Walk Bike planBTV

WALK BIKE MASTER PLAN
BURLINGTON, VT

DRAFT FOR PUBLIC REVIEW: JULY 1, 2016

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MANY THANKS

To the Burlington City Council and the hundreds of residents and business owners that participated in the creation of this plan.

To the organizations that funded this plan.

- Vermont Agency of Transportation (VTRANS)
- AARP Vermont
- Chittenden County RPC

To the two committees that helped guide the process:

The Technical Committee provided guidance on the plan's goals, public involvement process, priority improvements, strategies, and performance measures. With leadership from the Burlington DPW, the Committee included representatives from:

- Local Motion
- VTRANS
- AARP Vermont
- Chittenden County Regional Planning Commission
- CCTA

The Advisory Committee provided additional strategic guidance around priority improvements, strategies, and public involvement. Members of this Committee served as liaisons in outreach and communications efforts. They are also responsible for submitting the final Master Plan to the City Council for Adoption. Members include representatives from:

- Local businesses
- Residents from each of the 4 districts
- City Councilors
- Burlington Walk-Bike Council
- Burlington School District
- Burlington Advisory Committee on Accessibility
- University of Vermont Transportation & Parking Services
- Vermont Department of Health
- Representatives for relevant City Departments such as the Police and Fire Departments, Planning & Zoning, Community & Economic Development, and Burlington Parks, Recreation & Waterfront

(full bleed photo representing active transportation here - showing multiple modes)

Burlington's first comprehensive plan focused on walking and biking.

Welcome to Burlington's first comprehensive plan focus on walking and biking. In the pages ahead, this document will provide background information about the planning process, examine existing conditions, and make recommendations for how Burlington can improve pedestrian and bicycle conditions. While this plan is specifically focused on walking and biking, it serves as a compliment to past and ongoing planning efforts in Burlington, and throughout the region, including:

- Ongoing planBTV South End process (Draft plan released June 2015)
- 2016 Chittenden County Regional Planning Commission (CCRPC) Regional Bicycle and Pedestrian Plan
- 2016 Vermont Comprehensive Energy Plan
- 2015 planBTV Parks, Recreation & Waterfront Master Plan
- 2014 Burlington Bike Path Intersections Scoping Study
- 2014 North Avenue Corridor Study
- 2013 planBTV: Downtown and Waterfront Master Plan
- 2011 Comprehensive Transportation Plan for the City of Burlington
- 2011 Chittenden County Bike Share Feasibility Study
- 2011 Colchester Avenue Corridor Plan
- 2011 North Winooski Avenue & Archibald Street Intersection: Pedestrian Safety & Mobility Evaluation
- 2010 Final Report of the Waterfront South Access Project
- 2010 Chittenden County Transportation Authority Transit Development Plan
- Ongoing advancement of the Shelburne Road Rotary Redesign Project

For additional information on these related planning efforts, please visit: www.burlingtonvt.gov


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STOP

LET'S DO THIS.

Making Burlington a more walkable, bikeable place will improve quality of life for everyone.

When it comes to walking and biking, Burlington has a lot to be proud of. With access to forest, mountains, lakes, and river, Burlington's appeal for outdoor recreation is hard to match. The Burlington Bike Path is a tremendous asset to the City's parks system and is an immensely popular attraction during the summer, fall and spring and, increasingly, the winter months. Church Street Marketplace is a vibrant hub of pedestrian activity, surrounded by a walkable downtown with well-preserved historic architecture. Compact development patterns make Burlington inherently conducive to travel on foot and by bike. Indeed, the city has been awarded Silver level Bicycle Friendly Community and Walk Friendly Community designations, and in 2013 endorsed a community effort to "Go for Gold." The Queen City is consistently rated as one of the most livable and creative small cities in America.

Still, like many communities across the country, Burlington is experiencing growing demand for safer streets with better walking and biking options. Burlington's vision for becoming a more walkable, bikeable place has been articulated in every transportation-related plan adopted in the past decade. Many city agencies and non-profits are already working toward the ambitious goal of making Burlington the best small city for walking and biking on the East Coast. But up until now, Burlington has not had any dedicated plan defining strategies and priorities for walk/bike-related investments. As Burlington's first comprehensive plan devoted to improving pedestrian and bicycle conditions, this plan creates a road map to help Burlington rapidly transform into a place where walking and biking are viable, and enjoyable, transportation options for people of all ages and abilities, all year round. Why are walking and biking important for Burlington? First, people care about it! Even with limited infrastructure and no comprehensive plan in place, census data shows that more Burlington residents that are getting to work by bike or on foot. Second, safer walking and biking conditions will improve the quality of life for everyone. A growing body of data from around the country documents that growth in walking and biking brings a host of environmental and economic benefits tied to reduced traffic congestion, reduced vehicle emissions, lower road maintenance costs, savings in healthcare costs, increased independence for those who can't drive, and more. Cities around the nation are paying attention - in September of 2015 the Surgeon General even issued a national Call to Action, urging communities to improve access to safe and convenient places to walk and wheelchair roll for people of all ages and abilities. In the pages ahead, we'll take a closer look at what improved walking and biking conditions can do for Burlington, set goals for walk and bike improvements, and outline a path to help Burlington reach those goals. This plan has been a long time coming. Let's do this, Burlington!

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LETTER FROM MAYOR

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LETTER FROM PUBLIC WORKS DIRECTOR

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Executive Summary to include:

- Plan Vision and Goals, with overarching success metrics
- Selection of priority actions related to infrastructure/ engineering, including those related to bike parking and bike share
- Simplified, summary map of key investments
- Selection of priority actions related to policy, education, encouragement, enforcement, equity, and evaluation/planning

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EXECUTIVE SUMMARY SECTION HERE

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VISION

IMAGINE A FUTURE WHERE...

- ...Burlington's Streets were safe enough that parents could let their kids walk or bike to school, to the park, or to a friend's house without worry; and that older adults could comfortably walk or bike from their house to community destinations such as the grocery store, or the pharmacy.

- ...walking, biking, and taking the bus were the preferred choice for students and adults living or working in Burlington, all year round.

- ...Burlington's transportation network improved our local economy and quality of life, leading people to stay in Burlington and invest in our community.

GOALS

THIS PLAN IS ABOUT 2 THINGS:

- CREATING SAFER STREETS FOR EVERYONE
- AND, MAKING WALKING AND BIKING A VIABLE (AND ENJOYABLE) WAY TO GET AROUND TOWN.

GOAL:

CREATING SAFER STREETS FOR EVERYONE...

We will eliminate traffic-related fatalities and serious injuries by 2026.

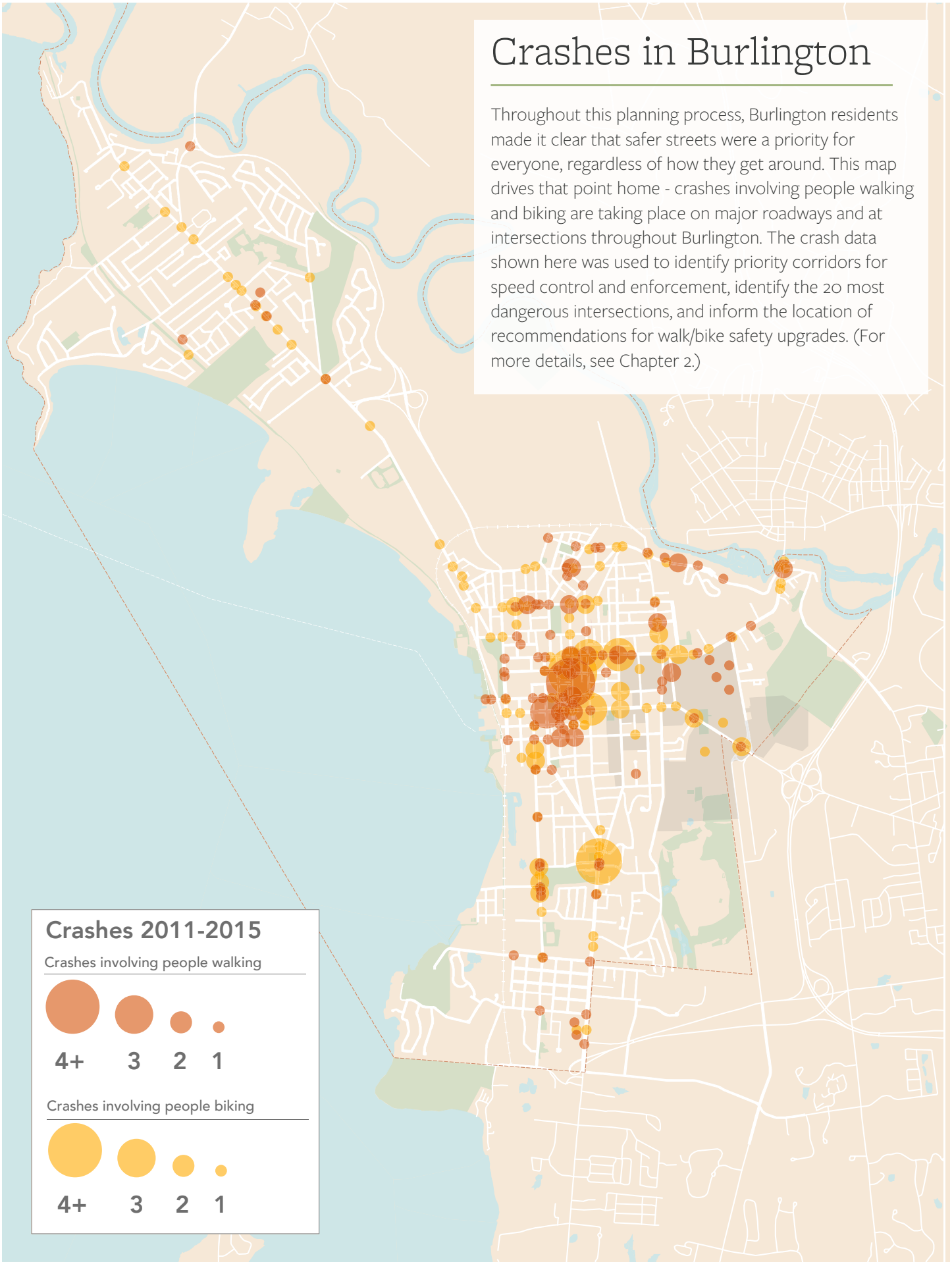
Traffic-related deaths and injuries are preventable. It isn't accurate to call serious collisions "accidents" - for the most part these incidents are the result of factors that we can change, such as unforgiving roadway designs and poor behavior.

To achieve the ambitious goal above, Burlington must approach the issue of street safety from multiple angles – creating infrastructure that emphasizes safety, predictability, and the potential for human error, along with targeted programs related to education, enforcement, and more.

This safety goal has been developed in the spirit of Vision Zero principles. For more information about Vision Zero and what it means, see the Policy and Protocol Action Plan in Chapter 3.

Crashes in Burlington

Throughout this planning process, Burlington residents made it clear that safer streets were a priority for everyone, regardless of how they get around. This map drives that point home - crashes involving people walking and biking are taking place on major roadways and at intersections throughout Burlington. The crash data shown here was used to identify priority corridors for speed control and enforcement, identify the 20 most dangerous intersections, and inform the location of recommendations for walk/bike safety upgrades. (For more details, see Chapter 2.)



GOAL:

MAKING WALKING AND BIKING A VIABLE (AND ENJOYABLE) WAY TO GET AROUND TOWN...

By 2026, reliance on drive-alone trips will be low, and alternative modes will make up the majority of commute trips in Burlington.

Mode share (also called mode split or modal share) is a way to measure the percentage of travelers using a particular type of transportation.

In the United States, it is difficult to measure exactly how many people walk and bike for transportation. The best data available for understanding Burlington's mode share comes from the U.S. Census Bureau's American Community Survey (ACS), which only asks for information about a person's journey to work. We know that getting to work is only a small part of the picture of a person's transportation habits - commuting to work constitutes approximately 20% of all person miles of travel in the United States. Additionally, the framework for collecting journey to work data has changed over time. In the year 2000 and prior, journey to work data was collected as part of the decennial census. Today, it is collected through the ACS, which is a more frequent survey from a smaller pool of people than the decennial census. This variation makes it difficult to make a clean comparison to recent data and data collected in the year 2000 and before.

Though not perfect, these data sources can help us understand trends in how people move around Burlington. This plan recommends that Burlington work with local and regional partners to collect more detailed data about transportation habits going forward (see details in Chapter 4). For now, we can use census data to set the goal of shifting mode share to the point where alternatives to driving alone make up the majority (51%) of Burlington's commute trips by 2026.

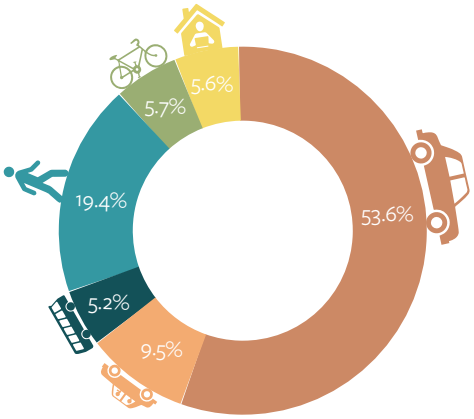
Our Mode Share Goal

Burlington's 2026 Mode Share Goal

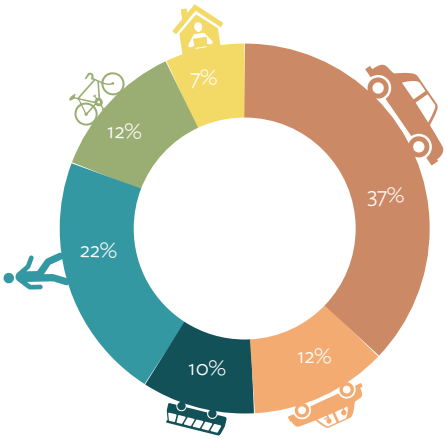
Burlington's mode share goal sets a target in which reliance on drive-alone trips is low, and use of alternate modes (carpooling, transit, walking, biking, and even telecommuting) makes up over half (or 51%) of commute trips.

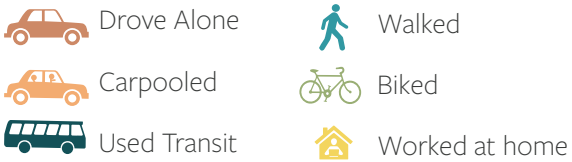
In the chapters ahead, we'll provide details on what Burlington's mode share looks like today, and why increased use of alternative modes benefits everyone. We'll also outline specific projects and actions to help the city meet this ambitious goal. The mode share goal will serve as a baseline to help the city determine if progress is being made towards the larger plan vision of making walking and biking a viable (and enjoyable) way to get around town.

Burlington in 2013*



2026 Mode Share Goal





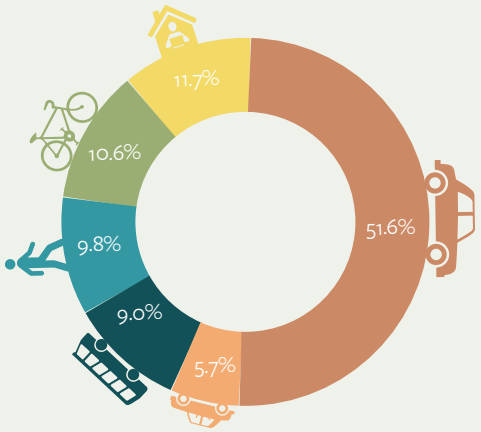
How does Burlington's target stack up with goals in leading cities?

Davis, CA

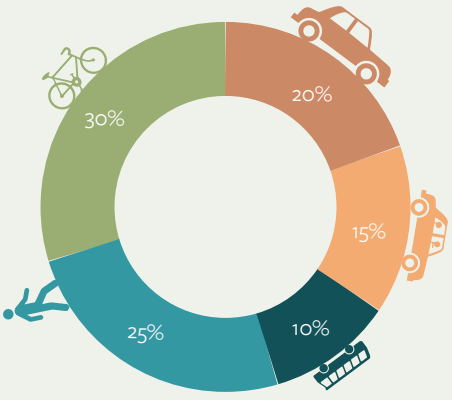
30%

The City of Davis Bicycle Action Plan set a target for 30% bicycle mode share by 2020 (working from a 2013 mode share of 20%).

Boulder, CO - 2013*



Boulder, CO - 2035 Target**



** 2013 data based on 2009-2013 American Community Survey 5-year estimates*

** City of Boulder 2014 Transportation Master Plan (note "working from home" was not detailed in the goals)

PART 1:
WHY?

...do we want to create safer streets for everyone, and make walking and biking a viable (and enjoyable) way to get around town?

Photo by Nic Anderson

...BECAUSE OUR CITY HAS ASKED FOR THIS.

Burlington residents have called for better walking and biking conditions in every transportation-related plan adopted in the past decade.

The Transportation Plan envisions a balanced investment in complete streets that will function safely for all users, with street design guidelines that have been widely applied on projects in recent years.

The Downtown and Waterfront Plan envisions green and healthy streets for the downtown district.

The redevelopment of the Burlington Town Center, in keeping with the Downtown and Waterfront Plan, may provide a much needed north-south bicycle connection through the heart of downtown.

The Burlington Parks, Recreation & Waterfront Master Plan notes "Connection" as a key focus area, and calls for better linkages to Burlington's parks and waterfront bike path through improved cycling infrastructure (including more east-west links), consistent wayfinding, and improved sidewalks. As a parallel effort, Burlington Parks, Recreation & Waterfront also completed a Scoping Study in 2014, focused on creating recommendations for improvements at 12 roadway crossings with the Burlington Bike Path.

The draft South End plan (undergoing revisions at this time) envisions a highly pedestrian centric arts hub, and a walkable, bikeable Pine Street corridor.

For more details and analysis of public input for this plan, see Chapter 2.

Because a walkable, bikeable city benefits *everyone*.

Beyond responding to a clear community priority and increasing safety, walking and biking investments will also bring economic, environmental, and health-related benefits that will improve quality of life for everyone in Burlington.

Families

Walking/biking increase household purchasing power. Households in automobile-dependent communities devote 50% more—an extra $3,000 on average—to transportation than households in communities with better bike and pedestrian facilities.*

Young Adults

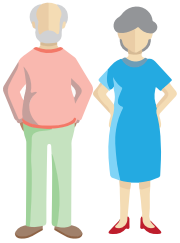
Walk/bike investments help attract and retain talent. Bike friendliness can be a factor in where people decide to live and work. In 2009, Portland, OR surveyed recent transplants who bike to work, and 62% of respondents said the city's bike friendliness was a factor in their decision to move there.*

Small Business Owners

Human-friendly streets boost retail performance. After the construction of a protected bike lane on 9th Ave. in NYC, local businesses saw a 49% increase in retail sales. On other streets in the borough, the average was only 3%.*

Major Employers

Better walk/bike conditions contribute to a healthy and happy workforce. The more often an employee cycles and the longer the distance traveled, the lower the rate of absenteeism.*



Older Adults

Walking/biking keeps people fit, healthy, and socially connected as they age. An adult cyclist typically has a level of fitness equivalent to someone 10 years younger and a life expectancy two years above the average.*

Teens

Walking/biking can help set teens up for healthy lives. Adolescents who walk or bike to school watch less TV and are less likely to smoke than their peers who are driven to school. They also get more overall physical activity.*

Young Children

Walking/biking improves kids' academic performance.

Studies have shown that girls who walk or bike to school perform better on tests. Longer commutes were associated with higher test scores, regardless of how much exercise kids got outside of school.*

Our Local Environment

Walking/biking reduces greenhouse gas emissions.

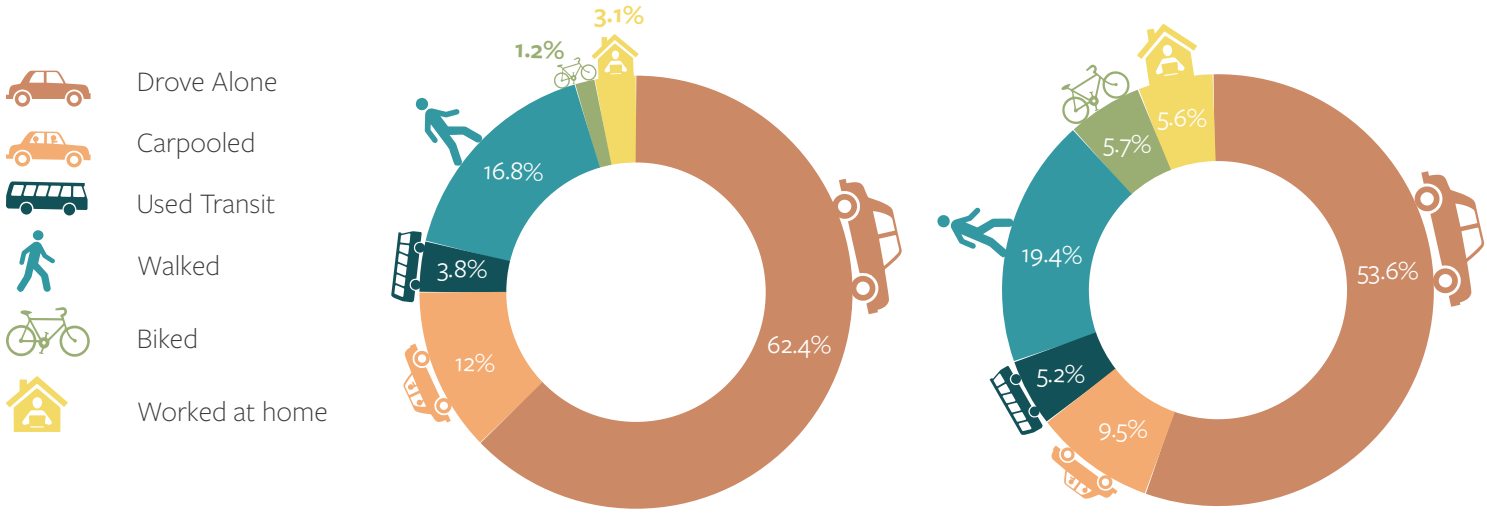
A 5% increase in the walkability of a neighborhood is associated with a per capita 32.1% increase in active travel, 6.5% fewer miles driven, 5.6% fewer grams of NOx emitted, and 5.5% fewer grams of volatile organic compounds (VOCs) emitted.*

**Data sources provided in Appendix.*

...BECAUSE PEOPLE ARE WALKING & BIKING MORE.

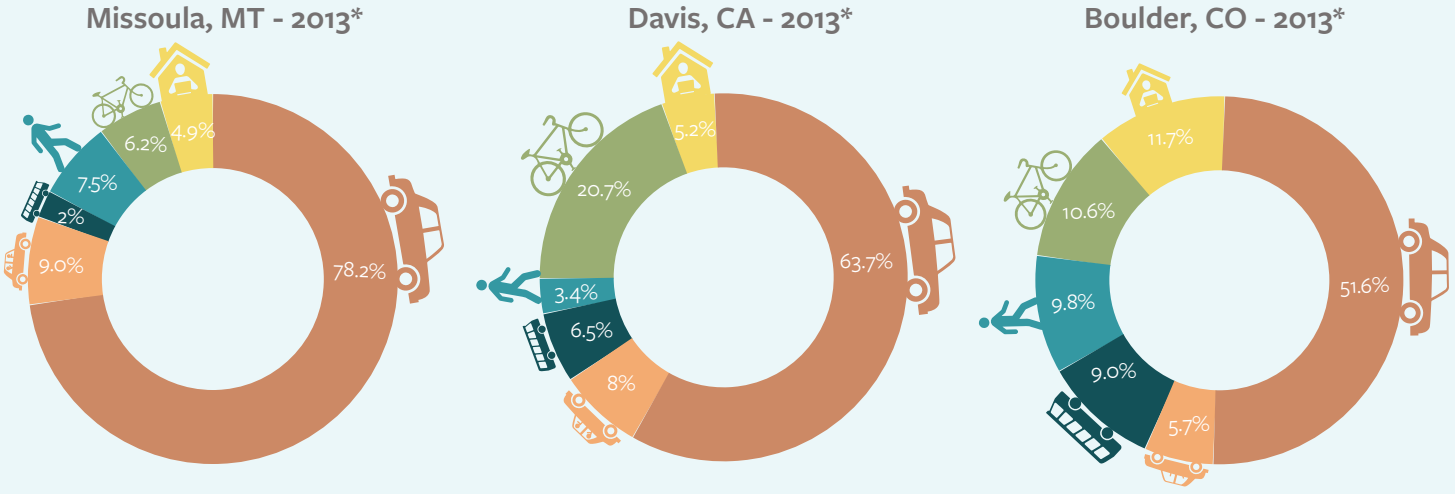
Burlington has seen a significant increase in the percentage of people commuting by public transit, biking or walking.

Journey to work



Compared to other parts of the country, Burlington boasts a high rate of people walking to work. The percentage of people walking or biking to work in Burlington has grown overall since the year 2000, but Burlington can still do better. Comparison of ACS 5-Year Estimate data for 2009 and 2013 in Burlington actually shows a slight decline in people walking to work (from 21.1% to 19.4%). And, while bicycle mode share is growing, it does not yet match the high percentages shown in the leading cities below.

How does Burlington's mode share stack up with that of leading cities?



Source Notes: Year 2000 data is based on the 2000 Census. Year 2013 data is based on 5-Year Estimates from the American Community Survey - a more frequent survey from a smaller pool of people. Though not a perfect source or comparison, these data points can help us get a snapshot of mobility trends in Burlington, and in other cities of similar size and/or climate that are leaders in walk/bike mode share. For more info on data sources and limitations, see page 22.

...BECAUSE BURLINGTON'S INFRASTRUCTURE ISN'T KEEPING UP WITH DEMAND

Recent projects are building momentum, but as the data below and on the previous page illustrates, Burlington's infrastructure still isn't good enough to making walking and biking a viable way to get around town.

95 miles of city streets

130 miles of sidewalk

12.2 miles of shared use paths

0 miles of protected bike lanes

12% of streets have bike lanes (11.9 miles total)

3% of streets have shared lane markings (2.9 miles total)

"Gold Level" Bike-Friendly cities are doing much better, typically featuring

65% of arterial streets with bike lanes.

To achieve the recognition and high levels of walk/bike mode share that other leading cities benefit from, Burlington will have to do better.

Of course, it isn't *only* about infrastructure. Burlington has a rich landscape of events, programs, and policies that support a culture of walking and biking. For more on these non-infrastructure elements, see Chapter X.

...BECAUSE BURLINGTON'S STREETS DON'T FEEL SAFE.

51%

of Burlington residents over the age of 45 feel that the City's streets are unsafe for cyclists.*

The 5 Streets that Feel Most Unsafe

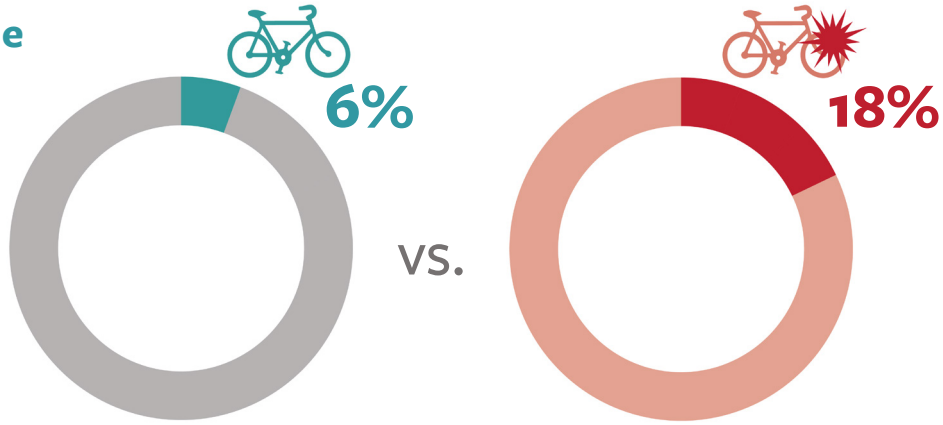
We asked over 500 Burlingtonians of all ages to tell us what streets felt the most unsafe for walking and biking. Here's what we heard:

- **Shelburne Road**
- **Pine Street**
- **North Avenue**
- **Battery Street**
- **Main Street**
- **Plus a "Dis-Honorable mention" for North/South Winooski Avenue (#6)**

High injury rate for people riding bikes in Burlington underscores the need for safer streets

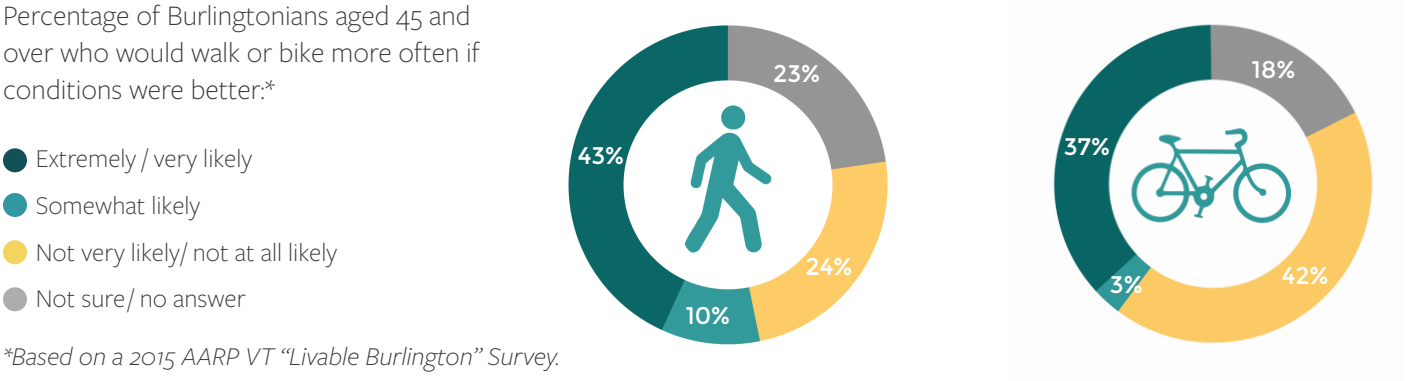
In 2013, about **6% of people regularly rode a bike** to work in Burlington.

But, of 771 traffic-related injuries in Burlington since 2011, **18% involved people riding bicycles.**

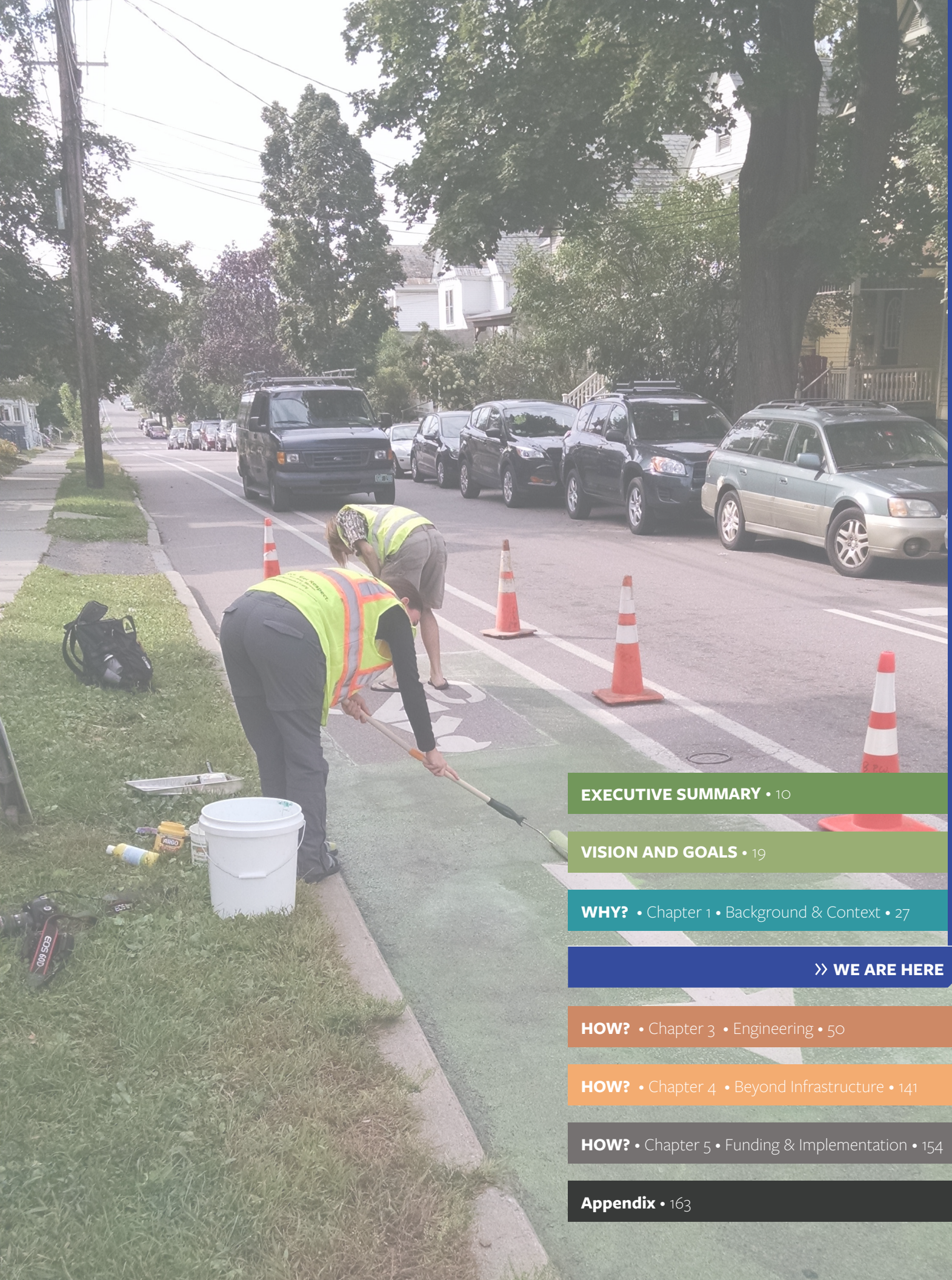


Burlington residents would walk or bike more often if conditions were better.

Percentage of Burlingtonians aged 45 and over who would walk or bike more often if conditions were better:*



Based on a 2015 AARP VT "Livable Burlington" Survey.



How Public Input Helped Shape the Plan

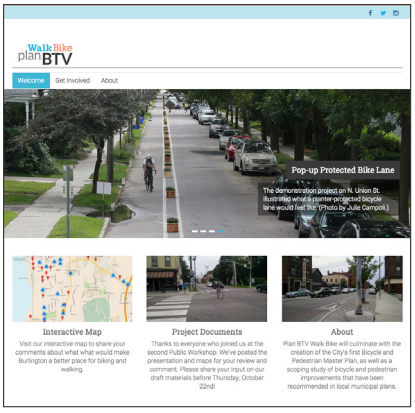
Through the activities described on the following pages, people shared many diverse opinions, concerns, and hopes about walking and biking in Burlington. The left column below summarizes the topics and issues that came up repeatedly across activities, from surveys to focus groups. The right column explains how this plan responds to what we heard from the community.

What we heard...	What we did
"Burlington needs a **dense, connected bikeway network**, that includes 'low-stress' **protected facilities** appropriate for **people of all ages and abilities**."	Created a bold plan that sets ambitious goals for making Burlington a more walkable and bikeable place, and positions Burlington to achieve Gold-level status as a walk and bike friendly community in the next 5 years.
"**Safety** is a huge priority. It should be the major focus of the plan."	Identified safety as a top priority in the plan vision, and set an ambitious goal to eliminate traffic-related fatalities and serious injuries by 2026.
"Burlington needs **safe intersections** for all modes. Intersections should be a major focus of the plan's pedestrian projects, in particular."	Structured walk recommendations around improving Burlington's most dangerous intersections (identified through crash data analysis and public input). And, outlined recommendations for an extensive network of low-stress bikeways that include protected intersections.
The plan must address **"gateway" areas** in and out of Burlington from South Burlington, Winooski, etc.	Recommended stronger and safer connections, with protected bikeways/ shared use paths at all entry/exit points on the cities border.
"**Speeding** is a major issue of concern, as is **aggressive driver behavior**."	Recommended target actions for enforcement. And, outlined a plan for infrastructure that will calm traffic on key corridors throughout the city, bringing speeds in line with Burlington's urban context.
"The plan must **embrace the winter climate** and integrate best practices for year-round maintenance of pedestrian and bicycle facilities."	Integrated best practices from cities that are leaders in active transport for winter climates (such as Montreal) in a special Winter Action Plan (see Chapter 3).

What we heard...	What we did
The network should minimize hills and **respond to grades**.	Recommended east-west cycling connections, like climbing and protected bike lanes to make cycling more appealing and unfavorable topography less intimidating.
"**Maintenance matters.** Poor pavement conditions of sidewalks and bike lanes reduces safety and mobility for people walking and biking."	Outlined best practices for maintenance of walking and biking infrastructure. Recommendations also call out the need for sidewalk maintenance funding reform and include strategies for reducing maintenance costs long-term.
"Puddles splash pedestrians and create hazards for people biking. We should aim to integrate **green infrastructure** into projects to **alleviate flooding**."	Outline tools for integrated green infrastructure into active mobility upgrades including planter-protected bike lanes, rain-garden curb extensions, and more street trees.
"Enforcement is important, but so is **engineering**. A sign with a low speed limit will not be enough to **encourage slow, careful driving** if the street is designed like a drag strip."	Established principles in Chapter 2 for using street design to "enforce" desired speeds and improve safety. This chapter also identifies focus corridors for speed control and enforcement, and outlines design tactics.
"Drivers are not the only ones who need education about safety and courtesy. Pedestrians feel threatened by **people biking on sidewalks** or **riding the wrong way** in streets and bike lanes."	This plan recommends bold infrastructure upgrades that will support "good" behavior - safer and more direct bike routes will discourage sidewalk and wrong-way riding. The plan also outlines strategies for education around safe walking and biking habits in Chapter 4.
"Talk is cheap. We **need to see projects hit the ground. NOW.**"	First, we invited people to experiment with and experience options through demonstration projects. A demonstration project policy will accompany this plan, enabling residents and organizations to continue to test recommendations. The 12-month Priority Action Lists in Chapter 3 set DPW up to make change all over the city in the next year, with little else than paint. Finally, the plan recommends pilots for key projects and outlines a path for implementation of many projects over 5 years.

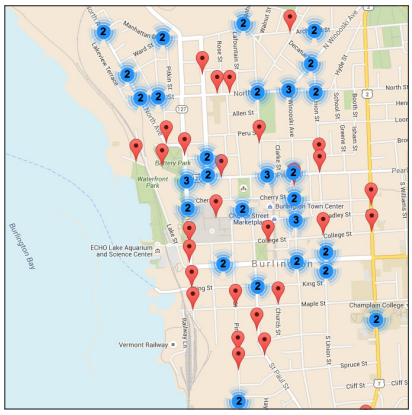
Summary of outreach activities

ONLINE OUTREACH



Dedicated Project Website

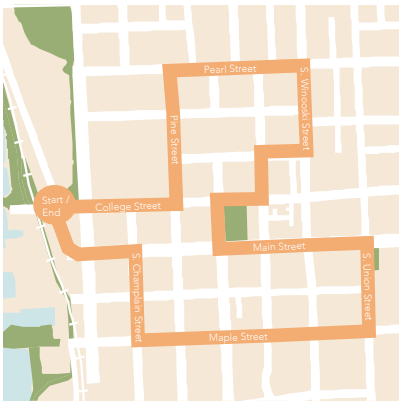
Social Media



Interactive map

The website and social media platforms were used to spread the word about the plan and disseminate materials such as the PlanBTV Walk/Bike Survey. The website featured an interactive map which allowed people to provide geo-located comments about walk/bike issues and ideas. Comments from the interactive map helped inform the list of top 20 priority intersections for upgrades and specific bike facility recommendations (see Chapter 3 for recommendation details).

HANDLEBAR + WALKABOUT SURVEYS INVOLVED:



Walk and bike tours.

Studying existing conditions.

Recording observations.

The Handle and Walkabout Surveys invited members of the public to participate in walking and biking tours to discuss and document existing conditions. The surveys helped us identify important routes for bikeway upgrades, observe conditions at dangerous intersections, and document existing bicycle parking. Importantly, these tours provided an opportunity for members of the public to impart "insider" information that might not be readily available in past plans and maps, such as the locations of informal footpaths around schools and parks (shown on the maps in Chapter 3).

PLANBTV WALK/BIKE SURVEY

The 24-question PlanBTV Walk/Bike Survey provided important information about existing conditions and community priorities for walking and biking in Burlington. The Survey was distributed through the mailing lists of the organizations on the Steering and Advisory Committees, and was promoted through public events and public workshops for the plan.

Who took the survey?

Over 540 people completed the survey between July and December of 2015. Survey responders were:

- Nearly all were full time residents of Burlington, 66% owned their own home and just under 30% rented.
- 67% work in Burlington, and over 65% have a commute of less than 5 miles. Commutes of this length are well suited to walking or biking.
- Seasonal bicycle commuters. Over 60% of respondents bike to work (compared to 5.7% citywide). But, a large percentage (62%) only bike seasonally, suggesting that improved winter infrastructure could have a big impact in Burlington's mode share.

66%

of 540 survey respondents said that they don't bicycle in Burlington because they don't feel safe.

TOP PRIORITIES FOR INFRASTRUCTURE*

- **Safer and easier intersections crossings**
- **Improvements to increase comfort and safety for people walking** (shade trees, wider sidewalks, fewer curb cuts, landscaping, plowing/ timely snow and ice removal, seating, separation from traffic)
- **Traffic calming and lower speeds**
- **More bike lanes**, paths, trails that are **protected** or separated from car traffic
- A more connected/ **continuous bicycle network**

What does this tell us?

It's all about speed control and infrastructure! For more information about how street design is related to speed and safety, see Chapter 3.

TOP PRIORITIES FOR PROGRAMS*

- Far and away, the top priority was **education and enforcement campaigns to improve driver behavior**
- **Traffic calming and lower speeds***Note that respondents were allowed to select more than one option for each category, resulting in percentages that total over 100%.*

What does this tell us?

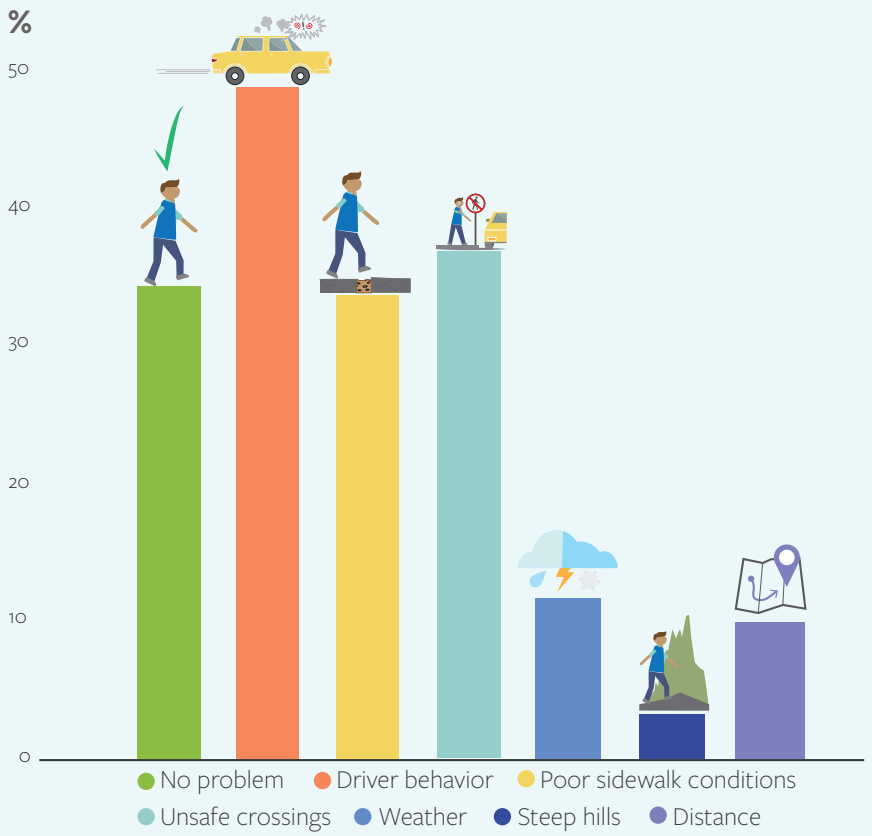
Conflict between people walking/biking and people driving is a major pain point. Survey respondents feel that aggressive driver behavior and high speeds are major threats to safety. Safer street design is a major priority to address these concerns. Although enforcement is important, street design sends strong signals about how to move through a space. See Chapter 3 for visual examples.

What makes you feel unsafe or uncomfortable walking around Burlington?

On a scale of 1-10, most survey respondents said they felt very safe walking (8-9 rating). Of the factors that make people feel unsafe or uncomfortable walking, driver behavior was the biggest problem, followed by unsafe crossings and poor sidewalk conditions. Survey respondents said that the most important infrastructure upgrades that would encourage them to walk more were:

- Safer, low-stress intersection design
- Better conditions (including benches, shade trees, etc.)
- More traffic calming/speed reductions
- More off-road trails and paths

They also noted the need for increased education around and enforcement of laws protected pedestrian priority. Recommendations related to education and enforcement can be found in Chapter 4.

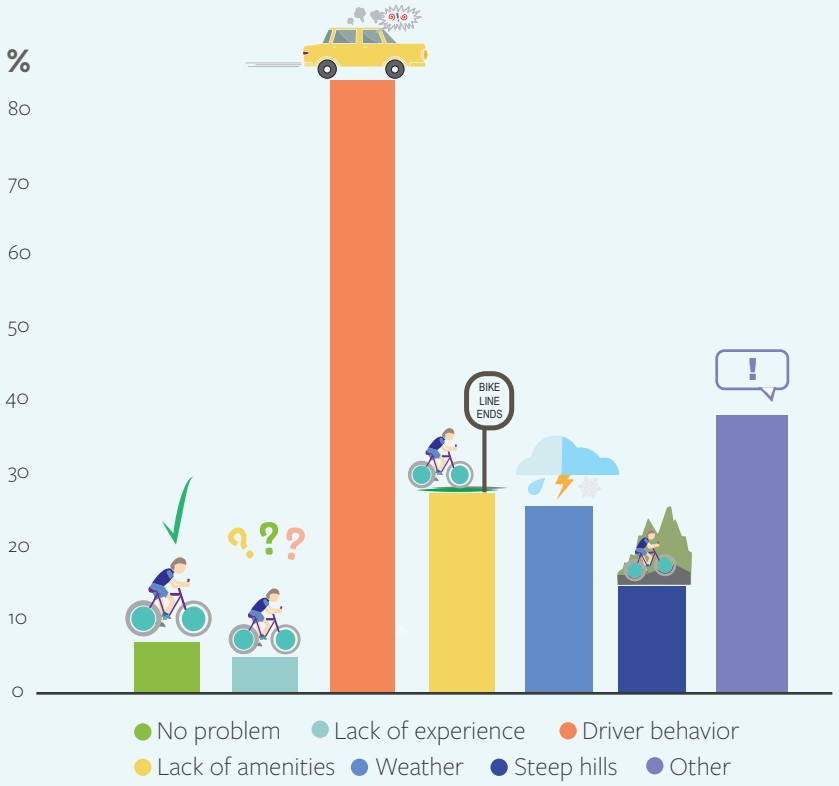


What makes you feel unsafe or uncomfortable biking in Burlington?

Although most survey respondents were confident and frequent cyclists, they reported feeling only moderately safe biking in Burlington. Driver behavior was listed as the main reason for feeling unsafe. To improve safety, respondents called for:

- More protected bike lanes and paths
- A more connected and continuous bicycle network throughout the city
- Additional signage reinforcing rules protecting cyclists
- More traffic calming/speed reductions
- Education and enforcement campaigns to improve driver behavior

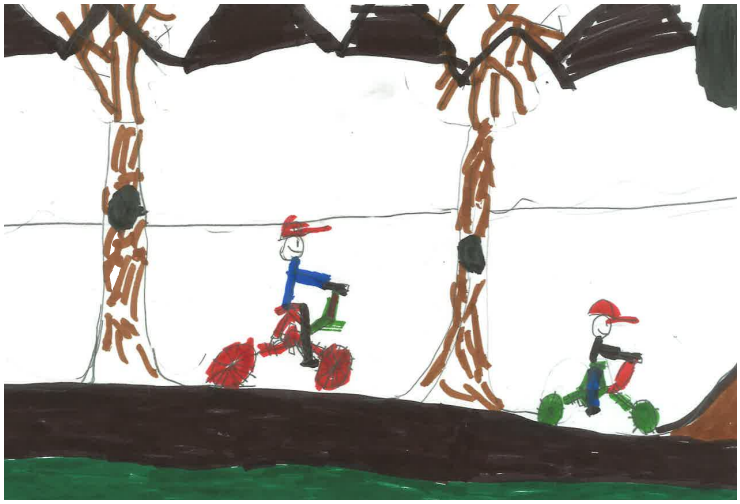
These desires are reflected in the recommended projects and actions in Chapters 3 and 4.

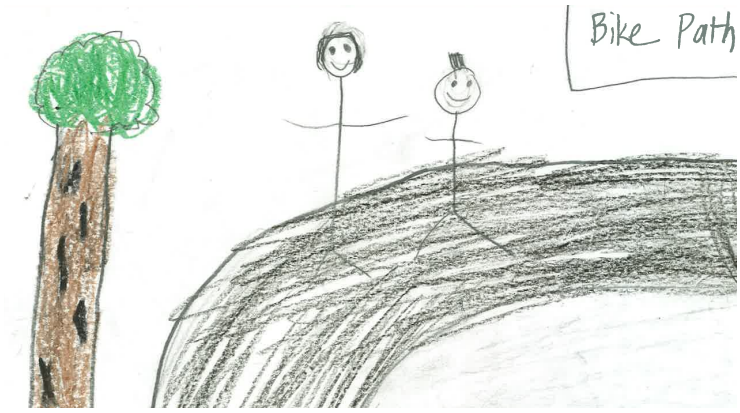


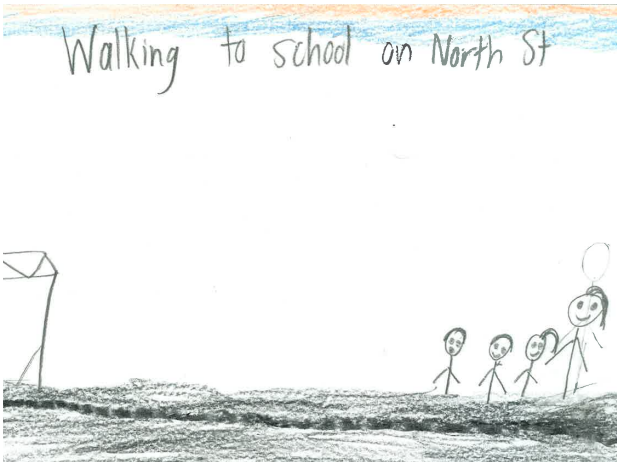
STUDENT SURVEY

With the help of their teachers, students from the Sustainability Academy completed an adapted version of the survey to share information about their walking and biking habits. Here's what we learned:

- Nearly all students enjoyed walking or biking around Burlington with their family, and many walk to school regularly.
- Favorite places to walk and bike included parks and playgrounds, the waterfront bike path, and on neighborhood streets in order to run errands.
- Most students do not walk or bike around Burlington by themselves or with friends, because their parents do not think it is safe for them to do so.







PUBLIC WORKSHOPS

The project team hosted in-person workshops to obtain input around key project milestones:

- **July 2015** - This initial Public Workshop defined the project's scope and approach. One key workshop activity used the "25/10" framework to rapidly define people's top priorities. For this exercise, everyone wrote down a single priority idea for making Burlington a better place to walk and bike. Each idea was passed around the room and scored on a scale of 1-5 by whichever 5 person happened to wind up with the idea in hand (1 indicated a less important idea and 5 indicated an idea with potential for high impact). The following page highlights the ideas that emerged with the highest scores.
- **September 2015** - This Public Workshop recapped public input to date and presented draft recommendations for improvements across the 5 E's. In small groups, participants had the opportunity to ask questions and provide specific feedback on draft proposals. Following the Workshop, the project team posted all draft materials on the project website for an additional 1-month comment period.
- **January 2016** - This Public Workshop provided an opportunity for the team to present revised recommendations, answer questions, and collect additional public input on the proposals in the plan.

These Public Workshops were a critical component of the planning process, and were supported by the many other online and in-person outreach strategies described in this section of the document.

If you could pick one priority project or policy to make Burlington more walkable or bikeable, what, and where would it be?

TOP PRIORITIES FOR **BETTER WALKING**

- Calm traffic and improve pedestrian crossings on S. Winooski Ave., especially near City Market (potentially using a 4-to-3 lane conversion).
- Install ADA accessible crosswalk and signal activators at key intersections citywide.
- Upgrade crossings at all major streets to have rapid flashing beacons, and follow-through on enforcement of pedestrian priority at these crossings.
- Widen sidewalks and narrow streets where pedestrian volumes are high, so that cars will be forced to drive 20 miles per hour.
- Add sidewalks on Leddy Dr. to connect Leddy Park and Leddy Beach with the Ethan Allen Shopping Center.
- Time pedestrian crossing signals so that walkers don't have to wait so long to cross.

TOP PRIORITIES FOR **BETTER BIKING**

- Create a two-way protected bike lane on N. Champlain from Pearl St. to Manhattan Ave., taking away one lane of traffic.
- Focus on adding more protected bike lanes citywide!
- Create protected bike lanes on North Avenue.
- Add protected bike lanes to S. Winooski Ave., through a 4-to-3 lane conversion.
- Provide protected bike lanes and/or a bike boulevard to get out of town commuters into the city safely.
- Create a protected North-South bike lane connection to enhance access to downtown and grocery stores.
- Legalize bikes crossing with pedestrians when the pedestrian signal comes on.

FOCUS GROUPS

In order to expand outreach and obtain input from underrepresented groups, the project team hosted Focus Groups with the VNA Family Room, a community resource center in the Old North End.

As parents of small children or new arrivals to America, Focus Group participants provided a unique perspective on walking/biking and street safety. While some bike regularly, most said they rely heavily on transit, driving, or walking. Common destinations included:

- Parks and playgrounds, especially Battery Park
- Old North End commercial corridor on North Street
- Local schools, especially H.O. Wheeler Elementary
- The Ethan Allen Homestead, which is a major hub for services and activities including summer camps

Walking was a key transportation mode for all attendees. When asked about specific streets or intersections that feel unsafe for walking, participants mentioned:

- Shelburne Road, and the Shelburne Rotary area
- North Avenue
- The intersection of Manhattan Ave. and 127
- Crossing to Battery Park from the Old North End
- Intervale/Elmwood intersection
- North Street crossings, such as at Murry St.
- Gateway areas from Winooski (such as the Winooski Bridge) or South Burlington.

Of the participants who did bike regularly, many stated that they typically bike on the sidewalk because they feel unsafe riding on the street. They noted that creating more protected bicycle routes should be a priority of the plan, and that affordable access to bikes and equipment would be helpful.

Participants also noted that there is a need to educate drivers about how to share the road with cyclists. Participants had positive experiences with Open Streets BTV and felt that doing more Open Streets events would be a great thing for Burlington.

Finally, participants noted that personal security is an important consideration when discussing pedestrian safety. Several people said that they feel unsafe walking around some parts of Burlington at night due to poor lighting and a high prevalence of people loitering and openly drinking on the sidewalk.

The planning team used "Demonstration Projects" to expand outreach and test possibilities for enhanced pedestrian and bicycle infrastructure.

Demonstration Projects refer to short-term or pop-up installations created with donated, borrowed or low-cost materials. For PlanBTV Walk/Bike, the Department of Public Works partnered with Local Motion and dozens of volunteers to create a series of Demonstration Projects in Burlington's Old North End and South End neighborhoods. These projects expanded the conversation about walking and biking beyond the traditional public workshop framework, allowing residents, business owners, and city agencies to physically experience and react to new types of pedestrian and bicycle infrastructure. To maximize public input, the project were installed during Burlington's popular South End Art Hop and Open Streets BTV events.

SOUTH END DEMONSTRATION: PARKLET AND PEDESTRIAN SAFETY UPGRADES @ ART HOP

The demonstration at Pine St. and Kilburn St. showed how the city might make walking safer and easier. The project featured a new "parklet" for sitting and socializing (pictured top left) and an artistic curb extension to reduce crossing distance for pedestrians (pictured bottom left). The parklet space included a tent with interactive activities to generate conversation and collect public input about walking and biking in Burlington.

OLD NORTH END DEMONSTRATION: BETTER BIKE LANES @ OPEN STREETS BTV

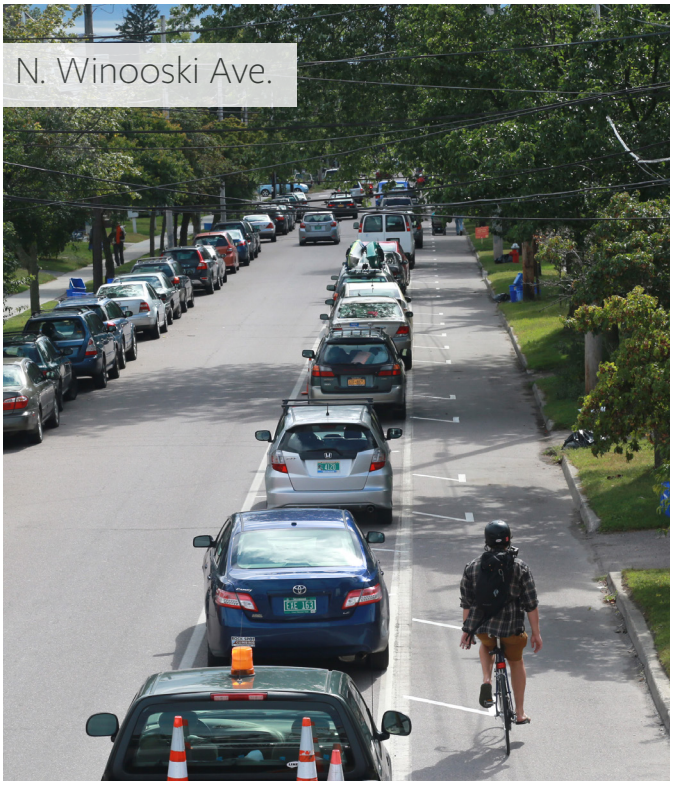


Photo by Julie Campoli

This demonstration project showcased various options for enhanced bike lanes on several streets adjacent to the Open Streets BTV route.

For this demonstration, the team created:

- Burlington's first parking-protected bike lane along one block of N. Winooski Ave. (pictured top left);
- A planter-protected bike lane on N. Union St. (pictured bottom left);
- Connections between the two protected bikeways - with a Neighborhood Greenway on Grant Street (pictured bottom right) and intersection treatments at Union and Pearl (see photos on following page)

Adjacent to the demonstration projects, volunteers set up outreach booths to talk to people about the plan and ask them about their priorities for a more walkable, bikeable Burlington.

Photo by Julie Campoli

MOVING TO PERMANENT ENHANCEMENTS AT THE UNION & PEARL INTERSECTION

Volunteers used temporary paint to add high-visibility lane markings to Union Street, providing a safe transition for cyclists crossing the intersection at Pearl.

Just 6 weeks after the demonstration project occurred, Burlington Public Works installed permanent pavement markings at the intersection.

Photos above by Julie Campoli

Photo by Nick Meltzer

WHAT WE LEARNED

The demonstration projects represented an unprecedented collaboration between Burlington's government agencies, advocates, local businesses, and residents, and they helped our team gather input for the plan. They also allowed a broad base of people not normally involved with the technical planning process to experience new and unfamiliar street design types. If this were the only outcome, then the projects could be considered a success!

Yet, beyond raising awareness and gathering input, our team learned what didn't work. Some aspects of the designs tested were imperfect. For example, the number of parking spaces moved off the curb on N. Winooski Ave. limited visibility for motorists turning into driveways located along the west side the street. Such conflict points between people driving and cycling could be ameliorated by changing the design approach, which underscores the value of testing design in the first place.

That said, the conversations we had with people during the demonstrations helped us deepen our understanding of what people like about protected bikeways, and what their interests and concerns are for more permanent infrastructure. Of course, there are many ways to design protected bike lanes besides the parking and planter-protected types shown in the demonstrations. Public input during the demonstration underscored that adding protected facilities remains a high priority for people in Burlington.

In addition to sparking important community conversations, the demonstrations allowed our team to gather some hard data. The Chittenden County Regional Planning Commission (CCRPC) collected vehicle speed and volume data on North Winooski Ave. and North Union St. from Friday, September 11 through Wednesday, September 23. The data allowed us to see how vehicle traffic was affected with and without the demonstration projects. Here is what we learned:*

- Volumes of vehicles did not change significantly; in fact volumes on both Union and Winooski were slightly higher during the pilot than on the following weekend, possibly due to re-routing of traffic during the Open Streets BTV event.
- Vehicle speeds were significantly lower during the demonstrations, as shown in the graphs to the right.

Thus, the two demonstrations showed that each of the primary corridors has additional capacity for motoring, and that redesigning the street with protected bikeways could lead to a much higher percentage of drivers observing the speed limit!

**Speed data (right) was collected in partnership with CCRPC. Data is limited to between the hours of 10:00 a.m. on Saturday through 4:00 p.m. on Sunday. Demonstration project data was collected during these hours September 12 to 13; Normal Conditions data was collected during these same hours on September 19-20.*

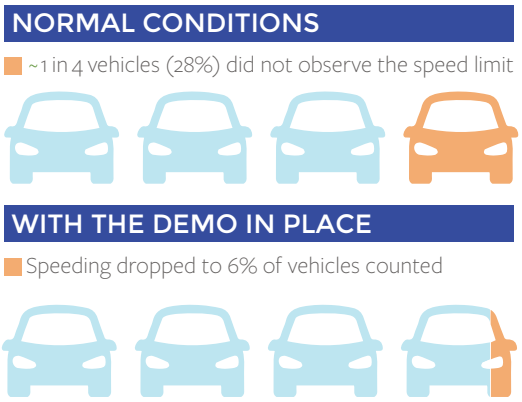
IDENTIFYING PRIORITY LOCATIONS FOR PROTECTED BIKES LANES

During the Demonstrations, Local Motion surveyed over 330 people to determine their top priorities for the location of protected bike lanes. As you'll see in Chapter 2, this plan recommends protected bike lanes at all of the Top 5 priority locations:

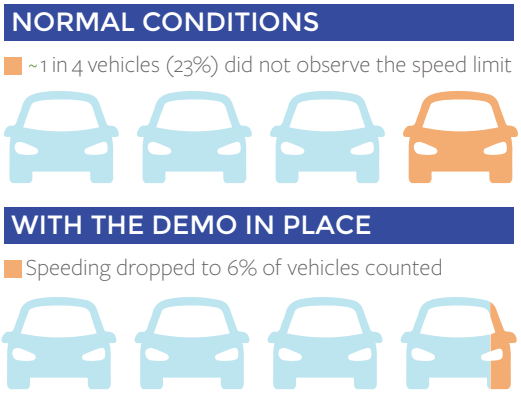
- ✓ **Main St.**
- ✓ **Pearl St./Colchester Ave.**
- ✓ **Winooski Ave./Union St.**
- ✓ **North Ave.**
- ✓ **Battery St.**

THE DEMONSTRATION PROJECTS RESULTED IN A MUCH HIGHER PERCENTAGE OF DRIVERS OBSERVING THE SPEED LIMIT.*

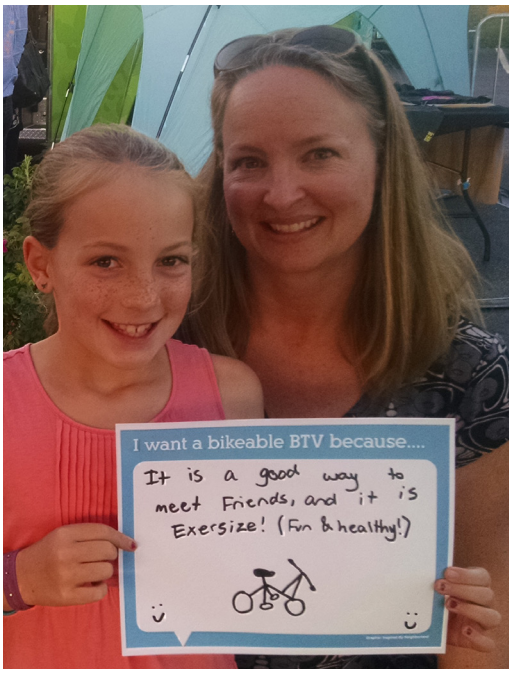
SPEEDING ON N. WINOOSKI AVE.



SPEEDING ON N. UNION ST.

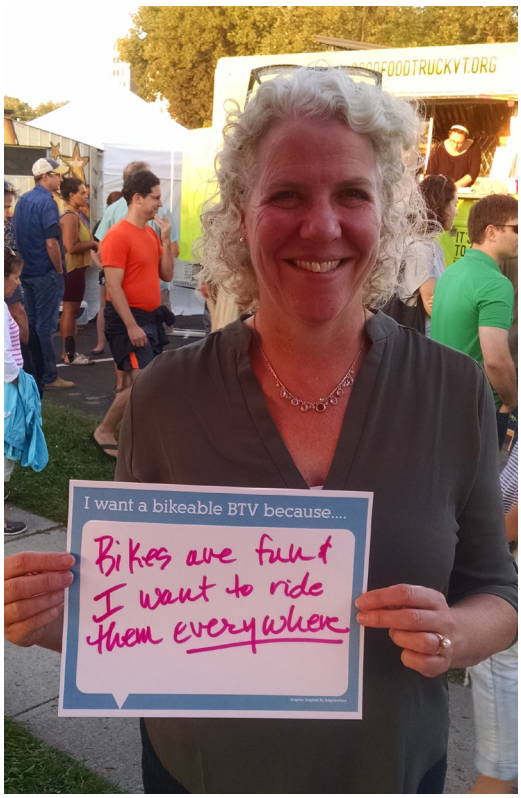


Burlington's residents want their city to be a more walkable, bikeable place because...



"Active transportation is more sustainable, and it saves me money!"

"Biking is good for my health and overall well-being."

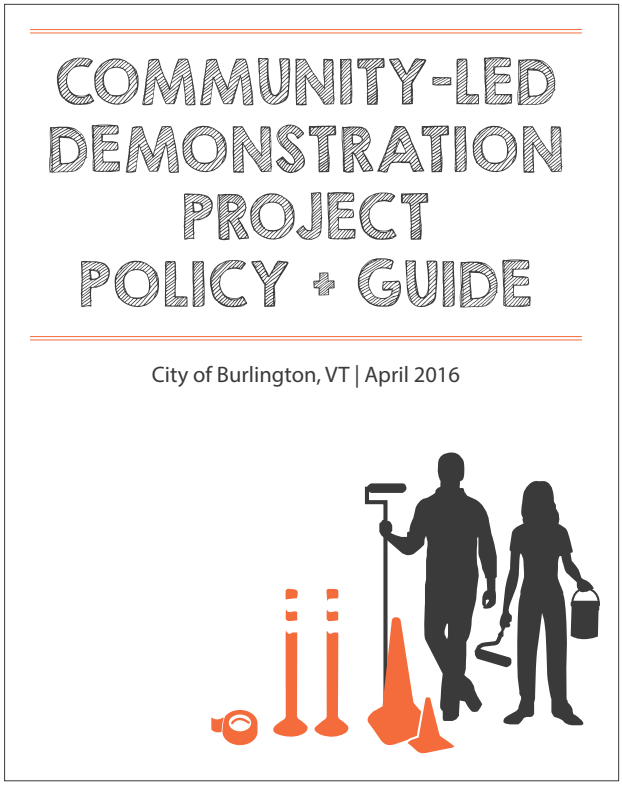


WHAT'S NEXT?

The City of Burlington is developing a guide and policy framework to help individuals and community organizations spearhead more short-term demonstration projects.

This guide and policy support Burlington's existing pilot project ordinance. That ordinance (Article 1 Chapter 20 Section 3) allows the Department of Public Works to implement temporary traffic and parking projects on public streets in order to evaluate the merits and impacts of proposed street design projects. This new policy breaks the process into even smaller segments, making it easier for everyday residents, advocacy organizations, and community groups to spearhead short-term demonstration projects (lasting from 1-7 days) alongside DPW and other agencies.

The September 2015 Demonstration Projects certainly helped inform the walk-bike master planning process. Ideally, the community-led projects authorized by this new policy will continue to inform city-led projects, including the temporary initiatives authorized by the pilot project ordinance.



PART 2:
HOW?

...do we create safer streets for everyone, and make walking and biking a viable (and enjoyable) way to get around town?

THE 6 ES

This plan is organized around "6 Es". Each E represents an element that will help us achieve the community's vision for walking and biking, and reach the bold goals outlined at the start of this plan:

- Eliminating traffic-related fatalities and serious injuries by 2026.
- Shifting mode share so that by 2026, reliance on drive-alone trips will be low, and alternative modes will make up the majority of commute trips in Burlington.

The E's offer a framework for how we'll reach these goals through: engineering, evaluation & planning, education, encouragement, enforcement, and equity. Following through with the recommended actions in all of these areas will position Burlington to meet the plan goals and become the best city on the East Coast for walking and biking.

It is important to note that implementing recommendations in this plan (particularly those in Chapter 4) will require a collaborative effort between DPW and other city and regional agencies, Neighborhood Planning Assemblies, non-profit organizations, and local businesses and residents.

CHAPTER 3

Refers to infrastructure such as intersection upgrades, sidewalks, trails, shared-use paths, and bike lanes.

CHAPTER 4

EVALUATION & PLANNING

Focuses on planning for walking and biking as viable modes of transportation. This involves creating a comprehensive plan, like the document you're reading now. It also involves establishing metrics for measuring success, and funding adequate staff and advocacy resources to accomplish goals.

EDUCATION

Refers to non-infrastructure related programs that help people of all ages and abilities gain the skills and confidence to walk or bike for transportation. It also involves educating all road users about rights and responsibilities.

ENCOURAGEMENT

Refers to programs that celebrate walking and biking and establish both modes as a normal parts of everyday life and transportation. Examples include events such as Open Streets BTV or Bike to Work Day.

ENFORCEMENT

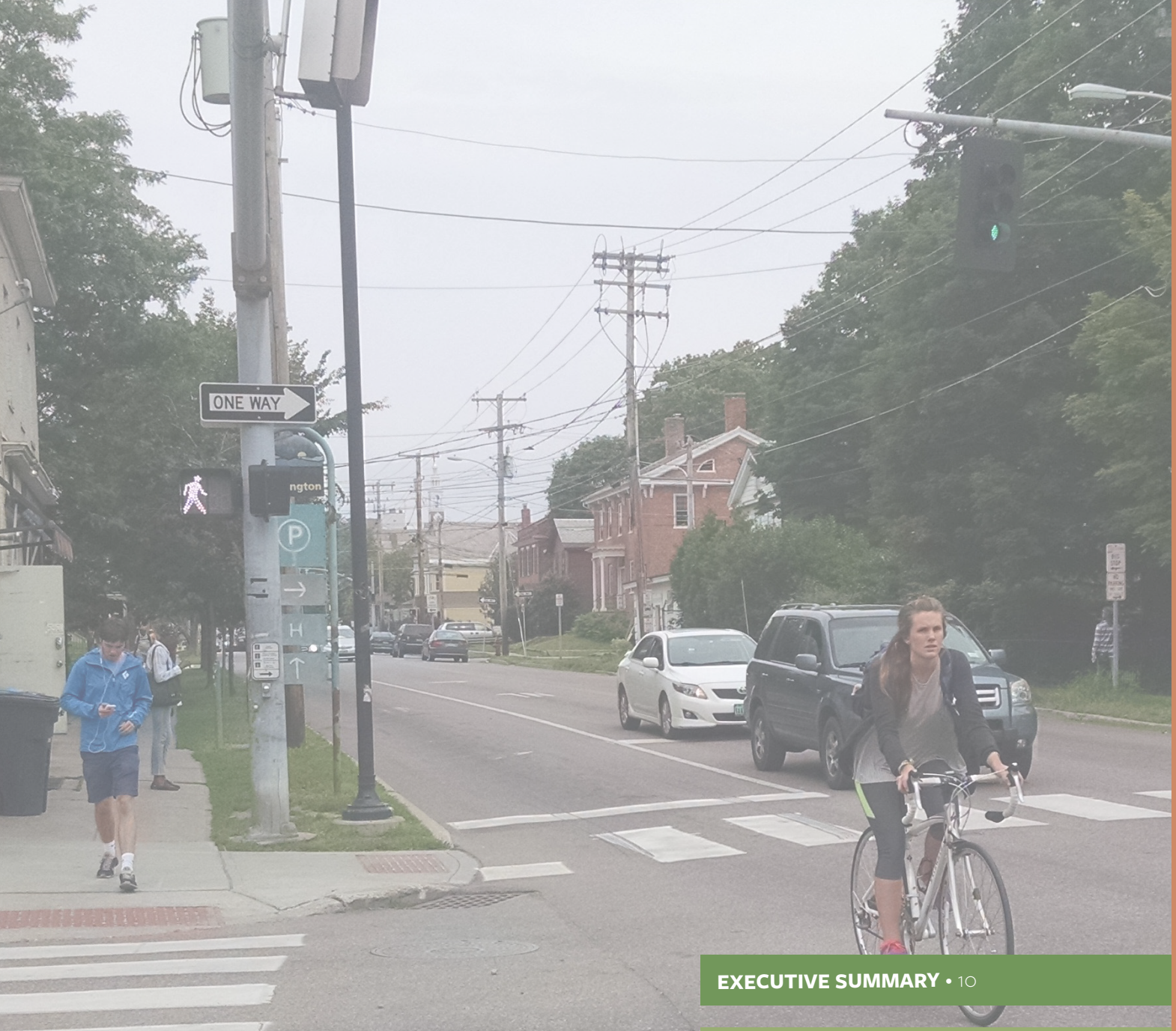
Focuses on making sure the road is safe for all users. This involves establishing laws and regulations that treat people walking or biking equitably within the transportation system. It also involves efforts to be sure that law enforcement officers understand these laws, know how to enforce them, and apply them equitably to ensure public safety.

EQUITY

Walking or biking should be viable options for people throughout Burlington. For the purposes of this plan, we've defined equity in terms of:

- Geography – the distribution of walking or biking improvements and programs within the community
- Social/Demographic factors – the distribution of walking or biking improvements across diverse populations

Equity is also related to enforcement, as it is essential that rules are enforced in an equitable manner.



DESIGNING SAFER STREETS

Streets are often the most vital yet underutilized public spaces.

Infrastructure that accommodates the needs of all road users is perhaps the most tangible characteristic of a walk- or bike-friendly community. The presence (or absence) of safe streets and crossings is a key factor in people's decision to walk or ride a bike when they run errands or travel to work or school. Engineering is also a key determinant of people's behavior when they drive – a posted speed limit of 25mph or a "Pedestrian Crossing" sign will not be enough to encourage slow, careful driving if the street is designed like a drag strip.

The streets of the most advanced walk- and bike-friendly communities provide well-connected walking and bicycling networks that feature safe pedestrian crossings, bikeway facilities of varying types, and shared use paths. These facilities are supported by amenities such as benches, street trees, water fountains, and secure and convenient bicycle parking. Finally, these communities benefit from proactive policies that help them maintain existing infrastructure.

To realize the plan vision and achieve Burlington's mode share and safety goals, Engineering will be a critical focus area. Infrastructure for walking and biking emerged as the biggest area of needed improvement in Burlington's 2013 "Go for Gold" Blueprint. It also stood out as a major priority at public workshops and in the PlanBTV Walk Bike survey. (For more details on how public input helped shape the plan, see Chapter 2).

Chapter 3 of the plan presents recommendations for infrastructure projects that will increase safety for all people, whether they are driving, biking or walking. In addition to responding to issues and concerns we heard throughout the planning process, the recommendations in this chapter are guided by existing conditions analysis and current research and best practices, both of which are described further in the pages ahead.

WE ARE HERE

ENGINEERING

EVALUATION & PLANNING

EDUCATION

ENCOURAGEMENT

ENFORCEMENT

EQUITY

For definitions of the "6 E's" framework guiding this plan, please see page 49.

Creating a Cycle of Sustainable Transportation Investments

PEAK TRAFFIC

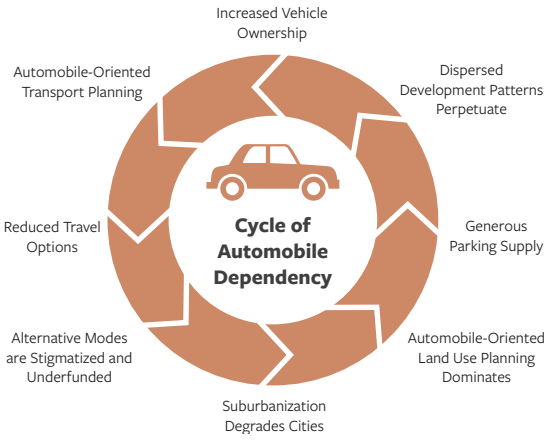
Based on a long history (since 1975) of consistent data collection on vehicular traffic volumes, it is clear that Burlington hit "peak traffic" in most locations between 1995 and 2000. Since then, traffic volumes have declined on ALL of the city's streets for which data is available. (See graph at the bottom of the page.) After a 50+ year period of transportation planning where it was always a baseline assumption that vehicular traffic would grow, our planning of the street network should respond to this change, and consider the right design of our streets and intersections given these well documented trends.

ASKING THE RIGHT QUESTIONS

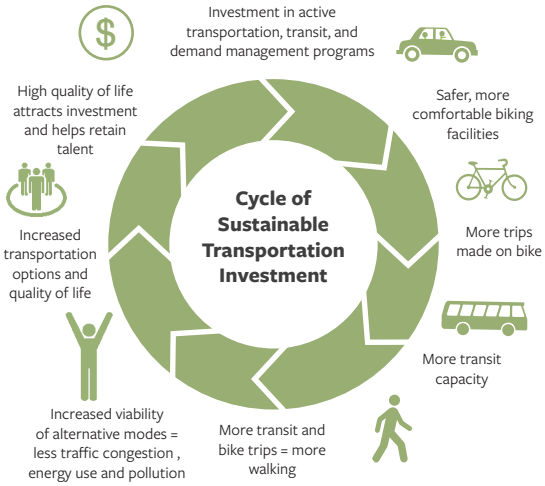
In looking at projects that may change the balance of space allocated to vehicles and people walking or biking, the question to ask should not be limited to "What will happen to the traffic?" We should also ask: "What will happen if we provide an attractive, low stress bikeway in this corridor? What will happen if we make safe and accessible street crossings for people walking or taking the bus? What are the outcomes for transportation access and choice? Will these changes reduce need for peak hour traffic capacity or parking?"

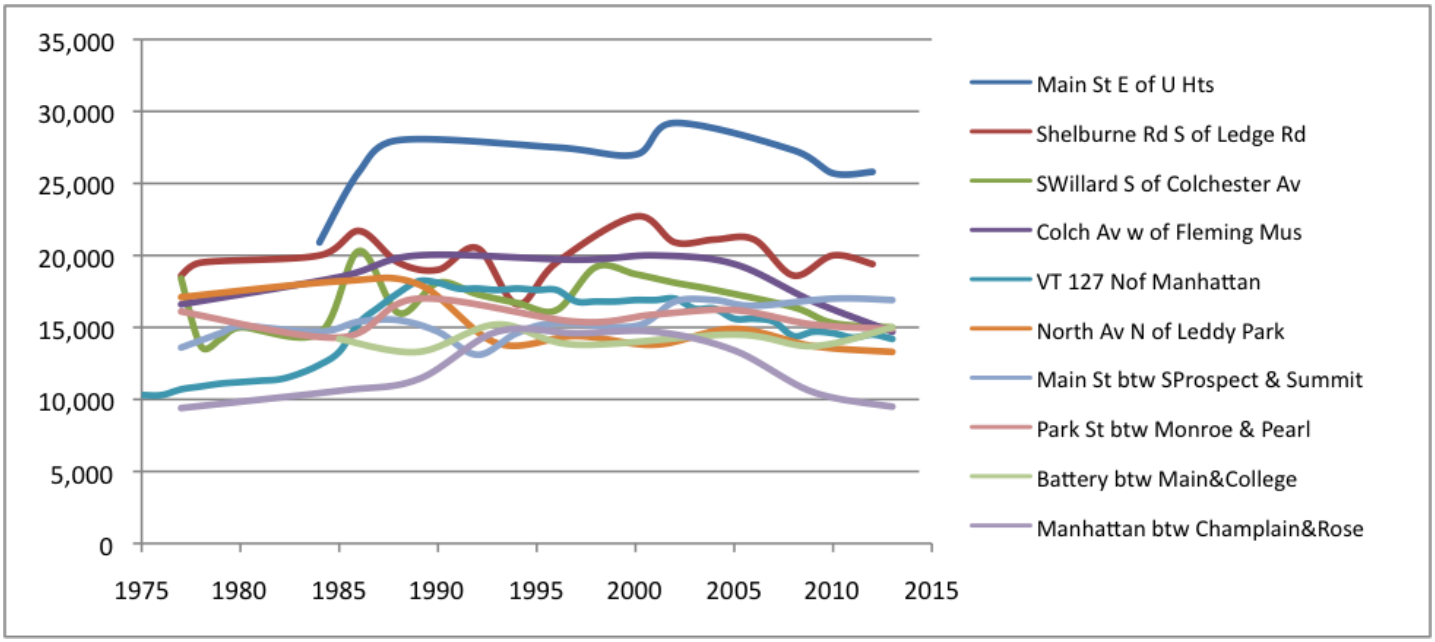
Designing safe streets for all modes will help make walking and biking a viable (and enjoyable) way to get around town. When coupled with other land use and urban design policies, walk/bike improvements can help communities instigate a sustainable cycle of investments that reinforce a safe, low-cost, and healthy transportation system.

Vicious Cycle



Sustainable Cycle





The Connection Between Design, Speed, and Safety

Image by Wes Craiglow.

"Vision Cone" image by NACTO: www.nacto.org

WIDE, OPEN STREETS = HIGH SPEEDS

The image comparison to the left illustrates the impact that street design has on vehicle speed. The wide, unobstructed lane in the top photo encourages high speeds. The narrow, tree-lined street at the bottom is designed to enforce the slow, careful driving that would be desirable on a neighborhood, residential street. This comparison graphic was created by Wes Craiglow, Deputy Director of Planning and Development for the City of Conway, AR. But, these principles are not unique to his community. The data collected during the Demonstration Projects described on page 42 demonstrated the same principle. For the demonstration, volunteers placed temporary planters in the bike lane buffer on S. Union St. to "enforce" the existing narrow lane striping. With the lanes narrowed, the rate of vehicle speeding dropped from about 25% to 6%!

HIGH SPEEDS = DANGEROUS STREETS

The series of images on the lower left illustrate that As a driver's speed increases, his peripheral vision narrows severely. There is a direct correlation between higher speeds, crash risk, and the severity of injuries.

LOWER SPEEDS ≠ LOWER CAPACITY

Reducing speed on city streets does not reduce their capacity to handle emergency vehicle or peak hour traffic. In fact, the optimal speed for traffic efficiency is around 25 mph due to the ability of drivers to safely follow the car ahead more closely and make efficient use of street space. It is also worth considering that the urban street network's capacity is primarily constrained by a relatively small number of bottleneck intersections, and changing the width of travel lanes will have little effect on the overall performance of the street network.

SAFE STREETS DESIGN PRINCIPLES

In addition to the concepts discussed on the previous pages, recommendations in this Chapter are based on best practices for safe street design, summarized in the principles below.

ACCESS + MOBILITY FOR ALL

Streets should allow people to travel in a safe, dignified, and efficient manner no matter their age, gender or level of ability. Though the focus of this plan is on improving conditions for walking and biking, recommendations must also consider the needs of people driving. Streets must allow for harmony between multiple modes - allowing for safe and efficient movement of trucks, public transit, and emergency response vehicles.

ENVIRONMENTAL SUSTAINABILITY

Sustainable streets protect and enhance natural ecosystems with tools including greenbelts, pervious pavements, and bioswales to control stormwater. Street trees are a vital part of sustainable streets: they provide shade, filter the air, and slow traffic. Street trees have been shown to be associated with lower crime rates, higher household income, and increase home values. Integrating ecological considerations into street design can also ease maintenance costs, as uncontrolled stormwater can damage street surfaces over time.

The Dekum Bike Corral in Portland, OR features rain gardens and an "eco roof" shelter. Photo and project by Buster Simpson.

SAFETY + SECURITY

Streets should be designed to reduce or eliminate traffic-related fatalities or serious injuries. As described on the following page, vehicle speed is one of the most significant factors in crash severity, and controlling speed will have a big impact on street safety. Street safety is also closely connected to public life - well-lit streets that encourage walking and biking throughout all hours of the day provide more "eyes on the street," and increase people's sense of security.

LAND USE CONTEXT

Street design should both respond to and influence the character of neighborhoods, advancing the community vision for the future. Street design is inherently connected to land use - compact land use patterns and connected multi-modal streets support transportation options. Options reduce demand for drive-alone trips, easing parking pressure and traffic congestion. In Burlington, this can be seen in many Neighborhood Activity Centers that provide essential services within walking distances of people's home and/or place of employment.

CLIMATE CONSIDERATIONS

Street design should respond to local environmental factors such as climate. Recommendations for improving walking and biking conditions in Burlington must embrace the city's winter climate and integrate best practices for providing safe walking and biking options year-round.

Image at right by Annie Follett, via Local Motion Facebook Page Winter Bicycle Commuter Photo Contest.

COMFORT

When creating new walk and bike infrastructure, comfort is an important consideration. For example, sidewalks should be made as wide as practical and retrofitted to be fully ADA accessible. They should feature amenities such as benches and shade elements. Bikeways should allow people on bikes to be separated from the sidewalk. They should be designed to allow people on bikes to pass each other safety and ride two abreast wherever possible. These are just a few examples of how consideration for comfort can inform design.

Image by People for Bikes: peopleforbikes.org

CONNECTIVITY

A dense, connected street network helps make walking and biking viable modes of transportation. Intersection density is one of the most important ways to create slower, safer streets - high ratios of intersections are associated with fewer the fatalities. Cul-de-sacs and dead-end streets should be avoided; they create indirect routes that cause people to drive longer distances and discourage walking and biking. Where existing cul-de-sacs cannot be connected to the street grid, multi-use paths should be used to at least improve connectivity for people walking and biking. Connectivity also matters for the network of walk/bike facilities within the street grid. For example, bike lanes or sidewalks that suddenly drop off discourage people from biking or walking.

Action is essential! In Fall 2015, DPW completed a handful of small projects that improved safety with paint. Burlington should continue acting fast. The 12-Month Priority Implementation Plan outlines more small projects that can be implemented in the next year. For large projects, Burlington should look for opportunities to use "pilot" projects to test options and inform public decision making.

ECONOMIC DEVELOPMENT

Streets are an economic asset to cities. Well-designed streets have been shown to generate higher revenues for businesses and increase home values. Streets should be designed to support a mixture of commercial and cultural activities, and leveraged to attract economic opportunities and attract talent.

ACTION!

Burlington can start improving safety now with low-cost materials. The 12-Month Priority Implementation Plans outline dozens of small projects that can be implemented quickly with little else than paint. For large projects that require significant capital planning and investment, Burlington should look for opportunities to use "pilot" projects to test options and inform public decision making.

ACTION PLAN

The following pages outline actions in the realm of engineering that will help Burlington apply the safe streets design principles and meet the goals outlined in this plan. These recommended actions are then followed by three chapter sections focusing on sub-areas of the city: New North End, Downtown | Old North End | Campus Area, and the South End. Each sub-area section contains an analysis of existing conditions and a 12-month Priority Action List, which sets up DPW and its partners to make change all over the city in the next year, with little else than paint. Sub-area sections also include maps with recommended projects for five-year and longterm time frames. Moving the recommendations in this chapter from paper to pavement will help make Burlington the best small city for walking and biking on the East Coast.

The City of Palo Alto is pilot testing neighborhood traffic circles as a tool to create streets that self-enforce appropriate speeds. Photo by Josh Mello.

#1. Engineer and design city streets to self-enforce appropriate target speeds.

Street design sends the strongest signal of how to move through space. To increase safety, engineer and design city streets to self-enforce a maximum target speed of 25mph or less along major corridors and 20mph or less on neighborhood and downtown streets. The Priority Streets for Speed Control map on page 63 illustrates recommended locations for creating corridor, neighborhood, and downtown "slow zones." Treatments in these priority locations might include a variety of traffic calming measures including raised crossings, walk/bike roadway markings, or signage.

Roundabouts are one great way to achieve lower speeds, and they are a tool that should be closely considered for intersections in slow zone areas in particular. Roundabouts come in many sizes and styles, and each type has a place on Burlington's streets. For more details, see the Field Guide to Roundabouts in the Appendix of this Guide.

Signal timing is another important factor in designing streets to self-enforce target speeds. Modify signal timing to reduce off-peak speeding and increase exclusive pedestrian crossing times (including lead pedestrian intervals) along and across all priority corridors and intersections by 2026.

Success Metric: All crashes (walking, bicycling, driving) resulting in serious injuries decrease 50% by 2021, 100% by 2026 (achieving the plan goal outlined at the start of this document).

Responsibility: City of Burlington Department of Public Works; VTrans

#2: Improve safety at all 20 priority intersections.

Focus investments on all 20 priority intersections identified in the Citywide Walk Plan Priorities at the start of this chapter, detailed in the Chart on page 65. Use the interim and permanent infrastructure treatments outlined in the Illustrated Glossary of Safe Streets Treatments found in the Appendix of this plan.

Success Metric: All 20 of the Burlington's most dangerous intersections are improved by 2026, or two per year for the next 10 years.

Responsibility: City of Burlington Department of Public Works; VTrans

#3: Provide a connected network of sidewalks and safe intersections.

This action can be implemented with the following approach:

- Provide a sidewalk on at least one side of every street in Burlington.
- For new development, do not allow cul-de-sacs to be built except where natural features or linear rights of way (river, wetlands, rail line etc.) exist.
- New development should achieve, at a minimum, an intersection density of 140 intersections per square mile.
- Automate all pedestrian signals in downtown Burlington.
- Retrofit existing parking lot driveway curb cuts so that pedestrians and bicyclists are clearly visible and have the right-of-way at conflict points; limit the number and width of proposed curb cuts and driveway access points to maximize safety by giving priority to pedestrians.
- Where paths do not currently exist, disconnected streets and cul-de-sacs should be retrofitted to include bicycle and pedestrian access, with a priority where such connection would provide access to a low-stress facility, such as a protected bikeway or shared use path.
- Upgrade key intersections to include ADA accessible ramps and crosswalk and signal activators.

Success Metrics:

- XX miles of new sidewalk miles implemented by 2026
- Ensure that all crosswalks are provided no more than 500 feet apart, Except where unique land use or topographic conditions dictate fewer crossings
- Walking mode share increase to 20.5% by 2021, 22% by 2026

Responsible Parties: Burlington Department of Public Works; Burlington Planning Department; Burlington Community and Economic Development Office; CCRPC; VTrans; and property owners, including major institutions (UVM, Champlain College etc.)

#4: Create a dense, interconnected bicycle network that serves the needs of people of all ages and abilities.

By implementing the projects recommended in the network maps in this plan, Burlington can:

- Increase the total bicycle network to at least 43 street miles, or at least 45% of the city's 95-mile street network by 2026.
- Provide a shared use path, neighborhood greenway, or protected bike lane connection to every school in Burlington by 2026.
- Provide a bikeway connection to every Neighborhood Activity Center, major employer, and adjacent communities by 2026.
- Provide at least 12 miles of on-street protected bikeways by 2026.
- Provide 90% of Burlington's residents with a bikeway facility within a 1/4 mile of their home by 2026.

As new bikeway projects are implemented to create this network, the City should add wayfinding at key decision points to indicate the best way to get to major destinations and areas of the city (for example Downtown, or the New North End). Burlington should develop a simple template bicycle wayfinding sign that can be installed at major decision points as new bicycle facilities are added to the network.

Success Metrics:

- Cycling mode share increases to 9%, by 2021, 12% by 2026
- Implement at least 28 miles of new bikeway miles by 2026.
- 65% of the city's bikeway miles are classified as low-stress routes by 2026.

Responsible Parties: City of Burlington Department of Public Works; Burlington Planning Department; Burlington Parks, Recreation, and Waterfront Department; Burlington Police Department; Burlington Fire Department; Burlington Community and Economic Development Office; CCRPC; and VTrans

Fell Street Bike Lane in San Francisco.

#5: Leverage walk/bike projects to add green infrastructure to Burlington's streets.

Integrate green infrastructure (permeable paving materials, rain gardens, street trees, garden walks etc.) into complete streets design and neighborhood greenway projects to control stormwater, reduce the heat island effect, and enhance beauty.

Success Metrics: Urban runoff is reduced by at least 80% compared to prior conditions along streets that receive green infrastructure treatments.

Responsible Parties: Burlington Department of Public Works; Burlington Planning Department; Burlington Parks, Recreation, and Waterfront Department; CCRPC; and VTrans

#6: Improve and Expand Bicycle Parking Citywide.

Build more high-quality, secure bicycle parking spaces, including bicycle racks, on-street bike corrals, shelters, bike lockers, and bike rooms / stations within public buildings and parking garages. Require more secure indoor bicycle parking for multi-family residential development and covered bicycle parking at major community destinations. Create and conduct a bi-annual bicycle parking survey for multi-family residential and commercial properties.

These mandates may be achieved by revising Chapter 8, section 8.2.2 of Burlington's zoning code and expanding DPW's Bicycle Parking Assistance Program to include on-street bike corrals and bike shelters. (See Bicycle Parking Recommendations on page 135 for more details.)

Success Metrics:

- In addition to those racks installed on private property, the city should install at least 100 high-quality bicycle parking spaces in the public right of way per year, or 1,000 new spaces by 2026.
- Annual bicycle theft reduced 50% by 2026.
- A high-capacity "station" is built within 3 years of plan adoption. See additional metrics related to bike parking on page 135 of this plan.

Responsible Parties: Burlington Department of Public Works; Burlington Planning Department; Burlington Parks, Recreation, and Waterfront Department; and property owners, including major institutions (UVM, Champlain College etc.).

Bike Share station in Aspen, CO. (Photo by Frias Properties of Aspen.)

#7: Implement a robust bicycle sharing system.

Work with key institutional partners such as the University of Vermont and Champlain College to create a public bicycle share program. The first step is to build from the 2011 Chittenden County Bike Share Feasibility Study to conduct a detailed, localized study to guide implementation. The study should recommend a preferred fleet system and include detailed guidance on station locations, with a phased plan for roll out. It should also provide recommendations related to funding and maintenance. Once a detailed study has been completed, Burlington should seek program funding through public health and transportation organizations, as well as local corporate and foundation sponsors. Once funding is solidified, Burlington can implement a cost-effective, high-density, equitable bike share system for Burlington's residents and visitors.

Success Metrics:*

- Complete a bike share implementation study and begin funder outreach in 2017.
- Implement a bicycle sharing system by 2021. Achieve a maximum spacing distance of 1,000 feet between station within the coverage area.

Responsible Parties: Burlington Department of Public Works; Burlington Planning Department; Burlington Parks, Recreation, and Waterfront Department; and property owners, including major institutions (UVM, Champlain College etc.).

**Note that the target timelines listed above assume the City leads this effort. If the City is able to serve as a leader and convener, but approach bike share implementation with a coalition of highly involved partners, implementation can and should be expected to occur much faster.*

#8: Create more walk priority or walk-exclusive spaces.

The Church Street Marketplace in Downtown Burlington is a much-loved walk-only zone. Stretching for 4 blocks, the Marketplace is a hub of activity with over 100 places to eat or shop, as well as year-round programming from festivals to street entertainers. In lieu of a fully closed street, many communities around the country are creating "shared streets". Also referred to as a "woonerf," a shared street is designed to encourage very low vehicle speeds and prioritize the needs of people walking and biking. (See the Illustrated Glossary of Safe Streets Treatments in the Appendix of this document for more detail.)

Burlington should look for opportunities to create new pedestrian priority or pedestrian-exclusive public spaces for people walk, play, and socialize. One way to do this is by creating a placemaking program that incentivize neighborhoods and business owners to spearhead public realm improvements (such as parklets or pedestrian plazas). More details about this approach can be found in the Policy and Protocols Section of the plan. At the same time, the City of Burlington should consider shared and pedestrian-priority streets as a part of its street design toolkit. The sub-area sections of this plan propose several new shared street conditions: intersection upgrades at the North, Murray and Rose Street intersection, the South Winooski Avenue and Bank Street intersection, and along Bank Street are examples.

Success Metrics:

- Create and implement a placemaking program by 2018.
- Measure economic gains for business and property owners following installation of projects.

Responsible Parties: DPW, CEDO, Department of Parks, Recreation & Waterfront, and NPAS

Lawson Lane in Burlington. (Photo by Rainy_J Tripadvisor.)

#9: Support investment in a Downtown Alley Walk.

The 2013 PlanBTV Downtown and Waterfront Plan notes that are several contiguous blocks of alleys moving east to west through downtown, towards the Lake. Some of these alleys have restaurants and businesses tucked away along them - Lawson's Lane is a primary example. The Downtown and Waterfront Plan recommends that the City emphasize and further activate this fledgling "Alley Walk," by adding interesting lighting and supporting investment in additional storefronts and outdoor dining spaces. The Lawson/Mechanics Lane Alley Walk, and others, could become a distinguishing asset in downtown Burlington, with signage to help make the connection from downtown to the Lake.

Success Metrics:

- [Forthcoming]

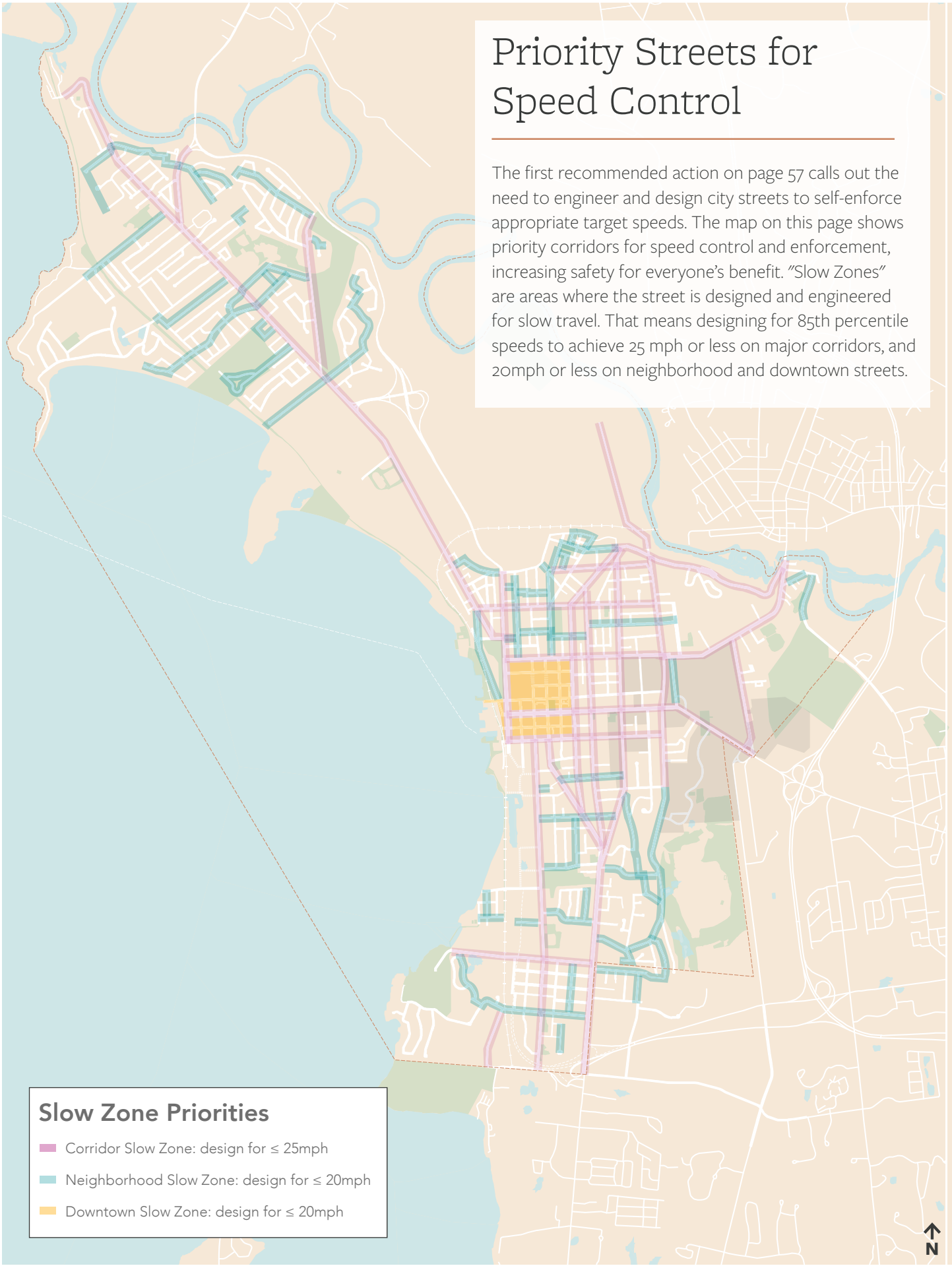
Responsible Parties: DPW, CEDO, local businesses, and private property owners.

THE MULTI-MODAL DAY

The chart below illustrates how public transit, walking and biking can work together to create a "Multi-Modal Day".

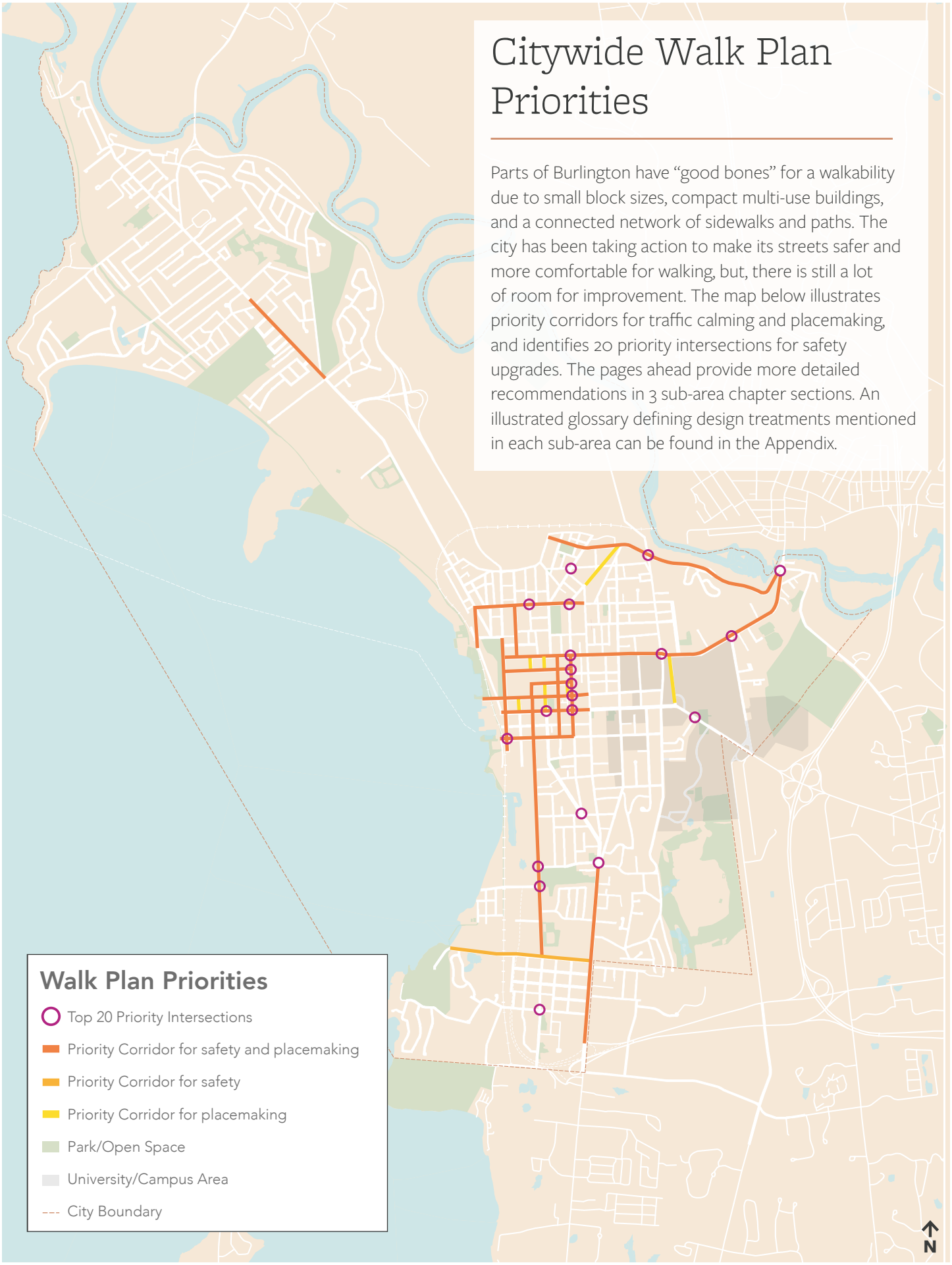
Priority Streets for Speed Control

The first recommended action on page 57 calls out the need to engineer and design city streets to self-enforce appropriate target speeds. The map on this page shows priority corridors for speed control and enforcement, increasing safety for everyone's benefit. "Slow Zones" are areas where the street is designed and engineered for slow travel. That means designing for 85th percentile speeds to achieve 25 mph or less on major corridors, and 20mph or less on neighborhood and downtown streets.



Citywide Walk Plan Priorities

Parts of Burlington have "good bones" for a walkability due to small block sizes, compact multi-use buildings, and a connected network of sidewalks and paths. The city has been taking action to make its streets safer and more comfortable for walking, but, there is still a lot of room for improvement. The map below illustrates priority corridors for traffic calming and placemaking, and identifies 20 priority intersections for safety upgrades. The pages ahead provide more detailed recommendations in 3 sub-area chapter sections. An illustrated glossary defining design treatments mentioned in each sub-area can be found in the Appendix.



Of the 80 crashes at intersections from 2011-2015, more than three quarters (61) of these happened at 17 of the 20 priority intersections listed on the map on the previous page, and in the chart below. The additional three locations in the priority list were added based on public input. Each of these locations has its own story, and deserves further study and research. The City should develop a plan for each intersection, and consider short term/low cost pilots to seek low-cost and rapid interventions. When evaluating options for each intersection, roundabouts and mini traffic circles should be closely considered - roundabouts offer many benefits and can be pilot tested in some scenarios. (See pages 174-175 in the Appendix for more information about roundabout types and potential opportunity sites.) As long-term projects are implemented, the City should continue to work towards upgrading intersections to include ADA accessible features. The chart below summarizes key issues, potential solutions, and next steps for each of the Top 20 Priority Intersections.

Top 20 priority intersections for safety upgrades

LOCATION	KEY PROBLEMS	IDEAS TO CONSIDER	NEXT STEPS
1. Bank and South Winooski	Conflicts at driveway crossings (City Market and Simons gas station); vehicle speed and lighting also factors	Reduce speeds thru lane re-assignment; Land use/urban design/access changes to reduce driveway crossing distances and conflicts.	2016 Corridor Study planned; demos/pilots of curb extensions and lane reassignment while study is developed
2. Archibald and Intervale	Turning traffic failing to yield to pedestrians in crosswalk; lighting; snow removal also factors	Curb extensions or median islands to reduce speeds and enhance visibility	Pilot projects to evaluate options
3. College and South Winooski	Turning traffic failing to yield to pedestrians in crosswalk; lighting; speed also factors	Mini roundabout; reduce crossing distance and/or speeds with curb extensions	2016 Corridor Study; demos/pilots of curb extensions and lane reassignment while study is developed
4. Main and South Winooski	Turning traffic failing to yield to pedestrians in crosswalk; long crossing distance and speed also factor	Advance or exclusive pedestrian phase; roundabout; reduce crossing distance and/or speeds with curb extensions	Great Streets initiative; 2016 Corridor Study; demos/pilots of curb extensions while design is developed
5. Main and St. Paul	Turning traffic failing to yield to pedestrians in crosswalk; long crossing distance and speed also factor	Roundabout; reduce crossing distance and/or speeds with curb extensions	Great Streets Initiative 2016 (Downtown TIF project); demos/pilots of curb extensions while design is developed
6. Riverside: Intervale to Hillside	Conflict points in parking lots and at driveway crossings create unsafe conditions for people walking or biking	Enhance visibility of walkers; reduce speeds to reduce conflicts; land use/urban design/access changes to reduce driveway crossing distances and conflicts	Add pavement markings at conflict points; pilot more robust urban design changes as needed

Top 20 priority intersections for safety upgrades

LOCATION	KEY PROBLEMS	IDEAS TO CONSIDER	NEXT STEPS
7. North St near Murray	Conflicts between vehicles and mid-block crossings or people leaving parked cars. Speed is a factor	Raised-textured intersection to reduce speeds and enhance visibility of pedestrians.	Study/pilot projects needed to determine best approach for traffic calming
8. Loomis at North Prospect	Oncoming or turning traffic fails to yield to crossing pedestrians. Speed is a factor	Curb extensions to reduce speeds and crossing distance, and enhance visibility	Traffic calming project underway for middle block of Loomis Street (2016 design/construction)
9. Pearl and North Winooski	Southbound left turn traffic fails to yield to pedestrians in crosswalk on Pearl.	Exclusive or advance pedestrian phase; Curb extensions to reduce speeds and crossing distance, and enhance visibility	2016 Corridor Study; demos/pilots while study is developed
10. Cherry and South Winooski	Turning or side street traffic failing to yield to pedestrians in crosswalk	Curb extensions across Cherry to increase visibility and reduce crossing distance; roundabout; advanced pedestrian phase	2016 Corridor Study; demos of curb extensions while study is developed
11. North Winooski at North	Turning vehicles from Winooski failing to yield to pedestrians crossing North	Exclusive or advance pedestrian phase; Curb extensions to reduce speeds and crossing distance, and enhance visibility	2016 Corridor Study; demos/pilots while study is developed
12. Lakeside and Pine	Lack of crossing phase; turning vehicles failing to yield to pedestrians in crosswalk	Pedestrian crossing signal with advanced or exclusive phase; Corner truck aprons	Crossing signals installed 2015/2016. Champlain Parkway-intersection reconstruction
13. Barrett and Colchester	Turning traffic failing to yield to pedestrians in crosswalk	Exclusive or advance pedestrian phase; Curb extensions to reduce speeds and crossing distance, and enhance visibility Roundabout for long term safety and operations	Pedestrian signals already planned for installation (year?) Intersection Scoping Study in progress. Use demos/pilots while study is developed.

Top 20 priority intersections for safety upgrades

LOCATION	KEY PROBLEMS	IDEAS TO CONSIDER	NEXT STEPS
14. East Ave and Colchester	Turning traffic failing to yield to pedestrians in crosswalk	Mid-block, median-protected crossings to the west of this intersection will reduce crossings at intersection, Roundabout for speed management and safety	2011 Corridor Study reviewed this intersection. Scoping is recommended.
15. Pine and Locust	Turning traffic failing to yield to pedestrians in crosswalk; speed is a factor	Curb extensions to reduce crossing distance and improved visibility of crossing pedestrians; roundabout	Champlain Parkway project in progress. Demos/interim treatments recommended until reconstruction begins.
16. Shelburne Rotary	Turning traffic failing to yield to pedestrians in crosswalk	2021 roundabout construction planned	Implement interim design measures (See Appendix for details)
17. Shelburne and Home	Turning vehicles failing to yield to pedestrian in crosswalk	Reducing speeds, reducing crossing distances, advanced or exclusive pedestrian phase	Future Corridor Study planned (not programmed yet)
18. Maple/Battery	Lack of pedestrian signals; Turning traffic failing to yield to pedestrians in crosswalk	Reduce distances with curb extensions; exclusive pedestrian phase	Pedestrian signals, upgraded curb ramps / sidewalk access improvements to be installed 2016/2017.
19. Main/University Heights	High speeds, high volumes of vehicles, pedestrians and bicycles on regional corridor.	Enhancements to increase visibility of signal and crossing; change signal cycle; wider median refuge	Scoping study 2016
20.Howard/St Paul/ Winooski	Lack of pedestrian signals, long signal cycle, turning traffic failing to yield to pedestrians in crosswalk	Curb extensions to reduce crossing distances; exclusive or advance pedestrian phase	Scoping study planned for Howard/St Paul/ Winooski in 2016. Pilot test alternatives during scoping.

From Pilot to Permanent

Burlington can start improving safety now with low-cost materials. Along with other parts of this plan, the charts on the previous pages make suggestions for use of pilot projects to evaluate and advance proposed design changes. So, how much can a quick, temporary project really do for a neighborhood? As the case here suggests... quite a lot!

The City of Palo Alto Transportation Division used a 3-month pilot project to evaluate the merits of a neighborhood traffic circle in a residential neighborhood. The project arose as a response to community concerns about safety at the intersection of two streets heavily used by kids biking to school. Parents in the neighborhood raised concerns that the intersection was unsafe: though one of the streets, Coleridge Ave., had a stop sign in place at each edge of the intersection, the other street allowed free flowing traffic, making it difficult for children to cross safely.

Parents and local neighbors originally requested stop signs at the intersection, but after the city's analysis ruled out this option, the Transportation Division began searching for other solutions. The city identified a neighborhood traffic circle as one option for addressing community concerns. A small, neighborhood-level traffic calming project of this nature didn't warrant a full 1-year public outreach process, and the city felt that a pilot may be a more effective way to evaluate the concept and gather public input.

An on-call traffic consultant created the design for the traffic circle using bolted down rubber curb stops-- that the city already had on hand-- four type 1 barricades with traffic circle signs attached, and yellow traffic paint. The type 1 barricades were used to temporarily hold the traffic circle signs, but were quickly upgraded to delineators once available. A sign on the street corner also clearly stated the name and duration of the pilot project and invited people to call or email with questions or concerns. There have been no complaints from the community thus far, and Safe Routes to School leaders of the nearby school reported very positive feedback.

The City of Palo Alto now plans to move forward with a permanent traffic circle in July of 2016, to be built with a mountable concrete curb with dirt and landscaping in the middle. The permanent project

This process of testing traffic safety projects has been a success for the City of Palo Alto: it has helped the City gather community input, while immediately improving safety at the intersection using temporary materials. The pilot has also enabled a permanent traffic circle to be built in only four months time.

Building the Long-term (15 yr) Bicycle Network

The following page outlines the long-term vision for a fully connected bicycle network that appeals to people of all ages and abilities.

Of course, this network will not be built overnight. The diagrams on this page show how infrastructure can be improved incrementally, building on Burlington's existing base of bikeways and paths over the next 15 years to achieve the network illustrated in the long-term map. Starting on page 74, the plan will zoom in on 3 sub-areas of the City and describe recommended projects for each area.

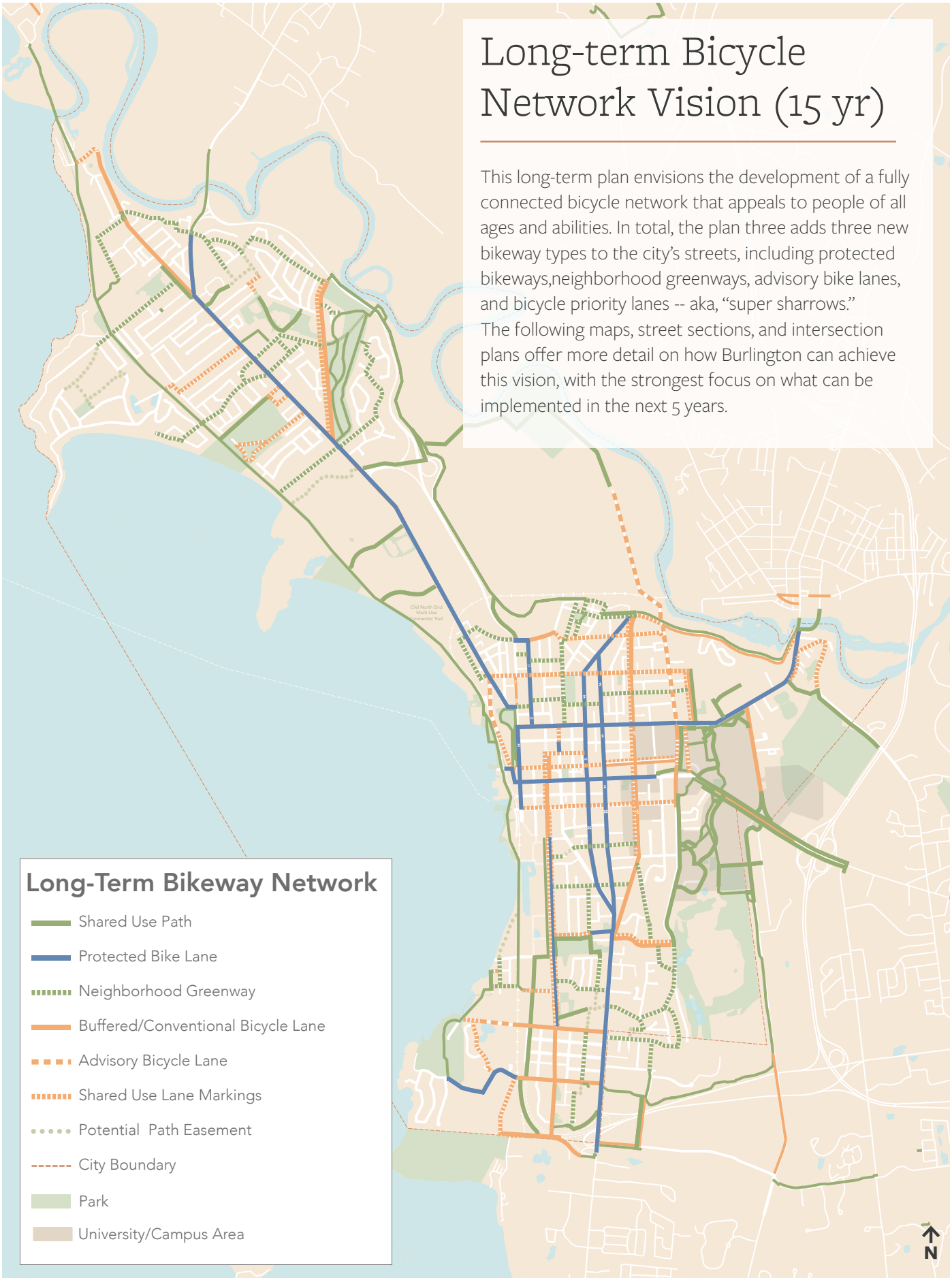
EXISTING BICYCLE NETWORK

PROPOSED 5-YR BICYCLE NETWORK

PROPOSED LONG TERM BICYCLE NETWORK

Long-term Bicycle Network Vision (15 yr)

This long-term plan envisions the development of a fully connected bicycle network that appeals to people of all ages and abilities. In total, the plan three adds three new bikeway types to the city's streets, including protected bikeways,neighborhood greenways, advisory bike lanes, and bicycle priority lanes -- aka, "super sharrows." The following maps, street sections, and intersection plans offer more detail on how Burlington can achieve this vision, with the strongest focus on what can be implemented in the next 5 years.



TO MAXIMIZE BENEFITS OF WALK/BIKE INVESTMENTS, WE MUST CREATE STREETS THAT WORK FOR PEOPLE OF ALL AGES AND ABILITIES

Imagine you are skiing down a mountain for the first time in years. You're a bit unsure on your skis, so you start with an easy trail marked with a green circle. Halfway down the mountain, the trail dumps you into a black diamond run - a section of steep and bumpy terrain only appropriate for experts. Assuming you make it to the bottom in one piece, you'd likely want to call it a day and head into the lodge for some cocoa. And, you'd probably vow never to return to that resort again!

The same is true for walking and biking. Burlington has some exemplary shared-use paths, but it lacks a connected network of bikeways and safe intersections to help people get to them. Burlington also has bike lanes in place, but they are not part of a continuous network, and none are protected. Let's face it, a stripe of white paint isn't enough to make a busy street a comfortable place to bike for everyone. People judge a potential journey on foot or on bike by the most challenging section of the route. If part of a trip requires people to ride in heavy traffic or cross a busy road without a safe intersection it's not a "low stress" experience. Riders and walkers who are less confident are not going to do it more than once.

While Burlington works to become a more walkable and bikeable community, it is important that we not lose sight of who we are planning for. We are not working to simply create more recreational opportunities for strong and fearless walkers and riders. We are responding to a significant demographic and behavior shift, meeting the demand for a community where walking and biking are as efficient, safe, and comfortable as driving a car. And, in order to do that, we need to create streets that work for people of all ages and abilities.

Imagine if a ski resort had an easy run that suddenly dumped inexperienced skiers into a black diamond trail, only appropriate for experts. People wouldn't go to that resort more than once!

The same principle applies to walking and biking. For walking and biking to be viable modes of transportation, Burlington must create continuous pedestrian and bicycle networks that work for people of all ages and abilities.

LET'S BUILD A NETWORK THAT WORKS FOR ISABELLA*

Isabella is 12 years old. Like most girls her age, she is exploring her independence. She wants to travel around town with her friends and bike to school, the library, and Church Street Marketplace. She's ready to travel her world by bike, but is the network ready for her? She likes to ride, but she is small and her skills aren't fully developed. She's sometimes a little wobbly and it's hard for her to see over parked cars near intersections.

To ride safely around her world, Isabella needs a low-stress, connected bike network. And, if we build a network that works for Isabella, wouldn't it work beautifully for the rest of us too?

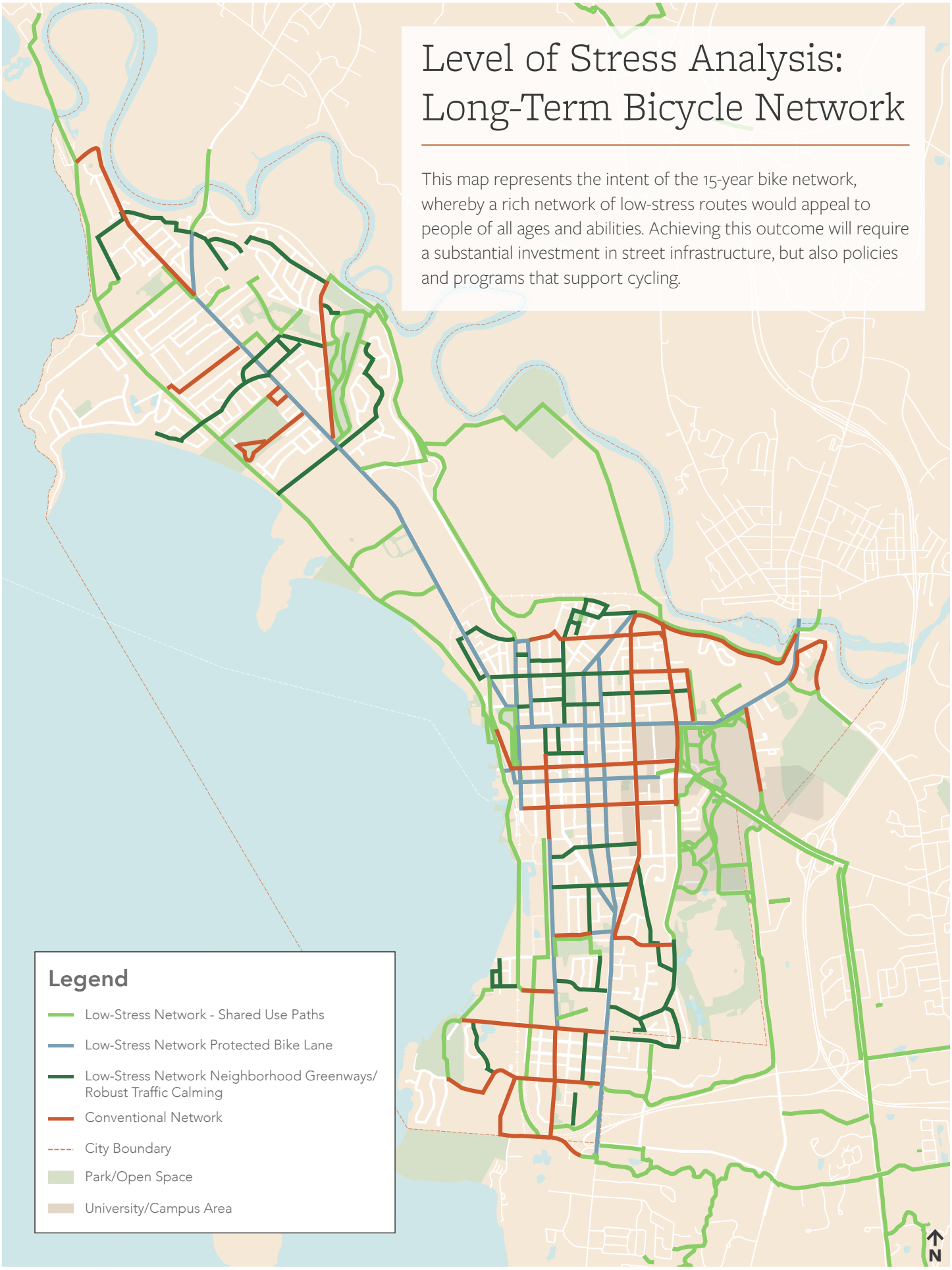
** Ski Route analogy, Isabella image and text developed by People for Bikes, as part of The Green Lane Project: http://www.peopleforbikes.org/green-lane-project*

Level of Stress Analysis: Existing Bicycle Facilities

This map represents existing low-stress bicycle connections. While some low-stress facilities do exist, they do not connect in any reliable way. For walking and biking to be viable modes of transportation, Burlington must create continuous pedestrian and bicycle networks that work for people of all ages and abilities.

Level of Stress Analysis: Long-Term Bicycle Network

This map represents the intent of the 15-year bike network, whereby a rich network of low-stress routes would appeal to people of all ages and abilities. Achieving this outcome will require a substantial investment in street infrastructure, but also policies and programs that support cycling.



Zooming in: Existing Conditions and Recommendations

This section of the plan will present details of existing conditions, followed by recommendations for both the walk and bike mode. To allow us to zoom in on challenges and responses at a neighborhood level, this section is divided into three "sub-areas":

- Sub-Area 1: New North End
- Sub-Area 2: Downtown | Old North End | Campus Area
- Sub-Area 3: South End

Each Sub-Area section will explore existing conditions and present maps with recommendations for walk and bike projects. These maps are followed by section and plan view drawings to illustrate options for a selection of the recommended projects. The Illustrated Glossary of Safe Streets Treatments in the Appendix provides more detail about the facility types and treatments recommended in the pages ahead. For intersections not discussed in the Top 20 chart in Chapter 3, refer to the Project Bank in the Appendix to see how treatments in the Glossary may be applied to the specific location.

SUB-AREA 1:

NEW NORTH END

Note: Dotted white street lines indicate conceptual street connections that have been discussed in other city or regional plans.

Note: Dotted white street lines indicate conceptual street connections that have been discussed in other city or regional plans.

EXISTING CONDITIONS SUMMARY

Most of the New North End was developed in the latter half of the twentieth century, after Burlington's more historic districts were established, closer to the downtown core.

The New North End is home to nearly one-third of Burlington's population. There are many older adults living in the New North End - this area represents AARP's largest membership base in Burlington. Younger people and families are also moving into the area at a significant rate, and there are four schools in the sub-area.

North Avenue acts as the major spine of the New North End, and the neighborhood is home to several major recreational destinations including Ethan Allen Park, Leddy Park, North Beach Park, and the Island Line Trail. Ethan Allen Shopping Center on North Avenue is a major commercial destination. The North Avenue Corridor Study's Health Impact Assessment estimates that approximately 45% of New North End households could walk or bike to Hannaford, the only full service supermarket within the study area, if safe, inviting infrastructure were present. Land use patterns in the New North End are less compact than in other parts of Burlington, and connectivity is mixed. Some residential neighborhoods follow a "cul-de-sac" style development pattern and lack direct connections to nearby streets, parks, and commercial areas. In some cases, informal foot paths have emerged through parks and green spaces to enhance connectivity, such as between Gosse Court and James Avenue.

Though several new crosswalks are in the works, connectivity is reduced by significant gaps in crossings along North Avenue.

Though the New North End features shared use paths along Route 127, at the waterfront, and in parks, bikeway infrastructure is very limited. There are no marked bikeway connections to allow New North End residents to safety travel from their homes to the great trails and parks in the neighborhood. North Ave. and other neighborhood streets lack bike lanes of any kind. As a result, people frequently ride on the sidewalk, reducing pedestrian safety and comfort.

12-Month Priority Action List

START NOW!

Ongoing projects to continue:*

1 PILOT TEST NORTH AVENUE BIKEWAY OPTIONS

Pilot test and evaluate buffered/protected bikeway treatments along North Avenue, between Shore Road and Plattsburg Avenue; VT-127 and Institute Road; and Institute Road and Berry Street. For protected segments, test vertical post delineators and "armadillos" for durability, protection, and aesthetics. This pilot will include a 4-to-3 conversation of North Avenue between VT-127 and Shore Road, planned for implementation in the Summer of 2016. Pending results of the 2016 Pilot Project, add protected/conventional/buffered bike lanes on North Avenue where feasible.

2 STRIPE NEW CROSSWALKS ACROSS NORTH AVENUE

Stripe five additional high-visibility crosswalks across North Avenue at Ward Street, Burlington College, Village Green / Killarney Drive, Gosse Court, and Green Acres Drive / Cayuga Court. This project is funded for 2017 Construction.

3 BURLINGTON BIKE PATH RENOVATION (CITYWIDE)

The City is currently working on enhancing the Burlington Bike Path through a multi-phase rehabilitation project led by Burlington Parks, Recreation, and Waterfront. The project proposes the rehabilitation of the approximate 8 mile multi-use path that runs along the Lake Champlain waterfront. Project limits extend throughout the entire city beginning with the southern terminus at the path intersection with Queen City Park Road and extending north to the Winooski River Bridge.

New projects:

4 IMPROVE CONNECTION BETWEEN NORTH AVENUE AND GOSSE COURT.

Add shared use path pavement markings and signs to Woodbury Road/Hunt Middle School driveway, connecting North Avenue and Gosse Court.

5 LEDDY PARK BIKEWAY CONNECTOR

Add shared lane markings in both directions on Leddy Park Road.

**Note that ongoing project lists include major projects with significant impact to the network of walkable, bikeable streets and intersections. Additional projects are in progress. These lists are not intended to be comprehensive.*

Sub-Area 1: 5-Year Action Plan

Major Community Destinations

- Public School
- University Area
- Park
- Area within 5-min. walk of Neighborhood Center

Planned Projects

- Crossing Upgrade - Already Funded for Construction

Existing Bikeways/Paths

- Shared Use Path
- Existing Informal Path
- Conventional Bike Lane
- Shared Use Lane Markings

Proposed Walk Projects

- Recommended New Sidewalk
- 12-mo Intersection or Crossing Upgrade
- 5-yr Intersection or Crossing Upgrade

Proposed Bikeways/Paths

- Shared Use Path
- Protected Bike Lane
- Neighborhood Greenway (includes Traffic Calming)
- Buffered/Conventional Bike Lane
- Advisory Bike Lane
- Shared Use Lane Markings with Traffic Calming
- Potential Path Easement

Note: Dotted white street lines indicate conceptual street connections that have been discussed in other city or regional plans.

LIST OF RECOMMENDED PROJECTS TO BE IMPLEMENTED IN THE NEXT 2-5 YEARS

Please see map on previous page for additional details.

Project Name	Proposed Action
Crescent/Shore Greenway	Shared lane markings and traffic calming
Farrington Parkway Greenway	Shared lane markings and traffic calming
Gosse Court Greenway	Shared lane markings and traffic calming
Marshall Drive Greenway (Gosse to Heineberg)	Shared lane markings, green infrastructure and traffic calming
North Ave Intersection Safety	High visibility crosswalks, curb extensions with epoxy/sand, flexposts or other creative materials (at Shore, Cottage Grove, Poirier, Saratoga, and Institute)
Old North End Multiuse Connector Trail	Shared use path between North Ave and Island Line Trail
Plattsburg Ave. Bikeway	In the short term, mark and sign conventional bike lanes (with more robust treatment coming in the long-term)
Starr Farm Road Sidewalk	Add new sidewalk
Venus Ave Connector	Begin planning for neighborhood connector between Venus Ave. and Sandra Cir.
Western Ave Sidewalk	Add new sidewalk

Sub-Area 1: Long Term Plan

Major Community Destinations

- Public School
- University Area
- Park
- Area within 5-min. walk of Neighborhood Center

Planned Projects

- Crossing Upgrade - Already Funded for Construction

Existing Bikeways/Paths

- Shared Use Path
- Existing Informal Path
- Conventional Bike Lane
- Shared Use Lane Markings

Proposed Walk Projects

- Recommended New Sidewalk
- 12-mo Intersection or Crossing Upgrade
- Intersection or Crossing Upgrade

Proposed Bikeways/Paths

- Shared Use Path
- Protected Bike Lane
- Neighborhood Greenway (includes Traffic Calming)
- Buffered/Conventional Bike Lane
- Advisory Bike Lane
- Shared Use Lane Markings with Traffic Calming
- Potential Path Easement

Note: Dotted white street lines indicate conceptual street connections that have been discussed in other city or regional plans.

Shore Road Neighborhood Greenway

The plan view drawings on the following pages illustrate recommended treatments for a neighborhood greenway along Shore Road and Crescent Beach Drive in Burlington's New North End. Typically applied to residential streets with low vehicle volumes and speeds, neighborhood greenways use traffic calming measures (such as chicanes, diverters, or mini roundabouts) to emphasize priority for people walking or biking. Through use of greening elements (such as the rain garden curb extensions shown below), neighborhood greenways can also improve stormwater management, beautify the street, and increase public life along neighborhood streets.

The proposed Shore Road neighborhood greenway would provide a low-stress connection between the waterfront, Island Line Trail, St. Marks Catholic Church, North Avenue bikeway, Hunt Middle School, Smith Elementary, and Ethan Allen Park trails, and the 127 Bike Path via bikeways proposed for Ethan Allen Parkway.

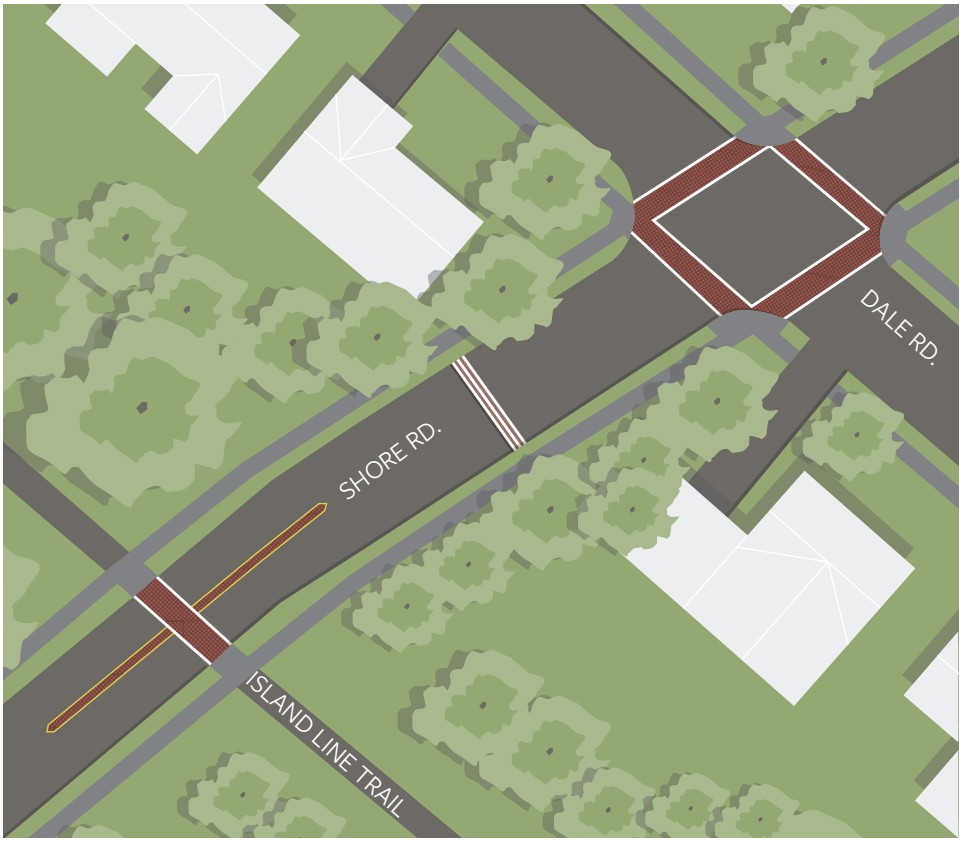
EXISTING CONDITIONS

Crescent Beach Drive is a low-volume, residential street, appropriate for neighborhood greenway traffic calming treatments. While curbside parking is permitted, residences on the street have ample parking options in driveways and attached garages. The street provides access to public waterfront facilities at the western edge.

PROPOSED GREENWAY

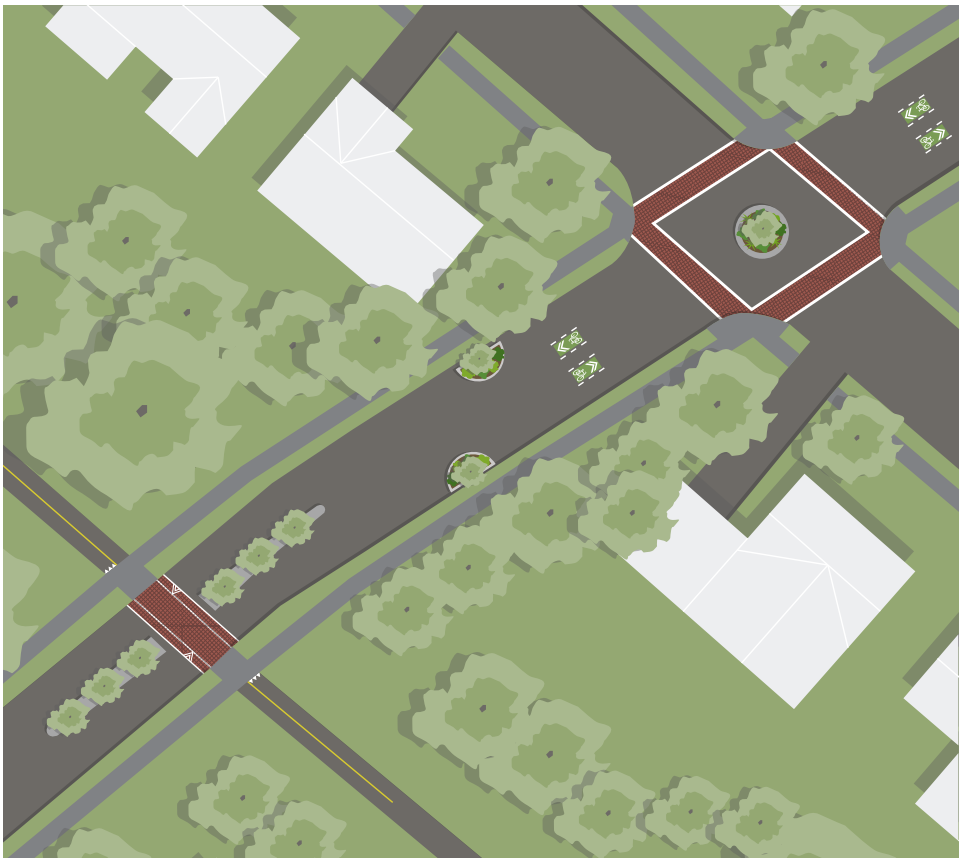
Rain garden curb extensions calm traffic and help manage stormwater, while adding beauty and greenery to the street.

Highly-visible, green "super sharrow" markings indicate that people on bikes and people driving are to share the same lane. The sharrows also function to recommend proper cyclist positioning in the lane and provide wayfinding along the greenway route.



EXISTING CONDITIONS

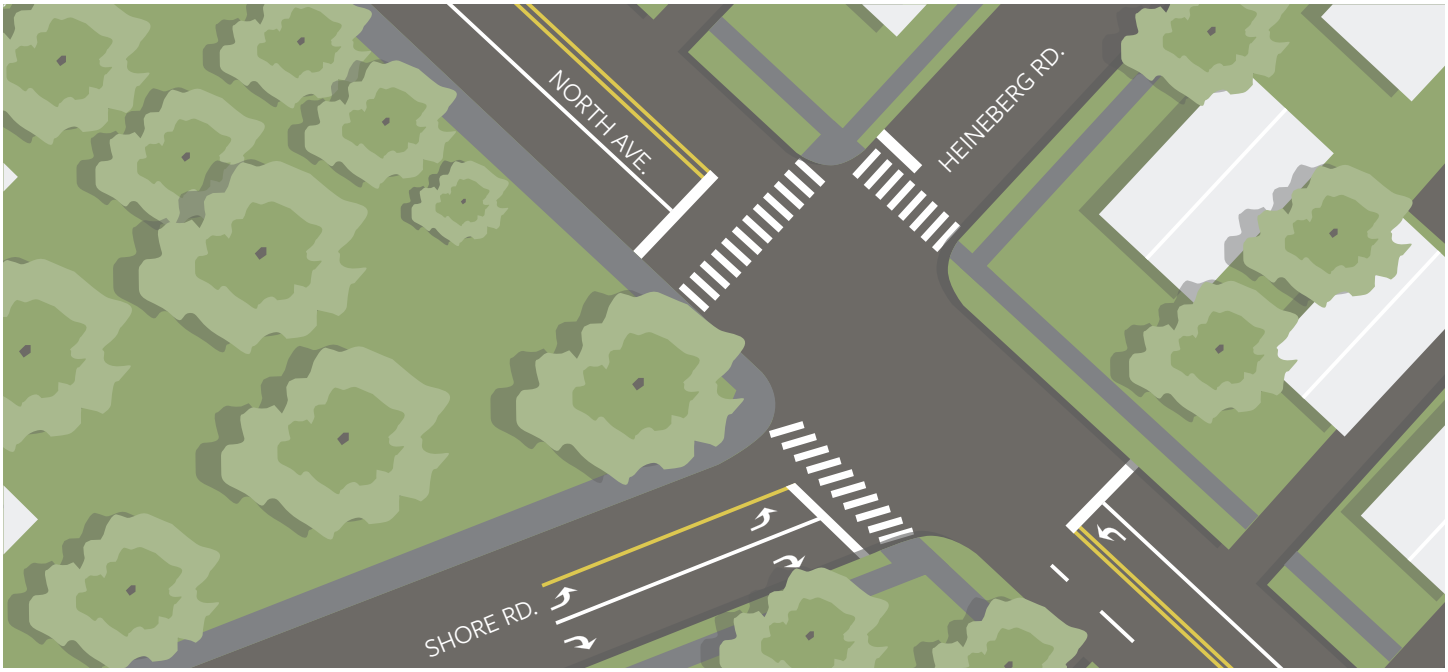
Shore Road is a low-volume, residential street. Curbside parking is permitted but not often needed, as most homes have driveways and attached garages. Shore Road lacks striping but features some traffic calming measures, such as small speed bumps and crosswalks. The Island Line Trail crosses Shore Road just south of the Dale Road intersection.



PROPOSED GREENWAY

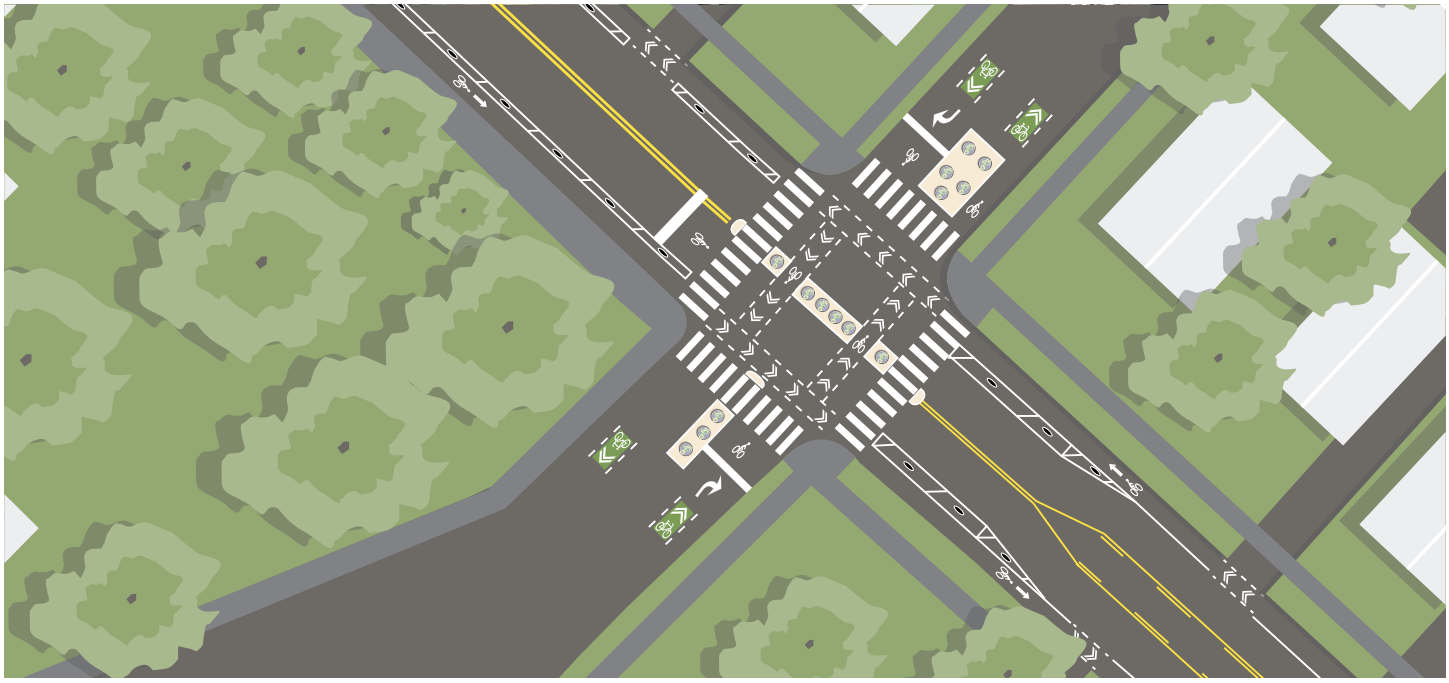
Neighborhood greenway treatments would send a strong message that Shore Road is a priority street for people walking and biking. Recommended treatments include:

- A neighborhood traffic circle at Dale Road.
- Chicanes with greenery to calm traffic, help manage stormwater, and add beauty to the street.
- Median enhancements, adding trees and greenery.
- Highly-visible, green "super sharrow" markings to indicate a shared lane condition, recommend proper cyclist positioning in the lane, and provide wayfinding.
- Raised crossing to improve safety and visibility where the trail crosses Shore Road.
- Trail striping for lateral positioning and yield markings where the trail approaches the sidewalk.



SHORE ROAD GREENWAY AND NORTH AVENUE INTERSECTION: EXISTING CONDITIONS

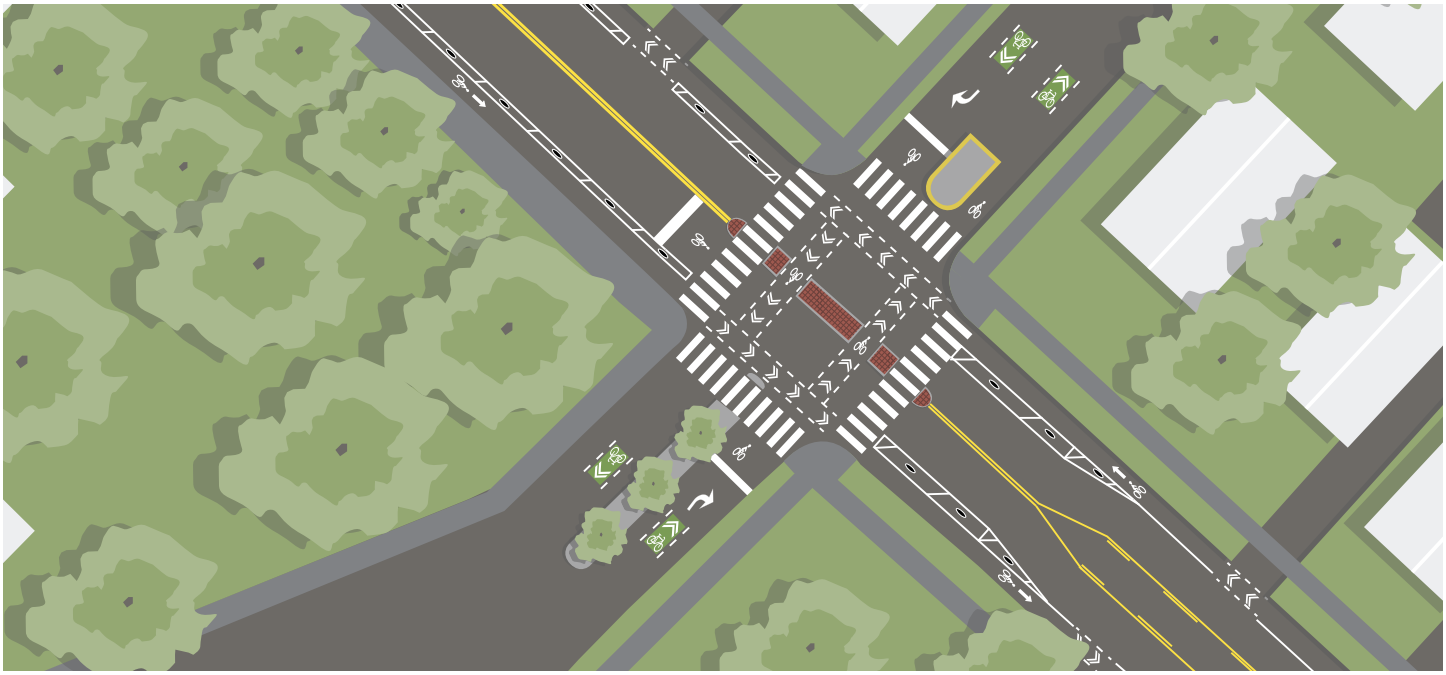
For the Shore Road neighborhood greenway to provide the desired low-stress connectivity benefits, the intersection of Shore Road, North Avenue, and Heineberg Road must be upgraded. The North Avenue Corridor Study proposes a concept which would relocate a portion of Shore Road to better align with Heineberg Road. Implementation of this concept is dependent on right-of-way donation from St. Mark Church, as the church property would be impacted.



SHORE ROAD GREENWAY AND NORTH AVENUE INTERSECTION: PROPOSED PILOT IMPROVEMENTS

- Turn lane restrictions and a bike box on Shore Road
- Crossbike intersection markings across North Avenue
- Median upgrades on North Avenue and Heineberg Road
- A bike box and super sharrow markings on Heineberg Road

These drawing above shows how protected bikeway treatments could dovetail with the potential re-alignment of Shore Road in the future (re-alignment information is based on concept drawings from the North Avenue Corridor Study).



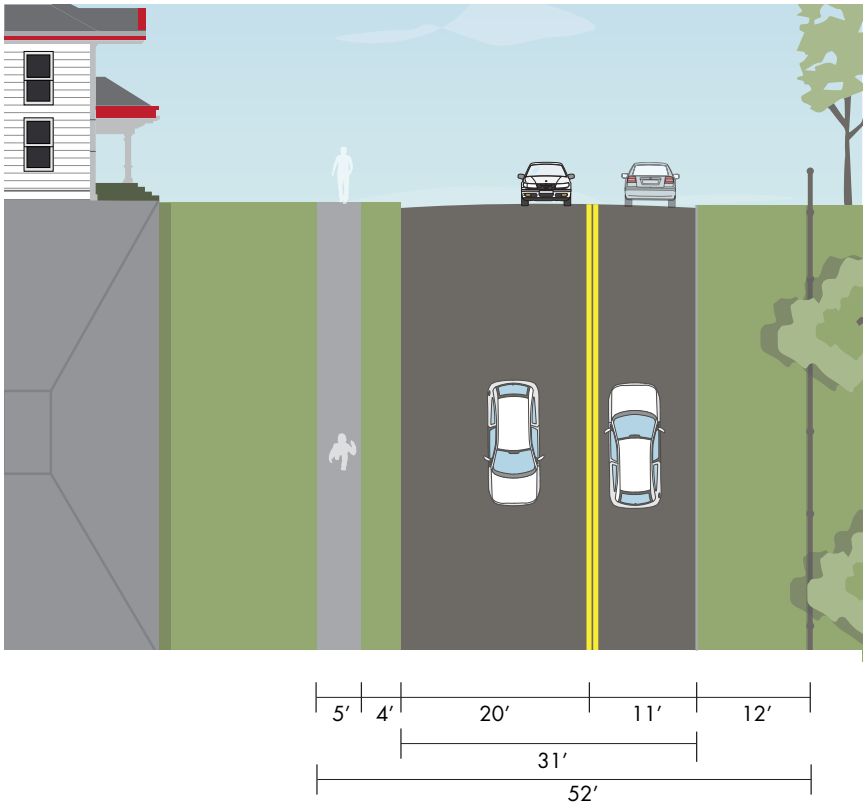
SHORE ROAD GREENWAY AND NORTH AVENUE INTERSECTION: PROPOSED

Based on results of the pilot phase, long-term build out of intersection upgrades at a re-aligned Shore Road, North Avenue, and Heineberg Road intersection would involve:

- Robust median upgrades where Shore Road meets North Avenue, with new street trees to calm traffic and add beauty.
- A bicycle box at North Avenue to provide cyclists with a safe space to wait at a red light.
- Crossbike markings to indicate the designated space for bicycle movement across North Avenue.
- Robust median upgrades on North Avenue providing a pedestrian refuge island at the crosswalk.
- A permanent protected bike lane on North Avenue
- Bikeway markings at conflict points along North Avenue, such as at driveways.
- A median diverter and bicycle box where Heineberg Road meets North Avenue.

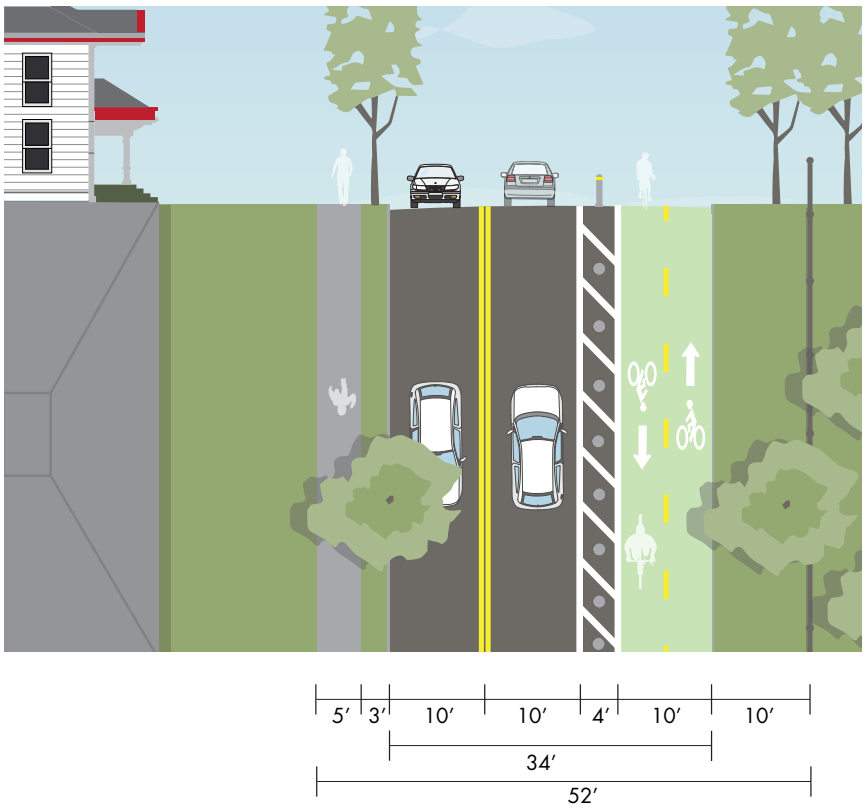
Plattsburg Avenue Two-Way Protected Bike Lane

The following pages outline a proposal for a two-way protected bicycle lane on Plattsburg Avenue. The bike lane would provide a key connection between Burlington and Colchester. Plattsburg Avenue connects residential neighborhoods in the New North End with North Avenue, providing access to: JJ Flynn Elementary School; a neighborhood greenway proposed for Rivers Edge Drive / Sunset Drive; and an existing trail that connects Plattsburg Avenue to the Heineberg Drive/127 Bridge into Colchester.



EXISTING CONDITIONS

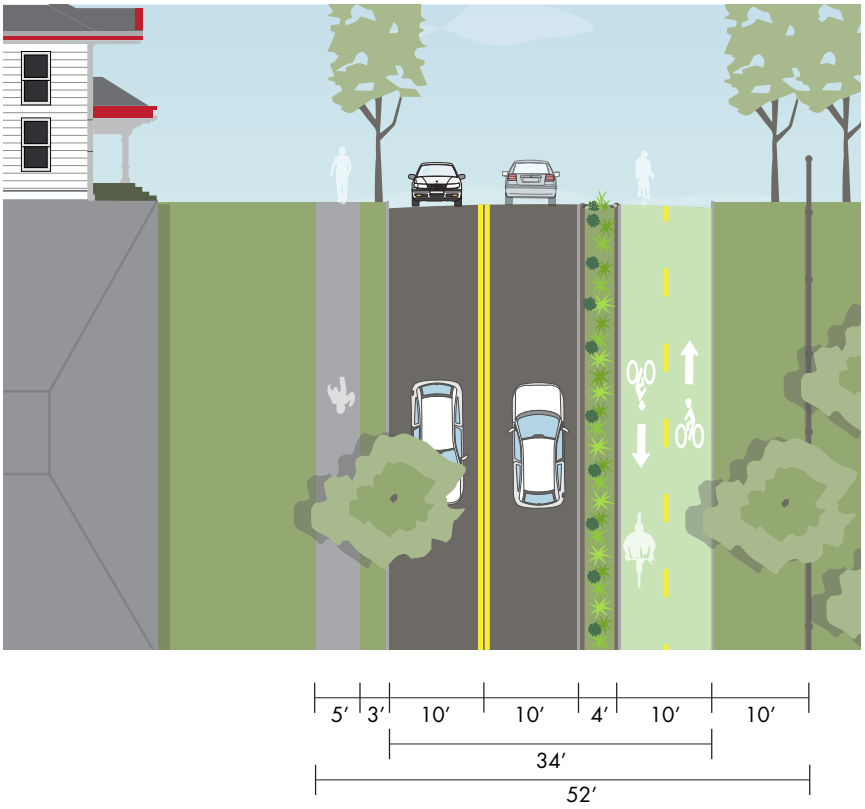
Plattsburg Avenue features two-lane traffic with a curbside parking lane on the west side of the street. Homes on the street typically feature driveways and garages for resident parking. The New Mount Calvary Cemetery on the east side of the street provides a continuous wall with no curb-cuts.



OPTION 1

Widen and re-stripe Plattsburg Avenue to remove the parking lane and move vehicle travel lanes to the west. This makes space for a two-way protected bicycle lane on the east side, which should be a minimum of 10 feet wide. This option is a moderate cost alternative when compared to Option 2 on the following page: it can be created by repurposing part of the greenbelt and then using low-cost materials such as paint and bollards to create the bikeway.

Existing conditions on Plattsburg Avenue, looking north east.



OPTION 2

In option 2, the bicycle lane is separated from the vehicle travel lane by a planted greenbelt or linear rain garden. Again, the lane should be a minimum of 10 feet wide. The planter treatment will help manage stormwater and add greenery and beauty to the street.

SUB-AREA 2: DOWNTOWN | OLD NORTH END | CAMPUS AREA

Note: Dotted white street lines indicate conceptual street connections that have been discussed in other city or regional plans.

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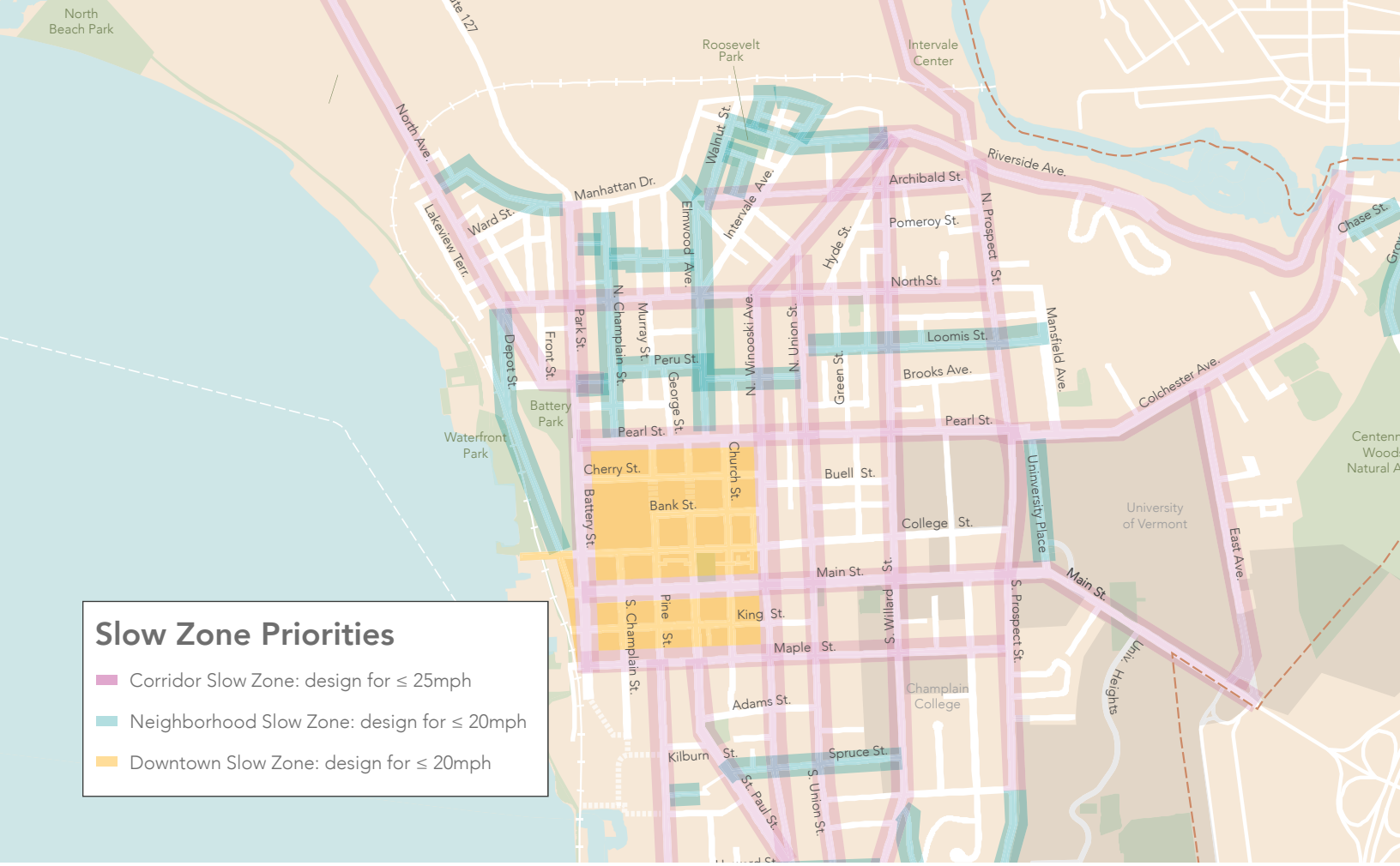


EXISTING CONDITIONS SUMMARY

The Downtown | Old North End | Campus Area sub-area represents Burlington's most compact land use patterns, especially in the historic downtown core.

This sub-area contains many major generators of walk/bike traffic, including campuses for the University of Vermont and Chaplain College. Downtown Burlington is home to hundreds of retail businesses, and neighborhood activity centers, such as North Street in the Old North End, also serve important commercial functions in the sub-area. Major recreational facilities, such as Battery Park and Waterfront Park are an attraction for tourists and residents alike.

In part due to the presence of two large universities, the population in the Downtown | Old North End | Campus Area sub-area is young compared to other parts of the city. Single person households, and non-related groups living together make up a significant segment of the population, reflecting a strong base of young professionals. This sub-area also has a high percentage of renter households.

This sub-area is often considered the most walkable area of Burlington due to its well-connected sidewalk network and high level of intersection density. The sub-area also contains the highest concentration of on-street bike infrastructure. Still, connectivity is an issue. In some areas, poorly maintained sidewalks and unsafe intersections reduce walkability. And, though bike lanes do exist on some streets, they do not connect or form any type of continuous network. Safety is another major concern in this sub-area. The vast majority of crashes involving people walking or biking take place here. Seventy-five percent of the top 20 priority intersections are located in this sub-area, further underscoring the need for improved walk and bike infrastructure.

Given the high concentration of commercial areas, recreational facilities, and major institutions, bicycle parking is particularly important in this sub-area. Current bicycle parking resources in Downtown | Old North End | Campus Area do not meet demand, and the recommendations in the Bike Parking Action Plan note a number of strategies to ameliorate this problem.

12-Month Priority Action List

START NOW!

Ongoing projects to continue:*

1. **COLCHESTER AVENUE SIDEPATH WIDENING**
   Funded for 2017 Construction.

2. **CONNECTORS THROUGH BURLINGTON TOWN CENTER**
   Create connections through Burlington Town Center at Pine and St Paul Streets. Ongoing project subject to development agreement, eligible for Downtown TIF funding.

3. **MAIN STREET STREETSCAPE REDESIGN**
   Dubbed the "Great Streets Project" this project involves planning for a streetscape redesign on Main Street from Battery to Union. The project is funded through the Downtown TIF and Great Streets Project funding. Funding for construction is currently available for the Church to Pine street segment of the project.

4. **MAPLE AND BATTERY INTERSECTION IMPROVEMENTS**
   Crossing improvements planned at this intersection will be implemented in 2016/2017.

5. **SAINT PAUL ST. STREETSCAPE IMPROVEMENTS (INCLUDING THE MAIN ST. /ST. PAUL INTERSECTION)**
   This two-block streetscape improvement (stretching from Maple to Main street) is funded through the downtown TIF program.

6. **ONGOING TRAFFIC CALMING PROJECTS**
   In progress on Grant Street, Loomis Street, King Street and Ward Street. Funded through the Traffic Calming Fund.

7. **BURLINGTON BIKE PATH RENOVATION (CITYWIDE)**
   The City is currently working on enhancing the Burlington Bike Path through a multi-phase rehabilitation project led by Burlington Parks, Recreation, and Waterfront. The project proposes the rehabilitation of the approximate 8 mile multi-use path that runs along the Lake Champlain waterfront. Project limits extend throughout the entire city beginning with the southern terminus at the path intersection with Queen City Park Road and extending north to the Winooski River Bridge.

**Note that ongoing project lists include major projects with significant impact to the network of walkable, bikeable streets and intersections. Additional projects are in progress, and these lists are not intended to be comprehensive.*

12-Month Priority Action List

START NOW!

New projects:

8 CREATE NEIGHBORHOOD GREENWAY ON LAKEVIEW TERRACE

Add bikeway markings and traffic calming treatments on Lakeview Terrace to create a low-stress Neighborhood Greenway as an alternative to the southernmost blocks of North Ave.

9 IMPROVE SAFETY AT COLCHESTER AND EAST AVENUE

Extend the eastbound Colchester Avenue bike lane to the East Avenue Intersection with shared lane marking treatments through the right turn lane. Pilot test a median treatment to increase safety for pedestrians crossing Colchester.

10 PILOT TEST DELINEATORS TO REINFORCE N. UNION STREET BUFFERED BIKE LANE

Pilot test and evaluate vertical post delineators and "armadillos" for durability, protection, and aesthetics within the North Union Street buffered bike lane, from Pearl to North Street.

11 ADD A BIKE LANE AND CURB EXTENSIONS TO PEARL STREET

Stripe a bike lane on Pearl Street between Battery Street and N. Winooski Ave. Add interim curb extensions to improve pedestrian safety at the intersection of Pearl and N. Champlain Streets.

12 ADD BIKEWAY MARKINGS ON COLLEGE TO CONNECT WITH THE PATH ACROSS PROSPECT

Add intersection striping treatments to carry College St. bikeway across the Prospect intersection, to connect with the path on the UVM campus.

13 USE PILOT PROJECTS TO TEST RECOMMENDATIONS FROM THE WINOOSKI CORRIDOR STUDY

The City is currently working on a corridor study to evaluate alternatives for Winooski Avenue from Riverside to Howard. As this planning effort continues, use pilot and interim design measures to improve safety for people walking and biking. One potential focus is the segment between Maple and Main Streets. Overall, improving safety and connectivity south of Pearl Street should be a major priority.

14 ADD BIKE PARKING AT HIGH NEED LOCATIONS

Add bike racks in high use areas such as Church Street, Pearl Street, and Main Street.

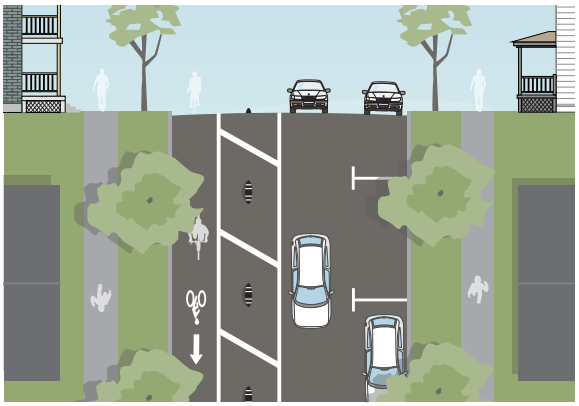
15 PILOT TEST IMPROVEMENTS ON DEPOT STREET

Revisit concept plans developed for Depot Street in the 2009 Waterfront North Access Scoping Study, and develop a plan to improve pavement conditions and use pilot projects to test alternatives. Recommendations in the Study suggested adding traffic calming features, new lighting, upgraded bicycle/pedestrian facilities, and more.

16 ADD CURB EXTENSIONS AT THE MAIN ST. / S. CHAMPLAIN INTERSECTION

Use rapid implementation materials to add curb extensions at this intersection.

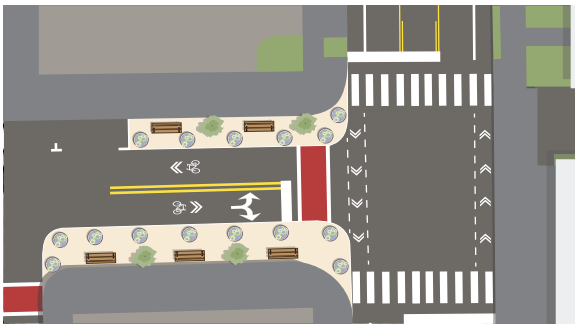
17



ADD A PROTECTED BIKE LANE TO N. WINOOSKI AVE., BETWEEN NORTH UNION ST. AND PEARL ST.

Remove on-street parking along the west side of North Winooski, between North Union Street and Pearl Street. Replace with a southbound protected bike lane created using flex posts; use lane reassignment or a thru/advisory/mixing zone bike lane treatment and bicycle box for the Pearl Street intersection approach; ban right turn on red.

18



PILOT TEST IMPROVEMENTS AT THE INTERSECTION OF S. WINOOSKI AVENUE AND BANK STREET

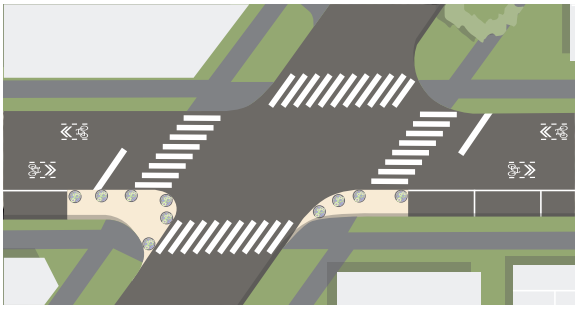
Use paint or epoxy-gravel mix and planters to extend the north and south side sidewalk at the intersection of Bank Street and South Winooski; Ban right turn on red and provide a lead pedestrian interval.

19

IMPROVE SAFETY ALONG RIVERSIDE SHARED USE PATH

Conflict points in parking lots and at driveway crossings create unsafe conditions for people walking or biking along Riverside. In the short term, add pavement markings at conflict points, and pilot intersection improvements at Intervale and Hillside in particular. Pavement markings might include high-visibility chevron markings, green paint or similar treatments. Markings should extend the bike lanes in both directions to and across each intersection using thru/advisory lane or sharrow treatments and crossing markings. Sharrows can be used to close the gap between the end of the eastbound bike lane and the intersection of Colchester Avenue/Barrett Street. As properties are redeveloped in the long-term, public realm enhancements should be required, including raised crossings for bicyclists and pedestrians at all driveway curb cuts.

20



PILOT TEST BIKEWAY UPGRADES AND SLOW ZONE TREATMENTS ON ARCHIBALD

Pilot test and evaluate bicycle priority shared lanes (“super sharrows”) on Archibald Street; install interim design curb extensions using paint or epoxy-gravel treatment where appropriate, such as the intersection of Archibald and Intervale Avenue.

Note: Dotted white street lines indicate conceptual street connections that have been discussed in other city or regional plans.

LIST OF RECOMMENDED PROJECTS TO BE IMPLEMENTED IN THE NEXT 2-5 YEARS

Please see map on previous page for additional details.

Project Name	Proposed Action
Bank Street Bikeway	Mark and sign shared use lanes
Cherry and South Winooski Intersection Improvements	Create rapid implementation curb extensions while 2016 Corridor Study is developed
Colchester Ave Bikeway	Stripe bike lanes on Colchester Ave. east of East Ave., with a more robust treatment to come in the long-term.
Colchester Ave Bridge to Winooski	Implement a lane reassignment with 3 travel lanes and a 2-way shared use path across the bridge, or build a new bridge for people walking/biking
Colchester Ave Hospital Crossing	Install high visibility pedestrian crossing
College/S. Willard Intersection	Consider mini-roundabout or high visibility pedestrian crossings
Main St/University Heights Crossing	Install high visibility pedestrian crossing
Main Street Complete Streets Upgrades (Battery to Winooski)	Design TBD with Great Streets Project; goal is protected bicycle lanes on this segment.
Main Street Complete Streets Upgrades (Winooski to Summit)	Protected bicycle lanes and improvements for pedestrians, per scoping study
Main Street Complete Streets Upgrades (Summit to University Place)	Add a shared use path on UVM property to connect to Main St path
Main Street Path on UVM Campus	Continue UVM Shared Use Path to fill gap from University Heights to the Jughandle
Main Street/S. Winooski Ave Intersection	Consider roundabout or mini-roundabout and lane reassignment
Maple Street Bikeway	Mark and sign shared lane treatments
N. Champlain Street/ Bikeway	Protected 2-way bicycle lanes on west side of street, lane reassignment
N. Winooski Bikeway (Union to Riverside)	Mark and sign protected bicycle lanes
North St Bikeway	Traffic calming with epoxy/sand, flexposts or other creative materials; shared lanes or advisory bike lanes
North Street near Murray	Study/pilot projects needed to determine best approach for traffic calming
North/North Ave Intersection	High visibility crosswalks, curb extensions with epoxy/sand, flexposts or other creative materials
ONE Greenway - Loomis Street segment	Shared lane markings, green infrastructure and traffic calming. Intersection improvements at Loomis/Prospect.
ONE Greenway - Sherman, Peru & Grant	Shared lane markings, green infrastructure and traffic calming
Pearl St/South Williams Crossing	Re-establish high visibility crosswalk
Pearl/Prospect/Colchester Intersection	High visibility crosswalks, realignment integrating curb extensions with epoxy/sand, flexposts or other creative materials
Pearl/Winooski Intersection	High visibility crosswalks, curb extensions with epoxy/sand, flexposts or other creative materials
Riverside Ave/Colchester Ave Intersection	High visibility crosswalks, curb extensions with epoxy/sand, flexposts or other creative materials
Riverside Ave/N. Prospect Intersection	High visibility crosswalks, curb extensions with epoxy/sand, flexposts or other creative materials

LIST OF RECOMMENDED PROJECTS TO BE IMPLEMENTED IN THE NEXT 2-5 YEARS (CONTINUED...)

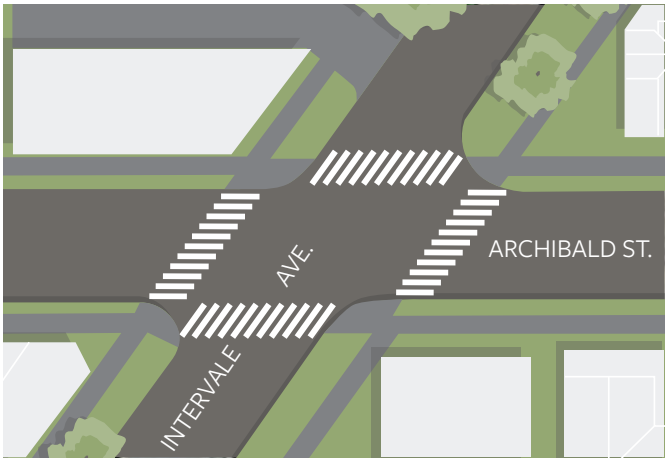
Please see 5-year project map for additional details.

Shelburne Rotary Upgrade	Implement pilot project to clarify traffic patterns and improve safety by narrowing vehicular lanes and adding curb extensions.
Shelburne and Home Street Intersection Improvements	Pilot recommendations from planned corridor study (not programmed yet) - aim to reduce speeds, reduce crossing distances.
S/N Union Bikeway (Main to N. Winooski)	Complete protected bicycle lanes with preferred rapid implementation treatment (flexposts or armadillos, etc.)
S. Union Bikeway (Shelburne to Main)	Establish protected bicycle lanes with flexposts or armadillos; consider lane reassignment with one-way street for vehicles
S. Union/Main Intersection	Consider mini-roundabout; high visibility crosswalks, curb extensions with creative materials
S. Willard St Bikeway (Cliff to Hyde)	Extend northbound bicycle lane from North Street to Hyde, add shared lane markings southbound
S. Willard/Main Intersection	High visibility crosswalks, curb extensions with creative materials
S. Willard/Pearl Intersection	High visibility crosswalks, curb extensions with creative materials
S. Winooski Ave/College St Intersection	Consider mini-roundabout; high visibility crosswalks, curb extensions with creative materials
S. Winooski Bikeway-Main to Pearl	Mark and sign bicycle lanes in both directions; reassignment of vehicle lanes

Note: Dotted white street lines indicate conceptual street connections that have been discussed in other city or regional plans.

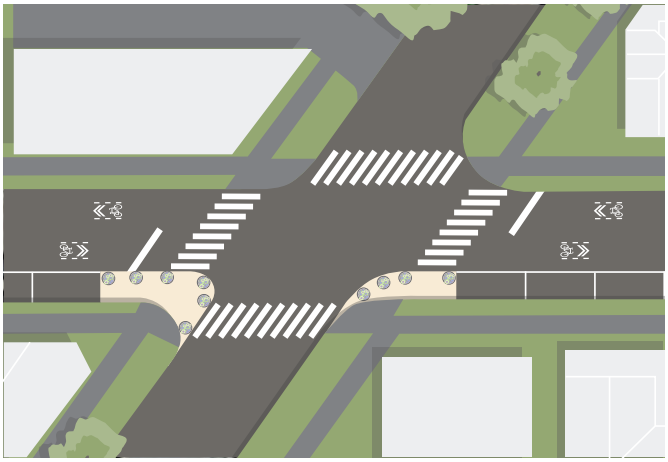
Intervale Ave. + Archibald Ave. Intersection Upgrade

Archibald provides critical east-west connections to Prospect Street, Integrated Arts Academy, and numerous neighborhood parks. It also intersects with a variety of proposed bikeways on Walnut Street, Elmwood Avenue, North Winooski Avenue, and North Prospect Street. Intervale intersects Archibald and is an important connection to the existing Riverside Avenue path facilities, public transit services, and several high-density shopping and housing areas. The Archibald/Intervale intersection has been identified as a top priority for improvement, based on crash data and public input. The drawings on this page illustrate how pilot and long-term design changes could be used to improve safety at the Archibald/Intervale intersection. The City should evaluate options to add similar traffic calming treatments at *all* intersections along Archibald, especially at Elmwood, N Winooski and Willard. Traffic calming treatments should establish a target speed of 20mph on Archibald. Slowing the whole corridor down in this manner is critical for creating a condition in which people biking will feel safe sharing the lane with cars on this key east-west corridor.



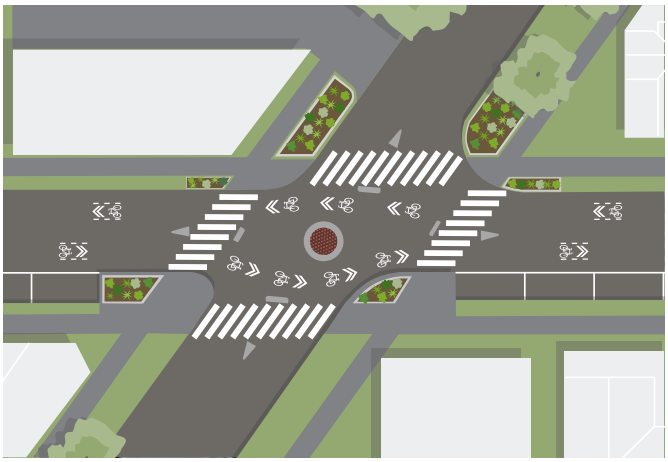
EXISTING CONDITIONS

Beyond simple crosswalks, this intersection, and the streets leading into it, lack amenities for people walking and biking. Curbside parking is permitted in the south side of Archibald, and along the west side of Intervale.



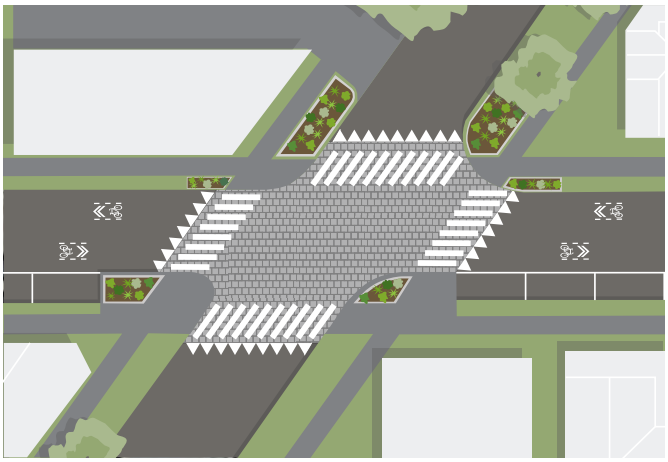
SHORT-TERM / PILOT

In the short-term, use paint and temporary planters to tighten turning radius for people driving, and shorten crossing distances and improve visibility for people walking. Clearly stripe parking spaces. Add bikeway markings along Archibald to create a new east-west route.



OPTION 1

Upgrade temporary curb extensions and add a mountable neighborhood traffic circle to permanently calm traffic and improve safety for people walking and driving. Option 1 upgrades include permanent rain gardens and expanded sidewalk space. Rain gardens will help control stormwater and add protection and beauty.



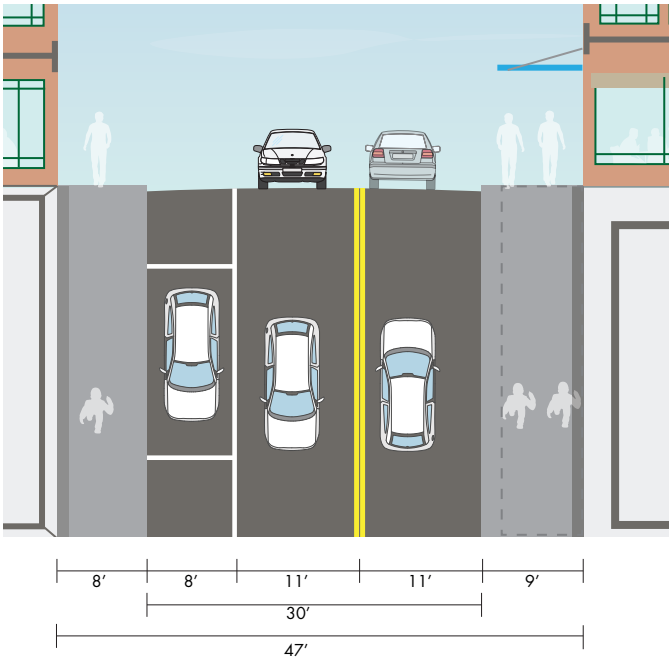
OPTION 2

For Option 2, create a raised intersection to slow people driving and increase the visibility and priority of people walking and biking. Use permeable pavers to help control stormwater and reduce maintenance costs.

North Street Bikeway

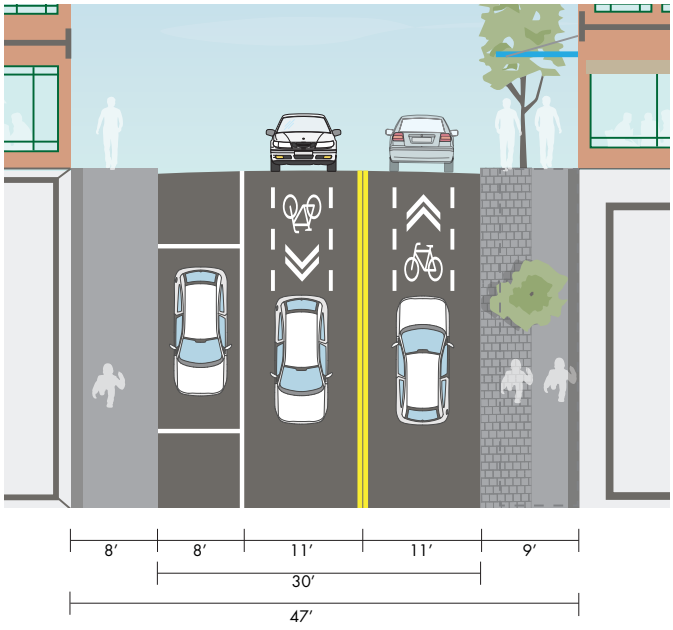
North Street is an important community destination in the Old North End neighborhood, providing access to a compact shopping district and an elementary school. It is also an important east-west connector, intersecting with existing bike facilities on Willard, Union, and North Winooski, all of which are slated for further improvements as part of this plan. Despite a high volume of cyclists on North Street, no bikeway facility exists there. This plan proposes recommendations for making North Street a safer place to walk and bike, while also balancing the parking and delivery needs of adjacent businesses on the corridor.

The drawings on this and the following page illustrate how robust traffic calming treatments (such as raised intersections) could be used to calm traffic speeds along the entire North Street corridor. The drawings on the following page provide an example of one potential treatment for the North/Murray/Rose intersection, which was identified as a top priority Intersection based on crash data and public input. This drawing is just one example. The City should evaluate options to add traffic calming treatments at *all* intersections throughout the North Street Bikeway in order to slow the whole corridor down. This approach is critical for creating a condition in which people biking will feel safe sharing the lane with cars.



EXISTING CONDITIONS

North Street features parallel parking on one side, with moderately sized vehicle travel lanes and sidewalks. Dense urban form and buildings oriented to the street help make North walkable, but the lack of mature street trees and safe crossings is a concern. Without removing parallel parking, existing street and sidewalk conditions do not provide enough space to accommodate a separated or protected bicycle lane.



PROPOSED

Given the compact and commercial land use context, North Street should be a slow zone for people driving. To increase safety for people walking while still preserving parking, add high visibility sharrow markings (aka “super sharrows”) throughout North Street. Slow vehicle speeds should also be enforced with additional traffic calming treatments at each intersection, such as raised intersections, curb extensions, street trees, and leading pedestrian intervals. Amenities such as public art and benches should also be a priority for this corridor.

North, Murray + Rose Street Intersection Upgrade

These drawings illustrate a robust traffic calming proposal for the North/Murray/Rose intersection, which was identified as one of the top 20 Priority Intersections based on crash data and public input. The City should evaluate options to add traffic calming treatments at *all* intersections throughout the North Street Bikeway in order to slow the whole corridor down.

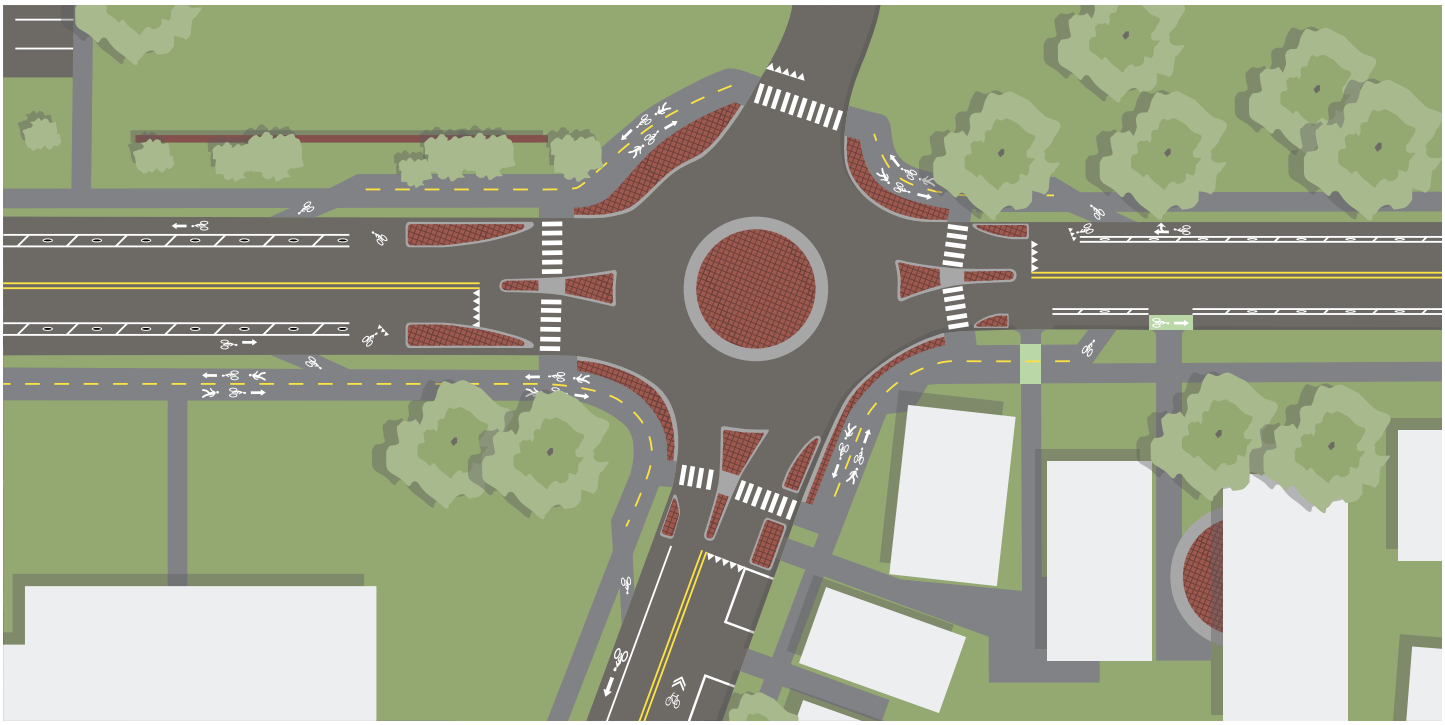
EXISTING CONDITIONS: Existing crosswalks do not provide a direct or logical path for people walking across this intersection, and people often cross where no crosswalk is present. Although there is a high volume of cycling traffic on North Street, no marked facility exists.

PROPOSED: Upgrade the entire North/Murray/Rose intersection to create shared street condition. Improvements would include raising the intersection to increase visibility of and indicate priority for people walking and biking. Use permeable pavers to help control stormwater and reduce maintenance costs. Add benches and landscaping planters for comfort, beauty, and further stormwater management. Add high-visibility sharrow markings to mark the route for people biking. The North/Murray/Rose intersection should be the first priority for traffic calming, but traffic calming treatments should be applied at *all* intersections throughout the North Street Bikeway. This approach will slow the whole corridor down, making it safer and more comfortable for people biking to share the lane with cars.

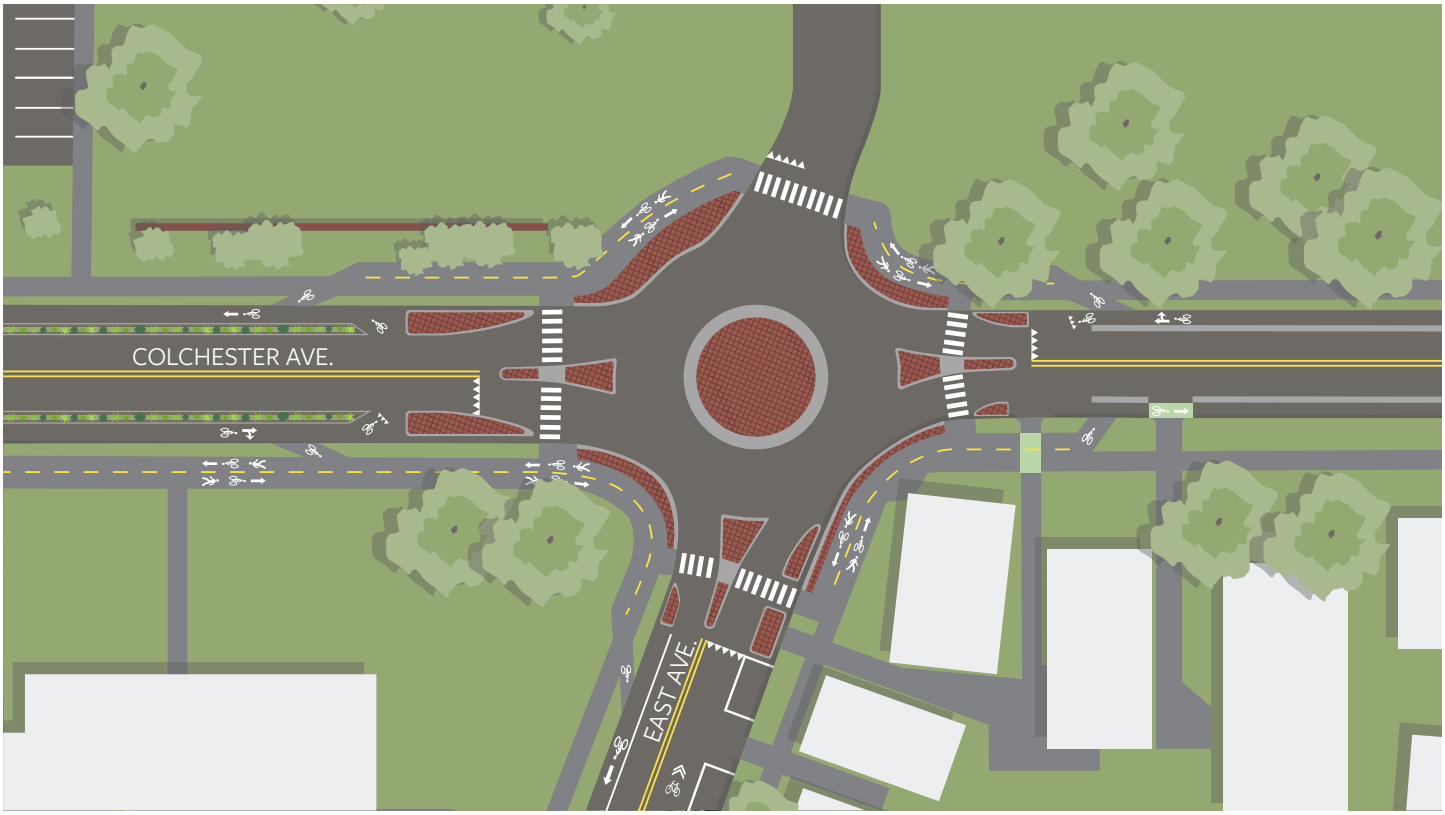
East Avenue + Colchester Avenue Mini Roundabout

This intersection is adjacent to the UVM campus and sees a very high volume of bicycle and pedestrian traffic. It was identified as one of the top 20 Priority Intersections based on crash data and public input.

EXISTING CONDITIONS: The eastbound bike lane on Colchester Avenue drops at this intersection, forcing people on bikes to merge with heavy vehicle traffic. High volumes of pedestrians cross Colchester Avenue to access key destinations on UVM's campus, and traffic calming is needed to increase safety.



OPTION 1: A mini-roundabout is recommended at this intersection to reduce vehicle speeds, without creating congestion (see Appendix for more on mini roundabouts). Upgrades should include protected median refuge islands for people crossing Colchester and East Avenues, as well as low-cost protected bikeway treatments along both streets. These treatments would be supported by off-road shared path facilities on campus property at the south edge of Colchester Avenue.

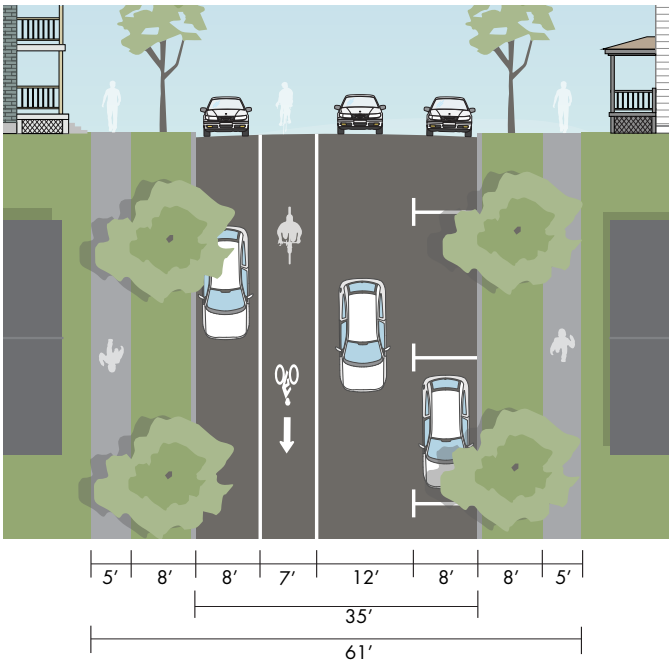


OPTION 2

The drawing above shows a second option for bikeway facilities on Colchester Avenue. In this scenario. the bike lane protection extends from the median at East Avenue, using linear rain gardens to control stormwater and create a continuous physical barrier between people biking and vehicle traffic.

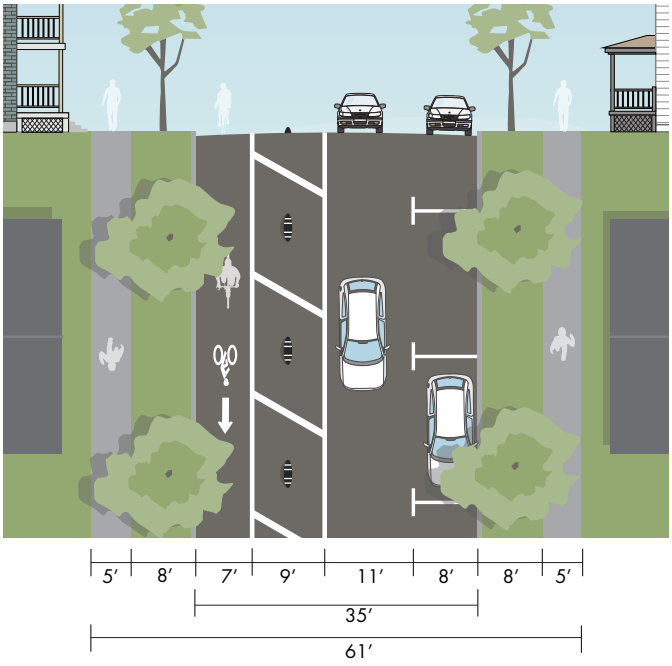
North Winooski Avenue Protected Bike Lane

North Winooski Avenue is a major pain point for people biking. It is a critical north-south connector route and features many important commercial and civic/service destinations north of North Street. Though a south-bound bike lane exists along a stretch of N. Winooski, it drops off completely at Pearl, dumping people biking into a congested and confusing intersection, with one thru lane and two turn lanes. Based on land-use context and high volume of pedestrian and bicyclist traffic, N. Winooski Avenue should be a slow zone for people driving.



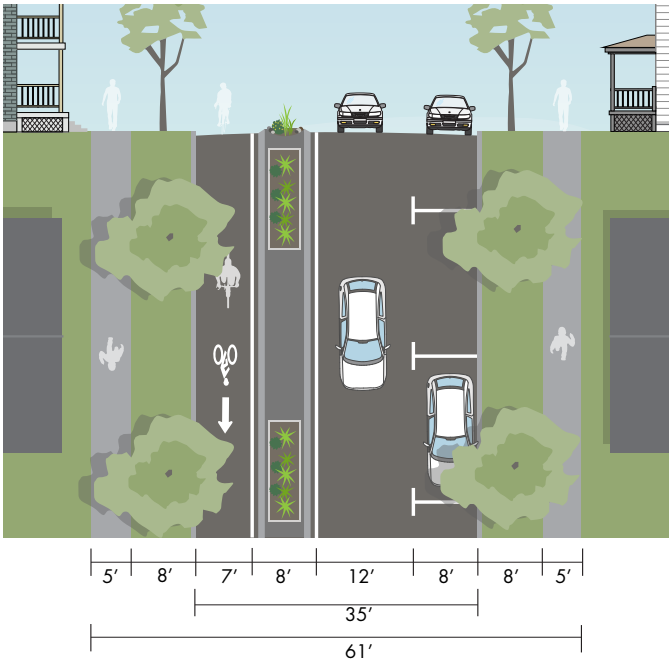
EXISTING CONDITIONS

North Winooski Avenue features one-way traffic with a moderate travel lane width and parallel parking on each side. The existing south-bound bike lane lacks protection and drops off before reaching Pearl Street. The nearest northbound bike lane is located on Union Street, so there is no direct route for people who want to travel north on N. Winooski by bike. Consequently, wrong-way riding is an issue. Street trees and a generous greenbelt provide a pleasant environment for pedestrians, but street seat amenities are lacking in commercial areas.



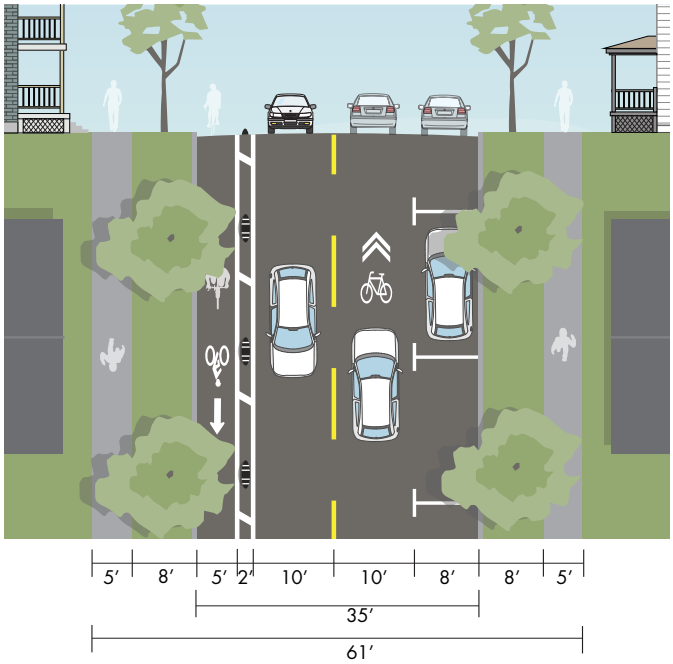
OPTION 1: PILOT PROTECTED BIKE LANE

Pilot test a protected bike lane on N. Winooski using paint and mountable “armadillo” barriers (or vertical delineators) to reinforce separation between the bike and vehicle lanes. In this scenario, parking is removed on the west side of the street, and one-way traffic patterns for bike and car lanes remain unchanged.



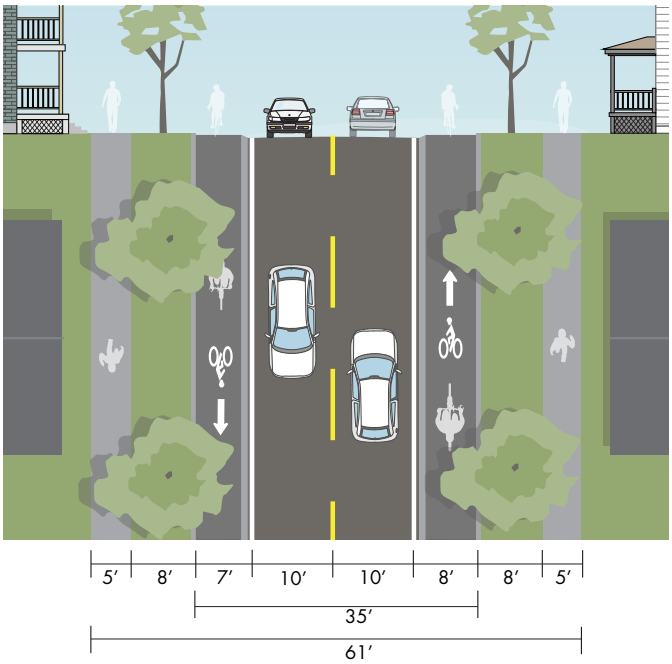
OPTION 1A: PROTECTED BICYCLE LANE

In the long term, upgrade the protected bike lane with a low mountable curb. One-way traffic patterns for bike and car lanes remain unchanged.



OPTION 2: SHORT-TERM/ PILOT

This option assumes that N. Winooski Avenue is converted into a two-way street. Parallel parking is preserved on the east side of the street, with a shared lane marking for north-bound bicycle traffic. Southbound cyclists are separated from vehicles with a protected bicycle lane. In the pilot phase, the bicycle lane can be tested using paint and low, mountable armadillo barriers or vertical delineators.

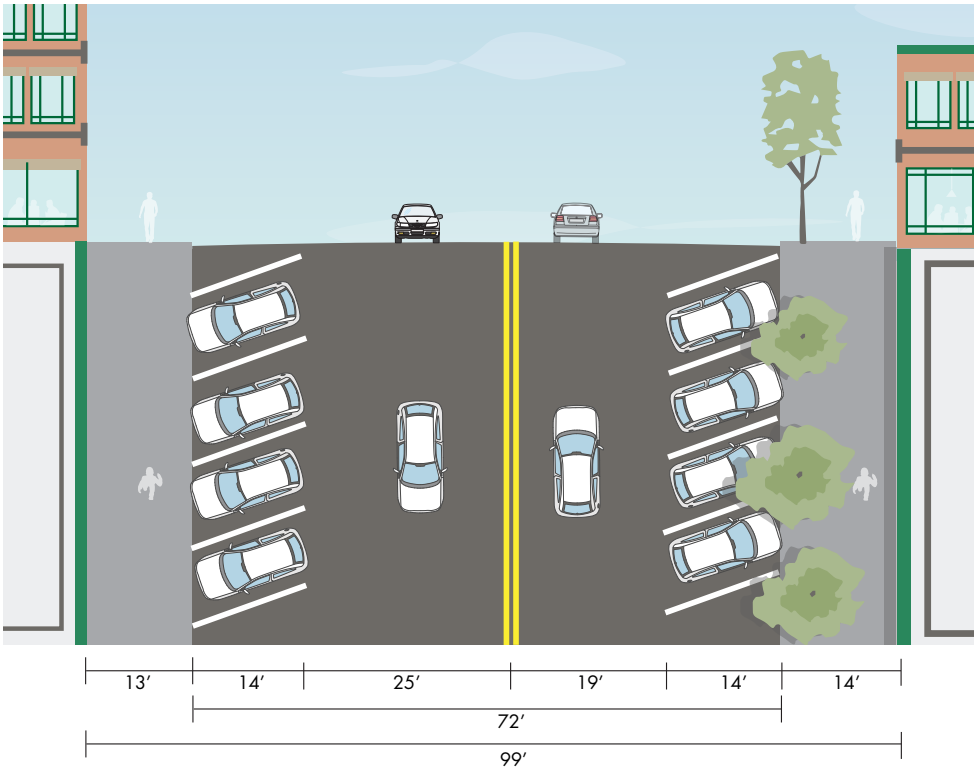


OPTION 2A: PROTECTED BICYCLE LANE

In the permanent phase of the project, the protected bicycle lane would be upgraded with a permanent mountable curb in both directions. The protected bike lane could be flush with the sidewalk and greenbelt, providing additional breathing room for those biking with wider cargo bikes.

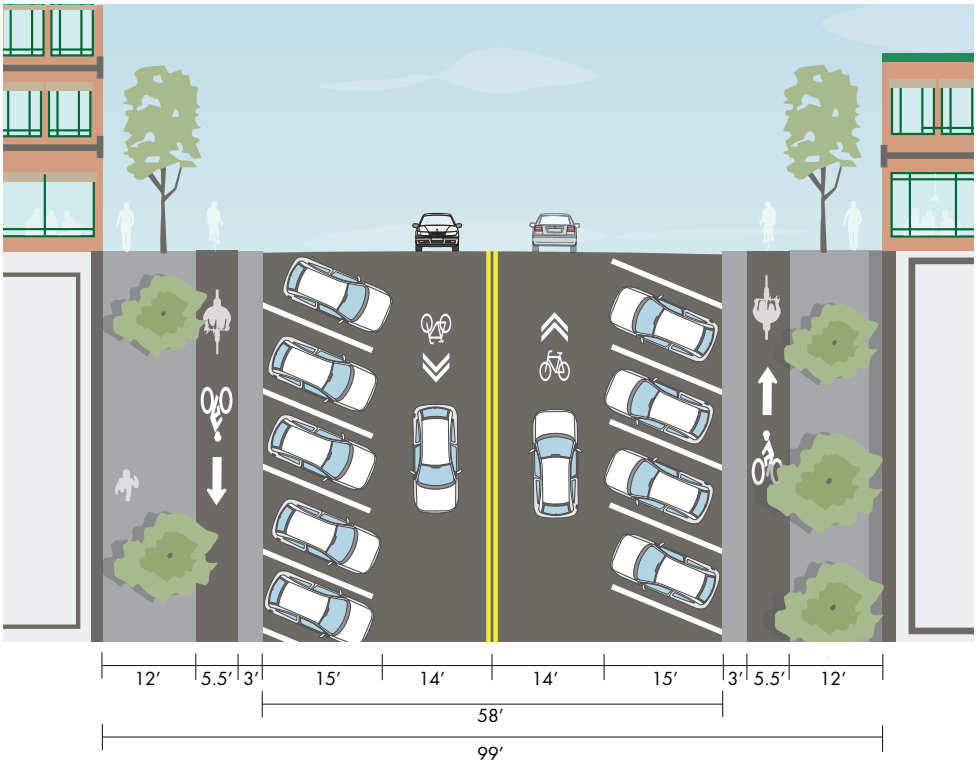
Main Street Bicycle Lane (at Pine Street)

Main Street is a critical east-west route in Downtown Burlington, with compact land use and high volumes of vehicle, pedestrian, and cyclist traffic. Several blocks of Main Street feature head-in angled parking, but parking and road width conditions vary somewhat from block to block. Currently, Main Street does not have any marked bicycle facilities.



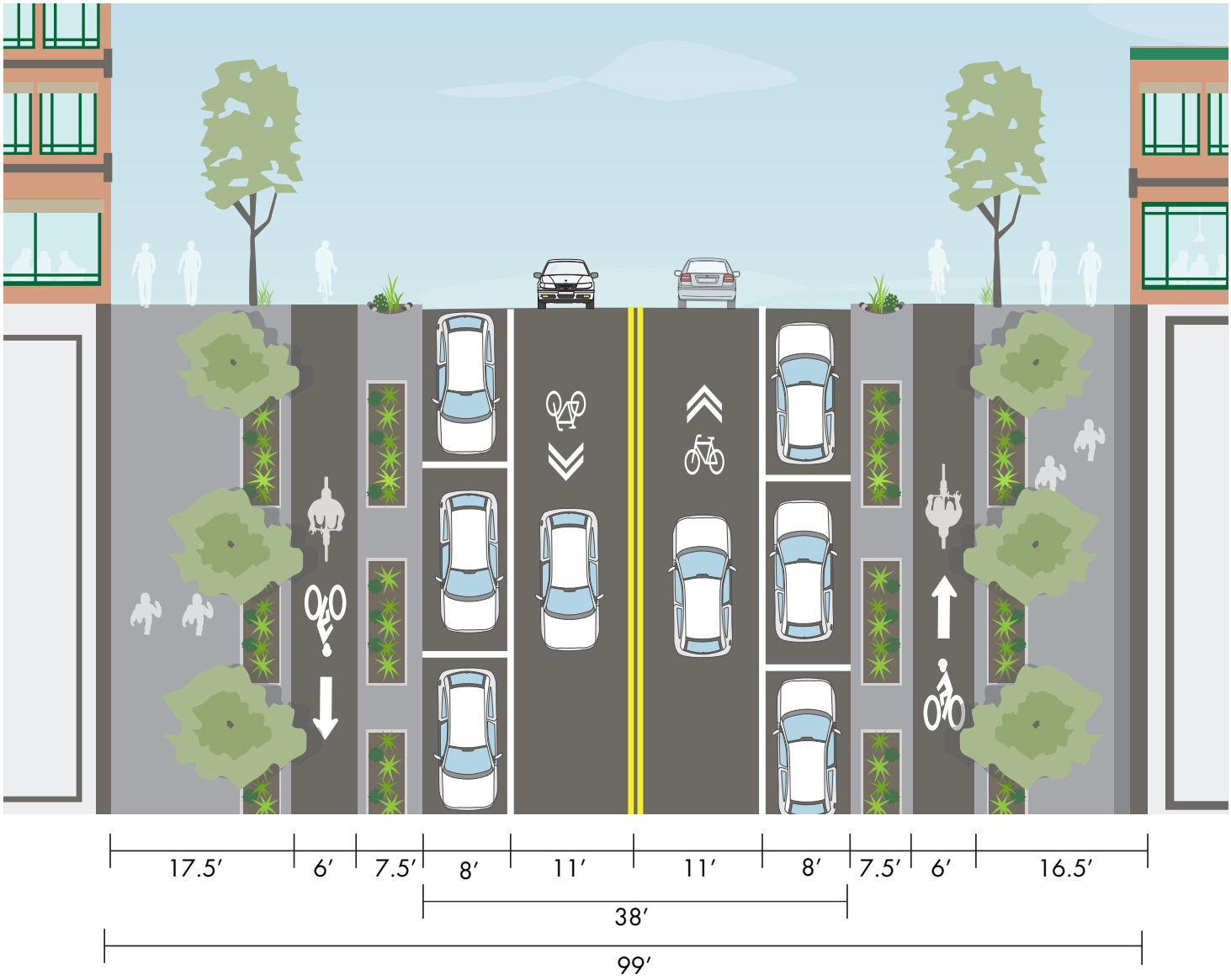
EXISTING CONDITIONS

Conditions at Pine Street include wide travel lanes (19-25 feet) and head-in parking, with no bicycle facility. The sidewalk is wide and features street trees but few other amenities for people walking.



OPTION 1

One option for adding the recommended bicycle facilities on Main is to add a sidewalk-level bike lane, protected by parked cars. The bike lane is clearly marked to avoid conflict between people walking and biking. Back-in angle parking makes motorists better able to see oncoming cars and bikes as they exit the parking space. Narrowed vehicle travel lanes calm traffic.

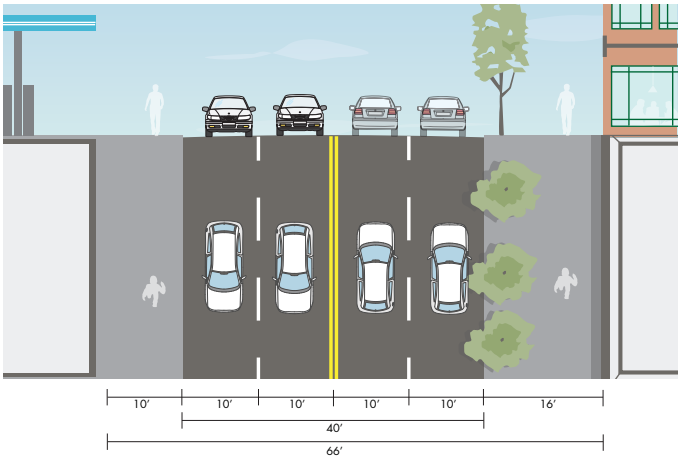


OPTION 2

Option 2 illustrates the use of rain gardens to create a protected bicycle facility. Planters provide a more defined and visible separation of space for people driving, biking or walking. Because this treatment requires more space, parallel parking is provided instead of the rear-angle option previously illustrated.

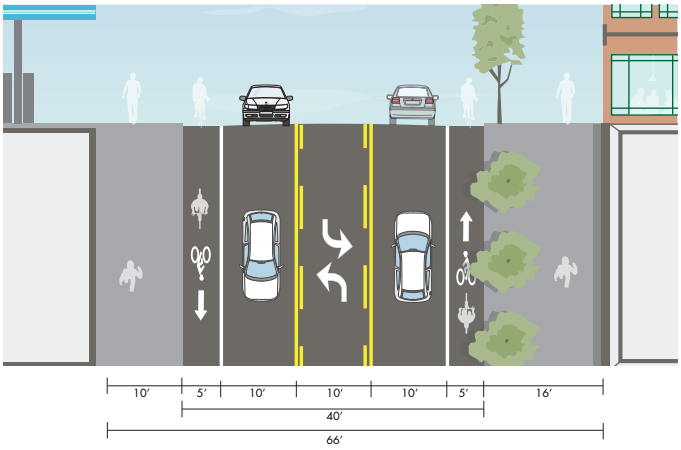
South Winooski Avenue Bikeway (at Bank Street)

Though it is adjacent to Burlington's walkable downtown core, S. Winooski Avenue feels like a hostile environment to people walking and biking. This corridor features 4 the top 20 Priority Intersections for safety upgrades. The bike lane on N. Winooski Avenue drops at Pearl Street, and people continuing down Winooski by bike are left with no designated facility. New development, such as the City Market at Bank Street, has led to a spike in walk/bike traffic in the area. S. Winooski should be a target for redesign as land use continues to develop in support of a more walkable, bikeable corridor.



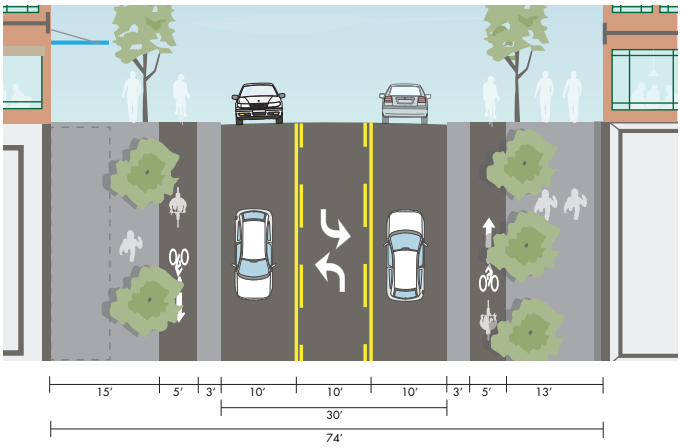
EXISTING CONDITIONS

South Winooski Avenue features two relatively narrow travel lanes in each direction, and no street parking. Wide sidewalks feature street trees, but other amenities for people walking or biking (such as benches and bike parking) are lacking.



PHASE 1

Phase 1 assumes existing land use patterns continue, with a re-striping of the roadway to allow a vehicle and conventional bike lane in each direction, as well as a center turn lane. This phase could also include addition of pedestrian amenities as space allows, such as benches.

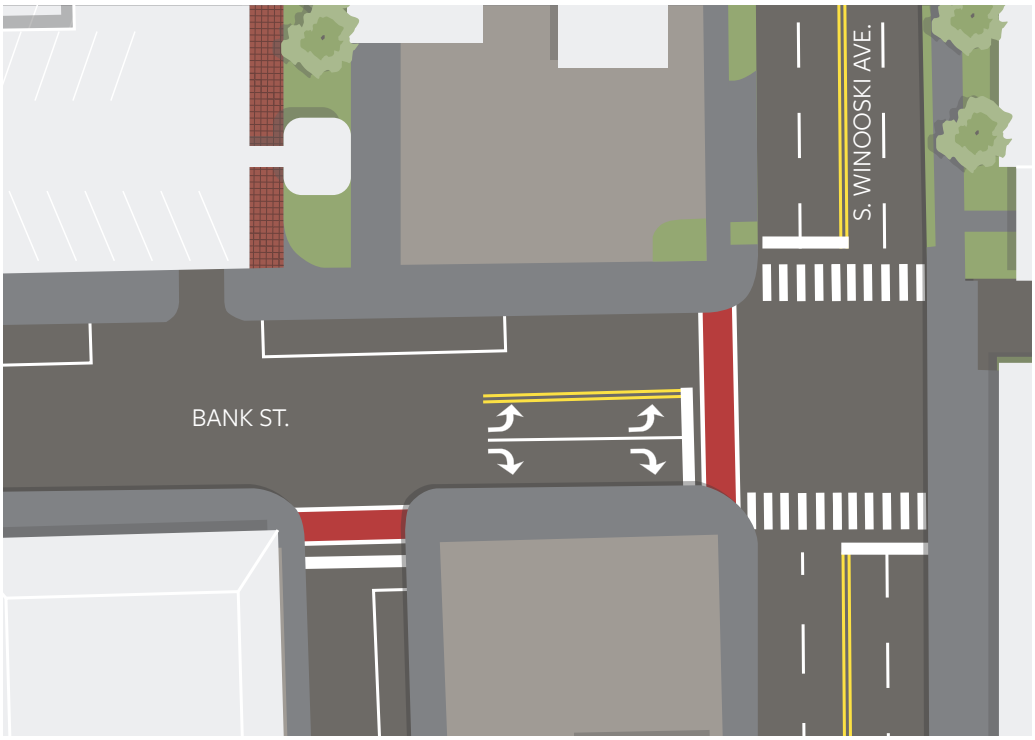


PHASE 2

Phase 2 assumes that over time, South Winooski Avenue will continue to densify, with more compact mixed used buildings. In this land use context, higher volumes of bicycle and pedestrian traffic can be expected. Increased investment in the area may merit more comprehensive street redesign, allowing for wider sidewalks and a protected bike lane. Such a redesign should consider upgrades to enhance pedestrian safety and comfort, such as high visibility treatments at driveways and additional amenities along the widened sidewalk space.

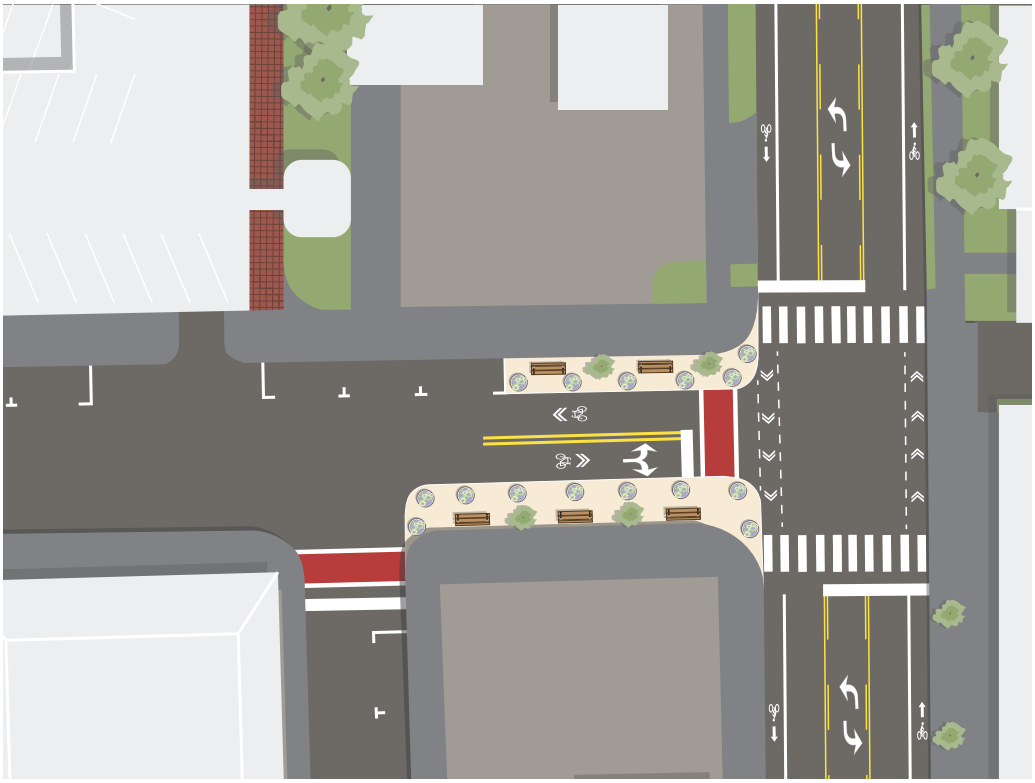
South Winooski Avenue + Bank Street Intersection Upgrades

To support the design changes recommended for S. Winooski Avenue on the previous page, Burlington should re-design the S. Winooski Avenue and Bank Street intersection to improve safety and comfort for people walking and biking. This intersection is one of the top 20 Priority Intersections identified for safety upgrades.



EXISTING CONDITIONS

Today, Bank Street features turn lanes in each direction onto S. Winooski Avenue, resulting in conflicts at the gas station driveway on Bank and at crosswalks on S. Winooski.



PILOT PHASE

Temporary materials such as paint, planters, and potted trees can be used to pilot test curb extensions and other traffic calming measures. In this scenario, the redundant Bank Street gas station entrance is transformed into a pedestrian plaza space, serving as a compliment to existing outdoor dining space at the City Market across S. Winooski Avenue. The pilot can occur with or without the road diet that is shown on S. Winooski Avenue.

OPTION 1

The first option for a permanent upgrade features shared lane markings and expanded pedestrian space on Bank. The intersection is raised and uses special pavers to indicate priority for people walking or biking. This option assumes that W. Winooski features a conventional bike lane, with bike boxes at Bank.

OPTION 2

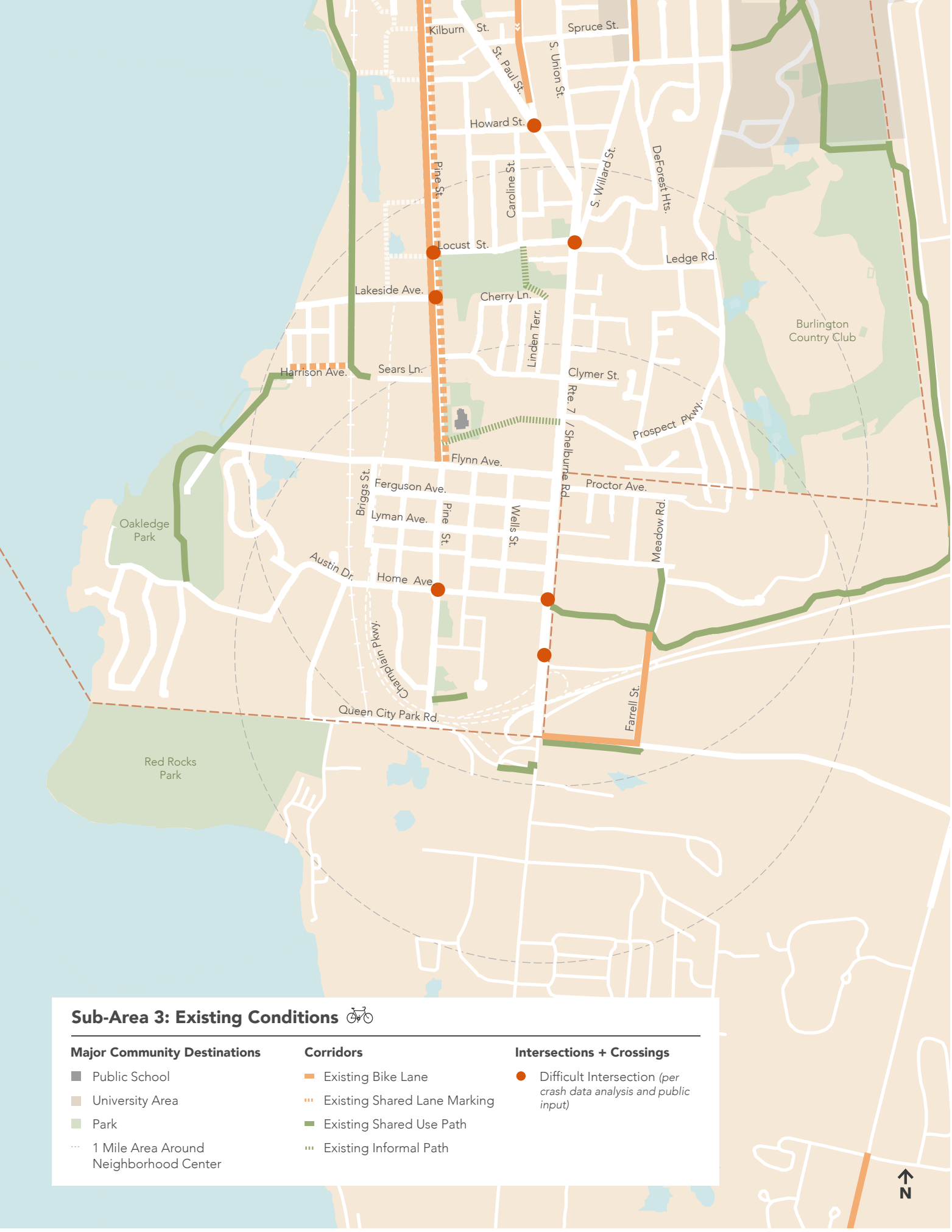
In option 2, S. Winooski Avenue features a protected bike lane. Conflict points (such as the City Market driveway) are marked with green paint so that people driving know to expect bike traffic ahead.

OPTION 3

Option 3 illustrates a full build-out of a shared street on Bank. In this scenario, an entire block of Bank Street is raised up to sidewalk level and treated with special pavers to indicate priority for people walking or biking. Vehicles share this lane but travel at very slow speeds (10mph or less).

SUB-AREA 3: SOUTH END

Note: Dotted white street lines indicate conceptual street connections that have been discussed in other city or regional plans.



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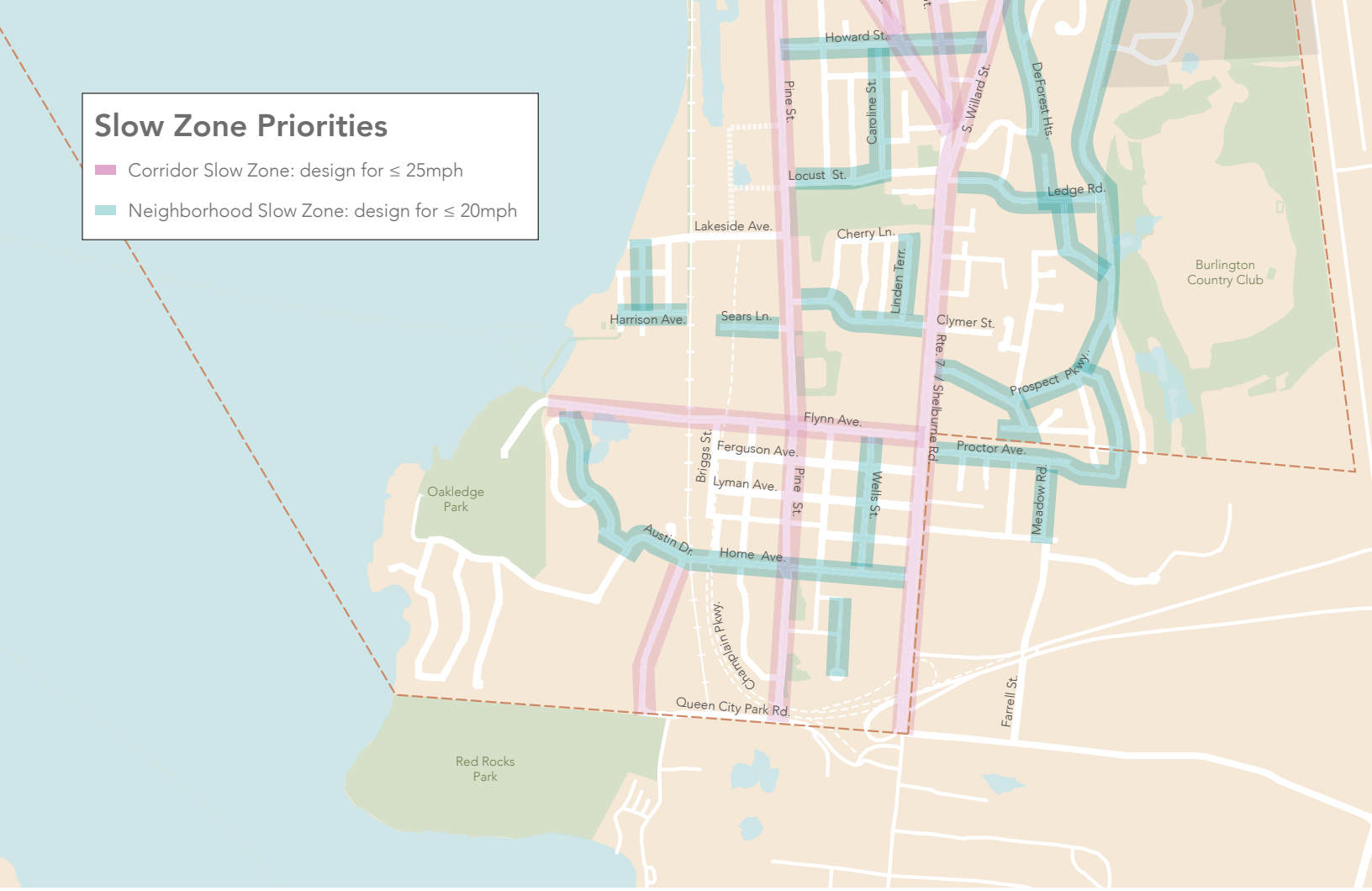


EXISTING CONDITIONS SUMMARY

Beginning in the 19th Century, the South End emerged as an important industrial hub. Especially around Pine Street, the area's architecture and land use patterns reflect a century of industrial land use. Today, many of the South End's commercial buildings are being adapted for a new generation of makers and businesses big and small. The South End accounts for 90% of Burlington's industrial space, and about 30% of Burlington's office space. Though housing is limited, residential neighborhoods are an important part of this sub-area's fabric, from the Five Sisters neighborhood to Red Rocks, and beyond.

Major generators of walk/bike traffic in this sub-area include several large employers (such as Dealer.com), artist and maker studio spaces, and many popular shopping and dining destinations. Major recreational facilities include Oakledge Park, the Island Line Trail, and access to the waterfront.

Pedestrian counts taken by the City of Burlington suggest that more people are walking on Pine Street, a major spine for this sub-area. The number of pedestrians counted has more than doubled in the past 8 years, but the number of crashes involving injuries to people walking or biking has also increased.

The sidewalk network in this sub-area is relatively continuous, but lack of safe crossings are an issue. Both Shelburne Road and Pine Street feature long gaps with no safe crosswalk available. On-street bicycle facilities are almost non-existent. In some areas, residential streets do not connect to the rest of the street grid, making it difficult for residents to walk or bike to neighborhood destinations. A handful of informal foot paths have emerged as a result, such as the well-known cut through at Callahan Park.

Conditions for people walking or biking are particularly poor at the southern end of this sub-area, making it difficult to reach the major commercial destinations South of the city on foot or on bike. The Shelburne Road Rotary is another major pain point for pedestrian and bicycle mobility - though a long-term plan is in the works, many people expressed concern about this intersection, and high levels of frustration with dangerous conditions in the present moment.

12-Month Priority Action List

START NOW!

Ongoing projects to continue:*

1 CHAMPLAIN PARKWAY

This project includes a shared use path, curb extensions, crossing improvements, bike lanes from Kilburn to Main Streets.

2 SHELBURNE ROTARY

This ongoing VTrans Safety Project features a redesign of the Shelburne Rotary. Movement on safety improvements to the rotary is a very high priority for the community. The proposed short-term upgrades proposed on page 124 should be implemented as soon as traffic patterns allow the adjustments.

3 LOCUST STREET AND BIRCHCLIFF PARKWAY WALKABILITY PROJECTS

Install speed tables and new pedestrian crossings along Locust Street and Caroline Street / Charlotte Street. Install a speed table and new sidewalk on the north side of Birchcliff Parkway, between Bittersweet Lane and Cherry Lane.

4 BURLINGTON BIKE PATH RENOVATION (CITYWIDE)

The City is currently working on enhancing the Burlington Bike Path through a multi-phase rehabilitation project led by Burlington Parks, Recreation, and Waterfront. The project proposes the rehabilitation of the approximate 8 mile multi-use path that runs along the Lake Champlain waterfront. Project limits extend throughout the entire city beginning with the southern terminus at the path intersection with Queen City Park Road and extending north to the Winooski River Bridge.

**Note that ongoing project lists include major projects with significant impact to the network of walkable, bikeable streets and intersections. Additional projects are in progress, and these lists are not intended to be comprehensive.*

12-Month Priority Action List

START NOW!

New projects:

5 **AUSTIN DRIVE BIKEWAY**

Restripe Austin Drive to add a 2-way protected bike lanes on north side of street.

6 **BIRCHCLIFF PARKWAY GREENWAY**

Add shared or advisory bike lane markings to Birchcliff Parkway create a greenway, leveraging planned traffic calming treatments.

7 **LEDGE ROAD SHARROW/BIKE LANES**

Stripe an eastbound bike lane and westbound sharrow on Ledge Road from Shelburne to Prospect. Add traffic calming features to slow vehicle speeds.

8 **ADD INTERIM DESIGN CURB EXTENSIONS ALONG PINE STREET**

Using temporary paint/epoxy gravel treatment and planters add interim design curb extensions along Pine Street at Kilburn Street, Marble Avenue, Howard Street, Locust Street, and Flynn Avenue.

9 **ADD SIGNAGE ALONG PINE STREET**

Add “Bikes May Use Full Lane” signs on the east side of Pine Street, north of Flynn Ave.

10 **IMPROVE BICYCLE CONNECTIVITY ALONG PINE ST.**

Eliminate parking to stripe conventional bicycle lanes along Pine Street, south of Lakeside Avenue to the end of Pine.

11 **ADD BIKEWAY MARKINGS AND SIGNAGE TO QUEEN CITY PARK ROAD**

Working with South Burlington, add 5 ft. bike lanes or sharrows on Queen City Park Road as space allows.

12 **IMPROVE SAFETY AT THE PINE STREET AND LAKESIDE INTERSECTION**

Where the existing southbound bike lane on Pine Street crosses Lakeside, add markings to reinforce bike lane along Lakeside and the Cumberland Farms driveway.

Sub-Area 3: 5-Year Action Plan

Major Community Destinations

- Public School
- University Area
- Park
- Area within 5-min. walk of Neighborhood Center

Planned Projects

- Crossing Upgrade - Already Funded for Construction

Existing Bikeways/Paths

- Shared Use Path
- Existing Informal Path
- Conventional Bike Lane
- Shared Use Lane Markings

Proposed Walk Projects

- Recommended New Sidewalk
- 12-mo Intersection or Crossing Upgrade
- 5-yr Intersection or Crossing Upgrade

Proposed Bikeways/Paths

- Shared Use Path
- Protected Bike Lane
- Neighborhood Greenway (includes Traffic Calming)
- Buffered/Conventional Bike Lane
- Advisory Bike Lane
- Shared Use Lane Markings with Traffic Calming
- Potential Path Easement

Note: Dotted white street lines indicate conceptual street connections that have been discussed in other city or regional plans.

LIST OF RECOMMENDED PROJECTS TO BE IMPLEMENTED IN THE NEXT 2-5 YEARS

Please see map on previous page for additional details.

Project Name	Proposed Action
Callahan Park Greenway	Shared lane markings and traffic calming
Flynn Ave Bikeway	Mark and sign bicycle lanes
Home Ave/Pine St Intersection	Consider mini-roundabout and shared lane markings
Howard Street Greenway	Shared lane markings and traffic calming
Linden Terrace Greenway	Traffic calming, shared lanes or advisory bike lanes
Pine Street Bikeway (Queen City Park to Flynn)	Mark and sign bicycle lanes
S. Winooski/Howard/St. Paul Intersection	Consider mini-roundabout or signal phasing changes; high visibility crosswalks, curb extensions with creative materials
Shelburne Road Crossings	Install high visibility pedestrian crossings

Sub-Area 3: Long Term Plan

Major Community Destinations

- Public School
- University Area
- Park
- Area within 5-min. walk of Neighborhood Center

Planned Projects

- Crossing Upgrade - Already Funded for Construction

Existing Bikeways/Paths

- Shared Use Path
- Existing Informal Path
- Conventional Bike Lane
- Shared Use Lane Markings

Proposed Walk Projects

- Recommended New Sidewalk
- 12-mo Intersection or Crossing Upgrade
- Intersection or Crossing Upgrade

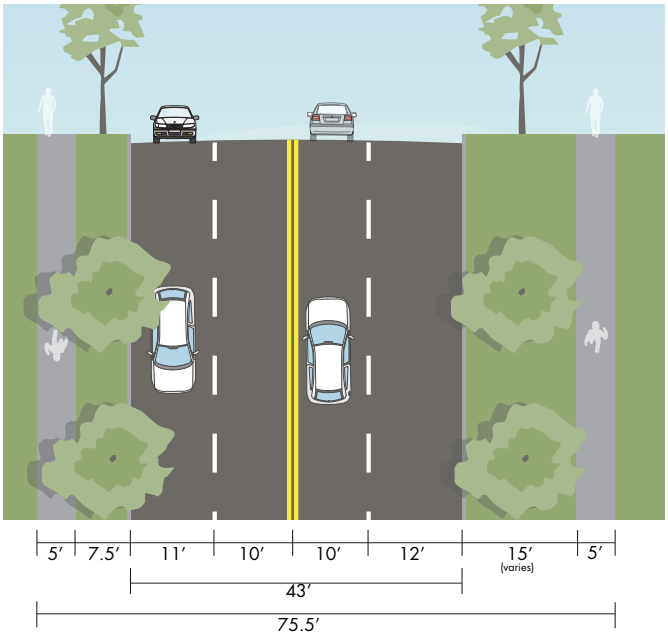
Proposed Bikeways/Paths

- Shared Use Path
- Protected Bike Lane
- Neighborhood Greenway (includes Traffic Calming)
- Buffered/Conventional Bike Lane
- Advisory Bike Lane
- Shared Use Lane Markings with Traffic Calming
- Potential Path Easement

Note: Dotted white street lines indicate conceptual street connections that have been discussed in other city or regional plans.

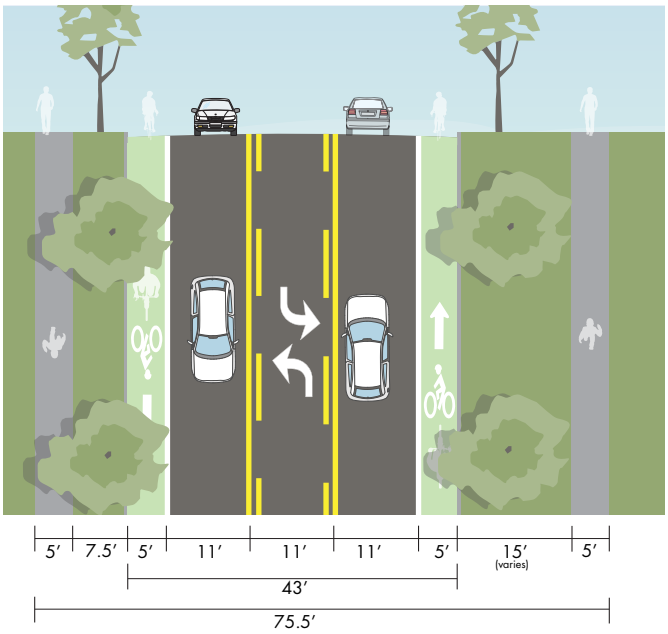
Shelburne Road Bikeway

Shelburne Road is a major north-south spine connecting the City's south end with the downtown core and the commercial centers and highway entrances at the southern edge of the city. Public input and crash data analysis have identified Shelburne Road as an unsafe and uncomfortable place for people biking and walking. The proposals below assume that traffic demand on Shelburne Road is lessened when the Champlain Parkway is opened. These are just a few ideas for Shelburne Road. Existing plans such as the draft PlanBTV South End Plan and the 2011 Comprehensive Transportation Plan for the City of Burlington call for a dedicated multi-modal corridor and land use study for Shelburne. This study should be used to generate more detailed strategies for making Shelburne a more walkable, bikeable, and crossable roadway.



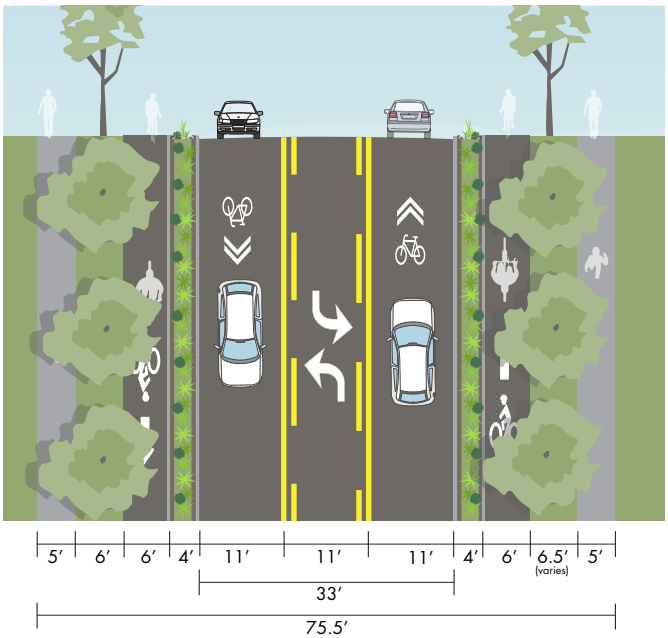
EXISTING CONDITIONS

Shelburne Road features two travel lanes of moderate width in either direction and no dedicated bike facility. Sidewalks are narrow, but are protected by a generous greenbelt and mature street trees. Driveway curb-cuts do create conflict points for people walking on the sidewalk. And, because most people do not feel comfortable riding their bikes in the Shelburne travel lane, sidewalk riding is another threat to pedestrian safety and comfort. Shelburne also features sections of roadways that greatly exceed the maximum recommended spacing between pedestrian crossings.



OPTION 1

Option 1 illustrates the option of providing only one travel lane in each direction, with a center turn lane. Such a shift would allow for a narrow, conventional bike lane in each direction.

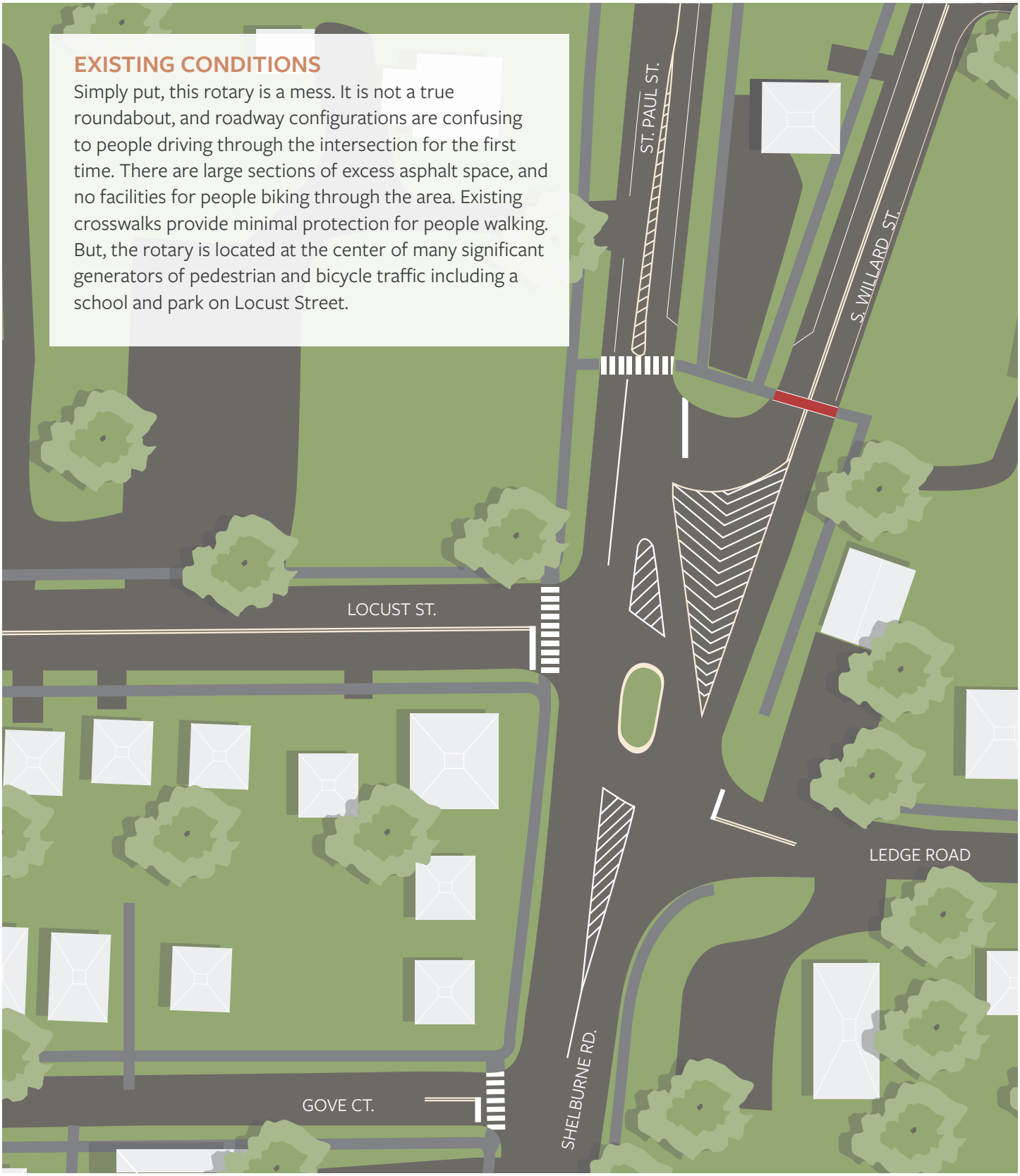


OPTION 2

Option 2 illustrates a more intensive project, in which the existing greenbelts on Shelburne Road are redesigned to feature a planter-protected bike lane in each direction.

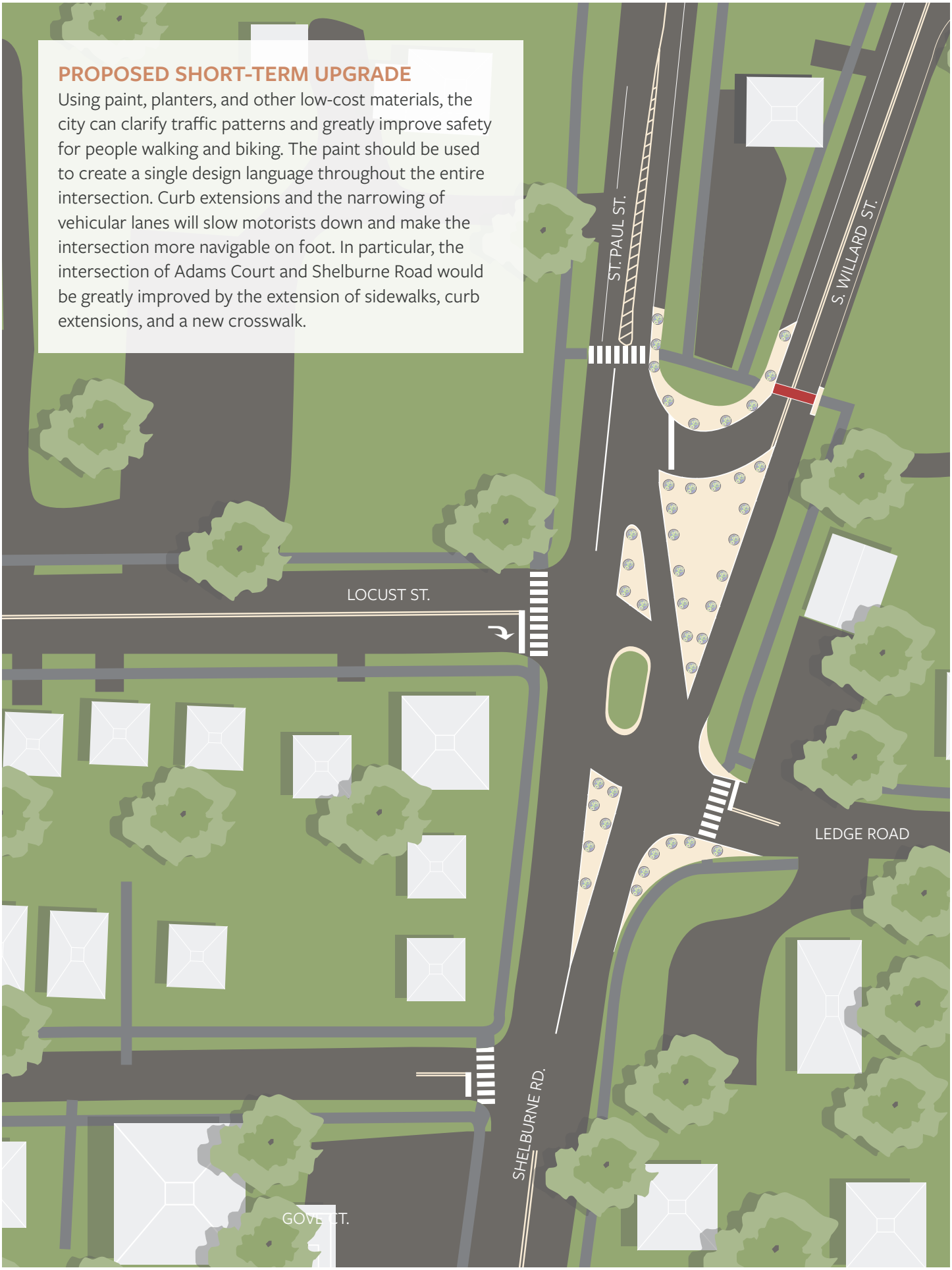
Shelburne Road Rotary

The Shelburne Rd. Rotary was mentioned more often as an area of concern than any other intersection in the City. There is a decades-long project in the works to rethink this space, and everyone is frustrated by the elongated timeline and persistent safety issues. The drawings on the following page illustrate recommends for interim design measures to address safety issues in the near term in response to these concerns.



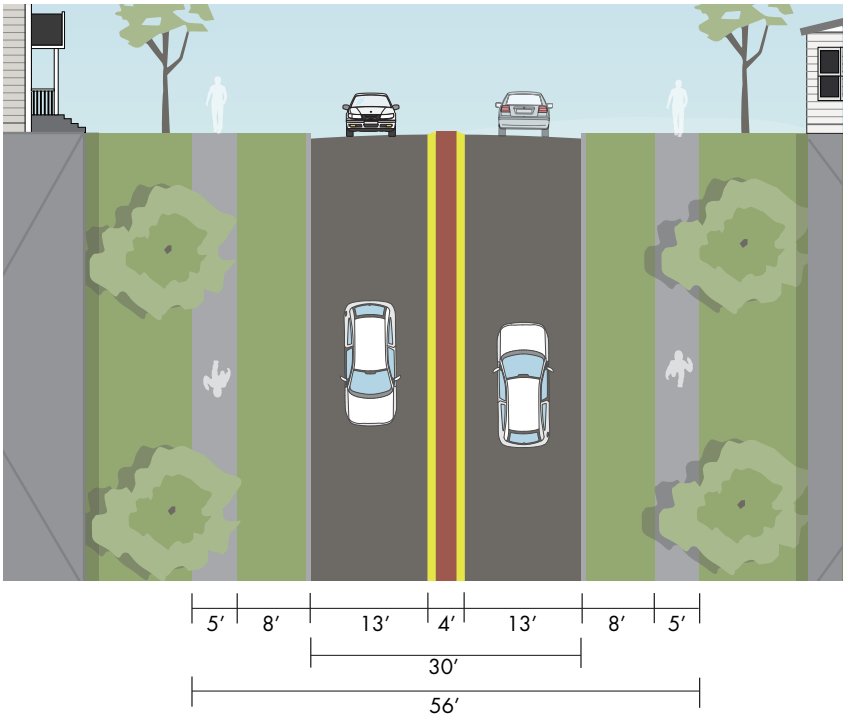
PROPOSED SHORT-TERM UPGRADE

Using paint, planters, and other low-cost materials, the city can clarify traffic patterns and greatly improve safety for people walking and biking. The paint should be used to create a single design language throughout the entire intersection. Curb extensions and the narrowing of vehicular lanes will slow motorists down and make the intersection more navigable on foot. In particular, the intersection of Adams Court and Shelburne Road would be greatly improved by the extension of sidewalks, curb extensions, and a new crosswalk.



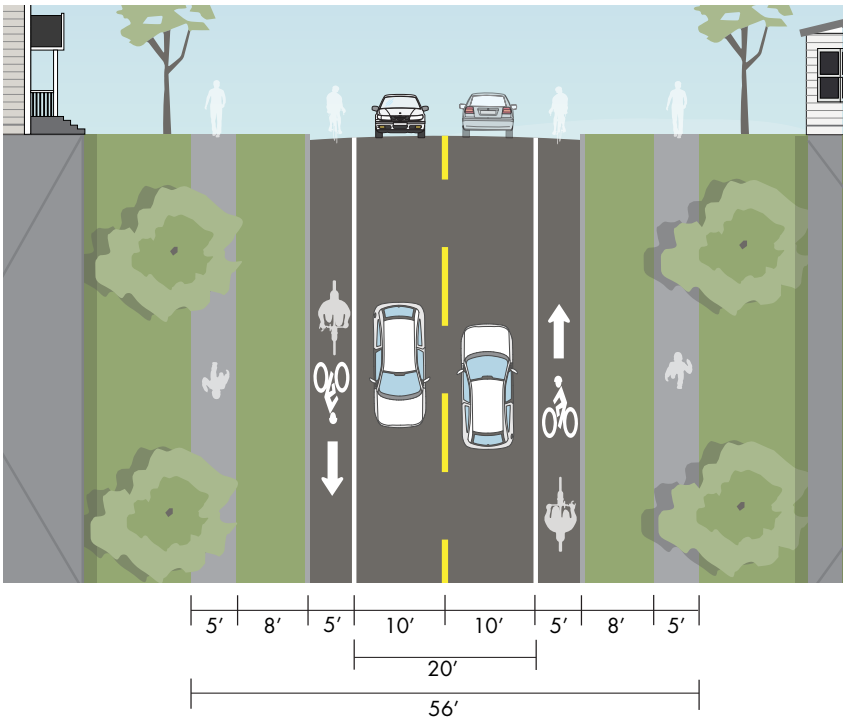
Home Avenue Bikeway

Home Avenue is an important east-west connector in the southern end of Burlington. It provides access between key recreational facilities and trail heads at Oakledge Park to Pine Street and Shelburne Road. The longterm bike network plan proposes a redesign of Home Avenue to create safe conditions for people walking and biking.



EXISTING CONDITIONS

Home Avenue features wide travel lanes in each direction. A narrow median serves to separate cars, but provides no value in terms of pedestrian or cyclist safety. Though sidewalks are narrow, they are protected from vehicle travel lanes by a generous green belt on one side. On-street parking is permitted.

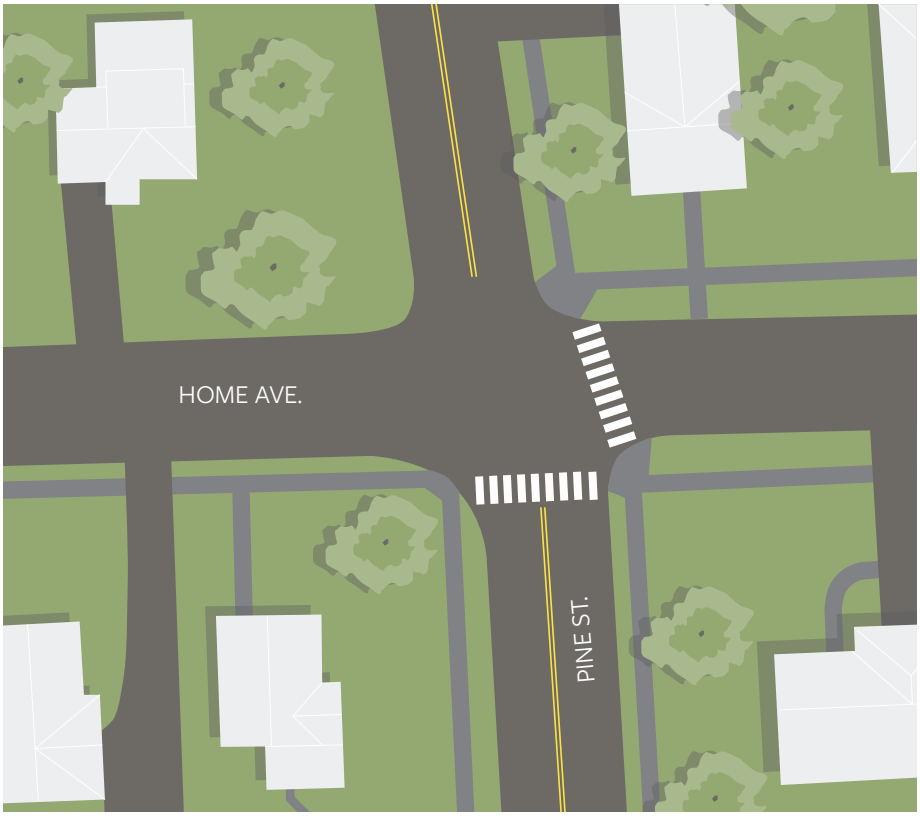


PROPOSED BICYCLE LANE

Calm traffic in both directions by removing parking and narrowing vehicle travel lanes. This adjustment provides space for a narrow bicycle lane in each direction.

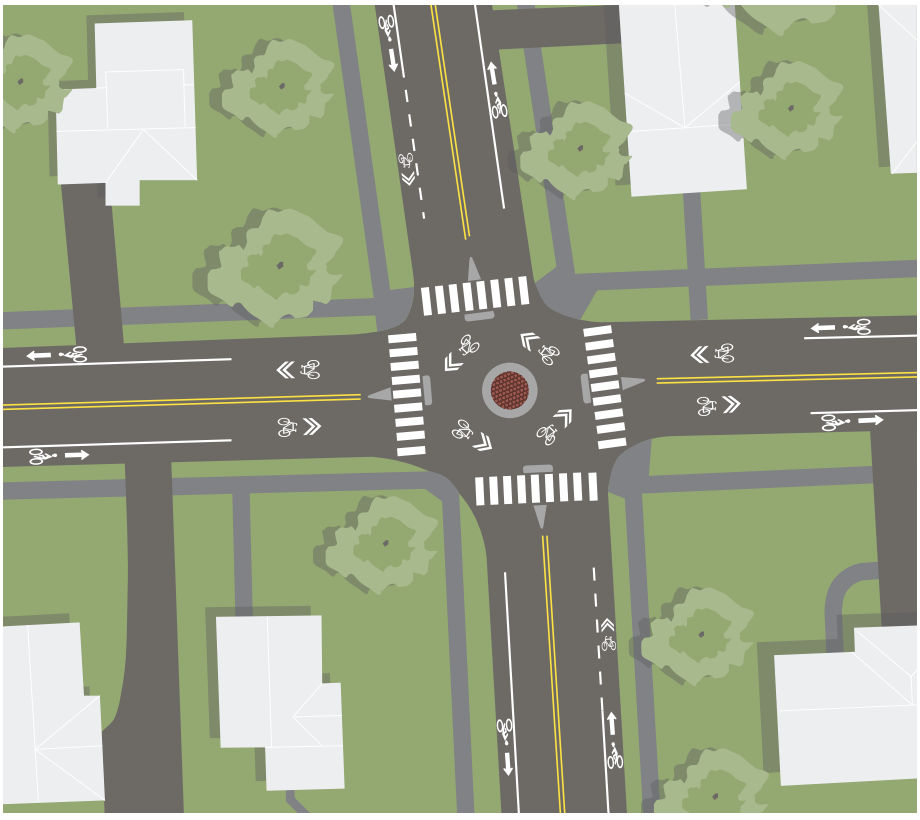
Home Avenue + Pine Street Mini Roundabout

The drawings below illustrate recommended changes to the intersection of Home Avenue and Pine Street, in support of the Home Avenue bike lane recommended on the previous page. This intersection has been identified as one of the top 20 Priority Intersections based on crash data and public input.



EXISTING CONDITIONS

Home Avenue's crosswalk configuration is limited, and it does not provide safe and direct routes to the transit stop on the northwest corner of the intersection. Protection and amenities for people walking are almost non-existent, and there are no bicycle facilities.



PROPOSED ROUNDABOUT

The drawing above illustrates a condition in which the proposed Home Avenue bike lane meets Pine with a mini-roundabout. Upgrades also include median refuge islands for people crossing in all four directions, and shared lane markings throughout the roundabout. Add a sidewalk on the north side of Home Ave.

POLICY + PROTOCOL ACTION PLAN

Not all recommendations in the realm of Engineering can be shown through maps and drawings. This section of the chapter details priority policies and protocols that will support safer streets and more transportation options city-wide.

VISION ZERØ

#1: Adopt a Vision Zero Policy

Adopting a Vision Zero Policy will be an important step in helping Burlington achieve the safety goal of eliminating traffic-related fatalities and serious injuries by 2026.

Vision Zero is an international road traffic safety framework that helps communities work towards the goal of no fatalities or serious injuries in road traffic. Initially developed in Sweden, Vision Zero has been adopted by a growing list of U.S. cities. The U.S. Department of Transportation's Federal Highway Administration has also adopted a Toward Zero Deaths vision statement, setting a framework that even one death in our nation's transportation system is unacceptable. When Sweden first launched Vision Zero, the country recorded seven traffic fatalities per 100,000 people; today, despite a significant increase in traffic volume, that number is fewer than three. (Compare this to the number of road fatalities in the United States, which is 11.6 per 100,000 people).*

Vision Zero Action Plans require a high level of leadership and investment from multiple public agencies. The plans are typically developed collaboratively with a city's transportation or public works department, police force, and Mayor's office at a minimum. Though this document is not Vision Zero Action Plan, it is guided by an ambitious safety goal that falls in line with the Vision Zero framework - creating a pathway to help Burlington eliminate traffic-related fatalities and serious injuries by 2026. In this way, the plan sets Burlington up to formally adopt a Vision Zero policy moving forward. Doing so would require a collaborative effort from the Mayor's Office, Burlington Police Department, Burlington Public Works, and the City Council.

Success Metrics:

- Adopt a Vision Zero policy by 2018.
- Reduce serious crash injuries by 50% and eliminate fatalities by 2026.

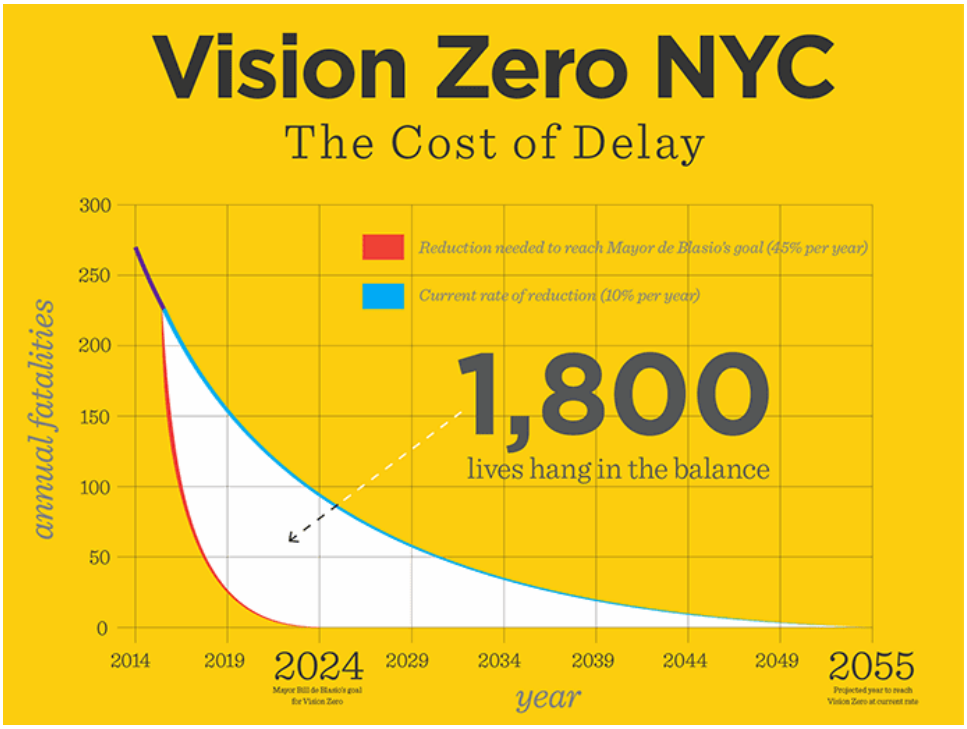
Responsible Parties: City of Burlington Department of Public Works; Burlington City Council, BPD, Mayor

**Source for information about results of Vision Zero in Sweden vs. the United States: CityLab.com "The Swedish Approach to Road Safety", published November 20, 2014.*

THE FOLLOWING U.S. CITIES ARE CURRENTLY UNDERTAKING MAJOR STREET SAFETY INITIATIVES INSPIRED BY THE ORIGINAL VISION ZERO EFFORT:

- ▶ San Francisco, CA
- ▶ New York, NY
- ▶ Chicago, IL
- ▶ Los Angeles, CA
- ▶ Seattle, WA
- ▶ Portland, OR
- ▶ Boston, MA
- ▶ Washington, D.C.
- ▶ San Antonio, TX
- ▶ San Diego, CA
- ▶ Santa Barbara, CA
- ▶ San Mateo, CA
- ▶ Fremont, CA
- ▶ Austin, TX
- ▶ Columbia, MO
- ▶ Tampa, FL
- ▶ Bellevue, WA

In addition to this list, many communities have adopted "Toward Zero Deaths" initiatives, setting a tone that even one death in the transportation systems of our communities is unacceptable. The U.S. Department of Transportation's Federal Highway Administration is one example of an organization that has adopted such a vision statement.



Cost of Delay graphic, from NYC Vision Zero Report Card, by Transportation Alternatives

New York City adopted a Vision Zero Policy in the winter of 2014, setting a 10-yr goal to eliminate all traffic death and serious injuries on the city's streets.

The advocacy organization Transportation Alternatives has produced a report card to track progress towards meeting New York's goal of reaching Vision Zero by 2024. The graph below appeared in the 2015 report card. It illustrates that achieving this goal is not simply about keeping a campaign promise. It is about saving human lives.

#2: Promote the vitality of Neighborhood Activity Centers (NACs) as places that provide essential services.

As noted in the Safe Streets Design Principals, street design is inherently connected to land use. Many Burlington's Neighborhood Activity Centers feature land use that support use of alternative modes, because they provide essential services within walking distances of people's home and/or place of employment. Burlington must continue to promote the vitality of NACs as places that provide essential services. This means creating zoning codes that help keep essential services like drug stores or grocery stores in neighborhoods. It is essential that new development in Burlington uphold a high standard of walkable NACs.

Success Metric/s: [Forthcoming]

Responsible Parties: DPW, Burlington Planning Department, CEDO, Planning Commission, and City Council

#3: Create a placemaking program to incentivize neighborhoods and business owners to create supportive amenities.

Burlington can make walking and biking more pleasant and comfortable by increasing supportive amenities through small-scale placemaking projects including: garden walks, street seats, plazas, parklets, bike corrals, and more. Burlington should create a clear pathway for neighborhoods and businesses to obtain a permission (and even funding) to create such public space amenities on a mid- to long-term basis. Such a policy could build off the Demonstration Project Policy currently in development, but allow for longer term installation of pre-approved project types. Models for such a program exist across the country - from the People St "kit of parts" approach to adding parklets, plazas or bike corrals in Los Angeles to the more loosely defined arts and placemaking Pop-up Providence program in Rhode Island.

Success Metric/s:

- Create and implement a placemaking program by 2018.
- Measure economic gains for business and property owners following installation.

Responsible Parties: DPW, CEDO, Department of Parks, Recreation & Waterfront, and NPAS

Photo by Julie Campoli.

#4: Expand Use of Pilot and Demonstration Projects

City Ordinance allows the Department of Public Works to implement temporary traffic and parking projects on all public streets, making use of short-term or "pilot projects" to evaluate the merits and impacts of proposed street design projects. Currently, pilot projects may be in place for up to 30 days. This time period should be extended to allow for pilots up to 12 months in duration, with the option for the use of more durable (but still removable) interim design measures in the 1-5 year time frame.

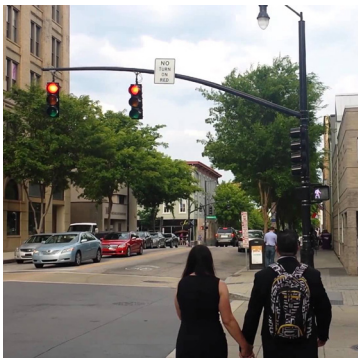
At the shorter end of the time scale, Burlington is working to develop a guide and policy to make it easier for everyday residents, advocacy organizations, and community groups to spearhead 1-7 day "demonstration projects" alongside DPW and other agencies. Burlington should continue the momentum around the use of trial installations once the demonstration project policy is formally approved, and commit to amending the approved project types in the policy every year.

Finally, Burlington should expand opportunities for online citizen input and engagement through existing platforms such as SeeClickFix. The Burlington Police Department is currently planning to expand its use of SeeClickFix for citizen input about abandoned bikes, safety issues, and more. A small group of current users could be engaged in a task force to help identify and structure opportunities for effective use of this platform.

Success Metrics:

- Continue to use pilot projects to inform decisions about walk/bike projects, and expand the pilot project time frame by 2018
- Approve the Demonstration Project guide and policy and update it every year, as needed.
- Create a task force to identify better use of SeeClickFix in collaboration with BPD.

Responsible Parties: City of Burlington Department of Public Works; Burlington City Council, BFD, BPD, residents and community groups



Lead pedestrian interval. (Photo by Leo Suarez.)

#5: Pass and Enforce Bicycle/Walk-Friendly Laws and Ordinances.

Top priorities include:

- Adopt the Idaho Stop Law - a law that allows cyclists to treat a stop sign as a yield sign and a red light as a stop sign. This law would also allow cyclists to proceed cautiously through a red light phase at T-Intersection.
- Absent of dedicated bike signal heads, amend city ordinances to allow people riding bicycles to cross through an intersection with pedestrian signals.
- Establish pedestrian priority at all signalized crosswalks, adjusting signal timing to provide advance pedestrian phasing. Throughout Burlington's downtown core and in high-foot traffic areas (such as UVM, and North Street), pedestrian crossings should be timed to cycle through automatically, without the need for push-button activation.

Success Metric: Police expend precious resources on top-line offenders (dangerous driving, dangerous cycling etc.)

Responsibility: Department of Public Works, City Council, BPD, State of Vermont, Local Motion and other advocates.

Photo by CCTA.

#6: Improve integration of cycling and bus travel.

CCTA has undertaken a number of initiatives to integrate bike travel with public transit. CCTA buses are equipped with easy to use bike racks which hold 2 bikes each. CCTA also provides bike lockers at the Waterfront and has installed bike racks around the region. The following actions would continue this great momentum and create a stronger link between bikes and buses:

- Install additional bicycle parking at the bus stops with highest boarding volumes;
- When opportunities arise, replace current two-bike capacity bicycle racks on buses with three-bike capacity racks.

Success Metric/s: [Forthcoming]

Responsible Parties: CCTA, with funding partners

#7: Improve pavement markings at bus stop conflict points

Where bicycle facilities intersect with bus stops, high-visibility pavement markings can make conditions safer for people biking. Burlington should focus on adding high-visibility bikeway markings to existing bike facilities at the bus stops with highest boarding volumes. And, as new facilities recommended in this chapter are implemented, high visibility pavement markings should be used to make sure people on bikes are expected and respected along the roadway.

Success Metric/s: [Forthcoming]

Responsible Parties: DPW, CCTA

WINTER CYCLING ACTION PLAN

- **COORDINATES:** 44.4758° N, 73.2119° W
- **WINTER SEASON:** November - April
- **AVERAGE SNOWFALL:** 81 inches (7ft. 9 in.)
- **# SIDEWALK SNOW PLOWS:** 12
- **TWITTER HANDLE:** @BTVSnowDragon

Minneapolis. Montreal. Copenhagen. Oulu. (Yes, Oulu.... it's in Finland and they love winter cycling there). Many of North America's -- and indeed the world's -- best cycling cities are located at latitudes that, like Burlington, experience harsh winter weather. These cities and many of their wintry peers have achieved success through investment in thoughtfully designed infrastructure and municipal policies that strive to make winter cycling as comfortable, safe, and enjoyable as skiing down a perfectly groomed run at Stowe. With so many great examples and recent innovation, Burlington's winter climate should not be viewed as a barrier to cycling, but as an opportunity to embrace the season as any skier, snowshoer, or ice skater does when the temperature dips below freezing.

The following 9 policy/protocol recommendations outline how to jump-start a winter cycling action plan. The goal is to ensure that Burlington's emerging bikeway network is maintained to the highest standard possible all year so that the city's past and future investments in cycling return as much benefit as possible. While these recommendations aren't comprehensive, they provide an initial pathway towards the city and its residents embracing winter cycling.

#1: Formalize winter bikeway maintenance into Burlington's existing snow removal/ maintenance hierarchy plan so that a grid of connected winter bikeways is maintained throughout the city, including select shared use paths.

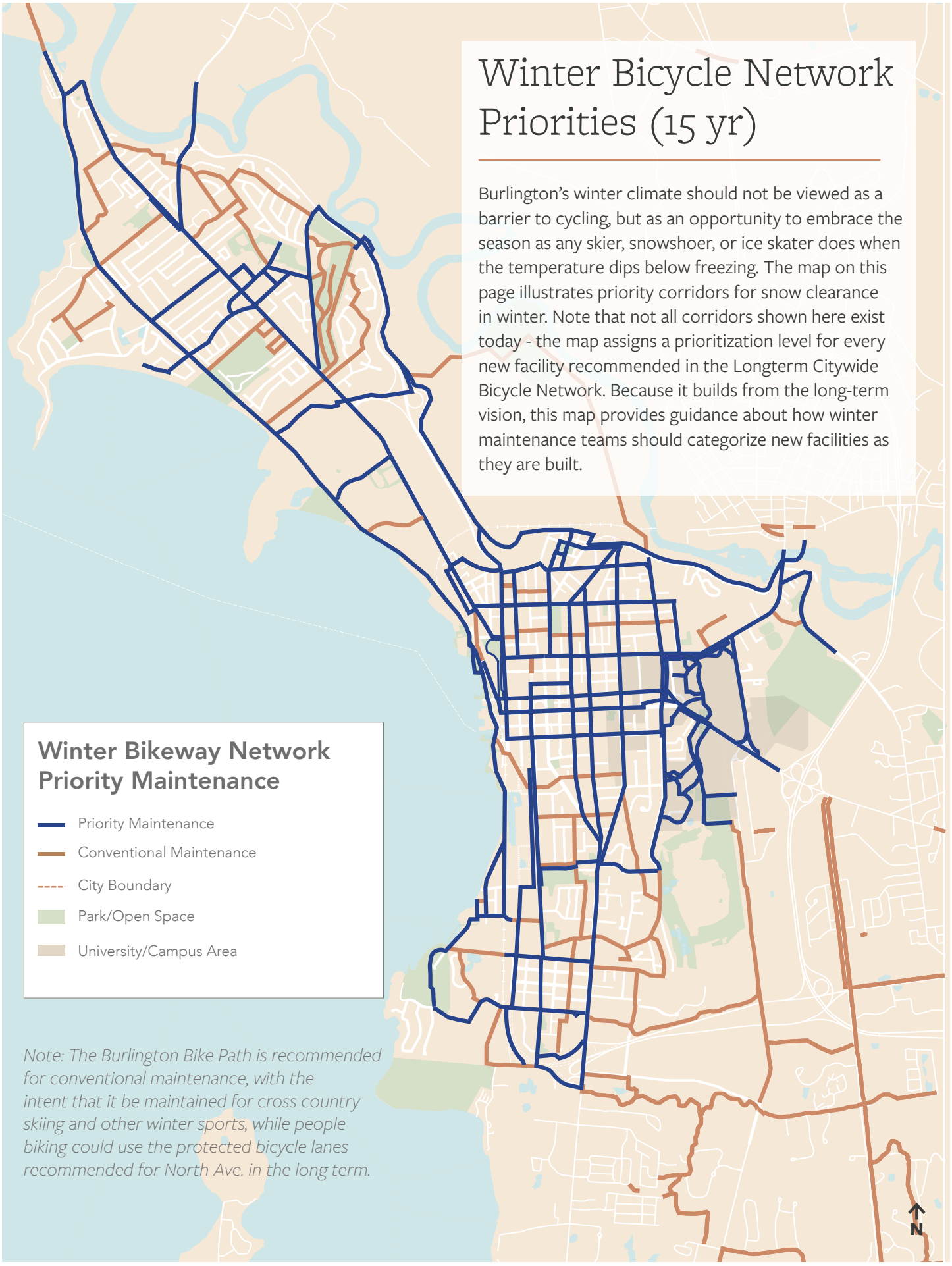
Burlington's snow removal protocols already prioritize regional thoroughfares, downtown streets, school zones and crossing guard locations for sidewalks and crosswalks. At a minimum, it is recommended that the same priority be afforded to all existing and future bikeways located within these priority locations. In addition, select streets and paths that link the city's most densely populated areas with common destinations like schools, UVM, and downtown should be included in a formal priority winter cycling grid maintenance plan. General recommended priorities are listed on the map on the following page.

Success Metric: Formalize Burlington's unofficial winter cycling maintenance plan by 2017.

Responsibility: Burlington Public Works Department

Winter Bicycle Network Priorities (15 yr)

Burlington's winter climate should not be viewed as a barrier to cycling, but as an opportunity to embrace the season as any skier, snowshoer, or ice skater does when the temperature dips below freezing. The map on this page illustrates priority corridors for snow clearance in winter. Note that not all corridors shown here exist today - the map assigns a prioritization level for every new facility recommended in the Longterm Citywide Bicycle Network. Because it builds from the long-term vision, this map provides guidance about how winter maintenance teams should categorize new facilities as they are built.



Note: The Burlington Bike Path is recommended for conventional maintenance, with the intent that it be maintained for cross country skiing and other winter sports, while people biking could use the protected bicycle lanes recommended for North Ave. in the long term.

#2: Experiment with new winter maintenance techniques for heavily used shared use paths.

Rather than attempting to scrape shared use paths down to the asphalt and limiting other winter activities, like snowshoeing, Burlington's Parks Department maintenance crew should consider building up and then maintaining a consistent layer of packed snow that lasts all winter long. Such conditions actually work well for winter cycling (without needing special tires or other equipment). And like surrounding ski resorts, creating an established base will then only require routine maintenance following a snowfall event. If the top layer gets too thick (More than 2 inches maximum) city crews may scrape it down to an acceptable depth and allow not only cycling, but other winter activities like cross-country skiing and snowshoeing to occur. This approach could be experimented with along segments of the Burlington Bike Path.

Success Metric: Develop a refined shared use path winter maintenance plan by 2017.

Responsibility: Burlington Public Works Department and Parks and Recreation Department

#3: Continue to design/retrofit streets to include sufficient space for snow storage.

When building new (rare) or retrofitting existing streets (less rare), provide enough space for snow storage either within a bikeway buffer or within the greenbelt. A 3 foot storage space is an accepted minimum, while 8 feet will accommodate heavier snowfalls, prolonged storage, and minimally impact the bikeway. If adequate space is not available, an alternate snow removal and storage plan should be put into effect.

Success Metric: All new and reconstructed streets incorporate snow storage space in greenbelt or bikeway buffer / barrier.

Responsibility: Burlington Public Works Department

#4: Develop and then educate the city's winter maintenance team about specific bikeway infrastructure plowing techniques

This plan recommends a variety of new bikeway designs not presently used in the City of Burlington. Some, like neighborhood greenways, require little to no additional plowing/storage methods as they simply make better use of existing travel lanes, while others, like physically protected bikeways, will require a modified or new approach. For example, Montreal's Rue Rachel two-way protected bikeway is separated from traffic by a tree lined median, which requires plows to avoid tree damage by plowing snow straight to the nearest intersection where an intersecting plow then moves the snow pile to an alternate storage area on the intersecting street.

Success Metric: Bikeways within the priority winter network are maintained to the same standard as priority streets and sidewalks.

Responsibility: Burlington Public Works Department

#5: Use pilot/interim design treatments for winter street flexibility and plow operator visibility

Certain segments of Burlington's protected bikeway network will be expanded using pilot/interim design treatments. Some types of physical buffers (armadillos, plastic bollards, and vertical delineators may cause challenges for plow operators and should be removed during winter months so that the cleared buffered may be used for snow storage. This storage area may be shaped as a barrier protecting the bikeway barrier. As temporary design transitions to more permanent curb and concrete, new vertical delineators that exceed average snowfall totals to communicate to plow operators where protected bikeway medians, curb extensions, and other elements that cannot be removed for the winter months exist.

Success Metric: Interim design successes/failures inform permanent snow storage design and damage is minimized to permanent safety upgrades.

Responsibility: Burlington Public Works Department

#6: Pilot and evaluate a range of pavement marking methods to decrease maintenance costs.

Snow plows, salt, and gravel can do a lot of damage to pavement markings. In order to preserve those marking bikeways, crosswalks, and general road markings, the City of Burlington should experiment with a range of treatments / marking types to see which decreases maintenance costs the most. In Minneapolis, the use of recessed thermoplastic markings proved to be more expensive on the front end, but also more effective and less costly in the long run as it reduced damage resulting from snowplows. Burlington should test a few different corridors with a range of treatments and evaluate successes and failures to inform an official policy by 2020.

Success Metrics: Various Pilot tests reveal a cost effective approach that reduces long-term maintenance costs by 2021.

Responsibility: Burlington Public Works Department

#7: Apply de-icing materials to bikeways in priority winter network in advance of a predicted snowfall exceeding 3 inches; Experiment with alternative de-icing materials.

At present, Burlington's de-icing process begins before small storms even hit, or during or after sidewalks have been plowed during a larger storm event. For bikeways, a de-icing strategy should have the de-icing material applied to the roadway approximately two hours before the snow event. Following the snow, the street should be cleared and additional de-icing material added as necessary. The advantages of a proactive approach are that less de-icing material and plowing is needed overall. In addition, alternative de-icing materials, like beet juice and cheese brine, help rock salt adhere to the roadway, offers a lower freezing temperature than regular brine, helps with skid control, and is more environmentally friendly than other salt or gravel materials. This approach also offers a cost savings, as it requires lower expenditures than using a conventional rock salt.

Success Metrics: Cost savings, less environmental damage, and better conditions for all modes following a snow event.

Responsibility: Burlington Public Works Department

#8: Evaluate and increase winter cycling retention rates.

Most cities experience peak cycling in the warmer winter months. Burlington should strive to increase winter cycling rates, which is an opportunity to further define the city as an attractive hub of outdoor physical activity, no matter the season.

Success Metrics: Achieve 20% winter cycling mode retention rates by 2021, 40% by 2026.

Responsibility: Burlington Public Works Department, Local Motion

#9: Expand winter cycling resources on City website.

Burlington should develop a winter cycling web page that offers resources such as the winter cycling map, maintenance policies, and education/encouragement resources aimed at inspiring city residents to give winter cycling a chance.

Success Metrics: Growth in web page hits; increased winter cycling retention rates.

Responsibility:


TREK

BICYCLE PARKING ACTION PLAN

Bicycle parking is critically important to supporting cycling as a viable mode of transportation.

Improving bicycle parking options for both short and long-term use is critically important to supporting cycling as a viable mode of transportation in Burlington. In recent years the City has increased bicycle parking supply by adding bicycle lockers to the Marketplace Parking Garage, offered property owners and retailers short-term bicycle racks at a subsidized rate, and provided Bicycle Parking Guidelines to ensure quality facilities are installed as properties are (re)developed. The City has also worked with local artists to provide unique artistic bike racks, and two in-street bicycle corrals, which provide approximately 12 bike parking spaces where a single car used to park. Finally, Burlington's City Green Employee program has set an example for other employers in the community by providing access to a fleet of city owned bikes and indoor bike parking for employees and visitors.

These advancements are a great start, yet a cursory analysis of Burlington's cycling "hot spots" (downtown, South End, UVM/Champlain College, Old North End etc.) reveals that supply is not meeting the current and coming demand that will result from continued investment in cycling infrastructure. And without an increase in supply, quality, and type, it will be difficult for Burlington to obtain the bicycle mode share goals set forth in this plan. Thus, a more robust approach must be taken to accommodate cycling growth, including adding high-capacity indoor bicycle parking facilities, especially in downtown Burlington and on the UVM and Champlain College Campuses.

The goal of the following recommendations is to support cycling through the provision of more high quality, plentiful, and visible bicycle parking options that serve residents and visitors for years to come. These bicycle parking recommendations are intended to address needs citywide but will ultimately be implemented at the block and individual building level. These recommendations must be calibrated and subject to site analysis before each installation is completed so that bicycle parking remains convenient, placed properly in the right-of-way or within the building in which it is located. They should also be revisited regularly as Burlington's bicycle mode share increases.

The Engineering Action Plan at the start of this chapter identifies better bike parking as a priority. This section provides details about specific steps the should be taken to improve and expand bicycle parking citywide.

#1: Add more high-capacity bicycle parking facilities

Update the city's existing bicycle parking guidelines to include on-street bicycle corrals, bicycle shelters, and bicycle rooms/stations. Create an easy pathway for interested property or business owners to co-sponsor (and/or request) bicycle corrals/shelters as an option through Burlington Public Works' parking assistance program in select high demand areas, such as popular bars/restaurants, retail shops, civic sites, and site triangle visibility zones. Work with key downtown property owner(s) and UVM / Champlain College to develop at least two high-capacity indoor parking "stations", with amenities such as showers, lockers, and basic bicycle repair tools / supplies, and locate them with close proximity to transit.

Success Metrics: Bicycle parking guidelines are updated within 12 months of the adoption of this plan; A high-capacity "station" is built within 3 years of plan adoption. See additional metrics related to bike parking on page 58 of this plan.

Responsibility: Department of Parks, Recreation, and Waterfront, and through a Public-Private Partnership framework including Burlington Department of Public Works, NPAs, local non-profits, institutions and business owners.

Classic non-conforming "wheel bender" rack. Photo by VeloBusDriver, Flickr.

#2: Remove non-conforming bike racks

Remove any/all existing non-conforming bike racks (wheelbender rack, wave rack, etc.) within the public-right-of-way or within or adjacent to public buildings (schools, government offices etc.) and replace the recommended bike park parking types included in Burlington's Bicycle Parking Guidelines and this plan (shelters, corrals). The Department of Parks, Recreation & Waterfront is a key parter; the Department is actively working to standardize bike parking within parks and insure that high-quality racks are available in every park.

Success Metric: Non-conforming racks are removed and replaced within 1-3 years from the adoption of this plan.

Responsibility: City of Burlington Department of Public Works; local schools; Department of Parks, Recreation & Waterfront

#3: Add more art racks

Create an easy pathway for interested property or business owners to work with artists and non-profits (Local Motion, SEABA, Burlington City Arts etc.) to sponsor and add artistic bike racks. Focus on schools, parks, civic institutions, and the South End arts district as priority receiving areas.

Success Metric: New racks are rolled out over the course of 1-5 years following the adoption of this plan.

Responsibility: Public-Private Partnership framework including Burlington Department of Public Works, Burlington City Arts, NPAs, local non-profits, institutions, artists, and business owners.

#4: Revise Bicycle Parking Ratios

Section 8.2.1 of Burlington's zoning code and the companion Bicycle Parking Guide currently require short- and long-term bicycle parking to be provided whenever property is (re)developed. While this ensures that new bicycle parking is added, current parking is already inadequate for meeting demand, to say nothing of future bicycle parking demand. So-called "hot spot" locations -- those with frequently oversubscribed bicycle racks -- may be replaced by in-street bicycle corral or shelters, however demand for long-term parking within existing buildings is also needed as more Burlingtonians take more trips by bicycle. The following bicycle parking ratio requirements should be adjusted.

Success Metric: Ratio guidelines are revised within 2 years of the adoption of this plan.

Responsibility: City of Burlington Department of Public Works; Planning and Zoning Department.

GENERAL UPDATES

- Revise Chapter 8, section 8.2.2 of Burlington's zoning code to allow long-term bicycle parking serving multiple uses or buildings to be pooled into a single area, enclosure or facility if located within close proximity of all the buildings it serves.
- Make clear that any bicycle parking space that meets the requirements for both long-term bicycle parking and short-term bicycle parking may contribute to the minimum requirement for one type or the other, but not both.
- If a property owner cannot meet the requirements for bicycle parking on-site, the owner must contribute to a dedicated Public Bicycle Parking Fund (not just capital general fund) for the city to provide additional public spaces where supply/quality is not sufficient.
- Bicycle parking ratios and requirements should be reviewed at least every five years.

SPECIFIC UPDATES

- For more accurate supply/demand residential building, establish long- and short-term bicycle parking provision as function of total bedrooms, not units, and add a baseline minimum number of spaces per building, no matter the unit total.
- Increase short- and long-term residential bicycle parking supply requirements for Fraternity, Sorority, and Dormitory uses, with a minimum number of spaces provided for each category.
- Increase short- and long-term bicycle parking requirements for Office uses, including medical/dental; improve supply/demand accuracy by requiring short-term parking ratios to utilize a square footage calculation while long-term parking ratios should be calculated using the number of current or anticipated employees; explicitly require a minimum number of spaces provided for each short- and long-term parking category.
- Improve short and long-term parking supply/demand requirements for Retail/Restaurant by using 1,000 square foot increments for short-term parking ratios; long-term parking ratios should be calculated using the number of current or anticipated employees; explicitly require a minimum number of spaces provided for each short- and long-term parking category.
- For Industrial, Manufacturing, Production, or Warehousing uses, peg long-term bicycle parking requirements to be the number of employees, not the amount of square footage; explicitly require a minimum number of spaces provided for each short- and long-term parking category.
- Increase the long- and short-term bicycle parking supply for non-residential university buildings
- Increase and improve supply/demand accuracy by requiring short-term Community Services bicycle parking to be a function of square footage ratio, while long-term ratios should be tied to the number of employees; explicitly require a minimum number of spaces provided for each category.
- Increase short- and long-term bicycle parking requirements for Medical uses, including medical/dental; improve supply/demand accuracy by requiring short-term office ratios to use square footage ratios and long-term office ratios to be pegged to the number of employees; explicitly require a minimum number of spaces provided for each category.
- Increase short-term bicycle parking requirements for Places of Worship; explicitly require a minimum number of spaces provided for each parking category.
- Increase the number of long-term bicycle parking spaces required for automobile parking lots/garages; require short-term bicycle parking be provided along the perimeter or within a single parking space of a parking garage or surface parking lot.

BEYOND INFRASTRUCTURE

Five More Methods for Improving Walking and Bicycling in Burlington

For definitions of the "6 E's" framework guiding this plan, please see page 49.

Thus far, much of this plan is devoted to infrastructure-related recommendations. But, we can't stop there. If Burlington is going become the best small city for walking and biking on the East Coast, we must continue our community's excellent momentum in other key areas such as education, encouragement, enforcement, evaluation and equity. This section of the plan provides recommendations for actions that fall into one of these other important categories.

It is important to note that nearly all recommendations in this section require a collaborative effort between DPW and other city agencies, Neighborhood Planning Assemblies, non-profit organizations, and local businesses and residents. DPW cannot implement these recommendations without support and leadership from a network of strong and willing partners.

EVALUATION + PLANNING ACTION PLAN

As Burlington's first citywide plan devoted to walking and biking, this document alone represents an important milestone in the realm of evaluation and planning. Adoption of the mode share target outlined in the Vision and Goals of this plan will help propel recommendations into reality. Below are a series of additional priority actions recommended in the realm of evaluation and planning.

#1: Increase City Capacity for Walk/Bike Project Planning, Implementation, and Evaluation.

DPW and other agencies are committed to making Burlington a better place to walk and bike, but limited staff resources are an impediment to the fast progress residents want and deserve to see. Burlington should hire at least one person this year to increase city capacity for planning, implementation, and evaluation of walk-bike projects. This staffer should work closely with the Burlington Walk Bike Council and the Safe Streets Collaborative to move projects forward and improve data collection efforts (more on that below). It may be appropriate to create a small, focused Committee with members of these two groups to coordinate strategies and messaging, and create a shared framework for action. The Committee should include at least one representative from each major interested sector including: health organizations, community centers, educational institutions, walk-bike organizations, police, etc. The City should also look to hire a second staff person within a year whose primary focus is getting rapid implementation safety projects on the ground.

Success Metric: Hire at least 1 additional full-time staff person by 2017, and a second person by 2018.

Responsibility: Department of Public Works

#2: Create a "data dashboard" of key metrics and evaluate progress towards alternate mode goals.

Data collection must go beyond the U.S. Census' Journey to Work report and existing crash reporting protocols. Burlington and CCRPC should launch a collaborative effort to improve data collection and create a new "dashboard" of data to evaluate progress towards alternate mode goals. Components of the dashboard could include:

- Detailed mode share data region-wide, including area of residence in the city and demographic information (gender/age, etc.)
- Bicycle volume estimates for the city and region
- Before and after bicycle volumes on streets that undergo improvements
- Sales data for commercial establishments on streets that undergo improvements
- Walk/bike to school numbers
- Infrastructure improvement summaries (miles of bikeways, intersections improved, number of bicycle parking spaces added to public right of way, etc.) by facility type. For example: In 2017, Burlington gained 4.2 miles of new bikeways, 1.3 of which are protected. etc.
- Detailed crash data, with a focus on responding to problem intersections. (See the Enforcement section for more recommendations related to crash data collection.)

A major role of the additional staffers recommended previously could be to manage data collection and evaluation efforts. Key tactics for improving data collection:

- Use automated counters to conduct annual cyclist volume counts on key corridors. Resources for such counts may be available through the National Bicycle and Pedestrian Documentation Project.
- Partner with advocacy organizations and universities to host manual walk/bike counts during Bike Month. On priority corridors use intercept surveys to measure how people arrive at key commercial or employment destinations. Use the results to inform infrastructure design decisions.
- Work with BPD to improve crash data collection (see page 150 for more). Then, expand efforts to evaluate crash data at problem intersections and create site-specific action plans to improve safety quickly with interim design projects.

Success Metrics:

- Use the Engineering Action Plan in Chapter 3 and the recommendations in this plan as well as the County-wide bicycle plan to create a data dashboard, with a regional work plan for collecting, tracking and updating the data each year. The dashboard should be created in a format that can be easily accessed by the public, as well as city staff and local officials.
- Produce a short annual report showing success/failure in identified areas (lower crashes, less injuries, more people biking, including women etc.) Annual report should be made publicly available each year.
- Use the Data Dashboard to evaluate progress advancing the recommendations in this plan, beginning 2 years from final publication of the document.

Responsibility: DPW, CCRPC, VTrans, Local Motion, BWBC, local Universities.

EDUCATION ACTION PLAN

Burlington benefits from a strong base of educational programs focused on active transportation. The "Go for Gold" Blueprint notes that schools and non-profits are already doing great work to help a wide cross section of people gain the skills and confidence to ride a bicycle, or walk to school. The priority actions below provide recommendations for building on existing momentum and taking it to the next level.

www. crashnotaccident.com

#1: Change how Burlington talks about traffic injuries & fatalities.

Safe streets advocates around the nation have begun pushing government agencies, law enforcement officials, and media outlets to change the way they talk about traffic crashes. For decades, we've talked about "accidents" caused by "out of control cars". Though it seems like a small matter, such language and passive voice framing reinforces a culture of inaction around unsafe streets. The reality is that traffic crashes are fixable problems caused by unsafe driving and dangerous streets. Building from existing resources from the Vision Zero Network and other advocates, Burlington should launch an inter-departmental pledge campaign, urging people to commit to using the word "Crash" instead of "Accident" moving forward. (For an example see: www.crashnotaccident.com)

Success Metrics:

- Secure a "Crash not accident" pledge commitment from at least 1 representative of all local media outlets and blogs, 100% of Department Heads in affected departments
- Removal of "accident" from official city documents and replaced with "crash" moving forward - ex. crash report, not accident report.

Responsibility: BPD, Mayor's office, BWBC, Local Motion, CCRPC, VTrans, Major Institutions are all key partners.

#2: Design and launch a broad reaching bike skills training and bike lock/safety gear distribution initiative.

Local Motion is currently working with UVM to offer free bike skills workshops for students, with free helmets, lights, locks, and pizza as an incentive to attend. Bike Recycle Vermont offers similar courses to their customers. The City should support expansion of this type of educational programming, in partnership with other organizations, such as community and youth centers. Such workshops would allow educational programming to reach groups who are currently underrepresented in active transportation circles, such as older adults and low-income residents.

Success Metrics:

- Reach 100 people per year
- Increase in bicycle mode share. (See Vision and Goals section of this plan.)

Responsibility: DPW should continue to support other organizations as leaders in this work (including: AARP, health organizations, community centers, Local Motion and Bike Recycle VT.)

Photo by SF Bicycle Coalition.

#3: Launch a professional driver education program.

Launch a professional driver education program to teach drivers who work in large fleets (such as bus drivers, sanitation workers, or taxi drivers) how to safely share the streets with people walking and biking. San Francisco Bicycle Coalition's Professional Driver Education Program provides an example: the SFBC's training covers key issues including navigating new types of infrastructure being piloted and implemented, how to safely make turns, loading and unloading, and bicycle rights and rules of the road. Groups that participate in the training include taxi drivers, public transit operators, and other companies with large fleets such as ride share programs, delivery vans, and shuttle operators. The City of Burlington should work with local advocacy groups to develop and deploy a similar program.

Success Metrics:

- Target a # (or %) of DPW and commercially licensed drivers that complete the program? Focus area: Training CCTA drivers about bus stops in bike lanes
- Decrease number of crashes involving professional drivers (track through crash data collection reforms suggested on page 150)

Responsibility: DPW, Special Services Transportation Agency, VTrans, CCTA, CCRPC, Local Motion

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Photo from the CP Smith Elementary School Travel Plan, created in April 2013.

#4: Expand Safe Routes to School programs to all schools.

Just over 80% of Elementary Schools and 50% of Middle Schools have a Safe Routes to School program. The "walking school bus" program at C.P. Smith Elementary School has been recognized as a successful case study by the National Center for Safe Routes to School. The Sustainability Academy has undertaken several pilots of a "bike train" program which functions much like a walking school bus – both programs provide important opportunities for education as students walk or bicycle to school together accompanied by one or more adults. Burlington schools should work to increase Safe Routes program offerings, with a focus on reaching low-income and/or New American students.

Success Metrics:

- By 2018, every elementary and middle school in Burlington should launch a Safe Routes to School Committee to lead SRTS program implementation and updating of school transportation plans. Burlington High School should also have an education and encouragement program for students.
- Use data dashboard to track progress towards a 50% increase in number of students walking or bicycling to school by 2025.

Responsibility: Local leadership teams, through Burlington School District

Campaigns like Local Motion's "Rides a Bike" initiative strike the right tone, sending the message that walking and biking can be transportation options for everyone, even if they don't have special skills or equipment. (Images by Doug Goodman, via Local Motion.)

#5: Improve the reach of Burlington's safety outreach campaigns to drivers

Educating drivers about how to safely share the road is a high priority for people who currently walk and bike in Burlington, and reaching drivers should be the focus of future safety campaigns. Distracted driving is one topic where driver education would be valuable - Burlington's advocacy organizations and government agencies could roll out a campaign focused on this topic in April, Distracted Driving Awareness Month. As new outreach campaigns are explored in years to come, it is important that words and images "normalize" walking and biking, and emphasize the positive. Campaigns like Local Motion's "Rides a Bike" initiative strike the right tone, sending the message that walking and biking can be transportation options for everyone, even if they don't have special skills or equipment.

Success Metrics:

- Local Motion's existing all-modes walk-bike-drive safety brochure outlines rules of the road in plain English and includes a coupon for up to $25 off safety gear (helmets, etc.). Translating this brochure into other languages and expanding its distribution is an easy first step.
- In 2017, create and launch an annual Distracted Driving Awareness campaign in April. This campaign should become an annual effort. To understand program impact, track progress towards a decrease number of crashes due to distracted driving (track through crash data collection reforms suggested on page 150).

Responsibility: Burlington Public Works and other funders should continue to support non-profits that have been leaders in this area, such as Local Motion. Other partners include AARP, which currently runs a successful driver safety course program (AARP Smart Driver Course), as well as local refugee/resettlement organizations that can assist with translation and outreach to the New American community.

ENCOURAGEMENT ACTION PLAN

Encouragement is all about creating a culture that welcomes and celebrates walking and biking. This is nothing new to Burlington - the city already has a strong tradition of fun public bike rides, such as the Halloween Ride and Ride 365, and popular Bike Month programming. Building off these traditions, along with a 2nd year of success with Open Streets, and many other initiatives, Burlington has a solid base to work from in the realm of encouragement. To grow in this area, the City will need strong partnerships with non-profits, grassroots groups, educational institutions, local businesses and major employers. These organizations are typically leaders in creating or sponsoring festive walk/bike events, and they are often well positioned to provide incentives and reduce barriers. Launching a public bicycle share program is also a priority, as it is a critical element to support the Encouragement programming referenced here - for more details see item #7 in the Engineering Action Plan.

Photo from Open Streets BTV.

#1: Expand the landscape of encouragement events to offer new, and more frequent programming.

Open Streets BTV events are an effective way to engage a broad base of people in physical activity. DPW should support Burlington Parks and Recreation in increasing the frequency and scale of its open streets programs, with a special focus on engaging including children and older adults. For example, a "snowpen" streets event in mid-winter could allow participants to enjoy winter biking, cross-country skiing, snow shoeing etc. in a street closed to automobile traffic. Other ideas include:

- Help NPAs leverage smaller scale "Play Streets" events to experiment with pedestrian-focused projects such as new plazas and public spaces.
- Create supportive programs to recruit interested but inexperienced cyclists. The "Bike Experience" program in Brussels provides a model: invite people to try out bike commuting for 2 weeks, and kick off their Experience with a free, half-day training on urban biking. For the first few days of the Experience, it is critical to pair new bikers with experienced riders with a similar itinerary. The experienced rider helps the newcomer get over fears and find their way in the first few days. This campaign could be rolled out as part of Bike Month in May, in partnership with CCRPC's 2-week Smart Trip Challenge.
- Host monthly bike-to-work breakfasts in partnership with local businesses.
- Conduct nighttime bike light outreach on a more frequent basis, and work to find times that coincide with other well-attended evening events. (Local Motion can provide lights and train community partners in distribution/outreach.)

Success Metrics:

- Increase Open Streets event frequency to 4 per year by 2018, with the addition of play streets events in interested neighborhoods.
- Increase Play Streets event frequency
- Launch a bike-to-work breakfast initiative by 2017
- Kick-off an annual nighttime bike light outreach initiative in fall of 2016.

Responsibility: Burlington Parks and Recreation, and Department of Public Works, in partnership with City Council members, NPAs, and local non-profit organizations.

Source info needed. Photo by...

#2: Host targeted events and programs to engage underrepresented groups, such as women and seniors.

Census data shows that the recent growth in biking to work in Burlington is very heavily weighted towards men. Data from AARP surveys also indicate that a high percentage of Burlingtonians aged 45 and over would walk or bike more often if conditions were better (see Chapter 1 for more details). As projects in this plan roll out, Burlington should kick-start a program series focused on inspiring underrepresented groups, such as women and seniors, to be leaders in active transportation. Events could include group rides, peer-to-peer encouragement initiatives, workshops, or a Facebook group. To kick of the initiative and identify people who are interested in helping spearhead the effort, the City should work with local advocates to host a small bicycling summit or forum.

Success Metrics:

- Host a summit in 2017. A key outcome of the summit should be identifying an action plan for organizing and empowering people to be leaders in active transportation in Burlington.
- Increase the number of women bicycling each year - to be demonstrated through tracking of census mode share and data dashboard figures.

Responsibility: Department of Public Works in a supporting role, in partnership with local non-profit organizations such as Local Motion and AARP, universities, and major institutions.

#3: Grow awareness of and participation in existing Transportation Demand Management (TDM) Programs

Support CCRPC, the Chittenden Area Transportation Management Association (CATMA), and other partners in their efforts to grow awareness of and participation in existing TDM Programs such as Go! Chittenden County and the Way to Go! Commuter Challenge.

CATMA's work convening advocates through the Employee Transportation Coordinator (ETC) Network has great potential to help large employers run effective TDM programs. At the same time, individual residents are stepping up to the plate: total participation in the Way to Go! Commuter Challenge has grown steadily since 2006, with a significant increase in participation from schools in the past 3 years. The region must continue to experiment with and invest in these and other programs. Use of pilot incentive programs can help regional and local partners understand the best strategies for growing participation in TDM programs. In addition to continuing to support these ongoing TDM efforts, the City can establish itself as an example for other large employers by implementing the short- and long-term recommendations in the City employee commute TDM Action Plan (published October 2015).

Success Metrics:

- Implement the short- and long-term recommendations in the City of Burlington TDM Action Plan (published October 2015).
- Shift in mode share to reflect a reduction in the percentage of people driving alone. (See mode share goals in Vision and Goals section of this plan.)

Responsibility: CCRPC, CATMA, CarShareVT, CCTA, Local Motion, DPW

ENFORCEMENT ACTION PLAN

Laws and regulations are essential to establishing rules of the road. Once laws are established, it is also important that enforcement officials understand the laws, know how to enforce them, and apply them in an equitable manner. Communities that excel in the area of enforcement typically have law enforcement officials that regularly walk and bike as part of their duties. They also have structures in place to create strong relationships between advocacy groups and law enforcement officials.

#1: Revise crash reporting protocol to collect more robust data for crashes involving people walking or biking.

Crash reports are typically entered by a police officer into a crash report template created by the State. The templates include space for written descriptions as well as diagrams and coded information to describe what occurred. As the number of people traveling to work by alternative modes increases nationwide, states and cities are looking more closely at crash reporting protocols. The information requested on most crash report templates across the country focuses on motor vehicle crashes, with very limited opportunities to provide details of crashes involving a person walking or biking. Burlington should work with State and local officials to spearhead amendments to data collection protocols. Additional variables that merit consideration on a crash data template include: type of bicycle environment (presence of and/or type of bike facility on the street), more nuanced detail on potential car and bike impact points (including open doors, side mirrors, etc.), turn/impact patterns, and vehicle type details (sedan, pick-up truck, commercial truck, bus, etc.), and whether or not the driver was using an electronic device/cell phone when the crash occurred.

Success Metric: Revise crash reporting template to augment information required by the state of Vermont by 2020.

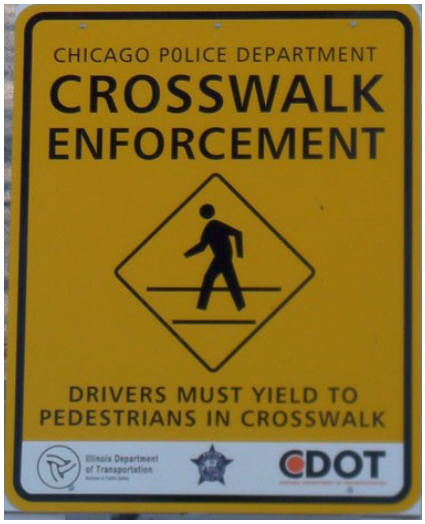
Responsible Parties: Requires state-level collaboration, with DPW, BPD as local leaders.

#2: Increase collaboration between DPW, BPD, the Safe Streets Collaborative, and the Burlington Walk Bike Council.

DPW should support partner organizations in establishing a framework for collaboration between the Safe Streets Collaborative, BWBC and BPD. Work of this group or task force should focus on strategic, collaborative projects that will advance the enforcement recommendations noted here and the safety goals outlined at the start of this plan. Implementation of this recommendation will require close partnership with BPD, to insure that BPD staffing resource and structures create time for this collaboration.

Success Metric: Establish a task force to help the Safe Streets Collaborative, BWBC and BPD work together to advance safety and enforcement recommendations.

Responsibility: Leadership needed from Safe Streets Collaborative and BWBC, with support and partnership from Department of Public Works and BPD



Source info needed. Photo by...

#3: Launch targeted sting enforcement efforts to crack down on dangerous behaviors at top offender locations.

Work with Local Motion and BPD to plan and execute a series of crosswalk stings in proximity to schools and community centers. During these stings, officers would monitor motorist compliance with crosswalks and issue warnings/ tickets to violators, often with television coverage of the sting. Work with BPD to set departmental goals for number of stings to be run each year on this and other issues, such as ticketing parked cars that are obstructing the pedestrian right of way, crosswalks, or parking in bicycle lanes. This recommendation is closely tied to Evaluation category, as it involves leveraging data to identify hot spot intersections for speeding, running red lights, etc. Targeted enforcement efforts could also be timed to coincide with programming around Distracted Driving Awareness Month in April or Bike Month in May (mentioned under Encouragement). The stings would provide an important opportunity for education - officers could be tasked with distribution of educational materials as part of the operation.

Success Metrics:

- Identify problem behaviors and launch the first "sting" effort at one priority intersection in by 2017.
- Decrease in crashes citywide, specifically those involving motorists who don't comply with safety laws at intersections. (Track through crash data collection reforms suggested on page 150).

Responsibility: Local Motion and BPD, with support from Department of Public Works

EQUITY ACTION PLAN

Too often, walk/bike planning fails to engage or solicit meaningful input from people who are not already involved in walk/bike advocacy circles. Though the population of people walking and biking in Burlington is diverse, special care must be taken to expand access, education, and encouragement efforts to be sure all residents benefit. For the purposes of this plan, we've defined equity in terms of:

- Geography – referring to the distribution of walking or biking improvements and facilities and programs within the community
- Social/Demographic factors – referring to the distribution of walking or biking improvements across diverse populations of all ages, genders, and abilities.

Importantly, item #7 in the Engineering Action Plan recommends that the city implement a public bicycle share system. This recommendation is a priority in the realm of equity; a high-density bike share system will help insure that all of Burlington's residents and visitors have access to bicycles.

Photo by Bike Recycle VT. Bike Recycle Vermont & Old Spokes Home create access to bikes and the opportunities they provide for our whole community.

#1: Expand education efforts and equipment access to low-income and minority communities

Start by producing educational/promotional materials in multiple languages. Work to expand reach of and access to existing programs such as Bike Recycle VT's Get A Bike program. As the recommended bicycle share program is rolled out, the city should work with local non-profit partners to develop a program that offers reduced membership rates and participation incentives to minority and low-income communities.

Success Metric: See recommendations related to public bike share on page 60.

Responsibility: See recommendations related to public bike share on page 60.

#2: Consider location equity in distributing walk/bike improvements across Burlington's neighborhoods.

Though implementation should respond to community support for projects, equity of project distribution across neighborhoods is an important consideration in building out a connected network of safe streets for people walking and biking.

Success Metrics:

- When considering implementation of the phasing plan suggested in Chapter 2, measure the distribution of network improvements and projects in each council district.
- Achieve proportional mode share gain in all council districts (to be tracked through data dashboard)

Responsibility: Department of Public Works

#3: Integrate equity safeguards in enforcement plans.

When implementing enforcement recommendations and developing protocols (such as the sting operations suggested previously), it is essential that equity concerns not be overlooked. Enforcement around unsafe behaviors (speeding, failure to yield, etc.) must not involve profiling of offenders.

Success Metric: [Forthcoming]

Responsibility: Department of Public Works, Burlington Police Department

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#4: Deepen understanding of the needs and priorities of populations under-represented in Burlington's walk/bike advocacy

Work with community groups to initiate ongoing, proactive conversations to deepen understanding of the needs and priorities of populations under-represented in Burlington's walk/bike advocacy community (including women, New Americans, young children, and older adults). The focus groups described in Chapter 2 provide a possible precedent for this type of conversation.

Success Metric: Create a work plan for pro-active outreach to under-represented communities, with the target of at least 2 events per year by 2018.

Responsibility: Department of Public Works, local non-profit partners, and NPAs

FUNDING & IMPLEMENTATION

For this plan to become a reality, commitment to funding and implementation of the plan's priority recommendations is essential.

WHAT ARE WE GOING TO DO?

The sub-area sections in Chapter 3 list recommended projects in the 12-month, and 2-5 year time frames, and illustrate recommended long-term projects through maps. A complete list of projects recommended at all time scales can be found in the Appendix of this document. Also in the Appendix, the illustrated glossary provides definitions for many of the terms used throughout this plan to describe design treatments and infrastructure types.

Over time, it is virtually a certainty that some new projects will be added to the "to do" list, and others recommended in this plan may become unnecessary. Still, having a list of target projects for each time frame allows us to understand the scale and scope of what is needed to take this plan from paper to pavement.

THIS CHAPTER ANSWERS THE FOLLOWING KEY QUESTIONS:

- What are we going to do?
- What do we spend now?
- What will we need to implement the plan?
- How will we pay for it?

WHAT DO WE SPEND NOW?

While budgets change every year, the City has allocated about $1.5 million per year for city-funded walk-bike projects over the past 2 years, and has allocated more in the coming year:

- The sidewalk replacement fund is currently funded at about $400,000 per year. Funding at this level is enough to replace sidewalks on a cycle of over 100 years, which is way too long. The good news is that in the last two years, City capital has boosted this program with more than $700,000 of additional funding. And, the City's 10-year capital plan (currently in development) outlines a strategy to continue increasing available funds for sidewalk repair and replacement, in order to address all of the sidewalks currently categorized as serious or failed within five years, and all of the poor to failed segments in approximately 15 years. For more details, see page 159.
- $100,000 for other walk-bike projects: $50,000 for bike projects (2% of funds received from street capital paving) and $50,000 for the traffic calming program. As with the sidewalk program, the City's 10-year capital plan outlines a strategy to increase available funds for other walk-bike projects, with $250,000 to $450,000 allocated or planned for these improvements.
- The city also puts a substantial amount of funding towards pedestrian and bicycle infrastructure through ongoing projects, some of which include federal funding. It is not possible to determine the exact portion of funds used exclusively for walk-bike infrastructure, but we do know that it is a significant amount compared to the above dedicated funding sources.

$1.5 million

While budgets change every year, the City has allocated about $1.5 million per year for city-funded walk-bike projects over the past 2 years, and has allocated more in the coming years.

Snapshot of funding for current capital projects

Project Name	Funding/Notes
Burlington Bike Path Renovation	Penny for Parks Funding, bonding
Champlain Parkway	Includes shared use path, curb extensions, crossing improvements, bike lanes from Kilburn to Main
Colchester Ave Sidepath	Funded for 2017 Construction
Connectors through Burlington Town Center (Pine and St Paul)	Subject to development agreement, eligible for funding with Downtown TIF
Locust Street/Birchcliff Parkway Walkabilitly Projects	Grant funded
Main Street Streetscape (Battery to Union)	Downtown TIF/Great Streets Project
Maple/Battery Intersection	Crossing improvements
North Ave Crosswalks	Grant funded
Shelburne Rotary	VTrans Safety Project
St. Paul Streetscape (including the Main St. /St. Paul Intersection)	Downtown TIF Project
Traffic Calming Fund Projects	King St Neighborhood, Grant St, Loomis St, Ward St (Traffic Calming Fund)

WHAT WILL WE NEED TO IMPLEMENT THE PLAN?

The total estimated cost for the projects recommended in the 12-month time frame is $295,000. These projects are primarily lower cost actions that can be implemented quickly, and do not require changes to curbs or utilities. Projects included in this estimate are listed in the project tables in the Appendix.

The total estimated cost for the projects recommended in the 2-5 year timeframe is $1,900,000, or $475,000 per year over four years. Projects included in this estimate are listed in the project tables in the Appendix.

Many of the walk-bike projects listed in the 12-month and 2-5 year time frame are small, and perhaps mundane, but in total could have a huge impact. As project prioritization and funding is discussed, keep in mind that putting funding toward a series of smaller projects can have greater city-wide benefit than a small number of high cost projects. The city's capital plan should have a healthy mix of small and big projects.

WALK-BIKE PROJECTS ARE GREAT INVESTMENTS

Walking and biking projects are generally much less expensive to build and maintain than roadway or highway projects, and can yield significant benefits. The City's significant commute mode shares for walking and biking (19% and 6% respectively) and goals for growth in these mode shares (at least 34% of all trips) should be considered in how City transportation funds are allocated. Investments in the City's walk and bike infrastructure will ultimately result in a transportation system that reduces overall costs and increases choices.

HOW WILL WE PAY FOR IT?

Many of the projects recommended in the plan already have funding identified, including the walk-bike components of the Champlain Parkway, bike path projects funded through Penny for Parks, or projects such as complete streets upgrades on Main Street and the connection through the Burlington Town Center, which can be funded through the Downtown or Waterfront TIF. Other major projects, such as the reconstruction of the Colchester/Barret/Riverside intersection, are eligible for state/federal funding through the Chittenden County Regional Planning Commission Transportation Improvement Program (CCRPC TIP). The majority of the projects needed to build out the plan are small, relatively simple changes that can be incorporated into ongoing projects and activities with little additional cost.

Implementing this plan will require a shift in focus and emphasis in the City's ongoing effort to repair and repave its streets. And, there is no way around the fact that the City will need to increase funding allocated for walk and bike projects to make this plan a reality. Luckily, the City's 10-year capital plan (currently in development) is already on track to increase funding in ways that will support implementation of this plan. The next page presents strategies that will help the City achieve the funding levels needed to implement the recommendations in this plan.

The summary graphic on page 158 compares current spending levels and known or planned funding sources against estimates for what we'll need to implement this plan. The good news is...we can do this!

FUNDING SNAPSHOT

The graphic on page 158 compares current spending levels and known or planned funding sources against estimates for what we'll need to implement this plan. The good news is...we can do this!

A snapshot of what we spend in a typical year now

$1.1 million
Funding for sidewalk repair/replacement (replacement cycle is too long!)

+

$350,000
For other walk/bike projects from Bicycle Program, Traffic Calming Fund, and City Capital

+ Additional funding from grants & ongoing project budgets

=

$1.5 million

Additional annual funding needs called for in the 10 Year Capital Plan through 2021

$1 million
Capital Sidewalk Funding

+

$100,000
Capital funding for other walk/bike projects

How we implement recommendations in the next 5 years (through 2021)

$2.1 million
City funding to repair serious sidewalk failures.

+

$450,000+
City funding and grant funding to implement other walk-bike projects recommended in the plan:

- $295,000 - estimated cost for projects in next 12-months
- $475,000/yr - estimated cost for projects recommended in the 2-5 year timeframe, over 4 years.

Estimated annual needs for sustainable funding after 2021

$1.5 million
+ 3% escalator to sustain a 40-year sidewalk replacement cycle

+

$2 million
+ 3% escalator for transportation system expansion, including walk-bike projects

Strategies to pay for plan recommendations

Below is a list of strategies that will help the City achieve the funding levels needed to implement plan recommendations.

- **Increase the sidewalk repair and replacement fund.** The sidewalk replacement fund is currently funded at about $400,000 per year. At this rate, it would take more than 100 years to replace all of the city's sidewalks. A well designed and constructed sidewalk can be expected to last 40 or 50 years, but not 100. The good news is that in the last two years, City capital has boosted this program with more than $700,000 additional funding. The City's 10-year capital plan recognizes the need to continue increasing available funds for sidewalk repair and replacement, with $2.1 million per year recommended through 2021 to correct serious sidewalk failures. With serious failures corrected, a 40-year replacement cycle can be sustained with level funding of $1.6 million with a 3% escalator through 2026.
- **Allocate Capital Funding to Bike-Walk Projects.** Every year, the city allocates millions of dollars to capital street projects. While a large percentage of the city's capital funding for walk-bike projects is already allocated to large projects in the coming years (such as the Railyard Enterprise Project and the Champlain Parkway), capital investments are still planned. The City's 10-year capital plan recommends an additional $350,000 be allocated for transportation expansion projects during 2017 through 2021 and $2 million with a 3% escalator through 2026. As ongoing projects are completed, a growing portion of capital funds can be allocated to walk-bike projects to help implement this plan.
- **Dedicate a larger share of local paving funds to bicycle projects.** Every year, the City of Burlington receives funding from VTrans and a dedicated tax that is allocated for paving of local streets. Bikeway projects are an eligible use of these funds, and currently the City dedicates 2% of street capital paving funds for bikeway projects. This percentage could be increased to be aligned with the existing mode share for bicycles (6%), and over time increased to the mode share goal (12%).
- **Bundle funds from a variety of sources.** Because many of the projects in this plan have benefits that extend beyond walking and biking (such as greening streets and overall safety), there will be opportunities to leverage funding for projects by bundling funding from several sources. Examples include stormwater projects as part of a greenway; or park funding for projects that enhance the bike path connections.
- **Use Federal Funding (judiciously).** Federal funding is available for walk-bike projects through competitive grants from VTrans, as well as directly from the FHWA for very large projects. Because of the lengthy and sometimes laborious process that needs to be followed with federal funding, it is best used for high cost projects, which are listed on the following page.
- **Tax Increment Financing (TIF).** TIF is a long-term tool that uses incremental tax revenue over 20 years to repay debt. Municipalities establish a TIF district within an area requiring public infrastructure to encourage public and private real property development or redevelopment. There is no impact on taxes. TIF is devised to use the incremental future property tax revenue, not additional taxes, to pay for the debt incurred to finance infrastructure improvements within the District. Investment debt is repaid with the incremental tax revenue of the TIF district, not just one particular project. Burlington currently has two TIF districts - the Downtown and Waterfront Districts.
- **Municipal Bonds.** Municipal bonds can be issued by state and local governments to raise funds for large transportation projects.

Projects to consider for federal funding

Note that federal funding comes with many strings attached and requires dedication of staff time to keep the projects advancing through a complex process.

Project	Comments
Battery Street Complete Streets Upgrades	Some of these projects could be initially put on the ground with rapid implementation, and eventually made more permanent and attractive with funding from grants.
Colchester Ave Complete Streets Upgrades (Prospect to Riverside)	
Ethan Allen Parkway Bikeway	
Main Street Complete Streets Upgrades (Winooski to UVM)	
North Ave Complete Streets Upgrades	
Pearl Street Complete Streets Upgrades (Battery to Prospect)	
Pine Street Complete Streets Upgrades (Howard to Flynn)	
Plattsburg Ave Bikeway	
Prospect Street Bikeway	
Rt. 127 Path-Manhattan Connector	
Shelburne Road Complete Streets Upgrades (City Line to St. Paul)	
Main St/University Heights Crossing	Potential for UVM participation in project funding
University Place - Shared Space Street	
Colchester Ave Bike-Ped Bridge	High cost project with regional implications, could be funded through CCRPC TIP or TIGER grant
North Street Slow Zone - North Ave to Union	Potentially funded in part with economic development funds
East/Colchester Intersection	Overall safety project, such as roundabout or mini-roundabout, could be funded through CCRPC TIP
Main Street/S. Winooski Ave Intersection	
Riverside Ave/Colchester Ave Intersection	

STRATEGIES TO BUILD THE PLAN

While raising funds for building out the walk-bike network is important, a change in approach for how projects are designed and constructed is also needed.

Rapid Implementation

To make the plan a reality, we need to move a lot faster to get projects on the ground. Greater reliance on phased or "rapid implementation" solutions using less expensive materials can be effective and efficient, and provide for a more adaptable transportation network. This will not only bring substantial transportation benefits sooner, but allow for reconsideration and adaptation as transportation patterns continue to shift in the coming decade. While funding for new walk bike projects is dedicated to projects already in development over the next five years, rapid implementation using lower cost materials and pavement marking will be the primary type of new walk bike projects

Many of the plan recommendations can be done initially using lower cost approaches such as lane reassignment and establishing protected bike lanes with flex-posts or armadillos. Communities across the country are using rapid implementation techniques to quickly build out their bicycle networks and crossing improvements – sometimes leaving low-cost materials in place for several years until there is an opportunity to upgrade to more robust facilities. The advantage of this approach is that the City can learn from the interim design and engage public input based on the user's experience with the infrastructure, taking this input into consideration as funding is acquired for the more permanent infrastructure.

Rapid Implementation also means getting started now with planning and design for challenging but important projects. The good news is that this approach is already underway: this master planning process includes a scoping of priority projects for implementation. The scoping phase of the project has already begun, setting the City up to implement two priority projects: a Neighborhood Greenway in the Old North End, and a bikeway along Main Street in downtown Burlington.

A Holistic Approach to Street Reconstruction

While many of the projects in this plan can be implemented with lower cost, quicker techniques, some City streets will be reconstructed each year to address a multitude of needs: underground utility repair or replacement, stormwater infrastructure, structural instability, and more. With this plan, it will be easier to coordinate reconstruction projects so that when streets are dug up, they get put back together the right way. This holistic approach to street reconstruction also will allow the leveraging of a variety of funding sources that can be combined to build truly complete street projects. However, we can't always wait for these big projects. Interim design or pilots can be used on streets where full reconstruction is more than 2 years away.

Make sure the people power needed is in place

We need more than just funding to build this infrastructure. We also need people who have the time and resources to coordinate the planning, designing, construction and maintenance of this network. This means hiring at least one person this year, plus a second one within a year whose primary focus is getting rapid implementation safety projects on the ground. Maintaining this enhanced network will require investing in the right fleet of equipment over time to maintain protected bike lanes and other types of infrastructure that the City doesn't currently have.

WE CAN DO THIS!

This plan is ambitious, but with funding at these levels, support at all levels of city government, and staff available to do the work, it can get done and will be well worth the effort. The result will be a modernized, attractive and safe street network that offers city residents and workers real choices in how they get around.

RAPID IMPLEMENTATION: FAST, FLEXIBLE CHANGES TO CITY STREETS

Long known as a natural gas capitol, the City of Calgary in Alberta, Canada might seem an unlikely leader in bike infrastructure implementation. But, after rolling out an entire network of protected bicycle lanes (or "cycle tracks") throughout its downtown all at once, Calgary is now widely recognized as a success story in rapid implementation of low-stress bikeways.

Calgary's innovative "all at once" approach differs from the common practice of implementing bike lanes one street at a time. Building from the City's general transportation plan and citywide bicycle plan, the City Council approved a pilot project to use temporary materials and roll out new protected bike lanes on 4 key downtown streets. This rapid implementation approach allows the city to quickly implement a pilot that can test the impacts not just of a bike lane on a single street, but of a truly connected bicycle network.

For the 18-month pilot, the city used flexible materials such as delineator posts, planter boxes and curb stops. The pilot was completed two months early and $2 million under budget. And, it was literally an overnight success. Daily downtown bike use quadrupled the day after the pilot protected bicycle lanes were implemented. After just three months, the city saw a 95% average increase in daily weekday bike trips. Needless to say, all signs are pointing to a positive outcome for the implementation of a permanent bike network which would not only transform Calgary's downtown but could also be utilized as a blueprint for transforming the rest of the city's transportation infrastructure.

Importantly, rapid implementation is not only used for pilots. Many cities are using low-cost materials (flexible delineators, paint, planters, etc.) to quickly implement planned street redesigns, leaving materials in place for years until funding is available for more permanent capital upgrades. One example is comes from Denver Colorado, where City officials completed two, one-mile protected bike lane projects, (from preliminary planning to completion) in less than 1 year. Another example comes from Palo Alto, where city officials are considering options for rapid implementation of their mobility plan, which calls for 9.3 miles of protected bike lanes and 5.5 miles of pedestrian greenways (streets that function as "linear parks" with wider sidewalks, pedestrian amenities, and landscaping).

The 12-month project lists and 5-year maps in the sub-area sections of this plan provide a blue-print for how Burlington can follow this exciting new approach for project delivery, and get started with implementation NOW!

Calgary's quick-build protected bike lane network doubled bike counts in 3 months! Top image by Bike Calgary; Bottom image by People for Bikes.

Denver used a rapid implementation approach, taking two protected bike lane projects from zero to finished in one year. Image by People for Bikes.

» **WE ARE HERE**

Placeholder Page

TABLE OF CONTENTS FOR APPENDIX

FINAL APPENDIX TO INCLUDE:

- FINAL PROJECT BANK (DRAFT INCLUDED HERE)

- FINAL SAFE STREETS ILLUSTRATED GLOSSARY (DRAFT INCLUDED HERE)

- CRASH DATA MAPS

- ALL PLANBTV WALK/BIKE SURVEY DATA

PROJECT LIST FOR "START NOW" 12 MONTH PROJECTS

► The total estimated cost for the projects recommended in the 12-month time frame is $295,000. These projects are primarily lower cost actions that can be implemented quickly, and do not require changes to curbs or utilities. Projects included in this estimate are listed in the table below. See the Funding + Implementation Chapter for more details.

Sub-Area	Project Name	Proposed Action
2	Archibald Street Slow Zone/Bikeway	Add supersharrows, and use rapid implementation materials to create curb extensions (epoxy/sand mix, flexposts, etc.)
3	Austin Drive Bikeway	Re-stripe with 2-way protected bike lanes with flex posts on north side of street
2	Bike Parking	Add bike parking in high-need locations such as Church Street, Pearl Street, and Main Street.
3	Birchcliff Parkway Greenway	Traffic calming with shared lanes or advisory bike lanes
2	College Street Bikeway Markings	Add intersection striping treatments to carry College St. bikeway across the Prospect intersection, to UVM path.
2	Depot Street Pilot Projects	Revisit concept plans in 2009 Waterfront North Access Scoping Study, and use pilot projects to test alternatives.
2	East/Colchester Intersection	Extend eastbound bicycle lane markings through intersection. Pilot test median treatments. Change signal phasing.
1	Gosse Court Greenway and Connections	Add traffic calming treatments and shared lane markings to Gosse Court, and shared use markings/signs to Woodbury Road/ Hunt Middle School driveway
2	Lakeview Terrace Neighborhood Greenway	Add bikeway markings and traffic calming treatments on Lakeview Terrace.
3	Lakeside Ave/Pine St Intersection	Reinforce southbound bicycle lane crossing through intersection
1	Leddy Park Bikeway Connector	Shared lane markings
3	Ledge Rd Bikeway	Shared lane markings and traffic calming
2	Main St. / S. Champlain Curb Extensions	Use rapid-implementation materials to add curb extensions
2	N. Union Bikeway	Install armadillos to protect bike lane as pilot
2	N. Winooski Bikeway (Pearl to Union)	Install flex posts to protect bike lane as pilot
2	Pearl Street Bikes Lanes and Curb Extensions (Battery to Winooski)	Mark and sign bicycle lanes. Add interim curb extensions at Pearl and N. Champlain.
3	Pine St Curb Extensions (Kilburn, Marble, Howard, Locust, Flynn)	Rapid implementation of curb extensions at key crossings with epoxy/sand mix, flexposts or other creative materials
3	Pine Street Bikeway Signage	Place "bikes may use full lane" signs
3	Pine Street Bikeway	Mark and sign bicycle lanes south of Lakeside Avenue to the end of Pine Street
3	Queen City/Industrial Bikeway	Work with South Burlington to mark and sign bicycle lanes
2	Riverside Shared Use Path	Enhance pavement markings at bikeway gaps and across busy driveways
2	S. Winooski/Bank Intersection	Rapid implementation of curb extensions with epoxy/sand mix, flexposts or other creative materials
2	Winooski Corridor Study Pilot Projects	Use pilot projects to test recommendations from the Winooski Corridor Study

Sub-Area 1: The New North End
Sub-Area 2: Downtown, Old North End, Waterfront
Sub-Area 3: South End
See page 74 for Sub-Area Overview Map

PROJECT LIST FOR YEAR 2-5 PROJECTS

- The total estimated cost for the projects recommended in the 2-5 year timeframe is $1,900,000, or $475,000 per year over four years. Projects included in this estimate are listed in the sub-area tables below (and on the following 2 pages). See the Funding + Implementation Chapter for more details.

Sub-Area 1: The New North End (*See page 74 for Sub-Area Overview Map*)

Project Name	Proposed Action
Crescent/Shore Greenway	Shared lane markings and traffic calming
Farrington Parkway Greenway	Shared lane markings and traffic calming
Gosse Court Greenway	Shared lane markings and traffic calming
Marshall Drive Greenway (Gosse to Heineberg)	Shared lane markings, green infrastructure and traffic calming
North Ave Intersection Safety	High visibility crosswalks, curb extensions with epoxy/sand, flexposts or other creative materials (at Shore, Cottage Grove, Poirier, Saratoga, and Institute)
Old North End Multiuse Connector Trail	Shared use path between North Ave and Island Line Trail
Plattsburg Ave. Bikeway	In the short term, mark and sign conventional bike lanes (with more robust treatment coming in the long-term)
Starr Farm Road Sidewalk	Add new sidewalk
Venus Ave Connector	Begin planning for neighborhood connector between Venus Ave. and Sandra Cir.
Western Ave Sidewalk	Add new sidewalk

Sub-Area 2: Downtown, Old North End, Waterfront (*See page 74 for Sub-Area Overview Map*)

Project Name	Proposed Action
Bank Street Bikeway	Mark and sign shared use lanes
Cherry and South Winooski Intersection Improvements	Create rapid implementation curb extensions while 2016 Corridor Study is developed
Colchester Ave Bikeway	Stripe bike lanes on Colchester Ave. east of East Ave., with a more robust treatment to come in the long-term.
Colchester Ave Bridge to Winooski	Implement a lane reassignment with 3 travel lanes and a 2-way shared use path across the bridge, or build a new bridge for people walking/biking
Colchester Ave Hospital Crossing	Install high visibility pedestrian crossing
College/S. Willard Intersection	Consider mini-roundabout or high visibility pedestrian crossings
Main St/University Heights Crossing	Install high visibility pedestrian crossing
Main Street Complete Streets Upgrades (Battery to Winooski)	Design TBD with Great Streets Project; goal is protected bicycle lanes on this segment.
Main Street Complete Streets Upgrades (Winooski to Summit)	Protected bicycle lanes and improvements for pedestrians, per scoping study
Main Street Complete Streets Upgrades (Summit to University Place)	Add a shared use path on UVM property to connect to Main St path
Main Street Path on UVM Campus	Continue UVM Shared Use Path to fill gap from University Heights to the Jughandle
Main Street/S. Winooski Ave Intersection	Consider roundabout or mini-roundabout and lane reassignment

Sub-Area 2 Continued... Downtown, Old North End, Waterfront (*See page 74 for Sub-Area Overview Map*)

Project Name	Proposed Action
Maple Street Bikeway	Mark and sign shared lane treatments
N. Champlain Street/ Bikeway	Protected 2-way bicycle lanes on west side of street, lane reassignment
N. Winooski Bikeway (Union to Riverside)	Mark and sign protected bicycle lanes
North St Bikeway	Traffic calming with epoxy/sand, flexposts or other creative materials; shared lanes or advisory bike lanes
North Street near Murray	Study/pilot projects needed to determine best approach for traffic calming
North/North Ave Intersection	High visibility crosswalks, curb extensions with epoxy/sand, flexposts or other creative materials
ONE Greenway - Loomis Street segment	Shared lane markings, green infrastructure and traffic calming. Intersection improvements at Loomis/Prospect.
ONE Greenway - Sherman, Peru & Grant	Shared lane markings, green infrastructure and traffic calming
Pearl St/South Williams Crossing	Re-establish high visibility crosswalk
Pearl/Prospect/Colchester Intersection	High visibility crosswalks, realignment integrating curb extensions with epoxy/sand, flexposts or other creative materials
Pearl/Winooski Intersection	High visibility crosswalks, curb extensions with epoxy/sand, flexposts or other creative materials
Riverside Ave/Colchester Ave Intersection	High visibility crosswalks, curb extensions with epoxy/sand, flexposts or other creative materials
Riverside Ave/N. Prospect Intersection	High visibility crosswalks, curb extensions with epoxy/sand, flexposts or other creative materials
Shelburne Rotary Upgrade	Implement pilot project to clarify traffic patterns and improve safety by narrowing vehicular lanes and adding curb extensions.
Shelburne and Home Street Intersection Improvements	Pilot recommendations from planned corridor study (not programmed yet) - aim to reduce speeds, reduce crossing distances.
S/N Union Bikeway (Main to N. Winooski)	Complete protected bicycle lanes with preferred rapid implementation treatment (flexposts or armadillos, etc.)
S. Union Bikeway (Shelburne to Main)	Establish protected bicycle lanes with flexposts or armadillos; consider lane reassignment with one-way street for vehicles
S. Union/Main Intersection	Consider mini-roundabout; high visibility crosswalks, curb extensions with creative materials
S. Willard St Bikeway (Cliff to Hyde)	Extend northbound bicycle lane from North Street to Hyde, add shared lane markings southbound
S. Willard/Main Intersection	High visibility crosswalks, curb extensions with creative materials
S. Willard/Pearl Intersection	High visibility crosswalks, curb extensions with creative materials
S. Winooski Ave/College St Intersection	Consider mini-roundabout; high visibility crosswalks, curb extensions with creative materials
S. Winooski Bikeway-Main to Pearl	Mark and sign bicycle lanes in both directions; reassignment of vehicle lanes

Sub-Area 3: South End (*See page 74 for Sub-Area Overview Map*)

Project Name	Proposed Action
Callahan Park Greenway	Shared lane markings and traffic calming
Flynn Ave Bikeway	Mark and sign bicycle lanes
Home Ave/Pine St Intersection	Consider mini-roundabout and shared lane markings
Howard Street Greenway	Shared lane markings and traffic calming
Linden Terrace Greenway	Traffic calming, shared lanes or advisory bike lanes
Pine Street Bikeway (Queen City Park to Flynn)	Mark and sign bicycle lanes
S. Winooski/Howard/St. Paul Intersection	Consider mini-roundabout or signal phasing changes; high visibility crosswalks, curb extensions with creative materials
Shelburne Road Crossings	Install high visibility pedestrian crossings

Long-term Plan Project Bank

LIST OF RECOMMENDED PROJECTS TO BE IMPLEMENTED IN THE NEXT 5-15 YEARS

Sub-Area	Project Name	Proposed Action
2	Battery Street Complete Streets Upgrades (Maple to Park/Sherman)	Lane reassignment and bike lanes (phase 1), protected bike lanes (phase 2)
3	Briggs St Sidewalk (Morse to Flynn)	New sidewalk
2	BTC Connector (Pine and St Paul between Bank and Cherry)	Establish bikeways as part of Burlington Town Center redevelopment
2	Cathedral Square Crossing (Cherry St at 3 Cathedral Sq)	High visibility crossing
2	Cedar-Poplar Greenway (Elmwood Ave to Park St)	Shared lane markings, green infrastructure and traffic calming
3	Champlain School Connection	Connecting path network to Pine Street
2	Chase Street Bikeway	Bike lane up/Shared lane down; shift parking to south side
2	Colchester Ave Complete Streets Upgrades (Prospect to Riverside)	Protected bicycle lanes
2	Colchester Ave Bikeway Winooski River Crossing	Lane reassignment on bridge to provide 2-way protected bike lanes
2	College Street Bikeway (Lake to Union)	Shared lanes with traffic calming
1	CP Smith Connector (Gosse Court to James Ave)	Shared use path
3	Deforest Heights Sidewalk (DeForest Rd to Chittenden Dr)	New sidewalk
3	Deforest Heights/Edgewood Connector (S. Willard to Ledge via path)	Shared use path or trail
2	Depot St-Lake St Bikeway (North Ave to Main St on waterfront)	Shared lanes with traffic calming
2	East Avenue Bikeway (Jughandle to Colchester)	Bicycle lane (phase 1)/Two-way protected lanes (phase 2)
1	Ethan Allen Connector	Shared use path through park
1	Ethan Allen Parkway Bikeway (North Ave to 127 Path)	Bicycle lane northbound/shared lane southbound
3	Fairmount St Greenway (Proctor to Prospect Pkwy)	Shared lane markings, green infrastructure and traffic calming
1	Flynn School Pathway (Plattsburg Ave to School)	Shared use path
3	Foster Street Sidewalk (Lyman to Home)	New sidewalk
1	Franklin Square Pathway (North Ave to Sunset Dr via path)	Shared use path or trail
1	Gazo Ave Greenway (Ethan Allen Pkwy to Sandra Circle)	Shared lane markings, green infrastructure and traffic calming
1	Grey Meadow-West Connector (West Rd & Grey Meadow)	Shared use path or trail
2	Grove Street Bikeway (Chase to South Burl City Line)	Mark and sign bicycle lanes

Sub-Area 1: The New North End
Sub-Area 2: Downtown, Old North End, Waterfront
Sub-Area 3: South End
See page 74 for Sub-Area Overview Map

LIST OF RECOMMENDED PROJECTS TO BE IMPLEMENTED IN THE NEXT 5-15 YEARS (CTD...)

Sub-Area	Project Name	Proposed Action
3	Harrison Ave Greenway (to Island Line Trail)	Shared lane markings, green infrastructure and traffic calming
1	Heineberg Road Greenway (North Ave to Farrington)	Shared lane markings, green infrastructure and traffic calming
3	Hillcrest-Crescent Greenway (Ledge to S. Prospect)	Shared lane markings, green infrastructure and traffic calming
3	Home Ave Bikeway (Oakledge Park to Shelburne)	Mark and sign bicycle lanes
3	Howard Street Greenway (Pine to Union)	Shared lane markings, green infrastructure and traffic calming
2	Intervale Road Bikeway (North of Riverside through Intervale Center)	Mark and sign shared lanes
3	Kilburn Street Sidewalk (Pine to St Paul-north side)	New sidewalk
1	Killarney Drive connector to Island Line Trail	Shared use path or trail
3	Lakeside Ave Sidewalk (Champlain Pkwy to Pine, south side)	New sidewalk
3	Lakeside Ave Sidewalk (Island Line Trail to Champlain Pkwy, north side	New sidewalk
3	Lakeside Neighborhood Greenway (Island Line to Blodgett Oven)	Shared lane markings, green infrastructure and traffic calming
3	Locust Street Bikeway (Caroline to Shelburne)	Protected bicycle lanes
3	Locust Street Bikeway (Pine to Caroline)	Shared use path and marked with shared lanes
2	Main Street Complete Streets Upgrades (University Heights to Jughandle - South Side)	Extend UVM Shared Use Path to South Burlington line
2	Manhattan Bikeway (Elmwood Ave to Park St)	Combination of bike lanes, protected bike lanes, and greenway
2	Manhattan-Washington Greenway (North Ave to Park St)	Shared lane markings, green infrastructure and traffic calming
2	Mansfield Ave Bikeway (Colchester to North)	Shared use path on east side; shared lane markings
1	Moore Drive Greenway (Park to Ethan Allen Parkway)	Shared lane markings, green infrastructure and traffic calming
3	Morse Place Sidewalk (Briggs to Pine)	New sidewalk
1	North Ave. Complete Streets Upgrades	Add permanent protected bikeway treatments along North Avenue. Pending results of the 2016 Pilot Project, add protected/conventional/buffered bike lanes on North Avenue where feasible.
2	N. Prospect Street Bikeway (Pearl to Riverside)	Bicycle lane northbound/shared lane southbound
2	North Street Sidewalk (Prospect to Mansfield Ave, north side)	New sidewalk
2	North Street Slow Zone (North Ave to Union)	Traffic calming, curb extensions, raised intersections, shared lane markings

Sub-Area 1: The New North End
Sub-Area 2: Downtown, Old North End, Waterfront
Sub-Area 3: South End
See page 74 for Sub-Area Overview Map

LIST OF RECOMMENDED PROJECTS TO BE IMPLEMENTED IN THE NEXT 5-15 YEARS (CTD...)

Sub-Area	Project Name	Proposed Action
1	Northview Drive Greenway (Rivers Edge to North Ave)	Shared lane markings, green infrastructure and traffic calming
2	Oak Street Greenway (Intervale to Manhattan)	Shared lane markings, green infrastructure and traffic calming
2	Pearl Street Bikeway (Battery to Prospect)	Bicycle lanes (phase 1)/Protected lanes (phase 2)
3	Pine Place Greenway (Pine to St. Paul)	Shared lane markings, green infrastructure and traffic calming
3	Pine Street Complete Streets Upgrades (Howard to Flynn)	Protected bicycle lane (northbound)/shared lane (southbound)
3	Pine Street Sidewalk (Lyman to Home)	New sidewalk
3	Prospect Pkwy Greenway (Shelburne to S. Prospect)	Shared lane markings, green infrastructure and traffic calming
3	Richardson Street Sidewalk (Home to Morse)	New sidewalk
2	Riverside Path Extension (N. Winooski to Intervale Ave)	Shared use path on north side of street
2	Roosevelt Park Greenway (St Louis St through Roosevelt Park)	Shared lane markings, green infrastructure and traffic calming
2	Route 127 Path-Manhattan Connector (Route 127 Path to Manhattan Drive)	Shared use path in Route 127 right-of-way
3	S. Prospect Street Bikeway (Ledge to Maple)	Shared Use Path on east side
2	S. Prospect Street Bikeway (Maple to Pearl)	Shared lanes/Shared Use Path on UVM Green
3	S. Prospect Street Greenway (Prospect Pkwy to Ledge)	Shared lane markings, green infrastructure and traffic calming
2	S. Willard Sidewalk (Cliff St to Champlain College)	New sidewalk
3	S. Willard St Bikeway (Shelburne to Cliff)	Mark and sign bicycle lanes
3	S. Winooski Bikeway (Shelburne Rd to Main St)	Southbound protected bicycle lane
3	Sears Lane Bikeway (Pine to Harrison)	Mark and sign for shared use lane
3	Sears Lane Sidewalk (Waterfront Path to Pine St)	New sidewalk
3	Shelburne Road Bikeway (City Line to St. Paul)	Lane reassignment and bicycle lanes (phase 1)/ Protected bicycle lanes (phase 2)
3	South Meadow Greenway (Champlain Pkwy/Howard Ctr to Raymond Pl)	Shared lane markings, green infrastructure and traffic calming
2	Spruce Street Greenway (St. Paul to S. Willard)	Shared lane markings, green infrastructure and traffic calming
1	Starr Farm Rd Greenway (North Ave to Island Line)	Shared lane markings, green infrastructure and traffic calming
1	Sunset Drive Greenway (Franklin Sq to Northview via Rivers Edge Dr.)	Shared lane markings, green infrastructure and traffic calming
2	University Place Shared Street (Main to Colchester)	Shared space zone, prohibit through traffic, consider dedicating street to UVM

Sub-Area 1: The New North End
Sub-Area 2: Downtown, Old North End, Waterfront
Sub-Area 3: South End
See page 74 for Sub-Area Overview Map

LIST OF RECOMMENDED PROJECTS TO BE IMPLEMENTED IN THE NEXT 5-15 YEARS (CTD...)

Sub-Area	Project Name	Proposed Action
1	Village Green Greenway (to Van Patten)	Shared lane markings, green infrastructure and traffic calming
2	Walnut-Elmwood Greenway (Archibald to Oak)	Shared lane markings, green infrastructure and traffic calming
2	Walnut-Elmwood Greenway (Pearl to Archibald)	Shared lane markings, green infrastructure and traffic calming
3	Wells Street Greenway (Flynn to Home)	Shared lane markings, green infrastructure and traffic calming
3	Wells Street Sidewalk (Flynn to Home, east side)	New sidewalk
1	Westward Drive-Northshore Drive Greenway	Shared lane markings, green infrastructure and traffic calming

Sub-Area 1: The New North End
Sub-Area 2: Downtown, Old North End, Waterfront
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See page 74 for Sub-Area Overview Map

Illustrated Glossary of Safe Streets Treatments

This section of the document is an "illustrated glossary" defining many of the treatments recommended throughout the plan. The Sub-Area sections of the plan and the Project Bank in this Appendix provide details about how some of these treatments could be applied to achieve the recommendations outlined in the plan.

Best practices in walk/bike planning are changing rapidly. Cities around the country are trying new types of infrastructure every year. Technologies to support active transportation are also rapidly evolving - wayfinding using smart phones is increasingly common, and electric assist bicycles are growing in popularity in cities with significant hills. Thus, it is important to note that this illustrated glossary is not an exhaustive or prescriptive list of tools - it is simply intended to provide definitions to help readers understand the recommendations in the plan.

Burlington can and should continue to integrate new design treatments as the dynamics of pedestrian and bicycle planning evolve. As new designs and technologies emerge, Burlington should aim to implement the most robust and appealing facility type possible, to meet the needs of people of all ages and abilities. Where the City's current Street Design Guidelines do not provide enough guidance on use of new tools, the City should consult the most progressive design standards available, like the NACTO and ITE Walkable Thoroughfares manuals.

In this rapidly-changing design landscape, the overarching goals of the plan should continue to guide implementation:

- Creating safer streets for everyone
- And, making walking and biking a viable (and enjoyable) way to get around town.

The illustrated glossary on the pages ahead is intended to provide definitions for many of the treatments recommended in the plan.

It is not an exhaustive or prescriptive list of tools for the City of Burlington to use, nor is it intended to provide detailed guidance about street design.

Best practices in walk/bike planning are changing rapidly. Burlington can and should continue to integrate new design treatments as the dynamics of pedestrian and bicycle planning evolve, consulting the most progressive design standards available, like the NACTO and ITE Walkable Thoroughfares manuals.

Photo: Dan Burden

ADVANCE CROSSING SIGNAL

Definition: The programming of a traffic signal to remain all-red for several seconds for vehicles traveling in all directions while pedestrian crossing signal gives people walking a head start. Increases compliance of turning cars to yield to crossing

Photo: unknown

ADVISORY BICYCLE LANE

Definition: A bicycle lane that creates preferential space for bikes that cars can use as needed to make room for oncoming traffic. Advisory bicycle lanes are typically marked with a dashed (not solid) line, and they are often used in conjunction with centerline removal along low-speed, low-volume streets. Bollards can be placed on the dashed line at intervals to enforce motorist use of the center lane.

BICYCLE BOX

Definition: A section of pavement aimed at preventing bicycle/car collisions at intersections, particularly between drivers turning right and cyclists traveling through an intersection or turning left. To improve its visibility, a Bicycle Box is often colored and includes a standard white bicycle pavement marking.

Overlapping benefits: Increases distance between people walking across the street and idling motorists, and provides people bicycling with a head start across the intersection when the light turns.

BICYCLE CORRAL

Definition: An on-street bicycle parking facility that can accommodate up to 12 bicycles in the same area as a single car.

Overlapping benefits: When placed near street corners, a Corral increases visibility and creates an additional buffer for pedestrians.

Photo: Boston, MA, via Boston.com

BICYCLE PRIORITY LANE ("SUPER SHARROWS")

Definition: As noted on page 176, sharrows are pavement markings that indicate a shared lane for bicycles and automobiles. Sharrow markings can be enhanced to create a "super sharrow" by adding colored pavement and/or doted line markings emphasizing a "bicycle priority lane".

Overlapping benefits: Enhances predictability of road use, providing a strong visual signal that travel lanes will be used by people on bikes.

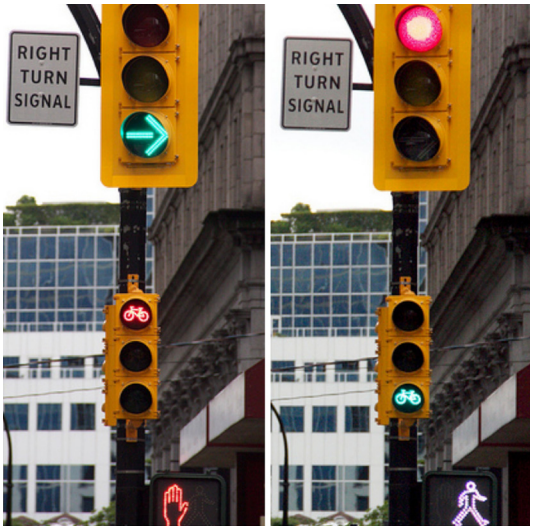

Photo: StreetsblogUSA

BICYCLE SIGNAL

Definition: A traffic control device used in combination with an existing conventional traffic signal or hybrid beacon.

BICYCLE WAYFINDING SIGNS

Definition: Signs of any kind that mark a bikeway route. Wayfinding signs should help people bicycling find the streets most amenable to bicycle travel, and find their way to major bikeway network or community destinations (landmarks, commercial districts, neighborhoods, schools, parks, etc.).

Photo: UrbanABQ

BUFFERED BICYCLE LANE

Definition: Buffered bicycle lanes are conventional lanes paired with a painted buffer between people on bikes and moving and/or parked cars. They are not a substitute for protected bike lanes, but have the added benefit of increased distance between motor vehicles and allowing width for faster cyclists to overtake slower ones.

Overlapping benefits: Can have a traffic calming effect, making a street safer for all users.

Photo: neighborhodonotes.com

CHANNELIZERS

Definition: A constructed barrier that narrows the roadway to slow vehicle speeds.

CHICANE

Definition: A constructed barrier that creates turns to slow the speed of vehicles along a particular roadway.

COLORED PAVEMENT

Definition: The use of colored pavement (typically green) to make bicycle facilities more visible at known and potential conflict areas. For more detailed guidance, refer to the latest VTrans standard, which specifies that solid green paint should be used for all intersections with 40+ VPH crossings.

Burlington Public Works recently applied green paint at a few intersections. The Department of Parks, Recreation & Waterfront has also consistently applied green paint to visually designate the Burlington Bike Path along the waterfront.

Photo: Streetsblog Los Angeles

COMBINED BIKE LANE/TURN LANE ("MIXING ZONE")

Definition: Pavement marking that suggest people bicycling through an intersection and motorists turning must share the space. Treatment is often accompanied by signs advising vehicles to yield to cyclists and/or directing cyclists/vehicles into appropriate positions within the lane.

Photo: NACTO

CONTRA-FLOW BICYCLE LANE

Definition: Bicycle lanes that are designed to allow cyclists to ride in the opposite direction of vehicle traffic.

Overlapping benefits: By providing a legitimate two-way pathway for people on bikes, contra-flow bicycle lanes can reduce the frequency of sidewalk riding.

Photo: Flickr user jcutrufo

CONVENTIONAL BICYCLE LANE

Definition: A lane reserved for bicycle travel within a thoroughfare, marked by simple painted lines. Conventional bicycle lanes are typically located along the curb or adjacent to parallel parked cars, and usually run in the same direction as vehicular traffic.

Photo: NACTO

CURB EXTENSION

Definition: The expansion of the sidewalk / greenbelt to physically narrow the roadway, creating safer and shorter crossings while increasing the available space for placemaking and stormwater management amenities, such as benches, bus shelters, rain gardens, trees, bike parking etc.

Photo: Paul Krueger

DIVERTERS

Definition: A physical barrier designed to control movement of traffic in a particular direction. One example is a diagonal diverters, which can be strategically located to prevent through moves at an intersection and reduce traffic volumes on a street. Diverters can also be designed to prevent drivers from entering or exiting certain legs of an intersection.

GARDEN WALKS

Definition: With involvement from adjacent private landowners, neighborhood organizations can create landscaping along the city's sidewalk that provides a more attractive and enjoyable place to walk, and can have ancillary benefits for stormwater management using rain garden design techniques.

Overlapping benefits: Creates a beautiful street that is more enjoyable for all.

HAWK BEACON

Definition: An acronym for High-Intensity Activated crossWalK beacon, a HAWK beacon is a traffic control device used to stop road traffic and allow pedestrians to cross safely.

INTERSECTION CROSSING MARKINGS

Definition: Pavement markings which indicate the intended path of bicycle traffic through an intersection. They guide bikes on the right path and visibly warn drivers of a potential conflict point. For more detailed guidance, refer to the latest VTrans standard, which specifies that solid green paint should be used for all intersections with 40+ VPH crossings.

Overlapping benefits: Markings reinforce proper directional travel and discourage people from riding their bicycles in the crosswalk itself.

Photo: NACTO

MEDIAN REFUGE ISLAND

Definition: A curb or barrier protected area between travel lanes that provides people crossing the street on foot or on a bike a safe place to rest midway.

Overlapping benefits: Median refuge islands provide a protected space for pedestrians to wait and can have a traffic calming effect.

Photo: NYCDOT

NEIGHBORHOOD + CORRIDOR SLOW ZONES

Definition: Neighborhood and Corridor Slow Zones are areas where the street is designed and engineered for slow travel. That means designing for 85th percentile speeds to achieve 25 mph or less on major corridors, and 15-20mph or less on neighborhood streets and greenways.

Neighborhood Greenways: A Field Guide

Neighborhood Greenways are streets with low vehicle volumes and speeds, designed to prioritize bicycling and enhance conditions for walking. Neighborhood Greenways are streets where people of all ages and abilities feel safe walking, biking, and playing. To create this condition, Neighborhood Greenways use a variety of the traffic calming and placemaking treatments, including:

- Narrow travel lanes, which can be created with cub extensions , channelizers, or chicanes.
- Treatments such as speed bumps and traffic diverters, which discourage vehicles from using the street as a cut-through.
- Greening elements such as planters or rain gardens.
- Clear wayfinding for people walking and biking.
- Pavement markings to reinforce the shared use of the street, typically via a shared roadway marking or sharrow.
- Protected crossings at major intersections.

▲ *Neighborhood Greenways are streets with low vehicle volumes and speeds, designed so that people of all ages and abilities feel safe walking, biking, and playing. (Photo by Seattle DOT.)*

▲ *Neighborhood Greenways feature traffic calming measures, like the diverter above, to keep speeds low. (Photo by Walk Eagle Rock.)*

▲ *In Seattle, a neighborhood traffic circle keeps speeds low along a Neighborhood Greenway (Photo by Seattle DOT.)*

▲ *Large shared lane markings help communicate bike/ped priority. (Photo by Payton Chung.)*

▲ *Neighborhood Greenway signage (Photo by Seattle DOT.)*

PARKLET

Definition: The replacement of 1- 3 on-street parking spaces with usable public space.

Overlapping benefits: Can integrate bicycle parking

PATHWAYS AND SHORTCUTS

Definition: Many neighborhoods have informal paths through public or private spaces that allow more convenient or pleasant access to key destinations, such as schools or parks. Examples include paths through Callahan Park, Integrated Arts Academy at H.O. Wheeler, or Leddy Park.

Overlapping benefits: If shared-use is appropriate, such paths can provide low-stress bikeways.

PEDESTRIAN PLAZA

Definition: Pedestrian Plazas transform underutilized roadway space into a public amenity.

Overlapping benefits: Can benefit locate businesses, integrate bicycle parking, and have a traffic calming effect.

Photo: Jonathan Maus, Bike Portland

PROTECTED BICYCLE LANES

Definition: A one or two-way bicycle lane that is separated from vehicular traffic with physical barriers (such as bollards, medians, raised curbs, etc.).

Overlapping benefits: By providing a low-stress option for riding a bicycle in the roadway itself, protected bicycle lanes typically reduce the frequency of sidewalk riding. They can also have a traffic calming effect, add beauty, introduce stormwater ma making, and improve access to commercial districts.

Photo: Alta Planning + Design

PROTECTED INTERSECTION

Definition: The use of design treatments (corner refuge islands, forward stop bar for bicyclists, a setback for bike and pedestrian crossing, and bicycle/pedestrian friendly signal phasing) to simplify left turns, protect right turns from traffic, and provide through movement that minimize or eliminate conflicts from turning cars.

RAISED CROSSWALKS

Definition: Much like a raised intersection, this treatment benefits people walking by raising crosswalks to the level of the sidewalk so that pedestrians are more visible to drivers and have a seamless experience crossing the street.

RAISED INTERSECTION

Definition: Similar to speed humps and other vertical surface traffic-calming treatments, raised intersections reinforce slow speeds and encourage motorists to yield to pedestrians at the crosswalk/ intersection.

RECTANGULAR RAPID FLASH BEACONS (RRFBS)

Definition: A flashing light activated by people walking who desire to cross the street and seen by people driving who are meant to yield the right-of-way to pedestrians.

Photo: Flickr

RIGHT-TURN-ON-RED BAN

Definition: The use of posted signs that indicate to people driving that they are not permitted to make a right turn on red during the pedestrian crossing phase.

Roundabouts: A Field Guide

Roundabouts offer many benefits, including increasing safety, road capacity, and design, and they are a tool that should be considered for Burlington's intersections. Single lane roundabouts have an excellent safety record for all modes of transportation, and can accommodate car traffic in fewer lanes, potentially leaving more room on the streets for biking and walking. (Note that multi-lane roundabouts lose many of the safety benefits of single-lane roundabouts.) Roundabouts come in many sizes and styles, and each type has a place on Burlington's streets. See the following page for details about potential opportunity sites for each of the roundabout types described below.

Main and High St. roundabout in Plymouth, NH between downtown and Plymouth State campus.

MODERN URBAN ROUNDABOUT

Definition: Typically greater than 90 feet in diameter (measuring the outside edge of the traffic portion), these roundabouts especially good for slowing down traffic, thus increasing safety for everyone.

Cost Range: Typically $3 to $5 million, due to high design and engineering complexity, and need for acquiring property, relocating utilities, etc.

Mini roundabout from Fort Collins, CO.

MINI ROUNDABOUT

Definition: Have many of the same features of a full sized roundabout, but in a pint-sized version. Mini Roundabouts are completely "mountable" by larger trucks.

Cost Range: Much lower than Modern Urban Roundabouts. Depending on design, can range from $100,000 to $300,000. Vermont's first Mini Roundabout is located in Manchester, VT.

Flickr Dylan Passmore

NEIGHBORHOOD TRAFFIC CIRCLE

Definition: Roundabout used for traffic calming and beautification on low volume neighborhood streets. Many examples exist in Burlington through the city's Traffic Calming program. Large vehicles have to make their left turns "left of center" of the island.

Cost Range: Less than $50,000, depending on materials and landscaping.

Roundabout Opportunities in Burlington

Single lane roundabouts, designed with contemporary guidelines (i.e. not a Massachusetts rotary or a New Jersey traffic circle!) have consistently proved to be the safest type of intersection, bar none. They are designed to handle high volumes of traffic in a safe and slow manner. The behavior of drivers navigating a roundabout is very different than traffic signals, where drivers tend to speed up just as the light turns yellow. Roundabouts are a very effective way to reinforce slow zones due to their ability to handle high volumes but maintain low speeds. Any roundabout in an urban setting should have very prominently designed pedestrian crossings. Roundabouts are typically designed to give bicyclists two choices: ride through as a vehicle (less intimidating than you might think due to the low speeds) or circulate outside the roundabout on a shared use path. The list below shows some of the opportunities for roundabouts in the City. For any intersection where a signal or widening is being considered, a roundabout should be considered first!

LOCATION*	URBAN ROUNDABOUT	MINI-ROUNDABOUT	TRAFFIC CIRCLE
Archibald & Intervale		X	X
Colchester & East Ave	X	X	
Colchester & Prospect & Pearl		X	
Colchester & Riverside & Barret	X		
Howard & St Paul & Winooski		X	
Intervale & Oak & Riverside		X	
Lakeside & Pine	X		
Loomis & North Prospect			X
Main & South Prospect	X		
Manhattan & Spring		X	
Maple & Battery	X	X	
Maple & Summit			X
North Ave & Institute	X		
North Ave & Plattsburg		X	
North Ave & Route 127 Ramps	X		
North St & North Prospect		X	
North St & North Willard		X	
North Willard & Loomis		X	

LOCATION (CONTINUED...)	URBAN ROUNDABOUT	MINI-ROUNDABOUT	TRAFFIC CIRCLE
Pearl & Willard		X	
Pearl & Winooski		X	
Pine & Flynn		X	
Pine & Home		X	
Randy & Hope			X
Shelburne & Flynn	X		
Shelburne & Home	X		
Shelburne Road Rotary	X		
Shore & Dale			X
South Winooski & Bank	X	X	
South Winooski & Cherry		X	
South Winooski & College		X	
South Winooski & Main	X	X	
South Winooski & Pearl	X	X	

**Not that the locations in the charts above are intended to be an initial list of suggestions, not a comprehensive analysis. More detailed, further review may identify additional opportunity sites.*

SCRAMBLE CROSSING

Definition: The use of a signal that goes red for people driving on all sides of an intersection, while allowing people walking or biking to cross in all directions, including diagonally, in an exclusive signal phase.

Photo: NACTO

SHARED SPACE

Definition: A public right-of-way, typically curbless, where people using all modes of transportation share the space without traditional safety infrastructure to guide them. May also be called a "woonerf."

Overlapping benefits: Can provide a low-stress bikeway and place-making benefits.

SHARED USE LANE MARKING (OR "SHARROW")

Definition: Pavement marking that indicates a shared lane for bicycles and automobiles. Sharrows reinforce the legitimacy of bicycles on the street, recommend proper positioning, and may be used to offer directional guidance. Sharrows are not a substitute for bike lanes, and more robust treatments should be applied wherever conditions indicate that sharrows are not an appropriate treatment. Sharrows typically do not improve bicyclist safety or comfort unless applied on low-speed streets in conjunction with other traffic calming features.

SHARED USE PATH

Definition: A two-way path that is physically separated from vehicular traffic. Shared-use paths should be designed to accommodate the needs of both people on bikes and people on foot.

Overlapping benefits: Provides safe and protected recreational option for people walking, jogging, skating, wheeling etc.

Photo: Portland, OR by FHWA

THROUGH BICYCLE LANE

Definition: Pavement marking that provides bicyclists with an opportunity to position themselves to avoid conflict with right turning vehicles.

Photo: Bicycle Tucson

TRUCK CORNER APRONS

Definition: Corner design that provides a tighter radius for passenger cars, and more generous curb for trucks of a mountable, durable surface. This treatment reduces speeds for turning passenger cars, but does not impede truck turns.

Overlapping benefits: By creating a tighter turning radius for passenger cars, corner aprons can have a traffic calming effect for all users.

Photo: Matt Johnson

TWO-STAGE TURN QUEUE BOXES

Definition: Pavement marking that allows cyclists a safe way to make left turns from the right side of the road. While two-stage turns may increase comfort in many locations, this design can increase delay for people on bikes, as they must wait for green signals or gaps in traffic.

Overlapping benefits: Provides a high-visibility, designated space for people on bikes to wait, outside of the crosswalk area.

Walk Bike
planBTV

For more information, visit: www.planbtvwalkbike.org