, 2015)

The Center for Disease Control and Prevention **recommends 150 minutes of moderate-intensity aerobic activity** (i.e., brisk walking) every week. This could be met by walking or bicycling to work 30 minutes per day (or 15 minutes each way).

TRANSIT RIDERS GET MORE PHYSICAL ACTIVITY

Individuals who use public transportation **get over three times the amount of physical activity per day of those who do not** (approximately 19 minutes, rather than six minutes) by walking to stops and final destinations.

(Source: American Public Transportation Association, 2007)

(Source: Erickson, 2013)

STRONG BRAIN

Regular physical activity has been shown to reduce the risk of dementia, including Alzheimer's disease, by as much as 50 percent.

(Source: Erickson, 2013)

ECONOMIC BENEFITS OF COMPLETE STREETS

CONGESTION IS EXPENSIVE

SHIFTING TRIPS TO :

REDUCES CONGESTION & SAVES $$

WALKING & BIKING IS CHEAP

In the US, some trips are long and cannot be easily completed by walking or bicycling, but many daily trips are short. By shifting shorter trips to walking and bicycling, a significant savings can be realized annually.

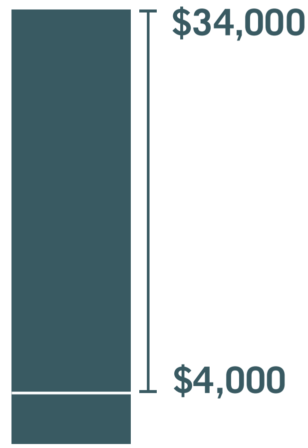
40% of all trips (In the US) are 2 miles (or less)

(source: NHTS, 2009)

DRIVING 4 miles/Day Costs **$847**/year in fuel and vehicle wear and tear (source: AAA, 2015)

is **FREE**

WALKABILITY PAYS OFF

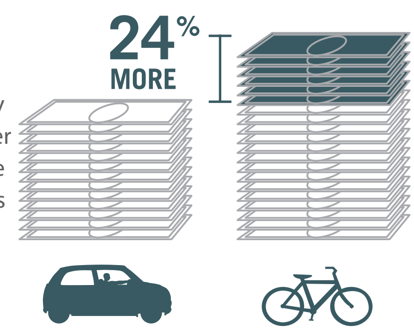


In a controlled study of 90,000 houses in 15 US metropolitan housing markets, **houses with the above-average levels of walkability were found to command a premium of about $4,000 to $34,000** over houses with just average levels of walkability. (Source: Cortright, 2009)

BICYCLISTS SPEND MORE

Customers who arrive by automobile spend the most per visit across all of the establishments, but cyclists spend the most per month.

(Source: Clifton, Morrissey & Ritter 2012)



TRANSIT ACCESS INCREASES PROPERTY VALUES

Transit Oriented Development

noun | Tran·sit Or·ie·en·ted Dev·el·op·men·t

Mixed-use residential and commercial area designed to maximize access to public transport

(Source: TOD Index Report, 2014)

247%

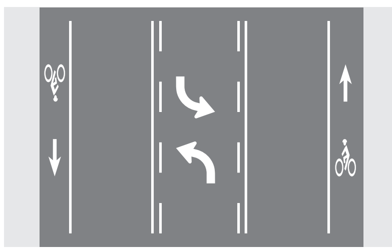
How much greater the average home value in a TOD was compared tothe average home in the United States in 2014.

ECONOMIC BENEFITS OF COMPLETE STREETS

COMPLETE STREETS ARE SAFER STREETS

A Road Diet typicaly involves converting a four-lane road into a two-lane road with a center turn lane, and can free up space for the provision of bike lanes. Studies indicate a **19 to 47 percent reduction in overall crashes when a Road Diet is installed** on a previously four-lane undivided facility.

Auto-Oriented Street (Before Road Diet)



19% to 47% REDUCTION IN ALL CRASHES

(source: FHWA, 2016)

Complete Street (After Road Diet)

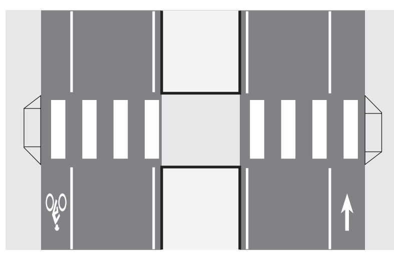
46% REDUCTION IN PEDESTRIAN CRASHES (source: Lindley, 2008)

demonstrated when raised medians or pedestrian refuge areas are provided at pedestrian crossings at marked crosswalks. **Raised medians have also been found to:**

REDUCE MOTOR VEHICLE CRASHES BY: 15%

(source: FHWA, 2007)

RAISED PEDESTRIAN REFUGE ISLAND



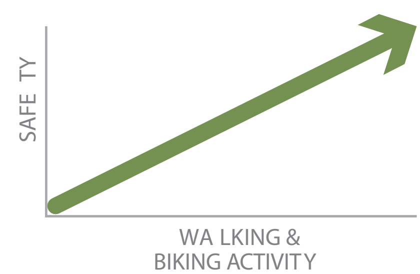
PEOPLE DESIRE BIKE FACILITIES

96% FEEL SAFER on THE STREET when riding in a protected bike lane because of the lanes (source: Green Lane Project, 2014)

47% INCREASE in BICYCLISTS on 15th Street in Denver since the implementation of the 15th Street Protected Bikeway. (source: Denver Public Works, 2014)

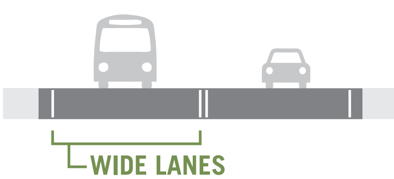
79% of DRIVERS FEEL COMFORTABLE driving on a street with a protected bike lane, compared to only 68% when the street has no markings (source: Sanders, 2013)

SAFETY IN NUMBERS



The likelihood that a given person walking or bicycling will be struck by a motorist decreases as the number of people bicycling and walking increases. (source: Jacobsen, 2003)

NARROW LANES MODERATE TRAVEL SPEEDS



Narrower lanes generally result in lower travel speeds and thereby increase street safety, particularly for private motor vehicles: narrower lane widths, down to 10 feet or narrower in special cases, are correlated with all-user safety benefits. (NACTO, 2015)

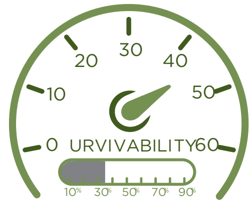
SLOWER SPEEDS REDUCE CRASH SEVERITY

Especially for vulnerable roadway uses, such as bicyclists and pedestrian

A PEDESTRIAN HIT BY A VEHICLE TRAVELING AT 25 MPH

HAS AN 89% CHANCE OF SURVIVAL

A PEDESTRIAN HIT BY A VEHICLE TRAVELING AT 45 MPH



HAS A 35% CHANCE OF SURVIVAL

(Source: Tefft, 2013)

The remainder of the Montpelier Complete Streets Report is divided into sections that include:

Chapter 2 – a description of existing conditions, including a summary of current land uses, destinations, traffic volumes and speeds, and existing infrastructure related to walking, bicycling, parking and transit

Chapter 3 – a toolkit of complete streets design treatments, including sidewalks, paths, bike lanes, shared roadway designs, streetscape elements, traffic calming features and green infrastructure

Chapter 4 – a description of the city's roadway typologies and the appropriate design treatments that should be considered relevant for each typology

Chapter 5 – an implementation framework that spells out the need for local policy changes, a potential funding strategy and a timeline.

2. EXISTING CONDITIONS

2. EXISTING CONDITIONS

The Existing Conditions chapter summarize the transportation infrastructure in the City of Montpelier. All map data was compiled using state of Vermont and local GIS sources, along with an assessment of conditions in the field. This includes a visual representation of land uses and key destinations, the volume and speed of motor vehicle traffic, the location of pedestrian and bicycle facilities, bus routes and stops, and the presence of parking (both on street and in surface lots). In aggregate, the maps and accompanying description paint a picture of how residents, employees and visitors experience Montpelier using all modes of transportation.

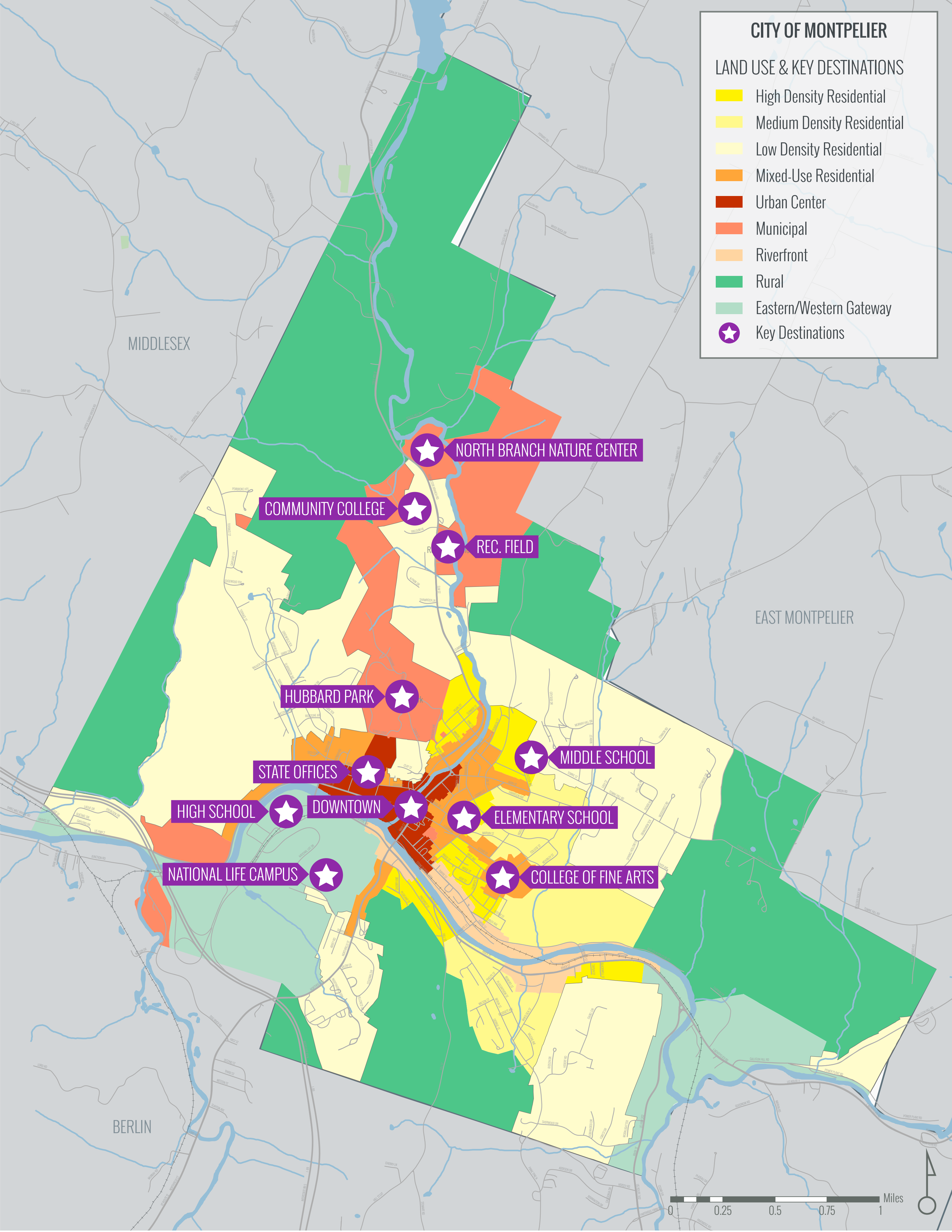
As one of Vermont many historic and thriving towns or cities, Montpelier is a very walkable community. Nearly all streets in the core of the city contain comfortable sidewalks on both side of the street. The compact nature of the city allows for a large percentage of trips made on foot, especially for those who live or work near downtown. Many short trips in the city center can also be made on bike, as traffic moves relatively slowly on many streets and a handful of bike lanes and the paths along the river provide separate facilities in some places.

Montpelier also features a significant transit network, especially notable for a city with less then 10,000 people. With current initiatives such as the DPW sidewalk assessment, planned bike lanes on State and Elm streets and the city-appointed Bicycle Advisory Committee, Montpelier is on target to become not only one of the most pedestrian-friendly cities in Vermont, but one of the most bike friendly as well.

The adoption of the Complete Streets Plan will encourage the continued growth of walking, bicycling and transit, and improve safety for all road users in Montpelier.

LAND USE AND KEY DESTINATIONS

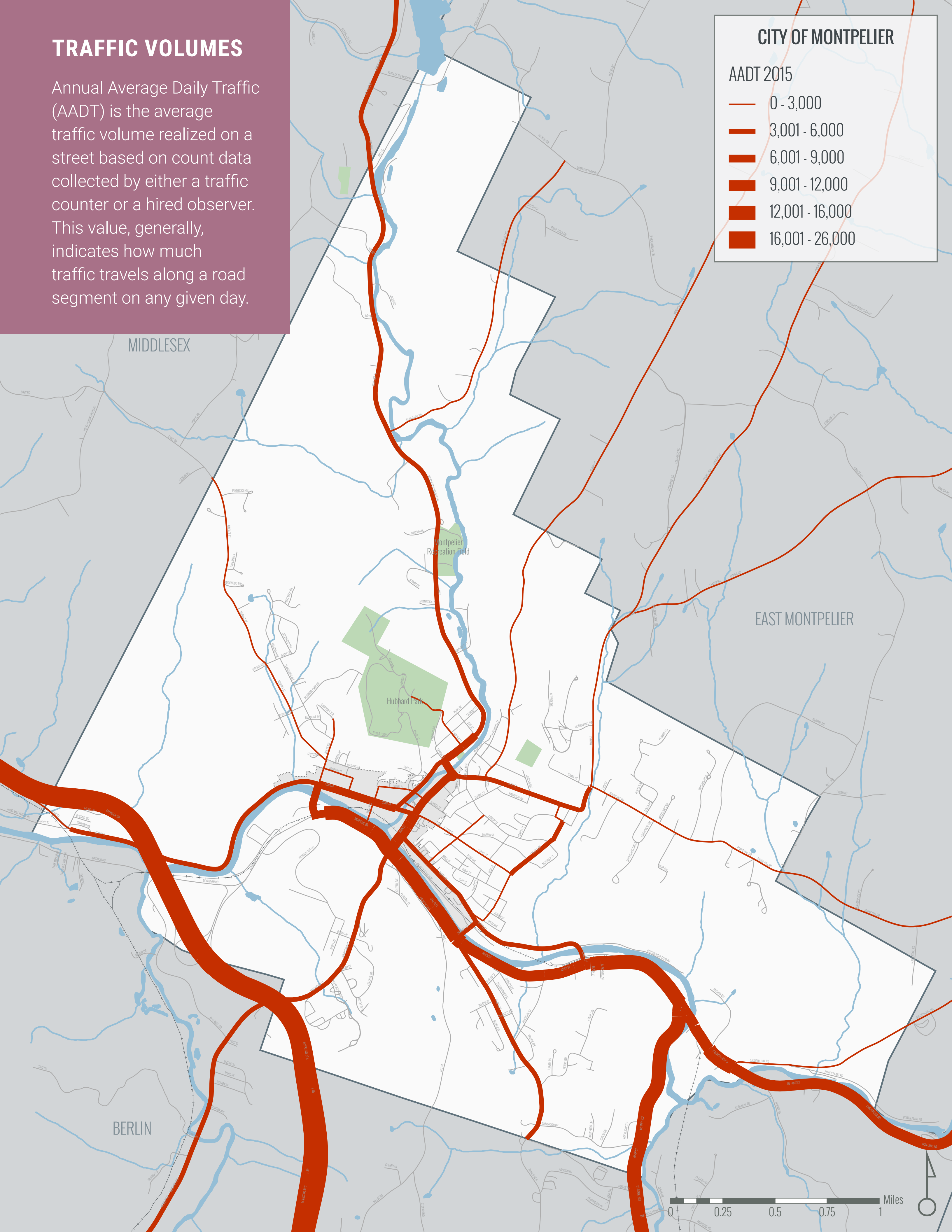
Within Montpelier's built environment, the pattern of land use radiate out from the downtown core. Within downtown are the greatest diversity of uses with many buildings featuring retail space at ground floor with commercial or residential space above. The multi-floor buildings with active ground floor help to create the pedestrian friendly environment downtown and this extends to the nearby historic neighborhoods to the east and downriver along the Winooski. To the west and north, land uses are more commercial/institutional. Medium and lower density residential development surrounds the neighborhoods immediately adjacent to downtown and extend into the surrounding hills. Key destinations are relatively well distributed throughout the city, pointing to the need for infrastructure for walkers, bicyclists, bus riders and drivers throughout Montpelier.

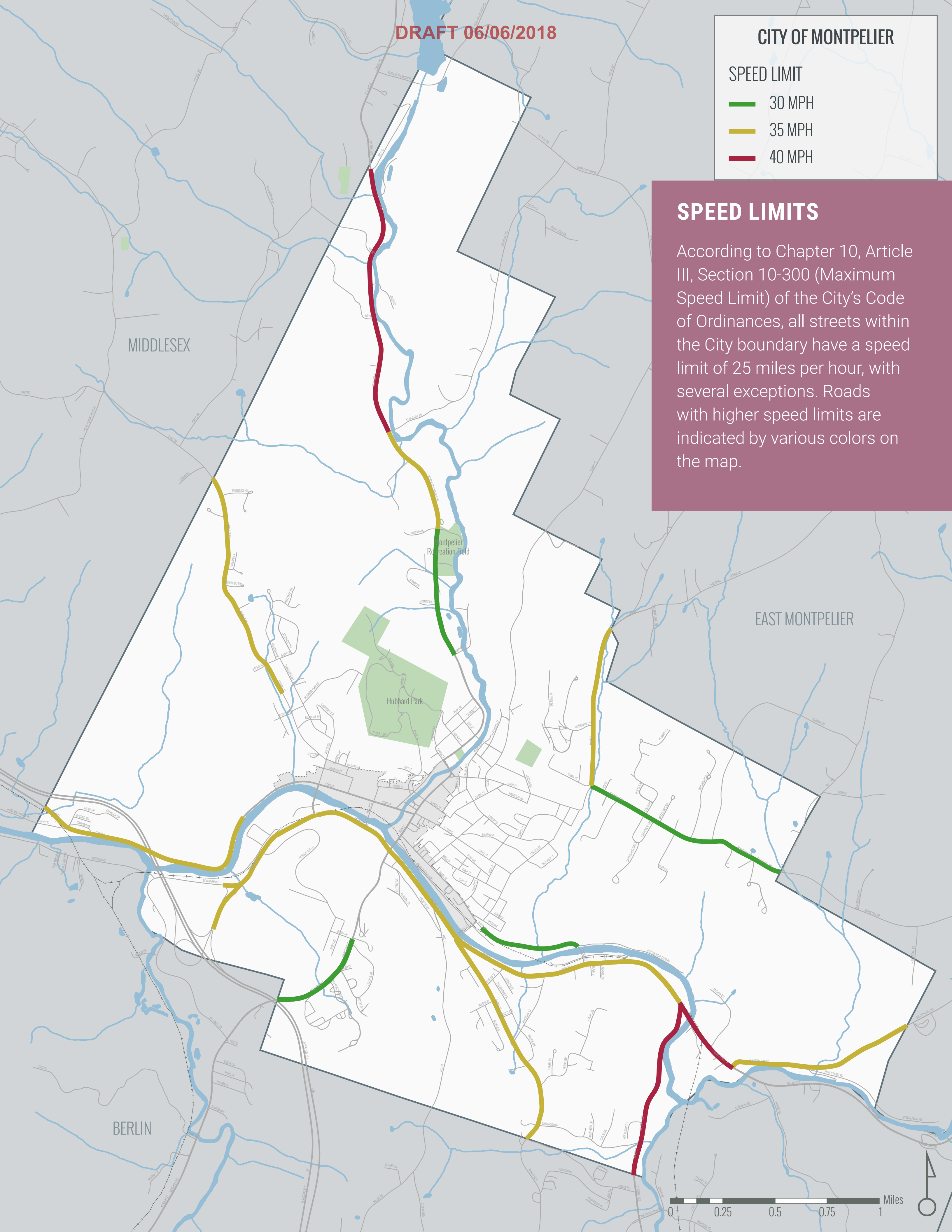


CITY OF MONTPELIER
LAND USE & KEY DESTINATIONS
High Density Residential
Medium Density Residential
Low Density Residential
Mixed-Use Residential
Urban Center
Municipal
Riverfront
Rural
Eastern/Western Gateway
Key Destinations
MIDDLESEX
EAST MONTPELIER
BERLIN
NORTH BRANCH NATURE CENTER
COMMUNITY COLLEGE
REC. FIELD
HUBBARD PARK
MIDDLE SCHOOL
STATE OFFICES
HIGH SCHOOL
DOWNTOWN
ELEMENTARY SCHOOL
NATIONAL LIFE CAMPUS
COLLEGE OF FINE ARTS
0
0.25
0.5
0.75
1
Miles

TRAFFIC VOLUMES

Annual Average Daily Traffic (AADT) is the average traffic volume realized on a street based on count data collected by either a traffic counter or a hired observer. This value, generally, indicates how much traffic travels along a road segment on any given day.





SPEED LIMITS

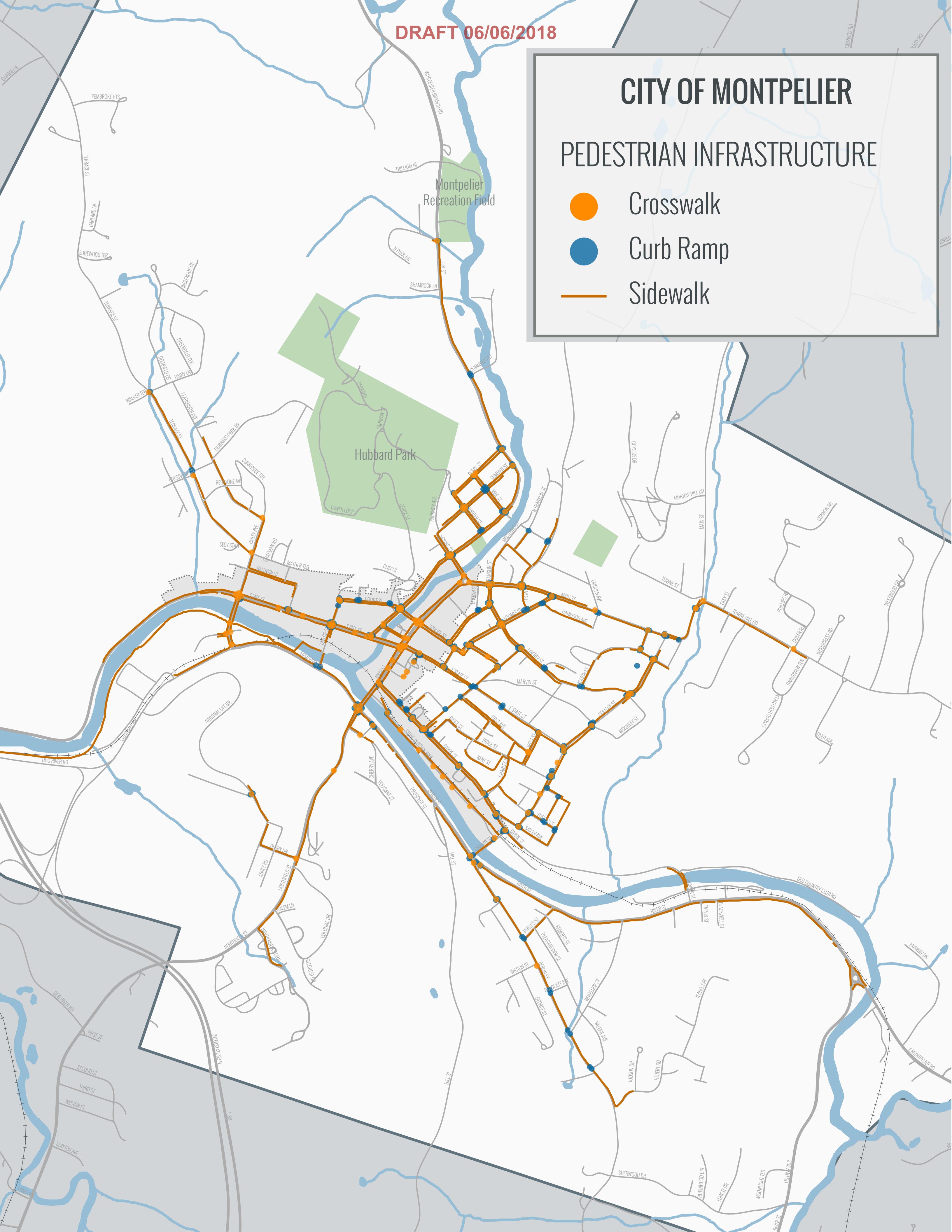
According to Chapter 10, Article III, Section 10-300 (Maximum Speed Limit) of the City's Code of Ordinances, all streets within the City boundary have a speed limit of 25 miles per hour, with several exceptions. Roads with higher speed limits are indicated by various colors on the map.

PEDESTRIAN FACILITIES

Approximately 17 percent of Montpelier residents ages 16 years and older walk to work, which is more than double the rate of walking amongst all Vermont commuters (6 percent) (American Community Survey, 5-Year Estimates, 2011-2015). Downtown pedestrian counts taken by the City in 2012 indicated peak walking hours around noon during the week and are fairly evenly spread throughout the day on the weekends (Greening America's Capitals: Montpelier, Vermont, 2015, USEPA). The highest amount of pedestrian activity was, unsurprisingly, witnessed during the summer months. While pedestrian counts were lower during colder months, it is apparent many residents still desire pedestrian facilities throughout the winter (Greening America's Capitals: Montpelier, Vermont, 2015, USEPA).

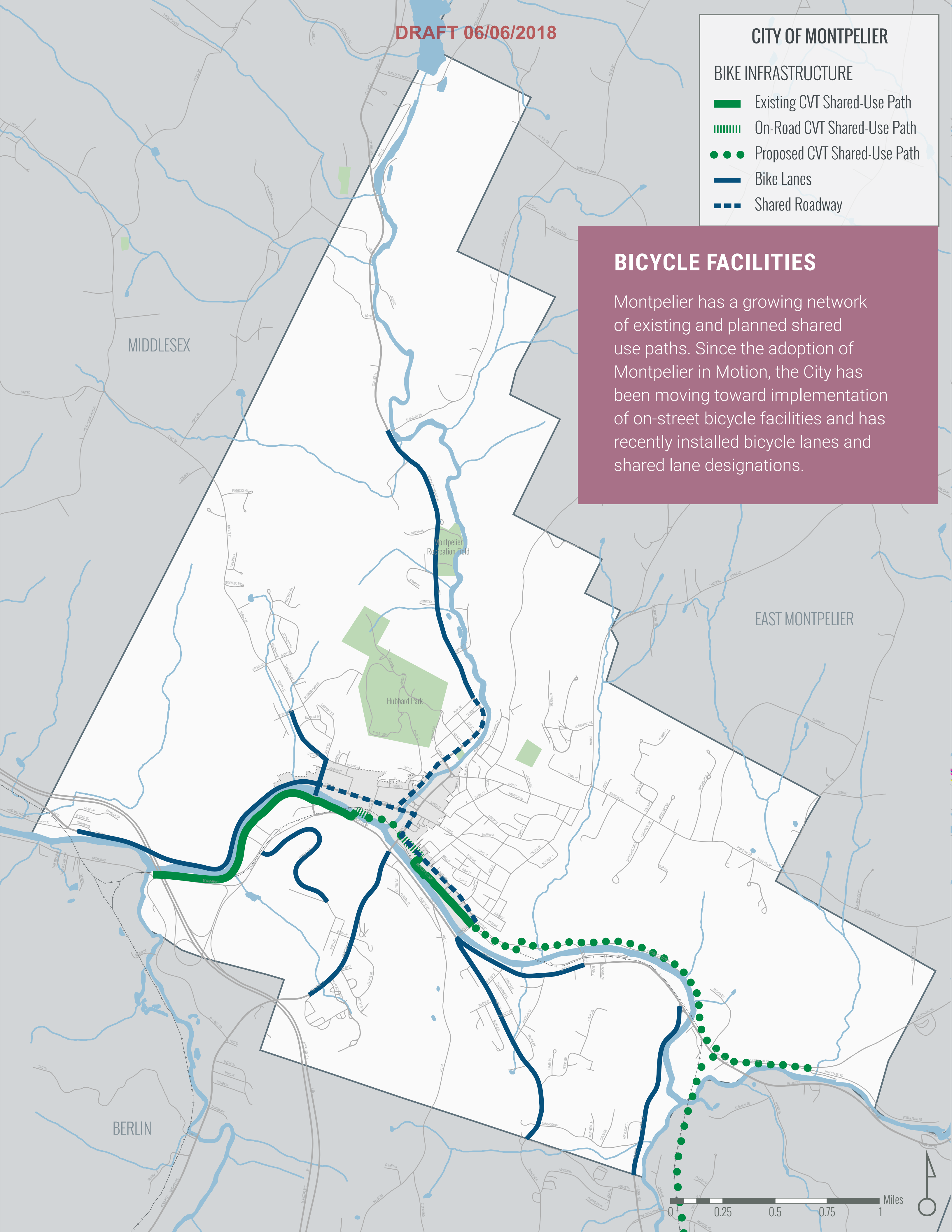
The downtown includes sidewalks on all streets and a shared-use path along Stone Cutters Way from Granite Street and the Montpelier Recreation Center and from Taylor Street to Junction Road. Frequently pedestrians pass between the segments over the railroad bridge (not formal or legal). Upgrades associated with the One Taylor project will close the few remaining gaps in this section of the downtown pedestrian network.

As of fall 2016, the City of Montpelier Department of Public Works is in the process of completing a sidewalk assessment of the City's pedestrian infrastructure using geospatial technologies. This includes recording the location of existing sidewalks, curb ramps, crosswalks, bump outs, and tripping hazards. This will help indicate areas in need of improvements and repairs as well as gaps which need to be filled to create a connected pedestrian network. An inventory of all data collected up to this point can be seen in the pedestrian facilities map.


DRAFT 06/06/2018
CITY OF MONTPELIER
PEDESTRIAN INFRASTRUCTURE
Crosswalk
Curb Ramp
Sidewalk
Montpelier Recreation Field
Hubbard Park

BICYCLE FACILITIES

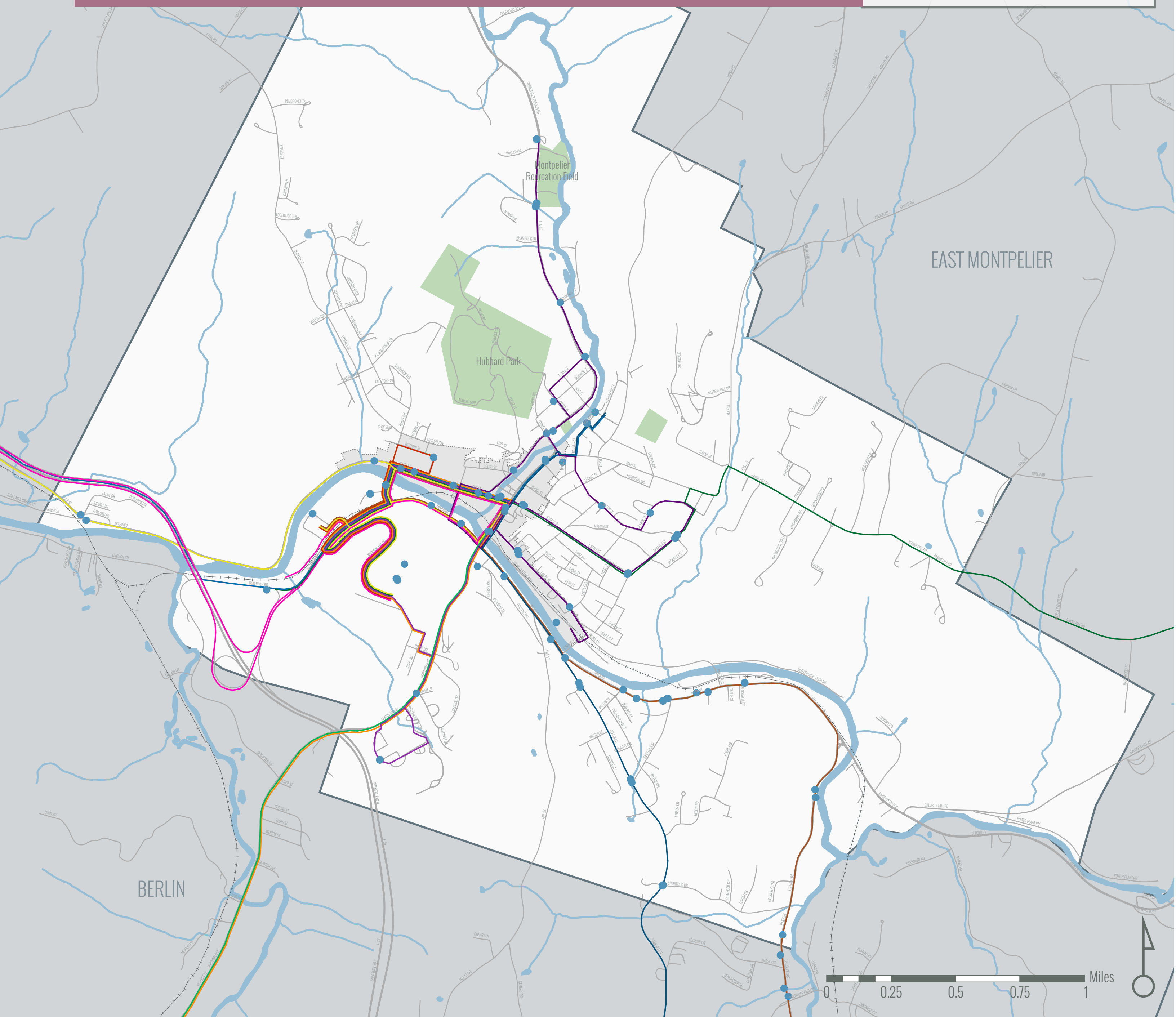
Montpelier has a growing network of existing and planned shared use paths. Since the adoption of Montpelier in Motion, the City has been moving toward implementation of on-street bicycle facilities and has recently installed bicycle lanes and shared lane designations.



DRAFT 06/06/2018

TRANSIT FACILITIES

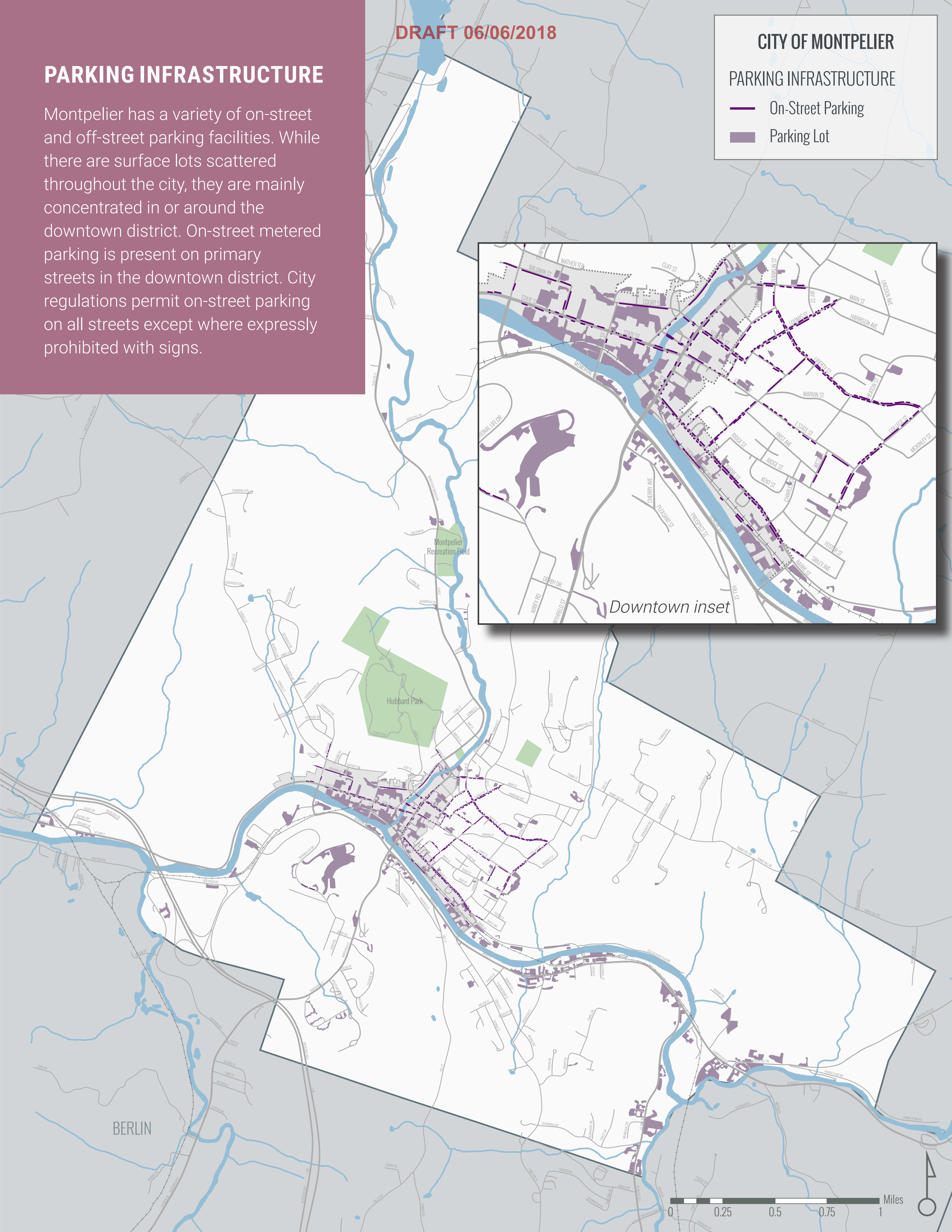
According to the 2015 American Community Survey 5-Year Estimate, approximately 230 Montpelier residents (3 percent of the population) use public transit to commute to work (American Community Survey, 5-Year Estimates, 2011-2015). Green Mountain Transit Agency oversees and operates the 11 local, circulator, and commuter bus routes servicing Montpelier. Transit stations are primarily located in the downtown district with other stations in the city located at key destinations outside of Montpelier's downtown. The new transit center slated for construction, One Taylor Street, and infrastructure upgrades to the surrounding area will provide increased connectivity to local and regional destinations by way of the public transportation system.



DRAFT 06/06/2018

PARKING INFRASTRUCTURE

Montpelier has a variety of on-street and off-street parking facilities. While there are surface lots scattered throughout the city, they are mainly concentrated in or around the downtown district. On-street metered parking is present on primary streets in the downtown district. City regulations permit on-street parking on all streets except where expressly prohibited with signs.



Page left intentionally blank

3. COMPLETE STREETS TREATMENTS

3. COMPLETE STREET TREATMENTS

This chapter presents the full range of complete street components also often referred to as "treatments."

3.1 CONSIDERATIONS

Interest in designing complete streets has emerged in recent years as a response to decades of demonstrably far too little consideration or prioritiziation to the needs of non-motorists. In principal and practice, complete streets is about a heightened awareness and consideration for the full range of road users inlcuding pedestrian, bicyclists, transit patrons, in addition to the needs of automobiles.

Because so many of the nation's roads have been designed or modified over time to prioritize motor vehicles, creating a better balance between all users and modes of travel often means challenging the status quo. Complete streets treatments must be carefully selected and applied so that safety and comfort is increased for pedestrians, bicyclists, and transit patrons but without creating unacceptable impacts. Impacts can sometimes be subjective in nature, and will often depend upon public policy priorities and support within a local jurisdiction. For instance, if a complete street treatment will dramatically improve bicycle and safety but will necessitate reducing vehicle capacity, and result in increased vehicle delay during peak travel periods, the community must decide if that is an acceptable trade-off.

Another consideration in creating a more balanced environment might include reducing or eliminating on-street parking in a commercial area in order to introduce a bike lane or widen a

Main Street School

Main Street Streetscape

sidewalk. Again, any real or perceived reduction in convenience to motorists (and/or business owners and/or city entities) must be weighed against the expected benefits.

Aside from trade-off considerations, it is also essential to ensure that complete treatments maintain safe and efficient travel of public roads for all users. This includes such things as minimum travel lane widths and other roadway designs that do not create hazardous conditions. The guidance provided in this report identifies the various dimensions and other design characteristics needed for maintaining safe operations for vehicles, while promoting opportunities for other modes of travel beside driving and helping to achieve the City's complete streets goals.

The remainder of this chapter provides a breakdown of complete streets treatments in the following categories:

- Pedestrian and Bicycle Facilities
- Intersections and crossings
- Streetscape elements
- Public transit facilities
- Traffic calming
- Streetscape elements
- Green infrastructure
- Placemaking

3.2 PEDESTRIAN AND BICYCLE FACILITIES

Pedestrian and bicycle facilities are perhaps the most impactful complete streets treatments available. This chapter defines them, and their application is detailed in Chapter 4.

3.2.1 SIDEWALKS

Sidewalks are the most fundamental element of the walking network, as they provide a dedicated space for pedestrian travel that is safe, comfortable, and accessible. Sidewalks are physically separated from the roadway by a curb and/or a landscaped buffer.

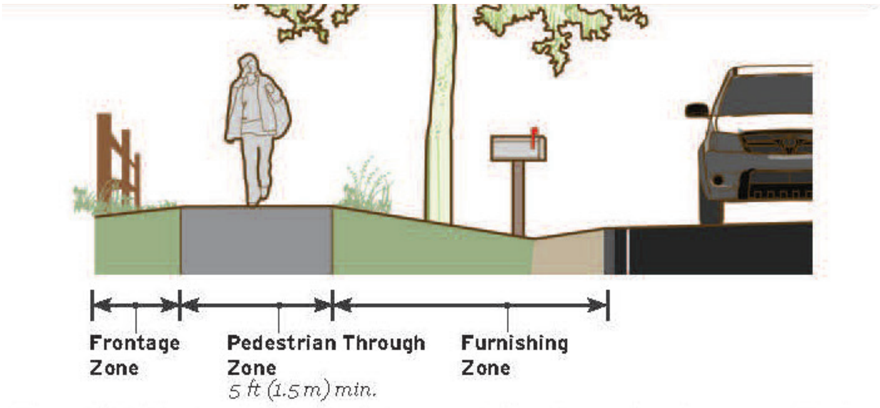


Image From: Small Town and Rural Multimodal Networks; US Department of Transportation Federal Highway Administration

DESIGN CONSIDERATIONS

- Accessibility: A network of sidewalks should be accessible to all users. Sidewalks should be compliant with the American Disabilities Act (ADA) and should meet the standards outlined in the Public Right of Way Accessibility Guidelines (PROWAG).
- Width: Sidewalks should be a minimum of 5-feet wide. In areas of intense pedestrian use, sidewalk widths should be increased to accommodate higher volumes of pedestrians.
- Safety: Design features of the sidewalk should allow pedestrians to have a sense of security and predictability. Sidewalk users should not feel they are at risk due to the presence of adjacent traffic.
- Continuity: Walking routes should be obvious and should not require pedestrians to travel out of their way unnecessarily.
- Landscaping: Plantings and street trees should contribute to the overall psychological and visual comfort of sidewalk users and landscaping should be designed in a manner that contributes to the safety of people.
- Drainage: Sidewalks should be well graded to minimize standing water.
- Social space: There should be places for standing, visiting, and sitting. The sidewalk area should be a place where adults and children can safely and comfortably participate in public life.
- Quality of place: Sidewalks should contribute to the character of neighborhoods and business districts.

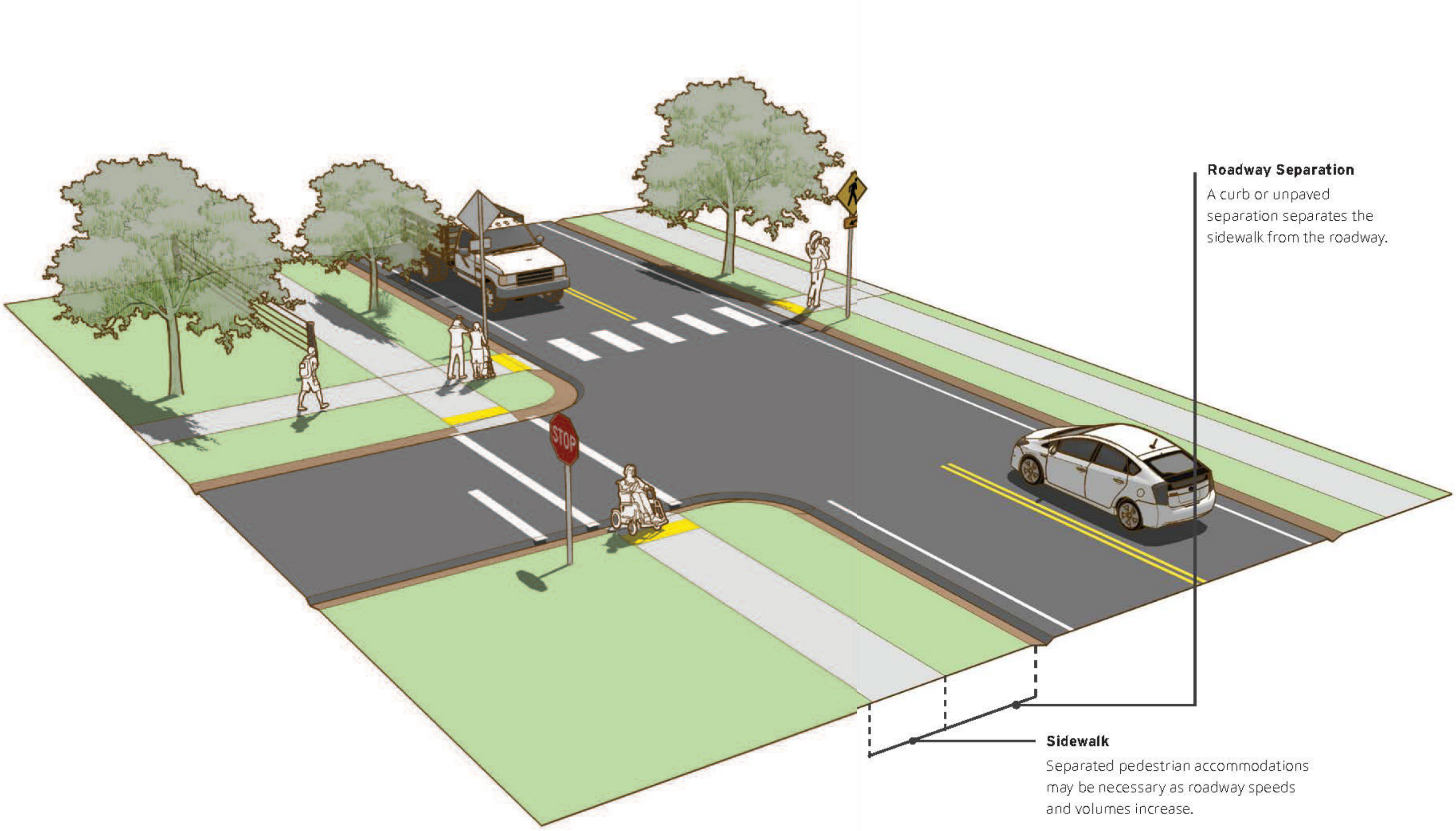


Image From: Small Town and Rural Multimodal Networks; US Department of Transportation Federal Highway Administration

SIDEWALK WIDTH

According to the Complete Streets: A Guide for Vermont Communities (2012) and the Vermont Pedestrian and Bicycle Facility Planning and Design Manual (2002), sidewalk widths should be constructed as follows:

- 5 feet: Constrained situations, or rural areas with lower activity
- 6-8 feet: For local streets outside the central business district
- 6-10 feet: For commercial areas outside the central business district
- 8-10 feet: For central business areas including downtowns and village centers

3.2.2 PAVED SHOULDERS

Paved shoulders occur on the edge of roadways and, while not inherently considered a bicycle or pedestrian facility, they can be enhanced to serve as a functional space for bicyclists and pedestrians in the absence of other facilities. Paved shoulders utilize pavement striping to delineate the shoulder from motor vehicle travel lanes. Rumble strips can also be used to provide auditory separation (rumble strips should be designed to minimize impacts to bicyclists). These facilities often include signage and/or pavement markings that alert motorists to expect bicycle and pedestrian travel along the roadway.

DESIGN CONSIDERATIONS

- The preferred width of a paved shoulder varies based on the functional class of the roadway. On collectors, the mimimum width is 4-feet. On minor and major arterials, the optimal width is 7 and 8 feet respectively.
- Paved shoulders can be enhanced with buffer zones, which further separate the paved shoulder from adjacent motor vehicle lanes. Buffer zones can range in width from 1.5 to 4-feet (or wider, if space is available).
- Shoulder bikeways often, but not always, include signage alerting motorists to expect bicycle travel along the roadway.

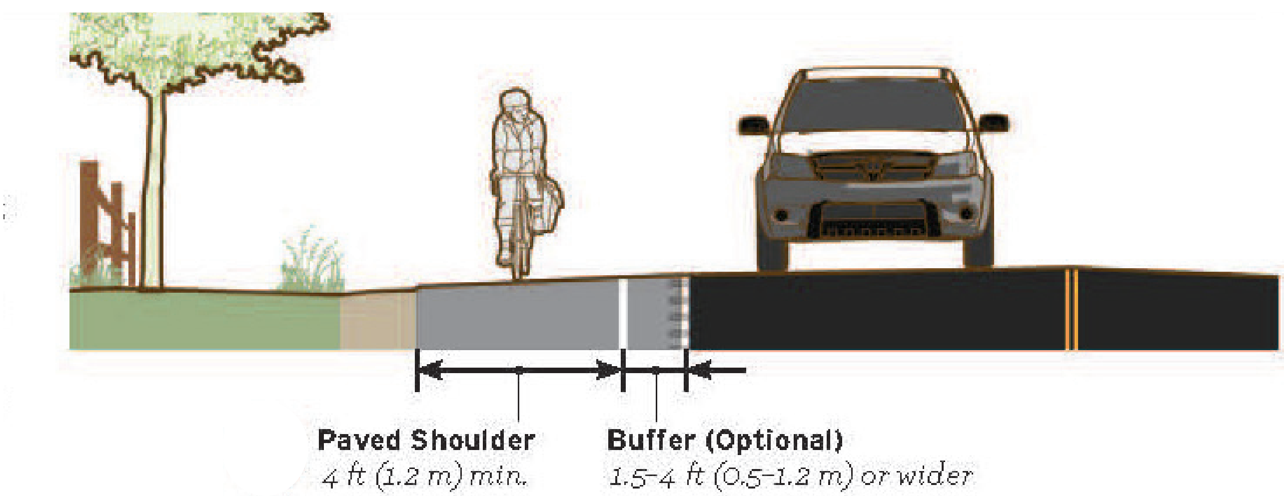


Image From: Small Town and Rural Multimodal Networks; US Department of Transportation Federal Highway Administration

3.2.3 SIDEPATHS

A sidepath is low-stress shared-use path for pedestrians and bicyclists that is completely separate from the roadway. Sidepaths parallel the adjacent roadway and provide a protected, comfortable space for users of all ages and abilities. Because sidepaths encourage walking and biking in areas where motor vehicle volumes and speeds are high, they can fill in network gaps where other active transportation facilities are precluded due to traffic conditions.

DESIGN CONSIDERATIONS

- The optimal width of a sidepath is 12-feet. The minimum preferred width is 10-feet, and in constrained conditions, the absolute minimum width is 8-feet.
- Preferred minimum separation between the sidepath and the roadway is 6.5-feet and the absolute minimum separation is 5-feet. If space is available, separation widths up to 25-feet (and greater) are recommended, particularly along high speed corridors.

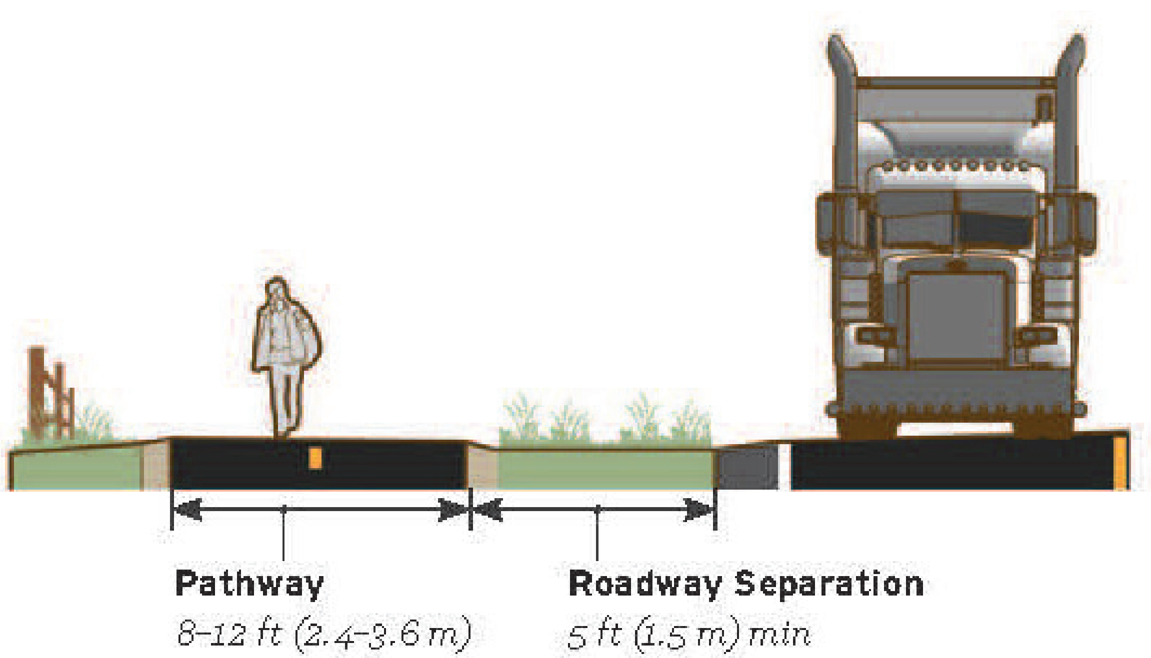


Image From: Small Town and Rural Multimodal Networks; US Department of Transportation Federal Highway Administration

3.2.4 SEPARATED BIKE LANES

A separated bike lane is an exclusive bicycle facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane. A separated bike lane is physically separated from motor vehicle traffic and distinct from the sidewalk.

Separated bike lanes may be directional (i.e., one-way) or bidirectional (i.e., two-way) and may be at street level, sidewalk level, or at an intermediate level. If at sidewalk level, a curb or median separates the facility from motor traffic, while different pavement color/texture separates the facility from the sidewalk. If at street level, they can be separated from motor traffic by raised medians, on-street parking, or flexible delineators.

By separating bicyclists from motor traffic, separated bike lanes can offer a higher level of comfort than bike lanes and are attractive to a wider spectrum of the public.

Separated bikeways can increase safety and promote proper riding by:

- Defining road space for bicyclists and motorists, reducing the possibility that motorists will stray into the bicyclists' path.
- Discouraging bicyclists from riding on the sidewalk.
- Reducing the incidence of wrong way riding.
- Reminding motorists that bicyclists have a right to the road.

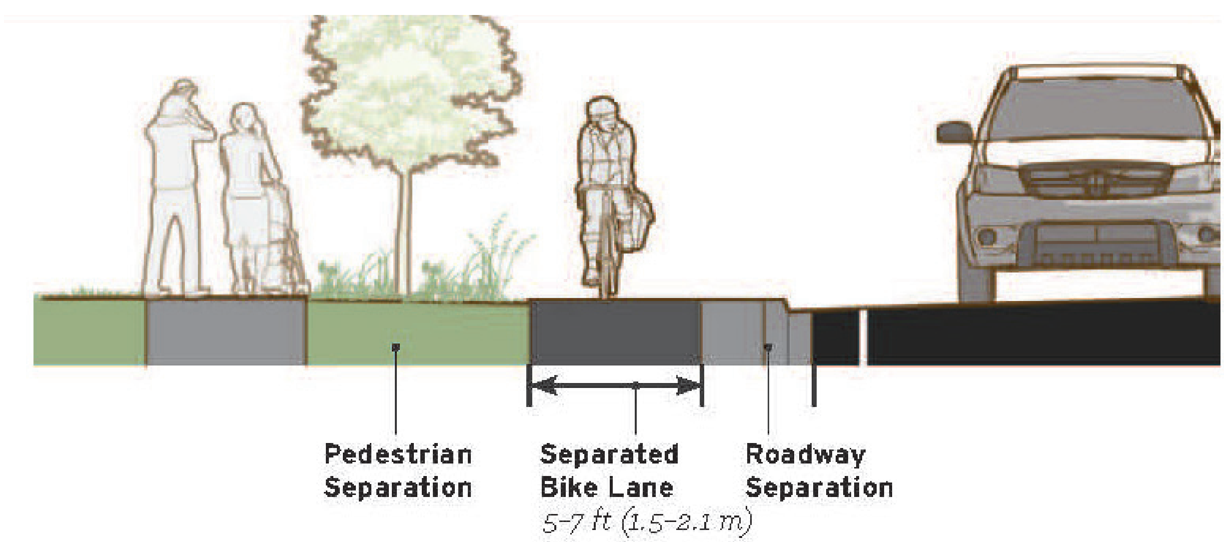


Image From: Small Town and Rural Multimodal Networks; US Department of Transportation Federal Highway Administration

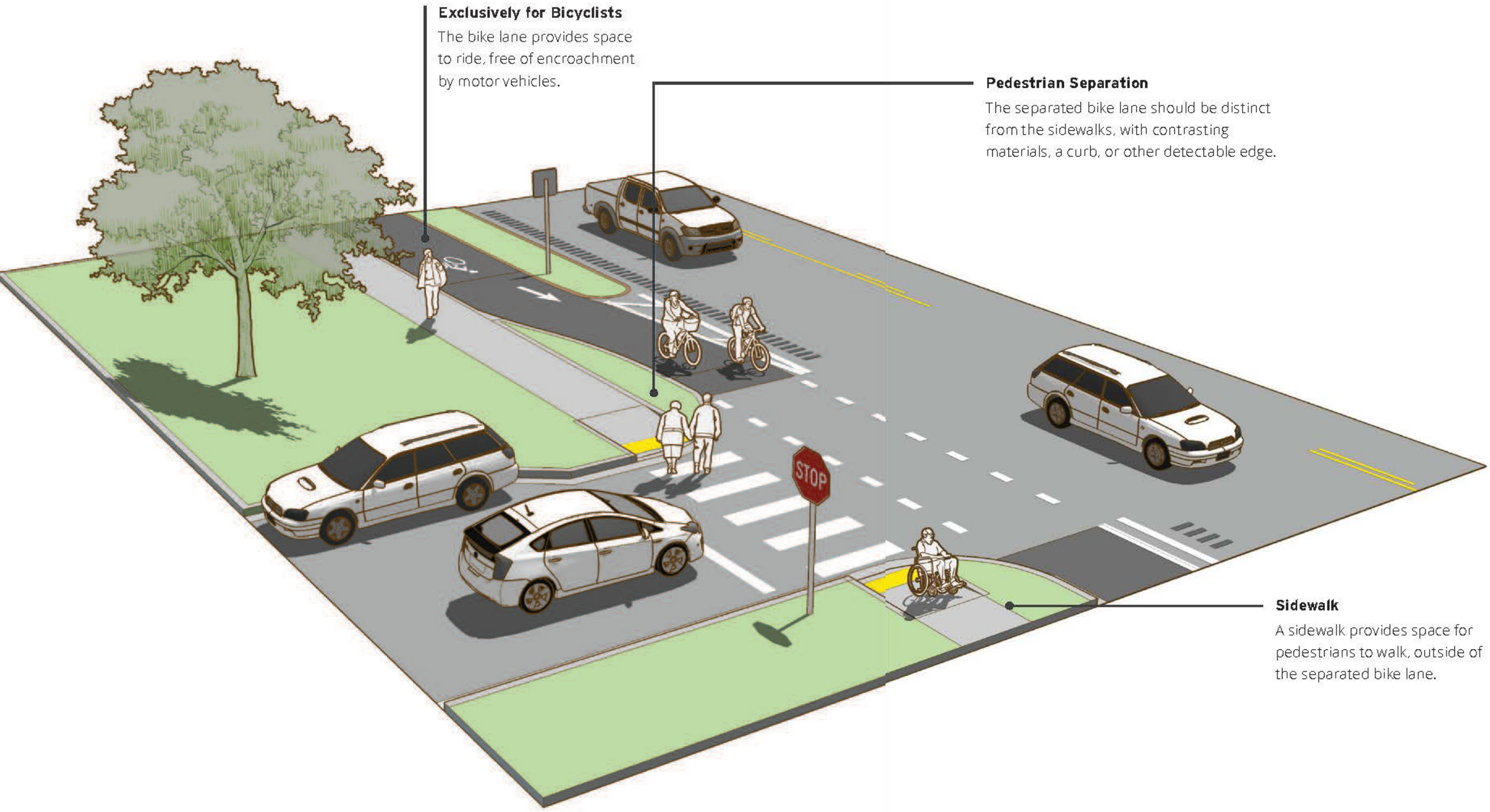


Image From: Small Town and Rural Multimodal Networks; US Department of Transportation Federal Highway Administration

DESIGN CONSIDERATIONS

- The preferred minimum width of a one-way separated bike lane is 7-feet, and the absolute minimum width is 5-feet. A clear through area at least 10-feet wide provides sufficient access for snow plows and street sweepers.
- A bidirectional separated bike lane is desirable if destinations are concentrated on one side of the street (therefore preventing additional crossings), the facility connects to a path or other bicycle facility on one side of the street, or there is not enough room for a separated bike lane on both sides of the road.
- The optimal width of a two-way separated bike lane is 12-feet, and the minimum width is 8-feet.
- The preferred minimum separation width between the separated bike lane and the roadway is 3-feet. In constrained areas, 1-foot of separation between the facility and roadway may be possible with a mountable or vertical curb.
- The separated bike lane should be clearly differentiated and separated from the sidewalk. Differentiation can be achieved by using different paving materials or surface treatments and/or using detectable warnings. Separation can be achieved by establishing landscaped buffer space between the sidewalk and bike facility.

SEPARATED BIKE LANE WIDTH

One-way separated bike lanes require a minimum width of 5 feet. The lane width should be increased to 7 feet when the separated bike lane is placed on an incline. A 3-foot wide buffer should be placed between the separated bike lane and the travel lanes or parked cars. Where on-street parking is allowed, the parking lanes should be at least 11 feet wide to deter motorists from parking in the separated bike lane buffer.

Two-way separated bike lanes require a minimum width of 8 feet, 4 feet for each direction of travel. Ideally, two-way separated bike lanes will be 12 feet wide, with 6 feet for each travel lane. Two-directional bicycle traffic should be delineated by a yellow dashed centerline. Similar to one-way separated bike lanes, a 3-foot wide buffer should be placed between the two-way separated bike lane and the travel lanes or parked cars. Additional protection can be provided by installing flexible delineators within the 3-foot buffer.

The Vermont Pedestrian and Bicycle Facility Planning and Design Manual (2002) recommends various minimum and preferred bike lane width depending on the presence of curbs and parking on the roadway. The following table summarizes these widths.

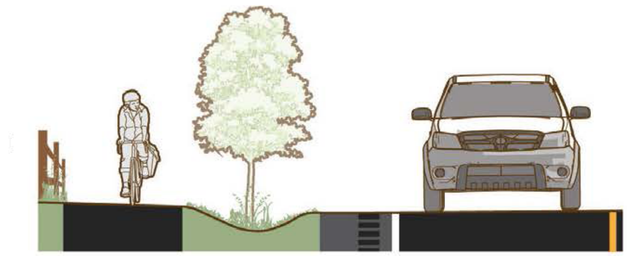


Figure 4-18. *Separated bike lanes may be separated by an unpaved roadway separation, and a vertical element. When configured as directional facilities, separated bike lanes should be provided on both sides of the roadway.*

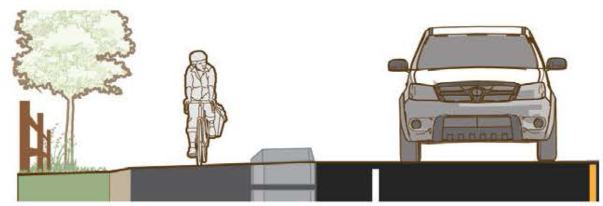


Figure 4-19. *Separated bike lanes may be configured on an existing roadway surface by using a physical barrier such as a curb or median to separate the bikeway from the roadway.*

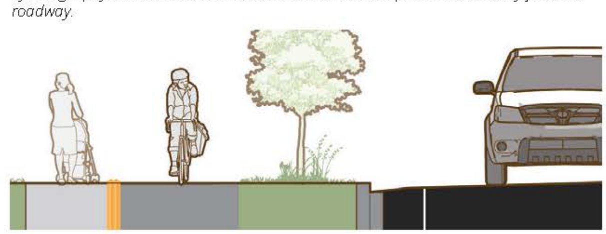


Figure 4-20. *Separation from the sidewalk is valuable for reducing unwanted pedestrian encroachment into the bike lane. The use of physical separation with vertical elements, unpaved separation, or detectable edges may be more effective than visual delineation.*

Image From: Small Town and Rural Multimodal Networks; US Department of Transportation Federal Highway Administration

CURBED STREET, NO PARKING		CURBED STREET, WITH PARKING		NO CURB, NO PARKING		NO CURB, WITH PARKING	
Minimum	**Optimal**	**Minimum**	**Optimal**	**Minimum**	**Optimal**	**Minimum**	**Optimal**
4 feet	6 feet	5 feet	6 feet	4 feet	5-6 feet	5 feet	6-7 feet

*Add 1 foot on bridges or where there are 30 or more overtaking heavy vehicles per hour in a single outside lane
Table Source: Vermont Pedestrian and Bicycle Facility Planning and Design Manual (2002)

3.2.5 BIKE LANES

Bike lanes are designated exclusively for bicycle use and are demarcated with pavement markings and signage. They are located on the roadway directly adjacent to motor vehicle travel lanes and follow the same direction as motor vehicles. Bike lanes provide visual separation from motor vehicles, which helps bicyclists and motorists anticipate on another's movements and behaviors.

Bike lanes can also increase safety and promote proper riding by:

- Defining road space for bicyclists and motorists and reducing the possibility that motorists will stray into the bicyclists' path;
- Discouraging bicyclists from riding on the sidewalk;
- Reducing the incidence of wrong way riding; and,
- Reminding motorists that bicyclists have a right to the road.

DESIGN CONSIDERATIONS

- The optimal width of a bike lane is 6-feet. The minimum preferred width is 5-feet.
- Bike lanes can be enhanced with buffer zones, which further separate the bike lane from adjacent motor vehicle lanes. Buffer zones are most appropriate on roadways with high motor vehicle traffic volumes and speeds and adjacent to parking lanes.

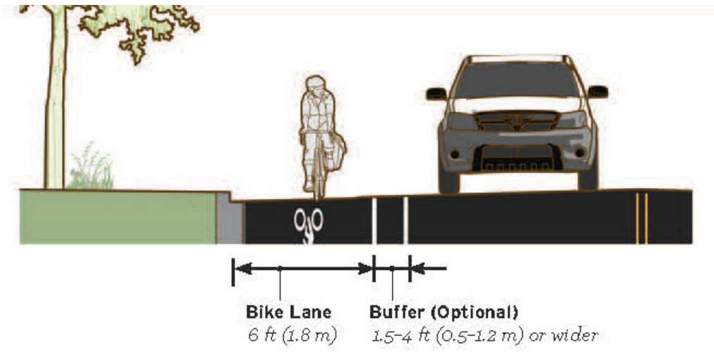


Image From: Small Town and Rural Multimodal Networks; US Department of Transportation Federal Highway Administration

3.2.6 ADVISORY SHOULDERS

Advisory shoulders create usable space for bicyclists on roadways that are otherwise too narrow to provide an adequately sized paved shoulder. Advisory shoulders are delineated by pavement markings. If desired, the shoulder can also be visually differentiated through pavement color. Motorists are only permitted to enter the advisory shoulder when no bicyclists are present and must overtake bicyclists with caution due to the potential of oncoming traffic.

Advisory shoulders are not yet approved by the Federal Highway Administration (FHWA) and require an approved Request to Experiment for implementation (advisory shoulders are referred to as, "dashed bicycle lanes" in the FHWA experimentation process).

DESIGN CONSIDERATIONS

- The preferred width of an advisory shoulder is 6-feet. The minimum width is 4-feet when no curb and gutter are present.
- The preferred width of the two-way center travel lane ranges from 13.5 to 16 feet. The maximum width is 18-feet and the minimum width is 10-feet.
- Visually differentiate the advisory shoulder and two-way center lane in order to minimize unnecessary encroachment. Visual differential could be achieved with pavement markings and/or paving materials.

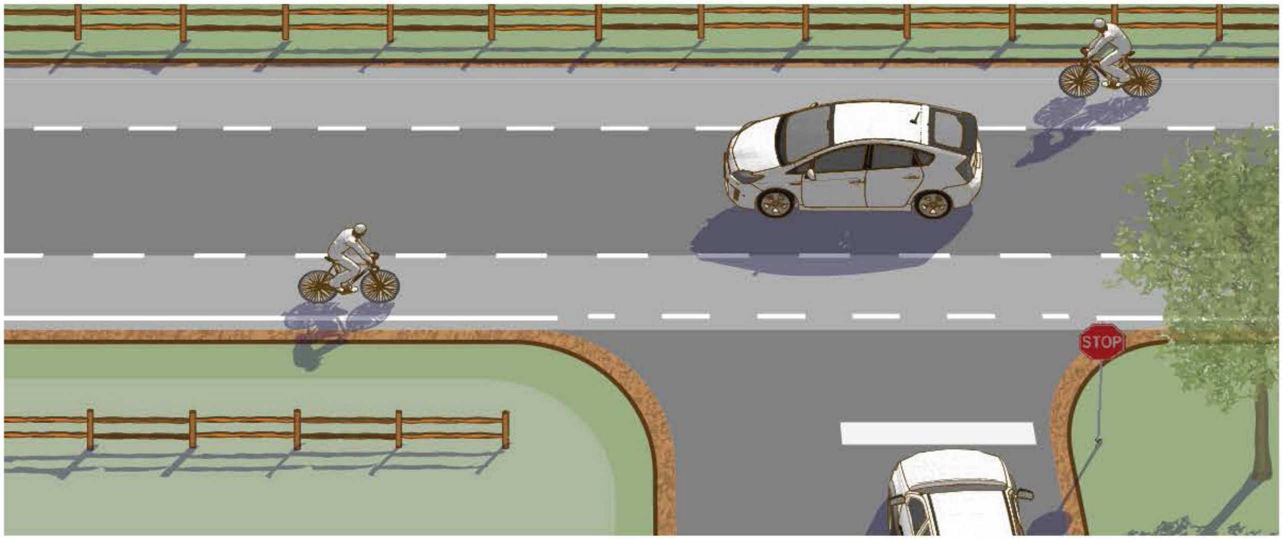


Image From: Small Town and Rural Multimodal Networks; US Department of Transportation Federal Highway Administration

3.2.7 SHARED ROADWAYS

Shared roadways are designated bicycle routes where bicyclists and cars operate within the same travel lane, either side by side or in single file depending on roadway configuration. These facilities are best suited for local roads with low speeds and low traffic volumes. Shared roadway treatments can include various forms of signage and shared lane markings that delineate a roadway as a bicycle route and indicating that drivers must share the road and/or allow bicylists to occupy the entire lane of travel.

Shared Roadway Marking in downtown Montpelier

DESIGN CONSIDERATIONS

- Shared roadways, delineated by sharrows or bike route signage, should be a minimum of 11 feet wide to accommodate both bicycle and motor vehicle traffic within the same space (Vermont Pedestrian and Bicycle Facility Planning and Design Manual, 2002).
- According to MUTCD Section 9C.07: “The Shared Lane Marking should not be placed on roadways that have a speed limit above 35 mph.”

3.2.8 YIELD ROADWAY

Yield roadways are low-speed facilities that allow pedestrians, bicyclists, and motor vehicles to share the same space. Pavement markings are not used to separate the different modes of travel.

DESIGN CONSIDERATIONS

- Yield roadways are most effective on roads that are narrower than 20-feet. This narrow width encourages slow travel speeds. When the roadway width is less than 15-feet, pull-out areas should be provided every 200-300 feet to allow for passing events to occur.
- While no pavement markings are necessary to implement a yield roadway, signage can be used to help orient users.
- If a yield roadway is intended for use by pedestrians, it must meet accessibility guidelines for walkways.

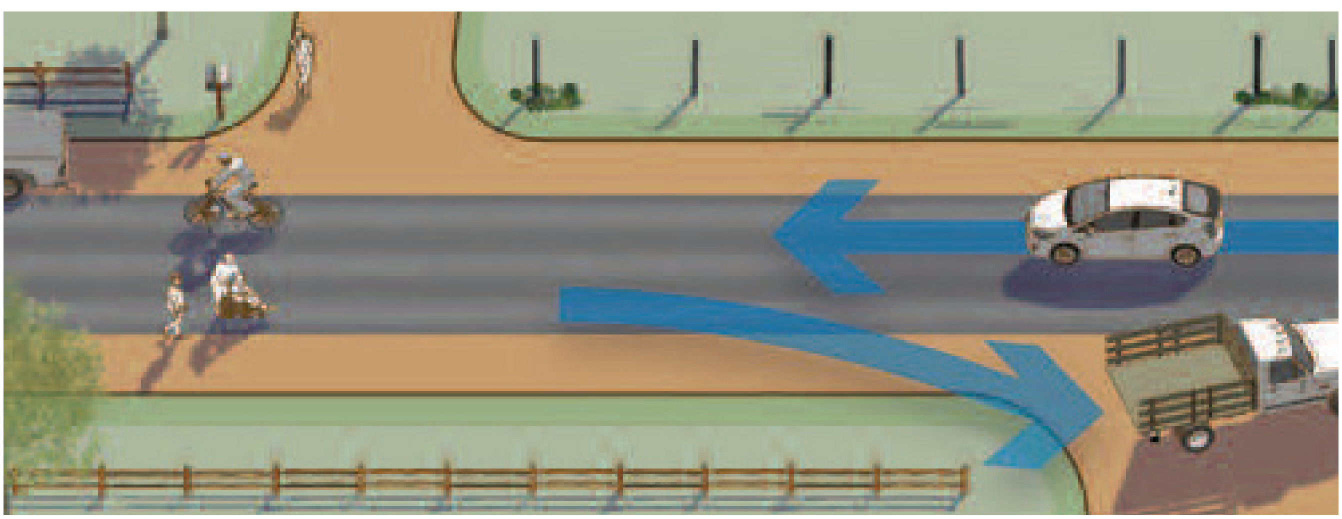


Image From: Small Town and Rural Multimodal Networks; US Department of Transportation Federal Highway Administration

3.3 INTERSECTIONS AND CROSSINGS

An intersection facilitates the interchange between bicyclists, motorists, pedestrians and other modes of transportation in order to advance traffic flow in a safe and efficient manner. Where bicycle and pedestrian facilities exist, intersections should be designed to reduce conflicts between bicyclists, pedestrians, and motor vehicles by heightening the level of visibility, denoting clear right-of-way, and facilitating eye contact and awareness between different modes of transportation.

The configuration of a safe intersection for pedestrians and bicyclists may include elements such as color, signage, medians, signal detection and timing, and pavement markings. In all cases, the degree of mixing or separation between different modes of transportation at an intersection should reduce the risk of crashes and increase user comfort. The type of intersection treatment required for pedestrians and bicyclists depends on the facility types, whether different facilities are intersecting, and the adjacent street function and land use.

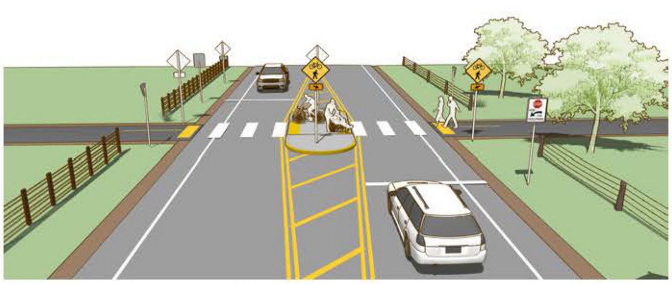


Image From: Small Town and Rural Multimodal Networks; US Department of Transportation Federal Highway Administration

3.3.1 CROSSWALKS

Crosswalks accommodate pedestrian access and mobility, and if well-designed and appropriately placed, they can increase pedestrian safety and comfort. Crosswalks should be installed at grade and across all legs of a signalized intersection, unless pedestrians are prohibited. To increase accessibility, crosswalks should be paired with curb ramps, detectable warnings, and pedestrian countdown signals. Where crosswalks traverse multi-lane roads should be paired with a median refuge island that separates motor vehicle travel directions and shortens the crossing distance for pedestrians.

Adjacent land use, present and future crossing demand, safety, crash history, and traffic speeds and volumes should also be considered when identifying crosswalk locations. In all cases, high-visibility ladder, zebra, and continental crosswalk markings are preferred to standard parallel or dashed pavement markings.

3.3.2 UNSIGNALIZED CROSSINGS

An unsignalized crossing typically consists of a marked crossing area, signage, and geometric design features (e.g., raised crossing, curb extensions) that slow or stop traffic. The design of crossings at mid-block locations depends on vehicular traffic volumes and speeds, line of sight, road width, and other safety issues, such as proximity to major attractions. When space is available, median refuge islands can improve user safety by shortening crossing distances and allowing pedestrians and bicyclists to cross one side of the street at a time.

3.3.3 RECTANGULAR RAPID FLASHING BEACONS

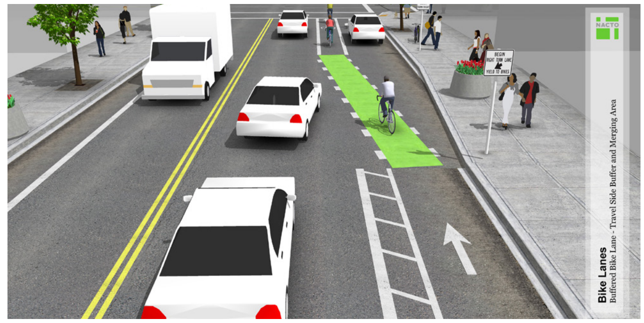
Rectangular Rapid Flashing Beacons (RRFBs) are user-actuated warning beacons that supplement pedestrian warning signs at unsignalized intersections or mid-block crossings. RRFBs have also been shown to increase motor vehicle yielding compliance at crossings of multi-lane or high volume roadways. RRFBs should be paired with a marked crosswalk, advanced yield pavement markings, and push buttons allowing pedestrians and bicyclists to activate the RRFBs.

3.3.4 SINGLE LANE ROUNDABOUTS

In single lane roundabouts, it is important to clearly communicate the right-of-way and circulation rules to motorists, bicyclists, and pedestrians. Right-of-way and circulation rules can be conveyed via signage, pavement markings, and/or geometric design features.

3.3.5 INTERSECTION CROSSING MARKINGS FOR BICYCLES

Bicycle pavement markings through intersections indicate the intended path of bicyclists through an intersection or across a driveway or ramp. They guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of bicyclists and motor vehicles in the adjacent lane.



3.3.6 COLORED BIKE LANES IN CONFLICT AREAS

Colored pavement within a bicycle lane increases the visibility of the facility and reinforces the priority of bicyclists in conflict areas.

3.3.7 BIKE BOXES

Bike boxes are a designated spaces at signalized intersections that are exclusively for bicyclists. Bike boxes are located at the head of a traffic lane and allow bicyclists to queue in front of motor vehicle traffic during the red signal phase. Placing bicyclists in front of motor vehicles increases the visibility and safety of both bicyclists and motorists.

photo credit: Vermont Natural Resources Council

3.4 PUBLIC TRANSIT FACILITIES

Transit facilties that support complete streets design should include as many of the following key elements as possible:

Integration into the contextual fabric: Transit stops should be coherent with surrounding visual themes, and they should serve transit-compatible land uses, such as shopping areas, employment centers, residential areas, public institutions, schools, and medical facilities.

The location and design of transit stops along a street and within larger institutional campuses and commercial centers are also important considerations. Sidewalks and paved walkways should be present at bus stops and should directly connect to adjacent development.

The design of transit stops should also allow buses to pull out of the vehicular travel lane in order to preserve traffic flow, especially on major streets. Where appropriate, transit stops can be incorporated into curb extensions.

Accessibility via multiple modes: Transit stations and routes should connect to other modes of transportation, such as pedestrian and bike networks, park and ride centers, and airports. For all users, transit stations should provide accessible alighting zones, benches for the comfort of waiting passengers, and a covered space to protect passengers from inclement weather. Transit route and station design should also minimize conflicts with bicyclists, provide secure bicycle parking, and provide ample loading space for bicycles on bus-mounted bicycle racks.

Security and comfort: Transit stops and systems should look, feel, and be clean and secure. This can be accomplished through a number of methods, including lighting and the provision of trash and recycling receptacles. Passenger waiting areas should be protected from the elements and provide enough separation from travel lanes as feasible while still being visible.

Functional simplicity: Transit stops should provide users with clear and informative system information and provide easy access and payment options.

Comprehensive systems sustainability: Transit station design should be environmentally conscious and be used as a tool to promote sustainable development. For example, bus shelters provide a discrete, highly visible space for solar panels.

Articulation of form and identity: Transit stops should respond to the unique qualities of a place and community landmarks. Local, relevant art should be incorporated into the transit stations and all aspects of the transit system in order to improve the quality of users' experiences.

3.5 TRAFFIC CALMING

Motor vehicle speeds affect the frequency at which automobiles pass pedestrians and bicyclists as well as the severity of crashes that occur between motorist and non-motorists on a roadway. Slower motor vehicle speeds improve motorists' ability to see and react to non-motorized users, minimize conflicts at driveways and other turning locations, and in many cases, improve vehicular throughout. Maintaining slower motor vehicle speeds and reducing traffic in areas where pedestrian and bicycle traffic is regularly expected can greatly improve comfort and safety for non-motorized users.

Traffic calming devices are engineered measures with the intent of decreasing motor vehicle speeds, reducing motor vehicle volumes, and reducing conflicts. Other approaches to traffic calming include educational, enforcement, and placemaking measures. Not all treatments listed here are appropriate for all roadways.

3.5.1 SPEED LIMIT REDUCTION

A reduction in speed limit is a simple way to make the roadway a safer place for pedestrians and bicyclists. Statistically, 80 percent of pedestrians struck by a car going 40 mph will die; at 30 mph the likelihood of death is 40 percent. At 20 mph, the fatality rate drops to just 5 percent (The National Highway Traffic Safety Administration).

3.5.2 LANE NARROWING

Lane narrowing is when an excessively large lane is reduced through the striping of a shoulder or the addition of bike lanes. This helps reduce motor vehicle speeds and creates dedicated space for bicyclists and/or pedestrians.

3.5.3 SETBACK REDUCTION

Large setbacks are a result of car-oriented development practices, which typically locate an expansive parking lot between the road and building frontages. Redeveloping roadside properties with little or no setback creates a sense of enclosure, adds visual stimuli, and creates a pedestrian-friendly environment, all of which help to slow traffic.

3.5.4 ROAD DIET

Road diets are a reduction in the number of lanes along a roadway. Typically, four lane roads are reduced to three lanes – one lane for each direction of travel and a center two-way turning lane. By reducing the amount of the roadway dedicated to motor vehicles, more space is available for bicycle and pedestrian facilities. This not only improves conditions for bicyclists, but also enhances the pedestrian environment, improves traffic flow, and reduces vehicle-on-vehicle collision rates.

3.5.5 SPEED HUMPS

Speed humps are raised areas usually placed in a series across both travel lanes. Longer humps reduce impacts to emergency vehicles. Some speed hump designs can be challenging for bicyclists and for plows in northern climates; however, gaps can be provided in the center or by the curb for bicyclists and to improve drainage. Speed humps can also be offset to accommodate emergency vehicles and plows.

Speed Hump

3.5.6 TRAFFIC DIVERSION

Motor vehicle traffic volumes affect comfort for bicyclists and pedestrians on local streets. Higher vehicle volumes reduce bicycle and pedestrian comfort and can result in more conflicts. Traffic diversion treatments reduce motor vehicle volumes by completely or partially restricting through traffic on select neighborhood streets such as bicycle boulevards.

Traffic Diversion

3.5.7 CURB EXTENSIONS

Curb extensions are typically implemented by removing on-street parking and extending the sidewalk into the roadway. This traffic calming device physically and visually narrows the roadway, increases the visibility of pedestrians, reduces crossing distances, and provides additional space for streetscape improvements, such as furniture, plantings, and/or green infrastructure. Curb extensions are effective traffic calming devices at intersections as well as mid-block.

Curb Extension

3.5.8 CHICANES

Chicanes are curb extensions arranged in an alternating pattern along the roadway, requiring motor vehicles to slowly weave along a street. Chicanes are most effective on long, straight neighborhood streets where speeding is an issue.

Chicanes

3.5.9 PAVING MATERIALS

Textured paving materials provide tactile and auditory cues that cause motorists to decrease speeds. Paving materials can also provide visual cues indicating a special district or pedestrian-oriented area, which can also help calm traffic.

Textured Paving

3.5.10 STREET TREES

Street trees, landscaping and other aesthetic elements, such as art or banners, produce a feeling of enclosure and add visual stimuli along a roadway corridor. Urban forests and green infrastructure also provide environmental benefits.

Street Trees

3.5.11 LIGHTING

Appropriately scaled street lighting provides a safer, more visible, and more inviting environment for all roadway users. Pairing pedestrian-scaled street lighting with other improvements, such as street trees, helps alert motorists to the potential presence of pedestrians and bicyclists.

Lighting

3.5.12 ENFORCEMENT AND AWARENESS MEASURES

Enforcement and awareness measures such as signage, speed traps, and educational programs, can help reduce speeding in problem areas.

The furnishing zone of a sidewalk buffers pedestrians from the adjacent roadway and is an important area for pedestrian and placemaking amenities, such as street trees, street furniture, transit stops, and public art.

Awareness

3.6 STREETSCAPE ELEMENTS

3.6.1 STREET TREES

Urban forests provide a wide range of benefits and services to society, and a robust tree canopy is one of the greatest contributors to a healthy and livable urban landscape. While the benefits provided by urban forests are not easily bought or sold, they have major economic implications. For example, several studies have demonstrated that the presence of mature trees and forest cover within a parcel are directly correlated to increased property values, and the value of properties adjacent to urban park or open space is approximately 8 to 20% higher than comparable properties without access to park or open space (Wolf, Kathleen. 2007. City Trees and Property Values).

Street Trees

Because trees can take fifteen years or more to develop a full canopy, preserving healthy existing trees wherever practicable is a cost effective and efficient way to obtain the most value from trees. Benefits provided by a mature urban forest include the following:

- Stormwater flow regulation and water quality treatment through interception, transpiration, sequestration, and increased infiltration;
- Enhanced character of a place;
- Improved air quality;
- Reduced noise and light pollution;
- Traffic-calming;
- Habitat provision;
- Mitigation of the heat island effect;
- Enhanced quality of open space; and,
- Provision of visual relief within the urban environment, leading to stress reduction and other health benefits.

The U.S. Department of Agriculture (USDA) Forest Service provides a suite of online, publicly-accessible tools to assess the benefits provided by street trees at the parcel, street, and landscape level. These tools can be accessed online at: www.itreetools.org.

3.6.2 LIGHTING

Lighting improves visibility for both pedestrians and motorists - particularly at intersections. Pedestrian-scaled lighting should be used in areas of high pedestrian activity and lighting placement should not impede pedestrian traffic. Lamp fixtures should be placed at a height of 12-14 feet and poles should be spaced approximately 50-100 feet apart, depending on the intensity of lights. Lamp fixtures should project light downward in order to provide sufficient illumination of the sidewalk while limiting excess light pollution. Illumination should be warm and moderate, rather than dim or glaring, and should provide a balanced coverage of the corridor and surrounding area for comfort and security.

3.6.3 SITE FURNISHINGS

Site furnishings are critical components of creating a socially and economically vibrant streetscape and accommodating a wide range of needs and activities. Providing benches at key rest areas and viewpoints encourages people of all ages to use the walkways by ensuring that they have a place to rest along the way. Bike racks accommodate bicyclists traveling to their destinations. Trash and recycling receptacles promote cleanliness and sustainability. Landscaped planters and movable furniture offer aesthetic and placemaking benefits to the sidewalk.

Lighting

Bike Racks

3.7 GREEN INFRASTRUCTURE

Green infrastructure offers an environmentally-friendly approach to managing urban stormwater, and if installed in appropriate locations and maintained over time, can be a viable supplement to or replacement of conventional stormwater drainage infrastructure. Green infrastructure systems are designed to slow, absorb, and filter stormwater at or near its source, thus decreasing the quantity and improving the quality of urban stormwater runoff. In addition to flood storage capacity and water quality benefits, green infrastructure can also help achieve aesthetic, educational, and biodiversity goals, especially when native plants are used. Incorporating a diversity of green infrastructure systems into the City of Montpelier's streetscape will enable the City to sustainably manage stormwater, improve streetscape aesthetics, create memorable City gateways, provide educational opportunities, and calm traffic.

Montpelier's Stormwater Master Plan, adopted on October 28, 2016, combines a watershed-scale approach with local knowledge of the Department of Public Works maintenance regimes and the characteristics of different neighborhoods (current and projected) to develop a prioritized list of stormwater problem areas and a comprehensive guide for future stormwater management activities. In particular, the Stormwater Master Plan outlines several different green infrastructure systems appropriate for the City of Montpelier, including: gravel wetlands, stormwater planters, stormwater swales, stormwater curb extensions, permeable paving, and trees. The remainder of this section discusses the applicability of these different green infrastructure systems within Montpelier's variable streetscape.

Constructed Wetland

3.7.1 CONSTRUCTED WETLAND

Description: Constructed wetlands are designed to slow, filter, store, and infiltrate stormwater. They typically consist of an open pond channel for water storage, filtration, and infiltration, a forebay at the inlet to collect the stormwater and facilitate the settlement of sediments, and a micropool at the outlet that provides an additional opportunity for sediments to settle. The shape of the pond channel can vary from linear to curvilinear. From a water quality perspective, curvilinear designs are preferred, as they increase the potential for the captured stormwater to interact with wetland vegetation. The edges of the pond channel are gently sloped and planted with wetland vegetation. In the case of gravel wetlands, stormwater enters the system at the forebay and then enters a series of horizontal flow-through treatment cells; the subsurface consists of gravel layers that distribute, filter, and infiltrate the stormwater.

Benefits: Large flood storage capacity, large treatment capacity, peak flow reduction, pollutant reduction, low maintenance, groundwater recharge, native landscape restoration.

Design + Maintenance Considerations: The side slopes of all wetland components should not exceed 30%; where space allows, 10-20% slopes are ideal for wetland plant survival. Routine removal of sediment collected in forebay and/or micropool; maintenance frequency will vary based on watershed size and neighboring land uses. Regular maintenance is necessary as vegetation becomes established (e.g., fences to deter herbivory); however, landscape maintenance is significantly reduced once vegetation is established.

3.7.2 STORMWATER SWALES

Description: Stormwater swales are densely planted linear depressions that are designed to slow, filter, infiltrate, and convey stormwater. Check dams can be incorporated along the length of the swale to slow the conveyance of water and encourage infiltration. Swales can be enhanced with a subsurface gravel layer to increase storage capacity and an underdrain to convey excess stormwater to existing storm drains.

Benefits: Moderate flood storage capacity, peak flow reduction, pollutant reduction, low maintenance, groundwater recharge, aesthetic enhancement

Design + Maintenance Considerations: Stormwater swales require well-draining soils and are best suited for areas with a gentle, natural slope. To reduce erosion in stormwater swales, areas with highly erodible soils and where high flow volumes and rates are expected should be avoided. Side slopes should not exceed 30% and longitudinal slopes should range from 2-4%.

Stormwater Swale

3.7.3 STORMWATER PLANTERS

Description: Stormwater planters, which include rain gardens, are manmade depressions in the landscape that slow, filter, and infiltrate stormwater. Unlike stormwater swales, which often parallel a road and have a larger catchment area, stormwater planters are designed to collect water from a discrete, local source, such as a rooftop, driveway, or street corner. Stormwater planters can be planted with perennials, grasses, shrubs, and/or trees and provide a great opportunity to improve streetscape aesthetics.

Stormwater Planter

Subsurface drainage wells can also be used in combination with stormwater planters in order to increase the storage capacity of the system. Drainage wells collect stormwater that infiltrates or overflows from the stormwater planter. The excess water slowly seeps into surrounding stone storage media and soils through perforations in the drainage well walls.

Benefits: Peak flow reduction, pollutant reduction, groundwater recharge, aesthetic enhancement.

Design + Maintenance Considerations:
Stormwater planters are intended to infiltrate stormwater, not collect and store it for long periods of time; therefore, well-draining soils are required. If water is entering the stormwater planter at a discrete location (i.e., inlet), this area should be stabilized to prevent erosion. The inlet should also be designed to allow sediment to settle and should provide easy access for routine sediment removal. Landscape maintenance (e.g., weeding and watering) will be more frequent in the first few years as plants become established; over time, maintenance regimes may be reduced in frequency, but should be tailored to ensure the desired aesthetic is achieved.

3.7.4 STREET TREES

Description: Trees have the ability to slow stormwater by intercepting rainfall in their leaves and branches and to reduce the volume of stormwater by absorbing water through their root systems. In urban areas, street trees are often confined to planters, which significantly constrain the amount of space, water, and air available to a tree's root system. In particular, soil compaction is a major threat to tree survival in urban areas. To address the constraints of the urban environments, subsurface structures, such as Silva Cells or structural soils. These subsurface modifications suspend pavement systems over soils, significantly increasing the volume, aeration, and water storage capacity of soils, while also accommodating utilities and traffic loads.

Benefits: Peak flow reduction, pollutant reduction, groundwater recharge, low maintenance, aesthetic enhancement, urban heat island mitigation

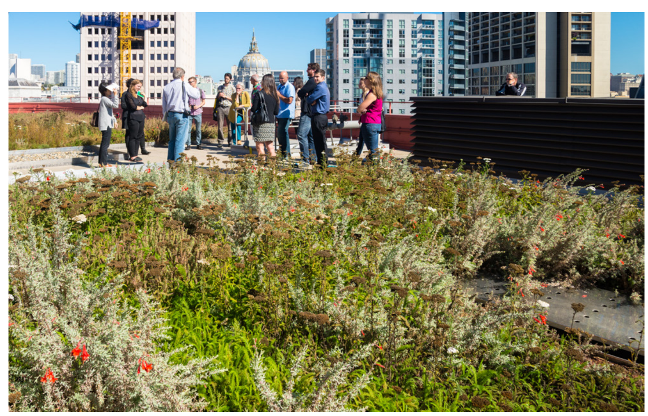
Design + Maintenance Considerations: Regular watering is required in the first few years following installation. As the tree becomes established, maintenance frequency can be reduced. If subsurface structures are used to decrease soil compaction and increase soil volume and water storage capacity, subsurface utility exploration will be required to identify an appropriate design.

3.7.5 GREEN ROOFS

Description: Green roofs enable plants to grow on top of building structures and vary in complexity. In their simplest form, green roofs are comprised of plants, a growing medium, and a waterproof membrane to protect the underlying roof structure. More complex systems also include root barriers and drainage and irrigation systems.

Benefits: Peak flow reduction, pollutant reduction, aesthetic enhancement

Design + Maintenance: Green roofs can be designed in tandem with new structures or can be retrofitted to an existing structure. Drought tolerant plants that can thrive in exposed locations (e.g., solar and wind exposure) should be selected to increase plant survivorship and decrease maintenance.



Green Roof

Pavers

3.7.6 PERMEABLE PAVEMENT / PAVERS

Description: Permeable pavements are paved surfaces with pores or spaces that allow stormwater to infiltrate. These pavements are composed of unit pavers, concrete, or asphalt that overlay a subsurface layer of crushed stone and gravel. A recent study conducted by the University of New Hampshire (UNH) Stormwater Center demonstrated that snow and ice melt faster on porous asphalt than conventional pavements, which can lead to substantial reductions in annual salt loads for anti-icing/deicing practices. Additionally, the UNH Stormwater Center has demonstrated that permeable interlocking concrete pavement has the ability to buffer warm ambient air temperatures; the ability to moderate runoff temperature has significant implications for mitigating thermal impacts to adjacent cold water streams.

Benefits: Peak flow reduction, pollutant reduction, groundwater recharge, aesthetic enhancement, urban heat island mitigation

Design + Maintenance Considerations:
Subsurface check dams can be installed to slow flow rates and increase infiltration of stormwater; the installation of check dams is particularly important on sloped terrain. The permeability of subgrade soils is also an important consideration, as well-draining soils will have a greater capacity to store and infiltrate stormwater. Routine maintenance to remove sediment and debris that accumulates in the pores and spaces of the permeable pavement is critical to ensure a high level of performance is maintained.

3.8 PLACEMAKING

Simply selecting and implementing facilities described in the preceding sections will not automatically create a successful complete street. Streets are part of the public realm and should respond to the nuances and idiosyncrasies that make a place special. Complete streets must be approached through placemaking.

Placemaking is a collaborative process that prioritizes people and communities in the planning, design, and programming of public spaces. This community-based process deliberately shapes the physical environment to facilitate social interaction and improve the community's quality of life.

Complete streets projects focus on public space, and placemaking is an important consideration when selecting and implementing complete street strategies. Implementing a placemaking approach will ensure that complete street design strategies meet community needs; are inclusive and flexible, celebrate the local community, culture, and environment; and, foster the creation of sociable, equitable, and vibrant spaces.

"Parklets" are examples of placemaking that create inviting public spaces for people, while calming traffic.

Page left intentionally blank

DRAFT 06/06/2018

4. ROAD TYPOLOGIES AND APPLICATIONS

4. ROAD TYPOLOGIES AND APPLICATIONS

ROAD TYPOLOGIES

Road typologies refer to groups of roadways in a give community that share similar characteristics and serve similar roles. Organizing similar roads into "typologies" is useful in helping to identify the likely kind of complete street treatments that are most appropriate for various roadways in the City of Montpelier.

An examination of Montpelier's existing network of roads was undertaken in developing this report, which considered facility type and function, traffic volumes, speeds, adjacent land use, and overall character. This resulted in identifying the seven typologies to be used in Montpelier's complete streets guidance.

APPLICATIONS

The appropriate roadway characteristics and bicycle and pedestrian treatments necessary for each road typology to become a "complete street" are presented in this chapter. While there are currently no formal recognized standards or criteria for complete streets, the information presented herein is based on widely recognized best practices, industry standards, and professional judgment.

In addition, the guidance provided herein has been "calibrated" for the local context of Montpelier, meaning that it has taken into account conditions and characteristics that are relevant and appropriate to Montpelier, not a one-size-fits all approach.

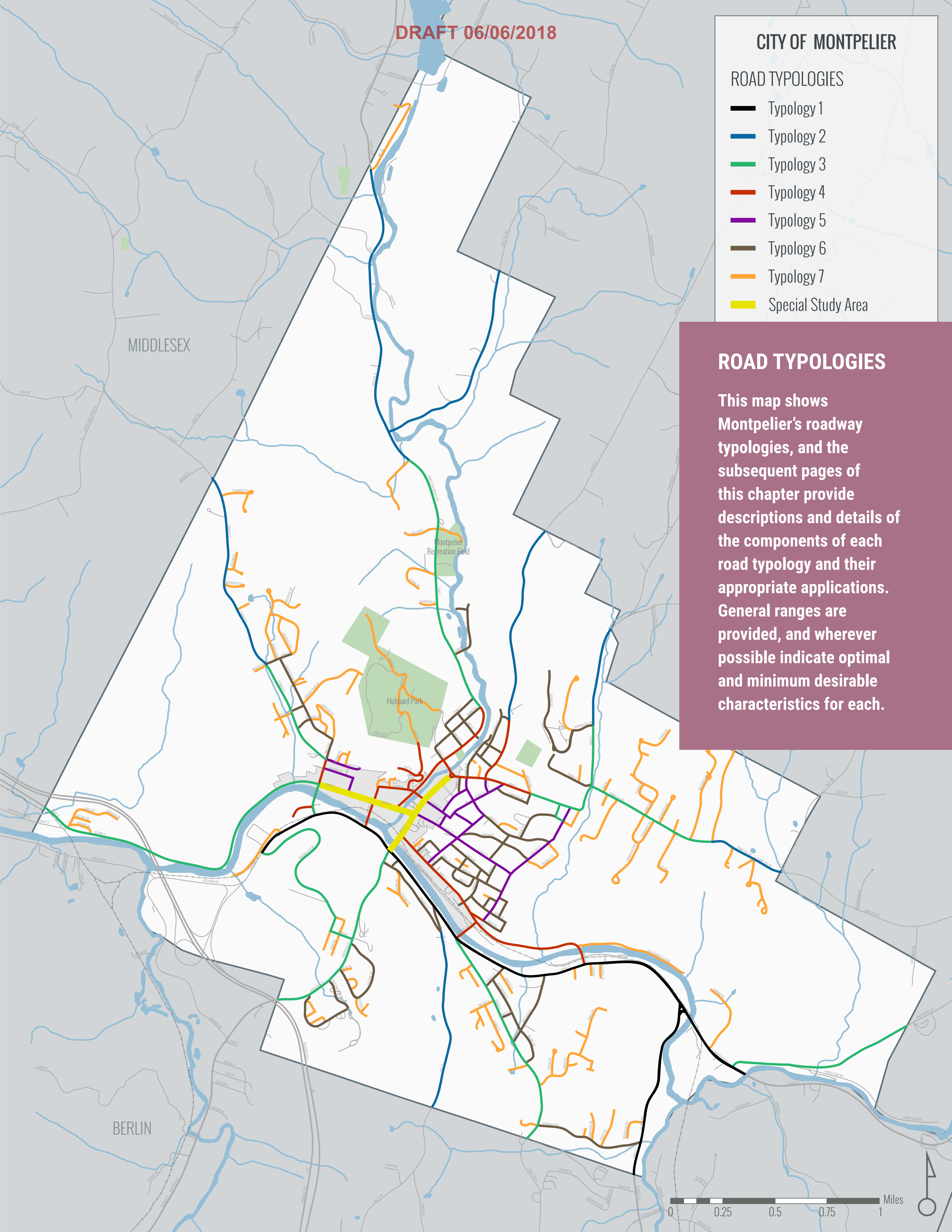
This guidance should also be viewed as a starting point for any location in Montpelier being considered for a complete street conversion, in advance of a formal design process.

Roadway characteristics include the following:

VTrans Reference Facility - Correlation between functional classification

Number of Travel Lanes - The optimal and maximum number of travel lanes. For complete streets, the fewest number of lanes is generally optimal because it reduces the crossing distance for pedestrians and creates a less intimidating environment for non-motorized road users.

Lane Width - The opimal and maximum width in feet of travel lanes. In general, narrower lanes are better because drivers tend to be more cautious and drive slower. The range of appropriate lane widths will vary by road type.



ROAD TYPOLOGIES

This map shows Montpelier's roadway typologies, and the subsequent pages of this chapter provide descriptions and details of the components of each road typology and their appropriate applications. General ranges are provided, and wherever possible indicate optimal and minimum desirable characteristics for each.

Speed Limit - For vehicle speed, lower is better for complete street environments. Lower vehicle speeds mean more ability for drivers to see pedestrians and bicylists, as well as more time to react and avoid collisions. Slower speeds also reduces the severity of crashes. It is worth noting that slower speeds do not appreciably reduce the capacity of a roadway.

On-Street Parking - The presence of on-street parking is an important consideration in servicing commercial and residential areas. On-street parking is generally a desirable characteristic in that motorists tend to drive more cautiously and slowly versus when there are no parked vehicles or other vertical elements directly next to the travel way.

It also provides a buffer between pedestrians, and sometimes bicyclists, from moving vehicles. Furhermore, it provides acess to businesses and other destinations that oriented to street frontages, particularly in downtown.

At the same time, however, on-street parking can also pose challenges, particularly in accommodating bicyclists if there is insufficient street space for dedicated bike lanes. Even when there is room for bike

State and Main Streets

lanes, there is often not enough space to avoid the “door zone” of parked vehicles, which leads to safety issues for bicylists needing to swing out into moving traffic when a car door opens, or colliding with a car door as it opens. Any proposed complete street treatment should be weighed carefully regarding potentially removing on-street parking versus the anticipated benefits that would be realized by doing so.

COMBINING COMPLETE STREETS TREATMENTS WITH ROAD TYPES

Section 3.2 presented the full range of pedestrian and bicycle treatments for complete streets, this chapter presents which of those treatments can be applied to each road typology, along with basic guidance for sidewalks and paved shoulders.

The following pages and the table on page 4-17 summarize how the various roadway characterstics and treatments in Section 3.2 can be applied to each of the road typologies.

NOTE: Additional complete street treatments that were presented in Chapter 3, Sections 3.3-3.8 have not been cross-referenced with road typologies because the applicability of those complete street components can vary greatly depending on context and should be evaluated only as part of individual design studies.

COMPLETE STREETS SAMPLE APPLICATIONS

Several illustrative examples are provided at the end of the chapter to show how various treatments could be applied to existing sections of roadway in Montpelier. Dimensions of lanes and other features have been omitted because they are not indended to be designs, but rather to show how treatments can potentially be applied within the same overall width currently devoted to roadway space.

4.1 TYPOLOGY 1

This typology includes Memorial Dr, Berlin Street, River street to Phelps and River St from Blackwell to Roundabout. These highways have AADTs in excess of 9,000 and a speed limit of 35 MPH. For U,1 all activity is on one side of the street, whereas U2 has activities on both sides of the street.

Memorial Dr.

This also includes parts of River Street where activity is on both sides of street. Similar to U1, this road has AADTs in excess of 9,000 and speed limit of 35 MPH. For U2 all activity is on both sides of the street.

Includes East Montpelier Rd and River Street from roundabout to the Berlin line. AADTs in excess of 9,000 and speed limit of 40 MPH.

Functional Classification: Primary Arterial

VTRANS Cross Reference: PA-U1, PA-U2, PN-N

Roadway Characteristics

- **Travel Lanes:** 2 to 3
- **Lane Width:** 11 FT
- **Speed Limit:** 35 to 40 MPH
- **Paved Shoulder:** 8 FT (optimal)
- **On-Street Parking:** Generally not present

Pedestrian & Bicycle Facilities

- **Sidewalks:** One or both sides
- **Sidepaths**

Other Treatments

Intersections and crossings, transit facilities, traffic calming, streetscape elements, green infrastructure, and placemaking are dependent on individual context and therefore must be evaluated on a case by case basis.

4.2 TYPOLOGY 2

Streets falling within the Typology 2 category are: Elm Street (past Nature Center), State Street (past Lague), Northfield (past Freedom), Gallison Hill, North Street (above Hillhead), Main Street (past Murray Hill), Towne Hill (past Murray). Typically, AADTs are between 3,000 and 6,000.

Elm St.

Functional Classification: Minor Arterials or Collectors

VTRANS Cross Reference: MA-R, CO-R

Typical AADT: <3,000

Roadway Characteristics

- **Travel Lanes:** 2
- **Lane Width:** 9 to 11 FT
- **Speed Limit:** 35 to 40 MPH
- **Paved Shoulder:** 7 FT (optimal)
- **On-Street Parking:** Generally not present

Pedestrian & Bicycle Facilities

- **Sidewalks:** None
- **Sidepath**
- **Separated Bike Lane**

Other Treatments

Intersections and crossings, transit facilities, traffic calming, streetscape elements, green infrastructure, and placemaking are dependent on individual context and therefore must be evaluated on a case by case basis.

4.3 TYPOLOGY 3

Streets falling within the Typology 3 category are: Elm (summer to Nature Center), Main (Whittier to Towne Hill), Berlin (River St to end), Northfield (Prospect to Freedom Dr), State (Bailey to Lague), College (McKinley to Main via Emmons), Main (towne hill to Murray hill), Towne Hill (to Murray), Gallison Hill, Sherwood, College (from kemp to Sibley and Sibley to Barre, Hubbard, North (to Hillhead), Terrace, National Life Drive plus others to Northfield Street. Typically, AADTs are less than 3,000 with a speed limit of 30 MPH.

College St.

Functional Classification: Minor Arterials or Collectors

VTRANS Cross Reference: MA-N, CO-N

Roadway Characteristics

- **Travel Lanes:** 2
- **Lane Width:** 9 to 11 FT
- **Speed Limit:** 25 to 35 MPH
- **Paved Shoulder:** 4 FT (minimal)/5 FT (optimal)
- **On-Street Parking:** Generally not present

Pedestrian & Bicycle Facilities

- **Sidewalks:** One side
- Sidepath
- Separated Bike Lanes

Other Treatments

Intersections and crossings, transit facilities, traffic calming, streetscape elements, green infrastructure, and placemaking are dependent on individual context and therefore must be evaluated on a case by case basis.

4.4 TYPOLOGY 4

Streets falling within the Typology 4 category are: College (E. State to McKinley), Main St (roundabout to Whittier), Elm (to Summer), Barre, Northfield (to Prospect), Taylor, Bailey (to State), Spring (roundabout to Elm), East State, College (E State to Kemp), Court, Bailey, Langdon, School (btween main and Elm), and Lower North. Typically, AADTs are less than 3,000 with a speed limit of 25 MPH.

Barre St.

Functional Classification: Minor Arterials or Collectors

VTRANS Cross Reference: MA-U, CO-U

Roadway Characteristics

- **Travel Lanes:** 2
- **Lane Width:** 9 to 11 FT
- **Speed Limit:** 25 MPH
- **Paved Shoulder:** None
- **On-Street Parking:** Generally not present

Pedestrian & Bicycle Facilities

- **Sidewalks:** Both sides
- Sidepath
- Separated Bike Lane
- Bike Lanes
- Advisory Shoulders

Other Treatments

Intersections and crossings, transit facilities, traffic calming, streetscape elements, green infrastructure, and placemaking are dependent on individual context and therefore must be evaluated on a case by case basis.

4.5 TYPOLOGY 5

Typology 5 roads tend to experience high traffic volumes that are typical of downtown residential streets. They are typically through streets in residential neighborhoods.

Loomis St.

Functional Classification: Local

VTRANS Cross Reference: LO-High

Roadway Characteristics

- **Travel Lanes:** 2
- **Lane Width:** 9 to 10 FT
- **Speed Limit:** 25 MPH
- **Paved Shoulder:** None
- **On-Street Parking:** Both sides

Pedestrian & Bicycle Facilities

- **Sidewalks:** Both sides
- **Sidepath**
- **Separated Bike Lane**
- **Bike Lanes**
- **Advisory Shoulders**

Other Treatments

Intersections and crossings, transit facilities, traffic calming, streetscape elements, green infrastructure, and placemaking are dependent on individual context and therefore must be evaluated on a case by case basis.

4.6 TYPOLOGY 6

Moderate traffic volumes (400<ADT<1500) are experienced on roads falling in the Typology 6 category. They are typically through residential streets with medium densities (Res. 24,000 to Res. 6000).

1st Ave.

Functional Classification: Local

VTRANS Cross Reference: LO-Mod

Roadway Characteristics

- **Travel Lanes:** 2
- **Lane Width:** 9 FT
- **Speed Limit:** 20 (optimal), 25 MPH (max.)
- **Paved Shoulder:** None
- **On-Street Parking:** One side

Pedestrian & Bicycle Facilities

- **Sidewalks:** One side
- Bike Lanes
- Advisory Shoulders
- Shared Roadway
- Yield Street

Other Treatments

Intersections and crossings, transit facilities, traffic calming, streetscape elements, green infrastructure, and placemaking are dependent on individual context and therefore must be evaluated on a case by case basis.

4.7 TYPOLOGY 7

Roads included in Typology 7 are typically deadend streets or no outlet streets. They are generally not in the urban core but could on very small deadend streets (such as Witt or Waverly). AADTs are usually less than 400.

Westwood Dr.

Functional Classification: Local

VTRANS Cross Reference: LO-Low Traffic

Roadway Characteristics

- **Travel Lanes:** 2
- **Lane Width:** 7 to 9 FT
- **Speed Limit:** 20 (optimal), 25 MPH (max.)
- **Paved Shoulder:** 2 FT
- **On-Street Parking:** Generally not present

Pedestrian & Bicycle Facilities

- **Sidewalks:** none or one side
- **Shared Roadway**
- **Yield Street**

Other Treatments

Intersections and crossings, transit facilities, traffic calming, streetscape elements, green infrastructure, and placemaking are dependent on individual context and therefore must be evaluated on a case by case basis.

Page left intentionally blank

TABLE: SUMMARY OF ROADWAY TYPOLOGY GUIDANCE

		TYPOLOGY 1	TYPOLOGY 2	TYPOLOGY 3
Functional Classification		Primary Arterial	Minor Arterials or Collectors	Minor Arterials or Collectors
VTRANS Cross Reference		PA-U1, PA-U2, PA-N	MA-R, CO-R	MA-N, CO-N
Features & Characteristics		Includes Memorial Dr, Berlin Street, River street to Phelps and River St from Blackwell to Roundabout. These highways have aadts in excess of 9,000 and a speed limit of 35 mph. For U1 all activity is on one side of the street whereas U2 has activities on both sides of the street. Includes parts of River Street where activity is on both sides of street. Similar to U1, this road has aadts in excess of 9,000 and speed limit of 35. For U2 all activity is on both sides of the street. Includes East Montpelier Rd and River Street from roundabout to the Berlin line. AADTs in excess of 9,000 and speed limit of 40 mph.	State Street (past Lague), Northfield (past Freedom). AADTs 3,000 to 6,000. Gallison Hill, North Street (above Hillhead).	Elm (summer to Nature Center), Main (Whittier to Towne Hill), Berlin (River St to end), Northfield (Prospect to Freedom Dr), State (Bailey to Lague), College (McKinley to Main via Emmons). Main (towne hill to Murray hill), Towne Hill (to Murray), Gallison Hill, Sherwood, College (from kemp to Sibley and Sibley to Barre, Hubbard, North (to Hillhead), Terrace, National Life Drive plus others to Northfield Street. AADTs <3000. Speed limits 30.
Roadway Characteristics	**Number of Travel Lanes (optimal/ max)**	2-3	2	2
	Lane Width (optimal/max)	11 ft.	10 ft.	10 ft.
	Speed Limit (MPH) (optimal/max)*	35/40 MPH	35/40 MPH	25/35 MPH
	Paved Shoulder	4 ft.	4 ft.	4 ft.
	On-Street Parking	No	No	No
Pedestrian and Bicycle Treatments**	**Sidewalks**	1-2 Sides	0 Sides	0-1 Side
	Sidepath	●	●	●
	Separated Bike Lane	●	●	●
	Bike Lane			●
	Advisory Shoulders			
	Shared Roadway			
	Yield Street			

TABLE: SUMMARY OF ROADWAY TYPOLOGY GUIDANCE (CONT.)

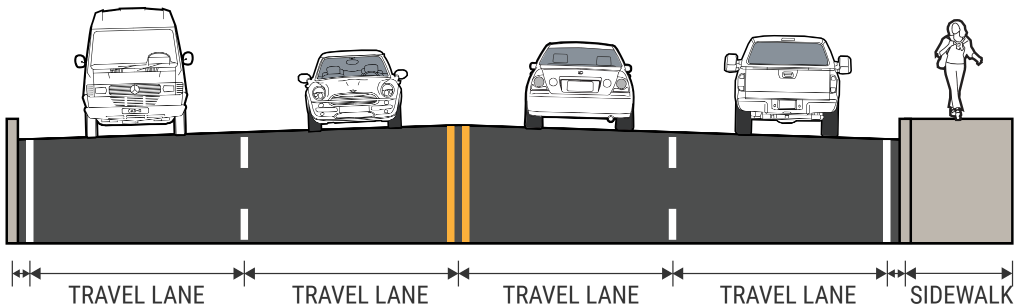
		TYPOLOGY 4	TYPOLOGY 5	TYPOLOGY 6	TYPOLOGY 7
Functional Classification		Minor Arterials or Collectors	Local	Local	Local
VTRANS Cross Reference		MA-U, CO-U	LO-High	LO-Mod	LO-Low Traffic
Features & Characteristics		College (E. State to McKinley), Main St (roundabout to Whittier), Elm (to Summer), Northfield (to Prospect), Taylor, Bailey (to State), Spring (roundabout to Elm), College (E State to Kemp), Court, Bailey, Langdon, School (btween main and Elm), Lower North. AADTs less than 3,000 and speed 25.	East State, Court. High Traffic volumes typical of downtown residential streets. Typically through streets in residential neighborhoods.	Moderate traffic volumes (100<AADTs<1000). Typically through residential streets with medium densities.	Typically deadend or no outlet. Generally not in the urban core but could on very small deadend streets (like Witt or Waverly). AADTs <400.
Roadway Characteristics	**Number of Travel Lanes (optimal/ max)**	2	2	2	2
	Lane Width (optimal/max)	10 ft.	10 ft.	9 ft.	7 ft. Lane & 2 ft. Shoulder
	Speed Limit (optimal/max)*	25 MPH	25 MPH	25 MPH	20/ 25 MPH
	Paved Shoulder	No	No	No	2 ft.
	On-Street Parking	No	2 Sides	1 Side	No
Pedestrian and Bicycle Treatments**	**Sidewalks**	2 Sides	2 Sides	1 Side	0 Sides
	Sidepath	●			
	Separated Bike Lane	●			
	Bike Lane	●	●		
	Advisory Shoulders			●	
	Shared Roadway		●	●	
	Yield Street				●

* Speeds below 25 MPH outside of downtown are recommended should the statute be changed in the future to permit it.

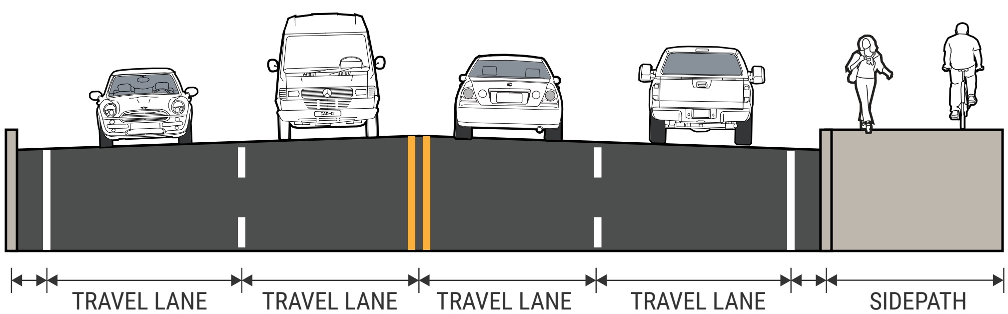
** Refer to Chapter 3 for more detailed design guidance for individual treatments.

4.6 SAMPLE COMPLETE STREETS APPLICATIONS

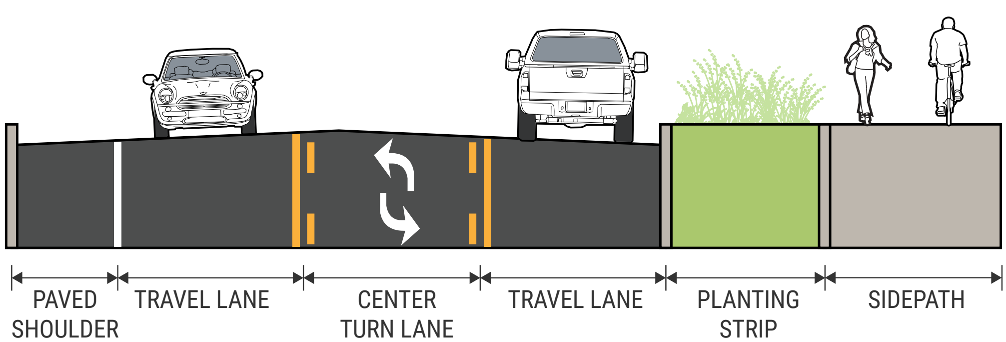
EXAMPLE 1



EXISTING

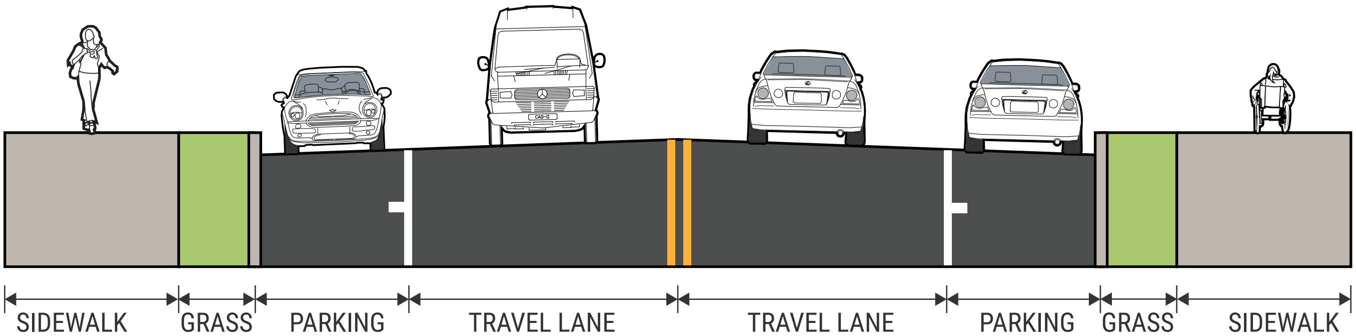


ALTERNATIVE 1

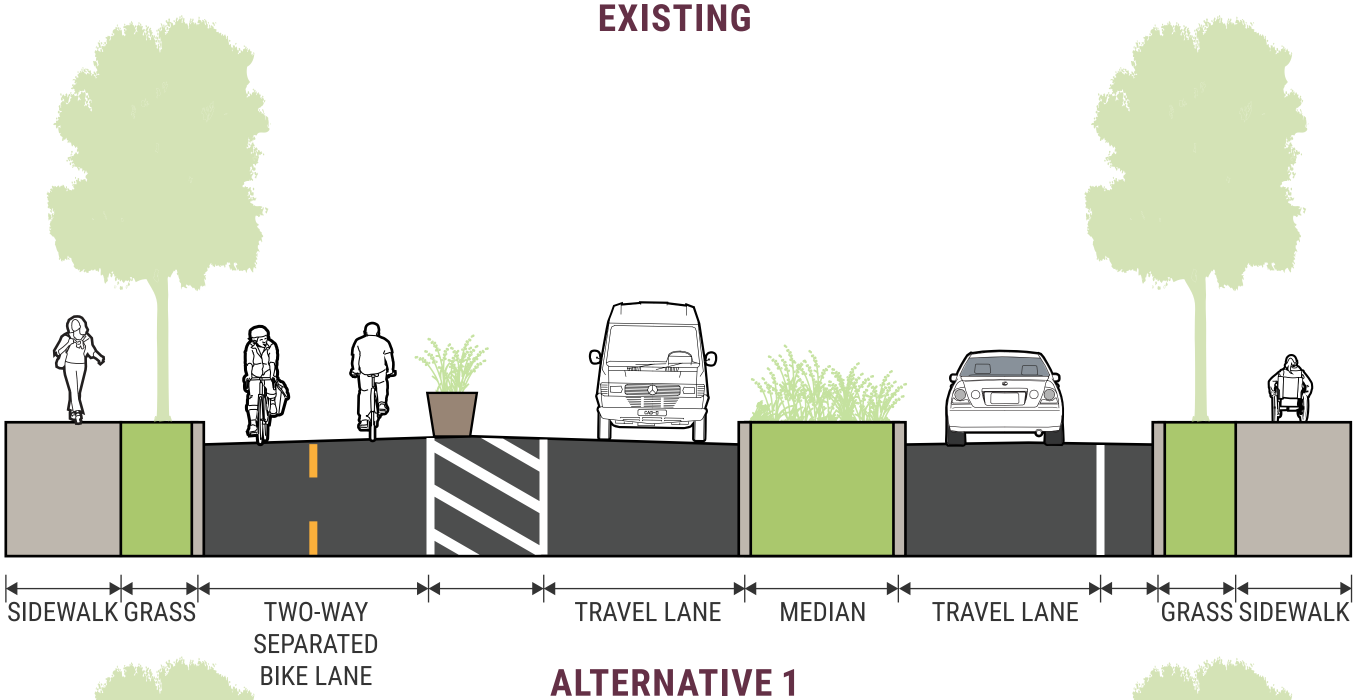


ALTERNATIVE 2

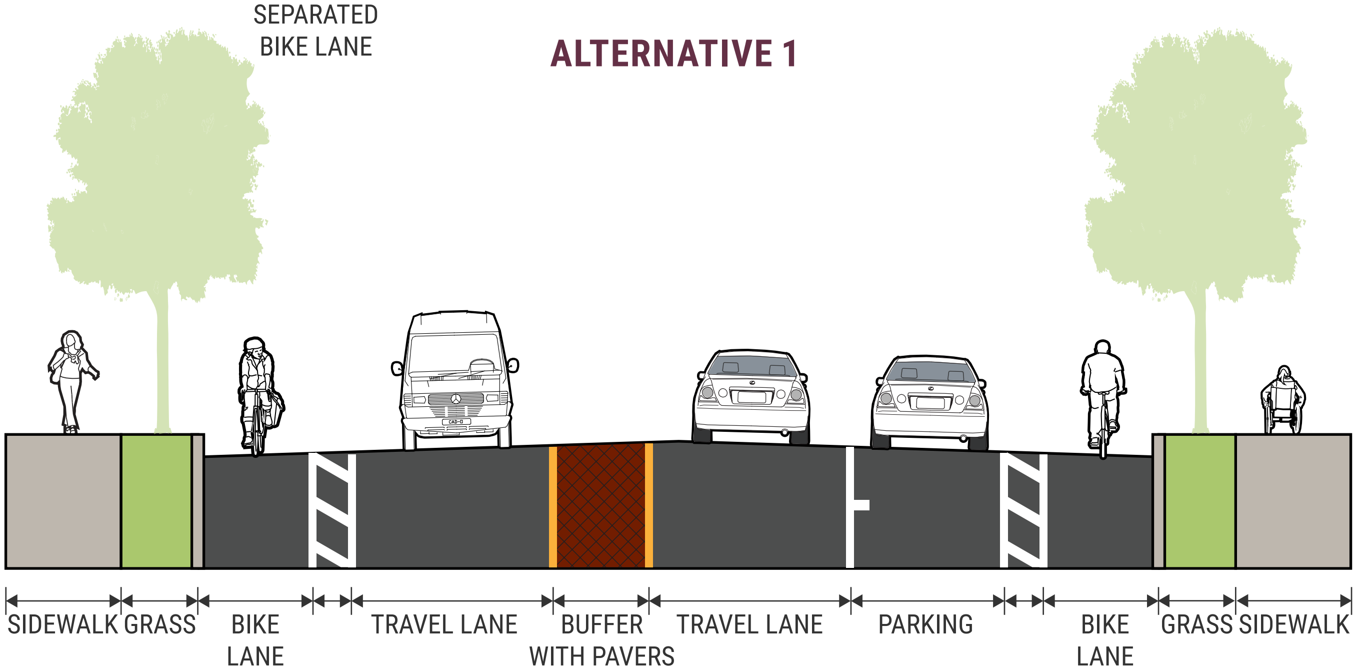
EXAMPLE 2



EXISTING



ALTERNATIVE 1



ALTERNATIVE 2

5. IMPLEMENTATION

5. IMPLEMENTATION

The City of Montpelier is making it a priority to advance the design of its streets so they can accommodate all modes of travel. In order to achieve the goals, projects should follow the principles outlined in this report, as well as the Vermont Complete Streets Law and draw upon other foundational work that has been done in Montpelier.

PROJECT PRIORITIZATION

In order to implement complete streets in a way that is most effective and provides the greatest positive impact, the following criteria should be considered:

CONNECTIVITY

This category considers how well a proposed project contributes towards the creation of a cohesive network of complete streets that connect residents and visitors to local and regional destinations and the integration of different modes of transportation.

COMMUNITY NEED AND IMPACT

This category considers existing street conditions, such as multimodal infrastructure, and assesses the ability of a given project to significantly improve these conditions while also positively impacting the community.

BENEFIT/COST

This category compares the long-term community health, safety, and welfare benefits of a project to capital investment required to construct the project. Projects that positively impact community health, safety, and welfare and require a small capital investment may want to be prioritized. However, projects that require large capital investment, but also have a significant long-term positive impact on the community should also be considered a high priority.

IMPLEMENTATION MECHANISMS

The Montpelier Department of Public Works will have the primary responsibility for implementing complete streets projects. Staff has expressed interest in implementing projects based on ongoing operations and maintenance (O&M) activities to ensure that as roads become due for resurfacing, restriping, or other reconstruction projects, that complete treatments can be applied as appropriate. The guidance contained in this document should be used to help facilitate the application of complete street treatments as they arise as part of regular O&M activities.

In addition, if the City identifies complete steets projects as high priority based on the criteria described in the previous section, which does not necessarily align with the O&M schedule, it may want to consider either revising or adjusting the O&M. Alternatively the City may also want to consider prioritizing such high priority projects through the city's capital improvement process (CIP). This may be warranted for projects of a larger scope and complexity, and/or over a larger area. The diagram on the opposite page illustrates how these alternative implementation mechanisms can be applied.

Menu of Implementation Mechanisms

A

PROJECT IMPLEMENTED THROUGH REGULAR O&M ACTIVITIES

- Integrate recommendation with existing or future design of transportation projects for the same corridors
- Bike/ped facilities can be small overall costs of larger roadway capital projects
- Less complex projects can be designed and constructed in-house such as resurfacing and restriping projects

OR

B

CREATE or PRIORITIZE DISTINCT PROJECT THROUGH CIP

- City elects to prioritize distinct projects
- Dedicate funding for design and/or implementation

B1

FEASIBILITY STUDY (POTENTIALLY REQUIRED)

- Determine treatment for implementation
- Conduct intersection and parking analysis and traffic counts
- Prepare intersection and cross-section options
- Lead public process to select preferred option
- Prepare cost estimate for detailed design and construction

B2

DESIGN PHASE (LIKELY WILL REQUIRE FUNDING)

- Translate conceptual design to construction documents (CDs)
- May require environmental review, survey, and permitting
- Plans prepared at different design levels, and detailed cost estimate and specification prepared at each level
- Final cost estimate and material specifications prepared with CDs

B3

CONSTRUCTION

- Obtain construction funding and execute property acquisition
- Bid-out project and select contractor, or bundle project with others to attract more
- bids
Construct project

PILOT PROJECTS

In order to help gauge the support and efficacy of various complete streets proposals, the City may want to test ideas through pilot projects. This could include installations of low cost or temporary complete streets treatments such as lane reconfigurations and installation of pedestrian and bicycle facilities using cones on a provisional basis over a period of time. This would provide an opportunity to monitor outcomes as well as the level of acceptance and supprt and adjust as necessary.

Temporary parklet installation on State St.

Page left intentionally blank