

I-89 Exit 14 Alternative Transportation Crossing Study

Final Report



Prepared for:



Chittenden County Regional
Planning Commission



City of South Burlington

May 29, 2018

I-89 Exit 14 Alternative Transportation Crossing Study

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1.0 EXECUTIVE SUMMARY

Over many years, the City of South Burlington has worked to improve transportation options and support the development of a walkable, compact livable downtown in City Center adjacent to the Interstate-89 (I-89) Exit 14. Both an asset and a barrier, I-89's Exit 14 connects South Burlington to the rest of Vermont, Canada, and New England via the US Route 2 (Williston Road) corridor. The commercial heart of South Burlington, Williston Road is surrounded by neighborhoods and adjacent to the largest employers in the State of Vermont. The City has long sought to accommodate existing and future pedestrian and bicycle recreational and commuting users with a facility parallel to Williston Road.

The I-89 Exit 14 Alternative Transportation Crossing Study was undertaken in 2016 by Chittenden County Regional Planning Commission in partnership with the City of South Burlington to identify a means and alignment to improve pedestrian and bicycle access across this interchange. In accordance with the City's project implementation process, public meetings were held, stakeholders were consulted, and a Purpose and Need Statement was approved. Alternatives were developed and tested in evaluation matrices. Several short-term alternatives that were deemed viable and with merit, but did not meet the purpose and need, may be pursued separately by the City or folded into adjacent projects.

A set of Alternatives were further evaluated in a matrix against criteria, presented to and discussed with the public in a workshop, as well as property owners and agency representatives in stakeholder meetings. Subsequently, the alternatives were narrowed to two which were presented to, and discussed with VTrans, before one was selected as the preferred alternative.

The **recommended alternative is Alternative 3**. This alternative includes a single span bicycle/pedestrian bridge over I-89, just south of the Exit 14 interchange ramps. The western terminus would be accessed by shared use path within the right-of-way adjacent to Staples Plaza along the southwestern edge of the interchange, and by a connection to shared use path that runs through the Quarry Hill neighborhood. The eastern terminus would be accessed by shared use path within the right-of-way adjacent to the Comfort Inn and CVS, and potentially by a connection to the University Mall property.

It is recommended that a separate scoping study be considered to evaluate the feasibility of a center median bike lane, running at least from the Spear Street/East Terrace jughandle to Dorset Street, with physically protected buffers. This shorter-term solution has potential for providing an effective separated bicycle facility, but will not serve pedestrians, and may possibly be used only by more competent bicyclists.

2.0 INTRODUCTION

The City of South Burlington is divided by Interstate-89 (I-89) at the Exit 14 Interchange. US Route 2 is a principal arterial roadway that spans I-89 and is a major transportation connection for the region, as well as between many major employment centers and residential areas in Burlington and South Burlington, including the planned mixed-use South Burlington City Center on the east side. The interchange area, including US Route 2, was primarily designed for moving motor vehicles efficiently and at speeds not typically compatible with bicycle and pedestrian uses. While existing sidewalks, bicycle lanes, and transit service provide alternative transportation accommodations along US Route 2, these modes are likely underutilized due to the speed, numerous conflict points, and volume of traffic immediately adjacent to and crossing these facilities.

Several plans and studies have identified the need for a safer and more comfortable crossing of I-89 to better connect major employment centers and residential areas. The Chittenden County Regional Planning Commission (CCRPC) is leading this study for the City of South Burlington (City) to identify possible crossing improvements for pedestrians, bicyclists and transit users in the Exit 14 area and evaluate the feasibility of those improvements. The goal of this study is to recommend an alternative transportation option with the support of the community to pursue funding for engineering, permitting, and ultimately construction. In September 2016, the CCRPC contracted with Stantec to provide support during the study.

Steps of the study included:

- Collecting background and existing conditions information
- Engaging citizens and stakeholders in a public process to identify needs and desires of the community
- Defining the purpose and need for the project based on citizen and stakeholder input for approval by the Planning Commission
- Creating and evaluating crossing improvements alternatives that meet the purpose and need for the project
- Review by the community and stakeholders of the alternatives that most meet the approved purpose and need
- Recommending a preferred alternative to the City Council for approval

I-89 EXIT 14 ALTERNATIVE TRANSPORTATION CROSSING SCOPING STUDY

Project Advisory Committee

A project advisory committee (PAC) was formed, and met periodically to oversee the project and make recommendations regarding the direction of the study. Much of the background, history, local input, and consensus documented in this report is attributed to the following committee members' involvement.

City of South Burlington (City) - Ilona Blanchard, Justin Rabidoux, Ashley Parker

Vermont Agency of Transportation (VTrans) - Nick Meltzer, Jon Kaplan

Chittenden County Regional Planning Commission (CCRPC) - Christine Forde, Peter Keating

Stantec - Greg Goyette, Sean Neely

3.0 BACKGROUND

Background information, including existing physical and environmental conditions, was documented to understand the need for and potential impacts of improvements. Team members researched and reviewed available information, solicited input from the City and project stakeholders and completed a field review of the project area.

3.1 STUDY AREA

The study area is approximately centered around Exit 14 of I-89, where US Route 2 passes over I-89 (Figure 1). In the west-to-east direction, the study area extends from Spear Street to Dorset Street. In the north-to-south direction, the study area extends from just north of the Exit 14 interchange to just south of the interchange. The study area is approximately one-half square mile and includes west of I-89, the University of Vermont (UVM) campus, the Sheraton Hotel, the East Terrace and Quarry Hill Road neighborhoods, and the Staples Plaza, and east of I-89, the University Mall, the Holiday Inn, Comfort Inn, CVS and Homewood Suites properties.

Improvements within the study area have the potential to link existing bicycle facilities along Main Street and within the UVM campus in Burlington to existing bicycle facilities on Dorset Street and planned bicycle facilities along Williston Road and within South Burlington's designated City Center.



Figure 1 - Study Area

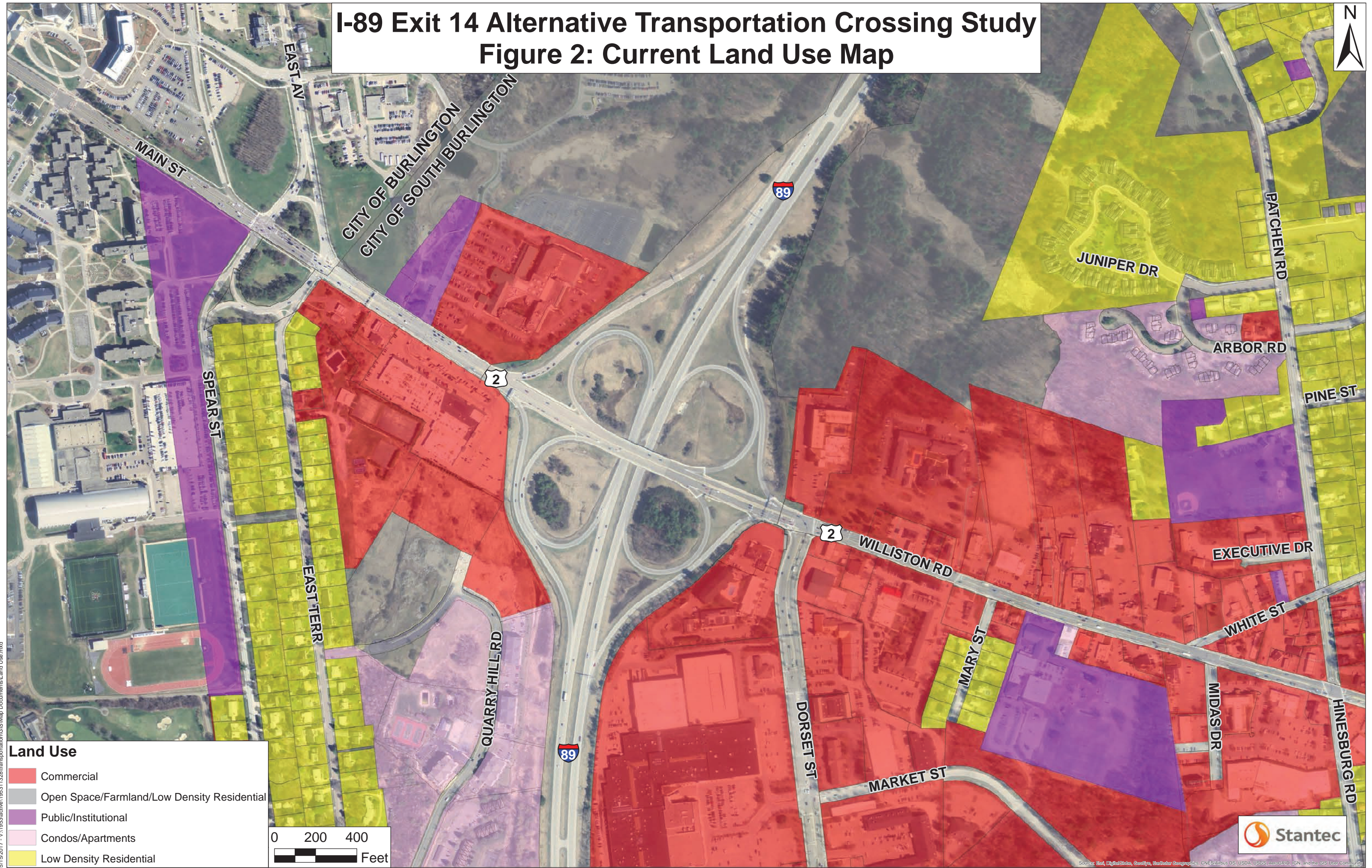
3.2 LAND USE & ZONING

3.2.1 Current Land Use

Current land uses within the study area are primarily a mix of commercial, medium to high density residential, public/institutional lands and open space (Land use data from City of South Burlington, 2016). These land uses are divided by a major limited access transportation corridor (I-89) as shown in Figure 2. The majority of land to the east of I-89 in the study area is developed as commercial and includes the University Mall, a grocery store and numerous hotels. Land to the immediate southwest of the interchange is medium to high-density residential. Public/institutional lands and uses include: the University of Vermont (UVM) campus west of Spear Street and west of the Sheraton Hotel; the Rick Marcotte Central School property approximately 0.4 miles east of I-89, south of US Route 2, and between Mary Street and Midas Drive; Jaycee Park on the west side of Patchen Road, north of the intersection with White Street; and the US Post Office on the north side of White Street, to the west of Patchen Road. The parcels between Spear Street and East Terrace, as well as most parcels on the east side of East Terrace, are low density residential. Most of the parcels on Mary Street, south of US Route 2, are also low density residential as are parcels on the west and east sides of Patchen Road, particularly near Juniper Drive and east of Patchen Road, north of White Street. A portion of land north of the cul-de-sac on Quarry Hill Road is open space/farmland/low density residential as is the land north of the Sheraton Hotel, along both the western and eastern sides of I-89.

I-89 Exit 14 Alternative Transportation Crossing Study

Figure 2: Current Land Use Map



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3.2.2 Future Land Use

Future land use designations (South Burlington Comprehensive Plan, 2016) are displayed in Figure 3. The current commercial land uses within the study area are anticipated to be redeveloped as Medium to Higher Intensity - Mixed Use. This land use is anticipated to be the densest development in the City: mixed uses within a network of blocks and buildings including multi-family residences, and well-organized transportation infrastructure geared towards walking and biking. The residential neighborhood area southwest of I-89 is designated for Medium Intensity – Residential to Mixed-Use. This designation is for clustered housing, sharing amenities and open space, with limited non-residential uses where suitable.

Figure 4, also from the City's Comprehensive Plan, illustrates the City's Land Use Planning Areas. Interstate-89 also divides the western portion of the Northwest Quadrant Land Use Planning Area (East Terrace and Spear Street neighborhoods, Staples Plaza and the Sheraton) from eastern portions of the Northwest Quadrant (Holiday Inn and other Williston Road businesses and the neighborhoods to the north) and the Central District. Many neighborhoods in the Northwest Quadrant are pedestrian-friendly, but lack pedestrian and bicyclist connectivity to amenities close by and to regional attractions. The Comprehensive Plan includes improved pedestrian connectivity and access to services for residents of the Northwest Quadrant, acknowledging that this area will continue to be both connected and separated by local and regional transportation arteries. The Plan supports regional use of these arteries moving forward, while promoting safety and accessibility for walking, biking, and using public transportation, by residents and visitors alike.

The Central District comprises the core of the City and currently has a mixture of land uses dominated by commercial development. This district is anticipated to be a focal point for mixed commercial, residential, and office use in the future. The City is making significant investments in walking and biking transportation infrastructure in this area to support the development of City Center, a clear downtown district, with more connectivity and compact, walkable, mixed use development. The Plan recognizes the need for improved bicycle and pedestrian infrastructure across I-89 to connect people in areas west of the interchange to City Center and to connect residents of City Center and surrounding low and mid-density neighborhoods to the institutions and neighborhoods west of I-89. Transportation crossing improvements are also in line with Objectives 46 and 47 identified in the Plan. These objectives aim to minimize parking demand in the Central District by fostering walking and biking along with transit, as well as promoting interconnectivity for residents to walk and bike to local amenities.

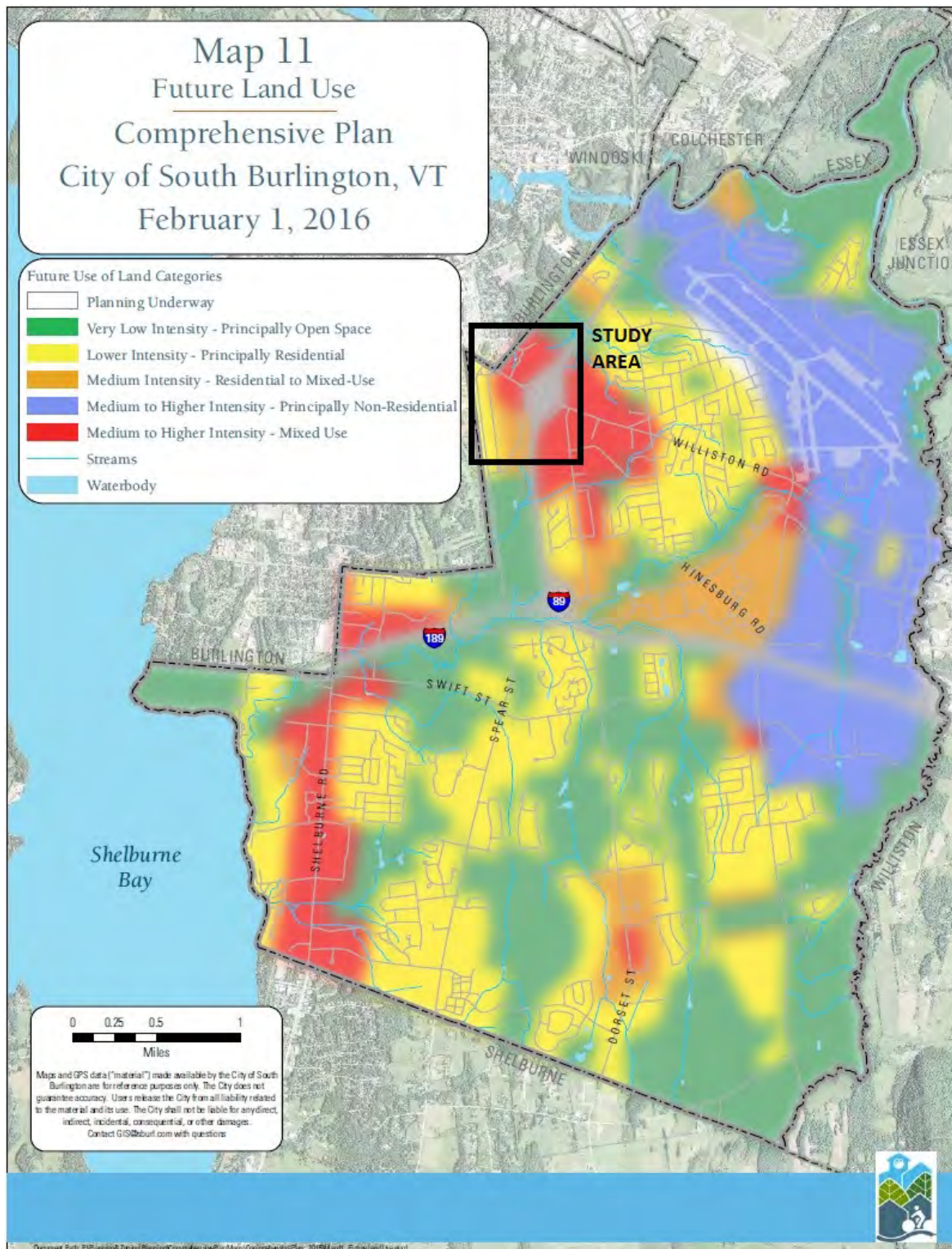


Figure 3 Future Land Use (Future land use map from City of South Burlington, 2016)

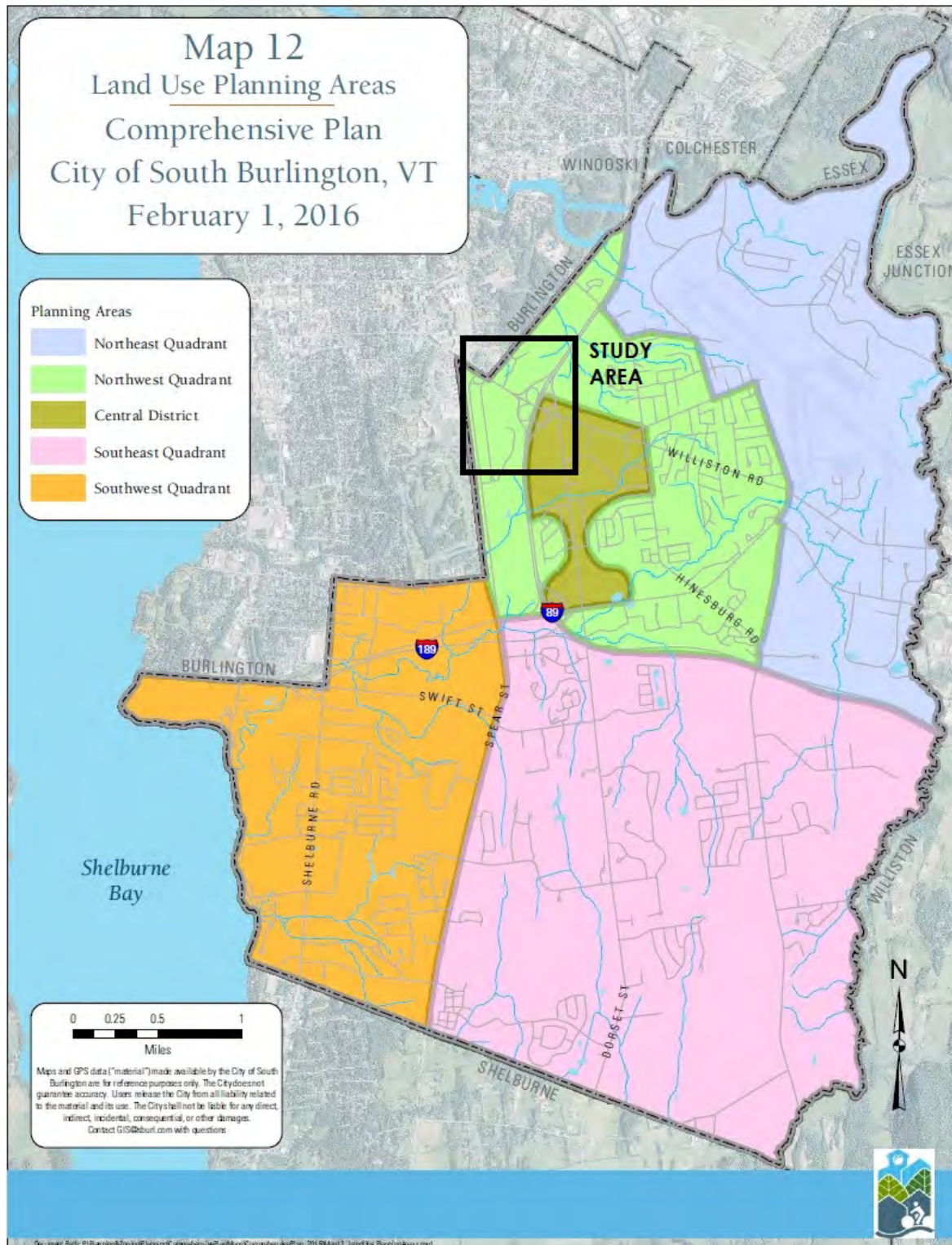


Figure 4 Land Use Planning Areas

3.2.3 Zoning

Zoning, which controls future land development, for the study area is depicted in Figure 5 (Zoning data from City of South Burlington Land Development Regulations, 2016). The areas on all four corners adjacent to the interchange are in the Form Based Code District Transect Zone 4 (FBC T-4). Form base code zoning emphasizes the form of a building rather than the use. This zone can contain residential or commercial uses, generally a minimum of two stories and a maximum of four, and has no density limit. The land along Market Street just to the southeast of the interchange is zoned as Form Based Code District Transect Zone 5, the most intense development zone in this District. This zone allows for buildings up to six stories, where the first story must be non-residential. It also has no density limit. The area to the far southwest of the interchange is zoned principally for residential use. This includes neighborhoods along the eastern side of Spear Street, both sides of East Terrace, and Quarry Hill Road. The land in the far northeast portion of the study area is also zoned for residential use, along Patchen Road and White Street. Land north and west of the interchange, along the border with the City of Burlington, is zoned for commercial and residential use. Land along the west side of the study area, along the eastern edge of the UVM campus, is zoned for institutional and agricultural use. The I-89 Exit 14 interchange itself is located within the Interstate Highway Overlay District.

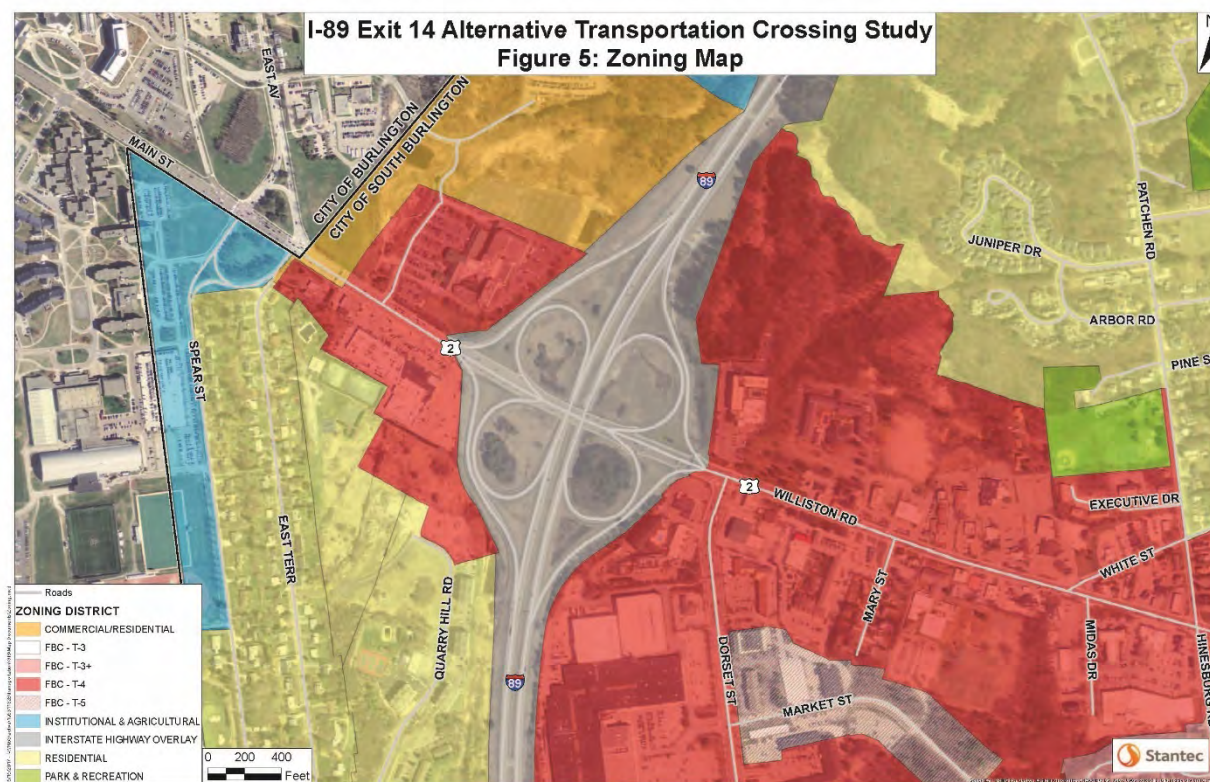


Figure 5 Zoning Map

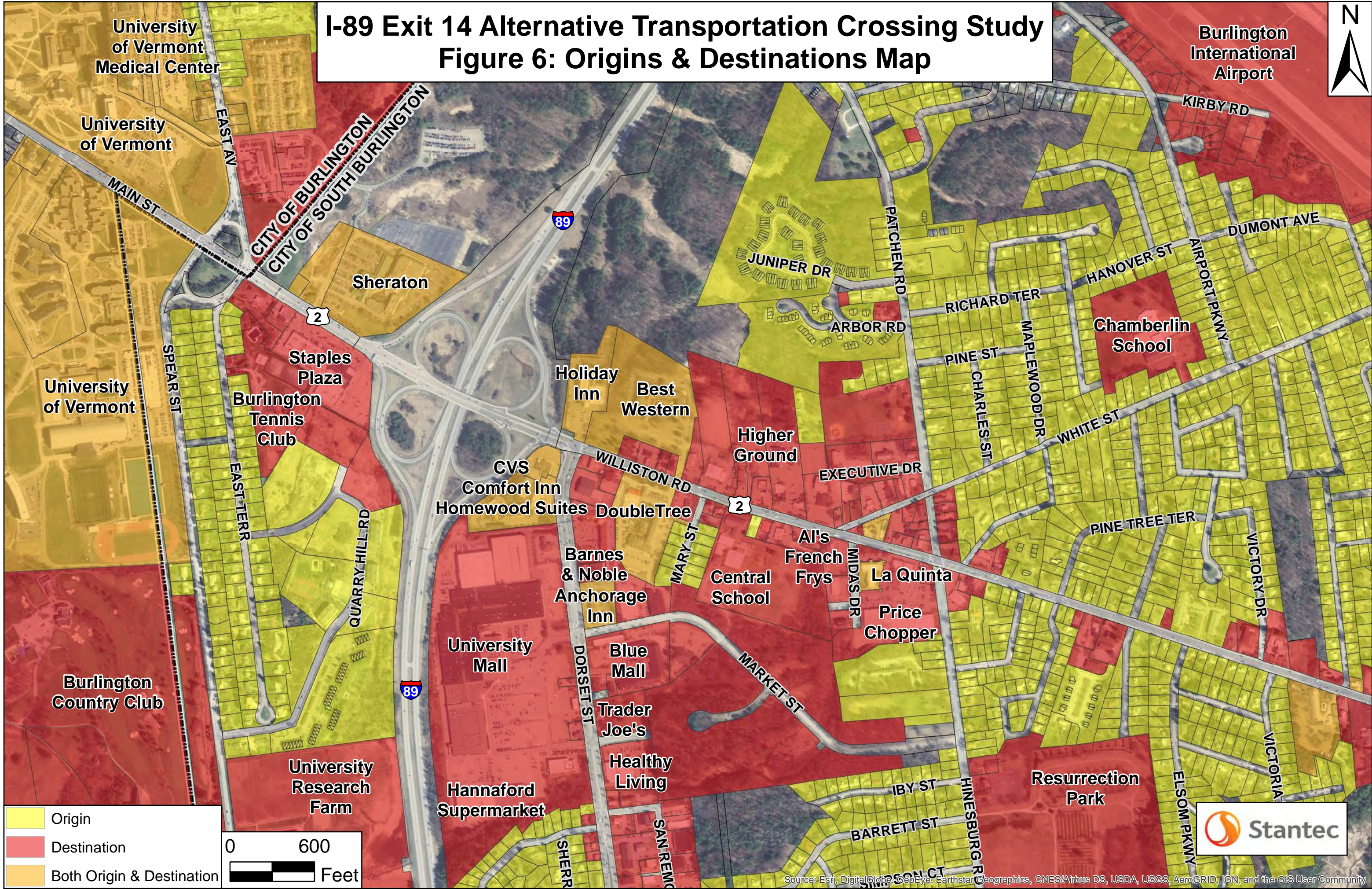
3.3 ORIGINS & DESTINATIONS

Figure 6 displays origins, destinations, and locations that are both, in the immediate study area. These designations were determined based upon initial review of land uses in the vicinity using data from the City of South Burlington (2016), the City of Burlington (2015), and Google Maps (2016). Residential locations are shown as origins. Businesses and employers are shown as destinations. Hotels, and the University of Vermont are shown as both origins and destinations, as some people may be lodging at these locations, while others may be employed there.

One of the state's largest conference centers is adjacent to and west of Exit 14 in the hotel currently operated as a Doubletree. Within the business district adjacent to the interchange there are approximately 175 businesses (among them over fifty smaller retailers, five grocery stores of which three are large format, three department stores, two pharmacies, 22 in the food service industry, 46 in the service industry, five banks, two government service offices, 19 medical establishments, and seven hotels operating over 1200 rooms). Just outside the Study Area and within a one-mile radius are the University of Vermont and UVM Medical Center, two of the largest employers in the State, as well as Champlain College. There are 4,664 dormitory units located within one mile of the interchange. UVM's basketball and hockey fieldhouse and gymnasium, used for public events throughout the year are within a half mile, as is Higher Ground, the state's largest multi-stage indoor live music venue. Two elementary schools (Chamberlin and Rick Marcotte Central elementary schools, each K-5) are within the one-mile radius, and the City's middle and high schools are just outside the one-mile radius. In addition to the dormitory units, there are also 2,727 residential units within one mile.

I-89 Exit 14 Alternative Transportation Crossing Study

Figure 6: Origins & Destinations Map



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3.4 DEMOGRAPHICS

The demographic information here provides background information about the population living and working within walking and biking distance from the Exit 14 bridge.

Table 1 shows the number of workers living and working within one mile and five miles of the current bridge crossing I-89 at Exit 14, and statewide, based on data from the U.S. Census Bureau's mapping application, OnTheMap (2014). There are far more workers that work within both one and five miles, than the number of workers that live within both one and five miles, indicating many workers commute to this area for work. The number of workers working within five miles represents over one quarter of Vermont workers statewide.

Table 1 – Number of Workers by Home and Work Locations (2014)

	Home Location	Work Location
1 Mile Radius	3,165	11,137
5 Mile Radius	44,303	82,100
Statewide	300,627	299,342

I-89 EXIT 14 ALTERNATIVE TRANSPORTATION CROSSING SCOPING STUDY

Figure 7 shows the relative density of workers by home location, within one mile of the current bridge crossing I-89 at Exit 14, based on data from the U.S. Census Bureau's mapping application, OnTheMap (2014). Research indicates most walking trips are within one mile, and walkability measures often consider one mile as a reasonable bound for making a trip by foot¹. The map shows workers by residence concentrated in three main areas: west of the interchange on the UVM campus, representing student workers; east of the interchange, north of US Route 2, in the residential neighborhoods between Patchen Road and White Street; and southeast of the interchange, among the residential neighborhoods on either side of San Remo Drive.

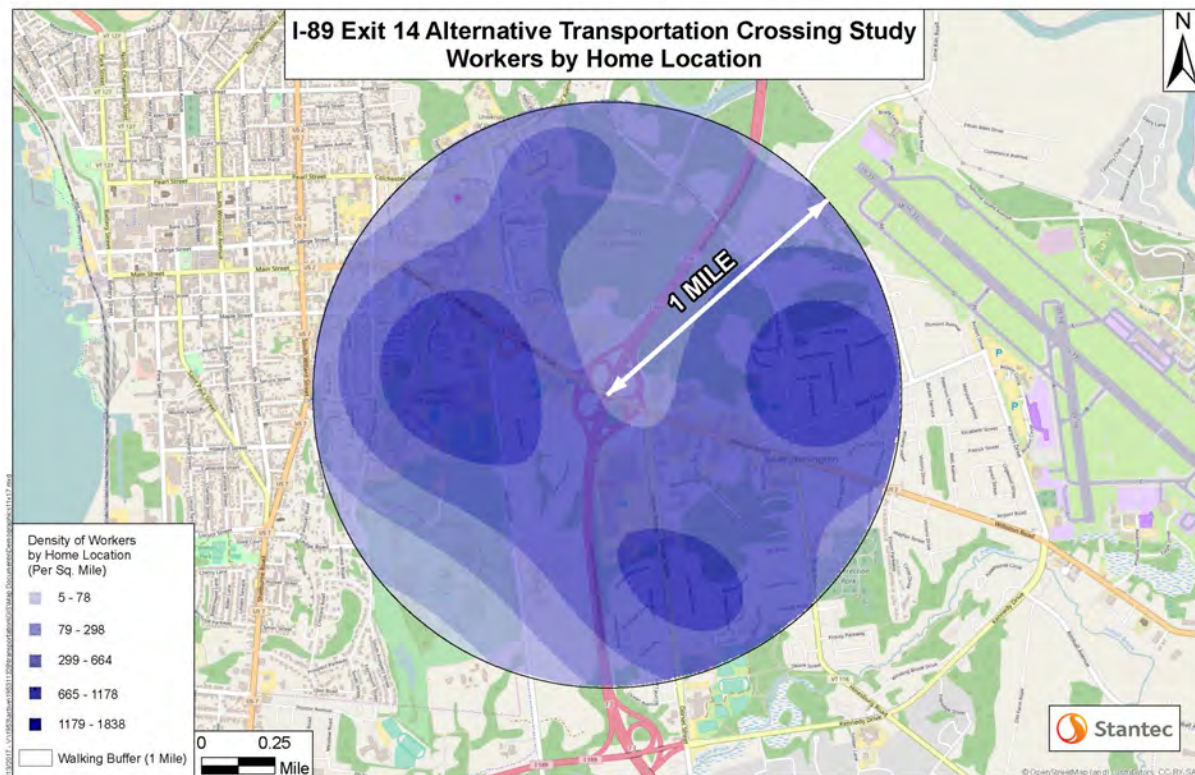


Figure 7 Workers by Home Location (1 Mile Radius)

¹ Dill, Jennifer. "Measuring network connectivity for bicycling and walking." 83rd Annual Meeting of the Transportation Research Board, Washington, DC. 2004; Cortright, Joe. "Walking the walk: How walkability raises home values in US cities." (2009).

I-89 EXIT 14 ALTERNATIVE TRANSPORTATION CROSSING SCOPING STUDY

Figure 8 shows the relative density of workers by home location, within five miles of the current bridge crossing I-89 at Exit 14. Travel research indicates most bicycle trips are within five miles². The map shows workers by residence concentrated in residential areas of Burlington, South Burlington, Winooski, Colchester, Essex and Williston.

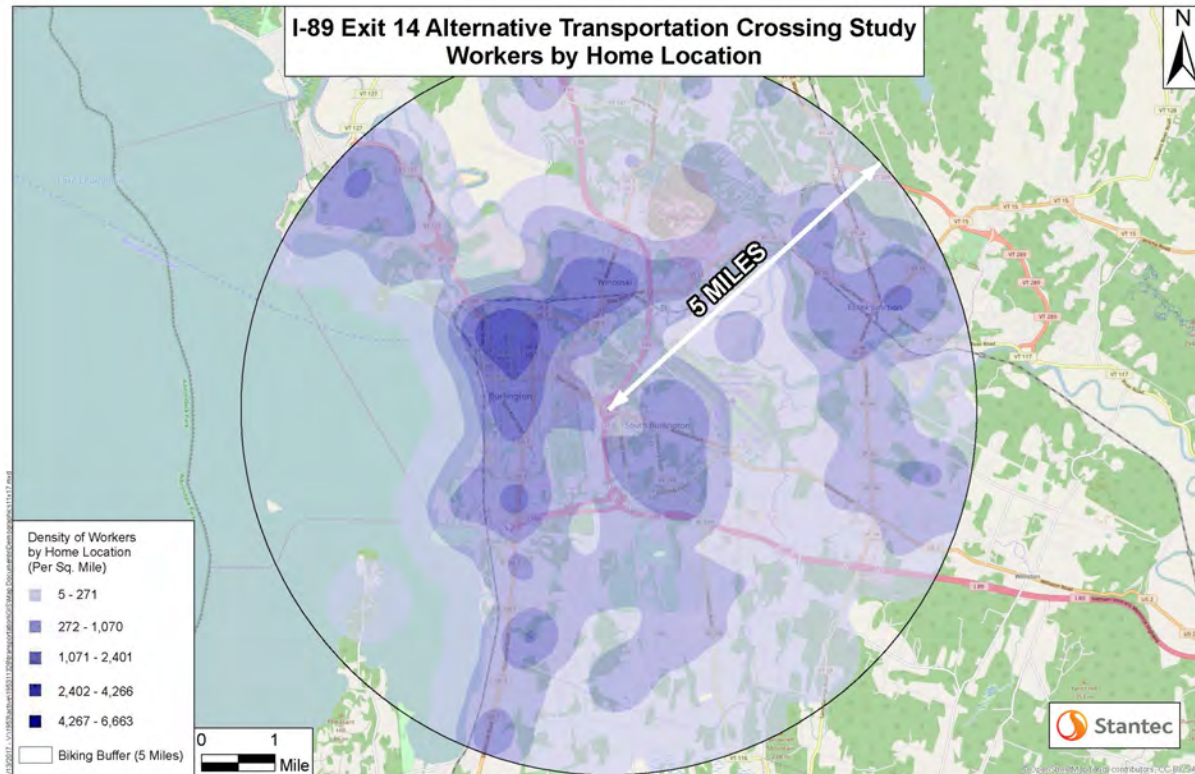


Figure 8 Workers by Home Location (5 Mile Radius)

² Dill, Jennifer. "Measuring network connectivity for bicycling and walking." 83rd Annual Meeting of the Transportation Research Board, Washington, DC. 2004.

I-89 EXIT 14 ALTERNATIVE TRANSPORTATION CROSSING SCOPING STUDY

Figure 9 shows the relative density of workers by work location, within one mile of the current bridge crossing I-89 at Exit 14. It shows workers by work locations concentrated in two main areas: west of the interchange near UVM and the UVM Medical Center; and in the commercial area southeast of the interchange and south of US Route 2.

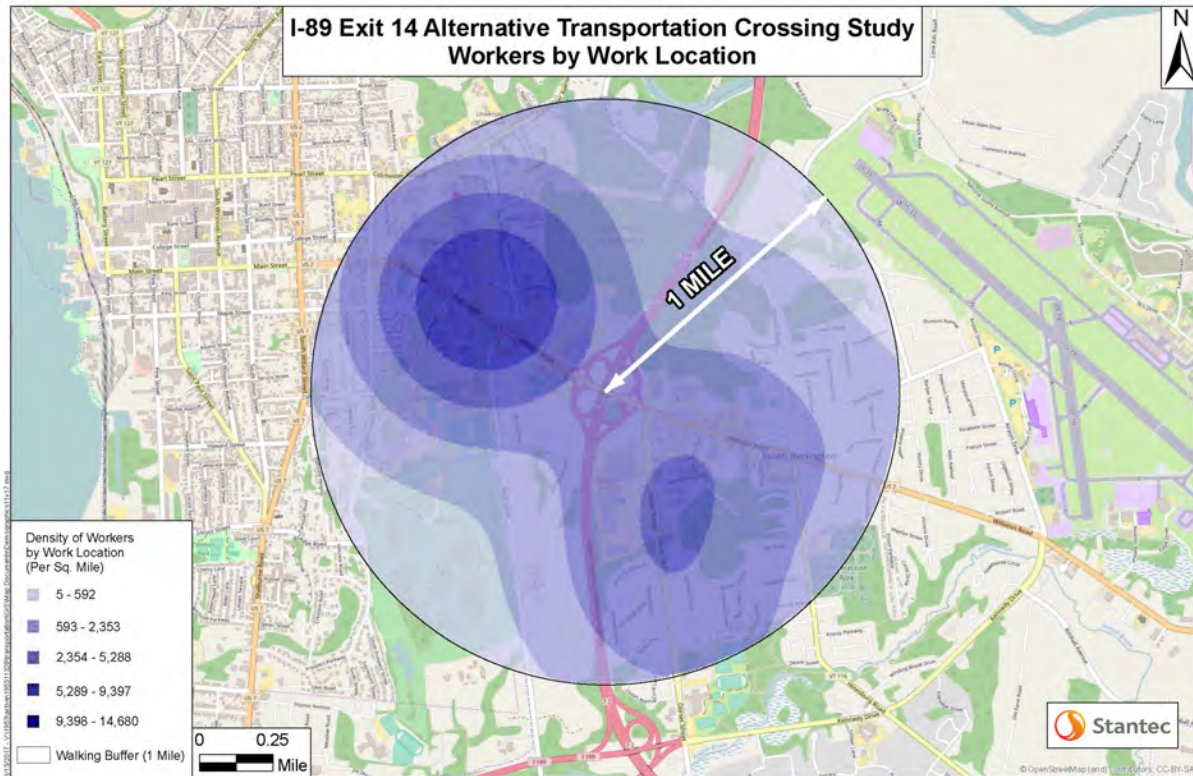


Figure 9 Workers by Work Location (1 Mile Radius)

I-89 EXIT 14 ALTERNATIVE TRANSPORTATION CROSSING SCOPING STUDY

Figure 10 shows the relative density of workers by work location, within five miles of the current bridge crossing I-89 at Exit 14. It shows workers by work locations clustered in Burlington, South Burlington, Colchester, Essex, and Williston.

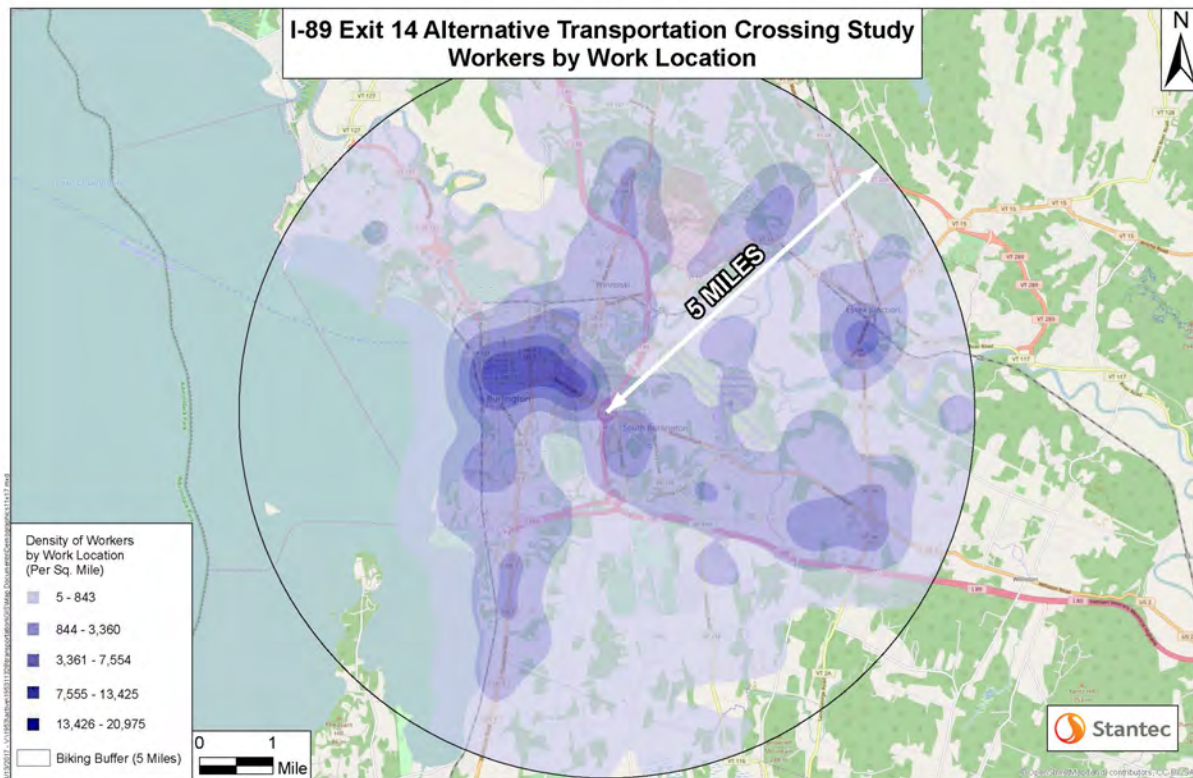


Figure 10 Workers by Work Location (5 Mile Radius)

I-89 EXIT 14 ALTERNATIVE TRANSPORTATION CROSSING SCOPING STUDY

Table 2 shows the number of workers by income level living and working within one mile or five miles of the current bridge crossing I-89 at Exit 14, and statewide, based on data from the U.S. Census Bureau's mapping application, OnTheMap (2014). Over half of workers living or working within one or five miles make less than \$40,000 annually.

Table 2 – Distribution of Worker Income Levels

Monthly Income	Number of Workers					
	Home Location			Work Location		
	1 Mile Radius	5 Mile Radius	Statewide	1 Mile Radius	5 Mile Radius	Statewide
\$1,250 or less	838	11,040	79,433	2,435	17,657	80,915
\$1,251 to \$3,333	944	14,172	101,595	3,251	24,590	101,542
More than \$3,333	1,383	19,091	119,599	5,451	39,853	116,885
Total	3,165	44,303	300,627	11,137	82,100	299,342

I-89 EXIT 14 ALTERNATIVE TRANSPORTATION CROSSING SCOPING STUDY

Table 3 shows the number of workers by race who live and/or work within one mile or five miles of the current bridge crossing I-89 at Exit 14, based on data from the U.S. Census Bureau's mapping application, OnTheMap (2014). Most workers living and working within both one and five miles are White Alone, similar to the statewide distribution. Over 200 workers who are not White Alone live within one mile of the bridge, while about 3,400 workers who are not White Alone live within five miles of the bridge.

Table 3 – Distribution of Worker Race

Race	Number of Workers					
	Home Location			Work Location		
	1 Mile Radius	5 Mile Radius	State-wide	1 Mile Radius	5 Mile Radius	State-wide
White Alone	2,942	40,913	289,535	10,503	77,803	288,638
Black or African American Alone	71	1,231	3,584	230	1,409	3,380
American Indian or Alaska Native Alone	10	139	1,111	44	272	1,064
Asian Alone	101	1,491	3,664	247	1,794	3,609
Native Hawaiian or Other Pacific Islander Alone	1	20	126	7	39	118
Two or More Race Groups	40	509	2,607	106	783	2,533
Total	3,165	44,303	300,627	11,137	82,100	299,342

3.5 SUMMARY OF STATE, REGIONAL, AND LOCAL PLANS AND STUDIES

Several recent plans, studies and policy documents have been completed, or are currently underway, that are relevant to this study for alternative transportation crossing improvements of I-89 near Exit 14. Many of these studies recognize the barrier that I-89 presents within the community and recommend some type of improvement be pursued. The studies are identified below with relevant outcomes described.

3.5.1 South Burlington Comprehensive Plan, 2016

The South Burlington Comprehensive Plan is the result of an extensive five-year planning effort with collaboration and substantial input from many stakeholders, including numerous public and private organizations, individuals, and the public. The policy framework includes a special emphasis on pedestrian and bicycle connectivity, among other quality of life considerations. The City, through their Comprehensive Plan, recognizes the need for a safer, more efficient crossing of I-89 to connect the University of Vermont Campus and neighborhoods located on the west side to the existing and planned development on the east side. This project is summarized in the City's comprehensive plan on Page 2-68 as Proposed Transportation Improvement #4 – I-89 Bicycle Pedestrian Bridge. It calls for the need for analysis and potential construction of a bicycle and pedestrian bridge over I-89 near Exit 14.

The Plan identifies the need for changes to the City's transportation system to better support walking, biking, transit, and greater connectivity.

Pedestrian and bicycle circulation are listed first among Future Needs and Trends for transportation in the Plan. The complete streets approach to planning and implementing for the safe accommodation of walking and cycling is acknowledged as imperative. The need for separate or shared facilities for walking and biking along arterial streets is emphasized, with special mention of this need along the Williston Road corridor.

The Williston Road corridor will continue to provide an important interface of residential neighborhoods and transportation arteries, serving several purposes, while accommodating some of the highest traffic volumes in the State.

Alternative transportation crossing improvements of I-89 will complement other potential future connections in the City, including proposed improved bicycle and sidewalk connections along Williston Road, grid streets which create smaller block sizes, a new street north of Williston Road and a new street south of Williston Road, between Hinesburg Road/Patchen Road and Dorset Street intersection.

3.5.2 South Burlington Official Map (2016)

The Official Map is a regulatory tool to reserve land and establish improvements during the land development process. A bicycle/pedestrian bridge over I-89, just south of Williston Road, has been on the City's Official map (Figure 11) since 2004.

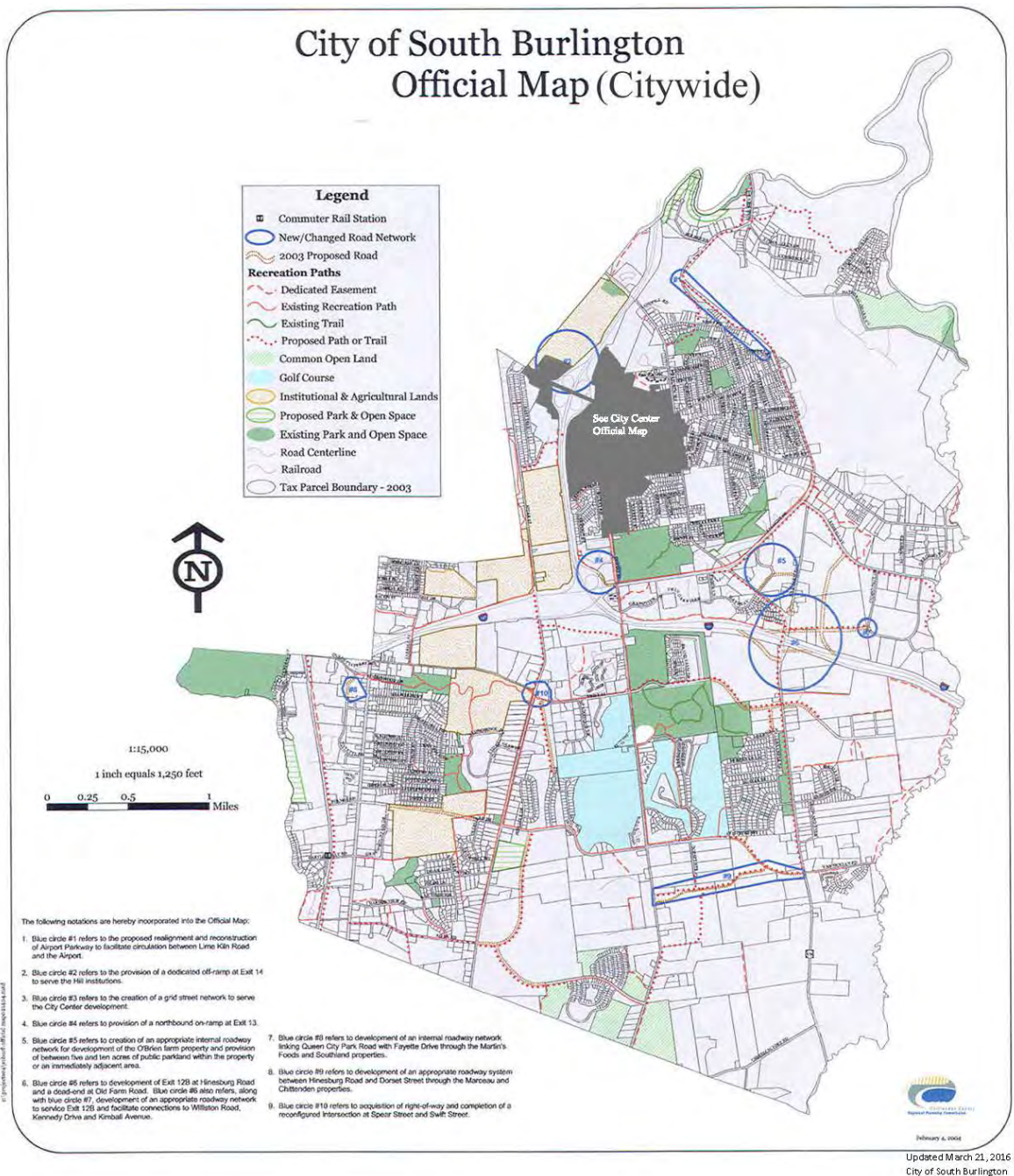


Figure 11 City of South Burlington Official Map (2016)

3.5.3 South Burlington TIF District Plan, 2012

The Tax Increment Financing (TIF) District Plan, adopted by the City and approved by the Vermont Economic Progress Council, identifies the bicycle pedestrian bridge from the City Official Map, and describes the need and funding for the project. TIF District Funds are planned to finance preliminary engineering, while other funding sources will be sought to complete engineering, permitting, and construction.

3.5.4 South Burlington TIF Financing Plan, 2015

The TIF Financing Plan, adopted by the City and approved by the Vermont Economic Progress Council, provides an updated cost estimate for an alternative transportation crossing. The plan estimates the project to cost between 10 and 13.6 million dollars, with expectations that the City would use TIF District increment to cover 30% of project costs. Potential funding sources for the remaining costs are identified, including the Surface Transportation Program, the National Highway Performance Program, and Transportation Investment Generating Economic Recovery (TIGER) grants.

3.5.5 South Burlington Capital Improvement Program

The City annually updates a Capital Improvement Program (CIP) to plan for capital expenditures and the next year's budget. The Pedestrian/Bicycle Bridge over I-89 in the vicinity of Williston Road has been included in the CIP since 2013 (Fiscal Years 2014-2023) and is included in the current year CIP (Fiscal Years 2018-2027).

3.5.6 Chittenden County Active Transportation Plan, 2017

The recently updated Chittenden County Active Transportation Plan (ATP), serving as the active transportation element of the CCRPC Metropolitan Transportation Plan, promotes the implementation of a well-connected, county-wide network of low-stress pedestrian and bicycle facilities, attractive for users of all ages and abilities. The proposed regional active transportation network was developed with extensive public participation, including an online wikimap, public design charrettes, and online comments. A wikimap is an online web map that allows the community to provide input, specifically about the transportation network in this case.

The study fostered public contributions to specify unofficial network connections, desired routes, and high priority roadways for pedestrian and bicycle improvements. Relevant to this study, bridges and the I-89 interchanges across the County were identified as a top bicycling issue. Design charrette participants identified US Route 2 at the I-89 Exit 14 interchange as a location they saw as a barrier to walking.

The regional network analysis acknowledges strong pedestrian networks within village centers and downtown areas, and focused more on the bicycle network at a regional scale. Roadway network segments were categorized per the level of stress associated with cycling along that

segment, related to the type of bicyclist that the segment is adequate for. This process used the Level of Traffic Stress (LTS) model, assigning roadway segments into one of three categories (LTS 1 through LTS 3) displayed in Table 4.

Table 4: Levels of Traffic Stress

Level of Traffic Stress	Bicyclists	Route Types
LTS 1	All bicyclists	Shared paths
LTS 2	Some “Interested but Concerned” bicyclists	Low stress routes: Low traffic volumes, slow speeds, and/or bike lanes
	All “Casual and Somewhat Confident” bicyclists	
LTS 3	“Experienced and Confident” bicyclists	High stress routes: Little to no separation from high volume and/or high-speed traffic

The portion of US Route 2 within the vicinity of I-89 Exit 14 is ranked in the analysis as a high stress route segment (LTS 3). Many high stress segments that were identified are important connections between origins and destinations identified through the analysis, reflected in their high traffic volume. For many pedestrians and bicyclists, the high stress routes are barriers to travel, as identified for Exit 14 by public input. The ATP recommends making these segments safer and more accessible for pedestrians and bicyclists.

Recommendations from the ATP address segments for further study, without specifying what type of facility to implement for most segments. The ATP does acknowledge that facilities with more separation from motor vehicle traffic should be prioritized where feasible to extend the network to the most users.

Long term capital improvement projects identified by the ATP include a recommendation to study alternatives for the I-89 Exit 14 Interchange, like a bicycle and pedestrian bridge.

3.5.7 VTrans On-Road Bicycle Plan: Phase 1 Report, 2016

This first phase of a state-wide comprehensive improvement plan classified potential opportunities to improve bicycle facilities along state routes, based on current and potential use. This phase ranked state route segments by level of current and potential bicycle use, determined through analysis of data for land use, bicycle access, and extensive public input by way of a diverse stakeholder committee, StravaMetro data, a wikimap, three statewide

meetings, and email comments. The product of Phase 1 is the VTrans Bicycle Corridor Priority Map. The map shows US Route 2 through Chittenden County as “High Use / High Priority”.

3.5.8 Williston Road Network Transportation Study, 2017

This study, undertaken through the CCRPC, recommends potential improvements to Williston Road and vicinity between Dorset Street and Hinesburg/Patchen Road intersections to build transportation capacity. Along with other solutions, the study looked at possible bicycle and pedestrian facility improvements, which would provide improved connectivity and capacity within the I-89, Exit 14 study area. The study recommends a separated bicycle facility and sidewalk buffered from vehicular traffic with landscaping and streetscape amenities on the south side of Williston Road from Dorset Street to Midas Drive and connects with a similar facility currently in engineering, between Midas Drive and Hinesburg/Patchen Road. The City of South Burlington recently received grant funding for design and partial construction of this facility.

3.5.9 US Route 2 Corridor Transportation Management Plan, 2007

The plan covers the 7.5 miles along the US Route 2 corridor, between South Willard Street in Burlington, to North Williston Road in Williston, with recommendations for highway, transit, bicycle and pedestrian facility, and streetscape improvements. Funding came from the Chittenden County Metropolitan Planning Organization (CCMPO). The first part of the plan presents existing conditions, public input, a Vision Statement and Goals, and traffic analysis projected to the year 2030, using multiple scenarios. Existing conditions include a detailed inventory of on-road bicycle facilities and shared use paths. The second part presents recommendations for projects to be implemented in the short- (1-5 years) and medium-term (5-10 years), with a long-term (more than 20 years) plan to expand the current bicycle and pedestrian network, and reconstruct the roadway cross section and major corridor intersections. Costs, project responsibility, and next steps for implementation are addressed. The plan identifies the I-89 Exit 14 interchange as a primary intersection. Figure 12 displays the roadway cross-section of the Exit 14 bridge.

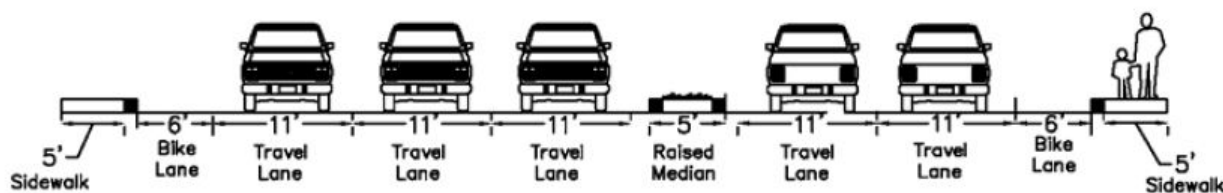


Figure 12 Cross-section of I-89 Exit 14 Bridge (US Route 2 Corridor Transportation Management Plan, 2007)

The plan identifies two gaps in the regional bicycle network along US Route 2: a large gap between Exit 14 and VT 2A, and a small gap between Exit 14 southbound ramps and the eastern terminus of the Main Street bike lane at Beaumont Avenue. Beaumont Avenue enters the UVM campus from Main Street, just west of the jughandle at East Avenue. The plan notes the small

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gap covers a significant link between the bicycle and pedestrian trip-generating UVM campus, and the destinations for employment and shopping along Dorset Street and Williston Road, east of Exit 14. The plan identifies the Exit 14 bridge among locations to better accommodate the mixture of traffic from motor vehicles, bicycles, and pedestrians. Public comments include suggestions to provide an alternative connection over I-89 for walking and biking, either a bridge or gondola.

Goals listed in the plan include “closing gaps in the existing bicycle and pedestrian system, providing safe connections and minimizing dangerous conflicts between modes.”

The bridge over I-89 at Exit 14 is recognized as “one of the most challenging locations for all cyclists”. Long-term strategies and recommendations from the plan include a route comprised of on- and off-road facilities, connecting the Staples parking lot to a new bridge over I-89 towards University Mall (Figure 13). The bridge would be for transit and non-motorized travel, to accommodate walking and biking.

Figure 46: Bicycle Network Recommendations

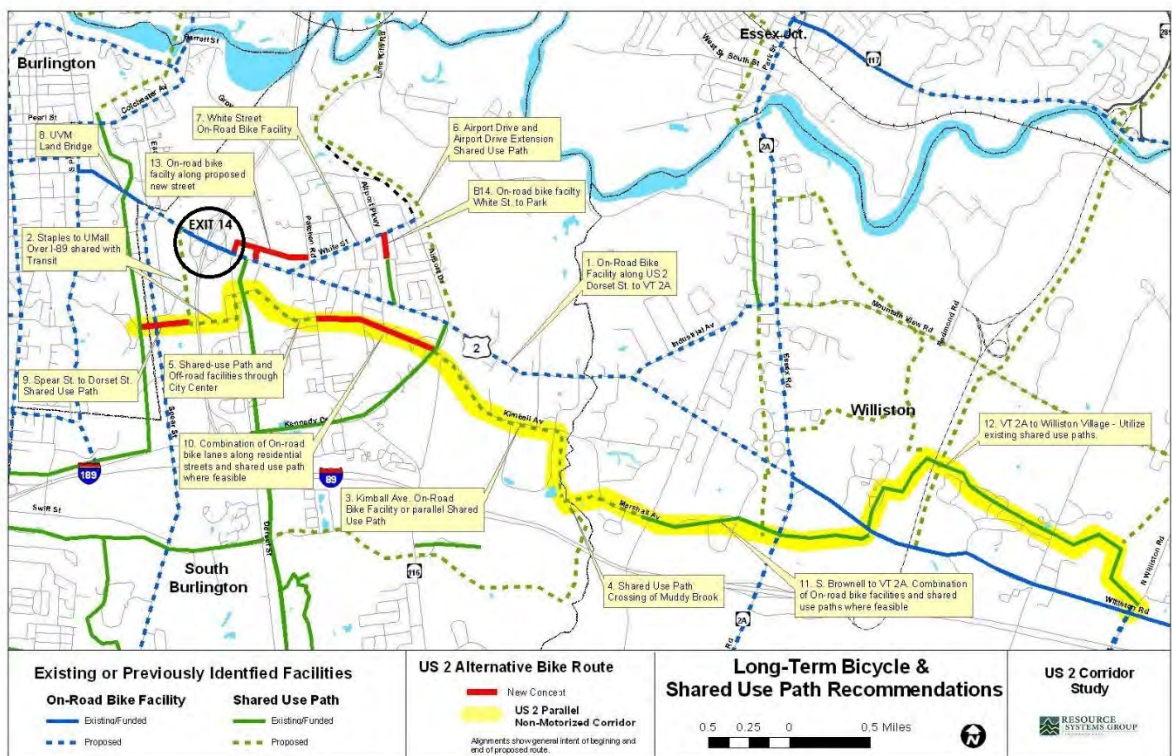


Figure 13 Bicycle Network Recommendations (US Route 2 Corridor Transportation Management Plan, 2007)

The Implementation Plan for US Route 2 Alternative Non-Motorized Route includes the shared use path and new bridge over I-89 (to be shared by pedestrians, bicyclists, and transit), connecting Staples Plaza to University Mall / Dorset Street, as a long-term implementation (more than 10 years). As the plan was developed in 2007, the 10-year timeframe is approaching. Potential funding sources identified included the VTrans Bicycle and Pedestrian program, Transportation Enhancement (currently called Transportation Alternatives) program, Local match, and developers. The City of South Burlington is identified as the project lead, with potential partners being Chittenden Area Transportation Management Association (CATMA), VTrans, Federal Highway Administration (FHWA), and owners of Staples Plaza, University Mall, etc. Next steps for the project are listed as (1) Identify connection on City's Official Map (done); (2) Conduct Conceptual Alignment Study; and (3) Include in conceptual alignment study with Staples-Dorset Connection.

3.5.10 City of Burlington PlanBTV: Walk Bike, 2016

The City of Burlington developed this plan for improving walking and bicycling. A wikimap was populated with public input. Even though the study was completed for the City of Burlington, comments were made on the wikimap regarding the need for safer bicycle and pedestrian routes within the vicinity of the I-89, Exit 14 interchange.

3.5.11 Mobility, Communication, and Place: *Navigating the Landscapes of Suburban U.S. Teens*

This study by Meghan Cope & Brian H. Y. Lee (2016) published in the *Annals of the American Association of Geographers* (vol 106, no. 2, p 311-320) compares relationships between information and communication technology (ICT), social networks, the built environment, and travel behavior of students from South Burlington High School and Champlain Valley Union High School. Results indicate South Burlington High School Students are nearly five times more likely to walk or bike to school. This is related to the more robust network of non-motorized transportation infrastructure in the surrounding area.

3.5.12 CATMA Employee and Student Survey (2014 & 2016)

The mission of the Chittenden Area Transportation Management Association (CATMA) is “to plan and manage safe, convenient, and economical parking and transportation in ways that better coordinate land use and reduce environmental impacts on the community.” The goals of CATMA include planning and developing multimodal transportation systems, along with transportation systems management (TSM) programs, using transportation demand management (TDM) methods. CATMA’s efforts to date have brought about substantial reductions in single occupancy vehicle (SOV) trips to member campuses (Champlain College, University of Vermont Medical Center, and University of Vermont (UVM)). To accomplish this, CATMA uses workplace TDM methods including incentives for employees to walk, bike, carpool, ride transit, telecommute, use flex-time, and provide feedback about their experiences.

An Unlimited Access Program provides unlimited transit rides through Green Mountain Transit (GMT) for UVM and Champlain College employees and students. Other participating institutional members have access to discounted transit passes. Participating members get a confidential carpool matching service, guaranteed ride home by taxi in case of emergency, and quarterly drawings for local gift certificates. CATMA maintains strong educational and outreach efforts.

CATMA administers biennial transportation surveys to help measure its TDM programs’ success. Surveys include employees of all CATMA member institutions during the fall, and students from Champlain College and UVM during the spring. Survey data has shown a persistent reduction in SOV mode share among employees, with similar shifts in students.

Among Champlain College students in 2014, 2/3 of survey respondents living on campus reported walking or biking as their primary mode, and nearly ¾ of respondents living within ½ mile of campus reported walking or biking as their primary mode (Table 5). Among UVM students in 2014, about 70% of survey respondents living either on campus or within ½ mile of campus reported walking or biking as their primary mode.

Table 5: CATMA 2014 Student Spring Transportation Survey Primary Mode (CATMA, 2014)

CHAMPLAIN COLLEGE							
Typical Commute (Resident Students)							
Drive Alone	Bike/Walk	GMT Bus	Carpool/Vanpool	Shuttles	Other	No Primary Mode	Total
1%	66%	2%	0%	30%	1%	n/a	100%
Primary Commute (Within ½ mile)							
Drive Alone	Bike/Walk	GMT Bus	Carpool/Vanpool	Shuttles	Other	No Primary Mode	Total
10%	73%	2%	0%	5%	0%	10%	100%
Primary Commute (Outside ½ mile)							
Drive Alone	Bike/Walk	GMT Bus	Carpool/Vanpool	Shuttles	Other	No Primary Mode	Total
42%	13%	5%	4%	12%	0%	25%	100%
UNIVERSITY OF VERMONT							
Typical Commute (Resident Students)							
Drive Alone	Bike/Walk	GMT Bus	Carpool/Vanpool	Shuttles	Other	No Primary Mode	Total
1%	70%	3%	0%	23%	2%	n/a	100%
Primary Commute (Within ½ mile)							
Drive Alone	Bike/Walk	GMT Bus	Carpool/Vanpool	Shuttles	Other	No Primary Mode	Total
5%	68%	2%	1%	3%	0%	21%	100%
Primary Commute (Outside ½ mile)							
Drive Alone	Bike/Walk	GMT Bus	Carpool/Vanpool	Shuttles	Other	No Primary Mode	Total
42%	16%	17%	4%	1%	1%	20%	100%

Among CATMA employee survey respondents from Chittenden County institutions, the share of those walking or biking as their commute mode doubled from 2000 to 2014 (Table 6). The share of employee survey respondents from “Hill” institutions (UVM, UVM Medical Center Main Campus, UVM Medical Center at 1 Prospect Street, and Champlain College) walking or biking as their commute mode stayed about the same between 2003 and 2014.

Table 6: CATMA Employee Fall Transportation Survey Commute Mode (CATMA, 2014)

Commute Mode, Chittenden County Institutions		
	2000	2014
Drive Alone	74%	61%
Carpool	12%	13%
Bus	2%	8%
Bike/Walk	5%	11%
Tele-Commute	-	0%
Park & Ride	-	3%
Bike & Bus	-	1%
Train	4%	0%
Other	3%	4%
	100%	100%

Commute Mode, “Hill” Institutions		
	2003	2014
Drive Alone	65%	57%
Carpool	11%	14%
Bus	5%	9%
Tele-Commute	14%	13%
Park & Ride	0%	0%
Bike & Bus	-	3%
Train	-	1%
Other	6%	4%
	100%	100%

**Have not yet received*

3.6 TRANSPORTATION FACILITIES

Figure 14 displays current transportation facilities in the study area, described in the following subsections.

3.6.1 Bicycle Facilities

Existing bicycle facilities crossing I-89 along US Route 2 consist of bike facilities for both eastbound and westbound directions. The western terminus of these bike facilities (a mix of lanes and off-road) is University Heights/ Carrigan Drive at Main Street (US Route 2) (approximately 0.6 miles west of I-89). The eastern terminus of the eastbound bike facility is the I-89 northbound off-ramp exit (Exit 14E). The eastern terminus of the westbound bike lane is approximately 35 feet west of the entrance to the Holiday Inn.

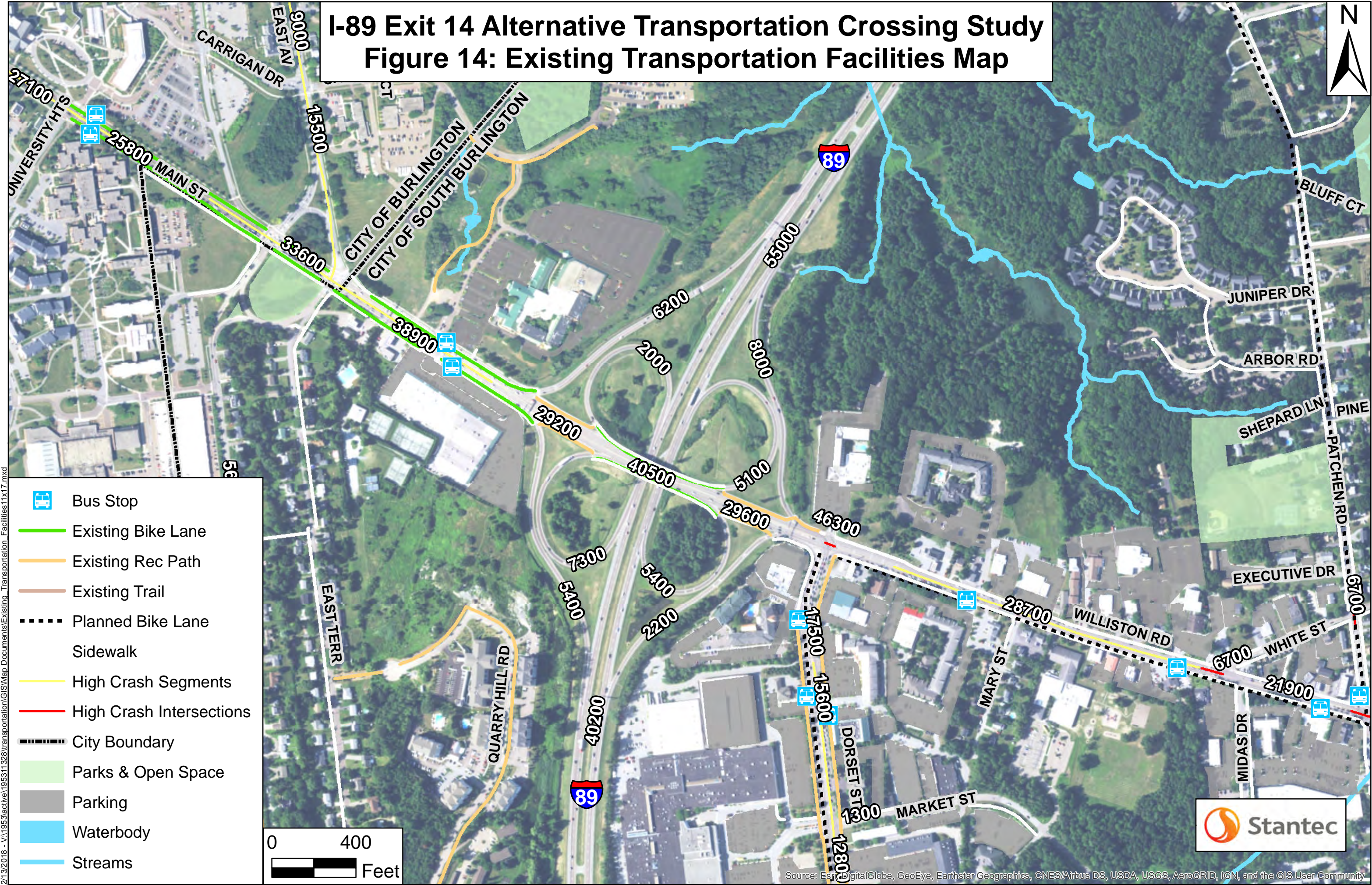
The westbound bike lane does not extend through the East Avenue junction forcing bicyclists to either ride in a travel lane or use the sidewalk. Both options present challenges. The first option requires competing for lane space with motor vehicles that may be making a right turn and the second requires leaving the roadway and does not provide a smooth transition back to the roadway.

Dorset Street has a separated bike path on each side of the road extending south beyond the study area. The northern terminus of the path on the west side of Dorset Street is the curb cut for CVS, approximately 300 FT south of US Route 2. The northern terminus of the path on the east side of Dorset Street is the stop bar for the NB approach of the intersection with US Route 2. This path connects with a separated path along Kennedy Drive and to other parts of the City recreational path network.

Planned bicycle infrastructure projects that are in, or about to be in, preliminary engineering include a buffered bicycle facility on the south side of Williston Road from Dorset Street to Hinesburg Road and a shared use path along Market Street.

3.6.2 Pedestrian Facilities

Existing pedestrian facilities include sidewalks crossing I-89 along both sides of US Route 2. The sidewalks continue along both sides of the roadway extending to downtown Burlington to the west, and past Kennedy Drive to the east. Signalized intersections along US Route 2 within the vicinity of I-89 have crosswalks and pedestrian phasing on most approaches. In addition, there are crosswalks on all I-89 ramp intersections with US Route 2 and two of these ramps are signalized with pedestrian phasing (southbound Exit 14 onto westbound US Route 2 and northbound Exit 14 onto eastbound US Route 2). The remaining six ramps have signage for motorists indicating pedestrian and bicycle use of these crosswalks. Dorset Street has sidewalk on both sides of the street through the study area.



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3.6.3 Motor Vehicle Facilities and Intersections

Williston Road - US Route 2 is an urban principal arterial. There are six travel lanes on US Route 2 crossing I-89 the outermost of which mainly serve as on and off ramps for I-89 and right turn lanes for Dorset Street, East Terrace, Spear Street and Staples Plaza. Immediately east of I-89, US Route 2 reduces to four travel lanes, continuing as four lanes for approximately 0.8 miles to Patchen Road/Hinesburg Road. To the west of I-89, US Route 2 continues as six lanes for approximately 0.3 miles to East Avenue/East Terrace. It drops to five lanes through the jughandle at East Terrace and Spear Street and it continues with four lanes west of Spear Street/East Avenue. The western terminus of this four-lane section is approximately 0.9 miles to the west of I-89 at University Place.

3.6.4 Traffic

VTrans estimates the 2013 Annual Average Daily Traffic (AADT) for the section of US Route 2 crossing the bridge over I-89 at Exit 14 to be 40,500 vehicles per day. AADT's for the principal roadways within the study area are shown in Figure 14. AADT's for each of the ramps are displayed in Table 7.

Table 7: 2015 AADT's for I-89 Exit 14 Interchange Ramps

I-89 Interchange	AADT (vehicles/day)
Ramp A – southbound on-ramp from eastbound US2	5,400
Ramp B – southbound off-ramp to eastbound US2	7,300
Ramp C – southbound off-ramp to westbound US2	6,200
Ramp D – southbound on-ramp from westbound US2	2,000
Ramp E - northbound on-ramp from eastbound US2	5,400
Ramp F - northbound off-ramp to eastbound US2	2,200
Ramp G – northbound off-ramp to westbound US2	5,100
Ramp H – northbound on-ramp from westbound US2	8,000

3.6.5 Crash History

High Crash Locations

VTrans maintains a listing of High Crash Locations (HCL) within the state. A 0.3 mile highway segment or intersection must have at least 5 crashes over a 5-year period and the actual crash rate (number of crashes per million vehicles) must exceed a critical crash rate to be classified as an HCL. The critical crash rate is based on the average crash rate for similar highways.

The VTrans High Crash Report: Sections and Intersections 2010-2014³ lists four intersections and five roadway sections as HCLs within the project study area. These are summarized in Table 8 and shown in Figure 14. Nearly the entire US 2 corridor within the study area is listed as a High Crash Location.

Table 8: High Crash Locations Summary 2010-2014

	Name	HCL No.	Mile Marker	AADT	Crashes	Fatalities	Injuries	Actual/Critical Ratio	Severity Index
Intersections	US Route 2 / Dorset St	14	0.490-0.500	40,960	106	0	10	1.813	\$15,756
	US Route 2 / White St	56	0.860-0.880	28,990	57	0	9	1.311	\$20,109
	US Route 2 / Patchen Rd	97	0.990-1.010	29,890	61	0	5	1.367	\$14,930
	Patchen Rd / White St	32	0.080-0.100	12,515	29	0	6	1.544	\$23,997
Segments	US Route 2 (Burlington)	194	0.289-0.589	26,870	147	0	24	1.627	\$20,631
	US Route 2	31	0.558-0.858	28,700	234	0	27	2.443	\$17,167
	US Route 2 (Burlington, S. Burlington)	34	0.689-0.158	30,589	244	1	37	2.407	\$25,585
	East Ave (Burlington)	63	0.000-0.300	8,326	56	0	10	2.152	\$21,559
	Dorset St	11	3.700-4.000	14,475	120	0	11	3.124	\$15,465

³ <http://vtrans.vermont.gov/docs/highway-research>

3.6.6 Transit Service

Transit service through the project area is provided primarily by Green Mountain Transit (GMT), formally Chittenden County Transportation Authority (CCTA). Three local routes use the Exit 14 bridge to provide service connecting downtown Burlington with the University Mall, Burlington International Airport, Williston, and Williston Village. Two regional commuter routes cross the Exit 14 bridge, connecting downtown Burlington with Montpelier and Middlebury. Transit stops in the vicinity of I-89 Exit 14 include two stops just west of the bridge, near the Staples Plaza, and in front of the Sheraton. Three stops are located within the first 1000 feet of Dorset Street, in front of Homewood Suites, People's United Bank, and Barnes & Noble. West of Dorset Street, transit stops are regularly placed along US Route 2 / Williston Road, beginning at the DoubleTree Hotel. Transit stop locations are shown in Figure 14.

The City's Comprehensive Plan reports that the GMT's Williston Road route has some of the highest weekday ridership for their system. This route has been redesigned for direct service between Williston and Burlington by way of US Route 2, the only detour being the University Mall. The route maintains 15-minute headways during peak travel times. These changes resulted from the Route 2 Corridor planning process.

3.7 NATURAL & CULTURAL RESOURCES

A desktop review was completed to identify and characterize wetlands, streams, rare, threatened or endangered (RTE) species, agricultural land, 4(f) and 6(f) public lands, and hazardous waste sites. The Vermont Agency of Natural Resources (ANR) Natural Resources Atlas mapping program⁴ was used to evaluate known natural resources within the Project Areas. Following is a summary of the findings. The full summary is in the appendix.

3.7.1 General Site Description

The study area includes a mixture of developed and undeveloped areas near the I-89 Exit 14 interchange. Developed areas include hotels, shopping malls, apartment buildings and other residences, university facilities and assorted commercial buildings as well as associated roads and parking areas. The undeveloped areas include a mixture of forest, shrub, and grass habitats.

3.7.2 Wetlands and Streams

Per the ANR program, there are Vermont Significant Wetland Inventory (VSWI) wetlands in the far north east of the study area and very possibly wetlands (mapped as "Wetland Advisory Layer") within the project limits. In addition, there are several unnamed streams mapped on the north side of Route 2 within the study area, flowing north toward the Winooski River. (see ANR Wetlands/Streams Figure15). The study area includes one impaired watershed – the Winooski River watershed is impaired for E. coli. The entire area is within Municipal Separate Storm Sewer (MS4) jurisdiction.

⁴ <http://anrmaps.vermont.gov/websites/anra/>

3.7.3 Rare, Threatened, and Endangered Species Review

One rare species is mapped within the Study Area but no longer exists there. The area mapped near the Burlington Country Club is a rare plant location; however, this is an historic location, and the species is now extirpated from the state (see ANR RTE Figure16). Note that the Northern Long-eared Bat is a federally listed species known throughout Vermont. No known hibernacula or maternal roosts are known within 1 mile of the study area.

3.7.4 Agricultural and Hydric Soils

According to the ANR program, there are soils within the Study Area mapped as Prime Agricultural Soils and Farmland Soils of Statewide Importance (see Figure 17 - ANR Prime Agricultural Soils). The Farmland Policy Protection Act does not apply to projects within existing road ROWs or urbanized areas. If any work is proposed outside of existing ROW, authorization from the NRCS via form AD-1006, the Farmland Conversion Impact Rating form, may be required.

3.7.5 Public Lands

The Study Area does not include public recreation lands (a Section 4(f) resource) or public lands developed with Land and Water Conservation Funds (a Section 6(f) resource).

I-89 EXIT 14 ALTERNATIVE TRANSPORTATION CROSSING SCOPING STUDY

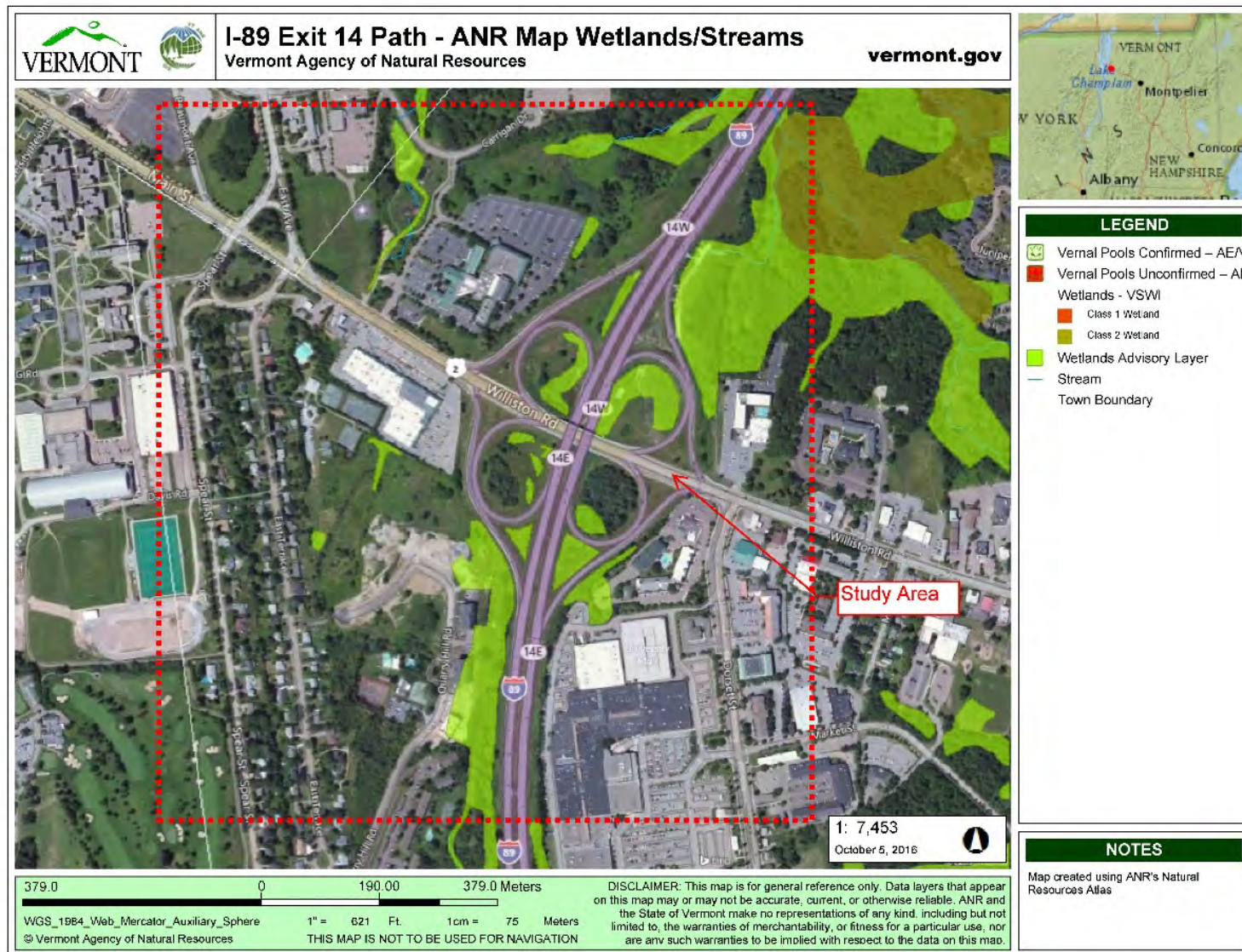


Figure 15 ANR Wetlands/Streams

I-89 EXIT 14 ALTERNATIVE TRANSPORTATION CROSSING SCOPING STUDY

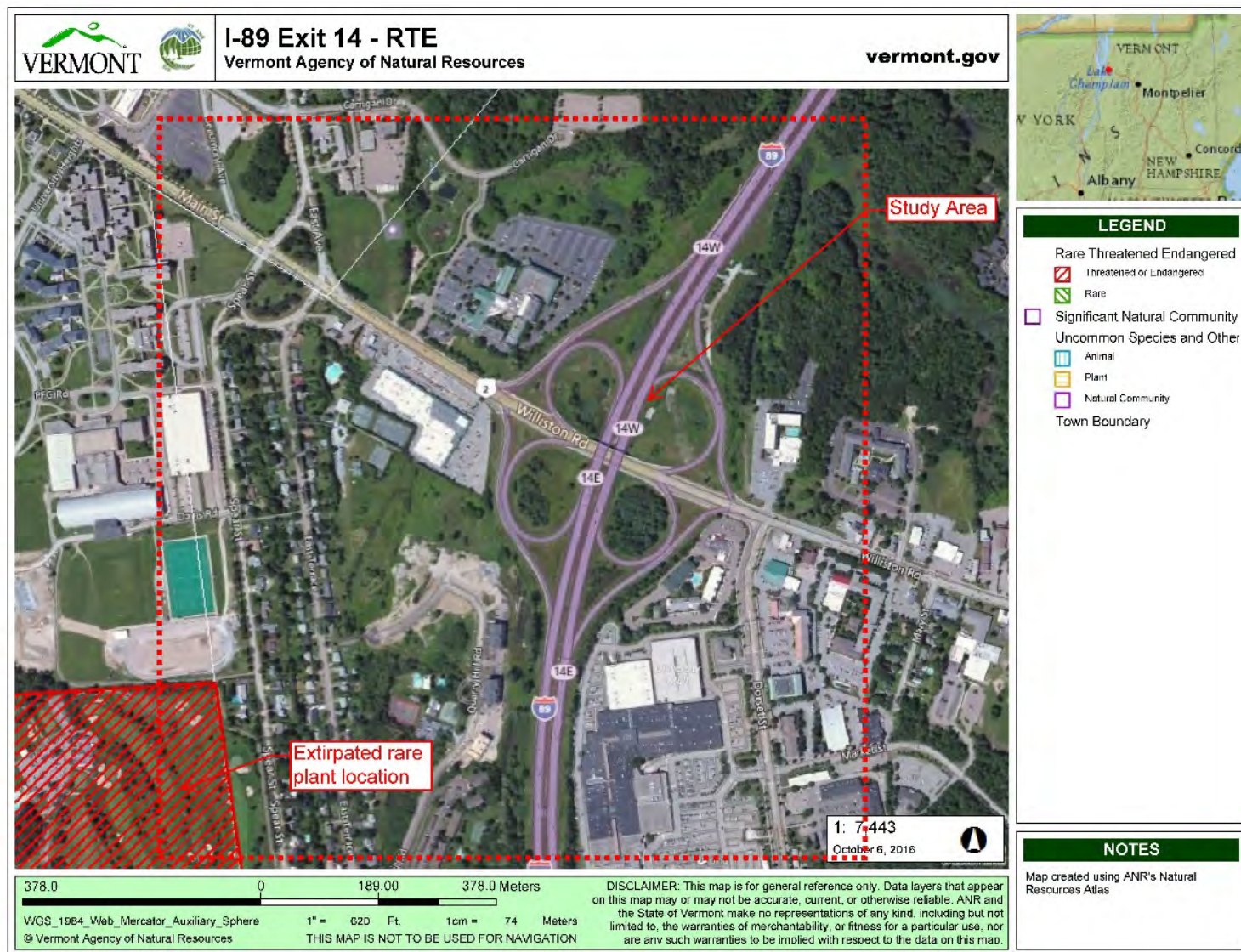


Figure 16 ANR Rare, Threatened, and Endangered Species

I-89 EXIT 14 ALTERNATIVE TRANSPORTATION CROSSING SCOPING STUDY

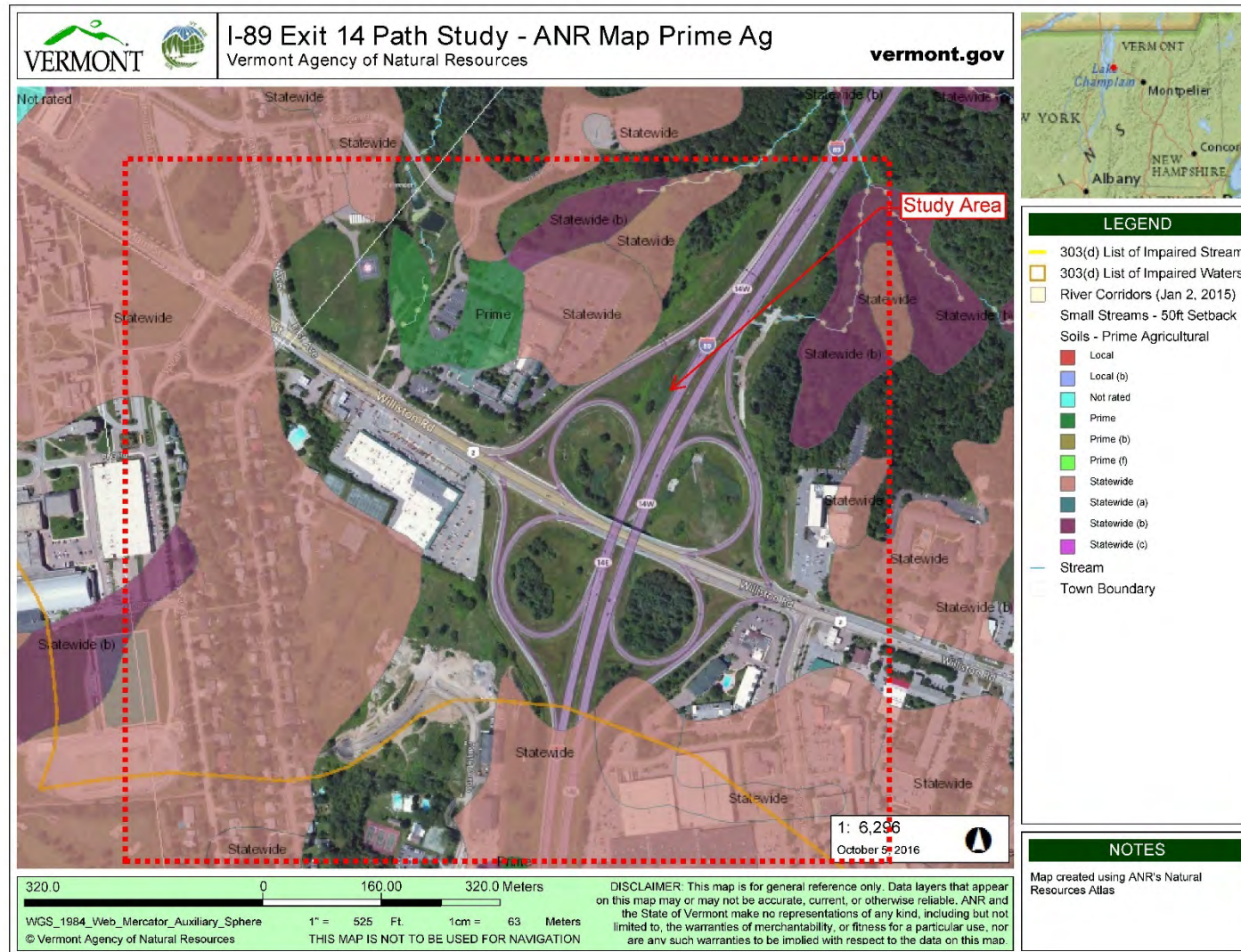


Figure 17 ANR Prime Agricultural Soils

3.7.6 Hazardous Waste Sites

The ANR mapping program was reviewed for information on Hazardous Waste Sites in the project vicinity. A few locations within the Study Area are considered Hazardous Sites or Hazardous Waste Generators (see attached ANR Hazardous Sites Figure 18). These are largely associated with gas stations or other uses featuring hazardous chemicals.

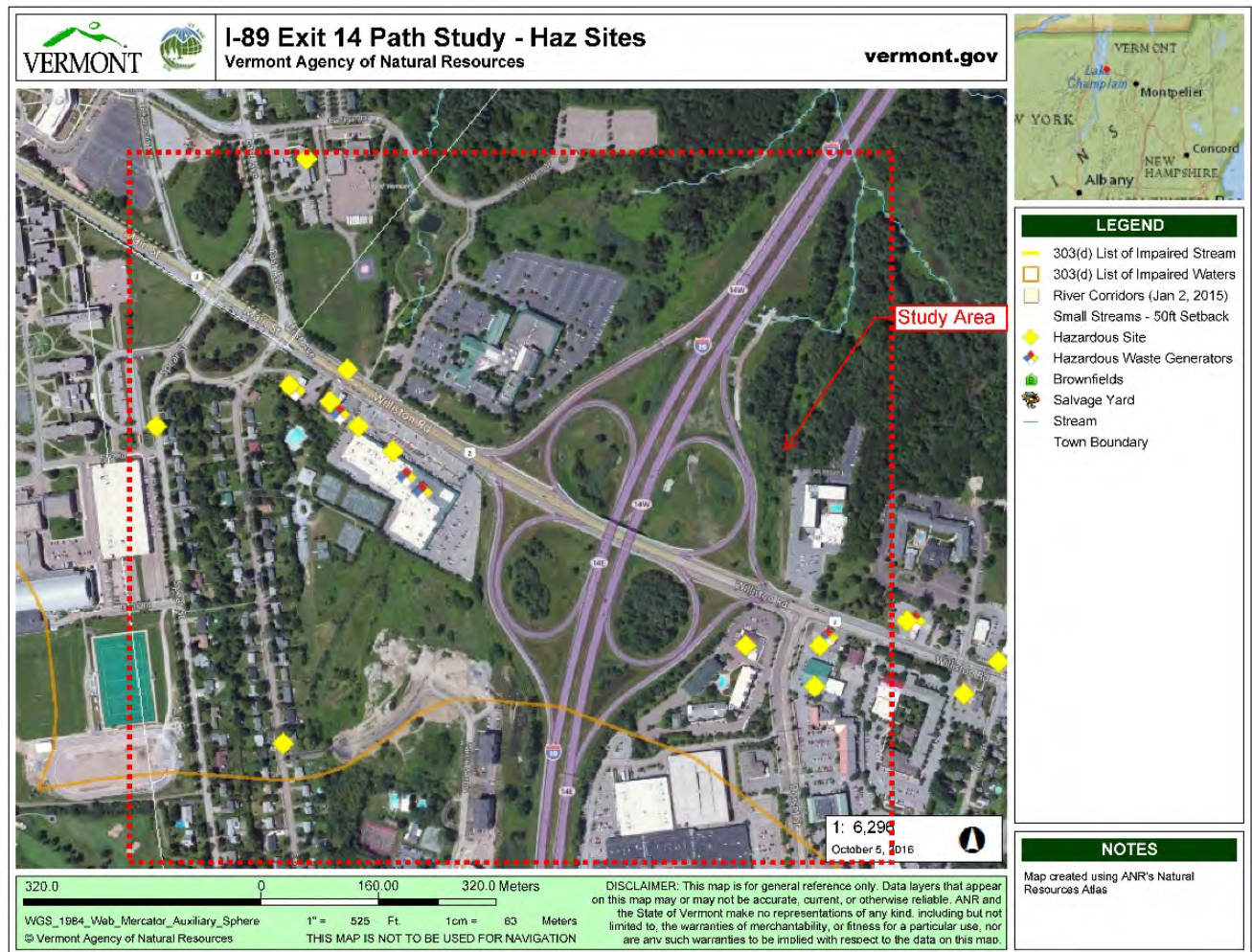


Figure 18 ANR Hazardous Sites

3.7.7 Summary

In summary, the study area includes wetland habitats and streams, and portions of the Study Area are located within a stormwater-impaired watershed. In addition, the Study Area includes Prime Agricultural Soils and Agricultural Soils with Statewide Significance. Any impacts to these soils may require clearance from NRCS via form AD-1006, the Farmland Conversion Impact Rating form.

3.8 UTILITIES

3.8.1 Aerial Utilities

There are aerial utilities on the west side of I-89, crossing over US Route 2, west of the Sheraton entrance drive and running along the western edge of the Staples Plaza parking lot. From the aerial utility crossing over US Route 2, aerial utilities also run along the south side of US Route 2 west to downtown Burlington. From US Route 2, aerial utilities run south along the length of East Terrace, where they extend to Quarry Hill Road, and back to Spear Street. Spear Street has aerial utilities, from the first residence near the northern terminus, running south through the extent of the study area.

There are aerial utilities on the east side of I-89, running from the northern side of US Route 2, just east of the northbound on-ramp, going north between the Holiday Inn property and I-89. Another line of aerial utilities begins on the south side of US Route 2, just east of Dorset Street, and runs east along US Route 2 through the extent of the study area. Aerial utilities include Green Mountain Power, Fairpoint, and Comcast.

3.8.2 Underground Utilities

The City of South Burlington has water, sewer, and storm drainage utilities within the study area. There are also underground electric, communications including fiber (glass), and gas utilities. Underground utilities include the City's sewer and stormwater, Green Mountain Power, Fairpoint, Comcast, Level 3, Champlain Water District, and Vermont Gas Systems, Inc. (VGS). A map of underground utilities is located in the appendix.

4.0 COMMUNITY ENGAGEMENT

Project stakeholders and the public were engaged to review the background of the project, identify needs and discuss potential concerns, questions, and ideas about the project.

4.1 USER SURVEY

A survey was conducted for bicyclists and pedestrians using US Route 2 to get from one side of I-89 to the other. The survey consisted of four simple questions about the existing bicycle and pedestrian facilities and the user experience. The survey questions were made available as a postcard and as an online survey accessed via a QR code. Table 9-1 through Table 9-4 show results for each survey question. Survey respondents' trip purpose for walking or biking across the bridge show relatively equal portions of respondents choosing 'Leisure', 'Get to Work', or 'Personal Business'. Respondents were encouraged to choose all trip purposes that apply. Most survey respondents indicated they walk or bike across the bridge less often than weekly; the frequency chosen least among survey respondents was for 'This is my first time'. About 1 in 10 respondents indicated making daily trips across the bridge by bicycle or on foot; about twice as many indicated making these trips weekly. About 1 in 15 respondents feel 'Very Comfortable' walking or biking across the bridge, while the clear majority of respondents feel 'Very Uncomfortable' doing so.

Table 9-1: Why do you walk or bike across this bridge? (Multiple selections accepted)

Leisure		Get to Work		Personal Business		Other	
142	49%	134	46%	134	46%	11	4%

Table 9-2: How often do you typically walk or bike across this bridge?

Less Often		Weekly		Daily		This is my first time	
210	65.8%	56	17.6%	31	9.7%	22	6.9%

Table 9-3: How comfortable are you with walking or biking across this bridge?

Very Uncomfortable				Neutral		Very Comfortable			
1		2		3		4		5	
107	33.97%	138	43.81%	49	15.56%	12	3.81%	9	2.86%

Table 9-4: Does crossing this bridge deter you from traveling to destinations on the other end of the bridge?

Sometimes		Never	
229	73%	86	27%

4.2 STAKEHOLDER MEETINGS

The project team met with local stakeholders, including adjacent property owners, nearby neighborhood residents, Quarry Hill, businesses, local and state agencies, Local Motion, UVM Medical Center, and the City of Burlington.

Residents of Spear Street and East Terrace would like to have a good bicycle/pedestrian connection from their neighborhood to a new crossing over I-89 for access to destinations in South Burlington. They do have some concerns about possible impacts of attracting college students to pass through their neighborhood. Representatives from Staples Plaza see the value in constructing an alternative transportation crossing. Representatives from Quarry Hill discussed the possibility of having a connection from the crossing to the existing and planned shared use paths in Quarry Hill.

At the time of these meetings, the University Mall was in foreclosure, without definite plans for its future. Whether the parcel continues with similar uses in the future, or is redeveloped for more mixed use, connections to the property, and/or nearby, by bicycle and pedestrian paths would be a positive improvement. However, the current owners are not considering significant changes.

Agencies, including Green Mountain Transit (GMT) and the Vermont Department of Health are interested in the project. From a health perspective, lack of exercise is one of the top three health risks in VT; any project that promotes active transportation for Vermonters would be beneficial. Local Motion is interested in both short-term and long-term solutions. UVM Medical Center was supportive of the project, and encouraged connecting with Burlington Wards 1 & 8. A project presentation was given to and received positively by these wards. The City of Burlington is supportive of the project and provided helpful input based on their experiences with promoting bicycle and pedestrian facilities.

Stakeholders were provided a link to the user survey and some distributed it to relevant groups.

4.3 PUBLIC WORKSHOP #1: LOCAL CONCERNS PUBLIC MEETING

The first of two public workshops was held (the local concerns meeting) with a strong turnout of over 50 participants. The project background and process were presented. Participants broke out into six groups and were asked to provide input regarding: pedestrian and bicycle needs; transit needs; potential ideas and solutions; and other community needs related to this project. Their input is summarized in the appendix.

At the end of the meeting, each participant had the opportunity to share what they saw as the best idea presented during the session.

Major common ideas shared include:

- Build new bicycle/pedestrian bridge or tunnel to cross I-89 near Exit 14
- Build a bicycle through lane down the center of the existing bridge
- Focus on connectivity
- Build new exits to access I-89 and relieve congestion near Exit 14
- Build U-turn at I-189 for access to I-89
- Consider smaller improvements available in short term: traffic calming, police enforcement for distracted driving, maintenance, lane changes
- Look at network holistically to improve travel for all users
- Recognize the inter-relationships between different users and components of the system
- Recognize different categories of bicyclists (e.g., commute vs recreation; expert vs beginner)
- Focus on comfort and safety
- City council needs to make biking a higher priority in South Burlington

5.0 PURPOSE AND NEED STATEMENT

The Purpose and Need Statement summarizes what a project is intending to accomplish and for what reasons. The Purpose and Need Statement is a fundamental requirement for projects that will pursue federal funding; and is a yardstick used to test each alternative.

Working with the Project Advisory Committee and using the input from Public Workshop #1, the following Purpose and Need Statement was drafted. The Purpose and Need Statement was reviewed by the South Burlington Planning Commission in December of 2016 and revisions were suggested. They approved the Purpose and Need Statement as revised on January 10, 2017.

Purpose and Need Statement

I-89 Exit 14 Bike-Pedestrian Crossing Study

Purpose

The purpose of this project is to create a safe, visible, comfortable, convenient, direct and attractive year-round crossing for pedestrian and bicycle travel across I-89 in the vicinity of the Exit 14 interchange while maintaining safe and efficient vehicular conditions on the I-89 mainline; support healthy and sustainable lifestyles; promote compact growth and economic development in City Center; create attractive public spaces in support of the region's identity; enhance capacity of the US Route 2 corridor in a cost-effective manner; and reconnect neighborhoods within South Burlington that have been split apart by regional and national transportation corridors.

Need

- 1. Build an inviting travel corridor that reinforces the City's and Region's goals for pedestrian and bicycle mobility.** The present bicycle and pedestrian facilities do not reflect the area's priorities for quality of life of its residents and visitors, mobility, nor commitment to vibrant interlinked downtowns. The 2016 South Burlington Comprehensive Plan sets the following goal: "Develop a safe and efficient transportation system that supports pedestrian, bicycle, and transit options while accommodating the automobile" (p 1-1). Limitations on access across a broad spectrum of users undermine regional goals for bicycle and pedestrian friendliness.
- 2. Build attractive public spaces and a distinctive identity for City Center and Chittenden County.** Exit 14 is a gateway to the State, the region, and the community. The current facilities lend no distinctive identity to this entry point to some of the State's premiere destinations and do not meet community goals for such. Exit 14 is a critical area within the region, but fails to be a great place for all users. The 2016 South Burlington Comprehensive Plan states: "Establish a city center with pedestrian-oriented design, mixed uses, and public buildings and civic spaces that act as a focal point to the community" (p. 1-1).

3. **Facilitate use by all age groups, experience levels, and purposes of trips.** The current facility is challenging for all users including the most experienced and confident pedestrians and bicyclists. This discourages would-be commuters and recreational bicyclists and pedestrians needing to cross I-89.
4. **Remove a barrier in the regional network. This location has been identified as a principal barrier to within the regional bicycle and pedestrian network.** I-89 splits South Burlington neighborhoods and three of the region's most significant nodes of activity: City Center to the east, and UVM and downtown Burlington to the west. Improvements need to seamlessly link the existing and planned bicycle and pedestrian network in South Burlington on both sides and be designed in a manner that is responsive to existing neighborhoods and activity areas.
5. **Increase the regional transportation capacity.** US Route 2 is the most direct means to travel across I-89 in the immediate vicinity; however, existing conditions reduce the viability of bicycling and walking as a regional transportation choice. This reduces the capacity of the system as existing sidewalks and recreational paths do not connect to places people need to go and they are therefore underused.
6. **Create a safe, comfortable, user-friendly, desirable year-round bicycle and pedestrian connection across Exit 14.** The cloverleaf interchange configuration results in challenging accommodations for pedestrians and bicyclists. It favors the high speed movement of many vehicles merging onto and across several lanes. Consequently:
 - Pedestrian and bike crossings occur where it is not easy for drivers to anticipate yielding or stopping for pedestrians and bicyclists due to higher speeds. This creates an uncomfortable condition for the driver and pedestrian/bicyclist due to the potential for collisions.
 - Inconsistencies in the availability of on-street bicycle lanes, recreation paths, and sidewalk width foster uncertainty and create the potential for conflicts between all users.
 - Limited real estate results in a lack of buffers between users and traffic, no snow storage and limited flexibility to reconfigure facilities.
7. **Maintain Interstate 89 safety and efficiency.** Modifications to ramp intersections with US Route 2 have the potential to increase ramp queues which could result in backups on I-89. Modifications that increase the risk of high-speed, rear-end collisions on I-89 need to be avoided.

Approved by the South Burlington Planning Commission Tuesday, January 10, 2017

6.0 ALTERNATIVES

6.1 ALTERNATIVE DEVELOPMENT & EVALUATION

Potential alternatives were identified and developed for short-to-medium-, and long-term timeframes, based on existing conditions, previous studies, public input, and project team expertise. Short-to-medium-term alternatives include roadway markings, signage, and ramp adjustments on Route 2. Long-term alternatives include physical infrastructure for crossing I-89, generally off-alignment from US Route 2.

Alternatives were evaluated through an iterative process. This began with evaluating a total of 13 alternatives based on how well they satisfy the purpose and need statement. This included three short-to-medium-term alternatives and ten long-term alternatives, including the 'Do Nothing' alternative. Each alternative was then evaluated based on high-level feasibility considerations. Through this process, the project team reduced the number of alternatives to five long-term alternatives to carry through further evaluation.

6.1.1 Short-to-medium-term alternatives evaluated

Three short-to-medium-term alternatives were developed and evaluated based on the purpose and need statement. These include making existing bike lane improvements, constructing a bike lane in the center of the roadway, and re-aligning the ramps at the interchange. These alternatives are summarized in Table 10. These short-to-medium-term alternatives do not completely satisfy the Purpose and Need but warrant further consideration in adjacent projects, planned roadway resurfacing projects or as stand-alone future studies.

Table 10: Short-to-medium-term Alternatives Evaluated

Alternative		Description	Advantages	Considerations
S1	Existing bike lane improvements	Continuous bike lanes straight along roadway past ramps. Dashed bike lane lines through intersections. Bike lanes along left side of right-turning lanes.	<ul style="list-style-type: none"> - Low cost - Shorter timeline - Benefit to US Route 2 bike commuters 	<ul style="list-style-type: none"> - Benefits narrow segment of bicyclists
S2	Center bike lane	Center median bike lane from jughandle to Dorset Street.	<ul style="list-style-type: none"> - Separates bikes, peds & motor vehicles - Apparent support from 1st Public Meeting 	<ul style="list-style-type: none"> - Short link for center bike lane - Connections to side bike lane - Snow removal
S3	Interchange ramp realignment (with or without signal control)	Ramps realigned to be closer to perpendicular with US Route 2, forcing motor vehicles to reduce speeds when entering or exiting ramps.	<ul style="list-style-type: none"> - Reduce speed of motorists exiting ramps with geometric design - Increased traffic control - Improved sight distance 	<ul style="list-style-type: none"> - Aim for as close to 90 degrees as possible - Research recommends entry angle >70 degrees* - Cost - Maintenance

6.1.2 Short-to-medium-term alternatives recommendation

While none of the short-term Alternatives met the Purpose & Need Statement for this project, they are not without merit as stand-alone projects.

It is recommended that a separate scoping study be considered for a center median bike lane, running at least from the jughandle to Dorset Street, with physically protected buffers. This shorter-term solution has potential for providing an effective separated bicycle facility, but will not serve pedestrians, and may possibly be used only by more competent bicyclists.

6.1.3 Long-term alternatives evaluated

Ten long-term alternatives, including the 'Do Nothing' alternative, were developed and evaluated based on the purpose and need statement, and high-level feasibility considerations. These alternatives consist of new facilities separated from the roadway and would support the greatest number of potential users.

The study team reviewed these alternatives and selected five for further evaluation (shown as green in Table 11). Graphics for Alternatives that were not selected for further evaluation are shown in the appendix.

Table 11: Long-term Alternatives Evaluated

Alternative		Description	Advantages	Reason to Eliminate
L0	Do Nothing	Continue to use facility 'as is', making no changes for bicycles or pedestrians.	- Low cost	- Does not satisfy purpose & need - Carried forward as baseline
L1	Bridge over cloverleaf south of US Route 2	Bicycle/pedestrian bridge crossing Exit 14 ramps over cloverleaf, from Staples Plaza area to CVS Pharmacy area.	- Closer to US Route 2 for commuters - Still separate facility	
L2	Circular bridge structure	Raised circular bicycle/pedestrian bridge centered around midpoint of current bridge, large enough in diameter for bikes & pedestrians to avoid current ramp crossings.	- Connectivity for EB/WB bicyclists - Reduce bicyclist crossings of US Route 2 - Potential visible City gateway entrance landmark	- Feasibility - Future of I-89 segment & interchange - Amount of structure (very very large) - Cost
L3	Bridge from Quarry Hill to north edge of University Mall property	Bicycle/pedestrian bridge crossing I-89, just south of the interchange ramps, from vicinity of Quarry Hill neighborhood to northwest corner of University Mall property.	- Shorter bridge length - Less dependent on future University Mall development - Identified on prior transportation plans - Strong community support at Public Workshop #1 - Lower cost	
L4	Bridge from Quarry Hill to middle of	Bicycle/pedestrian bridge crossing I-89, from southern section of Quarry Hill road to the	- Shorter bridge length	- Dependent on future University

I-89 EXIT 14 ALTERNATIVE TRANSPORTATION CROSSING SCOPING STUDY

	University Mall property	middle of University Mall property.	<ul style="list-style-type: none"> - Identified on prior transportation plans - Strong community support at Public Workshop #1 - Lower cost 	<ul style="list-style-type: none"> - Mall redevelopment - L3 preferred
L5	Tunnel or bridge on north side of US Route 2	Bicycle/pedestrian bridge crossing I-89, just north of the interchange ramps. Would connect via shared use paths behind the Sheraton and Holiday Inn properties.	<ul style="list-style-type: none"> - Protected from elements (Tunnel) - Call attention to natural areas - Access future north side developments 	<ul style="list-style-type: none"> - Environmental constraints - Personal safety & comfort (Tunnel) - Would not give same near-term connectivity as southerly options
L6	Two bridges/crossings (north & south)	Combination of L3 or L4 with L5.	<ul style="list-style-type: none"> - More connectivity - All advantages of L3 – L5 	<ul style="list-style-type: none"> - Cost - Same reasons as L5
L7	Tram or gondola	Tram or gondola to transport bicyclists and pedestrians across I-89 from vicinity of Staples Plaza or Quarry Hill neighborhood, to north side of University Mall property.	<ul style="list-style-type: none"> - Potential visible gateway entrance landmark for City - Could provide alternative crossing 	
L8	Cannoli bridge	Bicycle/pedestrian bridge that would run above, and in alignment with, the current bridge for US Route 2 over I-89 at Exit 14. Bicycles and pedestrians would access the bridge via one of four ramps; one for each side of US Route 2 and I-89.	<ul style="list-style-type: none"> - Connectivity between four corners of interchange - Potential visible gateway entrance landmark for City 	
L9	Cantilever bridge	Pre-built cantilever bridge segments would effectively widen the current bridge, for use by bicycles and pedestrians.	<ul style="list-style-type: none"> - Lower cost than separate bridge - Accelerated construction 	<ul style="list-style-type: none"> - Does not mitigate ramp crossings - VTrans resistant to similar cantilever design in other locations - Does not satisfy purpose & need

6.2 ALTERNATIVES ADVANCED FOR FURTHER EVALUATION

The five alternatives chosen to be advanced for further evaluation were:

- Alternative 1 – Do nothing (L0 in Table 11. Typical for all listed here)
- Alternative 2 – Bridge over cloverleaf south of US Route 2
- Alternative 3 – Bridge from Quarry Hill to north edge of University Mall property
- Alternative 4 – Tram or gondola
- Alternative 5 – Cannoli bridge

Each alternative is described below.

6.2.1 Alternative 1 – Do Nothing

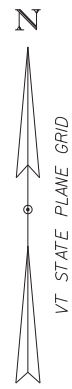
This alternative (Figure 19) proposes to do nothing. The crossing of US Route 2 over I-89 at Exit 14 would remain a high-speed facility that is unfriendly to bicyclists and pedestrians. While this alternative does not meet the project purpose and need, it is carried forward as a baseline for comparison among other alternatives.

6.2.2 Alternative 2 – Bridge over cloverleaf south of US Route 2

Figure 20 graphically depicts Alternative 2 improvements. Alternative 2 includes a combination of three separate bicycle/pedestrian bridges to cross I-89 and I-89's two sets of ramps. The three bridges are connected through the two cloverleaves by shared use path segments built on top of berms. The crossing would run parallel to, and south of, the current alignment of US Route 2, going over the cloverleaf interchange ramps. The western portion of the crossing would connect to US Route 2 by shared use path and an elevated ramp, beginning near the current crosswalk over the on-ramp (Ramp A) for I-89 southbound. It would also connect to existing shared use path in the Quarry Hill neighborhood, by way of new shared use path and an elevated ramp. The eastern portion of the crossing would connect to US Route 2 at the Dorset Street intersection by shared use path and an elevated ramp. It could also potentially connect to the north edge of the University Mall property by shared use path and an elevated ramp.

Bicyclists traveling westbound would cross US Route 2 at the intersection with Dorset Street, entering the shared use path connection. From the western portion of the crossing, these bicyclists would connect back to US Route 2 at the jughandle, by way of East Terrace and the Quarry Hill shared use path.

Considerations for this alternative include: relatively higher bridge costs; drainage impacts; and potential conflict with future development of the interchange (there is no redevelopment of the interchange planned or studied).



ALTERNATIVE 1:
DO NOTHING

	PROPOSED STRUCTURE		EXISTING REC PATH		PLANNED REC PATH
	POSSIBLE SHARED USE PATH CONNECTIONS		EXISTING BIKE LANE		PLANNED BIKE FACILITY
			EXISTING SIDEWALK		PLANNED SIDEWALK

0 200 400
SCALE IN FEET

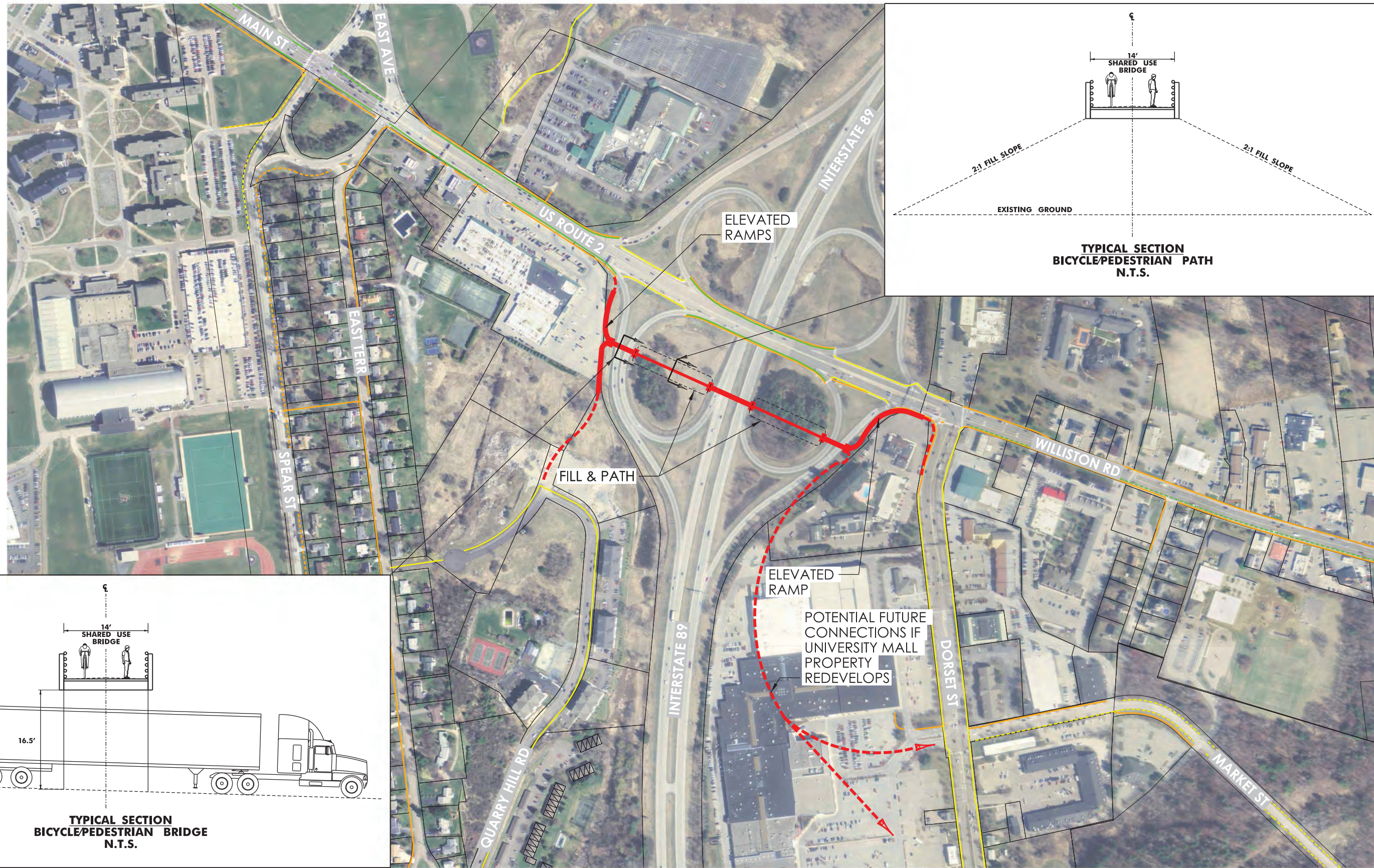
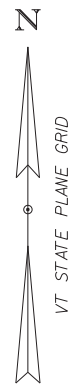


PROJECT NAME: I-89 EXIT 14 CROSSING
PROJECT NUMBER: 195311328

FILE NAME: layout_1.bdr_Alt1s_Short.dgn
PROJECT LEADER: G. GOYETTE
DESIGNED BY: S. NEELY
FIGURE 19

PLOT DATE: 1/26/2018
DRAWN BY: S. NEELY
CHECKED BY: G. GOYETTE
SHEET 1 OF 1

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TYPICAL SECTION
BICYCLE/PEDESTRIAN BRIDGE
N.T.S.

TYPICAL SECTION
BICYCLE/PEDESTRIAN PATH
N.T.S.

- | | | | | | |
|--|--------------------------------------|--|--------------------|--|-----------------------|
| | PROPOSED STRUCTURE | | EXISTING REC PATH | | PLANNED REC PATH |
| | POSSIBLE SHARED USE PATH CONNECTIONS | | EXISTING BIKE LANE | | PLANNED BIKE FACILITY |
| | | | EXISTING SIDEWALK | | PLANNED SIDEWALK |

ALTERNATIVE 2:
THREE SEPARATE BRIDGES OVER CLOVERLEAF



PROJECT NAME: I-89 EXIT 14 CROSSING

PROJECT NUMBER: 195311328

FILE NAME: layout_1.bdr_Alt2_Short.dgn

PROJECT LEADER: G. GOYETTE

DESIGNED BY: S. NEELY

FIGURE 20

PLOT DATE: 2/14/2018

DRAWN BY: S. NEELY

CHECKED BY: G. GOYETTE

SHEET 1 OF 1

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Although there are no current plans for interchange redesign, the US Route 2 bridge will eventually reach its structural life span and present the opportunity for redesign of the interchange. Alternative 2 could require demolition when the US Route 2 bridge is replaced.

Another consideration is that Alternative 2 is conceptualized as three bridges, or one very long bridge, and is probably the second highest cost alternative of the bridge options.

6.2.3 Alternative 3 – Bridge from Quarry Hill to north edge of University Mall property

Figure 21 graphically depicts Alternative 3 improvements. Alternative 3 includes a bicycle/pedestrian bridge running over I-89, just south of the interchange ramps. The bridge would cross from behind 376 Quarry Hill Road to the right-of-way adjacent to the northwest corner of the current University Mall property. The western terminus of the bridge would connect by elevated ramp to a new segment of shared use path from US Route 2, near Staples, running south-southeast to the western terminus of the bridge. It would also connect to the current shared use path that runs through the Quarry Hill neighborhood, with existing connections to East Terrace and Spear Street. The eastern terminus of the bridge would connect by elevated ramp, to a shared use path within the right-of-way behind the Comfort Inn, to US Route 2 and the existing shared use path on Dorset Street. The eastern terminus of the bridge could also potentially be integrated into the University Mall site via sidewalks and bike lanes, with connections to existing bicycle/pedestrian paths along Dorset Street and future paths along Market and Garden Streets. This would depend on the future of the University Mall property. As a single span bridge, Alternative 3 would have the lowest project costs of the bridge alternatives.

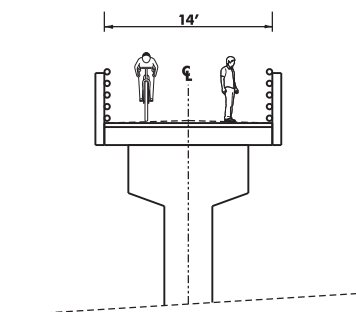
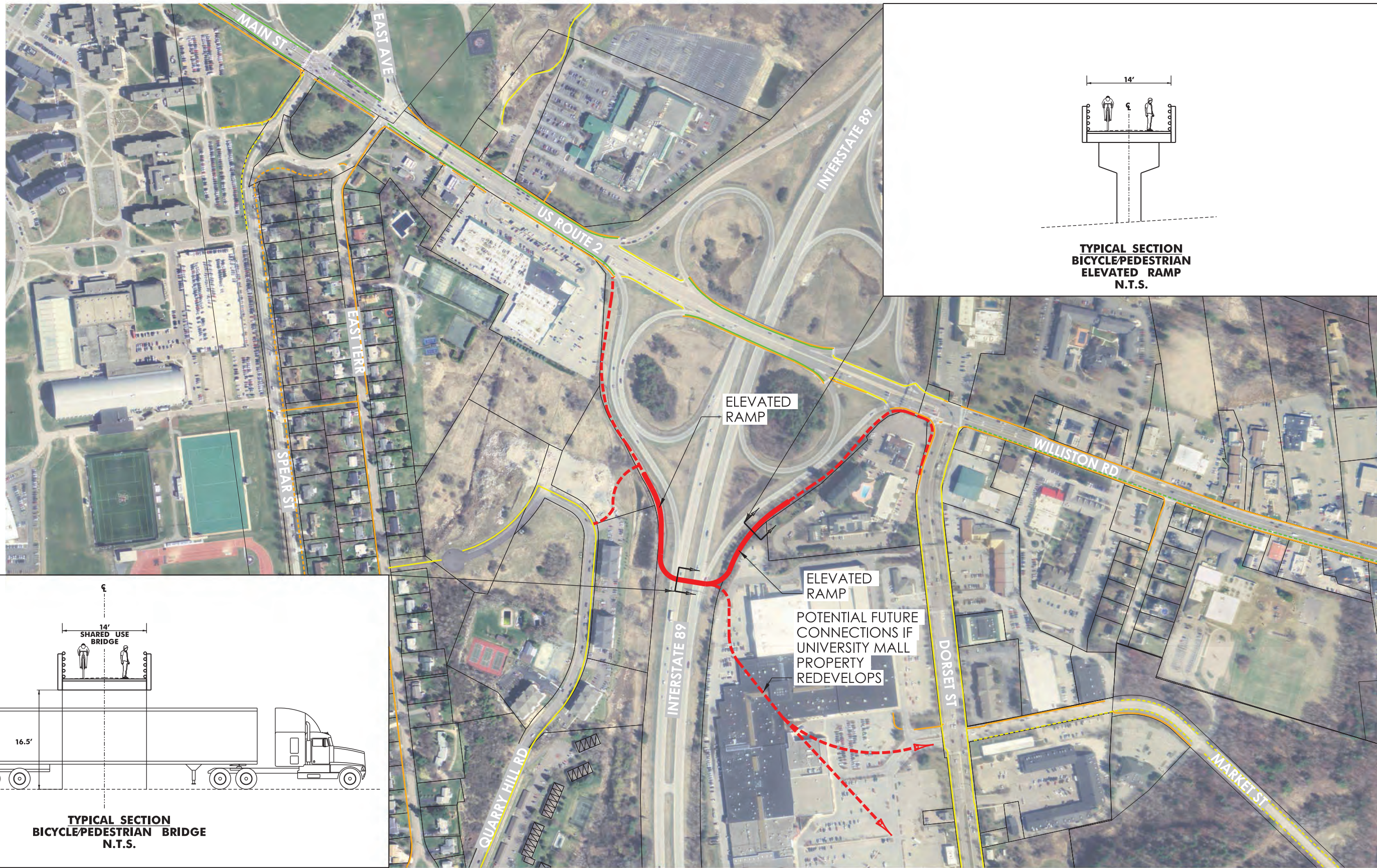
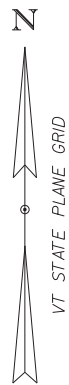
Considerations for this alternative include aesthetics, travel distance, and isolation. The approaches to the bridge have the potential to obstruct the view of the interstate for adjoining residents and will be very visible to them. The distance for users to travel is generally longer for this alternative than the other bridge options. This alternative is farther from the main road than other alternatives, which could lead to the perception of isolation by potential users. The City would want to make sure these considerations are addressed in the project design phase.

6.2.4 Alternative 4 – Tram or gondola

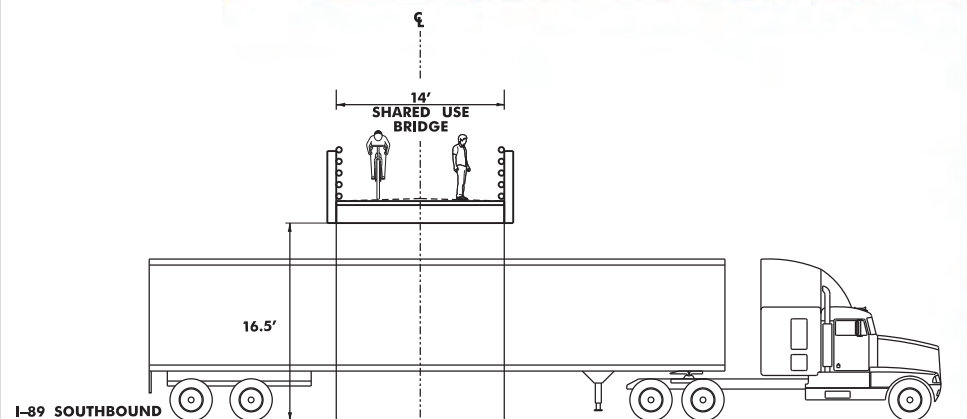
Figure 22 graphically depicts Alternative 4 improvements. Alternative 4 includes a tram or gondola installation to provide a safe and comfortable connection for bicyclists and pedestrians to cross I-89, south of the US Route 2 bridge at Exit 14.

This alternative could take the form of a shorter option, crossing I-89 at the same location as Alternative 3, with similar connections. A longer option for this alternative could provide transport via tram or gondola from closer to US Route 2 on the western side of I-89.

Considerations for this alternative include the need for staffing (at least two staff members) during operations, equipment maintenance, the schedule of operations (less than 24 hours/day,



**TYPICAL SECTION
BICYCLE/PEDESTRIAN
ELEVATED RAMP
N.T.S.**



**TYPICAL SECTION
BICYCLE/PEDESTRIAN BRIDGE
N.T.S.**

- | | | | | | |
|--|--------------------------------------|--|--------------------|--|-----------------------|
| | PROPOSED STRUCTURE | | EXISTING REC PATH | | PLANNED REC PATH |
| | POSSIBLE SHARED USE PATH CONNECTIONS | | EXISTING BIKE LANE | | PLANNED BIKE FACILITY |
| | | | EXISTING SIDEWALK | | PLANNED SIDEWALK |

**ALTERNATIVE 3:
BRIDGE FROM QUARRY HILL TO UNIVERSITY MALL**

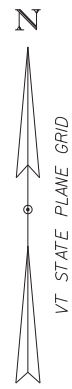


PROJECT NAME: I-89 EXIT 14 CROSSING
PROJECT NUMBER: 195311328

FILE NAME: layout_1.bdr_Alt3_Short.dgn
PROJECT LEADER: G. GOYETTE
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FIGURE 21

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SHEET 1 OF 1

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ALTERNATIVE 4:
GONDOLA OR TRAM

	PROPOSED STRUCTURE		EXISTING REC PATH		PLANNED REC PATH
	POSSIBLE SHARED USE PATH CONNECTIONS		EXISTING BIKE LANE		PLANNED BIKE FACILITY
			EXISTING SIDEWALK		PLANNED SIDEWALK



PROJECT NAME: I-89 EXIT 14 CROSSING
PROJECT NUMBER: 195311328

FILE NAME: layout_1.bdr_Alt5_Short.dgn
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FIGURE 22

PLOT DATE: 1/26/2018
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SHEET 1 OF 1

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7 days/week), downtime due to wind or maintenance issues, and use of facility by commuting or fitness bicyclists compared with leisure bicyclists. Access to either gondola station is also a concern, with added road crossings near the jughandle and the Holiday Inn.

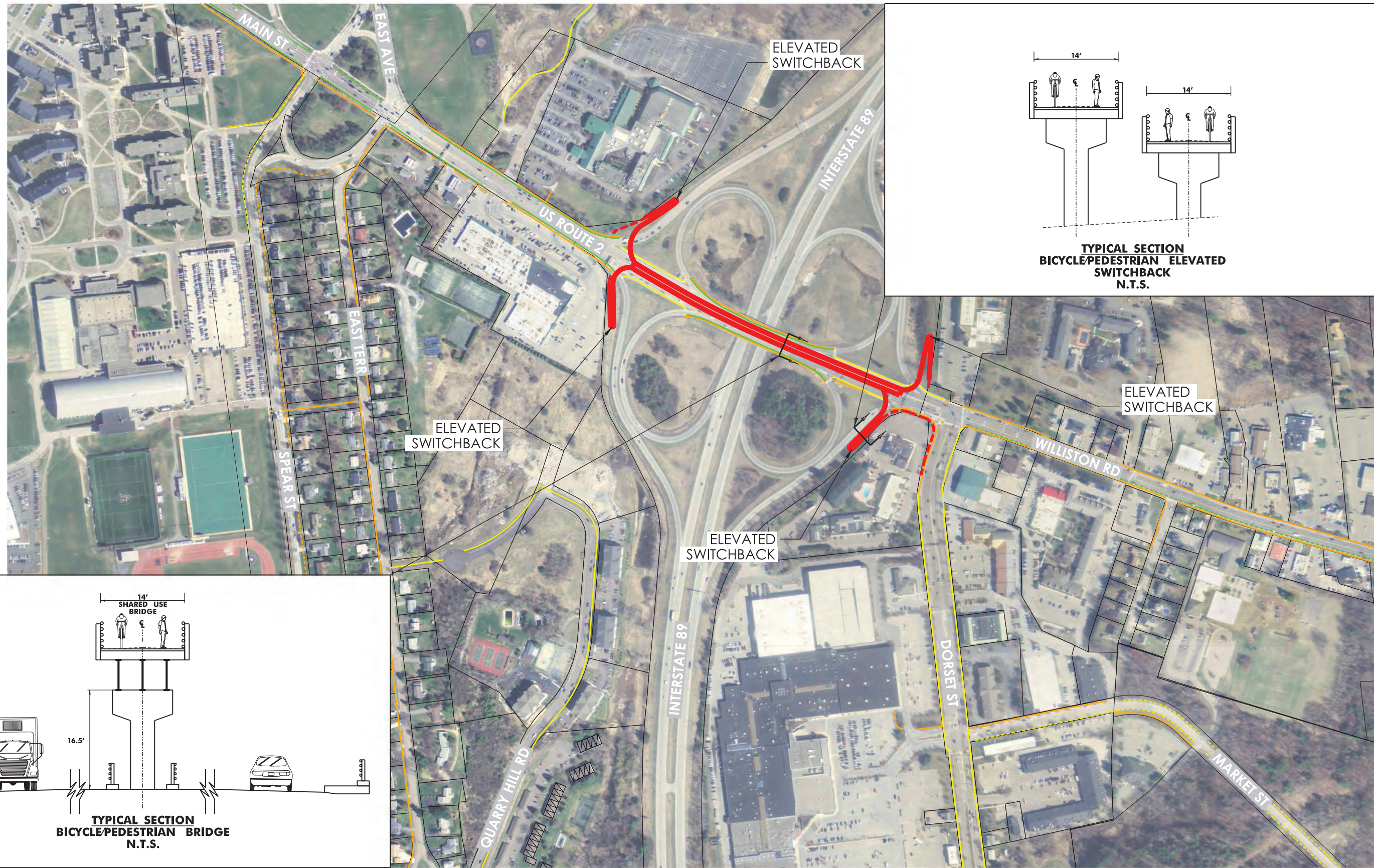
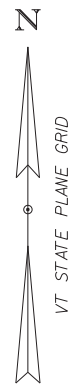
6.2.5 Alternative 5 – Cannoli bridge

Figure 23 graphically depicts Alternative 5 improvements. Alternative 5 includes a bicycle/pedestrian bridge that would run above, and in alignment with, the current bridge for US Route 2 over I-89 at Exit 14. The bridge would effectively make the current US Route 2 bridge over I-89 a double-decker bridge, with the upper deck exclusive to bicycles and pedestrians. Bicycles and pedestrians would access the bridge via one of four ramps; one for each side of US Route 2 and I-89. The structure of the bridge would resemble the wireframe of a cannoli, with a top spine and four connections to grade.

One of the considerations for this alternative is the placement of each of the four ramps. The minimum clearance between the roadway and the bottom of the upper bridge is 16.5 feet. To keep the grade ADA compliant, at a grade of 5%, and assuming an upper deck depth of one foot, the ramps would need to be 350 feet in run length. This alternative is probably the highest cost alternative of the bridge options.

6.2.6 Evaluation Matrix

An evaluation matrix was developed to compare each alternative to one another with regards to total project impacts, as well as how each alternative satisfies the Purpose and Need of the project. The evaluation matrix is shown in Table 12. The final recommendations developed by the project team are presented in Section 6.0.



ALTERNATIVE 5:
CANNOLI BRIDGE

- | | | |
|--|----------------------|---------------------------|
| — PROPOSED STRUCTURE | — EXISTING REC PATH | --- PLANNED REC PATH |
| - - - POSSIBLE SHARED USE PATH CONNECTIONS | — EXISTING BIKE LANE | --- PLANNED BIKE FACILITY |
| | — EXISTING SIDEWALK | --- PLANNED SIDEWALK |



PROJECT NAME: I-89 EXIT 14 CROSSING
PROJECT NUMBER: 195311328

FILE NAME: layout_1.bdr_Alt5_Short.dgn	PLOT DATE: 1/26/2018
PROJECT LEADER: G. GOYETTE	DRAWN BY: S. NEELY
DESIGNED BY: S. NEELY	CHECKED BY: G. GOYETTE
FIGURE 23	SHEET 1 OF 1

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I-89 EXIT 14 ALTERNATIVE TRANSPORTATION CROSSING SCOPING STUDY

Table 12: Alternatives Evaluation Matrix

ALTERNATIVE #		1	2	3	4	5
DESCRIPTION		Do nothing	Bridge over cloverleaf	Bridge south of cloverleaf	Gondola or tram	Cannoli bridge
PURPOSE AND NEED						
Build an inviting travel corridor that reinforces the City's and Region's goals for pedestrian and bike mobility.		No	Yes	Yes	Requires efficiency analysis	Yes
Build attractive public spaces and a distinctive identity for City Center and Chittenden County.		No	Yes	Yes	Yes	Yes
Facilitate use by all age groups, experience levels, and trip purposes.		No	Yes	Yes	May not for all trip purposes	Yes
Remove a barrier in the regional network.		No	Yes	Yes	May not for all trip purposes	Yes
Increase the regional transportation capacity.		No	Yes	Yes	Yes, but to a lesser degree	Yes
Create safe, comfortable, user-friendly, desirable year-round bike & pedestrian connection across Exit 14.		No	Yes	Yes	Generally, for pedestrians; Maybe for bicyclists	Yes
Maintain I-89 safety and efficiency.		No	Yes	Yes	Yes	Yes
GENERAL CHARACTERISTICS						
Number of Properties Potentially Impacted		N/A	3	4	3-4	0-3
Potential Down Time (Time Facility is Closed)		None	None	None	High	None
Maintenance		Modest	Moderate	Moderate	High	Moderate
Additional ROW Width Necessary		N/A	Possibly Lowest	Potentially High	Moderate	Potentially High
Landscaping Opportunities		N/A	Yes	Yes	Yes	Yes
Could Remain in Place with Future Redevelopment to Interchange		N/A	Less Likely	Likely	Likely	Less Likely
Hours of Operation		N/A	24/7	24/7	< 24/7	24/7
PEDESTRIANS						
Interstate Ramps Required to Cross at Grade		4 Ramps Each Side	None	None	None	None
Improves Pedestrian Comfort		No	Yes	Yes	Yes	Yes
BICYCLISTS						
Bicycle Facility Provided?		Existing	Yes	Yes	Yes	Yes
Bicycle User Types Likely to Use		Experienced & Expert	All	All	All	All
Improves Bicycle Comfort		No	Yes	Yes	Yes	Yes
Potential for Travel Delay		Xwalk delay	No	No	Yes	No
PROJECT COST ESTIMATE						
Relative Cost		-	\$\$\$	\$\$	Construct: \$ O&M: \$\$\$	\$\$\$\$

I-89 EXIT 14 ALTERNATIVE TRANSPORTATION CROSSING SCOPING STUDY

Table 13 displays estimated distances and travel times for bicyclists and pedestrians for each alternative, based on the assumption of traveling from the southwest ramp crossing (Ramp A) to the southeast ramp crossing (Ramp F) on US Route 2. Based on that assumption, Alternative 2 is estimated to be 405 feet (30%) longer than the Do Nothing alternative, while Alternative 3 is estimated to be 1380 feet (103%) longer, and Alternative 5 is estimated to be 960 feet (70%) longer. If we consider people living south of US 2 in the Quarry Hill neighborhood, East Terrace neighborhood, or on the UVM campus however, the distance traveled, for Alternative 2 or 3, to get to the University Mall or City Center, could be less than the distance traveled under existing conditions.

While the Do Nothing alternative likely includes travel delay, based on public input, at each of the four ramp crosswalks, the new bridge alternatives would not require using these ramp crosswalks. For the Do Nothing alternative, travel times were estimated for three delay lengths at the crosswalks: no delay, ten seconds, and thirty seconds of delay at each crosswalk.

For an eastbound bicyclist, each of the new bridge alternatives are estimated to increase travel time by about one minute or less. For a westbound bicyclist, the increase would be greater, due to the need to cross US Route 2.

For a pedestrian, the change in travel time ranges from less than two minutes for Alternative 2, to over six minutes for Alternative 3, if assuming no delay at crosswalks under existing conditions. If assuming thirty seconds of delay at each crosswalk under existing conditions, the change in pedestrian travel time ranges from zero for Alternative 2, to 4.5 minutes for Alternative 3.

Table 13: Estimated Distances and Travel Times

Estimated Travel Times – SW Ramp Crossing to SE Ramp Crossing on US Route 2						
		Alternative				
		1	2	3	4	5
		Do Nothing	Cloverleaf Bridges	Bridge: Quarry Hill to University Mall	Gondola or Tram	Cannoli Bridge
Distance (FT)		1345	1750	2725	-	2305
Difference (FT)		-	405	1380	-	960
Travel Times (Min)						
	Delays at X-Walks					
Bicyclist	None	1.0	1.3	2.1	-	1.7
	10s	1.7				
	30s	3.0				
Pedestrian	None	6.4	8.3	12.9	-	10.9
	10s	7.0				
	30s	8.4				

7.0 ALTERNATIVES PUBLIC OUTREACH

7.1 STAKEHOLDER MEETINGS

The project team met with local stakeholders, including representatives of adjacent property owners, local and state agencies, CATMA, UVM Medical Center, and the City of Burlington. Feedback from stakeholders for each alternative are summarized below. The South Burlington Bike-Pedestrian Committee also provided comments on the alternatives, presented in the appendix. The Committee sees Alternatives 2 & 3 as the best alternatives to meet the needs of non-motorized traffic crossing I-89 at Williston Road.

For Alternatives 2 & 3, westbound bicyclists would not have an immediate crossing over US Route 2 on the west side of I-89. Although some bicyclists might use the existing sidewalk along the south side of US Route 2 to get to the traffic signal at the entrance to Staples Plaza and the Sheraton, due to the sidewalk width (5 feet), this would not be the recommended route from a design perspective. According to the Vermont Pedestrian and Bicycle Facility Design Manual, the minimum recommended width for sidewalk that is intended for bicycle use is 8 feet. Due to right-of-way constraints, there is not sufficient space for this sidewalk to be widened to 8 feet. Westbound bicyclist travel on this sidewalk would increase the risk for crashes with motor vehicles exiting through the unsignalized Staples Plaza exit. These motorists would not likely expect bicyclists traveling on the sidewalk in that direction. This would also increase the risk for conflicts with pedestrians, due to the sidewalk width. The recommended route for westbound bicyclists would therefore be to use the connection to existing shared use path in the Quarry Hill neighborhood, connecting to East Terrace, then connecting back with US Route 2 at the jughandle. The City of Burlington is considering extending the shared use path from UVM to the jughandle area. There are also planned improvements at the jughandle.

Wind exposure for bicyclists and pedestrians over any bridge alternative could be mitigated through design. This could be addressed in the next phase; the current phase is focused on the alignment.

An inquiry will be made with VTrans to check on any plans for rebuilding the interchange. Comparing estimated travel time differences among alternatives for bicycles and pedestrians would be beneficial.

The creativity and gateway potential of a gondola or tram (Alternative 4) are appreciated, although it doesn't seem very practical.

Possible impacts to the current bridge configuration for Alternative 5 may include having to remove sidewalks from the existing bridge deck. This Alternative would be a good gateway landmark, with a welcoming feel, close to current development, and it mainstreams the concept that our transportation system is for more than just motor vehicles. Ramps would be at a 5% grade for ADA compliance.

The cannoli bridge (Alternative 5) would be the highest cost alternative. The bridge south of the interchange (Alternative 3) would be the lowest cost alternative.

Transit stops were also discussed. There are stops in front of the Sheraton, Staples, the DoubleTree and Cheese Traders. All buses go down Dorset Street and back.

7.2 PUBLIC WORKSHOP #2: ALTERNATIVES FEEDBACK

Alternatives were shared with the public at a meeting held on April 18, 2017. Participants had the opportunity to speak and provided comments for each of the alternatives on index cards. The feedback received by participants is summarized below and documented in the appendix.

7.2.1 Alternative 2

Participants were both for and against Alternative 2. Connecting back to US Route 2 is a concern for westbound bicyclists, as well as crossing US Route 2 multiple times. Some participants appreciate the accessibility of Alternative 2 and how it stays closer to US Route 2 than Alternative 3 does. Connections to University Mall are well-received. Concerns were raised over connections at the Dorset Street intersection and crossing US Route 2 at that location. The number of bridges was a concern in terms of construction cost.

7.2.2 Alternative 3

Participants were both for and against Alternative 3. Connecting back to US Route 2 is also a concern for westbound bicyclists regarding this alternative, as well as crossing US Route 2 multiple times. Connections to University Mall are well-received. Again, concerns were raised over connections at the Dorset Street intersection and crossing US Route 2 at that location. The longer distance for Alternative 3 was expressed as a concern for some, and a tradeoff for others.

7.2.3 Alternative 4

Some participants appreciated the creativity and possible attraction as a landmark, although most comments seem to be critical of this alternative. Concerns were expressed about how practical a gondola or tram would be for bicycles, staffing, maintenance, operating schedule, reliability, wind impacts, and cost.

7.2.4 Alternative 5

Participants were both for and against Alternative 5. Some participants appreciate the directness of the route, the ability to access the bridge from all four corners, the ability to cross US Route 2 using this alternative if desired, but without the requirement to do so. Other participants prefer an alternative that does move users away from this segment of US Route 2. Desires for connecting to Quarry Hill and more directly to University Mall, like Alternatives 2 and 3, were expressed.

7.3 ONLINE FEEDBACK

The City conducted an online survey to present alternatives and collect comments from the public unable to attend meetings. Survey comments express support for the range of alternatives, and for short term options like improved striping, and several calls for more bicyclist education to better use existing conditions. The survey consisted of seven simple questions: one question each for preference of the five alternatives, including 'Do Nothing'; one question about interest in mode for crossing the bridge; and one question for ranking factors that influence respondents' preferences for alternatives. Table 14-1 through Table 14-5 show feedback on alternatives. Survey results are reported in the appendix. Almost one eighth of respondents indicated no interest in crossing I-89 as a bicyclist or pedestrian. Remaining respondents mostly indicated interest or experience as both a bicyclist and pedestrian, with those that chose only one of these modes favoring bicycling. Safety was clearly the most influential factor in respondents' preference for alternatives. The majority of respondents indicated that neither 'Do Nothing' nor a Gondola or Tram would be acceptable. Of the three bridge options, Alternative 2 was the most popular among survey respondents.

Table 14-1: Alternative 1: Do Nothing

Most prefer		Somewhat prefer		Least prefer		Do not do this!	
7	4.27%	6	3.66%	36	21.95%	115	70.12%

Table 14-2: Alternative 2: Three Separate Bridges Over Cloverleaf

Most prefer		Somewhat prefer		Least prefer		Do not do this!	
79	46.75%	66	39.05%	14	8.28%	10	5.92%

Table 14-3: Alternative 3: Bridge from Quarry Hill to University Mall

Most prefer		Somewhat prefer		Least prefer		Do not do this!	
26	15.29%	86	50.59%	42	24.71%	16	9.41%

Table 14-4: Alternative 4: Gondola or Tram

Most prefer		Somewhat prefer		Least prefer		Do not do this!	
4	2.37%	8	4.73%	56	33.14%	101	59.76%

Table 14-5: Alternative 5: Cannoli Bridge

Most prefer		Somewhat prefer		Least prefer		Do not do this!	
52	30.77%	71	42.01%	28	16.57%	18	10.65%

8.0 VTRANS COORDINATION

Based on the matrix evaluation, the public feedback, and the stakeholder meetings, Alternatives 2 and 3 were identified by the project team as the most viable.

The project team then met with eight representatives of various sections of VTrans, along with representatives from the CCRPC, to present the two alternatives and discuss them more thoroughly.

It was noted that although there are no plans to expand or reconstruct the Exit 14 interchange, and replacement would be 20-30 years out, the US Route 2 bridge will eventually be replaced. The new design would need to accommodate pedestrians and bicyclists. Current modeling efforts indicate capacity issues on Exit 14 interchange ramps by 2050. The structural lifespan is also a factor. Alternative 2 would likely be demolished when the US Route 2 bridge is replaced. Alternative 3 would provide independent utility, remaining in place, and in use, during and after any potential long-term future interchange reconstruction that included a better inline facility, due to its separation from the interchange, and its proximity to the East Terrace/Quarry Hill neighborhood and the University Mall property.

Alternative 2 will likely conflict with VTrans' need to address stormwater treatment for the existing interchange in the near future.

Both Alternative 2 and Alternative 3 would face large costs for traffic control during construction, with costs for traffic control much higher for Alternative 2 due to the cloverleaf bridges.

Alternative 2 would be a much more complex project overall than the simple single span bridge for Alternative 3, resulting in substantially higher project costs.

Both Alternative 2 and Alternative 3 would have issues to work through for connecting the approaches on either side of the crossing. Alternative 3 has more options to connect to the easterly approach to City Center. The Federal Highway Administration (FHWA) would require the westerly approach to be connected to the traffic signal at Staples. The City will need to coordinate with FHWA for whichever option is chosen.

9.0 RECOMMENDED ALTERNATIVE

Each of the alternatives provides different advantages and disadvantages for the alternative transportation crossing over I-89 near Exit 14. The alternative that is ultimately selected by the City should be one that best serves users and the City for the foreseeable future.

Based on evaluation by the public, agencies, and project team of the long-term alternatives developed and the Purpose and Need Statement, the project team recommends Alternative 3, a bridge from Quarry Hill to the north edge of University Mall property, as the best alternative with the most flexibility to satisfy the current and anticipated activity in the vicinity of Exit 14.

The western terminus would be accessed by shared use path within the right-of-way adjacent to Staples Plaza along the southwestern edge of the interchange, and by a connection to shared use path that runs through the Quarry Hill neighborhood. The eastern terminus would be accessed by shared use path within the right-of-way adjacent to the Comfort Inn and CVS, and potentially by a connection to the University Mall property.

Alternative 3 is preferred over Alternative 2 for many reasons, including drainage, cost, complexity, and future development potential.

It is recommended the City undertake the following next steps:

- Update the Official Map.
- Develop a conceptual engineering design for the bridge, to include bridge architecture, approaches, path connections, and landscaping, and to evaluate options and cost for the type of bridge crossing the interstate, so the City can select a preferred conceptual design and pursue final engineering. A design competition may be one avenue for the City to consider.
- Work with Staples Plaza, Quarry Hill, the Comfort Inn/ CVS and University Mall property owners and developers to plan for the new bridge and incorporate bicycle and pedestrian connections to existing and planned shared use paths and sidewalks on Williston Road, Quarry Hill Road, Dorset Street, Market Street, and Garden Street.

The project team presented the final recommendations to the City Council on May 16, 2018. The City Council approved Alternative 3 as presented in this report. Documentation for City Council approval is provided in the appendix.

APPENDICES

APPENDIX 1: EXISTING CONDITIONS MAPS

APPENDIX 2: NATURAL RESOURCE MEMO

APPENDIX 3: UNDERGROUND UTILITIES

APPENDIX 4: PUBLIC OUTREACH

APPENDIX 5: INITIAL ALTERNATIVES – DISCARDED

APPENDIX 6: CITY COUNCIL DOCUMENTATION