UVMoves

UNIVERSITY OF VERMONT
ACTIVE TRANSPORTATION PLAN

PREPARED BY: ALTA PLANNING + DESIGN

In collaboration with: Broadreach Planning & Design

JANUARY 2017

The University of Vermont

BROADREACH Planning & Design

alta PLANNING + DESIGN

FOREWARD

The recommendations in this plan are conceptual.
It is important to note that the designs presented in this plan are intended as conceptual illustrations. As projects move from the plan towards implementation, each project will need to go through a detailed design process that will include being reviewed for compliance with the University's 2006 Campus Master Plan inclusive of site plan and design review processes, with recommendation to UVM senior administration for final approval. This will be a collaborative process that will involve the appropriate University stakeholders, and where needed, the Cities of Burlington and South Burlington, and Chittenden County Regional Planning, and other planning and/or regulatory parties as required for standard project review and approval.

The goal of the plan is to increase safety for all users while improving active transportation options.
As specific projects move toward implementation, options to increase safety as well as improved ease of access by a variety of methods will be assessed. Such methods could include assessing the feasibility of separate facilities, widening and/or delineating pathways to accommodate multiple uses, dismounting in areas of congestion, education and signage, enforcement and other regulations, among others.

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1.1 EXECUTIVE SUMMARY

The University of Vermont is poised to become the type of campus where moving without a car is both possible and desirable. Non-motorized mobility (including walking, biking, skateboarding, running, skating, skiing, scooters, wheelchairs, and other forms of travel) provides UVM faculty, staff, students and visitors with important health, environmental, educational and economic benefits. UVM has committed itself to this philosophy and is determined to improve conditions for pedestrians, bicyclists and other forms of active transportation and recreation. Currently, UVM is nationally recognized as a Silver level Bicycle Friendly University, achieving an upgrade from its Bronze Level designation due to increasing the number of bicycle racks on campus, and growing the Bicycle Education Center. Implementing this plan will take the campus to the Gold level and beyond, becoming a model for sustainability, which is an integral part of the University's vision.

The University of Vermont campus has a well-established network of existing paths that make non-motorized transportation a viable way to move around UVM's campus. However, many of these facilities are overcrowded and there are critical gaps in both the on-street bicycle network and off-street path system. Additionally, major streets bisect the Main Campus, creating challenging crossing conditions. Winter conditions are also a key issue, especially with Burlington's limited daylight hours and frequent snowfall during the majority of the academic year.

To support and encourage improved conditions for active mobility, the UVM community conducted campus outreach meetings, established a technical advisory committee of key stakeholders, and coordinated with municipal and regional partners to develop this Plan. The UVM Active Transportation Plan is presented in terms of "5 E's": Engineering, Education, Encouragement, Enforcement and Evaluation. While every campus is unique - the five E's serve as a useful model for recommendations to improve active transportation. The five E's were used to evaluate existing conditions at UVM, and then to provide recommendations for improving the active transportation conditions on campus and establish a culture that supports walking, bicycling and skateboarding and other forms of non-motorized mobility. The key recommendations of the plan are summarized as follows:

ENGINEERING

The most visible sign of a welcoming place for active transportation is the presence of high quality and well maintained infrastructure, including:

- A signature UVM greenway corridor defined by the Redstone and Green Mountain Walkway linking the campus from north to south.
- A well-connected network of paths, on-street bikeways, pedestrian zones, safe crossings and sidewalks, within and adjacent to campus
- Policies to ensure connectivity and all-season maintenance of this important infrastructure
- Consistent provision of bike parking, benches, lighting, shade trees, pocket parks and other amenities.

EDUCATION

Educating students and staff is key to building a safe and supportive active transportation culture that includes:

- Walking, bicycling and skateboard safety education/training and lights/helmets give-a-ways
- Online tips, rules, regulations, and tools (in addition to social media outreach)
- Information about rights and responsibilities for all road and path users included in orientation and recruitment materials

ENCOURAGEMENT

It is important to create a supportive environment where faculty, staff and students are encouraged to use active transportation can be readily implemented by providing a variety of opportunities and incentives to choose walking, biking and other non-motorized modes for transportation:

- National Bike/Walk Month, and Bike/Walk to Campus Day, Way to Go Challenge events
- Wayfinding tools including maps, route finding signage, and mobile apps
- Incentive programs offering prizes or Student Union discounts

ENFORCEMENT

An effective active transportation community has rules and regulations that are understood and enforced fairly and appropriately to address the safety of all road and path users, including:

- Updated rules and regulations related to riding and parking
- Fair and equitable enforcement and trained law enforcement officers
- Theft prevention and enforcement

EVALUATION

Evaluation involves measuring and benchmarking data as a tool to understand and create a successful and safe non-motorized mobility environment. Measuring and benchmarking activities include:

- Counting active transportation participation rates
- Evaluating facilities, their performance, and usage
- Tracking bike and skateboard thefts and crashes

To advance the recommendations in this plan, it is recommended that a full-time active transportation coordinator be hired.

UVMoves VISION The University of Vermont is firmly committed to setting policy, developing programs, and increasing infrastructure to support and safely accommodate active modes of transportation to, from, and on the UVM campus.

UVMoves Vision, Goals & Objectives

UVM has developed this Active Transportation Plan to increase rates of non-motorized mobility on campus. The Vision for this Plan was informed by a national review of goals, policies, and objectives to improve walking and biking conditions in urban environments and on campuses. It also reflects the central tenants of UVM's official Vision, Mission and Goals.

This plan's Vision is supported by a series of goals and objectives, which together, will put UVM on a path to becoming one of the most walk, bike and skateboard friendly universities in the country. The goals and objectives are organized into seven categories:

- Health and Safety
- Education and Encouragement
- Enforcement
- Transit Integration
- Sustainability
- Implementation

These goals and objectives should be referenced often to ensure that progress is consistently made on the recommendations within this report.

1.2 EXISTING CONDITIONS OVERVIEW

The University of Vermont has a long history of commitment to sustainability and active transportation. **Chapter 2: Existing Conditions** includes a review of supporting plans and initiatives related to active transportation. It also includes a thorough review of the existing walking, bicycling and skateboarding conditions in-and-around UVM. This chapter establishes the baseline from which recommendations to improve non-motorized circulation on campus were developed.

Past Plans Review

UVM's commitment to sustainability is demonstrated in the planning efforts, policies, programs and activities that UVM has led, which support and/or promote active modes of transportation. Additionally, other agencies, such as the Cities of Burlington and South Burlington as well as Chittendon County, have led planning projects that would improve circulation in and around campus. These internal and external initiatives are summarized in Chapter 2.

Figure 1-1: *The UVMoves Plan focuses on the Main Campus Area, identified in orange above*

Existing Conditions Analysis

The existing conditions analysis was necessary to understand the state of active transportation conditions on campus. This review formed the foundation from which recommended improvements were made. The analysis involved many components, including:

- Researching existing active transportation infrastructure (including bike parking and other

end of trip facilities), circulation patterns of students, faculty and staff, and areas where conflicts between modes exist
- Analyzing data generated by an online public input map administered by the University to students, faculty and staff
- Identifying the Strengths, Weaknesses, Opportunities and Threats to walking and biking on campus through a S.W.O.T. mapping exercise

UVM is a very walkable campus with a well-developed system of internal paths. These paths make circulating within the Central Campus comfortable. However, the Central Campus is separated from the primary residence hall areas by busy roads that can be uncomfortable to travel upon. These roads include Colchester Ave, East Ave, Main St and S. Prospect St. The recommendations in the report would improve non-motorized access along and across these roads, as well enhance the path network, making interactions between modes safer and active transportation more viable.

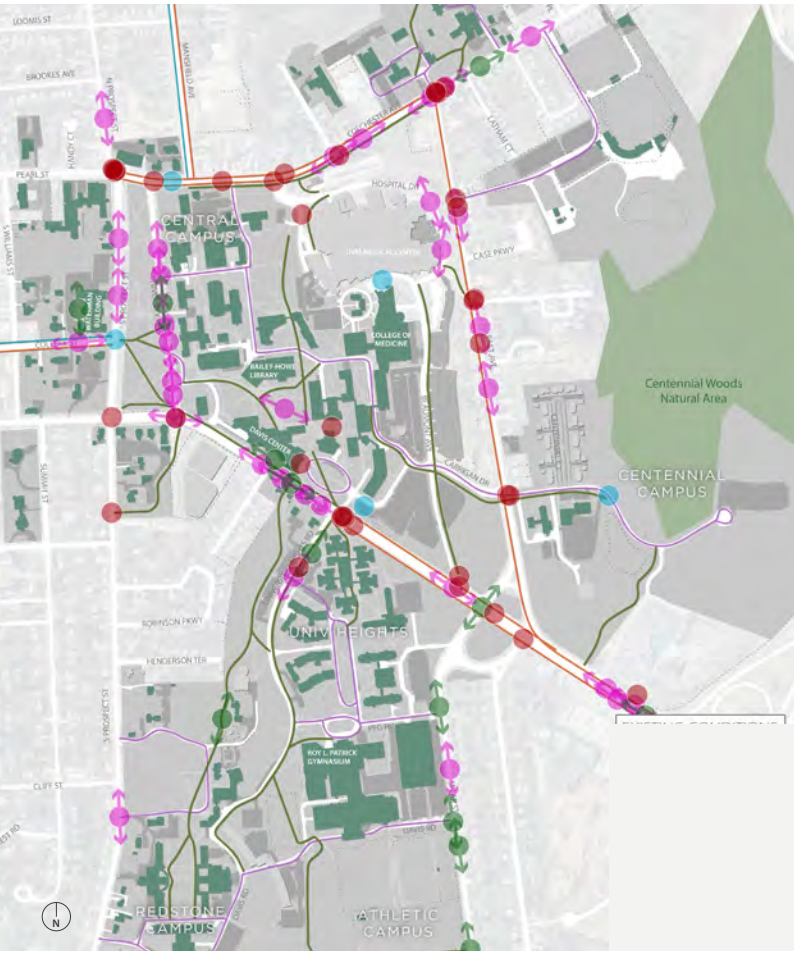


Figure 1-2: *Feedback from the Campus Community, collected both in person and via surveys, was critical to formulating the plan recommendations*

1.3 RECOMMENDATIONS OVERVIEW

The recommendations to improve active transportation on campus resulted from an iterative process. The steps taken to develop the Plan recommendations included:
- Research and analysis of campus policies and active transportation-related conditions in-and-around the campus
- Observation and analysis of circulation patterns, connectivity challenges, and opportunities for improvement
- Input gathering from the university community through campus open houses, surveys and mapping exercises
- Formulating recommendations that will improve active transportation conditions
- Vetting recommendations for feasibility, and evaluating the priority of the recommendations

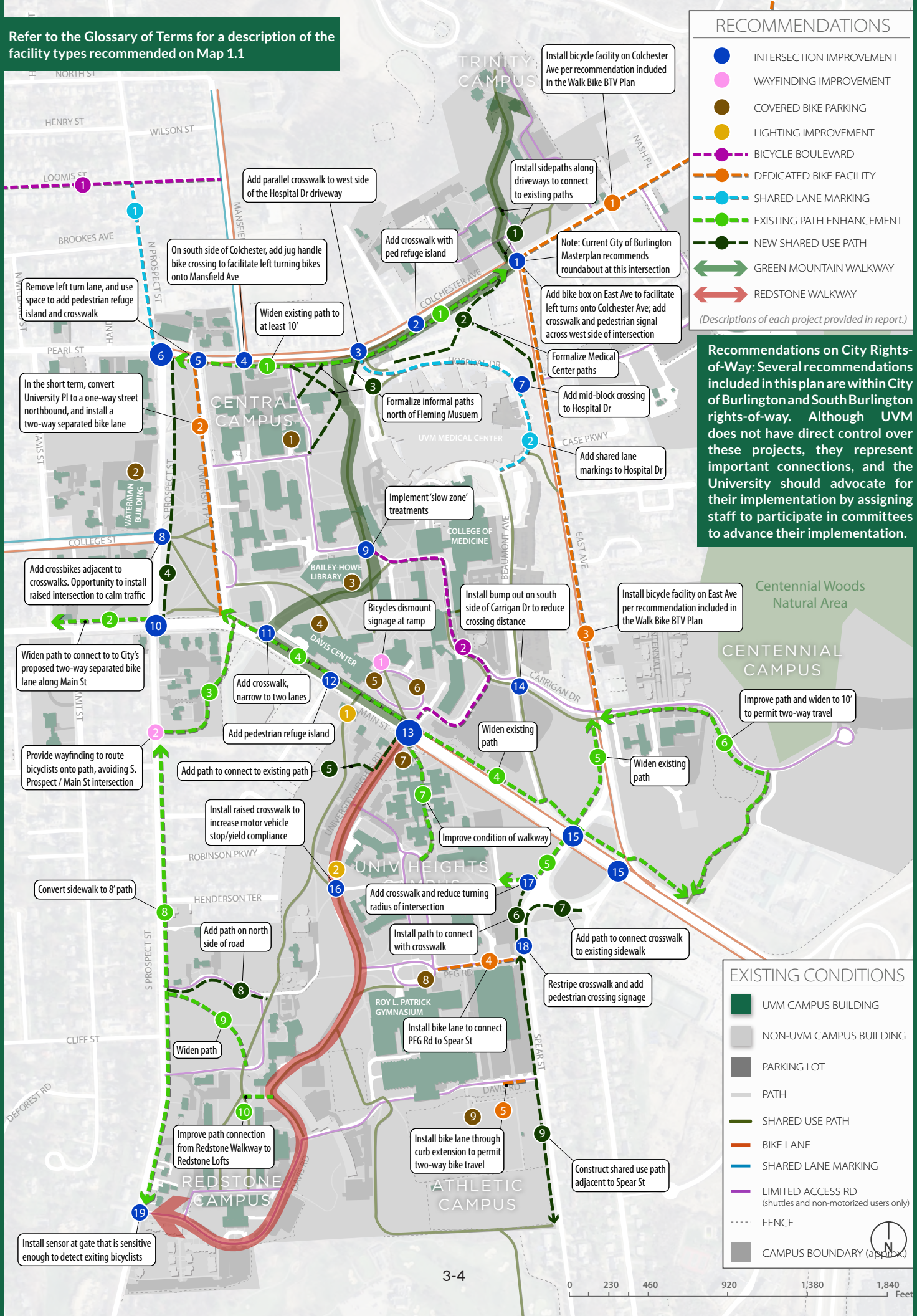
The recommendations are organized according to the Five E's. This approach aligns this Active Transportation Plan with national standards and best practices and positions UVM to improve active transportation on campus. The structure of the recommendations follow this outline:
- **Engineering**: Infrastructure recommendations included to improve non-motorized access in-and-around campus
- **Education**: Comprehensive education programs targeted at students, faculty, and staff to make interactions between modes safer
- **Encouragement**: Comprehensive encouragement programs targeted at students, faculty, and staff to foster a culture that supports active transportation
- **Enforcement**: Positive enforcement programs for safe walking, bicycling and skateboarding behaviors.
- **Evaluation and Planning:** Establish benchmarks and practives to monitor implementation of the UVMoves Active Transportation Plan.

Engineering Recommendations:

Engineering improvements result in better infrastructure that makes active transportation comfortable for people of all ages and abilities. The engineering recommendations, included in Chapter 3, are the foundation of this Plan and are divided into three categories:
- **Project Recommendations**: Specific spot and corridor improvements, grouped into nine category types including: wayfinding, lighting, covered bike parking, bicycle boulevards, bike lanes, shared lane marking, existing path enhancements, and new pathway projects (**displayed on on Map 1.1**) Summaries of each project, including project priority level, are included in Chapter 3.

MAP 1.1: PROJECT RECOMMENDATIONS

Refer to the Glossary of Terms for a description of the facility types recommended on Map 1.1



- **Bike Route Network & Dismount and/or Slow Zones:** Designate major routes in-and-around campus as bike routes; delineation of Dismount Zones and/or Slow Zones in congested areas of campus where bicyclists and skateboarders should dismount and walk.
- **Bike Parking Recommendations**: Strategy to improve both outdoor in indoor parking on campus.

Signature Project Recommendations

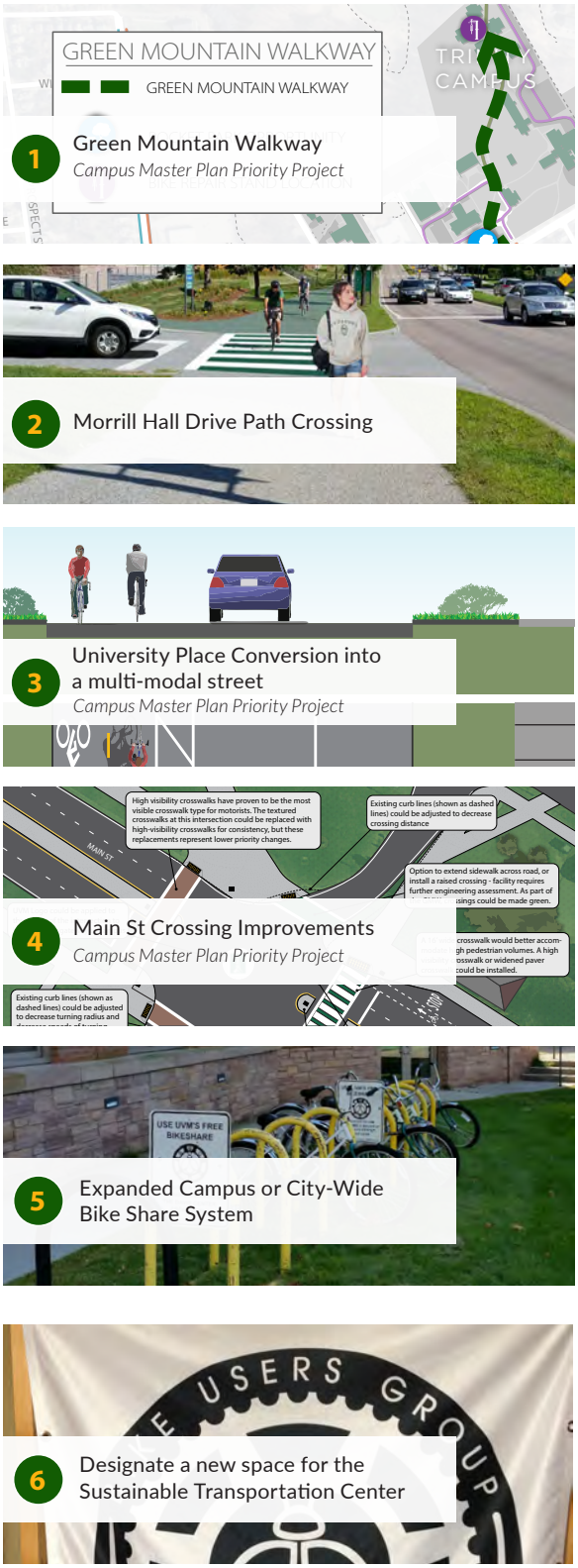
The campus community consistently identified six important sites and topics as priorities. These opportunities ranged from improving infrastructure to advancing programs that would support active transportation.

These six opportunity areas were designated as signature projects for UVM. These projects would significantly elevate the status of non-motorized mobility on campus, and visibly demonstrate UVM's commitment to prioritizing active transportation. These projects could be implemented independently or together, and represent opportunities for donors to contribute to improving non-motorized conditions on campus. Figure 3 displays these recommendations, and indicates if a project was also identified in the Campus Master Plan as a Priority Project.

Engineering Recommendations Summary

By implementing the engineering recommendations included in this Plan, the University will become a leader among higher education institutions who prioritize non-motorized mobility, and most importantly, improve the quality of life on campus.

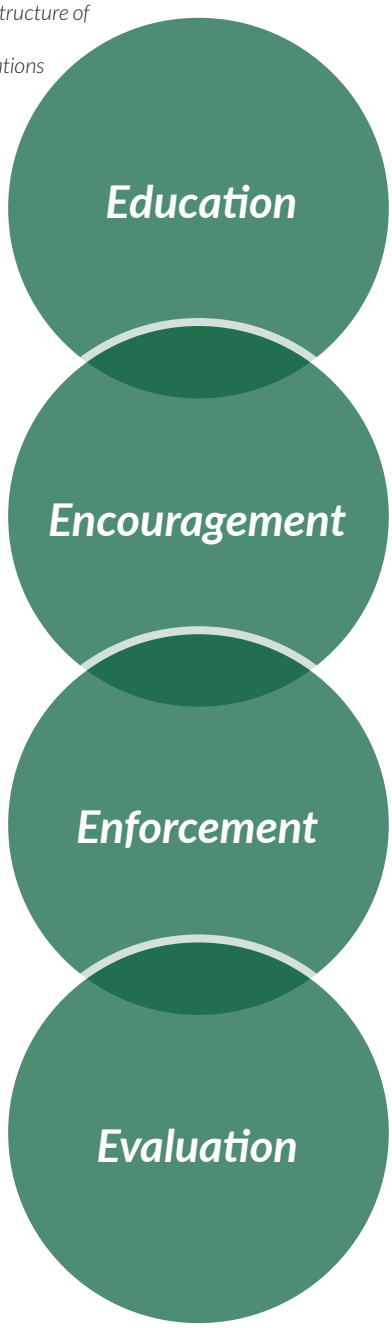
***Figure 1-3**: Signature Project Recommendations*



Program Recommendations

Equally important as providing bicycle and pedestrian infrastructure (engineering) is ensuring that users are familiar with the treatments and know how to use them. The other Five E's address these factors, and specific recommendations for each category are provided in **Chapter 4: Program Recommendations**. Education programs targeting the University community are recommended to complement existing efforts. Similar to education programs, encouragement programs provide incentives and benefits to the public to try non-motorized modes of transportation. Enforcement programs help to provide greater compliance to the "rules of the road", and evaluation programs help to track progress and statistics related to improving active transportation. Descriptions of the recommendations, and both dollar amount and labor cost-estimates, are provided in Chapter 4.

Figure 1-4: *Structure of Program Recommendations*



Gives people of all ability levels the confidence to use active modes of transportation and teaches travelers how to interact with each other safely

Creates a culture that supports active modes of transportation

Ensures all roadway users comply with the 'rules of the road'

Sets benchmarks to track key statistics related to walking, biking and skateboarding, ensuring progress is made

1.4 CONCLUSION AND NEXT STEPS

The Active Transportation Plan provides UVM with a greenprint to achieve a next generation of the campus environment. By moving more people with fewer cars, the University will reduce its carbon footprint, improve health and safety, support educational leadership, and integrate the values that define the unique experience that continues to attract faculty, students, staff and visitors to the University of Vermont. The following policy recommendations should be prioritized to guide the University's daily operations, design, implementation, and enforcement.

Table 1.2: UVMoves Policy Recommendations

POLICY		
Recommendation	Description / Rationale	Implementation Time Frame*
Adopt this Active Transportation Plan and endorse the goals within	Provides a map for improvements and indicates UVM's commitment to support the implementation of better facilities for non-motorized modes on campus	Short
Incorporate recommendations of this plan into other area plans	This will aid in funding and feasibility/design studies for the recommendations.	Ongoing
Work with City to appoint staff member to join Burlington's Walk/Bike Council	This committee makes recommendations to the City related to pedestrian and bicycle policy and infrastructure projects. UVM should have representation on this committee to advocate for the implementation of recommendations identified within this Plan on City ROW.	Short
Active Transportation Planner/ Sustainable Transportation Coordinator	Convert UVM's bike and pedestrian coordinator position from a half-time to full-time position. This staff person will monitor this Plan and ensure that it is implemented.	Short - increase Sustainable Transportation Coordinator to full time
Establish a Campus UVM Active Transportation Advisory Committee	UVM has a faculty/staff bike advisory group and a student bike user group. The purview of these groups should be broadened to include all non-motorized issues, becoming the Active Transportation Advisory group and the Active Transportation User Group, respectively. These groups will help staff uphold the recommendations of this Plan, advocate for changes at the City level, and advise on decisions about key projects. The committee can support UVM's cycling team, and oversee the student led Bike Maintenance Club. The Club should be given a larger, more visible space where they can repair more bikes and sell bike supplies (tires/tubes), and hire and pay students to work there using work study funds.	Short - establish the committee Ongoing - implement policy action items
Create and endorse a bicycle parking policy, inclusive of short-term parking and long-term bike storage policies	Institute a three tiered parking standard for the campus as detailed in this report, including *outdoor parking* (exposed and covered) as well as *indoor parking*. In developing the minimum number of parking spaces to be provided outside and within buildings, the Association of Pedestrian and Bicycle Professionals standards should be referenced.	Short - adopt a policy Ongoing - implement policy action items
Create and adopt a Winter Facility maintenance policy	This policy should be derived from the Winter Maintenance best practices included on page 6-5. At a minimum, all exposed bike racks should be maintained during winter months, and shared-use paths/bike facilities should be cleared of snow and de-iced post weather events.	Short - adopt a policy Ongoing - implement policy action items
Reevaluate parking policies and fees	Determine if parking policies and fees can be modified to reduce congestion and offer incentives for using transit and bicycles for commuting.	Mid
Continue to support CATMA's Guaranteed Ride Home policy for those who register their bikes, or who walk and skateboard to campus	Continue to support CATMA's Guaranteed Ride Home Program by offering taxi vouchers to individuals who sign up as an alternative commuter (carpool, bicycling, walking, skateboarding, or transit), providing a guaranteed way to get home should the need arise. A limiting factor in getting more adoption for alternative transportation is the fear that an individual will be stranded on campus should something unforeseen arise; a guaranteed ride home program helps to partially allay these fears.	Mid
Establish a budget for active transportation and pedestrian planning, implementation, and programming	Create a separate budget will allow UVM to fund projects and monitor trends in active transportation related expenditures.	Mid - Long

*__Short__ = within one to two years; __Mid__ = within three to five years; __Long__ = six or more years

CHAPTER 2:
EXISTING CONDITIONS

2.1 EXISTING CONDITIONS INTRODUCTION

The University of Vermont (UVM) has developed this Active Transportation Plan to guide the University through the next ten years. This Active Transportation Plan presents recommendations in anticipation of a greater level of interest in non-motorized transportation by students, faculty, and staff.

Recent years have seen a general rise in the rate of active transportation in many campuses and cities around the United States. These modes are low-cost and convenient in dense campus settings, and provide useful connections to existing transit systems. Nationally and within Vermont, many institutions of higher education have prioritized the development of facilities, programs, and policies that result in more friendly non-motorized environment for students, faculty, staff, and visitors.

The Existing Conditions chapter outlines the goals of this Plan and presents an analysis of the current state of walking, bicycling and skateboarding on campus, including existing active transportation infrastructure (Map 2.1), existing bike rack conditions (Map 2.2 and Map 2.3), existing bicycle support facilities (Map 2.4). It also includes a thorough analysis of existing non-motorized conditions on and around campus, featuring an assessment of conflict areas (Map 2.5), circulation patterns (Map 2.6), and the key opportunities and challenges to improving active transportation on campus (Map 2.7). The chapter concludes with information on past planning efforts the University and other agencies have undertaken relevant to this Plan, and also identifies UVM's existing programs and policies that support active transportation.

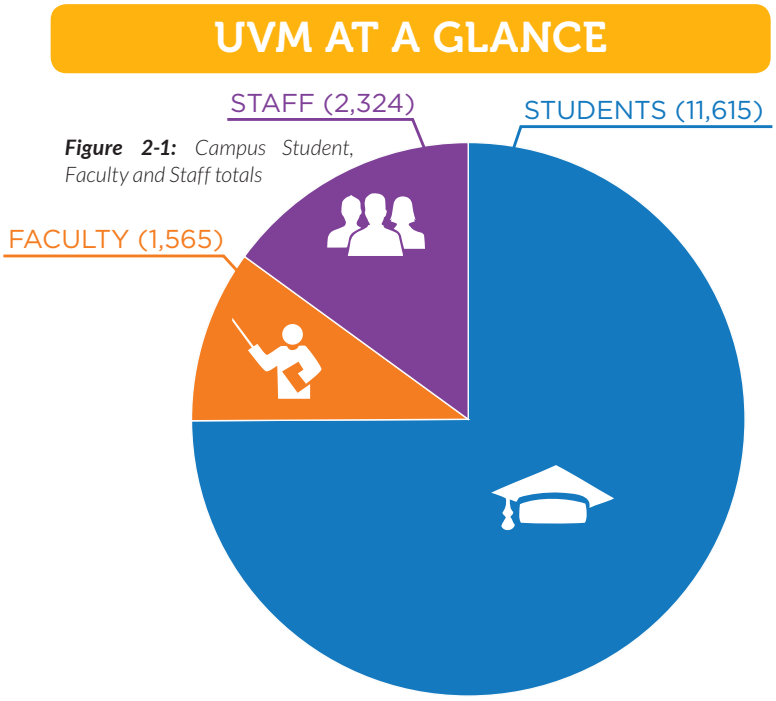


Figure 2-1: *Campus Student, Faculty and Staff totals*

Data Sources: Transportation and Parking Facilities; CATMA (2014)

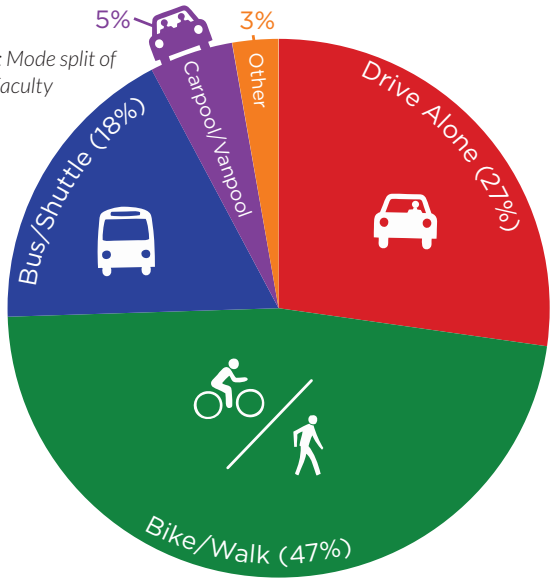


Figure 2-2*: Mode split of Students, Faculty and Staff*

Data Sources: CATMA mode share data, 2012 & 2014

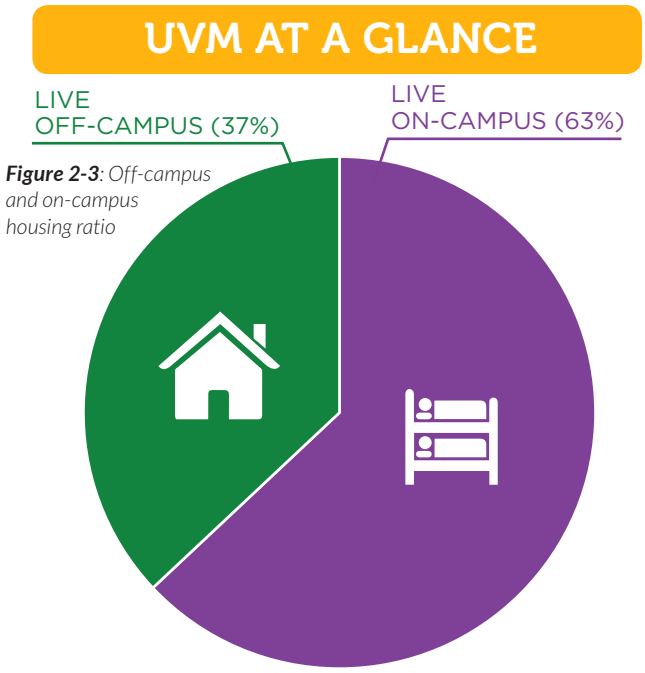


***Figure 2-3**: Off-campus and on-campus housing ratio*

Data Sources: Transportation and Parking Facilities (2015)

Recent Trends at UVM

In recent years, several trends have been identified on campus that indicate a greater preference for active modes of transportation among university students, staff and faculty. Some of these key indicators are highlighted below[1]:

- The number of UVM students that have cars **decreased** from 50% to 22% from 2003-2013
- The number of employees commuting to campus by bike **increased** from 5.2% to 10.7% from 2003-2013

UVM Vision, Mission and Goals

The goals and recommendations of this Plan were shaped by and based from the Vision, Mission and Goals of the University.

The Vision of the University of Vermont

To be among the nation's premier small research universities, preeminent in our comprehensive commitment to liberal education, environment, health, and public service.

The Mission of the University

To create, evaluate, share, and apply knowledge and to prepare students to be accountable leaders who will bring to their work dedication to the global community, a grasp of complexity, effective problem-solving and communication skills, and an enduring commitment to learning and ethical conduct.

For UVM to realize its vision to be among the nation's premier small research universities, it has comitted itself to taking the following actions:

- "Access to Success": Promoting Affordability, Financial Access, and Academic Support
- Promoting a culture of advancing academic excellence and cultivating talent
- Identifying necessary investments to ensure a bright future
- Instilling an institutional commitment to efficiency that optimizes the use of facilities, technology, and which promotes and supports healthy lifestyles

2.2 UVMOVES STUDY AREA & GOALS

The Study area for this effort includes the UVM Campus and the areas immediately surrounding the campus. The majority of the infrastructure and program recommendations are intended for the campus proper, an area defined by Colchester Ave to the north, Willams St to the west and East Ave/Spear St to the east (the study area includes Centennial Woods and Trinity Campus.) Main Street, a major arterial and route to downtown Burlington that bisects the campus, provides the

***Figure 2-4**: The UVMoves Plan focuses on the Main Campus Area, identified in orange above*

1 *Sources: UVM BFU 2015 Application, CATMA*
2 *University of Vermont Vision, Mission and Goals*

primary east/west corridor for all modes of traffic. Of important note is the fact that UVM experiences a significant amount of winter weather events, which have a pronounced impact on existing and proposed bike facilities. Opportunities to address winter bicycling issues are highlighted throughout the Plan, and are expanded upon on page 6-5. Efforts to improve the non-motorized network on-campus should be coordinated with the PlanBTV Walk/Bike, the City of Burlington's Bike and Pedestrian Master Plan, and the Chittenden County Regional Bicycle and Pedestrian Plan, and with development occurring on the UVM Medical Center Campus, which is a separate entity but heavily integrated with the Main Campus.

UVM recently was upgraded from a Bronze to a Silver level Bicycle Friendly University, and won the "Way to Go" Challenge for 2015 for having the highest bike/walk mode share of any employer in the state.

UVMoves VISION

The University of Vermont is firmly committed to setting policy, developing programs, and increasing infrastructure to support and safely accommodate active modes of transportation to, from, and on the UVM campus.

2.2.1 UVMoves Vision, Goals & Objectives

The Plan Vision Statement and recommended goals and objectives for the UVM Active Transportation Plan were developed from research of existing national, state, and university goals, policies and objectives, and reflect the University's preestablished Vision, Mission and Goals.

This plan's goals and objectives support UVM's mission, reflecting important aspects of its programs, priorities, and attitudes. The proposed goals and objectives for the UVM Active Transportation Plan are organized into seven categories, described below:

Health and Safety

Providing and promoting safe and accessible routes and accommodations for walking, biking and skateboarding as a daily form of physical activity.

a) Reduce crashes involving bicyclists, pedestrians, skateboarders and motorists.
b) Provide bicycle facilities and accommodations on campus that minimize conflict between bicyclists, pedestrians, and skateboarders.
c) Promote safe bicycling, walking and skateboarding through the use of encouragement, incentives, and bicycle-friendly programs.

Education and Encouragement

Implement comprehensive education and encouragement programs targeted at students, faculty, and staff.

a) Educate students, faculty, and staff on bicycle, pedestrian and skateboarder safety issues.
b) Encourage non-motorized transportation with programs that target pedestrians, bicyclists, motorists, skateboarders and public transit users.
c) Encourage students, faculty, and staff to use a bicycle for daily travel to campus instead of driving.
d) Develop and install consistent campus bikeway signage to increase awareness of bicyclists on campus.
f) Provide incentives and support facilities for individuals that commute to campus using non-motorized modes of transportation.
g) Promote walking, bicycling & skateboarding through UVM sponsored events.
h) Provide secure bicycle storage facilities and racks throughout campus.
i) Provide bikeway, pedestrian & skateboard route maps both online, in hard copy form, and on information kiosks located around the campus.

j) Coordinate with nearby agencies and groups on annual events such as "Bike/Walk/Skate to Work Day," "Bike/Walk/Skate to School Day," "Way to Go Challenge", and bicycle safety courses.
k) Educate drivers regarding safe behavior near vulnerable users.

Enforcement

a) Maintain a positive enforcement program for safe walking, bicycling, skateboarding behaviors and increase positive enforcement during periods of peak public awareness.
b) Reduce negligent behavior among drivers, bicyclists, skateboarders, and pedestrians.
c) Ensure that all bicycle, pedestrian and skate crashes are accurately recorded into a crash database for future analysis and monitoring.
d) Encourage bicyclists, pedestrians and skateboardes to report all crashes to UVM Police Services or Burlington Police Department
e) Reduce the number of bicycle thefts on campus.
f) Encourage students to register bicycles to aid in returning recovered bicycles if stolen.

Transit Integration

Improve the connection between bicyclists and transit on campus.
a) Provide convenient, covered, and secure bicycle parking at CATS/Green Mountain Transit (GMT) bus stops on campus and focal points such as residence halls, academic buildings, and major campus and staff employment centers.
b) Accommodate bicycles on all campus shuttles and increase bike carrying-capacity when demand warrants.
c) Provide opportunities for students to learn how to use the bicycle racks on transit vehicles.

Sustainability

a) Reduce emissions and traffic congestion by increasing the non-motorized mode share to and from campus.
b) Support the City of Burlington as it develops on- and off-street facilities that live in private housing off-campus.
c) Support the Climate Action Plan by accommodating campus expansion and reducing vehicular parking demands.

Implementation

Create a campus non-motorized network that is integrated into existing and future off-campus facilities.
a) Create a sustainable, dedicated source of non-motorized funding within the annual budget.
b) Develop a continuous non-motorized system with access to major activity areas on campus and maintain the system so that it provides safe and convenient travel to off-campus destinations.
c) Eliminate bicycling, pedestrian & skateboard barriers and hazards.
d) Avoid missed opportunities by ensuring all campus construction projects address non-motorized paths of travel and related projects as recommended in this Plan, the Campus Master Plan, and PlanBTV Walk/Bike
e) Implement less-complicated and less expensive projects first for efficiency.
f) Institutionalize non-motorized transportation in all campus transportation planning, design, and construction activities.

Accountability

Monitor implementation of the UVM Active Transportation Plan.
a) Track the success of the Active Transportation Plan as a percent completed of the total recommended improvements.
b) Track UVM mode share trends through expanded annual bicycle counts and commuter surveys.
c) Continue to monitor bicycle parking demand and increase parking supply, with temporary or permanent facilities as needed.
d) Monitor non-motorized crash data to address the causes of the crashes and reduce bicycle and pedestrian crash rates.
e) Regularly assess the needs of the campus walking and bicycling population and respond accordingly to these needs.
f) Produce an annual report card identifying non-motorized trends and accomplishments.

The CATS transportation system provides safe and convenient shuttle service to the UVM community (students, staff and visitors). The goal of the service is to support alternatives to driving, and to help reduce the number of vehicles traveling on city streets and parking in lots on campus.

2.2 EXISTING CONDITIONS ANALYSIS OVERVIEW

The existing conditions analysis describes the state of walking, bicycling and skateboard facilities on campus. This overview establishes a baseline from which recommended improvements can be made. The analysis involved many components, including:

- Analyzing existing infrastructure and researching past plans, including the Open Space Network mappping and analysis of needs included in the Campus Master Plan
- Analyzing data generated by an online public input map administered by the University to students, faculty and staff
- Reaching out to the campus community through stakeholder meetings and campus open house meetings
- Using this data to identify the Strengths, Weaknesses, Opportunities and Threats to walking and biking on campus

Each of these components and the results of the analysis are described in this section.

Mapping Facilities

The UVM campus is an enjoyable and comfortable place to walk, bike and ride a skateboard, and the majority of students use one of these three modes to move around campus. A primary driver of their mode choice is the structure of the campus itself - the Main Campus is dense and pathways linking these facilities are well developed. Existing Active Transportation Infrastructure is shown on Map 2.1.

The campus also boasts a relatively high number of bike racks compared to its student population, a ratio of one rack for every three students. Existing bike parking conditions are displayed on Maps 2.2 and 2.3. In addition to existing bike parking, the campus also provides bike fix it stations located around the campus, as well as shower facilities and a bike repair shop. These support facilities are shown on Map 2.4.

Identifying Deficiencies

Despite a well developed network of active transportation infrastructure and support facilities, there are deficiencies in UVM's on-campus network and gaps between surrounding neighborhoods. The identification of these issues were informed by site visits, input provided through an online map, and public and stakeholder meetings.

An example where there is desire for a formalized path

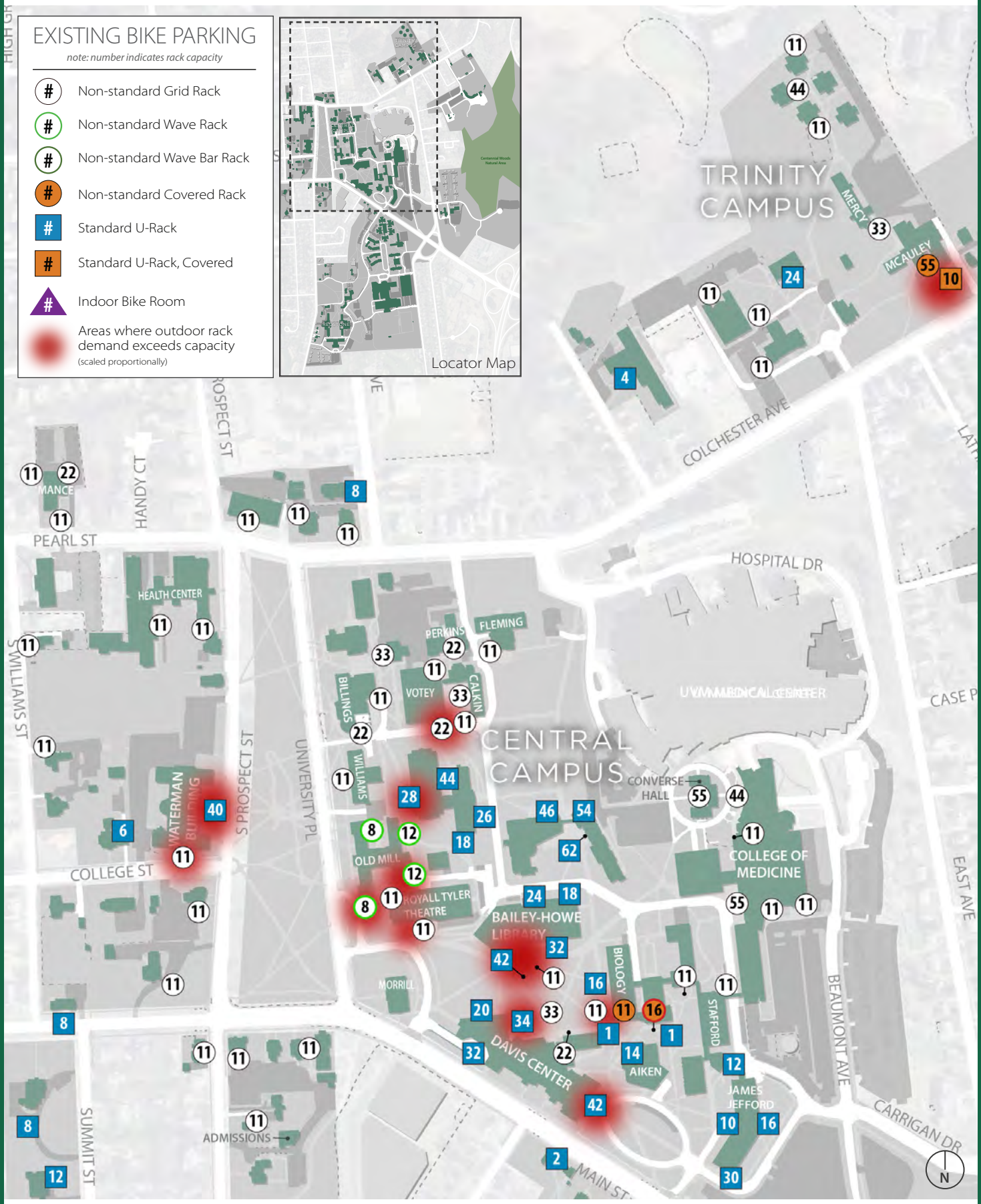
Desire lines are an important concept to understand when developing a campus plan. A desire line is the path someone would like to take between a given origin and destination. Like water, desire lines follow the path of least resistance naturally, and are not always consistent with the available path and street conditions (this is how cow paths, or informal dirt paths, become established). When desire lines and available infrastructure available are incongruous, deficiencies in the network arise. Additionally, deficiencies in the network exist when a desirable on-campus route intersects with busy streets, and where on-campus paths are too narrow to allow for bikes, pedestrians and skateboarders to pass safely. Areas where these issues are present are identified on Map 2.5.

Identifying Preferred Routes

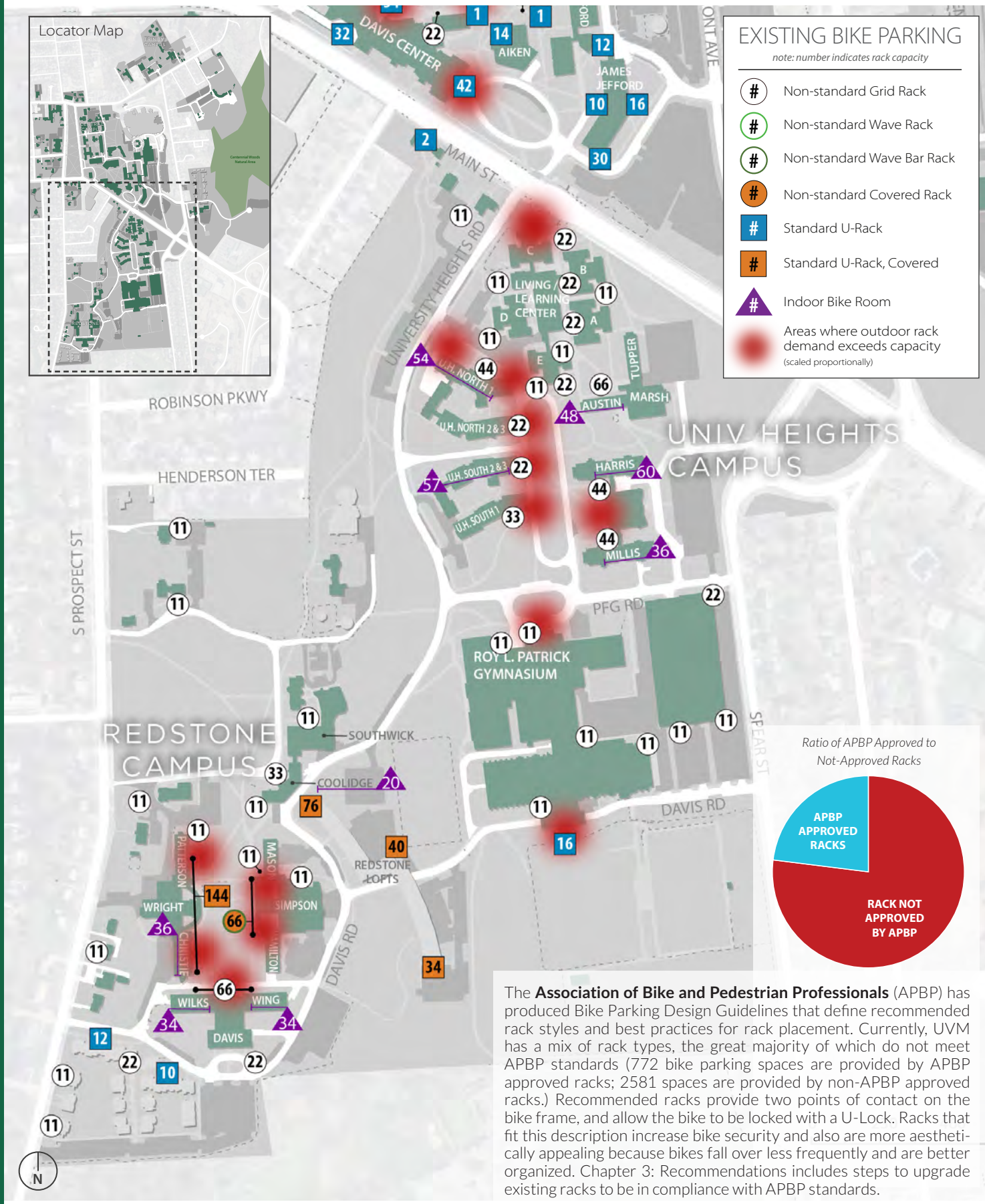
Understanding how people are moving on the campus, and which routes are most heavily used, is critical to making improvements to the network. Map 2.6 identifies the major, moderate and minor routes for on-campus travel. The existing conditions analysis information is synthesized in the S.W.O.T Map (Map 2.7), which highlights opportunities and challenges to active transportation on campus.

MAP 2.1: EXISTING ACTIVE TRANSPORTATION INFRASTRUCTURE

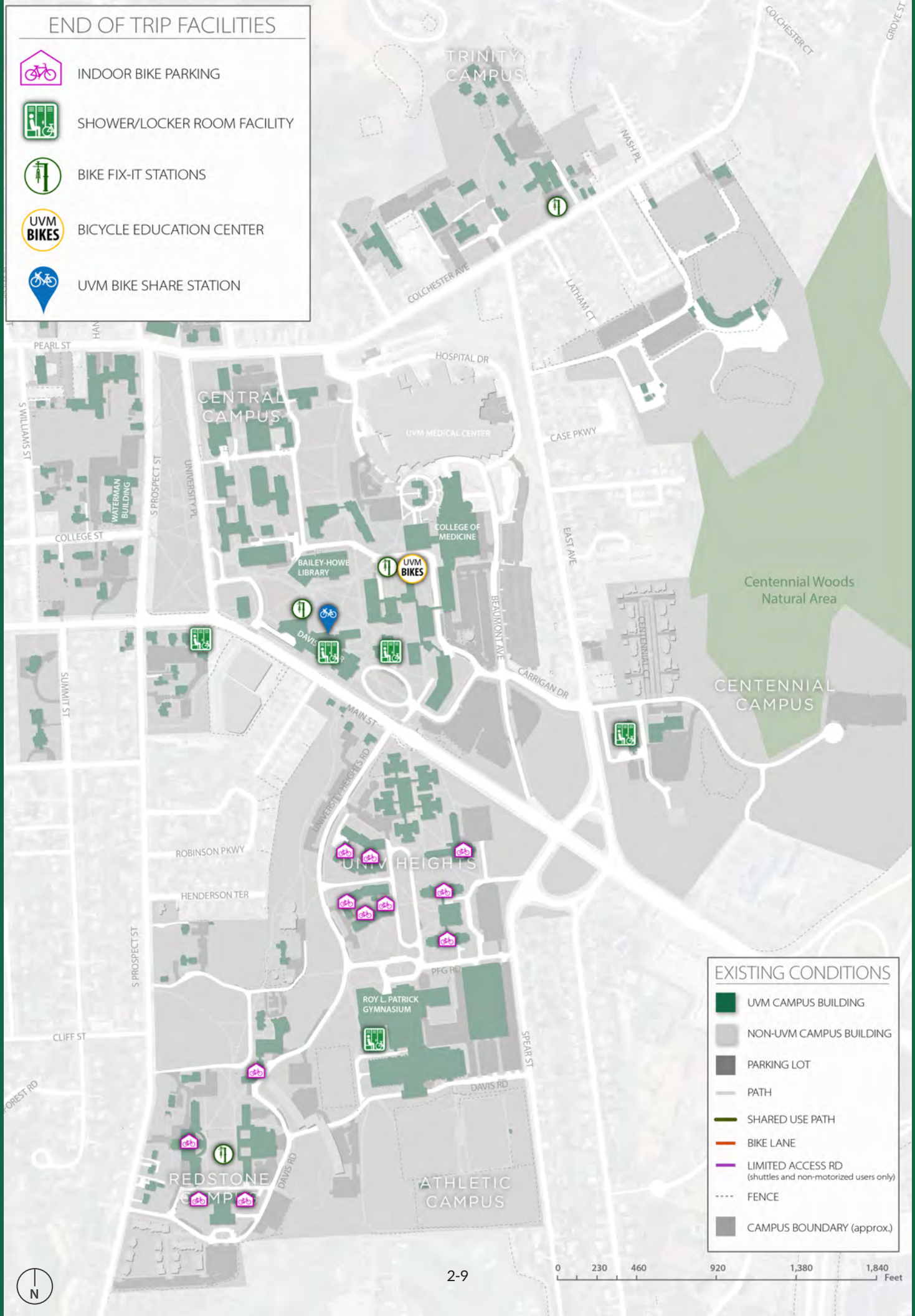
UVMoves



MAP 2.2: EXISTING BIKE RACKS, NORTH



The **Association of Bike and Pedestrian Professionals** (APBP) has produced Bike Parking Design Guidelines that define recommended rack styles and best practices for rack placement. Currently, UVM has a mix of rack types, the great majority of which do not meet APBP standards (772 bike parking spaces are provided by APBP approved racks; 2581 spaces are provided by non-APBP approved racks.) Recommended racks provide two points of contact on the bike frame, and allow the bike to be locked with a U-Lock. Racks that fit this description increase bike security and also are more aesthetically appealing because bikes fall over less frequently and are better organized. Chapter 3: Recommendations includes steps to upgrade existing racks to be in compliance with APBP standards.


END OF TRIP FACILITIES
INDOOR BIKE PARKING
SHOWER/LOCKER ROOM FACILITY
BIKE FIX-IT STATIONS
UVM BIKES
BICYCLE EDUCATION CENTER
UVM BIKE SHARE STATION
TRINITY CAMPUS
COLCHESTER CT
GROVE ST
NASH PL
COLCHESTER AVE
LATHAM CT
PEARL ST
HOSPITAL DR
CENTRAL CAMPUS
UVM MEDICAL CENTER
CASE PKWY
S WILLIAMS ST
WATERMAN BUILDING
S PROSPECT ST
UNIVERSITY PL
COLLEGE ST
COLLEGE OF MEDICINE
BAILEY-HOWE LIBRARY
UVM BIKES
EAST AVE
Centennial Woods Natural Area
BEAUMONT AVE
CENTENNIAL WOODS
CARRIGAN DR
CENTENNIAL CAMPUS
SUMMIT ST
MAIN ST
UNIVERSITY HEIGHTS RD
ROBINSON PKWY
UNIV HEIGHTS
HENDERSON TER
S PROSPECT ST
PFG RD
ROY L. PATRICK GYMNASIUM
SPEAR ST
CLIFF ST
DAVIS RD
REDSTONE CAMPUS
ATHLETIC CAMPUS
EXISTING CONDITIONS
UVM CAMPUS BUILDING
NON-UVM CAMPUS BUILDING
PARKING LOT
PATH
SHARED USE PATH
BIKE LANE
LIMITED ACCESS RD
(shuttles and non-motorized users only)
FENCE
CAMPUS BOUNDARY (approx.)
0
230
460
920
1,380
1,840
Feet
N

2.3.1 End of Trip Facilities

The available indoor bike parking areas are well utilized for both long-term and short-term parking. In residence halls that do not currently have indoor bike parking, there is a very strong desire to have them installed. The campus also boasts hundreds of outdoor bike racks. These racks come in many varieties, several of which do not meet standards set by the Association of Pedestrian and Bicycle Professionals (APBP).[1] Map 2.2 and 2.3 display available racks for the northern and southern portions of campus.

Table 2.1: Residence Hall Indoor Bike Parking*

Location	Spaces/ residents
University Heights (2 rooms)	54/408
University Heights (3 rooms)	57/408
Harris Hall	60/334
Millis Hall	36/344
Christie Hall (and Wright/Paterson)	38/489
Wilks Hall (serves Davis hall also)	34/350
Wing Hall (serves Davis hall also)	34/358
Coolidge Hall	20/146
Austin Hall	48/423

Source: Transportation and Parking Services Office
**Jeanne-Mance, Trinity (Mercy, Back 5, Cottages), Mason & Simpson do not have indoor bike parking*

End of trip facilities support bicycling and remove some of the barriers that prevent people from riding. They provide convenient places to park, places to shower and change, tools to repair bikes, and access to bike repair expertise. Tables 2.1 and 2.2 identify buildings on campus that provide end of trip facilities, and Map 2.4 indicates their location on campus.

2.3.2 Conflict Areas & Circulation Patterns

Thousands of people circulate through UVM's campus daily, using many different modes of transportation. Inevitably, conflicts arise between these modes. Issues are heightened along corridors with high volumes, at intersections, and where accommodations are lacking, such as paths that are too narrow where sidewalk conditions are inferior.

1 *These standards are described in detail in Chapter 3*

Table 2.2: Shower/Locker Facilities

Location	Facilities
Patrick Gymnasium	multiple showers/lockers
Davis Center	1 shower/locker
Aiken Building	1 shower/locker
Pomeroy Hall	showers/lockers
284 East Ave	1 shower/locker

Determining circulation patterns and conflict areas are important steps needed to improve active transportation on campus. The planning team used both research and analysis to understand campus circulation and conflicts. The team first assessed the Open Space Network recommendations included in the Campus Master Plan, which identified circulation routes and conflict areas. The team then analyzed input provided through an on-line map, which was distributed by the campus to students, faculty and staff. Respondents were asked to draw routes they used to travel through campus, and place points representing challenging locations for walking, bicycling and skateboarding.

This information was used to determine both spot conditions and circulation patterns. The data from the online map helped to highlight 'hot spots' representing key conflict areas and high priority routes, shown as darker shades of color on Maps 2.5 and 2.6.

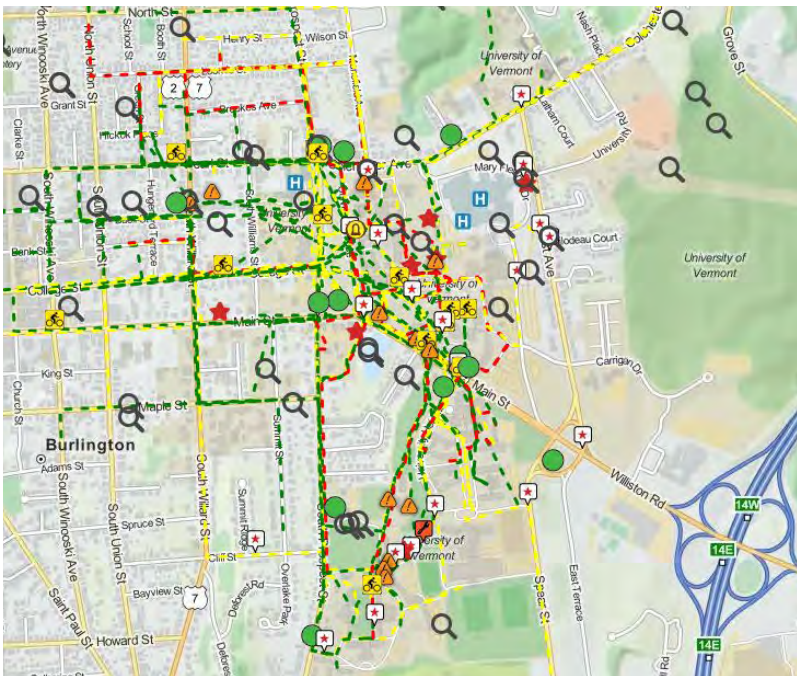


***Figure 2-5**: The campus community was asked to identify routes that they liked to walk, bicycle and skateboard, and challenges to using these modes on campus. The on-line input map generated hundreds of comments, which was used to identify circulation routes and conflict areas on and around campus.*

Conflict Areas

The following maps display conflict areas as identified by on-line map respondents. For each map, the spot locations are shown by mode, with the final map being a general issue category.

***Figure 2-6**: Bicyclist Conflict Areas*

***Figure 2-7**: Pedestrian Conflict Area*

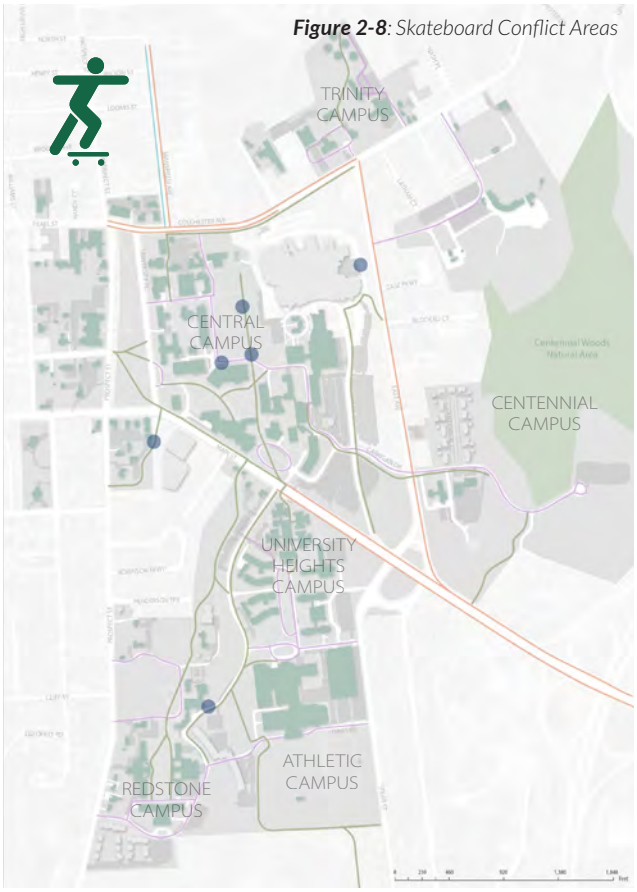


***Figure 2-8**: Skateboard Conflict Areas*

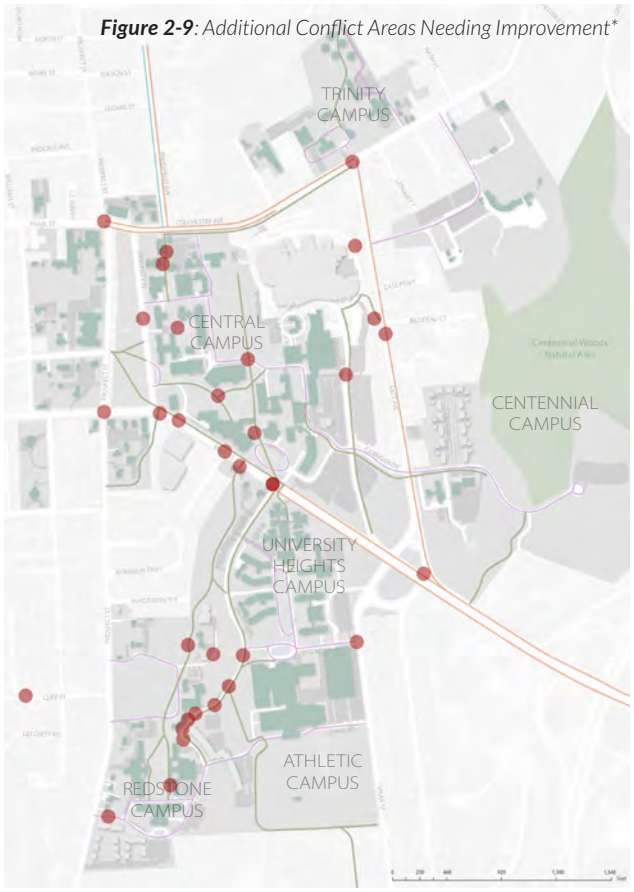
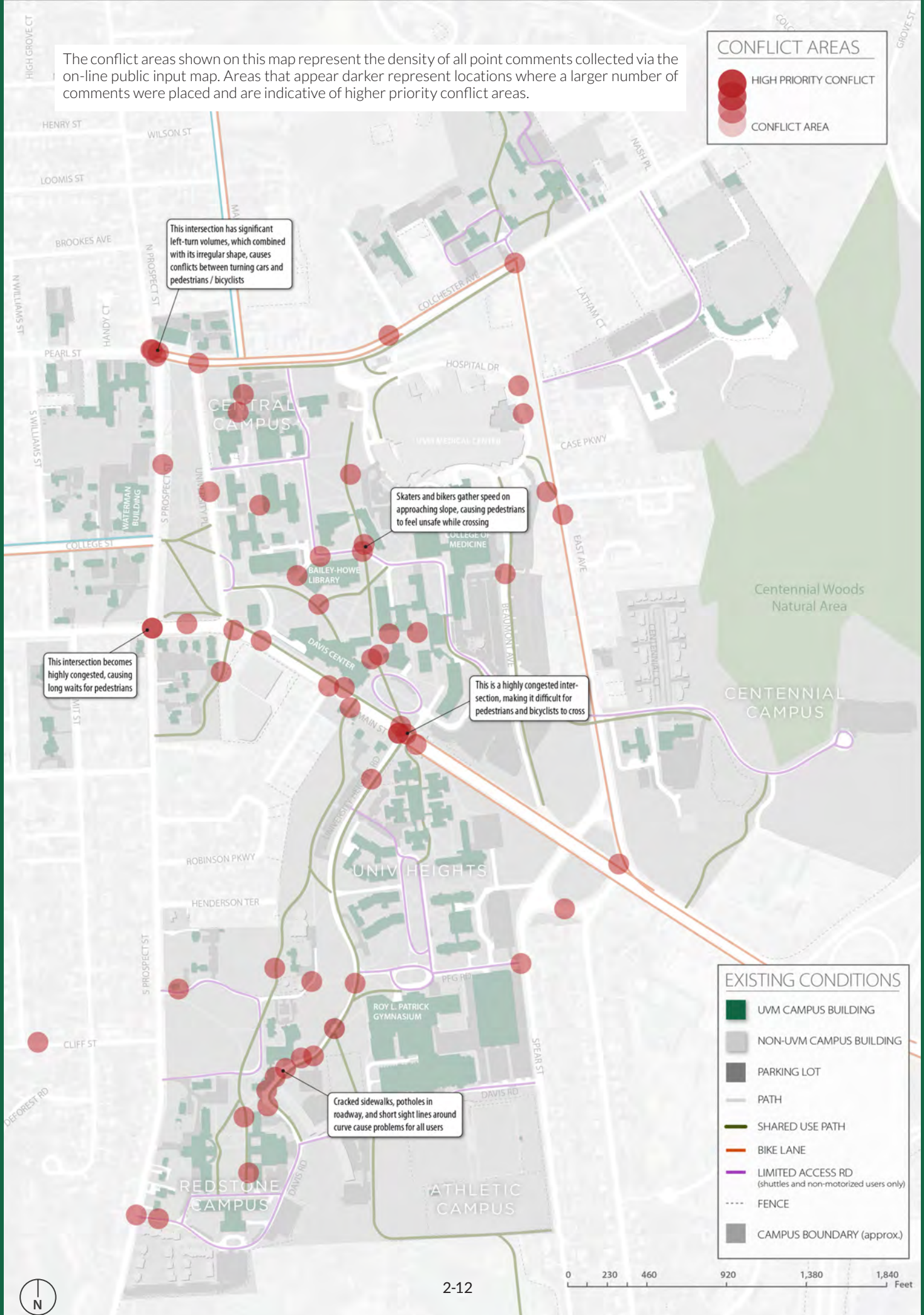


***Figure 2-9**: Additional Conflict Areas Needing Improvement**

**Includes the following data sets: Missing Link Along Route, Improvement Needed, and Danger Area. Not inclusive of information from Figures 2-6 to 2-9*

The conflict areas shown on this map represent the density of all point comments collected via the on-line public input map. Areas that appear darker represent locations where a larger number of comments were placed and are indicative of higher priority conflict areas.



Preferred Routes

The maps below display preferred routes as identified by on-line map respondents, who were asked to draw the routes they used to travel around campus, and which modes they used. For each map, the preferred routes are shown by mode, with the final map showing the combined routes of all three modes. Darker lines represent routes that were drawn multiple times, indicating that they are more desirable routes.

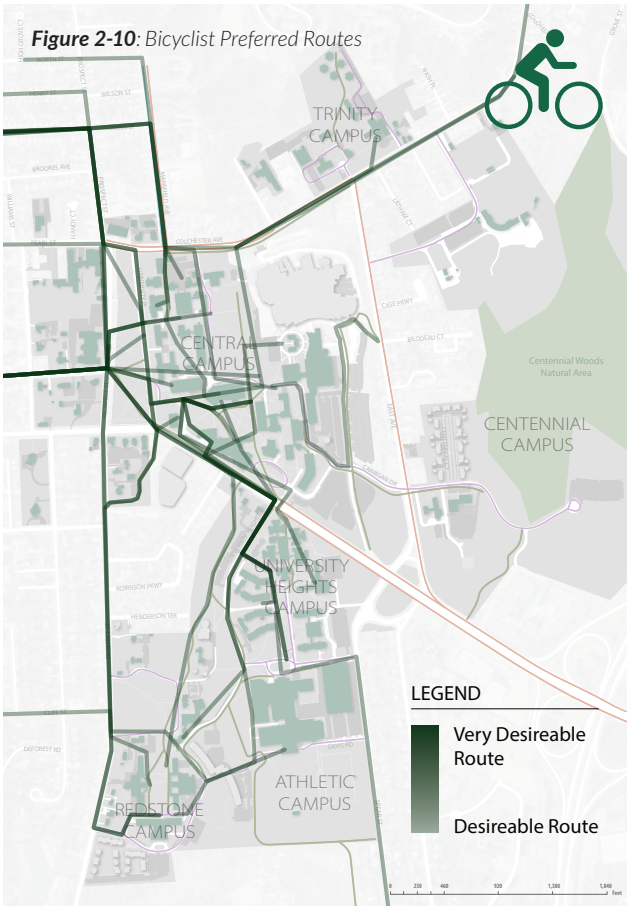


***Figure 2-10**: Bicyclist Preferred Routes*

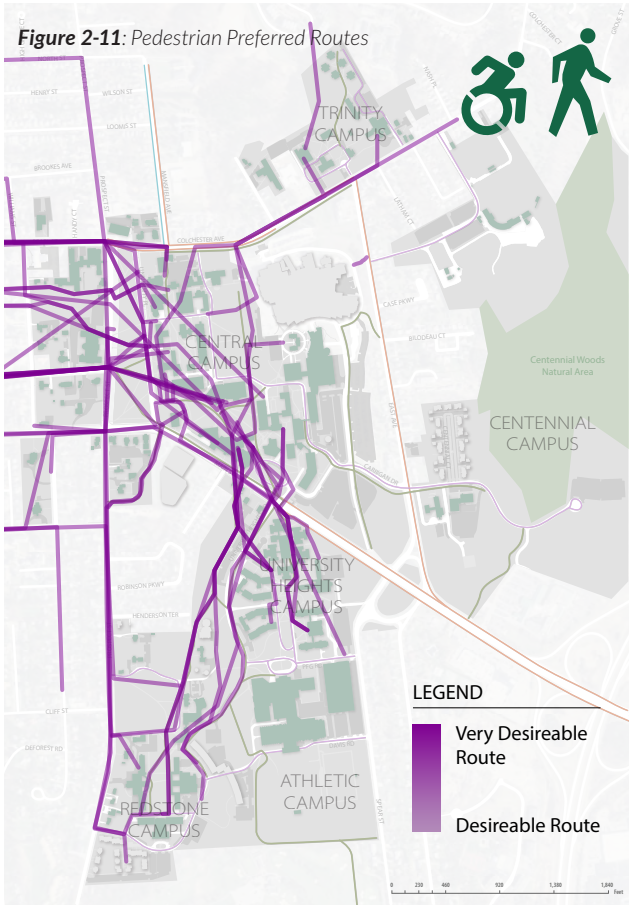


***Figure 2-11**: Pedestrian Preferred Routes*

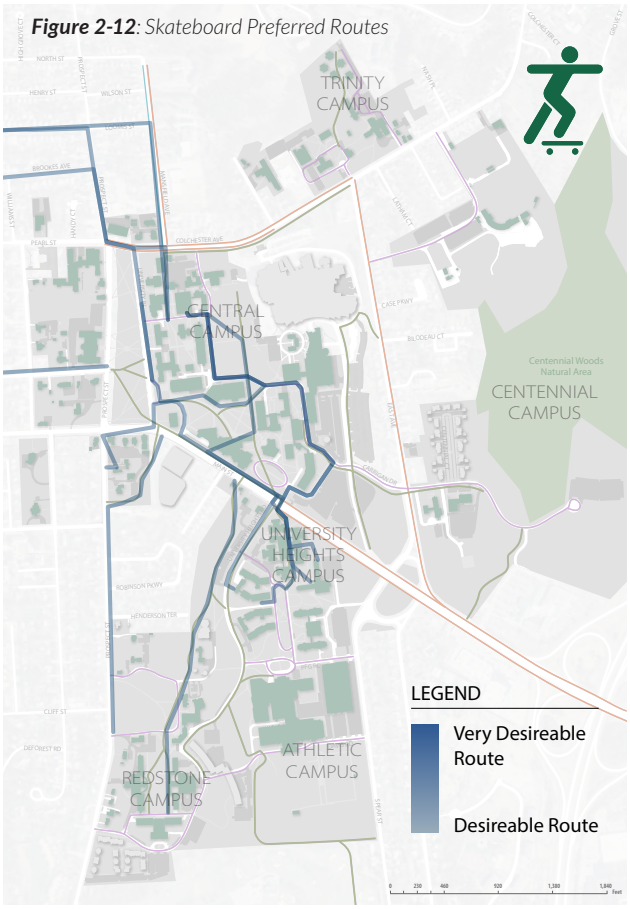


***Figure 2-12**: Skateboard Preferred Routes*

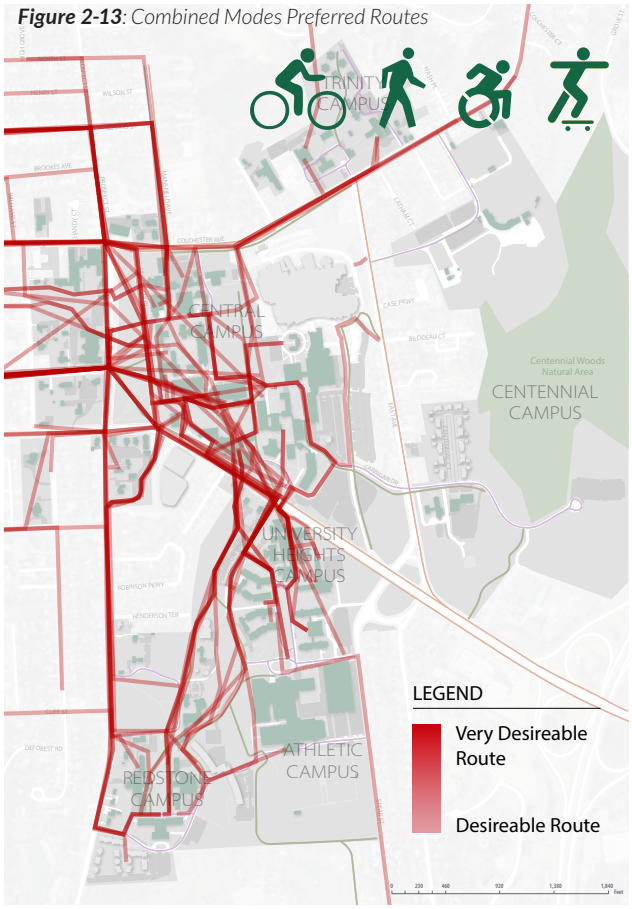
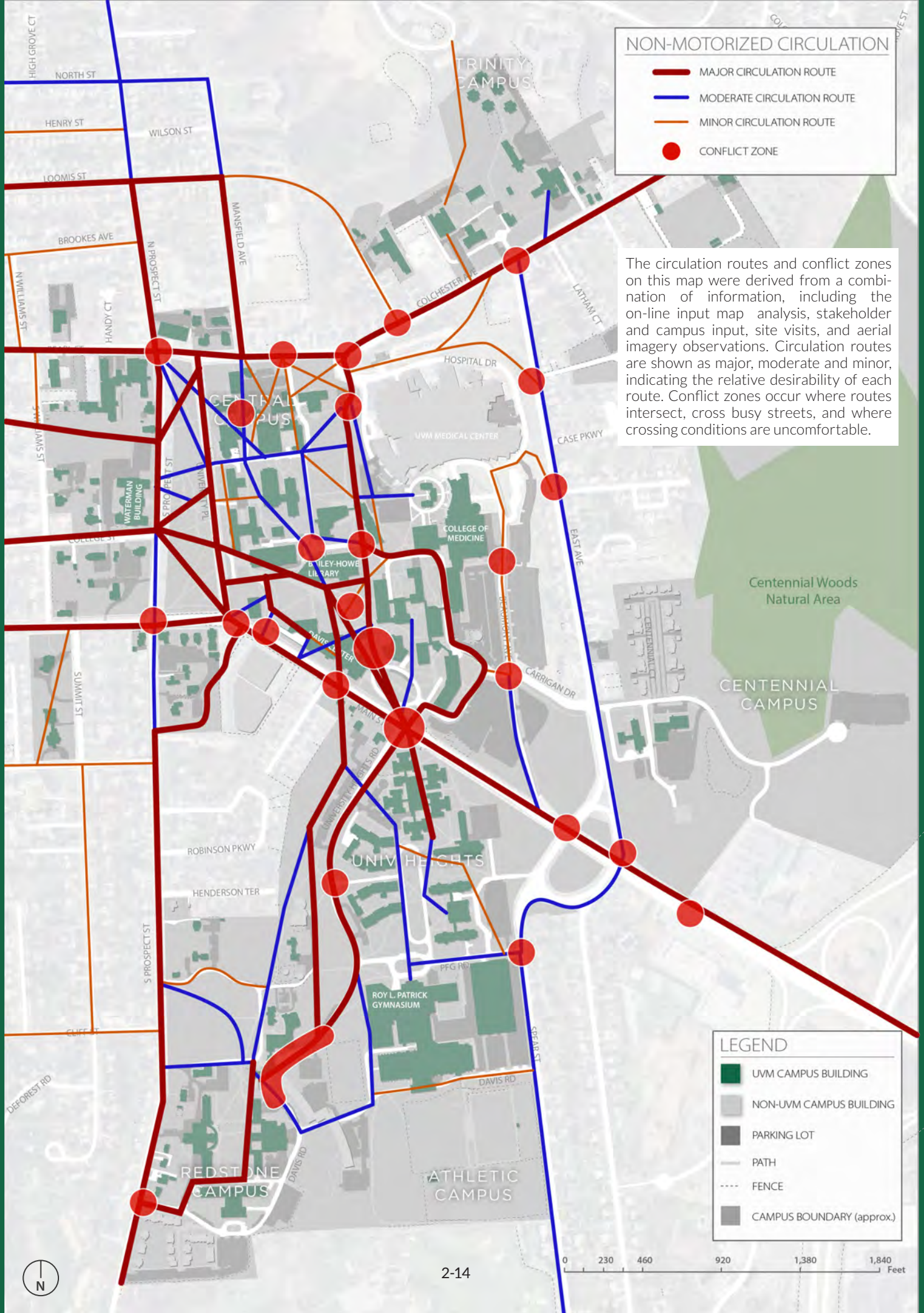


***Figure 2-13**: Combined Modes Preferred Routes*



MAP 2.6: ACTIVE TRANSPORTATION ROUTES

UVMoves

2.3.3 SWOT Analysis

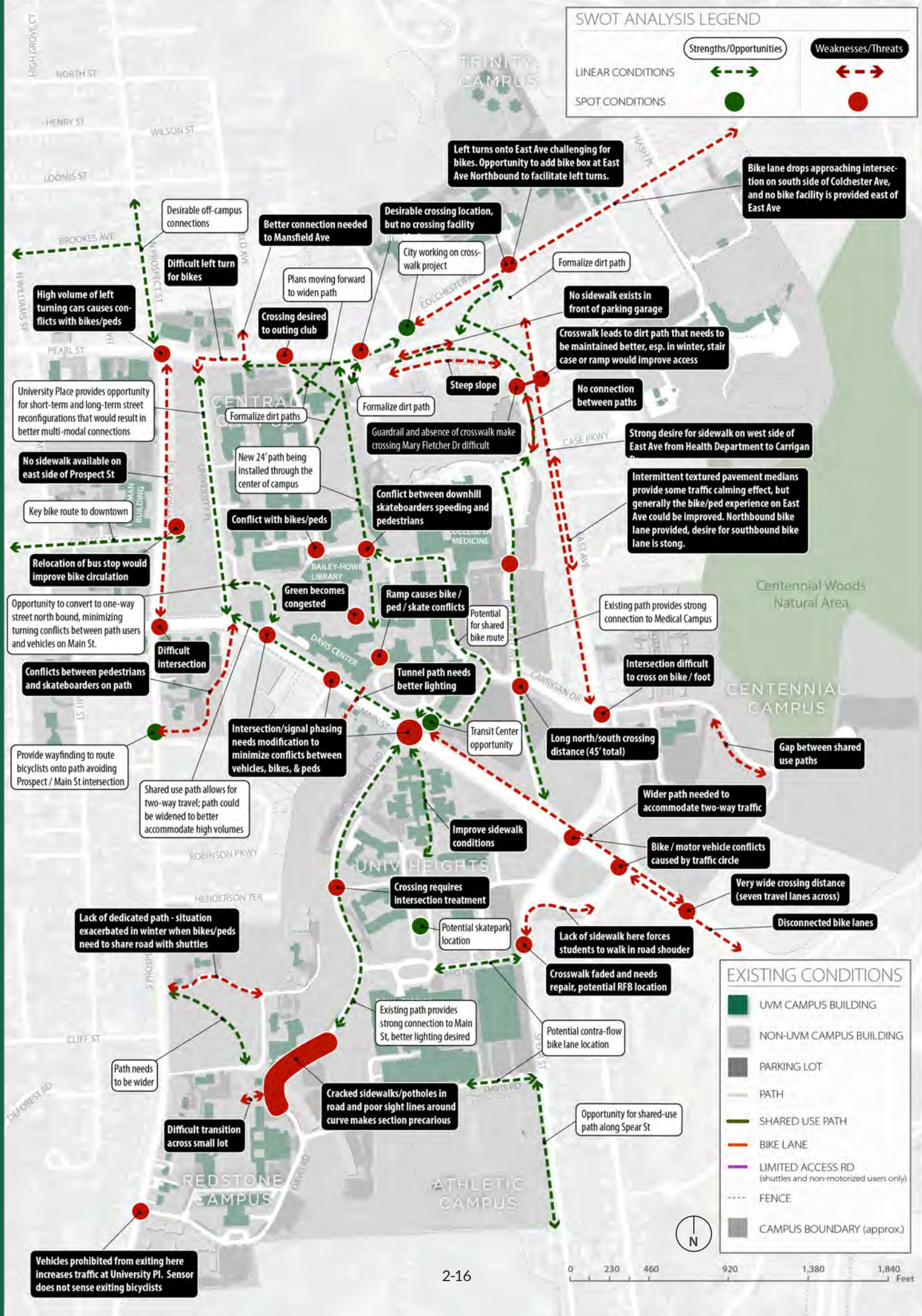
The SWOT analysis evaluated the Strengths, Weaknesses, Opportunities, and Threats that exist for walkers, bicyclists, and skateboarders on the UVM campus. The analysis grouped key pieces of information into two categories:

- **Internal factors:** the strengths and weaknesses internal to the campus, relating to infrastructure, policies and circulation patterns within the campus. These factors are within the control of UVM.
- **External factors:** the opportunities and threats presented by the surrounding context of the campus, the campus culture, and other factors that are influenced but cannot be directly controlled by UVM.

Table 2.3 lists the campus S.W.O.T. analysis results, derived from an examination of campus conditions, outreach to the campus community, meetings with stakeholders and a thorough review of supporting plans and policies (Plans and policies are summarized in Section 2.4). Map 2.7 illustrates the conditions summarized in Table 2.3. This map showcases place specific issues faced by students and faculty as they move around campus, and the opportunities to create more comfortable conditions for all modes.

Table 2.3: UVMoves S.W.O.T. Analysis

	BENEFITS	ISSUES
INTERNAL	STRENGTHS: • Well established path network exists that provides strong connections to many destinations on campus • High density of residential and classroom buildings • High concentration of green spaces and gathering locations • Well established winter maintenance policy for clearing paths and roads of snow & ice	WEAKNESSES: • Informal paths should be formalized to provide safer connections in winter months • Bike / pedestrian accommodations at major intersections need improvement • Signal phasing modifications at key intersections are needed to improve traffic flow • There is a general lack of dedicated bicycle facilities in and around campus • Several paths that carry high volumes are too narrow • Existing crosswalks require more frequent maintenance
EXTERNAL	OPPORTUNITIES: • Strong culture of walking, bicycling and sustainability among students, faculty, staff and University administrators • High bike / walk commute mode share among students, faculty and staff • Commitment by the City of Burlington to improve bike/ pedestrian circulation along and across the roads that flank the campus • Ownership of City owned roads could be transferred to UVM, giving the campus flexibility to redesign them to become more amenable to active transportation	THREATS: • Steep terrain causes conflicts between pedestrian and fast-moving skateboarders and bicyclists • High volume of bicycles in the central campus causes uncomfortable conflicts with pedestrians • Major arterial streets bisect the campus, such as Main St and Colchester Ave • These streets carry high vehicular volumes, making crossing them difficult/uncomfortable • UVM experiences harsh winters, making bicycling, walking and skateboarding year round difficult


SWOT ANALYSIS LEGEND
Strengths/Opportunities
Weaknesses/Threats
LINEAR CONDITIONS
SPOT CONDITIONS
Left turns onto East Ave challenging for bikes. Opportunity to add bike box at East Ave Northbound to facilitate left turns.
Bike lane drops approaching intersection on south side of Colchester Ave, and no bike facility is provided east of East Ave
Desirable off-campus connections
Better connection needed to Mansfield Ave
Desirable crossing location, but no crossing facility
City working on cross-walk project
Formalize dirt path
Difficult left turn for bikes
Plans moving forward to widen path
Crossing desired to outing club
No sidewalk exists in front of parking garage
High volume of left turning cars causes conflicts with bikes/peds
Crosswalk leads to dirt path that needs to be maintained better, esp. in winter, stair case or ramp would improve access
Steep slope
No connection between paths
University Place provides opportunity for short-term and long-term street reconfigurations that would result in better multi-modal connections
Formalize dirt paths
Formalize dirt path
Guardrail and absence of crosswalk make crossing Mary Fletcher Dr difficult
Strong desire for sidewalk on west side of East Ave from Health Department to Carrigan
No sidewalk available on east side of Prospect St
New 24' path being installed through the center of campus
Intermittent textured pavement medians provide some traffic calming effect, but generally the bike/ped experience on East Ave could be improved. Northbound bike lane provided, desire for southbound bike lane is stong.
Key bike route to downtown
Conflict between downhill skateboarders speeding and pedestrians
Conflict with bikes/peds
Relocation of bus stop would improve bike circulation
Green becomes congested
Ramp causes bike / ped / skate conflicts
Potential for shared bike route
Existing path provides strong connection to Medical Campus
Opportunity to convert to one-way street north bound, minimizing turning conflicts between path users and vehicles on Main St.
Difficult intersection
Intersection difficult to cross on bike / foot
Conflicts between pedestrians and skateboarders on path
Tunnel path needs better lighting
Intersection/signal phasing needs modification to minimize conflicts between vehicles, bikes, & peds
Transit Center opportunity
Long north/south crossing distance (45' total)
Gap between shared use paths
Provide wayfinding to route bicyclists onto path avoiding Prospect / Main St intersection
Shared use path allows for two-way travel; path could be widened to better accommodate high volumes
Wider path needed to accommodate two-way traffic
Improve sidewalk conditions
Bike / motor vehicle conflicts caused by traffic circle
Very wide crossing distance (seven travel lanes across)
Crossing requires intersection treatment
Disconnected bike lanes
Lack of dedicated path - situation exacerbated in winter when bikes/peds need to share road with shuttles
Potential skatepark location
Lack of sidewalk here forces students to walk in road shouder
Crosswalk faded and needs repair, potential RFB location
Existing path provides strong connection to Main St, better lighting desired
Potential contra-flow bike lane location
Path needs to be wider
Cracked sidewalks/potholes in road and poor sight lines around curve makes section precarious
Opportunity for shared-use path along Spear St
Difficult transition across small lot
Vehicles prohibited from exiting here increases traffic at University Pl. Sensor does not sense exiting bicyclists
EXISTING CONDITIONS
UVM CAMPUS BUILDING
NON-UVM CAMPUS BUILDING
PARKING LOT
PATH
SHARED USE PATH
BIKE LANE
LIMITED ACCESS RD
(shuttles and non-motorized users only)
FENCE
CAMPUS BOUNDARY (approx.)
N
0
230
460
920
1,380
1,840
Feet
TRINITY CAMPUS
CENTRAL CAMPUS
CENTENNIAL CAMPUS
UNIV HEIGHTS
REDSTONE CAMPUS
ATHLETIC CAMPUS
Centennial Woods Natural Area
BAILEY-HOWE LIBRARY
COLLEGE OF MEDICINE
NORTH ST
HENRY ST
WILSON ST
LOOMIS ST
BROOKES AVE
PEARL ST
COLCHESTER AVE
CASE PKWY
DAVIS CENTER
MAIN ST
CARRIGAN DR
EAST AVE
ROBINSON PKWY
HENDERSON TER
CLIFF ST
DEFOREST RD
DAVIS RD
SPEAR ST

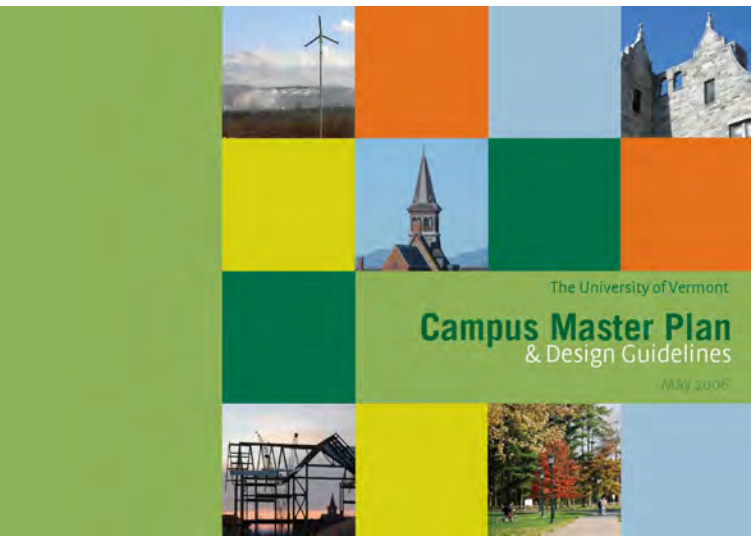
2.4 SUPPORTING PLANS, POLICIES, PROGRAMS & ACTIVITIES REVIEW

This section provides an overview of the relevant plans, policies, programs and activities that support or promote active transportation on campus. The relevant UVM led initiatives are first presented. This overview is followed by summaries of planning efforts conducted by other agencies, which are important because they include recommendations that would affect transportation in and around campus. Existing transit services, a mode that supports walking and biking, are also described in this section.

2.4.1 UVM Existing Plan Review

The University of Vermont's core values, as stated by the University's Board of Trustees, are Excellence, Community and Sustainability. Over the last ten years, the University has been basing its progress and growth on these values. Sustainability, in particular, has been at the core of its building and campus development plans. It's commitment to sustainability is evident in its policy of achieving at least a silver LEEDS rating for all new projects since 2007, the STARS initiative, and its dedication to improving active transportation on the campus.

The University of Vermont Campus Master Plan & Design Guidelines, adopted in 2006, also reflect this commitment. It focuses heavily on improving open space network connections throughout the campus and to the surrounding neighborhoods. The University has also contended to win the Vermont Bike Challenge and won the Way to Go program in 2015. The University, also in 2015, applied for rating as a Bicycle Friendly University and received a Silver designation. The feedback report on their application provided valuable information on how they could improve their friendliness towards bicycles and bicyclists, which the University is already starting to address. Other local and regional plans also provide support for increasing the ability of students, faculty and staff to use active transportation methods to move to and through the campus on a regular basis.



The UVM Campus Master Plan & Design Guidelines was adopted in 2006

The following section provides short summaries of those portions of the Campus Master Plan and other University plans, programs and policies that affect active transportation on the campus.

The University of Vermont Campus Master Plan & Design Guidelines

The University of Vermont Board of Trustees approved the current University of Vermont Campus Master Plan & Design Guidelines (Campus Master Plan) in May 2006. The Campus Master Plan is intended to guide and direct "growth of the campus through 2015, and looks forward to project growth in the decades beyond." The Campus Master Plan is currently being updated, but generally, planning principles and premises will remain consistent. It states that, "All projects will comply with the principles, premise and design guidelines identified in this Campus Master Plan."

As the Campus Master Plan states in its introduction, it is meant to help implement,

> ... an ambitious "vision" and strategic plan that will substantially increase student enrollment and quality, bolster the size of the faculty and research enterprise, and transform the physical campus, creating new spaces for living, teaching, student life and re-search.
>
> ...
>
> At the heart of this document is the Vision's insistence that the University needs to maintain and improve the range and quality of its facilities if it is to remain competitive for top students and faculty. A strong campus community, fostered by an attractive and cohesive physical environment reflecting the institution's values of excellence, community and sustainability, is critical to the University's future aspirations. The Campus Master Plan 2006 was designed to help explicate this unfolding vision of the University's future and aid the University in implementing it over time.
>
> ...

> The goal of the Campus Master Plan is to maintain and reinforce a sense of place that is true to the University's distinctive character during a period of sweeping change.

Four of the objectives that guided the development of the Campus Master Plan are important considerations for UVMoves: Active Transportation Plan:

- "**Open Space** - create a cohesive and legible public open space system that fosters the prime directives of quality of campus life and education."
- "**Connectivity** - create a campus that is logically and efficiently connected and is accessible; and create a campus that promotes community and institutional cohesiveness."
- "**Quality of Campus Life and Services**—provide a campus that promotes an excellent quality of life, is memorable, and has a strong sense of place."
- "**Sustainability**—realize the University's stated goal of becoming the "leading environmental university of the nation" in terms of educational programs and physical facilities. A fundamental environmental ethic must permeate all aspects of the future transformations of the campus and the University as it moves forward as a leader in environmental responsibility."

There are also several planning assumptions that should also be incorporated into the Active Transportation Plan:

- "**The Campus should be a Place of Beauty**. The physical appearance of the campus should project an overall image consistent with the excellence of the University."
- "**The Campus should provide a Healthy and Secure Environment.** The University is a 24-hour environment, essentially open to the public and home to many students, faculty, and staff. Provision of a comfortable and secure campus that provides for the health and well being of its community and encourages a healthy lifestyle is essential to realize a sustainable environment."
- "**The University Campus must be an exemplar of environmental ethics and a truly sustainable environment.** All actions, from day-to-day decisions to long-range planning and capital projects, must be aligned with the University's ethic of environmental sustainability."
- "**The Campus should be Accessible, Flexible and Adaptable.** Accessibility and adaptability are essential to the University's ability to progressively evolve. Flexible solutions must be considered in any planning effort."
- "**The Campus should be a Place of Heritage and Tradition.** The rich history of the University is the cornerstone of its identity and must form the foundation on which all future work is undertaken."

The Campus Master Plan includes several land use premises for physical planning, at least one of which is relevant to the Active Transportation Plan,

- "**North-South Corridor:** the University recognizes the need to preserve and enhance the major north-south activity corridor (crossing Route 2) that facilitates circulation between Patrick-Forbush-Gutterson Complex, Bailey/Howe Library, Trinity District and Waterman Building. Additionally, any new campus academic or student services development should facilitate and allow ready access to the major north-south corridor."

The Davis Center

The Campus Master Plan presents several visionary concept projects that are relevant to bicycling and walking to and through the campus, some of which are now complete:

- **The Davis Center** is identified as the heart of the main Campus (now complete);
- **The Redstone Walkway**, a circulation system for walking and bicycling that would link the Redstone Campus and University Heights to the Davis Center (improvements complete);
- **Green Mountain Walkway**, envisioned as a circulation spine for walking and bicycling through the center of the main campus, from Colchester Avenue to the Davis Center (in progress);

- **The Land Bridge**, which would close the gap between University Heights and the rest of the campus north of Main Street by depressing Main Street under a wide pedestrian plaza and links the south and north sides of the street; and
- **University Place**, a major pedestrian plaza created after the road is acquired by the University and closed to vehicular traffic.

The existing conditions portion of the Campus Master Plan shows data relevant to the Active Transportation Plan. The two key regional bicycle connections are identified as College Street heading west from the campus and the shared use path heading south from the campus west of Spear Street. With the exception of Williston Rd, there are no key regional bicycle connections identified as heading north or east from the campus. The existing conditions section also indicates that,

> "The University has developed a hierarchical system of pathway designations for the future delineation of vehicular, bicycle and pedestrian routes on campus. This approach will guide the implementation of new path-ways as well as the reconfiguration and rehabilitation of existing pathways."

The system includes:

- **Multi-Use Paths** - 20 to 24 feet in width, to accommodate primarily shuttles, bicyclists and walkers *(shown in the image below)*;
- **Primary Walkway/Bikeway** - 8 to 15 feet in width to accommodate primarily bicyclists and walkers;
- **Secondary Walkways** - 5 to 8 feet in width, to accommodate primarily walkers;

The Campus Master Plan divides the campus into several different architectural districts and presents detailed recommendations for each, ranging from architectural modifications to new buildings, as well as improved pedestrian circulation plans and landscaping treatments. It also includes a detailed review of existing conditions for both on-campus and off-campus areas. Plans for the nine different architectural districts of the Main Campus provide general recommendations for future pedestrian circulation.

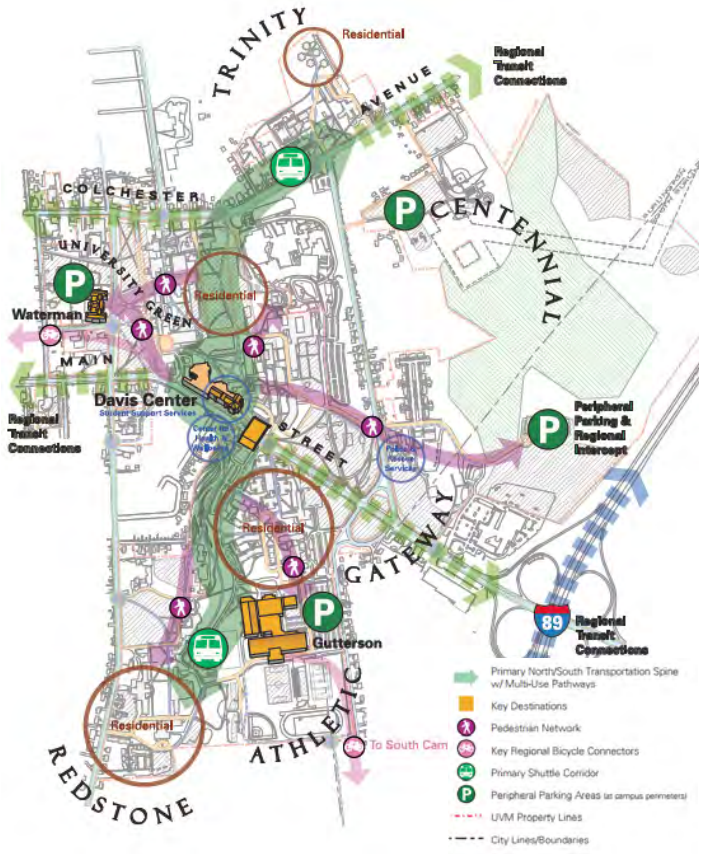


***Figure 2-14**: Pedestrian circulation routes (Campus Master Plan, pg 74)*

Chapter 4.2 of the Campus Master Plan includes analysis of the Pedestrian Campus (Figure 2-14), as well as detailed maps of the pedestrian (Figure 2-15) and bicycle circulation system (Figure 2-16).

There are several other relevant recommendations in the Campus Master Plan, as well as suggestions for new pedestrian circulation systems:

- Circulation within new buildings will provide interior connections to other buildings and campus destinations, removing the need to go outside;
- The sidewalks along both sides of Main Street will

***Figure 2-15**: Pedestrian Circulation Map (Campus Master Plan, pg 76)*

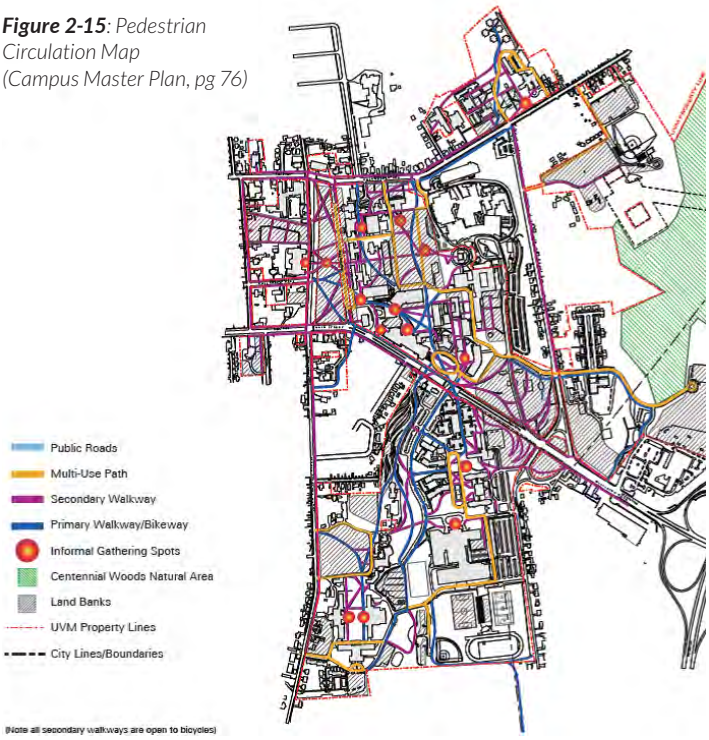
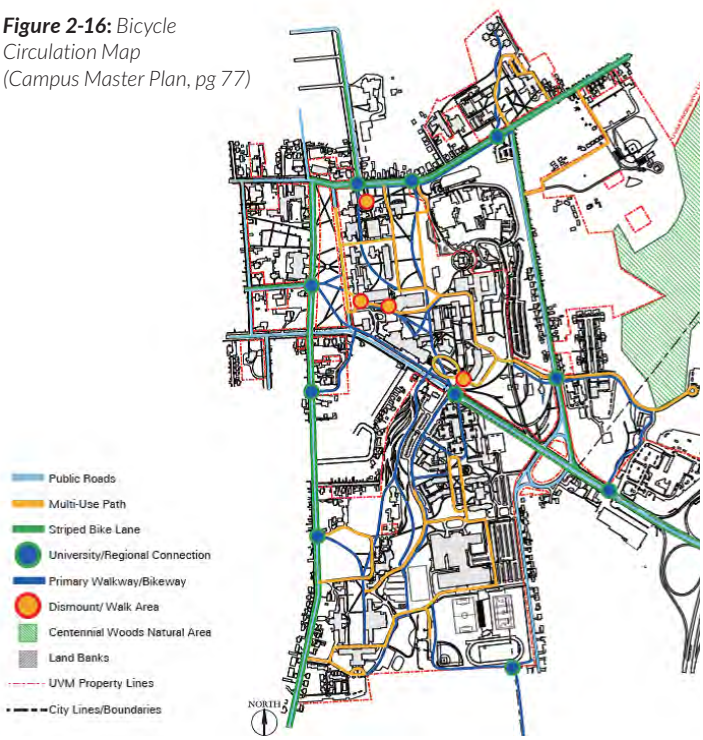


***Figure 2-16:** Bicycle Circulation Map (Campus Master Plan, pg 77)*



serve as the primary east-west bicycle routes for that area of the campus;

- The new University Place pedestrian space will be paved with historically appropriate material;

2.3.2 UVM's Active Transportation related Programs, Activities & Policies

The University has institutionalized many programs, policies and activities that have resulted in a more bike, walk and skateboard friendly campus. These initiatives help to create a culture that supports these modes by providing an environment where they are convenient, safe, and appealing ways to travel through campus. This section outlines these initiatives, which together, demonstrate UVM's commitment to active transportation and environmental stewardship.

Programs

Programs are University led initiatives that encourage people to use non-motorized modes of transportation. By removing barriers to using these modes and providing support services and incentives, programs help to make bicycling, walking and skateboarding logical choices for moving in and around campus.

- **Bicycle Education Center** – A well-stocked workshop for bicycle commuters and riders. Student volunteers assist visitors and teach basic skills of bike maintenance. The Bicycle Education Center is open weekday afternoons from 1 to 4pm in the walk-out basement portion of the Hills Building. The volunteers place a sandwich board sign for the Bicycle Education Center outside the entry when the Center is open.
- **Bicycle Share** – A free service available on campus that includes 15 bicycles that are available for 24 hour use. The main location for the Bike Share system is the first floor of the Davis Center.
- **Bicycle Semester Rental** – A small but growing service that includes used and abandoned bikes that are repaired by student mechanics at the Bicycle Education Center. Approximately ten bicycles are currently included in the program. The affordable rent for semester is between $30 or $50.
- **Helmets and Lights Subsidies** - A University Transportation and Parking Services program to encourage the use of both by students. Local shops set up on Davis Center's Quad in September and April to sell their subsidized helmets and lights. There are also on-site bike safety checks (Dr. Your Bike) by the Bicycle Education Center as well as flat tire kit giveaways.

UVM Bikes! Headquarters

- **Campus Bike Maps** - Resource for best routes, closest bike racks.
- **CATMA membership** - CATMA commuter programs for employees and students. Bike/Walk Rewards program for employees.
- **CarShare Vermont Campus Program** - Free or discounted membership to CarShare Vermont.
- **Unlimited Access Program** - GMT free bus access with UVM ID. This program encourages students and faculty to use the regional bus system. Bicycles can be transported by the bus.
- **UVMBikes!** - An organization sponsored by the Student Government Association to promote bicycling as a means of transportation as well as for recreation on, to, and around campus. Formerly known as the Bicycle Users Group (BUG), the group assists with the Bike Share program and the Bicycle Education Center.
- **Bicycle and Walk Benefits** – A program of discounts and other rewards for bicyclist and walkers. The program currently features gift cards from a local grocery store (City Market), a movie theater (the Roxy Cinema), or a sports shop (the Skirack) for bicyclists that join the program. Bicyclists and walkers in the program can purchase stickers through CATMA or Local Motion, which is a local bicycle and pedestrian advocacy organization based in Burlington.
- Guaranteed Ride Home - A program by GMT and CATMA. This program guarantees a ride home for anyone enrolled in the program that needs to get home for an emergency or after regular service hours after commuting to work without a personal vehicle.

The unlimited access program provides UVM students, faculty and staff with a free GMT bus access. Busses are equipped with bike-on-bus racks, making them an even more appealing commute option for many people.

Activities

University sponsored activities provide information about using active modes, and also include organized events and clubs that promote them. Together, these activities help to foster a University culture that sees walking, biking and skateboarding as appealing ways to travel. These activities are identified below:

- **Winter Commuter Event** – Informative presentation by bicycle safety instructor for those wanting to commute in the winter. The presentation is done with the assistance of Local Motion and is given at the Davis Center in January.
- **Employee Commuter Event** – Informative presentation by bicycle safety instructor for those wanting to commute by bicycle to work on the campus. This is an employee event done with assistance from Local Motion. The presentation has been given in the fall and spring since 2012.
- **National and Vermont Bike Challenge** - A local and national challenge to encourage more bicycling.


UVM Cycling Team

- **Way To Go! Vermont Participation** - A statewide commuter challenge to encourage more non-motorized ways of commuting to and from work. UVM was the local winner in 2015.
- **Bicycle Repair Classes** - Classes for UVM students on how to do basic repairs on bicycles. The classes are taught in Sustainable Transportation.
- **Cycling Team** - A cycling team that competes with other colleges and universities, which is sponsored by the Student Government Association. The cycling team members also assist with some maintenance in the Bicycle Education Center.

Policies

Campus polices help to support active modes of transportation by regulating parking and ensuring facilities are adequately maintained. The campus policies relevant to walking, biking and skateboarding are identified below:

- First-year students are not allowed to have cars, which encourages their exploration of the campus and surrounding area by foot, on a bicycle, or on a bus.
- Students are allowed to store their bicycles in their dorm rooms.
- All new dormitories include indoor protected and secure parking spaces for bicycles, as well as outdoor bike parking
- Most existing residence halls offer indoor bike parking rooms.

Snow Removal Policy

UVM experiences harsh winters that makes travelling difficult. The University has established a snow removal policy that helps to lessen the impact of winter events on campus circulation. The goals of this policy are listed below:

Snow removal focuses on clearing heavily traveled routes first, as well as shuttle and bus routes. In particular, during a storm event the Physical Plant Grounds Department first clears:

- Main roads and bus routes,
- Faculty, staff and student parking lots,
- Walkways and pathways,
- Steps, and
- Handicap walks.

The Residential Life and Custodial Services staff clears:

- Building entrances, and
- Emergency access to buildings.

Once the main areas are cleared of snow, the Physical Plant Grounds Department concentrate on:

- Blue lights and emergency phones
- Dumpsters, trash cans
- Parking meters
- Widening of walks and roadways
- Hauling snow from lots

The Residential Life and Custodial Services staff concentrates on:

- Keeping emergency doors free of falling snow from roofs,
- Fire doors, and fire hydrants.

UVM on a snowy morning


Photo: J. Henry

Bicycle Parking Practices

The University provides outdoor bicycle parking at numerous locations around the campus. Many of the University and/or private resedential student housing facilities also provide secure indoor bicycle parking. The campus has four different types of indoor and outdoor bicycle parking fixtures:

- U racks,
- Bar racks,
- Square racks, and
- Grid racks.

University Heights Bike Parking Room

Some of these are permanently anchored in place while others are seasonally anchored, so that they can be removed in the winter to make snow plowing easier. Maps 2.3 and 2.4 show the location of the different types of racks around the campus.

All new resedential halls include indoor protected and secure parking spaces for bicycles. Such parking, as well as short term bicycle parking, is one of the criteria used in evaluating construction projects for LEED certification.

2.4.3 Other Campus Related Reports

Bicycle Friendly University Feedback Report

In response to the University of Vermont's application to become a bicycle friendly university, the League of American Bicyclists (LAB), which sponsors the program, designated UVM at the Silver level in 2014. The LAB BFU Feedback Report suggested ways that the university could move up in its rating level. The report summarized the key measures.

- Continue to expand the bike network and to increase network connectivity through the use of different types of bike lanes, cycle tracks and shared lane markings.
- Increase the amount of high quality bicycle parking at popular destinations on campus. Prioritize indoor, secure, and/or covered parking where possible.
- Encourage your Bicycle Advisory Committee to meet more often.
- Create a campus bike master plan that will guide future plans with a long-term physical and programmatic vision for your campus.
- Expand efforts to evaluate crash statistics to produce a specific plan to reduce the number of crashes on campus.
- Establish a formal incentive program for those who bike commute, and consider adding bike valets at campus events.
- Ask local or campus police to enforce traffic laws for both bicyclists and motorists on campus. Consider also adding a ticket diversion program that offers educational alternatives to traffic citations.

Additional items that the Feedback Report recommends include:

- Provide ongoing training opportunities for engineering and planning staff on accommodating bicyclists.
- Place way-finding signage at strategic locations around campus.

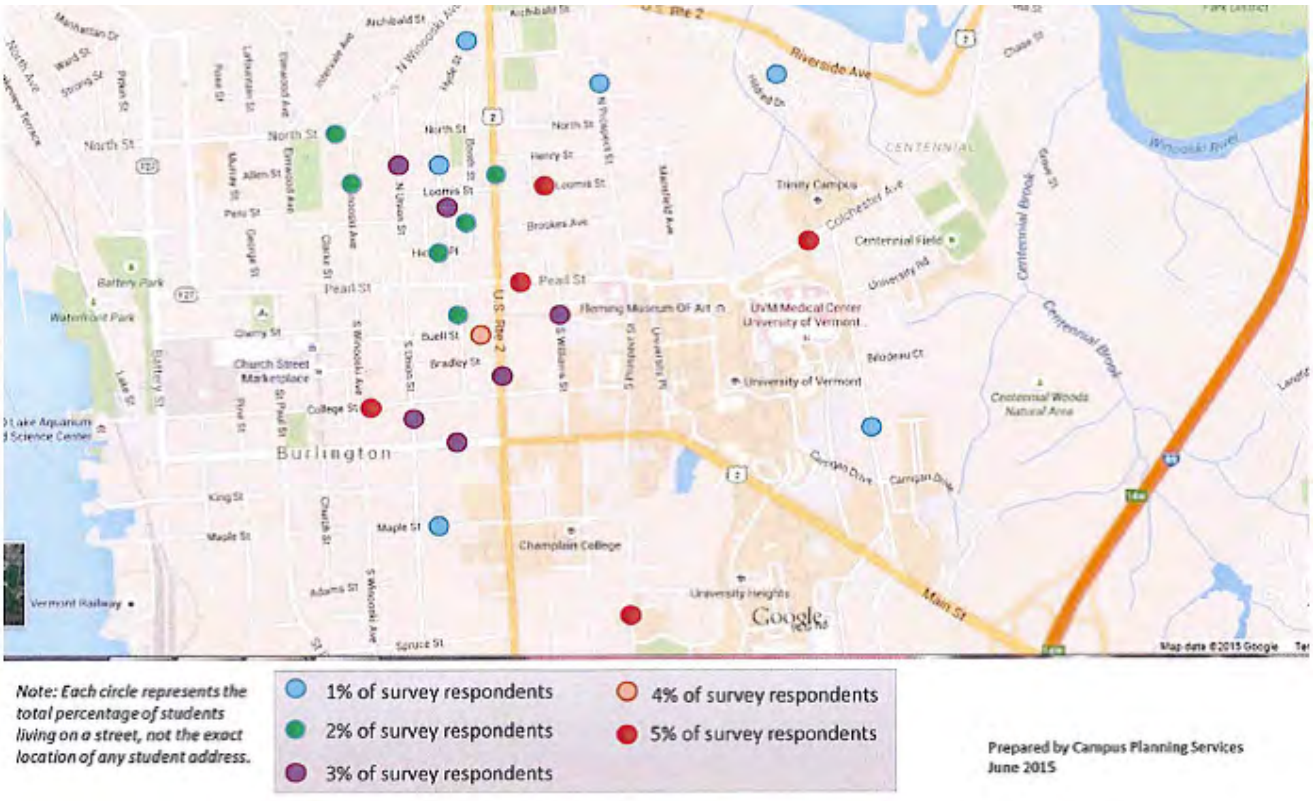
UVM Bicycle Friendly University Feedback Report (2014)

- Expand efforts to make both motorists and pedestrians, bicyclists and skateboarders aware of their rights and responsibilities on the road.
- Continue to expand your education campaign promoting the share the road message; take advantage of your local bicycle groups for content development and manpower.
- Start a bicyclist and motorist ticket diversion program; students and faculty that are found violating a traffic law are offered an opportunity to waive fees for violations by attending a bicycling education course.
- Offer cycling skills classes, Traffic Skills 101 classes and bike commuter classes more frequently or contact your local bicycle group to see if there are classes in your area that could be promoted to students and employees.
- Host a League Cycling Instructor (LCI) seminar to increase the number of local LCIs; having local instructors will enable the University to expand cycling education, recruit knowledgeable cycling ambassadors, deliver education to motorists, and have experts available to assist in encouragement programs.
- Make more information available about bicycle commuting (The League of American Bicyclists now offers a handy Smart Cycling Quick Guide and a similar guide is available from the Vermont Agency of Transportation and Local Motion.)

2015 Student Housing Report

The Student Housing Report is produced annually by the UVM for the City of Burlington to ensure that off-campus housing patterns are understood and so that plans to manage off-campus housing can be developed. From this report, the University estimates that in 2015 approximately 2,775 students lived off campus within the City of Burlington. About 65 percent of these students are concentrated near campus or in the downtown area. This map below shows the general location of where these students live. All of these students are within a range where they could easily bicycle or walk to and from the campus, and generally are concentrated to the northwest of campus

Figure 2-17: *UVM Off-Campus Student Address Survey - Burlington Street locations with a report rate of 1% or higher (published June 30th, 2015)*

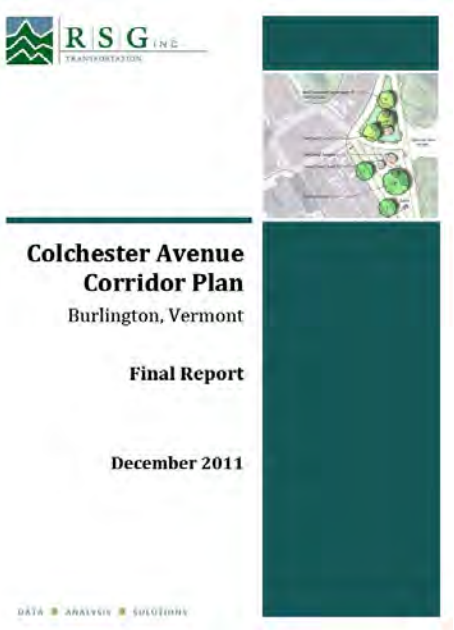


2.4.4 Supporting Planning Efforts

Colchester Avenue Corridor Plan

Chittenden County Regional Planning Commission

The Colchester Avenue Corridor Plan was completed in 2011 by the Chittenden County Regional Planning Commission (CCRPC), in cooperation with the City of Burlington, Vermont. The Plan examines the existing conditions and expected future conditions on Colchester Avenue and sets out a series of recommendations meant to address existing or expected problems and issues. Colchester Avenue separates the Trinity campus area from the rest of the University. It also creates the northern edge of the University Green and the western most portions of the campus. Several of the recommendations in the Plan are relevant to walking and bicycling on and around the campus. More specifically, the Plan recommends:



The creation of dedicated bike lanes on both sides of Colchester Ave between the S./N. Prospect Street and the East Avenue intersection - (Bike lanes have been installed along a portion of Colchester Avenue, with the westbound bike lane extending from East Avenue to just past S. Prospect Street, and the east bound bike lane only extending from S. Prospect Street to Fletcher Place due to the addition of a turning lane on Colchester Avenue's eastbound approach to the intersection.);

The installation of crosswalk and pedestrian signal on Colchester Avenue on the eastbound approach to East Avenue;

- The upgrading of the multi use path along the south side of Colchester Avenue between University Place and East Avenue, with improved connections at each end to other walking and bicycling facilities (NOTE: The City of Burlington currently has an RFP out for the design of the upgraded multi use path.);
- The addition of a midblock crossing on Colchester between Mansfield Street and East Avenue with the specific location to be determined later;
- The addition of crosswalks with pedestrian signals and a leading pedestrian interval at all signalized intersections;
- The reconstruction of sidewalks where necessary to address drainage issues;
- The addition of a protected crossing with a no turn on red, pedestrian activated sign at the exit of Hospital Drive at Colchester Avenue;
- The closing of University Place, suggested to occur within five years of the completion of the plan, with a conversion to right-in and right-out turns only in the interim before it is closed;
- The reduction of the speed limit to 25 miles per hour along Colchester Avenue; (completed);
- The trimming of vegetation along the road to maintain sight distances; and
- The clearing of snow from bus stops to make it easier to get to and from the stop and onto the bus.

US 2 Corridor Transportation Management Plan

Chittenden County Regional Planning Commission

The US 2 Corridor Transportation Management Plan, completed in 2007 by CCRPC, is an overall look at how the Route 2 corridor can be upgraded and improved over time to address existing and anticipated issues, traffic increases and other issues. Route 2 passes through the campus as Main Street. Several bicycle and pedestrian related recommendations are relevant to the Active Transportation Plan.

- Add crosswalks, countdown pedestrian signals, and advanced pedestrian phase at existing traffic signals.
- Create a new bike path south of Route 2, which includes a new bicycling and walking bridge over Interstate 89 in the vicinity of Quarry Hill Road and the University Mall to avoid forcing bicyclists to traverse the existing US 2/Main Street interchange bridge over the interstate.
- Review the timing for existing traffic signals in the vicinity of the campus on a regular schedule.

Regional Bicycle Pedestrian Plan Update

Chittenden County Regional Planning Commission

CCRPC is in the process of updating its bicycle and pedestrian plan. The current plan includes maps that show on-road bicycle facilities designated on:

- S. Prospect Street,
- East Avenue,
- Main Street west of East Avenue,
- Pearl St west of Prospect Street, and
- Mansfield Street.

It shows "Common Routes not Designated" on:

- Main Street east of East Avenue, and
- Colchester Avenue east of S. Prospect Street.

The Off-Road plan in the Update includes existing shared use paths on:

- Main Street west of East Avenue,
- The Redstone Walkway,
- The Spear Street Shared Use Path.

It includes proposed shared use paths along Spear Street, with a spur into Quarry Hill. Sidewalk or on-road links are shown on University Place and College Street.[1]

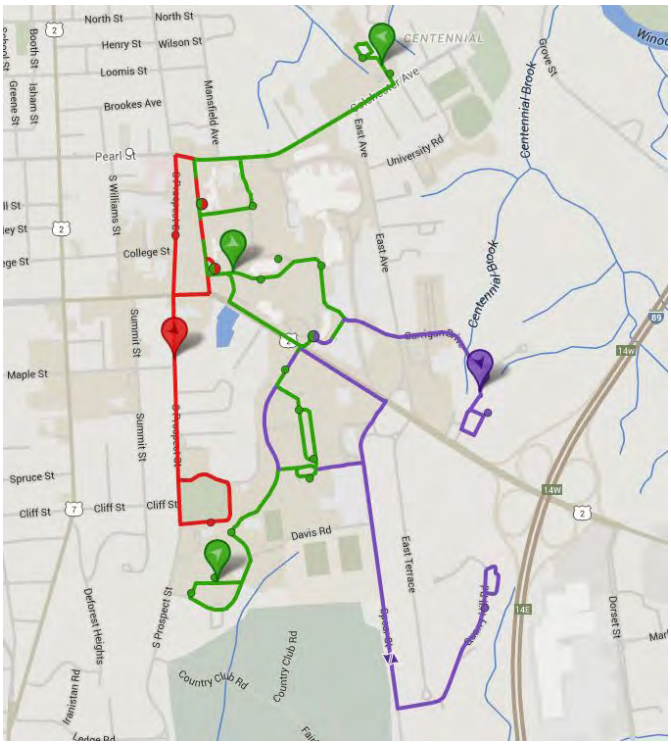
2.4.5 Transit Services

The Campus Area Transportation Service (CATS) bus system provides five separate services, three of which follow the same route through the campus:

- **The Redstone Express**, running up and down S. Prospect Street Monday through Friday, every 15 minutes from 7:45 AM to 4:45 PM, providing a quick link between the Redstone Campus and the University Green:
- **The Daytime Route**, running north-south through University from the Trinity Campus to the Redstone Campus, every ten minutes, Monday through Friday from 7:30 AM to 6:30 PM;
- **The Evening Route**, running north-south through University from the Trinity Campus to the Redstone Campus, every half hour, Monday through Friday from 6:15 PM to 11:45 PM;
- **The Weekend Route**, running north-south through University from the Trinity Campus to the Redstone Campus, Saturday and Sunday, every 30 minutes, from 11:30 AM to 6:30 PM; and
- **The Quarry Hill/Sheraton Route**, which links the Davis Center with the Sheraton Hotel and the Quarry Hill residence, running every half hour from 7:30 AM to 10 PM on days that school is in session.

CATS also provides an off campus bus service, all following the same route but with different schedules. The route provides a link to the Burlington downtown area, starting at the Trinity

***Figure 2-18**: UVM Campus shuttle routes.*



Campus and ending at the Redstone Campus. CATS shuttles do not provide bike-on-bus racks. The three separate services are:

- **The Monday through Thursday schedule**, which is every 30 minutes, 6:30 PM to Midnight;
- **The Weekend schedule**, which is every 15 minutes on Friday, Saturday, and Sunday, 6:30 PM to 10:00 PM; and
- **The Late Weekend schedule**, which runs Friday, Saturday and Sunday, every ten minutes, 10:00 PM to 3:00 AM.

GMT buses run near the campus, with routes on:

- Main Street,
- East Avenue,
- Colchester Avenue,
- N./S.Prospect Street,
- College Street,
- Maple Street,
- Hospital Drive

These routes link the campus with other parts of Burlington, the Burlington International Airport, and the region. GMT buses are equipped with racks that hold two bicycles. They are currently researching how to accommodate more bicycles on each bus.

1 *The plan can be viewed here: http://www.ccrpcvt.org/our-work/our-plans/regional-bikeped-plan/*

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CHAPTER 3:
INFRASTRUCTURE RECOMMENDATIONS

3.1 RECOMMENDATIONS OVERVIEW

The recommendations to improve active transportation on campus resulted from an iterative process. The steps taken to develop the Plan recommendations included:

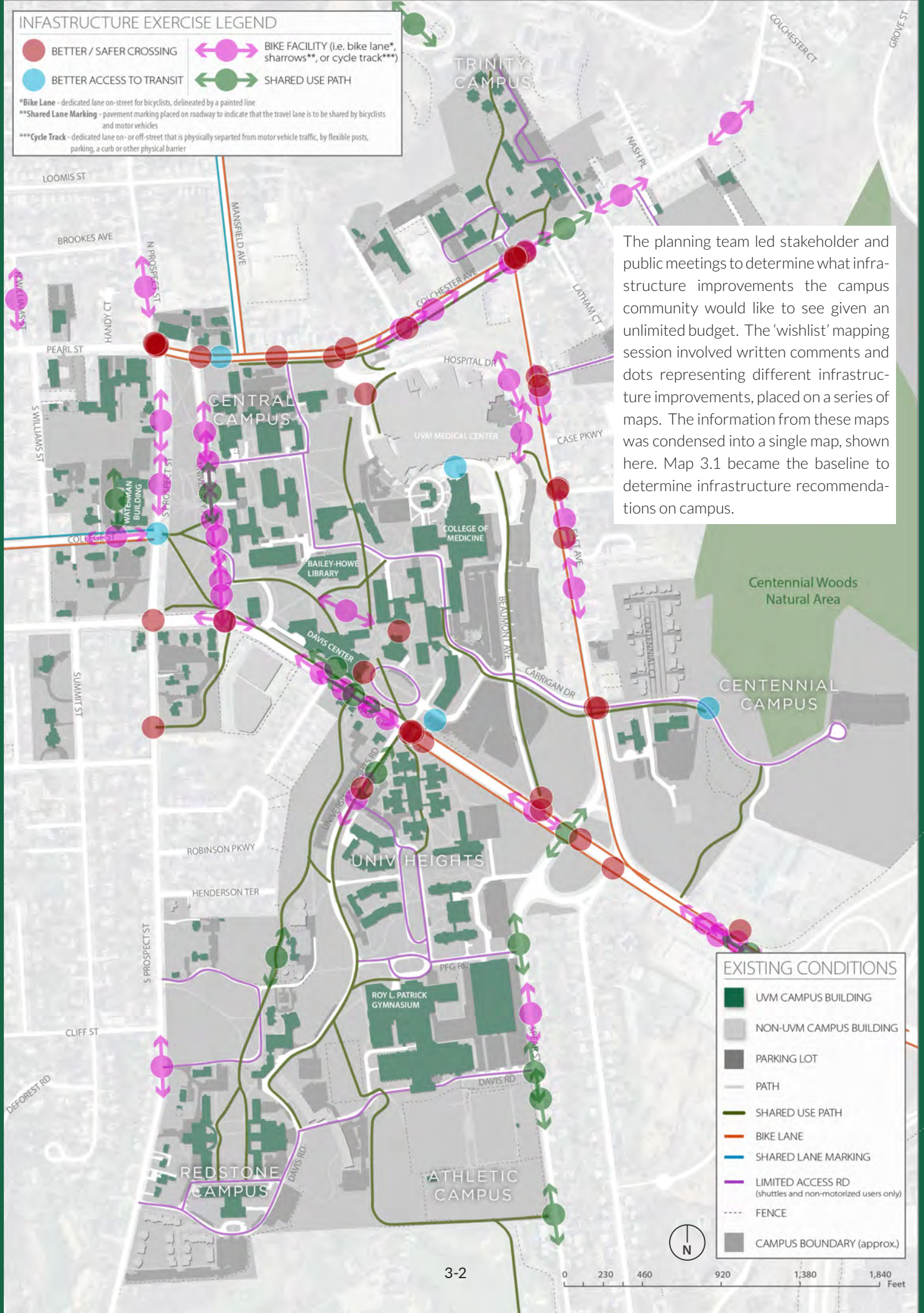
- Research and analysis of campus policies and active transportation-related conditions in-and-around the campus
- Observation and analysis of circulation patterns, connectivity challenges, and opportunities for improvement
- Input gathering from the university community through mapping exercises and campus stakeholder and public meetings
- Formulating recommendations that will improve active transportation conditions
- Vetting recommendations for feasibility, and evaluating the priority of the recommendations

The 5 E's

While every campus varies in context, climate, student composition, and culture - the five E's serve as a standard across all universities to assess and improve active transportation on campuses. This Plan used the five E's to evaluate UVM and structure recommendations to improve non-motorized circulation on campus. UVM staff should use these categories to monitor progress, and from them, develop a work plan that will result in a more walk, bike and skateboard friendly campus.

Table 3.1: The 5 E's (Representing Goals and Benchmarks for the University)

THE 5 E's	Description
ENGINEERING	The most visible sign of a welcoming place for active transportation is the presence of high quality and well maintained infrastructure including: • A well-connected network of accessible paths and sidewalks, within and adjacent to campus • Highly visible crosswalks and conflict zones • Policies to ensure connectivity and maintenance of these facilities year-round • Secure, convenient, and readily available bike parking and access to shower and locker facilities
EDUCATION	Educating students and staff is key to building a safe and supportive active transportation culture and includes: • Walking, bicycling and skateboard safety education/training and lights/helmets give-a-ways • Online tips, rules, regulations, and tools (in addition to social media outreach) • Information about rights and responsibilities for all road users
ENCOURAGEMENT	A supportive non-motorized environment where faculty, staff and students are encouraged to consider using active modes every day can be very effective in increasing participation. This can be readily implemented by providing a variety of fun opportunities and incentives to choose biking or walking for transportation trips: • National Bike/Walk Month, and Bike/Walk to Campus Day, Way to Go Challenge • Wayfinding tools like providing maps, route finding signage, and mobile apps • Incentive programs offering prizes or Student Union discounts
ENFORCEMENT	An effective active transportation environment has rules and regulations that are understood and enforced fairly and appropriately and address the safety of all road and path users and include: • Updated rules and regulations related to non-motorized modes • Fair and equitable enforcement and trained law enforcement officers • Theft prevention and enforcement
EVALUATION	Evaluation involves measuring and benchmarking number of users and other data as a tool to understand and create a successful and safe bicycling, walking, and skateboarding environment. Measuring and benchmarking activities include: • Understanding trips and active transportation participation rates • Evaluating facilities, their performance, conditions, and usage • Tracking bike and skateboard thefts and crashes involving non-motorized users



The planning team led stakeholder and public meetings to determine what infrastructure improvements the campus community would like to see given an unlimited budget. The 'wishlist' mapping session involved written comments and dots representing different infrastructure improvements, placed on a series of maps. The information from these maps was condensed into a single map, shown here. Map 3.1 became the baseline to determine infrastructure recommendations on campus.

3.2 ENGINEERING RECOMMENDATIONS

The dot map exercise, combined with the existing conditions analysis, served as the foundation for making recommendations to improve active transportation on campus. Recommendations in this chapter are divided into three categories, described below:

1. **Active Transportation Recommendations**: Identifies project specific spot and corridor improvements, grouped into nine category types
2. **Bike Route Network & Dismount/Slow Zones**: Identifies major routes through campus that should be signed as bike routes, helping to reduce conflicts between bicyclists and pedestrians by encouraging bicyclists to stay on bike routes. Additionally, dismount/slow zones are identified where bicyclists/skateboarders should dismount and walk.
3. **Bike Parking Recommendations**: Identifies recommendations to improve both outdoor in indoor parking on campus.

In total, 60 projects are included on the Active Transportation Recommendations Map. Images illustrating the nine project categories are provided on page 3-5:

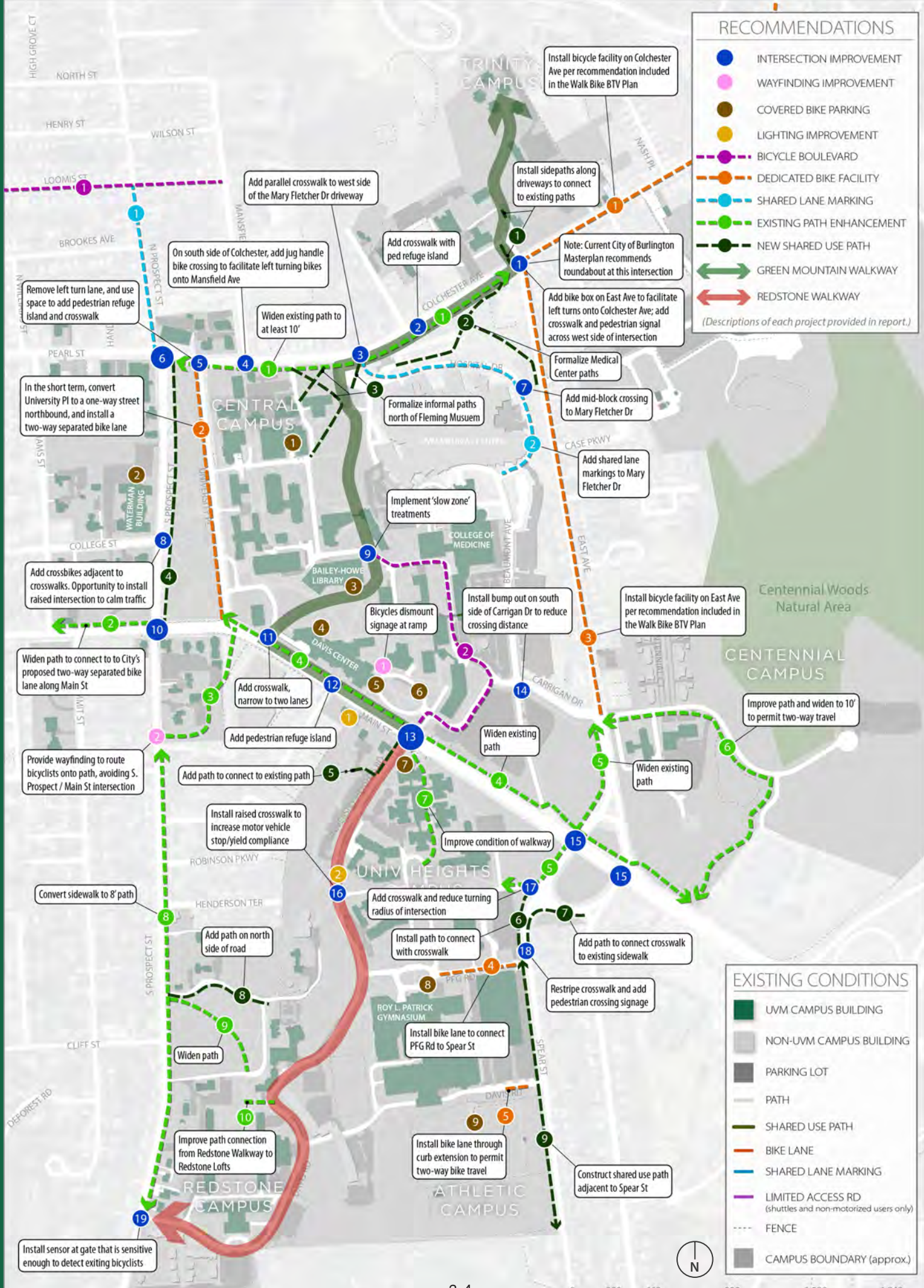
- Intersection improvements (19 projects)
- Key wayfinding locations (2 projects)
- Improved lighting (2 projects)
- Covered Bike Parking Locations (9 projects)
- Bicycle boulevards (2 projects)
- Bicycle facility (5 projects)
- Shared lane markings (2 projects)
- Existing path enhancement (10 projects)
- New shared use path (9 projects)

The projects were scored against ten evaluation criteria to assess their priority level. The criteria are described in Table 3.2. The evaluation criteria are based upon best practices, and were modified to reflect the goals and objectives of UVMoves.

Table 3.2 - Evaluation Criteria*

Criteria	Description	Low Score	Medium Score	High Score
Mobility	Prioritizes options that provide mobility for multiple modes of active transportation	Provides mobility option for one mode of active transportation	Provides mobility option for two modes of active transportation	Provides mobility option for three or more modes of active transportation
Connectivity	Prioritizes options that improves connectivity to campus	Improves connectivity along minor campus route	Improves connectivity along moderate campus route	Improves connectivity along major campus route, and could induce more trips to campus
Safety	Prioritizes options that will improve safety the most	Resolves minor safety issue	Resolves moderate safety issue	Resolves major safety issue
Benefits Most Users	Prioritizes options that benefit the widest variety of active transportation users	Along minor route and benefits low volume of users	Along moderate route and benefits moderate volume of users	Along major route and benefits high volume of users
Administration Support	Prioritizes options that are supported by the majority of campus administration	Project not located on campus & not a high priority for administration	Project adjacent to campus & moderate priority for administration	Project on campus & identified as major priority for administration
Student / Faculty / Staff Support	Prioritizes options that have the support of the majority of students, faculty, and staff	Identified as a lower priority location through campus outreach	Identified as a medium priority location through campus outreach	Identified as a high priority location through campus outreach
Reduction in Carbon Footprint	Prioritizes options that will provide the greatest reduction in number of motorized trips	Minor impact on inducing new active transportation trips	Moderate impact on inducing new active transportation trips	Creates strong connection to campus and high potential for inducing new trips
Cost / Benefit	Prioritizes options that are supported by a favorable cost / benefit analysis	Cost is high to relatively low benefit to campus	Medium cost relative to moderate benefit to campus	Investment would result in major benefit to active transportation
Ease of Implementation	Prioritizes options that do not present significant engineering obstacles to implementation	High engineering barriers to implementation	Moderate engineering barriers to implementation	Low engineering barriers to implementation
Potential for Fundraising	Prioritizes options that have the greatest potential for fund raising support	Project not located on campus and would have little chance of being funded by donor	Project located adjacent to campus and could feasibly be funded by donor	Represents a signature project that could garner significant donor funding

*Not listed in order of importance



MAP 3.2: INFRASTRUCTURE RECOMMENDATIONS

Range of Recommendations The following images depict the range of projects recommended to improve mobility on campus:

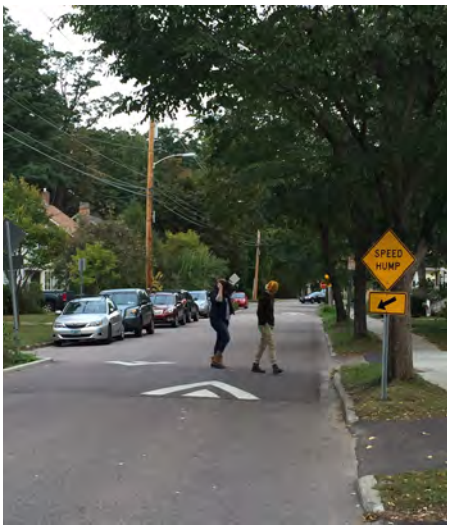
Intersection Improvement

Wayfinding

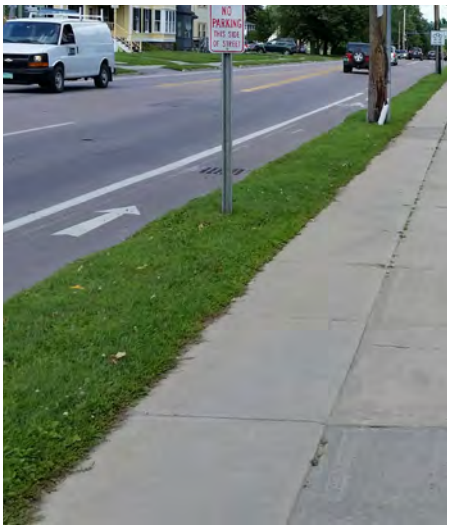
Campus Lighting

Bike Parking

Bicycle Boulevard



Bicycle Facility



Shared Lane Marking

Path Enhancement

New Shared Use Path

3.2.1 Scoring Recommendations

The planning team evaluated 60 recommendations against the ten criteria presented in table 3.2 to assess their priotity level for the campus community. The tables in this section provide detailed information about each project, including the: Project ID (which can be used to locate the project on Map 3.2), Project Name, Project Description, an indication of whether the project is on City or Campus owned land ('City' indicates City of Burlington unless otherwise noted), Project Score, and Priority Level ('Low', 'Medium' or 'High').[1]

Recommendations on City Rights-of-Way

Several of the recommendations included in this plan are within City of Burlington and South Burlington owned rights-of-way. Team members have discussed the plan's recommendations with staff from both Burlington and S. Burlington. Although UVM does not have direct control over these projects, they represent important connections, and the University should advocate for their implementation by assigning staff to participate in committees and public meetings to advance these projects.

Intersection Improvements Recommendations

UVM's campus is intersected by several busy streets that students, faculty and staff must travel along and cross daily to reach their destinations. The high vehicular volumes along these corridors, including Main St, Prospect St, Colchester Ave, East Ave, among others, makes crossing them difficult. The recommendations in Table 3.3 would make these difficult crossings more comfortable for those walking, bicycling and skateboarding.

Table 3.3 - Intersection Improvement Recommendations (see Map 3.2 for location of recommended improvement)

Project ID	Project Name	Project Description	Property	Priority
1	Colchester Ave and East Ave	Add bike box onto East Ave to facilitate left turns onto Colchester Ave; Add crosswalk & ped signal on west side of intersection connecting to existing curbcut	**City**	HIGH
2	Colchester Mid-Block Crossing	Add crosswalk here with pedestrian refuge island	**City**	HIGH
3	Colchester Ave @ Hosptial Dr	Add new crosswalk at the west side of Hospital Dr, parallel to the existing crosswalk	UVM	MEDIUM
4	Colchester Ave & Mansfield Rd	On south side of Colchester Ave, add jug handle[1] crossing to facilitate left turning bikes onto Mansfield Ave	**City**	LOW
5	Colchester Ave and University Place	Remove left turn lane, and use space to add pedestrian refuge island and crosswalk	**City**	MEDIUM
6	Prospect St & Pearl St	Conduct scoping study to redesign intersection and modify signal phasing to improve bike/ped circulation	**City**	HIGH
7	Hospital Dr Crossing	Add mid-block crossing to link dirt path to sidewalk on west side of road	**City**	LOW
8	S. Prospect St & College St	Add crossbikes adjacent to crosswalks. Install raised crossing to calm traffic. Add sharrows in both turn lanes as College St approaches S. Prospect St.	**City**	LOW
9	Carrigan Dr Slow Zone	Implement 'slow zone' treatments at intersection to encourage slow travel	UVM	MEDIUM
10	S. Prospect St & Main St	Conduct scoping study to redesign intersection and modify signal phasing to improve bike/ped circulation	**City**	MEDIUM
11	Morrill Hill Dr & Main St pathway	Reduce Morrill Hill Dr to two lanes, and reconstruct curb lines to reduce crossing distance. Add crosswalk to make crossing road safer	**City**	HIGH
12	Main St & University Terrace	Add pedestrian refuge island to existing crosswalk	**City**	LOW
13	Main St & Univ Heights Rd	Conduct scoping study to improve crossing through the addition of wider crosswalk & signal modification. Crossing could incorporate dedicated crossbike.	**City**	HIGH
14	Carrigan Dr & Beaumont Ave	Install bump-out on south side of Carrigan Dr to reduce crossing distance	**City**/UVM	MEDIUM
15	Main St, East Eve, & Spear St Intersection Enhancements	Conduct scoping study to improve bike/ped circulation and safety through intersection	Burl & S. Burl	HIGH
16	University Heights Crossing	Install raised crosswalk to increase motor vehicle stop/yield compliance	**City**	LOW
17	PFG Rd entrance at Spear St	Add crosswalk and reduce turning radius of intersection	UVM/**City**	MEDIUM
18	Spear St and PFG Rd	Restripe crosswalk at this location and add pedestrian crossing signage	**S. Burl**	MEDIUM
19	Davis Rd Exit	Install sensor at gate that is sensitive enough to detect exiting bicyclists	**City**	LOW

1 The scores for Low Priority projects fell within the lower 33rd percentile of all of the scores; The scores for Medium Priority projects fell between the 33rd and 66th percentile of all scores, and the scores for High Priority projects were greater than the 66th percentile of all scores.
2 A jug handle is a U-shaped path that enables bicyclists to turn their bicycles so that they are oriented perpendicular to a crossing.

Key Wayfinding Spot Improvement Recommendations

Wayfinding provides guidance for people unfamiliar with an area, giving information about how to reach destinations. There are two specific locations where new wayfinding should be implemented to facilitate travel for non-motorized users, identified in Table 3.4.

Table 3.4 - Wayfinding Spot Improvement Recommendations (see Map 3.2 for location of recommended improvement)

Project ID	Project Name	Project Description	Property	Priority
1	Davis Center Staircase	Install signage at both the top and bottom of the staircase indicating that bicyclists are to dismount at staircase. In the long term, study option to improve/rebuild ramp to accommodate bicycles.	UVM	HIGH
2	Prospect St & Path	Provide signage to route people onto path avoiding S. Prospect/Main St intersection. When S. Prospect & Main St Intersection is redesigned, reevaluate bike route option through this intersection to improve connection to Waterman.	UVM	HIGH

Covered Bike Parking

Covered bike parking helps to protect bicycles from the elements, such as snow and rain, a benefit that is especially important given Burlington's harsh winters. Covered bike parking is recommended at key 'intercept zones' around campus. Intercept zones occur along bike routes that flank the central campus, and would enable bicyclists to park their bicycles in a visible, covered location, and then walk to their final destination. Providing convenient, covered parking at these locations provides an incentive for people to park their bikes and walk. This has the added benefit of reducing conflicts between bicyclists and pedestrians in more congested areas of campus where bicycling can be hazardous. The nine locations where this covered parking is recommended are identified on Map 3.2. Additional types of bike parking should be provided as well, including indoor parking and short term parking in front of buildings. Recommendations for these other types of bike parking are included in Section 3.3.

Table 3.5 - Covered Bike Parking (see Map 3.2 for location of recommended improvement)

Project ID	Project Name	Project Description	Property	Priority
NONE	Various Locations	Locate covered bike parking along major bike routes to intercept bicyclists and encourage them to park their bike and walk through more pedestrian oriented parts of the campus	UVM	HIGH

Lighting Spot Improvements

In a campus environment that operates 24/7, pedestrian scale lighting is critical. Lighting helps people see and be seen at night, and also has been found to increase the perception of safety for those travelling alone or within small groups. People walking, bicycling and skateboarding on campus would benefit from the installation of lighting at two specific locations identified in Table 3.6.

Table 3.6 - Lighting Spot Improvement Recommendations (see Map 3.2 for location of recommended improvement)

Project ID	Project Name	Project Description	Property	Priority
1	South of Main St @ Tunnel	Improve lighting along Redstone Walkway leading to tunnel to Davis Center	UVM	LOW
2	University Heights Rd	Improve lighting along University Heights Rd	UVM	LOW

Bicycle Boulevards

Bicycle boulevards are recommended along low volume residential & campus streets that represent key bikeway connections. These streets should become optimized for bicycle travel through the installation of traffic calming measures intended to slow down vehicles and divert traffic away from these streets. The installation of these features would make them more comfortable routes to bike. Since these streets will slow vehicles down, they will also become more comfortable for other modes of non-motorized transportation.

Table 3.7 - Bicycle Boulevard Recommendations (see Map 3.2 for location of recommended improvement)

Project ID	Project Name	Project Description	Property	Priority
1	Loomis St	Traffic calm Loomis St to make it more comfortable for bicyclists going downtown	**City**	LOW
2	Carrigan Dr	Sign the western end of Carrigan Dr and the connections to Main Street as a neighborhood bikeway to highlight this key on-campus bike route	UVM	MEDIUM

Dedicated Bicycle Facility Recommendations

Several streets were identified through the planning process as desirable bike routes. Bicycle facilities provide a dedicated space in the roadway for bicyclists to travel, and they are recommended on the streets identified in Table 3.8. For recommendations not on campus roads, the University should collaborate with the Cities of Burlington & South Burlington to advance these recommendations.

Table 3.8 - Dedicated Bicycle Facility Recommendations (see Map 3.2 for location of recommended improvement)

Project ID	Project Name	Project Description	Property	Priority
1	Colchester Ave Bike Lanes	Install bicycle facility on Colchester Ave per recommendation included in the Walk Bike BTV Plan	**City**	LOW
2	University Place (Short Term Option)	In the short term, convert University Pl to a one-way street northbound, and install a two-way separated bike lane on the west side of the road	**City**	HIGH
3	East Ave Bike Lanes	Install bicycle facility on East Ave per recommendation included in the Walk Bike BTV Plan	**City**	LOW
4	PFG Rd	Install bike lane connecting PFG Rd to Spear St. Add signage allowing east-bound bicyclists to use sidewalk to access Spear St.	UVM	MEDIUM
5	Davis Rd	Install bike lane through curb extension to permit two-way bike travel on Davis Rd	UVM	LOW

Shared Lane Marking Recommendations

Shared Lane Markings, an image of which is shown on page 3-5, help to communicate to motorists that bicyclists will be using a street, and reinforce that drivers should adjust their behavior and share the road. Shared Lane Markings also indicate the lane position that bicyclists should assume when riding in the road. Although these markings do not provide a dedicated space for bicyclists, they are effective in marking streets as bike routes and are an appropriate treatment on low-speed, low-volume roads where there is not space available to provide a dedicated bicycle facility. Shared Lane Marking Recommendations are included in Table 3.9.

Table 3.9 - Shared Lane Marking Recommendations (see Map 3.2 for location of recommended improvement)

Project ID	Project Name	Project Description	Property	Priority
1	S. Prospect St	Place shared lane markings and bikeway signage on Prospect St to emphasize that this connection as a major bike route	**City**	LOW
2	Hospital Dr	Place shared lane markings and bikeway signage along Hospital Dr	UVM	LOW

Path Enhancement Recommendations

UVM has a well established network of paths, but some of these paths have deteriorated. Others are too narrow to accommodate the high volume of people that use them, causing people to walk on the path shoulder and increasing the risk of head-on collisions. Smooth paths are safer to use, and wider paths minimize conflicts between oncoming traffic. The paths below should be rehabilitated and/or widened to improve the circulation of active modes of transportation on campus.

Table 3.10 - Path Enhancement Recommendations (see Map 3.2 for location of recommended improvement)

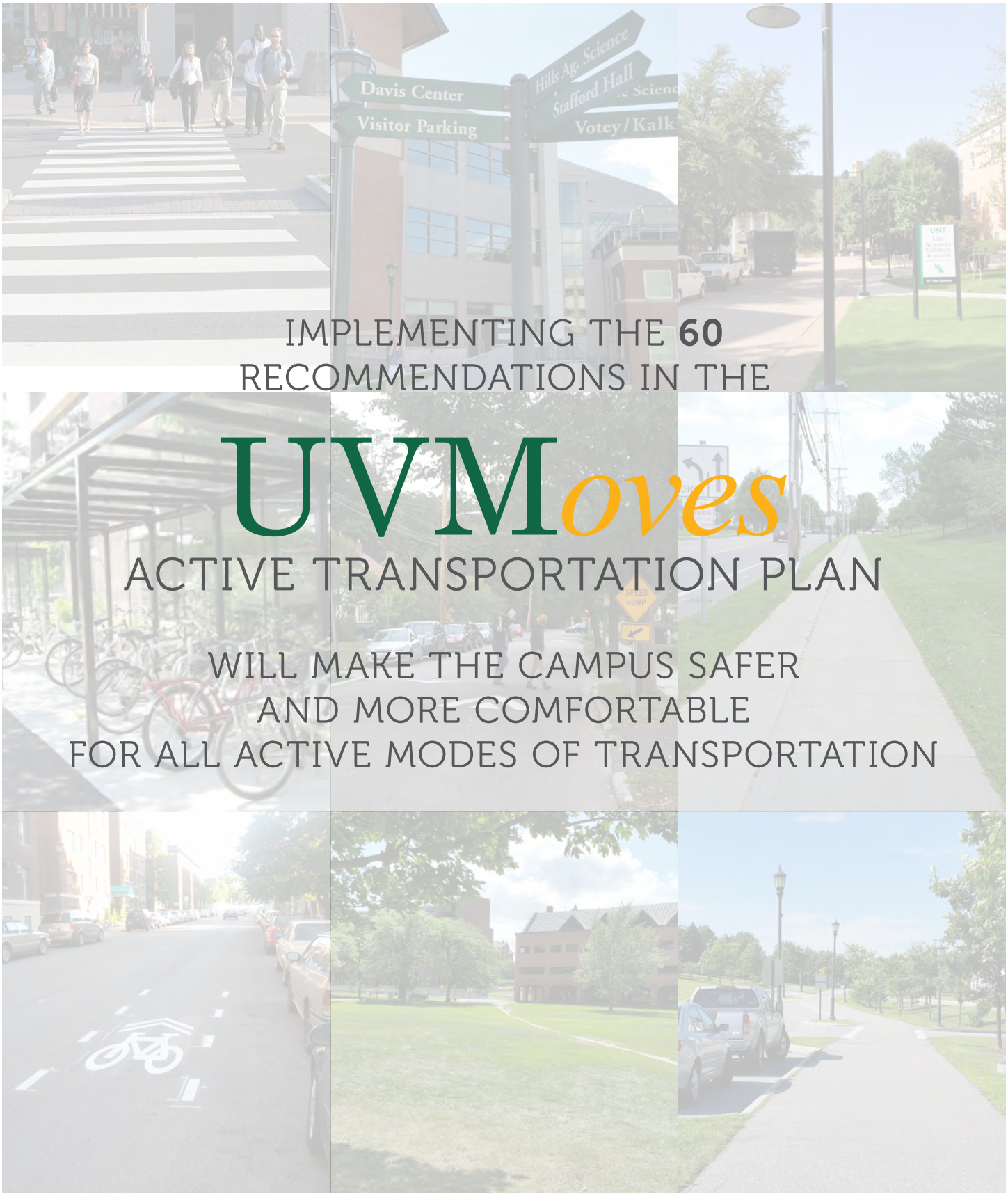
Project ID	Project Name	Project Description	Property	Priority
1	Colchester Ave Side Path	Widen existing path to at least 10' from Univ. Place to East Ave (project underway)	**City**	HIGH
2	Main St pathway Connection*	Widen path to connect to City's proposed two-way separated bike lane west of the path along Main St	UVM	HIGH
3	Admission Bldg. Path	Widen path to accommodate high volume of users	UVM	MEDIUM
4	Main St north-side shared use path	Widen path to accommodate high volume of users	**City**	HIGH
5	East Ave Sidepath	Widen existing sidewalk to 10' minimum accommodate two-way traffic, from Carrigan Dr. across Main St to University Heights	**City**/UVM	MEDIUM
6	Carrigan Drive Path (east of East Ave)	Widen sidepath to permit two-way travel and improve surface conditions	UVM	MEDIUM
7	Living/Learning Walkway	Improve surface condition of walkway, which has deteriorated	UVM	HIGH
8	South Prospect St Sidepath	Widen west side sidewalk to become at least an 8' wide path	**City**	MEDIUM
9	Redstone Path #1	Widen path to accommodate high volume of users	UVM	MEDIUM
10	Redstone Path #2	Revise description to read install raised crosswalk across University Heights rd, and construct path connection through existing hashed area to reduce crossing distance.	UVM	LOW

New Shared Use Path

UVM has an extensive path network, but there are some deficiencies in this network. In several locations, 'cow paths' have formed. These informal dirt paths have come about after years of use because they provide a direct connection to a destination, but they are not formalized and may not be passable during winter. Additionally, there are gaps in the existing shared use path network. These gaps are especially evident along busy roads, where walking or riding in the road shoulder can be uncomfortable. By formalizing cow paths and filling gaps in the path system, UVM will make active modes of transportation more viable. In developing the new shared use path recommendations the Campus Master Plan Open Space Network recommendations were studied and incorporated as appropriate.

Table 3.11 - New Shared Use Path Recommendations (see Map 3.2 for location of recommended improvement)

Project ID	Project Name	Project Description	Property	Priority
1	Trinity Campys Access Rd Sidepaths	Install sidepath along Trinity Campus access roads, connecting directly to existing shared use paths. Install crosswalks where paths intersect crosswalks	UVM	MEDIUM
2	Medical Center Paths	Formalize UVM Medical Center (MC) paths	UVM/MC	LOW
3	Informal Paths North of Fleming Museum	Formalize dirt paths south of Fleming Museum.	UVM	LOW
4	South Prospect St Sidepath	Add sidepath on the east side of South Prospect St along the UVM Green	**City**	HIGH
5	University Heights Sidepath	Add sidepath on west side of University Heights Rd extending from Main St and connecting to Redstone Walkway; Path should be 8' to 10' wide	UVM	HIGH
6	Spear St Sidepath, North	Install path to complete adjacent path and crosswalk connection	UVM	HIGH
7	Spear St Traffic Circle Connection	Add path to connect crosswalk to existing sidewalk around traffic circle (project is currently under consideration & awaiting funding)	**S. Burl**	HIGH
8	Redstone Campus Path	Construct path on north side of road, where currently no facility exists	UVM	HIGH
9	Spear St Sidepath, South	Construct sidepath on west side of Spear St. The section north of PFG Rd. should be 5' wide due to right-of-way constraints. The southern portion between PFG Rd and Davis Rd along Spear St should be 8' wide.	UVM/**S. Burl**	HIGH



IMPLEMENTING THE **60**
RECOMMENDATIONS IN THE

UVMoves
ACTIVE TRANSPORTATION PLAN

WILL MAKE THE CAMPUS SAFER
AND MORE COMFORTABLE
FOR ALL ACTIVE MODES OF TRANSPORTATION

3.2.2 Campus Bike Routes

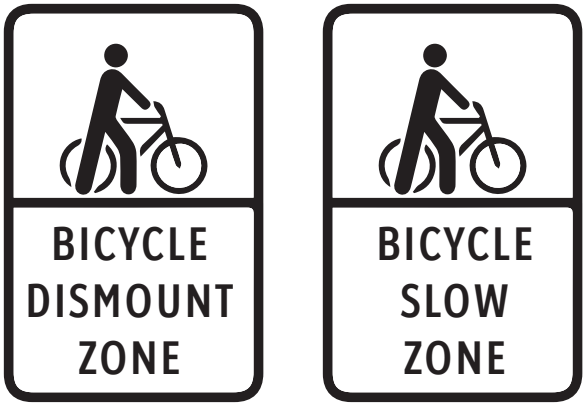
An important step to improving bicycling conditions in-and-around campus is the development of a campus-wide bicycle route system. The routes, displayed on Map 3.3, were selected based upon a range of factors, including existing bicycle traffic patterns, roadway/path conditions, and connections to destinations both on-and-off campus. The routes include both streets and pathways, and enhancements to them will be necessary to make the routes more comfortable for bicycling. Once implemented, biking in-and-around campus will become less stressful, and this could motivate more people to choose to bicycle for transportation.

The University has many options to make these routes more comfortable for bicycle travel. Bicycle facilities should be installed on roadways, including sharrows for low volume streets and dedicated facilities, such as bike lanes and cycle tracks, for busier roads. Alternatively, roads could be traffic calmed, or designed to intentionally slow vehicles down, causing vehicle speeds to be more consistent with that of bicyclists. The network would also benefit from intersection improvements, signal modifications, and bike route signage. Paths included in the system should be at least 10 feet wide to accommodate two-way travel. The implementation of these enhancements will result in a low-stress bike route system for students, faculty and staff.

Two primary goals of the system are to: 1) provide a comprehensive and logical system for bicyclists to reach destinations throughout campus, and 2) encourage bicyclists to stay on these routes, reducing conflicts on other paths with pedestrians. Primary bike routes should be implemented before secondary bike routes. Bicyclists will still be permitted to ride on roads and paths not designated as bicycle routes, but the implementation of the network will make designated routes the most appealing options to reach destinations. Some areas of campus are so congested that riding a bicycle can pose a safety hazard. In these areas, bicyclists should dismount and walk, or ride slowly. The planning team worked with stakeholders to delineate dismount/slow zones.

Dismount/Slow Zones

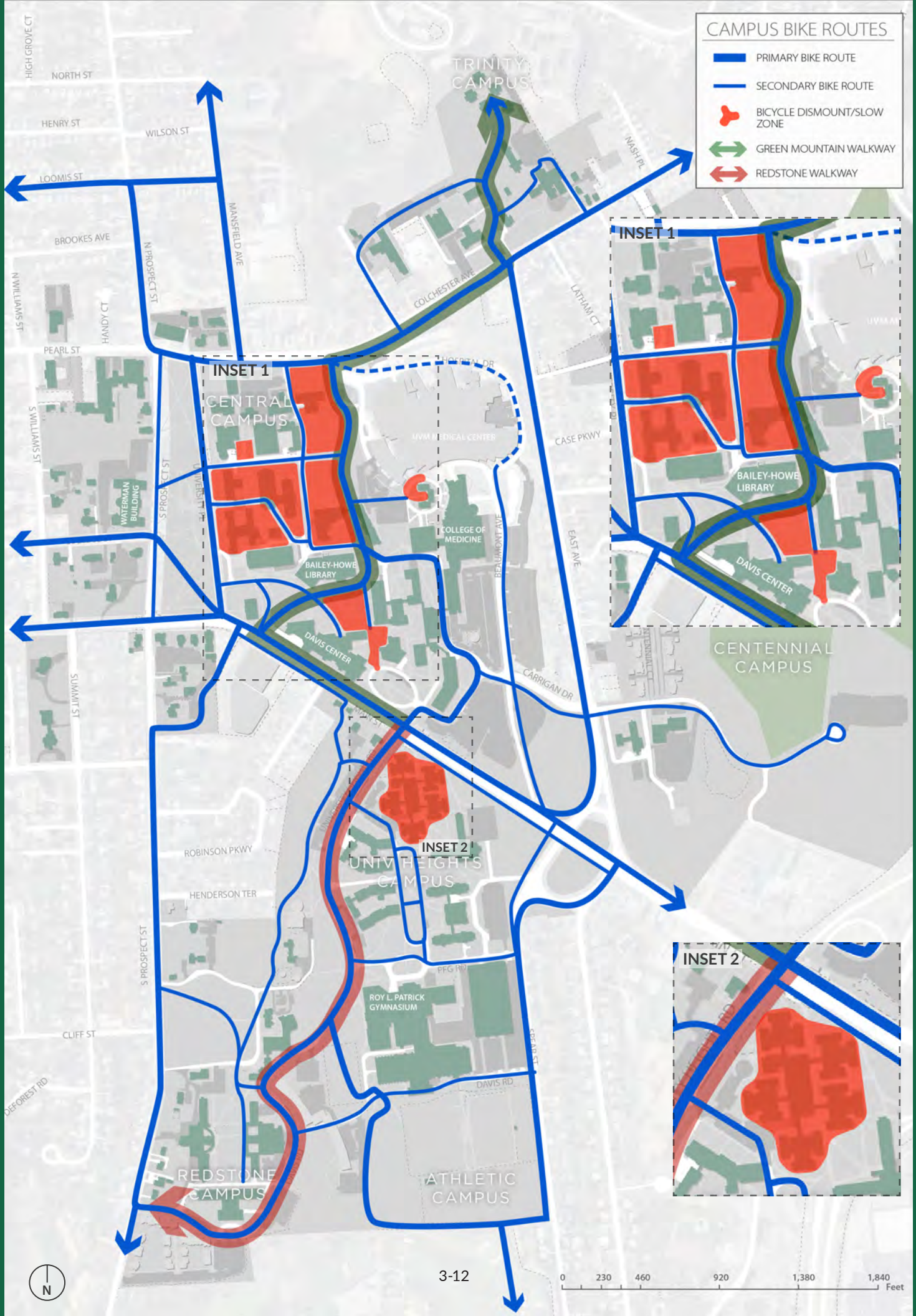
Increasing bicycle access in and around UVM was a primary goal of this planning effort. Through conversations with the campus community, it became evident that in some locations, the presence of bicyclists increases stress levels for pedestrians. To better manage these congested areas, the bicycle dismount/slow zones, illustrated on Map 3.3, should be established. To increase awareness of the zones, 'Walk Your Bike' signage should be installed on their periphery, and the zones should be illustrated on campus maps. Maps identifying the zones should also be distributed to first year students in their orientation package.



"Walk your bike" signage or "Slow Zone" signage should be located within Dismount/Slow Zones

The implementation of the bicycle dismount/slow zones cannot occur in isolation. Without convenient bike parking on their periphery, and without designated bike routes surrounding them, bicyclists will be less likely to obey the dismount/ride slowly rule. Therefore, the establishment of the zones must coincide with the installation of better bicycle parking options (see page 3-11) and the implementation of the campus bike route system. The coordination of these three components will increase the likelihood that bicyclists will comply with the bicycle dismount/slow zone rule.

The implementation of the zones will also take time. Either campus security or other University staff will need to be designated to enforce the zone rules, and identifying staff and allocating budget to this task will take time to coordinate. Furthermore, it will take time for students to learn the new rules and to adjust their behavior to comply with them. College campuses are constantly in flux, with new buildings and paths being built frequently. The zones should be malleable to adapt to these changing campus conditions. Campus Planning Services and other departments should collaborate to review the location of the zones annually and make recommendations to maintain or alter them.


CAMPUS BIKE ROUTES
PRIMARY BIKE ROUTE
SECONDARY BIKE ROUTE
BICYCLE DISMOUNT/SLOW ZONE
GREEN MOUNTAIN WALKWAY
REDSTONE WALKWAY
INSET 1
INSET 2
TRINITY CAMPUS
CENTRAL CAMPUS
CENTENNIAL CAMPUS
UNIV HEIGHTS CAMPUS
REDSTONE CAMPUS
ATHLETIC CAMPUS
BAILEY-HOWE LIBRARY
DAVIS CENTER
COLLEGE OF MEDICINE
WATERMAN BUILDING
ROY L. PATRICK GYMNASIUM
NORTH ST
HENRY ST
WILSON ST
LOOMIS ST
BROOKES AVE
PEARL ST
MANSFIELD AVE
COLCHESTER AVE
CASE PKWY
CARRIGAN DR
EAST AVE
ROBINSON PKWY
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3.2.3 Other General Recommendations

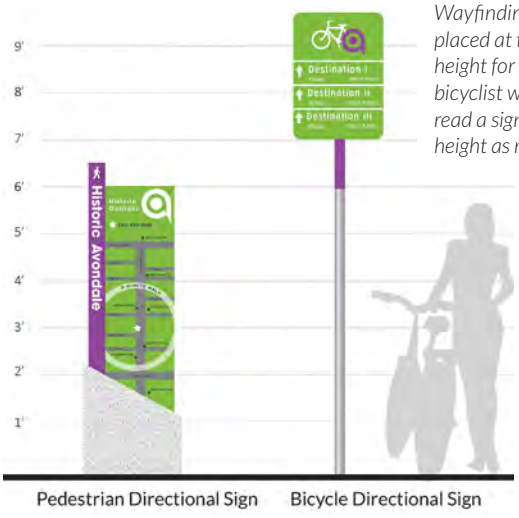
In addition to the projects identified in the Campus Project Recommendation Map (Map 3.2), UVM should prioritize the general improvements listed below to facilitate active transportation on campus. Together, these improvements will make walking, bicycling and skateboarding on campus more viable and attractive ways to travel. These general recommendations include:

- **Lighting** - Areas on campus where people are travelling should be well lit. Well lit paths and streets help to make people feel comfortable and improve safety during nighttime. Areas that have poor lighting should be identified, and lighting should be installed that is consistent with the campus aesthetic. Additionally, installation of campus lighting should be coordinated with the City of Burlington to ensure that it adheres to the City's lighting ordinance, with specific regard to minimizing light pollution and maintaining high contrast between high and low lighting.
- **Benches and Seating** - Benches and seating provide a space for those using active modes to rest. They also can help to shape public spaces, creating environments where spontaneous interactions, and other activities important to campus life, can take place. Benches and seating should be incorporated into campus capital improvement projects. When making these improvement, refer to the recommendations included in the Open Space Network.
- **Wayfinding** - Wayfinding guides people to destinations, and effective wayfinding is especially important for those who are new or unfamiliar with the campus. Existing signage could be enhanced by including information specific to the non-motorized network. Section 3.3 elaborates on wayfinding recommendations for UVM.
- **Landscaping** - Landscaping, such as street trees, green spaces, and shrubs, has many benefits. It creates more environmentally sustainable built environments, helping to control runoff and reduce erosion. Landscaped environments are also correlated with successful public spaces, creating a stage where public life can take place. Additionally, vegetation adjacent to streets has the benefit of creating a visual buffer between motor vehicles and those on the sidewalk/sidepaths, increasing comfort for those walking, biking or skateboarding along the roadside.
- **Bike Parking and End of Trip Facilities** - Proper bike parking placed in high demand areas makes riding a bike to a destination more convenient. End of trip facilities, such as fix-it stations, showers, and indoor parking reduce some of the barriers posed to people considering bicycling. Improved bike parking is especially important within and outside residence halls, and indoor bike rooms should include multi-level bike parking to maximize storage capacity. Section 3.4 provides standards that the campus should adopt to improve bike parking campus wide.

3.3 WAYFINDING RECOMMENDATIONS

Signage is necessary along routes and intersections in and around campus to guide active transportation users to destinations. In most situations, two wayfinding signs are recommended in each direction at an intersection. These include a decision sign before the turn and a confirmation sign after the turn. In some situations it may also be useful to add turn signs to provide clarity at complex intersections, or waymarkers to highlight routes.

In campus environments, wayfinding and orientation signage help to lead people to key locations. Orientation kiosk signage should include a map of the campus, and have a place marker which indicates where the viewer is located within the system. These maps should include helpful information for bicyclists and pedestrians, including bicycle routes, the UVMbikes! repair shop, shower locations, bike fix-it stations, bike share locations, and the Green Mountain Walkway/Redstone Walkway.



Wayfinding signs should be placed at the appropriate height for their users. A bicyclist will be better able to read a sign that is at the same height as most traffic signs.

Existing turn signs could be updated to include the walking and biking distances and times to destinations.

The campus should review its existing wayfinding system, and incorporate the following types of signage to facilitate active transportation:

- Wayfinding signage designed for bicyclists, pedestrians and skateboarders (that includes travel times or distances to destinations)
- Orientation map signs with walk, bike and skateboard specific information
- Walk your bike/board signage, which indicates that bicyclists and skateboards should dismount and walk
- Slow Zone signage that cautions bicyclists and skateboarders to slow down and proceed with caution in conflict areas

Kiosks could be updated to include campus bike routes as well as bike parking and bike maintenance locations.

The image below displays the typical configuration of wayfinding signs at a decision point. Each direction has a decision sign on the approach and a confirmation sign on the exit. In normal situations the default approach is to use two signs for each leg of an intersection.

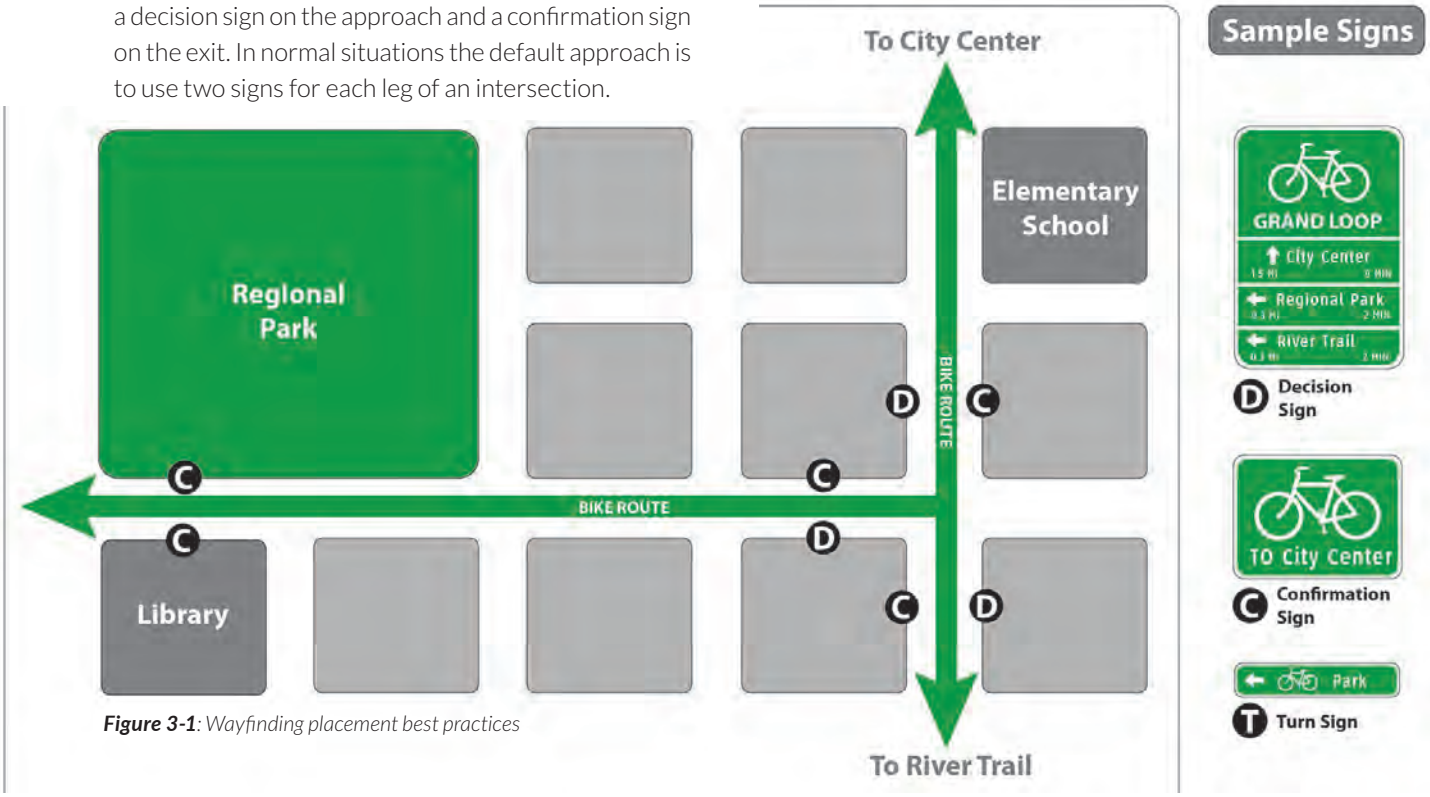


***Figure 3-1**: Wayfinding placement best practices*

3.4 BICYCLE PARKING IMPROVEMENTS

Although UVM has taken key steps to ensure that quality bike racks are provided to students, several existing racks are not secure and and do not provide an efficient space to lock a bike. As such, the University should continue to upgrade bike parking on campus in the short term. The best example of quality bike parking -- black inverted "U" racks -- have recently been installed throughout campus. **This type of rack should be formally designated as the official UVM bike rack.**

To encourage the University to prioritize the replacement of racks, it is important to understand the basics of good bike parking, which have been defined by the Association of Pedestrian and Bicycle Professionals (APBP) guidelines and are outlined below. Inverted "U" racks are emblematic of good bike parking equipment, as they follow these standards:

- U-lock compatible: parking must enable the user to attach a "u-lock" to the rack and to their bicycle
- Two-Point Locking and Support: u-locks must be able to attach to the rack by passing through the bicycle at two locations (typically the bike's front wheel and bike frame's down tube).
- Secure anchoring to the ground, preferably into a concrete base
- Rust-preventative coating and appropriate tube thickness to prevent cutting. Common metal coating types include: powder coat, thermoplastic, or galvanized steel.
- Weather protected: where budget allows, overhangs to protect bikes from weather are recommended.
- Use existing overhangs to provide covered bike parking areas

The following sections highlight the importance of developing a tiered bike parking design standard to create better bicycle parking on campus. Recommendations for each tier are also provided in this section. In determining proper rack placement, UVM should refer to the ABPB Essentials of Bike Parking Guide (2015).

3.4.1 Creating a Tiered Bike Parking Design Standard

When choosing bicycle parking solutions, University officials must balance cost with a variety of other considerations, such as usability (is the rack design intuitive?), capacity (number of bicycles per rack/corral), aesthetics, and pedestrian maneuverability. Instituting a tiered bike parking design standard will ensure reliable and convenient bike parking provided year-round. Standards for the following tiers of parking are included here:

Outdoor Parking:

- Tier 1: Short Term Bicycle Parking
- Tier 2: Covered Short Term Bicycle Parking

Indoor Parking:

- Tier 3: Indoor Bicycle Parking

Designating a Campus Standard Bike Rack

Although racks that hold multiple bicycles, such as U-Racks, are more expensive in the short-term, lower cost racks have many shortcomings. They tend to have less capacity, and the University will likely need to purchase more racks in the future. Too many bikes attached per rack causes unattractive piles of fallen bicycles, and irritation or danger to pedestrians. Also, when racks have reached their capacity, bicyclists may lock their bikes to railings, which can be a fire and ADA hazard. **Administrators should formally designate black Inverted U-Racks as the official UVM bike rack, and accelerate the replacement of non-standard racks.**

Wheel bender racks are poorly designed, allowing bicycles to easily tip over and appear disorganized.

Inverted U-Racks are a superior rack type from a security stand-point, and also better organize bicycles, making them more aesthetically appealing. ***Inverted U-Racks should become the standard for rack installations across campus***

Tier 1: Short Term Bicycle Parking

Short-term bike parking should follow these requirements:

- Properly anchor all short-term parking options by using tamper-proof Spike Anchors will ensure

racks cannot be dislodged and stolen.
- Racks should be placed parallel to the sidewalk to maximize pedestrian space.
- Racks should include maneuvering space around them so bicyclists can easily move, park, and remove bikes.
- Racks that do not meet APBP standards should be replaced with campus standard U-Racks.

Inverted-U style racks are designed to hold bicycles parallel to the rack. When bikes are parked perpendicularly, bikes are more susceptible to falling, which can cause tripping hazards or other mobility issues. To prevent this, the University can produce inexpensive, waterproof stickers for racks that read, "Park parallel to rack". If students or staff incorrectly attach bicycles to racks—by using only cable locks or by locking only one wheel—bicycles are more likely to fall over. Again, inexpensive stickers that read, "Always use a U-lock. Attach U-lock to frame AND wheel" are simple and inexpensive ways to mitigate against these problems. The University should consider painting some new racks the school colors, or having custom racks made with the Catamount mascot to brand the racks.

Black U-racks should be designated as the campus standard. However, some racks could be branded with UVM colors and logos. Custom painted racks should be located purposefully throughout campus, such as the campus athletic areas.

Tier 2: Covered Short Term Bicycle Parking

For an added level of weather protection covered bike racks are recommended at key locations throughout campus, especially near student housing and along high-volume bikeway corridors. Typically inverted-U racks, or other standard racks, can be located under building overhangs, where available, and if not, free-standing structures can be installed. Covered bike parking shelters come in a variety of styles and price points. Less expensive varieties are a good option for less prominent locations on campus. For more conspicuous locations, investing in an architecturally interesting shelter can enhance the campus aesthetics.

Lower cost, mass-produced shelters provide an economical covered bike parking solution (Kimmeridge Cycle Shelters)

Custom designed shelters, though more expensive, may be most appropriate for more central locations on campus (Shelter located in Arlington, VA)

Tier 3: Indoor Bicycle Parking

Indoor bicycle parking should be as user-friendly and secure as possible. A number of options exist for indoor parking, including the ability to retrofit existing spaces for bicycle storage. Many options, ranging from relatively low-cost to much more elaborate indoor bicycle parking, are available. Improving indoor parking locations could influence students' decisions to bring bicycles with them to campus, sparking a stronger campus bicycle culture from their first year onward.

Types of indoor facilities:

- Bicycle-friendly housing policy: in-unit storage
- Bicycle-friendly housing policy: indoor bike room
- Indoor bike rooms in high traffic campus buildings

Indoor Bike Rooms

Transportation Alternatives, a non-profit advocacy organization, has developed a guide to indoor bike parking. Although geared toward developers, three rules resonate for student dormitory in-door bicycle storage:

- Bicycle racks can be installed in almost any space.
- Generally speaking, a space of 14 feet by 6 feet can store up to a dozen bicycles.
- Each bicycle parking space should be accessible to the user without having to move another bicycle. Generally, horizontal parking will require 2 feet by 6 feet per bicycle parking space. For vertical parking, you will need 4 feet by 2 feet and a height of 6 feet for each space. Finally, you should provide for an aisle of at least 5 feet wide to allow room for maneuvering.
- Multi-level bike racks should be installed in high-demand bike rooms to increase capacity. Various multi-level racks are available, and only racks with a hydraulic or spring loaded assist should be purchased.
- Bike rooms should include both inverted U-Racks and multi-level racks to provide a variety of bike parking options.

The University should complete an inventory of all relevant buildings to determine where space may be available for indoor bike rooms. Opportunities to include lockers and showers, especially in buildings within the campus core, should be investigated. The university should also prioritize the installation of indoor bike rooms and shower facilities in all new buildings on campus.

The bike parking room at University Heights South provides a secure space for dorm residents to park their bikes. Rooms like this exist throughout campus and they are consistently well utilized, indicating the high demand for this type of parking

If multi-level racks are desired, the top level should provide a mechanical or hydraulic assist to help people lift their bike. Recognizing that most people prefer to use the bottom level, the bottom tier of the Josta Double Parker System has two spaces for ever one above.

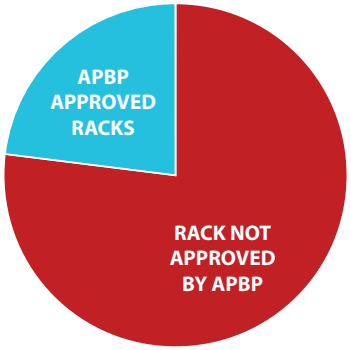
An alternative multi-level option is the PFL Spaces Push Bike Slide system. This rack design provides the same density as a conventional multi-level rack, without the need to lift the bike.

3.4.2 Outdoor Parking Recommendations

The previous section identified the need to officially adopt a three-tiered bike parking design standard, inclusive of short term, covered and indoor bike parking standards. While indoor bike parking provides spaces for long-term storage of bicycles, short-term and covered bike parking enable students, faculty and staff to park their bikes for shorter periods of time close to their destinations. This section provides specific recommendations to improve outdoor (Tier 1 & 2) parking on campus.

The planning team surveyed the existing outdoor bicycle parking on campus, and identified both the existing rack types as well as areas of campus where high bike parking demand exists. Overall, the campus has a significant supply of bike parking. However, much of it does not meet APBP standards, as shown in the chart below:

Figure 3-2:
Ratio of APBP Approved to Not-Approved Racks



It is recommended that over time, non-standard racks be replaced with standard U-racks. Initially, rack replacements should be prioritized at the high demand locations throughout campus. Thereafter, racks should be replaced by rack type, according to this schedule:

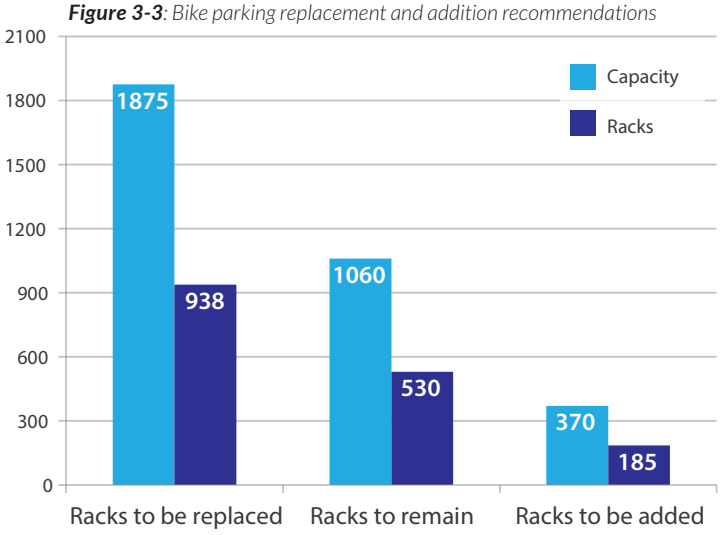
1. Grid Racks
2. Bar Racks
3. Wave Racks

The rack replacement program should take place over a three to five year period. Simultaneously, additional rack capacity should be added at the high demand locations. At these locations, the demand for bike parking exceeds the number of spaces available. This result in bikes being locked to poles, stair cases, and other fixed objects. This impedes the flow of traffic, poses hazards, and diminishes the campus aesthetically. The provision of more racks at high demand locations will counter these issues.

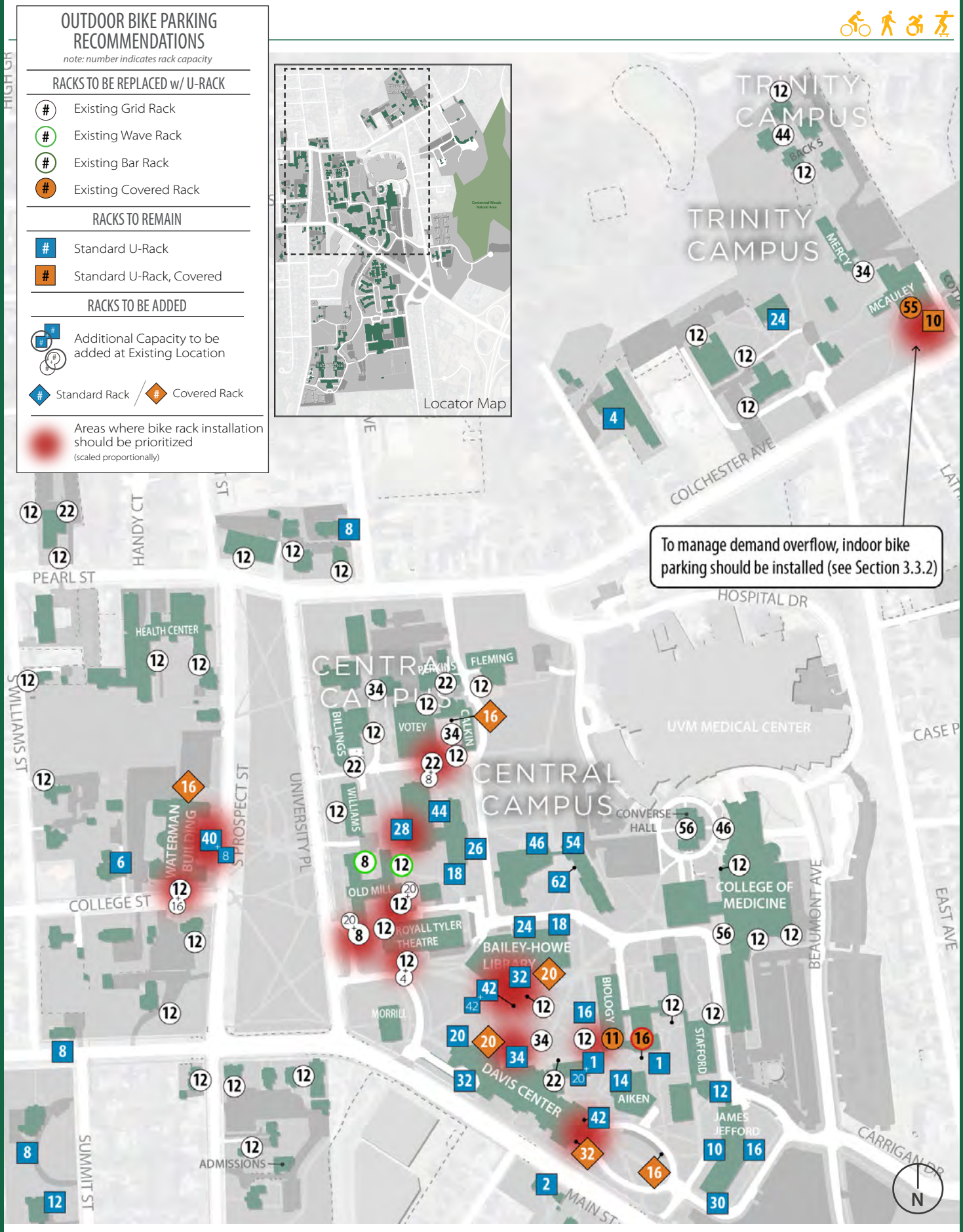
In winter, racks that are not covered can become inundated with snow and ice. Although some of the racks on campus are covered (15%), most are not (85%). Since fewer people tend to bicycle in winter, not all racks need to be covered, but overall, **more covered bike parking is recommended throughout campus.** Locations for this parking type were selected based on their proximity to high demand bike corridors, and also, where an opportunity to install a covered parking area existed.

Maps 3.4 and 3.5 illustrate the plan's recommendations for outdoor bike parking. The chart below summarizes the number of non-standard racks to be replaced, the number of standard racks to remain, and the number of new racks to be added. After these recommendations have been implemented, a total of 3,306 outdoor spaces (1,653 individual racks) will be available.

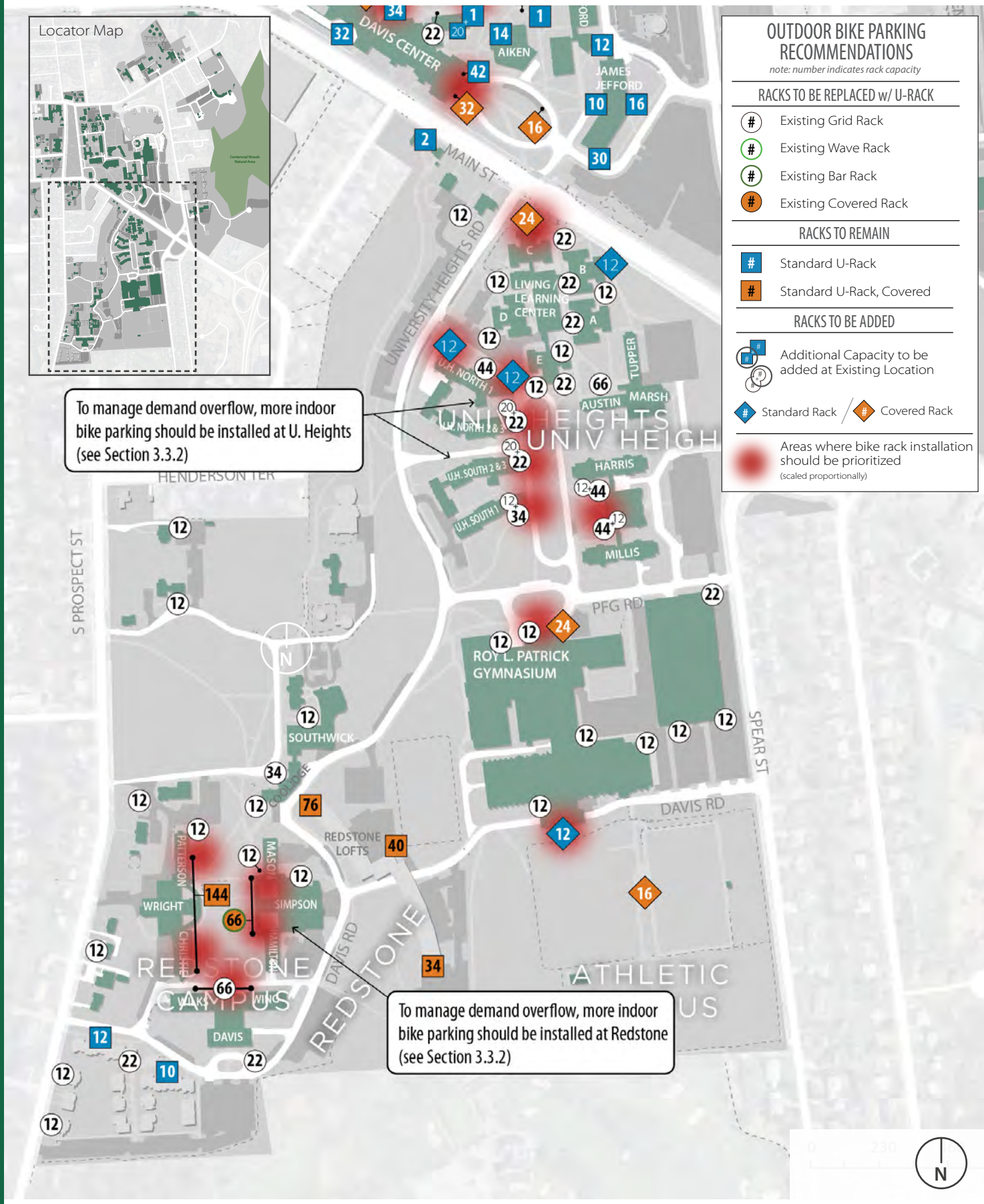
Figure 3-3: *Bike parking replacement and addition recommendations*



Increasing the supply of outdoor parking is not the solution for all campus locations. In some instances, the provision of more indoor parking would more effectively reduce overcrowding issues. Indoor bike parking recommendations are included in Section 3.4.3.



MAP 3.4: BIKE RACK RECOMMENDATIONS, NORTH



MAP 3.5: BIKE RACK RECOMMENDATIONS, SOUTH

3.4.3 Indoor Parking Recommendations

Residence Halls

Many of the residence halls on campus were identified as 'hot-spots' for bike parking. At several locations, the number of racks provided are not enough to accommodate the high level of demand. After reviewing the amount of racks available, the planning team determined that in many situations, the installation of more outdoor racks would not necessarily resolve the overcrowding issue. Rather, bicyclists at these residence halls would benefit more from the provision of indoor bike rooms. If indoor rooms were available, the demand for the outdoor racks would decrease as more bicyclists could store their bikes indoors. Racks should be replaced in and around residence halls according to the campus rack replacement program, and concurrently, efforts should also be taken to identify opportunities to install indoor bike rooms. The table below identifies residence halls that have indoor bike parking.

Table 3.12: Existing Residence Hall Indoor Bike Parking

Residence Hall	Spaces/residents
University Heights (2 rooms)	54/408
University Heights (3 rooms)	57/408
Harris Hall	60/334
Millis Hall	36/344
Christie Halls (and Wright/ Paterson Halls)	38/489
Wilks Hall (serves Davis also)	34/350
Wing Hall (serves Davis also)	34/358
Coolidge Hall	20/146
Austin Hall	48/423
NEW First Year Res Hall	198*/699

Tables 3.13 to 3.16 identify the number of spaces that should be provided for each residence hall on campus. [2]

Table 3.13 - Trinity Campus

Residence Hall	Students Housed	Indoor Spaces
Hunt	45	22.5
McCann	44	22
Ready	44	22
Richardson	44	22
Sichel	44	22
McAuley	160	80
Mercy	182	91
Cottages	28	14
Subtotal	**591**	**296**

Table 3.14 - Central Campus

Residence Hall	Students Housed	Indoor Spaces
Converse Hall	164	82
Jeanne Manche Hall	165	83
Subtotal	**591**	**296**

Table 3.15 - Redstone Campus

Residence Hall	Students Housed	Indoor Spaces
Christie Hall	185	92
Patterson Hall	158	79
Wright Hall	146	73
Slade Hall	25	12
Coolidge Hall	146	73
Hamilton Hall	126	63
Mason Hall	164	82
Redstone Hal	33	16
Simpson Hall	170	85
Davis Hall	180	90
Wilks Hall	170	85
Wing Hall	178	89
Subtotal	**1,681**	**841**

Table 3.16 - University Heights Campus

Residence Hall	Students Housed	Indoor Spaces
Harris	334	167
Millis	344	172
Living Learning A	120	60
Living Learning B	120	60
Living Learning C	102	51
Living Learning D	120	60
Living Learning E	114	57
Austin	127	63.5
Marsh	117	58.5
Tupper	179	89.5
U.H. North 1	192	96
U.H. North 2	192	96
U.H. North 3	24	12
U.H. South 1	189	94
U.H. South 2	185	92
U.H. South 3	24	12
Subtotal	**2,483**	**1,242**

** This building is still under-construction, but two free standing Secure Parking Areas (SPAs) that will service the building will be built. These two rooms are spec'ed to include two-level parking, which if installed, would fit 198 spaces. If two-level parking is installed, the top level should have a mechanical or hydraulic assist.*

2 Data for the tables was provided by Transportation and Parking Services Department. Data was current as of 2015. The Formula to calculate indoor bike parking quantities was developed by the APBP Bicycle Parking Guidelines, 2nd Edition (2010). The guide specifies that 0.5 spaces should be provided for each resident.

The formula used to calculate the recommended number of indoor (aka long-term) spaces for residence halls is derived from APBP[3]'s Bicycle Parking Guidelines, 2nd Edition (2010). A hypothetical example of this formula is presented in table 3.17. This calculation can be used to determine bike parking needs (short and long term) for both existing and new buildings. Currently, UVM policy is to install one space for every three residents. Best practices recommend installing one space for every two residents.

Table 3.17: Example of Residence Hall Bike Parking Formula

Building Type	Residential; Residence Hall
Building Program	
Number of Residents	1,000
Long-Term Bike Parking Requirement	0.5 spaces for each resident
Long-Term Bike Parking Calculation	500
Short-Term Bike Parking Requirement	0.1 spaces for each resident
Short-Term Bike Parking Calculation	100
	Total Spaces
Total Bike Parking Calculation	600

Other Indoor Parking Recommendations

In addition to providing indoor bike parking at campus residence halls, opportunities to install indoor bike rooms within academic and administrative buildings should be identified as well. Table 3.17 displays a hypothetical example of how to use the APBP formula to determine how much bike parking should be provided within educational buildings (both long term (indoor) and short term (outdoor) parking). These calculations can be used to determine bike parking needs for both existing and new buildings. One key location where parking should be provided is within the Gutterson Garage. Here, bike parking be incorporated into the garage, and provide a location where commuters can safely store their bicycles.

Table 3.18 - Example of Educational Building Bike Parking Formula

Building Type	Civic; Education
Building Program	
Square Feet of Floor Area	200,000
Planned Student Capacity	2,400
Planned Faculty and Staff	140
Long-Term Bike Parking Requirement	1.5 spaces for each 10 employees
Long-Term Bike Parking Calculation	21
Short-Term Bike Parking Requirement	1.5 spaces for each 10 students of planned capacity
Short-Term Bike Parking Calculation	360
	Total Spaces
Total Bike Parking Calculation	381

3 The standards were developed based on surveys and best practices from around the United States. These standards are from tables intended for communities and campuses that are densely developed and which have high bicycle use. UVM can reference these best practices when developing their own bike parking policy.

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CHAPTER 4: SIGNATURE PROJECTS

4.1 SIGNATURE PROJECT RECOMMENDATIONS

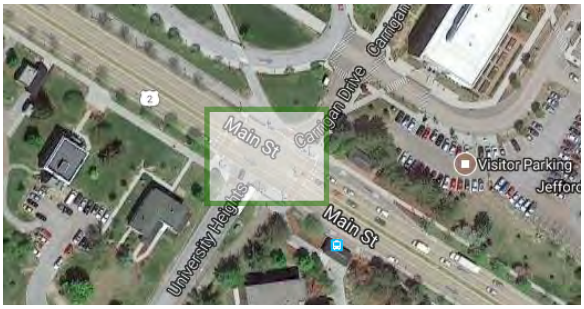
Chapter Three included several recommendations to improve walking, bicycling and skateboarding on-campus. Of all of the considerations, the campus community consistently identified six important sites & topics as opportunity areas. These opportunities ranged from improving infrastructure to advancing programs that would support active transportation.

This chapter presents the six signature projects for the campus, which would significantly elevate the status of walking, bicycling and skateboarding on campus, and visibly demonstrate UVM's commitment to prioritizing these modes of travel. These projects could be implemented independently or together, and represent opportunities for donors to contribute to improving active transportation on campus. The projects include:

***Figure 4-1**: Signature Project Recommendations*

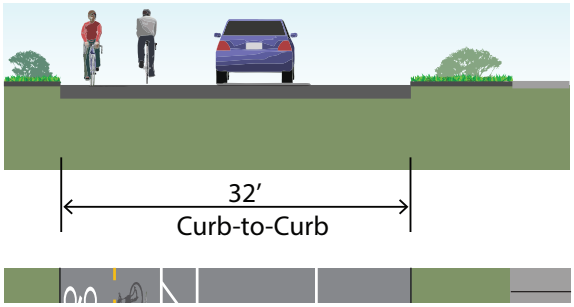
1 Green Mountain Walkway/Redstone Walkway
Campus Master Plan Priority Project

2 Main St Crossing Improvements
Campus Master Plan Priority Project



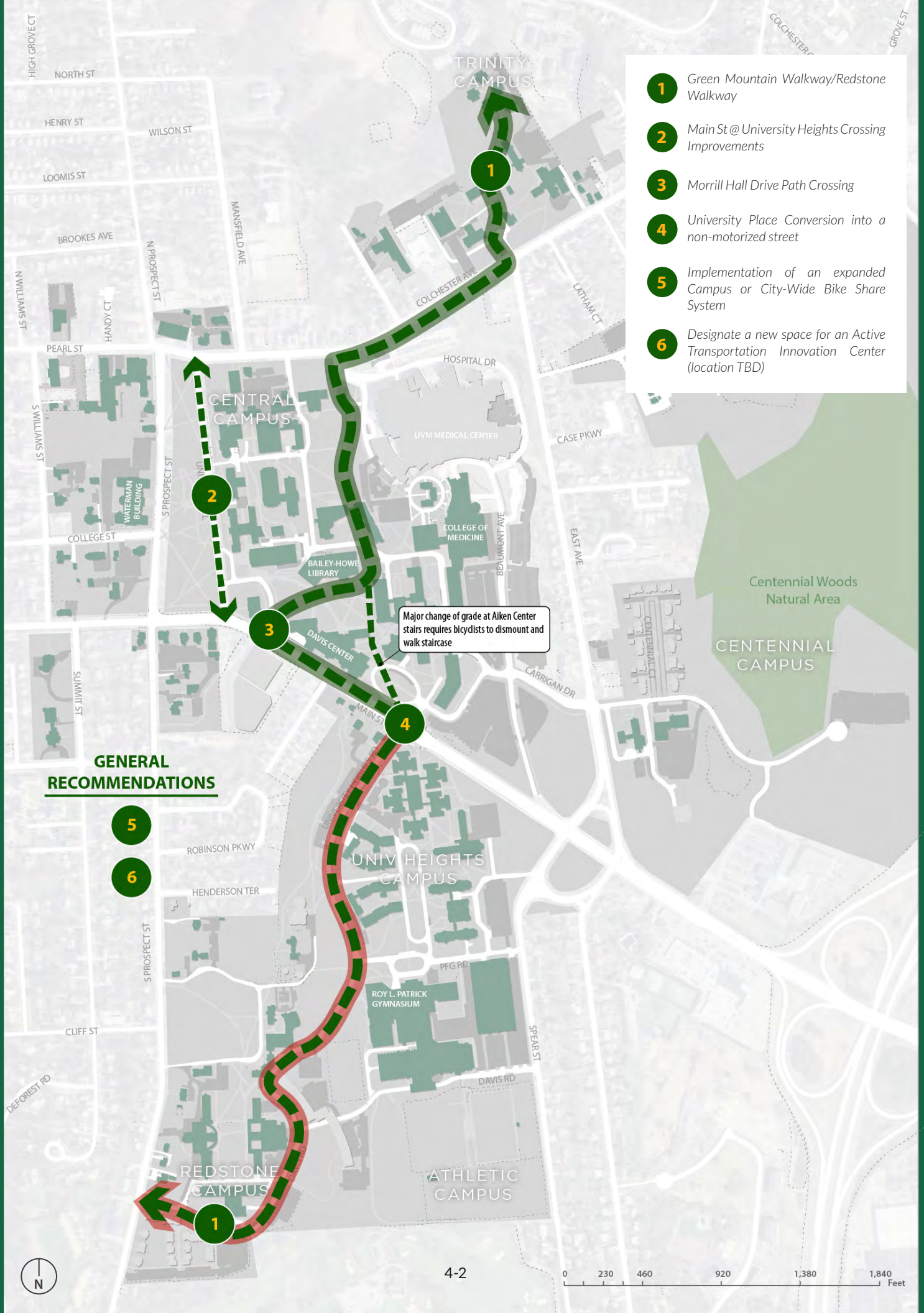
3 Morrill Hall Drive Path Crossing

4 University Place Conversion into a multi-modal street
Campus Master Plan Priority Project



5 Expanded Campus or City-Wide Bike Share System

6 Designate a new space for the Sustainable Transportation Center


MAP 4.1: SIGNATURE PROJECTS
1 Green Mountain Walkway/Redstone Walkway
2 Main St @ University Heights Crossing Improvements
3 Morrill Hall Drive Path Crossing
4 University Place Conversion into a non-motorized street
5 Implementation of an expanded Campus or City-Wide Bike Share System
6 Designate a new space for an Active Transportation Innovation Center (location TBD)
GENERAL RECOMMENDATIONS
Major change of grade at Aiken Center stairs requires bicyclists to dismount and walk staircase
TRINITY CAMPUS
CENTRAL CAMPUS
UNIV HEIGHTS CAMPUS
REDSTONE CAMPUS
ATHLETIC CAMPUS
CENTENNIAL CAMPUS
Centennial Woods Natural Area
UVM MEDICAL CENTER
COLLEGE OF MEDICINE
BAILEY-HOWE LIBRARY
DAVIS CENTER
WATERMAN BUILDING
ROY L. PATRICK GYMNASIUM
NORTH ST
HENRY ST
WILSON ST
LOOMIS ST
BROOKES AVE
COLCHESTER AVE
HOSPITAL DR
CASE PKWY
COLLEGE ST
MAIN ST
CARRIGAN DR
ROBINSON PKWY
HENDERSON TER
PFG RD
DAVIS RD
CLIFF ST
DEFOREST RD
SPEAR ST
EAST AVE
BEAUMONT AVE
MANSFIELD AVE
N PROSPECT ST
S PROSPECT ST
S WILLIAMS ST
N WILLIAMS ST
HANDY CT
LATHAM CT
PEARL ST
SUMMIT ST
HIGH GROVE CT
GROVE ST
N
0 230 460 920 1,380 1,840 Feet

4.1.1 Green Mountain Walkway

The Green Mountain Walkway (GMW) is an expansion of the concept included in the Campus Master Plan. It would be combined with the Redstone Walkway, and is intended to be the primary north-south circulation spine for walking, bicycling and skateboarding through the campus, from Trinity Campus to Redstone Campus, as illustrated in Map 4.2.

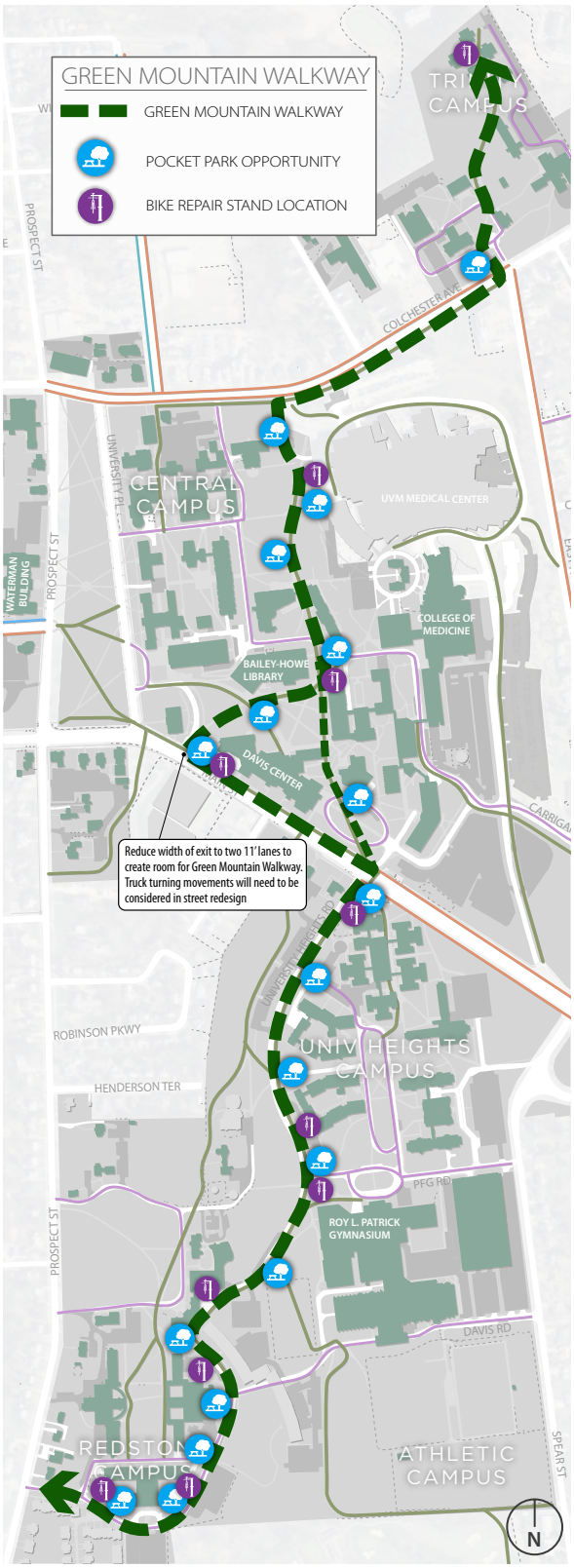
It is imagined that the Green Mountain Walkway would also become a linear park through the middle of the campus. The GMW could incorporate Locus and Grove trees, gathering places, and Landscape Geometry included in the Landscape Priorities Initiatives of the Campus Master Plan. Additionally, it could include unique paving, smaller pocket park gathering places, seating, rain gardens, solar powered pedestrian scale lighting, bicycle repair stations, and covered bicycle parking along its length.

The Green Mountain Walkway would facilitate active transportation through the campus, create a central feature unifying the various campus districts, provide a place for passive recreation, studying or social gathering, and provide a transition zone for bicyclists switching to or from a walking mode to reach classrooms or enter designated pedestrian zones.

To provide a route around the new Davis Center staircases, a parallel route for bicyclists, skateboarders and other wheeled path users should be provided to the west of the Davis Center. This section would follow Main Street and reconnect with the path through Central Campus. North of Main Street, the GMW would be a multi-use path, up to 24 feet wide. This portion of the path would be the widest because it is projected to have the most use. South of Main St, the existing Redstone Walkway, which is currently eight to ten feet wide, is recommended to be rebranded as a continuation of the Green Mountain Walkway, and reconstructed to be up to 15 feet wide (the southern section does not need to be as wide as the northern section, as volumes on the souther section are projected to be lower). The exact width of this portion of the GMW would depend on the existing lighting, trees and utilities along the east side of the existing pathway. The overall alignment matches, as closely as possible, the Green Mountain Walkway and other Multi-Use Paths or Primary walk/Bikeways shown on the Campus Maser Plan. It also respects, as possible, the limits of the "land banked" areas shown in the Campus Master Plan.

The surface of the Green Mountain Walkway can be designed with a UVM green pigmentation, possibly with imbedded lighting or a solar responsive surface that glows at night. The

Map 4.2 - Green Mountain Walkway

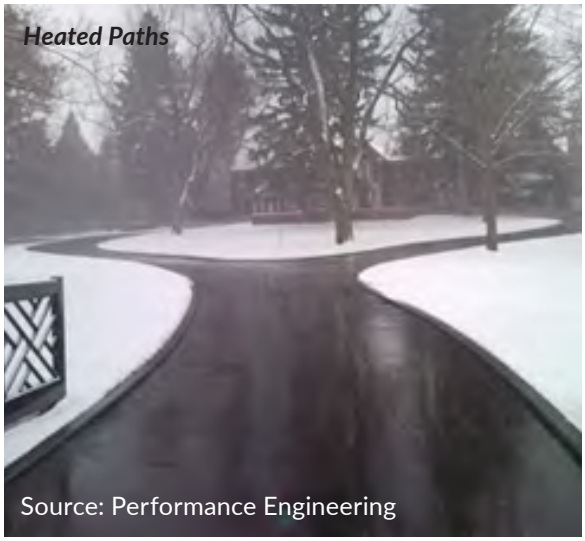


The Green Mountain Walkway is envisioned to become the central spine for non-motorized transportation through the Campus. The GMV would travel from the Central Campus to the north to Trinity Campus, and to the south to University Heights, Redstone and Athletics Campuses. Its implementation will demonstrate the University's commitment to sustainability and active transportation.

pavement could be pervious, to allow storm water runoff to infiltrate into the ground. The pavement surface could also be heated, via solar power (or with geothermal heat from the campus' steam system), to guarantee that it would always be clear of snow & ice for walkers, bicyclists and skateboarders.

The overall alignment of the Green Mountain Walkway as shown on Map 4.2 is realistic. More detailed planning, analysis and design will be needed, however, to address the challenging areas along the route, such as the turn off Main Street west of the Davis Center, the alignment around the north end of the Redstone Lofts, or the section adjacent to the parking area south of Wilks, Davis, and Wing Halls. Based on this vision, the Green Mountain Walkway will exemplify the University's commitment to sustainability and active transportation.

Potential Elements of the Green Mountain Walkway



*This image is an example of solar lighting. Existing light fixtures could potentially be retrofitted with solar charging capabilities.

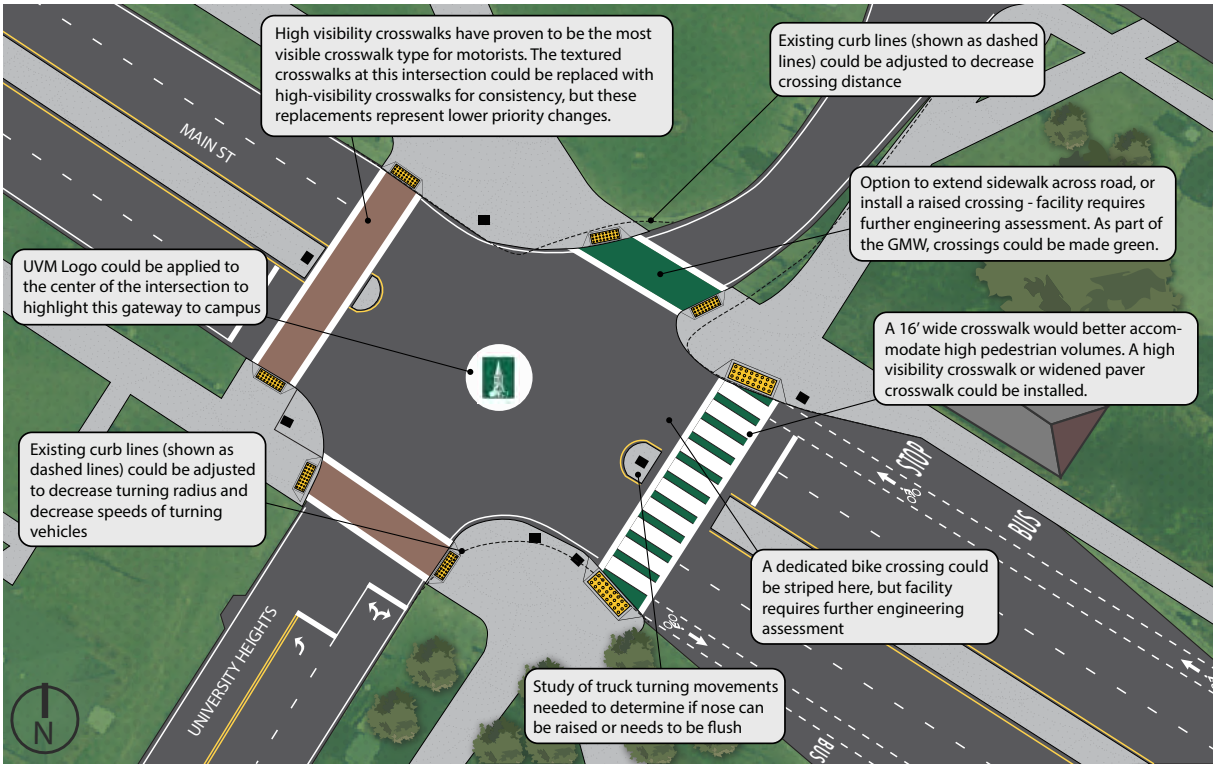
4.1.2 Main St to University Heights Crossing

This crossing represents the heaviest crossing location for non-motorized users on campus. Figure 4-2 illustrates how there is not enough space currently to accommodate the high volume of users. Figure 4-3 presents a conceptual solution to improve this crossing by providing a wider crosswalk to accommodate the high volume of users. An engineering assessment of turning movements and signal timing would be required to further assess the concept.

The area highlighted in red roughly delineates the space people are currently using to cross the street, and shows that the existing cross-walk is not wide enough to accommodate the high flow of non-motorized users, which causes people to use the crosswalk improperly.

***Figure 4-2**: Main St/University Heights Existing Conditions*

***Figure 4-3**: Main St/University Heights Conceptual Proposed Crossing Improvements*



Note: A dedicated bike crossing could be incorporated into the intersection redesign, but such a design would require an engineering assessment.

4.1.3 Morrill Hall Drive Path Crossing

The intersection of Morrill Hall Drive and the Main St pathway was identified as a problem area. Vehicles travelling westbound on Main St turn right quickly into Morrill Hall Dr, often catching path users off-guard. Attendants at the listening session identified the Morrill Hall Drive crossing of the Main St sidepath as a problem area. Vehicles exiting to Main St sometimes stop within the path crossing area, interfering with the flow of path users. The proposed concept below illustrate solutions to improve yield compliance and make those on the path more visible to motorists. Enhancements include installing a high visibility crosswalk and reducing the number of travel lanes at the crossing from four to two lanes. The curb lines of the entrance could also be moved into the roadway, shortening the crossing distance for path users.

Figure 4-4: Main St/University Heights Conceptual Proposed Crossing Improvements

4.1.4 University Place

The campus community repeatedly identified University Place as an issue for non-motorized users. Vehicles use the street as a cut through to avoid S. Prospect St, and traffic speeds and volumes make travelling along it uncomfortable. The long term vision for the street is for it to be converted into a pedestrian promenade, as articulated in the Campus Master Plan (pg 136). The graphic below illustrates a short-term concept for the street to be converted to a one-way street, northbound. This adjustment will provide space for a two-way separated bike lane and will reduce traffic volumes on the road, making it easier to cross and converting the road into a multi-modal street.

***Figure 4-5**: University Heights - Existing Conditions*

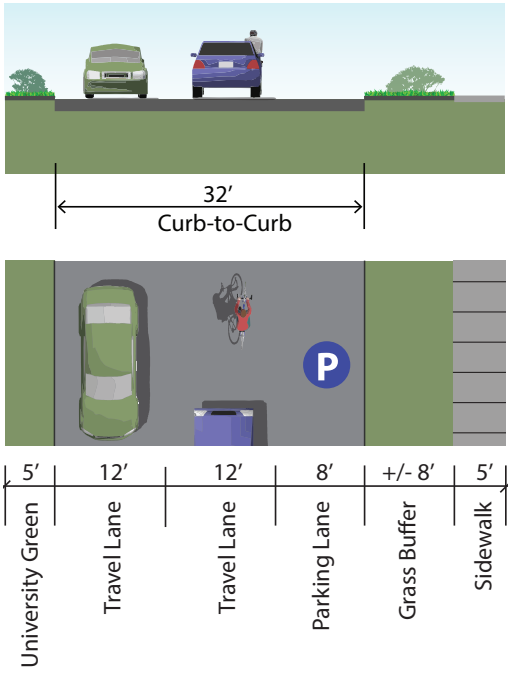
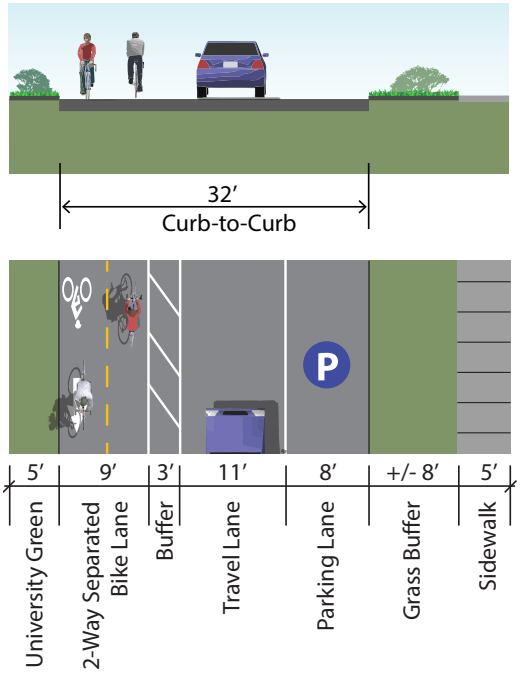


***Figure 4-6**: University Heights - Proposed Improvements*



4.1.5 Improving Bike Share on UVM's Campus

The current bike share program on the UVM campus plays an important role by providing an alternative mobility option for students, faculty and staff. Maintained by the University's bicycle program administrator, the 15 bicycles are available to "check out" for daily use. Use of the system has seen steady growth since its inception in the fall of 2013, highlighting the demand for an expanded bike share system on campus.[1] Recently, the University added new bikes to the system's fleet. The new bikes are lighter and have gearing, making them easier to ride. They are an improvement over the older bikes in the fleet, which are heavier, single speed bikes.

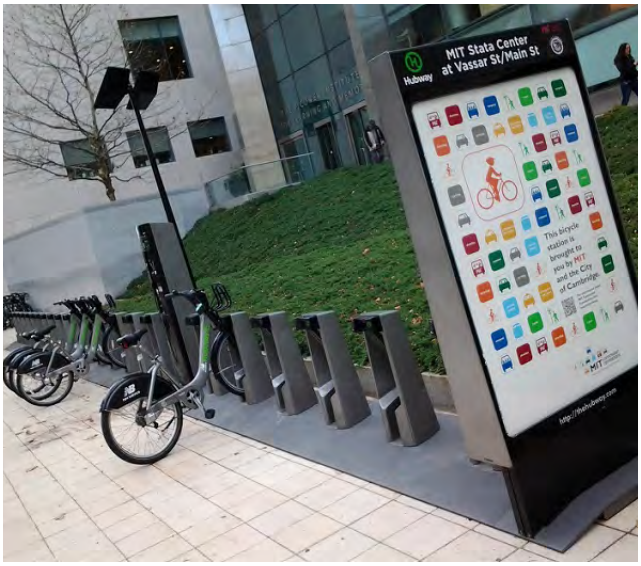
UVM's Bike Share Program

Bike share thrives when it is highly visible, easily accessible at prominent locations, and perceived to be a key part of the transportation system. Based in a single location at the Davis Center, the current program is more like a campus bike library system than bike share. Typically, the latter is oriented for short trips from point to point, not for longer term use. While many colleges and universities throughout the US have bicycle libraries, a growing number are turning to bike share as a way to improve mobility, public health and air quality on campus.

University-based bike share systems are either available within/adjacent to the campus itself or are integrated into a city-wide bike share program. As part of the Boston Hubway system for instance, roughly 20 of the 150 total bike share stations sit within or adjacent to Harvard, MIT, Northeastern, Tufts and Boston Universities campuses. Students, faculty and staff must become members of the Greater Boston program in order to use the bikes, whether those on campus or throughout Boston, Cambridge or Somerville. In New Haven CT, on the other hand, ten bike share stations all sit within the Yale University campus and are available for use by members of the Yale community only.

There are various equipment models that could potentially replace the current fleet of bikes. The models range in price and durability, but all are designed as a self-service bike share system that does not require "checking out" a bike and/or accessing a key from UVM staff. Of the various models available, they generally fall into two categories: dock based and smart locking. Dock based system tend to have more robust bicycles, with heavy-duty docking stations. These are more prevalent in larger North American cities such as Boston, Montreal, Toronto, Philadelphia and New York.

The other model type includes smart lock systems, which include highly visible and attractive stations but whose bicycles feature integrated locks that allow them to park anywhere within a designated service area and not restricted to parking at the station, as per the dock-based systems. The various smart lock models have been launched at Yale, the University of Virginia, the University of Buffalo, University of South Florida and Ohio State. Dock-based systems are more expensive, and are typically the most suitable option for larger cities that can afford the increased cost. Smart locking systems, although less robust, are an economical option, and tend to be used in small to medium sized cities. Table 4.1 compares the three most promising models for an expanded UVM bike share system, and table 4.2 compares their relative costs for equipment and operations.



MIT and the City of Cambridge, MA have partnered to provide bike share to the community. MIT provides funding to implement stations both on and near their property, and its students, faculty and staff benefit from the close proximity to this alternative transportation option.

1 *Use of the system in the fall increased from 2013 to 2015 by 153%, from 40 trips in the Fall of 2013 to 101 trips in the Fall of 2015 (source: UVM)*

Table 4.1 - Bike Share Model Comparison Scoring: 1 - Poor | 2 - Fair | 3 - Good | 4 - Very Good | 5 - Excellent

CRITERIA	MAX SCORE	EQUIPMENT OPTION		
		Dock-Based	Smart-Lock based	
		Motivate or B-Cycle	Social Bicycles (SoBi)	Zagster
Bike Share Equipment				
1. Bicycle/Station Durability	**5**	5	5	3
2. Site Planning Challenges	**5**	2	3	4
3. Ease of Use	**5**	4	4	4
4. Level of visibility within the context	**5**	5	4	3
5. 'Brandability' of equipment	**5**	4	4	3
6. Ability to 'scale up' to serve City of Burlington	**5**	3	5	2
System Costs and Vendor				
7. Equipment Costs	**5**	1	4	5
8. Operations Costs	**5**	2	3	4
9. Track record of success in similar markets/contexts	**5**	3	4	4
10. Timeframe for equipment delivery	**5**	2	2	3
TOTAL:	**50**	33	38	35

Criteria Notes:

Bike Share Equipment:

1. Bicycle/Station Durability: "You get what you pay for" is an important aphorism here, as low cost may not translate into durable equipment

2. Site planning challenges: How much flexibility is there in station design and layout

3. Ease of use: Ease of both using the bike, and also more importantly, the interface for accessing it

4. Level of Visibility within the Context: Bike and station designs need to be conspicuous and attractive to draw interest and ridership

5. 'Brandability' of equipment: Does the equipment (bicycles, stations, kiosks, etc) lend itself well to promoting the owners/sponsors brand?

6. Ability to scale up: Does the equipment typology lend itself well to "scaling up" to become a city-wide bike share program

System Cost and Vendor:

7. Equipment Costs: Costs can vary greatly between dock-based and smart lock equipment, from an average high of $5,000 (gross) per bike for dock-based equipment, to $1,500-$3,000 (gross) per bike for smart lock equipment

8. Operations Costs: Operational costs will be determined by the performance measures established between UVM and the eventual operations vendor.

9. Track Record of Success in Similar Contexts: Does the vendor have well-functioning equipment and a successful system in similar university contexts?

10. Timeframe of Equipment Delivery: After funding is found, the turn-around time for delivery of equipment

Dock Based B-Cycle Station

Smart Locking SoBi Station

Smart Locking Zagster Station

The bike share models compared in Table 4.1 all represent different price-points, with the dock-based dock-based systems representing the most expensive and Zagster the least expensive. System costs for bike share are divided into capital and operational costs. Capital costs include the bicycles and stations, while operating costs include the resources needed to launch the system, as well as the costs associated with operating the systems. Operational tasks include rebalancing bicycles and maintaining the bike share infrastructure, including the bicycles, the stations, and the software needed to run the system. Operational tasks are typically outsourced to the equipment provider or third-party vendors. Table 4.2 compares the capital and operational costs for the three models:

Table 4.2 - Bike Share Model Cost Comparison (Estimated)

CRITERIA	EQUIPMENT OPTION		
	Dock-Based	Smart-Lock based	
	Motivate or B-Cycle	Social Bicycles (SoBi)	Zagster
Bike Share Capital Costs			
Cost Per Station	$45-55,000	$25-35,000	$12-16,000
Cost Per Bike	$5,000	$3,000	$1,500
Bike Share Operational Costs			
Launch Costs Per Bike	$1,500	$1,000	$1,000
Operations Cost Per Bike	$2,500	$2,000	$1,500

Probable Scenarios

All three models could potentially be appropriate for the University. The two scenarios described below can be used to assess which models are most appropriate given different circumstances.

Scenario 1:

This scenario assumes that the City of Burlington commits to collaborating with the University to implement a city-wide system within the next year. In this scenario, a Dock-Based system or a SoBi system is recommended. Both provide durable infrastructure, and have a proven track record of success at the city-scale. To determine which is the most appropriate model for the city-wide system, a complete feasibility study should be conducted. This feasibility study will provide an impartial review of the available models, and recommend which is the most appropriate given the goals of the program. The study will also identify where stations should be placed, how many, and determine the projected costs of the system. A city-wide system for a community like Burlington can cost a million dollars or more, and private sponsorship and potential federal grants are typically needed to help fund the capital costs and/or operations.. Through the feasibility study process, potential sponsors can be identified, and meetings can be held with them to assess their desire to support the system. Overall, a feasibility study would be the next step needed to implement a city-wide system.

Scenario 2:

This scenario assumes that the City of Burlington does not commit to developing a city-wide bike share system within one year. In this scenario, the University should move forward with implementing an independent system. It would be cost prohibitive to install a dock-based system that only services the campus. Therefore, the recommended models for a campus-wide system include SoBi and Zagster. Both options have their advantages and disadvantages, as identified in Table 4.1. The infrastructure for the SoBi system is more advanced and their bikes are more robust than Zagster bicycles, but Zagster represents a more economical option for providing a campus-wide bike share system. The University should speak with representatives from each company to determine overall system costs, and then weigh the pros and cons of each to select the desired model for the system.

4.1.6 Sustainable Transportation Center

The University of Vermont Bicycle Education Center (BEC) appears to have reached the point where the size of the facility is limiting its ability to expand its programs and the level of service it can provide the campus community. The space that it occupies, which is primarily dedicated to repairs, includes tools and parts storage, long term rental bicycle storage, a small instruction space, and a smaller administration area. Often, BEC staff need to turn people away because there is not enough space availale to help more than just a few people service their bikes simultaneously. There is no room to provide other services or benefits to students, staff or faculty. The BEC should be rebranded as the Sustainable Transportation Center (STC), and more contiguous space would allow it to expand the range of services it offers.

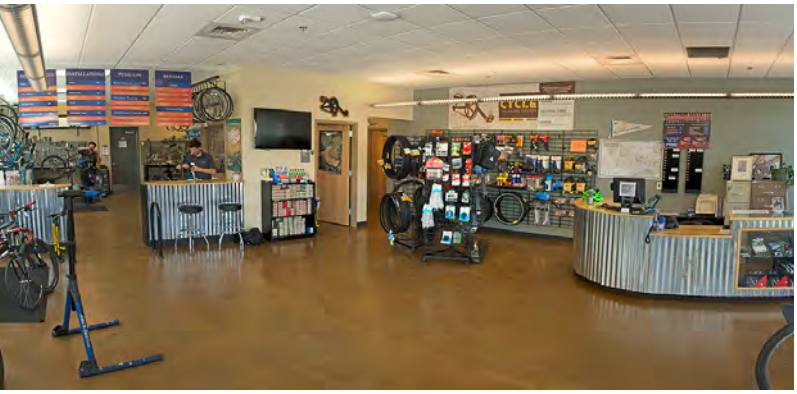
The location of the BEC is not visible to anyone from the outside. The only clues of its location are the sign on the wall, and a small sandwich board placed along Carrington Drive when the BEC is open. The lack of visibility hinders its goals of providing bicycle and active transportation services and education to the entire campus, especially since it is not possible to look into the BEC to see what activities are taking place inside. There are many in the campus community that do not know that it exists. A more visible location within the campus would help the STC to have more value to the entire campus.

Several of the other bicycle friendly universities have centers with similar missions as the BEC, such as Boise State University, Michigan State University, the University of Minnesota, Portland State University (OR), and the University of Wisconsin Madison. Most offer more services than the BEC provides, and some of them lead programming activities that support the services they provide within their campus communities. Almost all of the other centers provide:

- Group and one-on-one on bicycle maintenance instructions,
- Bicycle repairs for a fee,
- Bicycling information and resources,
- Bicycle rentals,
- Safe bicycle riding classes,
- Bicycling activities and events, and
- Some level of bicycling equipment sales.

Some of them also offer new and/or refurbished bicycles for sale, and on- and off-campus bicycle advocacy.

UVM's existing Bicycle Education Center is cramped, and not large enough to accommodate the volume of people hoping to use the services of the center. A larger space would ameliorate this issue.



The bicycle education center at Boise State has several features that should be incorporated if UVM establishes a new Sustainable Transportation Center, including large windows so the space is visible from the outside, and a larger room that can accommodate more activities.

The University should make the proposed STC larger, and place it in a more visible location.

The new location should:

- Be a larger space that can accommodate more bike maintenance, an office for the active transportation coordinator, and a class room or meeting area that can hold meetings and host campus groups related to walking, bicycling, and active transportation.
- Be placed in a more prominent location on campus; and
- Have large windows to provide visibility to the activities happening inside.

To expand the level of services it provides to the campus and to help fund the expanded space and activities, the University should consider other modifications to the operations of the STC that could include:

- Selling active transportation goods and equipment;
- Expanding its mission so that it becomes the hub for active transportation activities and services on campus;
- Teaching bicycling, walking, and active transportation courses in its own space for credit;
- Conducting jointly funded research on active transportation topics, such as sustainable transportation, the intersection of health and transportation, safety education methods, and encouragement.

To support its larger role on the campus, the STC should seek additional funding opportunities with other University departments to fund research, possibly with the Campus Office of Sustainability, the UVM Transportation Research Center; the College of Engineering and Mathematical Sciences, Transportation and Parking Services, the Rubenstein School of Environment and Natural Resources, the Vermont Agency of Transportation, and others. The STC could be housed in one of the buildings used by the potential on-campus partners, as long as the space is visible and large enough to accommodate the range of services identified above.

CHAPTER 5:
PROGRAM RECOMMENDATIONS

5.1 PROGRAM RECOMMENDATIONS

Equally important as providing non-motorized infrastructure (engineering) is ensuring that users know how to use the treatments and are familiar with them. The additional four E's address these factors. **Education** programs targeting the University community are recommended to complement existing efforts. Similar to education programs, **encouragement** programs provide incentives and benefits to the public to try walking, bicycling, and skateboarding as modes of transportation. **Enforcement** programs help to provide greater compliance to the "rules of the road", and **evaluation** programs help to track progress and statistics related to improving active transportation. Descriptions of the program recommendations for UVM, and both dollar amount and labor cost-estimates, are provided in this chapter. The term by which the recommendations should be completed is also noted in the descriptions. Short term recommendations should be completed within one to two years, midterm within two to four years, and long term within five years or more.

Figure 5-1: *Structure of Program Recommendations*

Gives people of all ability levels the confidence to use active modes of transportation and teaches travelers on how to interact with each other safely

Creates a culture that supports active modes of transportation

Ensures all roadway users comply with the 'rules of the road'

Sets benchmarks to track key statistics related to walking, biking and skateboarding, ensuring progress is made

5.1.1 Education programs

Educational strategies are extremely effective in improving the non-motorized environment while promoting non-motorized transportation. This section presents recommended bicycle, pedestrian, and motorist education programs that will help to give people the confidence to use active modes of transportation.

Table 5.1 - Educational Programs

EDUCATION PROGRAMS				
Recommendation	Description / Rationale	Time Frame	Cost ($)	Cost (labor)
Campus Orientation	Distribution of information to incoming and returning students at the beginning of the year through school information packets, including how to walk, bike and skate with cars, proper (and legal) roadway crossing behavior, locations of bike parking, instructions on how to properly lock your bicycle, facility improvements, programming events, and applicable policies and rules.	Short	$4,000 to print 30,000 trifold brochures.	20-30 hours staff, student, or consultant time to produce brochures. Assume 2-3 hours for coordinating distribution, if assuming the distribution uses established channels such as orientation packets or displays in university offices.
Bicyclist, Pedestrian and Skateboarder Education	Initiate campaign for proper bike locking techniques, and proper walking and riding behavior. Use flyers, videos, and workshops. Add these subjects to freshman/new student orientation. Volunteers and instructors, such as League Cycling Instructors (LCI), can be tasked with leading education workshops.	Short	$4,000 to print 30,000 trifold brochures. Estimate a $1,000 - 1,500 budget for workshop materials such as handouts or small incentives (i.e.- coffee, reflective lights). Workshop curriculum ranges from $0 (volunteer-created or LCI donated time) to $20,000 (custom-made curriculum)	20-30 hours staff, student, or consultant time to produce brochures. 10-20 hours to produce campaign videos. 5-10 hours to plan workshop(s) and/or new student orientation session(s). Assume no cost for using university meeting locations. Assume workshops are taught by volunteers or university staff.
Motorist Education	Initiate education program for all students, faculty and staff with parking permits to increase awareness of how to interact with pedestrians, bicyclists and skaters. Provide information in residence halls, through campus paper and flyers posted around campus, and/or through Public Service Announcements (PSAs).	Short	$400 - $500 to print 1,000 color flyers in 8.5" x 11" format.	10-12 hours staff or student time to research and produce flyers. 2 hours coordination with campus paper. Additional time to post flyers varies according to number posted or distributed to university buildings/residence halls.
Active Transportation Services Website	Create a dedicated web page that will become the central point of information for all things active transportation on campus. All policy, registration, programming, events, and local active transportation related news should be posted here.	Short	Websites vary from the very basic ($2,000- $5000) to entirely custom-made ($5,000 - $30,000 or more). Adding to the existing website would cost around $2,000.	Ongoing staff time spent updating resources would likely be minimal after the website's or web page's launch.
Active Transportation Curriculum for College Credit	Integrate active transportation into a wide variety of academic programs for credit, including urban studies, marketing and education as part of the curriculum offerings on campus. Coordinate this program through the applicable academic accreditation channels to award credits.	Mid	$2,000 - $5,000 for curriculum development, per year. Costs increase, if using curriculum specialists.	Costs vary depending on the number of course materials that require updating. Staff would spend time reviewing existing materials and delivering new curriculum.

EDUCATION PROGRAMS, CONT.				
Recommendation	Description / Rationale	Time Frame	Cost ($)	Cost (labor)
Safety/skills/commuter/repair workshops	Continue to offer commuter skills clinics in partnership with Local Motion, and continue to offer free bike repairs within the Bicycle Education Center.	Mid	Many free educational resources exist online ($0). Other curricula may be purchased. Custom-made curricula begins around $2,000 but can increase with additional materials or educational activities. Volunteers may lead on-bike skill sessions ($0) or the university may hire professional instructors. Public repair stands cost about $800 - $1,525 to purchase repair stand. The price does not include installation (bolting into concrete).	Labor includes time to gather resources and select curriculum. Writing an article for the student newspaper about the new self-serve repair station could result in greater awareness and positive publicity. Labor time varies, and labor time will decrease as more programs are run (due to decreased planning and prep time required).
Local Motion Everyday Bicycling Project (EBP) Classes	Partner with Local Motion to offer EBP classes through PE or as a part of a traffic ticket diversion program.	Mid	Contact Local Motion for current rates or explore the possibility of them teaching a course as an in-kind donation.	Staff or student time would be spent coordinating with Local Motion. The efforts can overlap with the traffic ticket diversion program.
Buddy Programs	Initiate a buddy program where interested people can sign up to partner with a buddy to walk/bike/skateboard to campus. This can be for commuting or recreation. Provide a page via a new Active Transportation Website for joining as a buddy ambassador and as a participant looking for a buddy.	Mid	Material production costs are minimal, as are publicity costs. The university can investigate incorporating Google Forms or a similar, free product to help keep costs low.	Estimate 15-20 hours to launch and publicize the program. Such a program requires ongoing monitoring, but an online system can help streamline operations.

5.1.2 Encouragement programs

If you build a facility, people will use it; however, if you build the facility and tell people about it, they will embrace it. This section identifies encouragement programs for UVM and other partners to promote bicycling as a viable transportation option. The recommendations are based both on findings of previous tasks plus experience gained in communities around the region and the United States.

Table 5.2 - Encouragement Programs

ENCOURAGEMENT PROGRAMS				
Recommendation	Description / Rationale	Time Frame	Cost ($)	Cost (labor)
Events and Rides (Encouragement)	Encourage students, faculty and staff to participate in local bicycling event, and create new events to encourage biking in and around campus. New events could include: charity ride, monthly bike commuter appreciation free breakfast, or a bike ride led by the college president. Add additional events each year.	Short	Minimal printing costs associated with flyer printing ($400-$500 for 1,000 copies of 8.5" x 11" color flyers. Organized rides may require permitting- costs vary. Ride participation incentives and logistics (i.e.- food for event, entertainment at start/finish, etc) varies. Students can lower costs by obtaining in-kind donations and by recruiting volunteers.	Student or staff time varies. Assume 5-12 hours to coordinate with student organizations on existing rides. Time to establish a new event varies-- assume at least 15 hours for a basic ride (route planning, outreach/communication, etc) and much more for large-scale charity rides.

ENCOURAGEMENT PROGRAMS, CONT.				
Recommendation	Description / Rationale	Time Frame	Cost ($)	Cost (labor)
Helmet/Light Give-aways	Continue to partner with Local Motion to provide free and subsidized front and rear lights and bike helmets to students, staff and faculty that request them and at campus events.	Short	$875 - Assume $3.50 per light (likely more expensive than actual cost) and an initial purchase of 500 units through a wholesale supplier. $7,500 - Assume $30 per helmet and an initial purchase of 250 units from a wholesale supplier.	Minimal staff time required to purchase materials. Some research may be required to set discounted pricing system or giveaway system/event(s).
Walk/Skate/Bike to Campus Day/Competitions	Organize a Walk/Skate/Bike to Campus Day or Week Competition. Student organizations, years, departments, or classes can sign up as groups to compete in this activity. Student organizations can lead this program. Donations from local shops can become prizes for participants and winners.	Short	$4,000 - $10,000 for start-up costs: program materials, labor to organize, special events (i.e.- breakfast for cyclists, etc). Materials only (i.e.- incentives and printing) would cost around $500 - $700, per competition.	Staff and student time varies depending on the number of activities organized. Assume increased costs if creating a custom-made trip-tracking website for the competition. A lower-cost program could use Google Forms to track participation or physical copies of ride-tracking spreadsheets.
Custom Winter Caps for Bicyclists & Beanies for Pedestrians and Skaters	Order custom winter caps for bicyclists and beanies for pedestrians and skaters with the school's color and logo, and sell them in the campus bookstore. These can also be issued as prizes in campus led bike/ walk/ skate incentive programs.	Short	$6,000 - $12,000. Assume 300 - 600 caps ordered. About $20 per customized cap. Choosing caps that require less customization would lower costs. Selling the caps in the bookstore means proceeds could continue to support bicycling on campus or other initiatives.	Staff or student time is minimal and would be spent designing the caps through a vendor and coordinating with the bookstore.
Larger space for the bicycle education center.	Identify a new, more centrally located and visble space for a larger Active Transportation Center, which would become the center for education, research and advocacy for sustainable modes of transportation within UVM.	Short	In-Kind space donation, and $2000 of tools and equipment	6 hours per week or staff/ faculty oversight. This could be volunteer time, but a paid shop adviser is preferred.

5.1.3 Enforcement programs

Enforcing traffic laws related to bicycling, walking and skateboarding helps to promote a safer environment for all road users. This section identifies enforcement strategies that have proven effective at creating greater compliance to the "rules of the road" and also foster greater mutual respect toward sharing the road among all transportation users.

Table 5.3 - Enforcement Programs

ENFORCEMENT PROGRAMS				
Recommendation	Description / Rationale	Time Frame	Cost ($)	Cost (labor)
Security patrols of bike parking (Enforcement)	Ensure that campus police conduct regular security checks of bike racks and indoor bike parking rooms to deter theft.	Short	See column to the right.	10-20 hours for staff coordination with law enforcement, establish registration protocol and forms, publicize program.
Stolen or impounded recovery system (Enforcement)	Initiate reporting system and recovery procedures based on updated bicycle registration.	Short	No monetary cost.	Time required depends on opportunities for collaboration with campus police. Plan for at least 30-35 start-up hours for initial implementation.

ENFORCEMENT PROGRAMS, CONT.				
Recommendation	Description / Rationale	Time Frame	Cost ($)	Cost (labor)
Ticket diversion (Enforcement)	Initiate Diversion Program whereby students who receive traffic tickets on campus can elect to attend a motorist, bicyclist, skateboard, and pedestrian safety clinic. Satisfactory participation and learning will be gauged by the instructor who will administer a certificate of completion for use as payment of the fine.	Mid	Costs vary depending on program materials produced: $400 - $1000. Clinics may require hiring a professional instructor ($2000 - $3,000) or they may operate based on volunteer and/or student labor.	Labor includes time spent organizing the session (12-20 hours per semester), as well as leading the regularly-occuring workshops (about 3 hours for set-up, instruction, and debrief/reporting for each workshop).
Positive Enforcement Ticketing (Enforcement)	Campus police could conduct "positive enforcement" ticketing which includes speaking to people riding bicycles without helmets or lights about the need for both and handing out coupons for discounts at local bike shops (or, instead of coupons, they could conduct helmet and light giveaways)	Mid	$2,000 for 100 helmets and sets of lights.	2 hours of officer time per week for "ticketing". For Police Services and/or Parking Enforcement to take on this responsibility, additional resources would need to be committed to each department. Alternatively, Local Motion could be contracted with to manage enforcement efforts. Active Transporation coordinator role could also be expanded to manage efforts.

5.1.4 Evaluation programs

Monitoring and evaluating the trends in non-motorized activity is important to understanding what strategies have been effective at increasing active transportation rates and improving safety. It also enables UVM to report progress against benchmarks. Progress reporting will continue to spread awareness of issues, encourage ongoing community buy-in, and highlight successes to the campus community.

Table 5.4 - Evaluation Programs

EVALUATION PROGRAMS				
Recommendation	Description / Rationale	Time Frame	Cost ($)	Cost (labor)
Dedicated funding source for implementation (Evaluation)	Segment Facilities and Planning budget to include active transportation infrastructure and programming.	Short	--	--
Crash data/incident data (Evaluation)	Work with the City to understand how they collect bicycle, pedestrian and skateboarder crash data. Ensure the University monitors crashes within the immediate context of the campus. Implement a program by which this is tracked internally.	Short	See column to the right.	Time required depends on opportunities for collaboration with campus police. Plan for at least 30-35 start-up hours for initial implementation.
Conduct seasonal active transportation counts (Evaluation)	"UVM should coordinate with Burlington and South Burlington, Chittendon County Regional Planning Commission and Vtrans to perform counts at high risk locations surrounding campus, and ensure non-motorized users are included in these counts. Additionally, inventory bike parking demand to provide data for supporting the development of new facilities.	Mid	National Bike and Pedestrian Documentation Project (NBPDP) provides free training and other materials. An estimated $800 for time spent training staff related to bicycle counts along routes. About $800 to orchestrate data collection using volunteer-collected data. Automated equipment starts around $3,000 per unit, but has many advantages including the possibility of enabling longer count durations.	8-10 hours spent training staff and/or volunteers. NBPDP national count days collect data during the AM and PM peaks (4 hours total, per count location). Time spent creating a report varies depending on the desired level of detail.

EVALUATION PROGRAMS, CONT.				
Recommendation	Description / Rationale	Time Frame	Cost ($)	Cost (labor)
Create a non-motorized transportation report card (Evaluation)	Begin monitoring and setting benchmarks for: Trip Demand, Mode Share, A Program Coordinator, and the Bicycle (and Pedestrian) Advisory Committee	Mid - Long	Report card creation: $6,000 for initial production, not including printing costs. Hosting the material online would lower printing costs. Ongoing cost of about $4,000 for staff/contractor time spent compiling report.	See column to the left. Report cards are excellent opportunities to publicize the university's progress. As such, they should include time spent towards publicizing the report outcomes.
Update Active Transportation Plan (All 5 E's)	Update the Plan (at least) every five years.	Long	Varies depending on project scope and whether the effort is produced in-house.	The university can choose to use staff time or consultant time. Either way, the effort must accurately benchmark the program and set future goals.
Satisfaction survey for those using active modes of transportation (Evaluation)	Work with CATMA to initiate best practices for satisfaction survey, semi-annually and yearly.	Long	Start-up costs include $6,000 for survey development and first implementation. Ongoing costs include $2,000 staff or consultant time to create a report based on synthesizing data.	See column to the left. Like report cards, the university should publicize results after reviewing survey results.

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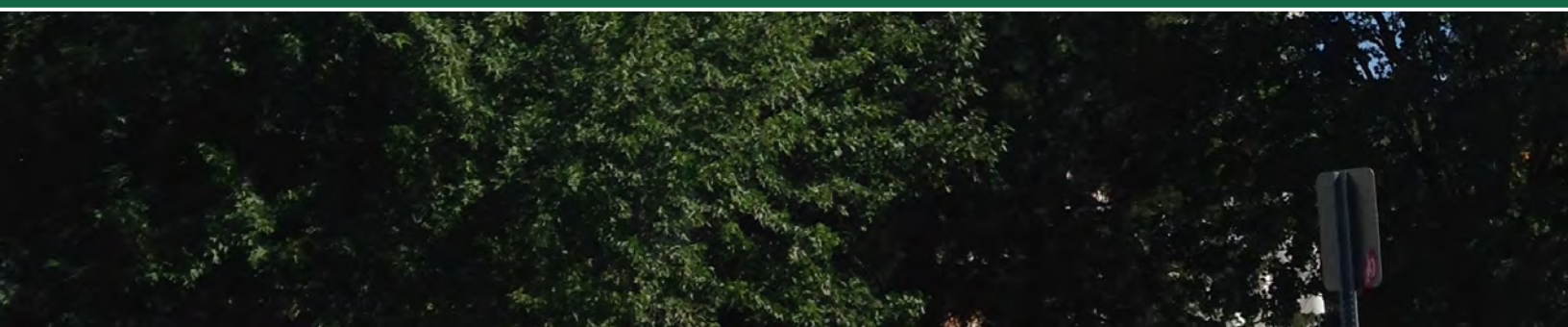
CHAPTER 6: CONCLUSION & NEXT STEPS



6.1 CONCLUSION

Universities are in competition with one another, and to attract the best students, faculty and staff, universities have to offer a quality of life that is desirable. Across the country, universities recognize that people place a high value on the ability to move without a car, especially in campus contexts. The University of Vermont is poised to become the kind of campus where moving without a car is both possible and desirable. In addition to making the campus a more appealing place, increased non-motorized mobility (including walking, biking, skateboarding, running, skating, skiing, scooters, wheelchairs, and other forms of travel) will provide UVM faculty, staff, students and visitors with important health, environmental, educational and economic benefits. UVM has committed itself to this philosophy and is determined to improve conditions for pedestrians, bicyclists and other forms of active mobility. UVM has been nationally recognized as a Silver level Bicycle Friendly University. Implementing this plan will take the campus to the Gold level and beyond, becoming a model for sustainability, an integral part of the University's vision.

Implementing the plan recommendations will put UVM on course to becoming a leader among universities prioritizing active modes of transportation

The plan recommendations will make active transportation comfortable for people of all ages and ability levels

The University of Vermont Campus has a well-established network of existing paths that make non-motorized transportation a viable way to move around UVM's campus. However, many of these facilities are overcrowded, they are not 'branded' with a clearly understood wayfinding system, and there are critical gaps in both the on-street bicycle network and off-street path system. Additionally, major streets bisect the Main Campus, creating challenging conditions for non-motorized transportation. Winter conditions are also a key issue, especially with Burlington's limited daylight hours and frequent snowfall during the majority of the academic year.

To support and encourage improved conditions for active mobility, the UVM community developed this Active Transportation Plan. The UVM Active Transportation Plan followed the "5 E's" framework: Engineering, Education, Encouragement, Enforcement and Evaluation. The 5 E's are the national model used to develop recommendations to improve active transportation. The five E's were used to evaluate existing conditions at UVM, and then to provide recommendations for improving the active transportation conditions on campus and establish a culture that supports walking, bicycling and skateboarding.

This chapter is titled Next Steps because it identifies key opportunities that the University can take to immediately advance the recommendations within this plan. These steps include becoming a Gold Level Bicycle Friendly University, taking measures to ensure non-motorized transportation remains viable year round, and implementing policies that will integrate active transportation into all facets of campus life.

6.1.2 Becoming a GOLD LEVEL Bicycle Friendly University

A specific objective of this plan was to identify opportunities to elevate UVM's Bicycle Friendly University (BFU) status from silver to gold. The BFU program is part of the Bicycle Friendly America (BFA) program, which is administered by the League of American Bicyclists (LAB). The evaluation criteria for the BFU program is based on the "Five E's" addressed earlier in this chapter. In 2014, UVM applied for a BFU status and received a Silver level designation. Table 6.2 identifies criteria that would need to be achieved to elevate UVM's status from silver to gold, and eventually, platinum.

Figure 6-1: *Attaining Platinum Bicycle Friendly University Status*

Campus exemplifies what it means to be a Bicycle Friendly University, with high marks across the board. In short, people are on bikes everywhere.

- Campus has a well connected, comfortable and safe bicycling network
- There are excellent bicycle parking facilities
- Outstanding bicycle education programs
- A supportive police force

The Campus has a strong bike culture, but may still need to offer more accessibility in the bike network.

- Campus has a well-developed bicycle network, but it has some gaps
- Programs to encourage more bicycling could be developed further
- Bicycling education could be strengthened

UVM is currently designated a Silver BFU. Based on the 2014 Report Card, the university should prioritize the following to upgrade its Silver designation:

- Expand the bike network and increase network connectivity
- Increase amount of bike parking available
- Encourage bicycle advisory committee to meet more frequently
- Create a campus bike master plan
- Expand efforts to evaluate crash statistics
- Request local or campus police to enforce traffic laws for both bicyclists and motorists on campus, and institute a ticket diversion program

Gold Level BFU Comparison

The planning team researched the programs and policies that other gold level universities have been implementing to foster greater bicycle use. Three peer institutions were selected by the team for study and comparison which share various similarities to UVM. These included:

- Harvard University: Cambridge, MA
- University of Minnesota: Minneapolis MN
- University of Montana: Missoula, MT

These three universities were chosen for comparison based on their regional context, geographic location and climate, and their Gold or Platinum BFU status. Cambridge, Missoula, and Minneapolis all have similar winter climate conditions to Burlington. Table 6.3 identifies the programs that these universities have prioritized, which have helped them to gain Gold Level BFU designation. UVM can use this table to assess steps that could be taken to elevate their BFU status to Gold.

Table 6.1: Peer Institution Winter Climate Comparisons[1]

Location	Avg. Dec. through Mar. Snowfall (Inches)	Avg. January Low Temp.
Cambridge, MA	42	22
Missoula, MT	30	18
Minneapolis, MN	42	8
Burlington, VT	71	10

1 http://www.usclimatedata.com/climate/

Table 6.2 - BFU Gold-Level Model Programs and Policies

University	Financial Incentives	Safety / Encouragement	Other Perks	Stand Out Feature
Harvard University	• CommuterChoice Program Bicycle Benefits reimburses employees up to $240 / year for bicycle related costs • Regional bike share membership discounts	• H.U. Parking Services distributing over 7,000 'look' stickers reminding motorists and bicyclists to be aware of their surroundings	• Harvard University Cycling Team • Proximity to well-organized and successful regional bike share system • Free and discounted helmets	• Full-time staff member / program coordinator dedicated to campus wide bicycling initiatives • Presence on Cambridge Bicycling Committee board • Implementation of a Bicycle Master Plan and a continued commitment to increase the number of high-quality and secure bicycle parking locations
University of Minnesota	• Free RFID chips, classes about bike safety and maintenance	• Free electronic kiosks and maps available for safe route-planning	• Proximity to well-organized and successful regional bike share system	• University conducts and publishes bicycle trip related research that helps prove the need for additional safe bicycling facilities
University of Montana	• Yellow UBike two-day loan program (free) • Semester bike rental program (low cost) • Partnership with local banks offering interest free Bike Loans for students who wish to own their bicycle	• Tips for winter riding on website • Bike theft prevention resources on website • Bicycle serial number registration services on website	• Prizes for popular social media posts related to biking • Member (fee-based) services such as secure parking and access to showers and lockers	• Guaranteed Ride Home program: bicyclists who ride to work / school 3 or more days per week are eligible for up to $100 / year in reimbursements for using Metro Transit

6.1.3 Making Active Transportation Viable Year-Round

Burlington experiences long winters with heavy snow falls. For walking, bicycling and skateboarding to become viable year-round, accommodating these modes during winter needs to become a campus priority. Winter maintenance policies for campus roads and the pedestrian path network are well established, but maintenance should also extend to campus bike routes. Also, more coordination is necessary with the Cities of Burlington and South Burlington to ensure that key routes to campus are well maintained during the winter. Best practices for the winter maintenance of active transportation routes is described in Figure 6-2. These best practices should be incorporated into the University's winter maintenance program and budgets to ensure travelling by all modes is safe and comfortable.

In the past, South Burlington has cited a lack of budget available to conduct more comprehensive snow removal of walking and bikings routes. A cost savings could be realized by shifting more people to active modes, thereby reducing the wear-and-tear of roadways surrounding campus. This shift would also reduce parking demand on campus, which represents a significant cost for UVM. Communicating this potential cost savings may incentivize the City and UVM to increase their snow-clearing budgets to reduce congestion and parking demand.

An identified barrier to active transportation in the winter months are the unplowed sidewalks and shared use paths that are used to travel to and from campus. Better coordination between Burlington, South Burlington, and UVM regarding winter snow clearing for bicycle and pedestrian routes could increase the number of people using active modes of transportation to travel to and from campus.

Figure 6-2: *Winter Maintenance Best Practices*

MOVING IN WINTER

Burlington experiences long winters with heavy snow falls during the months when most students are on campus. For active transportation to become viable year-round, accommodating pedestrians, bicycles, and skateboarders during the winter months needs to become a campus priority.

The winter maintenance of paths and infrastructure (ie: bike racks) should be a planned, regular activity on campus. Bicyclists, pedestrians and skateboarders have different winter needs than motor vehicles—for example, less weight and surface area means they are more sensitive to snow and ice—and winter roadway maintenance programs should have specialized practices to respond to these needs.

It is the University's responsibility to provide safe conditions for non-motorized users year round, and the City's responsibility to maintain paths, sidewalks, and on-street facilities within the public right-of-way. Thoughtful roadway design and a strategic snow removal and de-icing program are key to the safe and comfortable accommodation of non-motorized users in the winter.

Bicyclists rely on convenient and accessible parking to park their bikes. The racks pictured at right and below, which have not been cleared of snow, discourage people from riding during the winter.

A heavy snowfall will require the initial removal of snow from the path to restore functionality. A pro-active and reactive de-icing program is also necessary to maintain safe conditions

6.2 NEXT STEPS

The Active Transportation Plan provides UVM with a greenprint to move the campus environment to the next level. By moving more people with fewer cars, the University will reduce its carbon footprint, improve health and safety, support educational leadership, and integrate the values that define the unique experience that continues to attract faculty, students, staff and visitors to the University of Vermont. The following policy recommendations should be prioritized to guide the campus' daily operations, design, implementation, and enforcement.

Table 6.3: UVMoves Policy Recommendations

POLICY		
Recommendation	Description / Rationale	Implementation Time Frame*
Adopt this Active Transportation Plan and endorse the goals within	Provides a map for improvements and indicates UVM's commitment to support the implementation of better facilities for non-motorized modes on campus	Short
Incorporate recommendations of this plan into other area plans	This will aid in funding and feasibility/design studies for the recommendations.	Ongoing
Work with City to appoint staff member to join Burlington's Walk/Bike Council	This committee makes recommendations to the City related to pedestrian and bicycle policy and infrastructure projects. UVM should have representation on this committee to advocate for the implementation of recommendations identified within this Plan on City ROW.	Short
Active Transportation Planner/ Sustainable Transportation Coordinator	Convert UVM's bike and pedestrian coordinator position from a half-time to full-time position. This staff person will monitor this Plan and ensure that it is implemented.	Short - increase Sustainable Transportation Coordinator to full time
Establish a Campus UVM Active Transportation Advisory Committee	UVM has a faculty/staff bike advisory group and a student bike user group. The purview of these groups should be broadened to include all non-motorized issues, becoming the Active Transportation Advisory group and the Active Transportation User Group, respectively. These groups will help staff uphold the recommendations of this Plan, advocate for changes at the City level, and advise on decisions about key projects. The committee can support UVM's cycling team, and oversee the student led Bike Maintenance Club. The Club should be given a larger, more visible space where they can repair more bikes and sell bike supplies (tires/tubes), and hire and pay students to work there using work study funds.	Short - establish the committee Ongoing - implement policy action items
Create and endorse a bicycle parking policy, inclusive of short-term parking and long-term bike storage policies	Institute a three tiered parking standard for the campus as detailed in this report, including *outdoor parking* (exposed and covered) as well as *indoor parking*. In developing the minimum number of parking spaces to be provided outside and within buildings, the Association of Pedestrian and Bicycle Professionals standards should be referenced.	Short - adopt a policy Ongoing - implement policy action items
Create and adopt a Winter Facility maintenance policy	This policy should be derived from the Winter Maintenance best practices included on page 6-5. At a minimum, all exposed bike racks should be maintained during winter months, and shared-use paths/bike facilities should be cleared of snow and de-iced post weather events.	Short - adopt a policy Ongoing - implement policy action items
Reevaluate parking policies and fees	Determine if parking policies and fees can be modified to reduce congestion and offer incentives for using transit and bicycles for commuting.	Mid
Continue to support CATMA's Guaranteed Ride Home policy for those who register their bikes, or who walk and skateboard to campus	Continue to support CATMA's Guaranteed Ride Home Program by offering taxi vouchers to individuals who sign up as an alternative commuter (carpool, bicycling, walking, skateboarding, or transit), providing a guaranteed way to get home should the need arise. A limiting factor in getting more adoption for alternative transportation is the fear that an individual will be stranded on campus should something unforeseen arise; a guaranteed ride home program helps to partially allay these fears.	Mid
Establish a budget for active transportation and pedestrian planning, implementation, and programming	Create a separate budget will allow UVM to fund projects and monitor trends in active transportation related expenditures.	Mid - Long

UVMoves Active Transportation Plan - Glossary of Terms

5.1.1 Recommended Bikeway Facilities

A description of bicycle transportation facilities is provided below, including include off-street shared-use paths, striped on-street bike lanes, buffered bike lanes, separated bike lanes,[1] bike routes (including shared lane markings, or "sharrows"), bicycle boulevards.

On-Street Painted Bike Lanes

Bike lanes are striped and signed on-street travel lanes exclusively for bicycles. Bike lanes provide physical separation from automobile traffic and appeal to bicyclists with moderate to high levels of experience. Because they often provide the most direct connections, these facilities tend to be most popular with experienced bicycle commuters.

Buffered Bike Lanes

Buffered bike lanes are a type of bike lane with a striped or paver delineated buffer either between the bicycle path of travel and the motor vehicle path of travel or a parking lane. A buffered bike lane can encourage bicycle riders with less confidence to ride more often as it provides an increased level of safety that standard bike lanes do not offer. Buffers between the bicycle and motor vehicle path of travel are useful for high-speed, high-volume arterials or collectors, while buffers between the bicycle path of travel and a parking lane are appropriate for areas with high parking turnover that put bicycle riders at risk of riding in the door zone. Streets where buffered bike lanes are recommended may require travel lanes to be narrowed to ten feet in some locations or the removal of a travel lane.

Bike Routes

Bike routes share the right-of-way between vehicles and bicyclists and utilize signage and optional shared lane markings to indicate that the road is a shared use facility. These facilities are typically recommended for streets with relatively low traffic speeds and lower volumes, such that less experienced bicyclists will feel comfortable bicycling with mixed traffic.

In order to better highlight the presence of bicyclists to motorists, bike routes could potentially be supplemented with shared lane markings or green backed sharrows. These pavement markings help to make less experienced riders more comfortable on the road

Bicycle Boulevard

A bicycle boulevard is a bike route on a local or neighborhood street that prioritizes pedestrians, neighborhood traffic, and bicycle riders, and discourages cut-through traffic. Neighborhood friendly corridors include a wide range of treatment options including the following:

- Wayfinding signage
- Pavement markings
- Speed reduction measures (bulb-outs, traffic circles and diverters, chicanes, speed humps)
- Tree canopy
- Traffic volume reduction measures

[1] On-street separated bike lanes can be substituted for conventional or buffered bike lanes where street width is available.

- High visibility pedestrian crosswalks
- Bicycle detectors at intersections
- Bicycle crossing signals
- Pedestrian countdown signals

Bicycle boulevards are effective in encouraging the 'interested but concerned' to ride more often since they provide a comfortable bicycling environment for most ability levels.

On-Street Separated Bike Lanes

A separated bike lane is an exclusive bicycle facility combining the user experience of a separated path with the on-street infrastructure of a conventional bike lane. Separated bike lanes may take many forms but share common elements. Separated bike lanes provide dedicated space for bicyclists separated from vehicle travel lanes, parking lanes and sidewalks. Separated bike lanes can be either one-way or two-way, on one or both sides of a street, and separated from vehicles flexible posts, curbs, parked vehicles, planters or a combination of these elements. The appropriate design treatment will depend on corridor- and site-specific conditions.

5.1.2 Bikeway Intersection Treatments

Intersection Crossing Markings

Intersection crossing markings indicate the intended path of bicyclists. They guide bicyclists on a safe and direct path through intersections, including driveways and ramps. They provide a clear boundary between the paths of through bicyclists and either through or crossing motor vehicles in the adjacent lane. Intersection markings can be placed adjacent to crosswalks through intersections, and be referred to as crossbikes.

Bike Box

A bike box is a designated area at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase.

Jug Handle Crossing

A jug handle crossing allows bicyclists to exit the flow of traffic and then reorient themselves perpendicular to the travel lane before crossing the roadway at an intersection. This treatment is effective where the flow of vehicle traffic makes left turns uncomfortable. The jug handle provides the option to make the left turn movement in two stages, which can be more comfortable.

5.1.3 Bike Share

Regular bicycle commuting requires some activities that not all people are interested in, such as finding secure parking areas and bicycle maintenance. Bike-sharing programs can encourage people to give bicycling a try by reducing or removing these barriers. One model of bike-sharing includes stations of bikes around a campus, city, and/or region available for checkout. Users checkout these bicycles for a specified period of time at one station for a maximum time frame and turn them back in at any other station. Other bike-sharing models have been implemented around the country, including several on college campuses. Bike-sharing programs not only increase the visibility of bicycling and reduce barriers to riding, but can create an identity for the implementing jurisdiction.

5.1.4 Shared Facilities

Shared-Use Paths

Shared-use paths are paved facilities used by bicyclists, pedestrians, and those using other non-motorized modes of transportation. These facilities can be constructed in roadway right-of-way or can have exclusive right-of-way off-street. Shared-use paths are generally slower moving than bicycle paths and other facility types because they are shared among a variety of users.

5.1.5 Pedestrian Facilities

This section focuses on recommended improvements to facilitate pedestrian travel and ADA accessibility to, from, and within campus.

Signalized Crossing Enhancements

High Visibility Crosswalks

Crosswalks act as the right-of-way for pedestrians crossing the street. They can be marked with paint, thermoplastic, decorative pavers, and other materials to establish the area where pedestrians should cross. High visibility crosswalks help to highlight to motorists the presence of pedestrians in the intersection. Common styles of high visibility crosswalks are zebra or continental crosswalks, which resemble a ladder. Crosswalks paved with decorative pavers can also be considered high visibility crosswalks as the contrast between the crosswalk and the street can be effective in directing the motorist's attention to the pedestrian. All of the traffic signalized and stop sign controlled intersections around the campus could all have high visibility crosswalks to better highlight pedestrian areas. Intersections are where a number of collisions occur.

Leading Pedestrian Intervals

Leading Pedestrian Intervals (LPI) provide pedestrians the "Walk" sign several seconds before motor vehicles traveling in the same direction receive a green light. LPIs allow pedestrians to get a head start on crossing before vehicles begin turning. LPIs are typically installed to reduce conflicts with pedestrians and turning vehicles sharing the same right-of-way. Pedestrians permitted to enter the intersection prior to the release of traffic are more visible to motorists and drivers are less likely to initiate turns when pedestrians are already in the street. All signalized intersections into campus should be upgraded to have LPIs.

Pedestrian Countdown Timers

A pedestrian countdown timer allows pedestrians to activate the traffic signal by pressing a push button at the intersection. A pedestrian signal head at the opposite side of the street displays the crossing time remaining. Pedestrian countdown timers may be particularly beneficial at preventing pedestrians from failing to complete their crossings at intersections with shorter crossing times or wider crossing distances. All signalized intersections that do not currently have pedestrian countdown timers should be retrofitted to have them installed.

"Yield to Pedestrians" Signs for Right-Turning Vehicles

"Yield to Pedestrian" signs for right-turning vehicles are used to tell motorists who are executing turns that they need to yield to pedestrians in crosswalks. These signs are typically used at signalized intersections where right turns on red (RTOR) movements are allowed. Installing "Yield to Pedestrian" signs has the potential to reduce conflicts between pedestrians and vehicles turning right when there

are high volumes of turning vehicles, high pedestrian volumes, and the presence of pedestrian signal indications.

Curb Extensions

Curb extensions, or bulbouts, are an expansion of the curb into the parking lane at intersections. Curb extensions reduce the pedestrian crossing distance, making pedestrians more visible to motorists and lowering motor vehicle speeds by visually narrowing the roadway. Curb extensions are typically installed with curb cuts to increase accessibility for persons with disabilities and in combination with marked crosswalks to increase the visibility of pedestrians crossing. Since there is the potential for reductions in the number and severity of crashes involving motor vehicles and pedestrians, curb extensions are often used in highly urbanized environments where pedestrian volumes are high. Curb extensions can also be effective traffic calming treatments at non-signalized intersections.

Pedestrian Refuge Island

A pedestrian refuge island reduces the exposure time experienced by a pedestrian in the intersection. While refuge islands may be used on both wide and narrow streets, they are generally applied at locations where speeds and volumes make crossings prohibitive, or where three or more lanes of traffic make pedestrians feel exposed or unsafe in the intersection. The provision of refuge islands enables pedestrians to cross the roadway in two stages, making it possible to navigate one direction of traffic at a time, improving safety.

Raised Crosswalks

Raised crosswalks, also known as speed tables, are elevated pedestrian crossings that extend the sidewalk across the street. They make the pedestrian more visible to drivers and provide more convenient crossings for persons with disabilities. Raised crosswalks result in reduced vehicle speeds, thereby creating a potentially safer pedestrian environment.

Advance Yield Markings

Advance yield markings are placed on the roadway in advance of the crosswalk to increase the rate at which motorists yield to pedestrians and allow pedestrians to complete a safe crossing.[2] They can be particularly helpful on multilane roads, as shown in Error! Reference source not found., to reduce the potential for a multiple threat crash, which involves a motorist in one lane yielding to allow a pedestrian to cross and the driver in the adjacent lane proceeding into the crosswalk, thus causing a collision.

[2] At controlled intersections, advance yield markings should be placed between four and 30 feet back from the intersection. At uncontrolled intersections, they should be placed 20 to 50 feet in advance of the crosswalk.

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