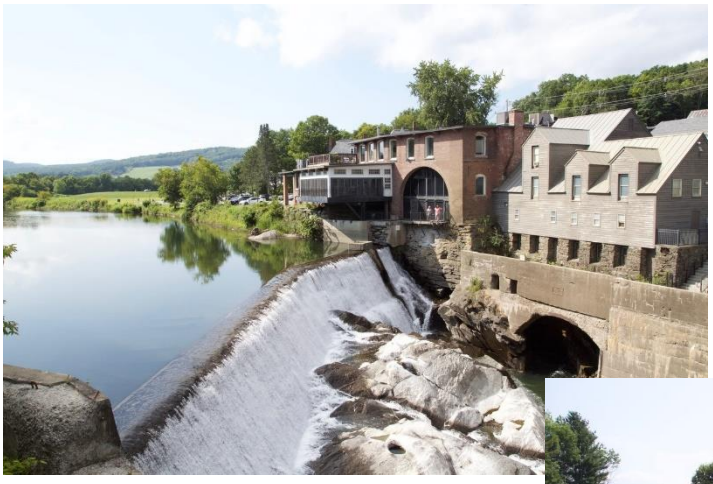
CASE STUDIES OF BICYCLING & WALKING IN SMALL COMMUNITIES: *HARTFORD, VERMONT*



February 2022

Prepared by the Western Transportation Institute at Montana State University's Small Urban, Rural, and Tribal Center on Mobility (SURTCOM) for the Vermont Agency of Transportation.

DISCLAIMER

This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof. The United States Government does not endorse products of manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the objective of this case study.

AUTHORS

This document was authored by Natalie Villwock-Witte, PhD, PE, and Karalyn Clouser of the Western Transportation Institute (WTI) at Montana State University. Technical editing was provided by Dana May; select graphics were created by Neil Hetherington; and a review was provided by Jaime Sullivan, all of WTI.

ACKNOWLEDGMENTS

The authors would like to acknowledge the contributions of the Vermont Agency of Transportation and AARP Vermont as well as the input and information provided by leaders, advocates, and residents within the Town of Hartford, Vermont.

COVER IMAGES

Front Cover Top: A view of the Ottauquechee River in Quechee

Front Cover Middle: Wilder Multi-Use Pathway

Front Cover Bottom: Parklet in downtown White River Junction

The back cover presents a photo collage of people walking and bicycling in the Town of Hartford, Vermont, as observed by the case study researchers while on-site.

TABLE OF CONTENTS

Executive Summary iii

Introduction 1

Background Information on the Community 1

County Typology 2

Community History 3

Timeline 8

Evolution of *Planning* for Bicycle and Pedestrian Infrastructure 9

Pedestrian/Bicycle Trail Linking Lebanon, NH and Hartford, VT via Railroad Bridge Over Connecticut River 9

Hartford Pedestrian and Bicycle Plan 11

Christian Street – Bugbee Street – US5 Pedestrian and Bicycle Study 13

Hartford Comprehensive Plans: 2014 and 2019 13

Climate Action Plan 15

Existing Bicycle & Pedestrian Infrastructure 15

Bicycle & Pedestrian Infrastructure Map 18

Supporting Programs for Bicycle and Pedestrian Infrastructure 19

Partnerships to Plan & Implement Bicycle & Pedestrian Infrastructure 20

Funding for Bicycle & Pedestrian Infrastructure 20

Lessons Learned 22

The Future of Bicycle & Pedestrian Infrastructure in the Community 22

Key Points 23

Successful Strategies to Apply in Other Small Communities 23

References 24

EXECUTIVE SUMMARY

The purpose of this case study was to identify bicycle and pedestrian infrastructure and programs in the Town of Hartford, Vermont that would be of interest to other peer communities. The Town of Hartford is composed of five distinct unincorporated villages (Hartford, Quechee, West Hartford, White River Junction, and Wilder). Most of the bicycle and pedestrian infrastructure within the Town of Hartford primarily supports walking. Three of the villages have extensive sidewalk networks (Hartford, White River Junction and Wilder), whereas Quechee has very few sidewalks and West Hartford, the most rural village, has none. Some of the most unique examples of provisions for walking and biking are found in the Village of Wilder. The one-mile Wilder Multi-Use Pathway provides a connection from the core of the village to the Dothan Brook School. In addition, bridges over a railroad line that would otherwise separate the core of Wilder from the Connecticut River allocate one-lane each for motorists and for pedestrians. The Village of White River Junction has reclaimed some parking space to create a parklet that serves as additional seating for a local restaurant. While a sidewalk connects White River Junction to Wilder when heading north and Hartford when heading west, Quechee and West Hartford are isolated from this core compilation from a walking and bicycling perspective. However, as the area is part of the larger Upper Valley, a public transportation system (where every bus has a bicycle rack) is present which helps to connect the numerous smaller communities in the region.

INTRODUCTION

Walking and bicycling have become increasingly popular modes of transportation and the existence of dedicated infrastructure to support active modes offers benefits to a community and its residents. While examples of active transportation infrastructure found in larger communities are well documented, this infrastructure can look different in rural communities and documented examples are lacking. This research effort aims to address this gap. Case studies from fifteen communities with fewer than 10,000 residents were developed. The case studies feature existing rural bicycle and pedestrian infrastructure located across five states, to include: Arcadia, LaBelle, and Taylor Creek in Florida; Calvert City, Corbin, and Morehead in Kentucky; Pelican Rapids, Pipestone, and Walker in Minnesota; Ruidoso, Silver City, and Truth or Consequences in New Mexico; and Fair Haven, Morristown, and the Town of Hartford in Vermont. Communities were selected using a prioritization process developed through a cooperative effort between the state departments of transportation and the researchers. More details about the research project, Case Studies of Communities of Less Than 10,000 People with Bicycle & Pedestrian Infrastructure, as well as additional case studies can be found at: https://westerntransportationinstitute.org/research_projects/case-studies-of-communities-of-less-than-10000-people-with-bicycle-pedestrian-infrastructure/

Case studies provide a detailed description of each community including a discussion of recent planning efforts related to bicycle and pedestrian infrastructure, supporting programs, and partnerships. Site visits, approximately one day per community, were conducted from June through December of 2021. During these visits, researchers collected spatial data and photographs to document existing infrastructure. Within this day visit, researchers also captured photos of people walking and bicycling in the communities, which can be found on the back cover of each case study. They also reached out to local advocates and community leadership. Lessons learned and best practices were documented from reviewing the planning documents and speaking with advocates and community leadership. The case studies aim to provide peer communities with the knowledge and encouragement to support additional implementation of active transportation infrastructure in rural communities across the US.

This case study focuses on the Town of Hartford.

BACKGROUND INFORMATION ON THE COMMUNITY

The Town of Hartford, Vermont has approximately 9,643 residents (2019), and experienced a 0.3% population decrease since 2010. It is in Windsor County, in southeastern Vermont at the junction of Interstate 89 and Interstate 91 (Figure 1); the Town of Hartford borders New Hampshire. The community's boundaries encompass 45.9 square miles.

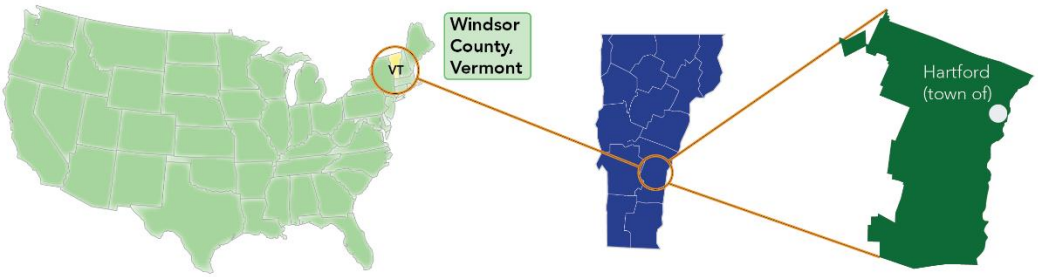


Figure 1: Location of the Town of Hartford, Vermont of Windsor County in southeast Vermont.

The following paragraphs provide demographic and socioeconomic data about the community, so that peer communities can better understand similarities and differences between their community and this case study community.

The average age of the Town of Hartford residents is 48.0 years old (2019). Approximately 23.5% (2019) of homes in the Town of Hartford are vacant which includes seasonal housing, vacant housing for rent/sale, and vacant housing held off the market. This percentage is slightly higher than the statewide percentage of vacant housing which is 22.4%. The Town of Hartford is the gateway to Vermont for large east coast cities like Boston, New York City, and Philadelphia. Consequently, locals report that there are many second homes in the region.

Approximately 21.1% (2018) of the Town of Hartford residents are employed within the community; a statistic which may provide a level of understanding regarding residents' commute distance and potential interest in walking or biking to work. According to the 2019 American Community Survey, 2.3% of people in the Town of Hartford walk and 0.2% bicycle to work for their daily commute. Hartford has a 4.4% (2019) unemployment rate. Hartford's median household income is $64,493 (2019), with 5.5% of households earning less than $10,000 and 6.6% earning more than $200,000. Approximately 6.0% (2019) of Hartford's population lives in poverty, as defined by the Office of Management and Budget's Statistical Policy Directive 14.

COUNTY TYPOLOGY

According to the rural classification methodology used in *Emerging Technology and Opportunities for Improved Mobility and Safety for Rural Areas*, The Town of Hartford is located within a county that was designated as a Rural Towns County Type. A Rural Towns County Type is defined by having a city or town with a population below 20,000 people.

COMMUNITY HISTORY

The Town of Hartford was established as an agricultural community in 1761. It is unique for the case study communities involved in this research effort in part because it is made up of five different villages (Hartford, Quechee, West Hartford, White River Junction, and Wilder) (Figure 2), each of which have their own unique feel. All five villages are recognized as having historic districts. As established in New England states, a Selectboard serves as the local legislative body of the Town of Hartford.

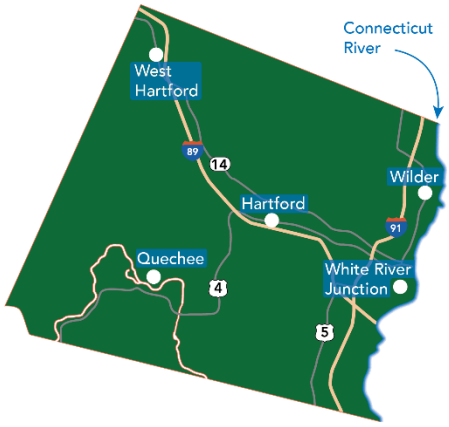


Figure 2: Map showing the five villages that make up the Town of Hartford.

The Town of Hartford is part of the Upper Connecticut River Valley (locally known as the Upper Valley). Within the Upper Valley there are about sixty-nine towns spread between Vermont and New Hampshire. Grocery stores, pharmacies, and libraries cannot be found evenly spread throughout these communities and consequently, a resident in one may have to travel to another community to access basic needs (Figure 3). For example, Wilder is largely residential so they may choose to shop at the food co-op in White River Junction, across the Connecticut River in Lebanon, New Hampshire or elsewhere. Therefore, while public transportation is available, a vehicle is almost essential for many residents in the river valley. Add to this the hilly, river valley topography and winter weather, and bicycling can be difficult for some residents.

Quechee is well known for its gorge (see top left photo on the cover page), the deepest in Vermont. This feature draws many visitors in the summer months. In the winter months, there is a small ski hill that draws a few tourists. Quechee has a post office and a local market (Figure 3).

Figure 3: Village map of Quechee, Vermont showing boundaries and services.

White River Junction was historically a railroad town. It has numerous restaurants and a co-op (Figure 4). Just on the other side of the Connecticut River is West Lebanon, New Hampshire, which also has a lot of services.

Figure 4: City map of White River Junction, Vermont showing boundaries and services.

West Hartford is the most rural of the villages; it has a library (Figure 5). The Appalachian Trail passes through this village.

Figure 5: City map of West Hartford, Vermont showing boundaries and services.

Wilder, is largely residential, and was developed as a planned mill community. There is a post office in the community (Figure 6). There is also access to the Connecticut River from a park.

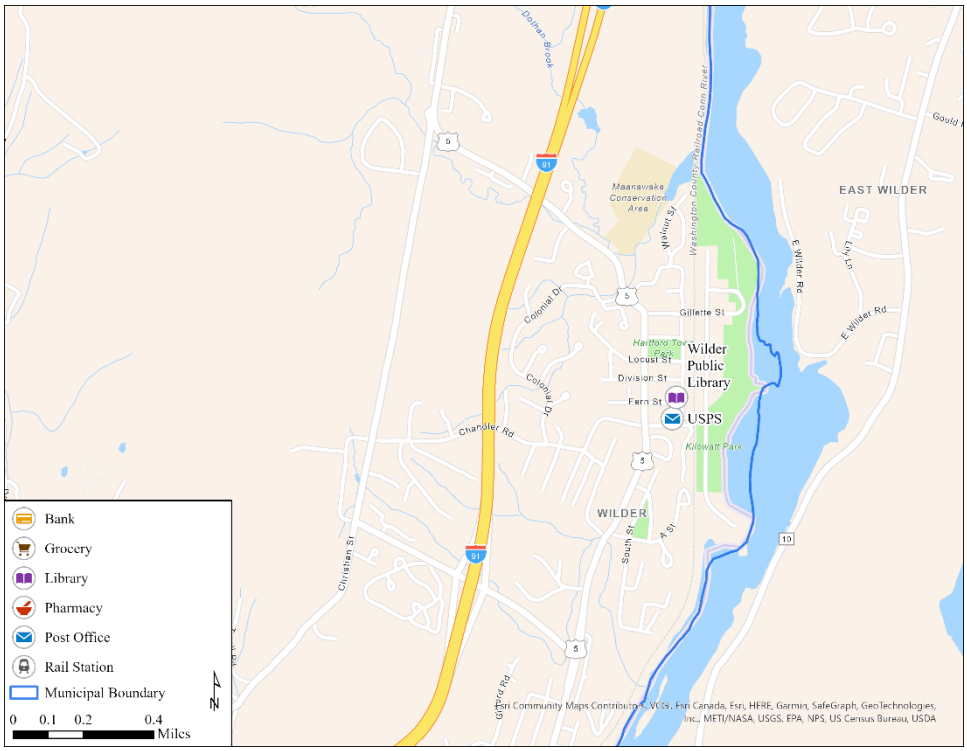


Figure 6: City map of Wilder, Vermont showing boundaries and services.

Hartford is also largely residential; it has a library and post office (Figure 7).

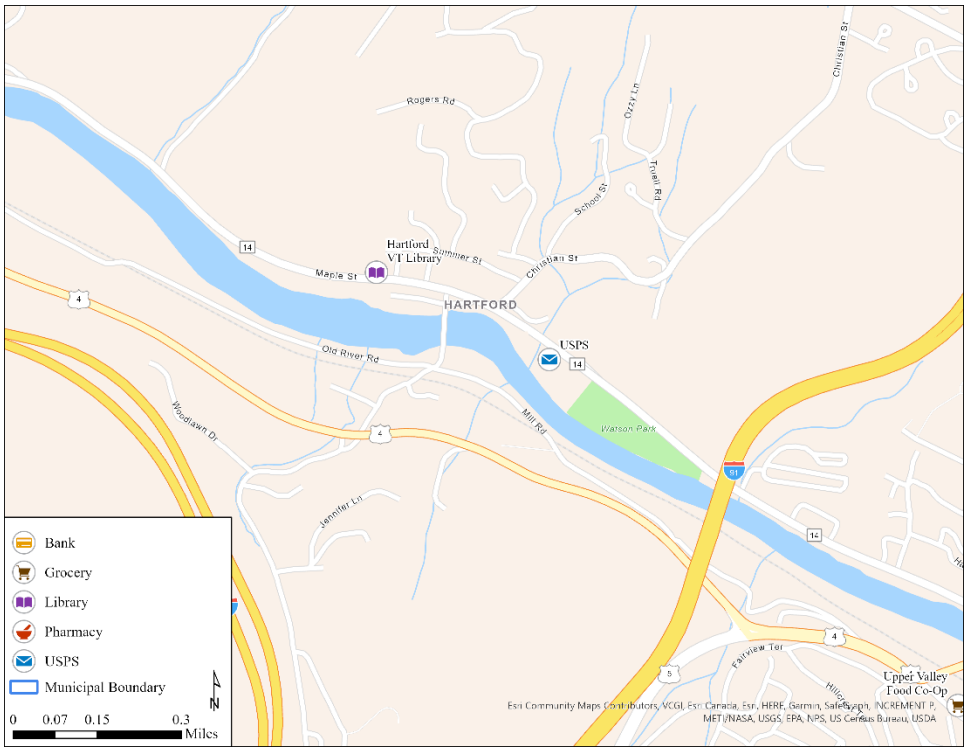


Figure 7: City map of Hartford, Vermont showing boundaries and services.

TIMELINE

A timeline of events is provided in Table 1 to describe major milestones for bicycle and pedestrian infrastructure development and supporting programs in the Town of Hartford, Vermont.

Table 1: Timeline of major milestone events for bicycle and pedestrian infrastructure.

Year	Event
1996	The Quechee Gorge Master Plan, developed with a Federal Public Lands Highways Grant, recommended enhancements, including sidewalks along US4
2001	The one-mile Wilder Multi-Use Path is opened
2006	The Town of Hartford is accepted in the Vermont Safe Routes to School Program; Dothan Brook School was selected as a pilot program to educate and encourage children to walk and bicycle to school
2007	The Town of Hartford Comprehensive Plan begins to include a bicycle and pedestrian component
2007	A coordination meeting was held between the Upper Valley Trails Alliance, National Park Service, Town of Hartford, City of Lebanon, and the New Hampshire Department of Transportation on March 14, 2007, for the feasibility study, *Pedestrian/Bicycle Trail Linking Lebanon, NH and Hartford, VT via Railroad Bridge over Connecticut River*
2007	A coordination meeting was held with Vermont Agency of Transportation on June 15, 2007, for the Bike/Ped Railroad feasibility study
2007	A Public Information Meeting was held on July 11, 2017, for the Bike/Ped Railroad feasibility study
2007	The feasibility study, *Pedestrian/Bicycle Trail Linking Lebanon, NH and Hartford, VT via Railroad Bridge over Connecticut River*, was completed on December 21, 2007
2007	A survey of Dothan Brook School parents found that more than fifty percent of parents did not allow their children to walk or bike to school because they were concerned about vehicle traffic speeds
2007	Safe Routes to School funding was used to construct a new sidewalk on Gillette Street and crosswalks along US 5 in Wilder Village
2009	The *Hartford Pedestrian and Bicycle Plan* was completed and approved by the Selectboard on July 28, 2009
2010	The Dothan Brook School was awarded $27,000 through Safe Routes to School by the Vermont Agency of Transportation to conduct a feasibility study for walking and bicycling facilities along Christian Street, Bugbee Street, and US5
2011	A Public Meeting was held for the Christian Street, Bugbee Street, and US5 Pedestrian and Bicycle Scoping Study on December 8, 2011
2011	A Tax Increment Financing (TIF) district was established on April 5, 2011, later approved by the Vermont Economic Progress Council (VEPC) on December 8, 2011. It is applicable to the historic White River Junction downtown area
2012	Preliminary proposed sidewalk treatments for Christian Street and Bugbee Street were presented at a PTO Meeting on March 19, 2012
2012	An Alternatives Public Meeting was held for the Christian Street, Bugbee Street, US 5 Pedestrian and Bicycle Scoping Study on April 23, 2012
2013	The Town of Hartford accepted the Christian Street, Bugbee Street, US 5 Pedestrian and Bicycle Scoping Study on June 11, 2013
2014	A Kick-off community meeting was held for the Quechee Village Bicycle/Pedestrian Scoping Study on April 2, 2014
2014	An alternative public meeting was held for the Quechee Village Bicycle/Pedestrian Scoping Study on September 23, 2014
2014	$900,000 in TIF funding was approved by voters for reconstruction and realignment of Prospect Street, including pedestrian walkways and lighting

Year	Event
2015	The final public meeting for the Quechee Village Bicycle/Pedestrian Scoping Study occurred on January 6, 2015 with the Selectboard accepting the study and its recommendations
2016	An alternatives public meeting was held for the West Hartford Village Bicycle/Pedestrian Scoping Study on May 26, 2016
2016	Final public meeting for the West Hartford Village Bicycle-Pedestrian Scoping Study occurred on December 20, 2016, with the Selectboard accepting the study and its recommendations
2017	The Town of Hartford put out a request for bids for the "construction of sidewalk, curbing, bike lane and retaining wall for Lower Sykes Mountain Avenue from South Main St. to Butternut Lane"
2018	The retaining wall, sidewalk, curbing and bike lanes on Lower Sykes Mountain Avenue from South Main St. to Butternut Lane was completed
2019	The Town of Hartford Selectboard and School Board formed the Ad-Hoc Climate Advisory Committee
2019	The Town of Hartford Selectboard adopted eight projects that included sidewalks on January 2, 2019, as part of their Capital Improvement Plan (CIP)
2020	Construction of the Upper Sykes Mountain Avenue and bike lane project and the Sykes Mountain Avenue and Route 5 roundabout began
2020	US Route 5 Improvements Study: Project Definition Report, Arboretum Lane to Highland Avenue, Hartford, Vermont
2021	Vital Communities, in cooperation with Local Motion, lends e-bicycles through the local libraries
2021	Vital Communities is piloting an e-bicycle purchasing program with a goal of engaging twelve Vermonters
2021	Sidewalks and bike lanes for Upper Sykes Mountain Avenue were under construction as well as a multi-use pathway as part of the construction of two roundabouts
2021	On August 24, 2021, the Town of Hartford Selectboard formally adopted their Climate Action Plan

EVOLUTION OF *PLANNING* FOR BICYCLE AND PEDESTRIAN INFRASTRUCTURE

This section discusses the following plans: a plan that investigated a trail connection over the Connecticut River on an existing railroad bridge (no motorized traffic); the 2009 Hartford Bicycle and Pedestrian Plan; the Christian Street, Bugbee Street, and US5 scoping study; Hartford Comprehensive Plans; and the 2021 Climate Action Plan.

PEDESTRIAN/BICYCLE TRAIL LINKING LEBANON, NH AND HARTFORD, VT VIA RAILROAD BRIDGE OVER CONNECTICUT RIVER

In 2007, a feasibility study was conducted to look at the possibility of using a partially active railroad bridge that spans the Connecticut River between White River Junction, Vermont and West Lebanon, New Hampshire as a formalized trail connecting the two communities. Motor vehicles do not have access to this bridge. The Upper Valley Trails Alliance (UVTA) viewed the railroad bridge as an opportunity for improved infrastructure for the Upper Valley Loop Trail (Figure 8). (Note: The Upper Valley Loop Trail is approximately a fifteen mile, on-road bicycle route which connects multiple communities in Vermont and New Hampshire including the Town of Hartford.)

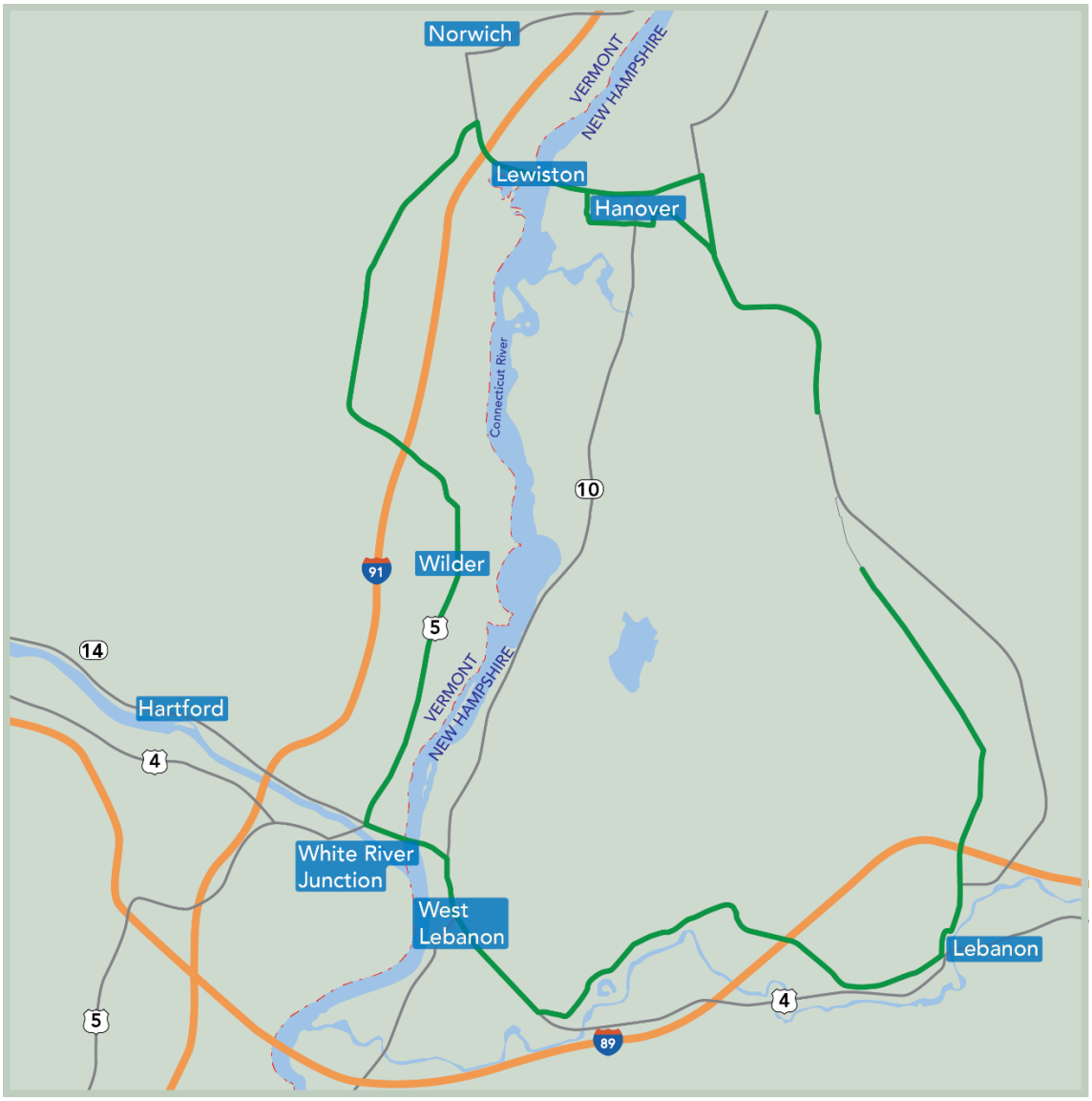


Figure 8: Upper Valley Loop Trail.

Pedestrians were already using the bridge to cross from one community to the other. The feasibility study was funded through the National Park Service's Rivers, Trails and Conservation Assistance Program (RTCA). Concerns were expressed by VTrans' Rail Program Manager and the railroad (operating on the Vermont side of the Connecticut River) regarding trail alternatives that would cross over active railroad tracks. Concerns regarding the safety of trail users were also identified as being associated with a box culvert or underpass alternative that would obstruct the view of trail users because of the presence of homeless people in the area. The proposed alternatives tried to balance the above concerns while also trying to maintain more direct access to downtown White River Junction. It does not appear as if this connection was formally made available to walkers and bicyclists.

HARTFORD PEDESTRIAN AND BICYCLE PLAN

A Pedestrian and Bicycle Steering Committee was formed to help facilitate the completion of the 2009 Hartford Pedestrian and Bicycle Plan. The Steering Committee worked with the Hartford Town Planner and a transportation planner with the Two Rivers-Ottauquechee Regional Commission. The plan was noted as intending to "promote bicycling and walking as a safe, attractive, convenient, healthy, non-polluting form of transportation and recreation for all Hartford residents and visitors."

The introduction of the plan highlights that motor vehicles tend to dominate the transportation systems and influence how a community is developed. In addition, the plan lists negative impacts of motor vehicles: noise, air pollution, and traffic congestion. It also highlights concerns by public health officials regarding sedentary lifestyles. In particular, the plan expresses concerns with the relationship between an increase in commuting times and an increase in waistlines. The plan notes that it is imperative to connect people to essential services (grocery stores, post offices, schools, and community facilities). It highlights that walking and bicycling can create a sense of community because of personal interactions.

The plan highlighted the difference between those living within the village cores as compared with those living in the more rural areas, suggesting that "data supports an intuitive connection that people require space to walk or bicycle as well as nearby places to frequent." The plan identifies 9.5 miles of existing walking facilities and the one-mile walking-and-biking Wilder Multi-Use Pathway. They also highlight the absence of bicycle lanes on any road in town. The plan cites the following sidewalk conditions (Table 2).

Table 2: Town of Hartford sidewalk conditions.

Sidewalk Condition	Percent of Sidewalks
Excellent	26%
Good	60%
Fair	6%
Poor	7%

They also noted that as the town began reconstructing the roadways to improve the pavement conditions, they constructed or reconstructed four miles of sidewalk. The sidewalk was constructed using a combination of money from private developers (0.6 miles of sidewalk), town-only financing (1.2 miles of sidewalk), and town financing combined with state and/or federal grants (2.1 miles of sidewalk).

The plan suggests finding a balance between lower cost, smaller projects and higher cost projects that may also address some significant challenges, like a gap in network connectivity. One important recommendation that the plan made was to engage a more active base of community members. When talking about types of facilities, the plan suggests providing a balance between soft-surface facilities that may be preferred by

walkers and runners (and would not be maintained in the winter) with hard-surfaced facilities like asphalt and concrete (that would be maintained year-round).

Within the plan, the Hartford Area Bicycling Route Map is identified. The plan also identifies a total of ten bicycle racks, concluding that there is insufficient bicycle parking. The plan notes that the lack of available bicycle parking is demonstrated by bicycles being chained to trees and other objects (Figure 9). However, they also highlight that certain designs of bicycle racks can damage bicycles and bicycle tires. To address the limited amount of parking, the plan proposes that the town reimburse private owners who install bicycle parking fifty percent of the cost (with the program capped at $1,500 annually).

Figure 9: A bicycle secured to a post.

In 2006, the Town of Hartford was accepted into the Vermont Safe Routes to School Program. The Dothan Brook School was selected to pilot educating and encouraging children to walk and bike to school. The intent was for the program to be self-sustaining once the federal funds ran out.

The pedestrian and bicycle plan also highlights the safety benefits of shorter crossings, suggesting that road lane restrictions, curb bump-outs, and median pedestrian refuges can help to reduce crossing distances. The interplay between the town's public transportation system (Advance Transit) and walking and bicycling facilities is also very important. While bicycle parking and storage facilities present at the bus stops are limited, all buses have bicycle racks on them.

Highlighted several times within the bicycle and pedestrian plan is a desire to connect all villages with a trail system. The plan also discusses pedestrian and bicycle counts, suggesting that the technology is "still very new, unreliable, and expensive to install." The plan ultimately creates a ranking system with three parts. For Part 1, the following was used to rank projects:

$$Planning\ Priority\ Score = Traffic\ Volumes + Land\ Use\ Density + Walking\ \&\ Bicycing\ Routes + Public\ Transportation$$

Part 2 says that every village must be walkable. Part 3 used the following to rank projects:

$$Condition\ Priority\ Score = Quality\ of\ Walking\ Conditions + Quality\ of\ Bicycling\ Conditions + Traffic\ Factors$$

The projects were identified as being addressed over a twenty to thirty-year time span. The plan indicates that municipal taxes help to address approximately $100,000 a year in the repair or construction of sidewalks. They note that community constructed facilities are more affordable than state or federally funded construction. Similarly, the plan identifies that when private developers construct bicycle and pedestrian improvements, they are less expensive because there are fewer "government procedures, regulations, and permits." The plan identifies the Planning Commission as having the authority to require bicycle and pedestrian improvements for the approval of private developments. The plan concludes that within five years, they wanted to:

1) repair sidewalks so that ninety percent of them have a good/excellent rating (maintaining 1,000 feet annually until this condition is reached),
2) expand the network by 1,000 feet annually (once the first action has been met),
3) incorporate the plan into the Town of Hartford Master Plan, and
4) maintain the Hartford area bicycle route map.

CHRISTIAN STREET – BUGBEE STREET – US5 PEDESTRIAN AND BICYCLE STUDY

Building from the success of constructing the Wilder Multi-Use Trail and installing sidewalks in the Village of Wilder along US5, the *Christian Street – Bugbee Street – US 5 Pedestrian and Bicycle Study* was conducted. It was formally adopted by the Town of Hartford Selectboard in 2013. As implied by the name, the study focused on potential alternatives for walking and bicycling on three additional roadways (Christian Street, Bugbee Street, and US5) for access to Dothan Brook School for students. The current configuration presented a level of concern for parents and school officials. A 2007 survey of parents reported that vehicle traffic speed was preventing more than fifty percent of parents from allowing their children to walk or bike to school. The study identified that Bugbee Street is on Vermont Agency of Transportation's list of high crash sections. Ultimately, none of the recommendations were implemented, with comments during a presentation to the public suggesting that the proposals were too expensive, and that it would change the rural character of Christian Street. A few comments expressed concern for the safety of children.

HARTFORD COMPREHENSIVE PLANS: 2014 AND 2019

This sections discusses the Hartford Comprehensive Plans of 2014 and 2019. Since 2007, the Hartford Comprehensive Plans have included discussions regarding walking and bicycling.

The 2014 Hartford Comprehensive plan had a section both on bicycle and pedestrian transportation. It identified three types of bicycle facilities: 1) bicycle shoulders, 2) bicycle path networks, and 3) designated bike lanes. Two examples of transportation service improvements provided in the plan were bus bike racks and commercial-center bike-storage facilities. The plan also discusses some of the challenges, including steep grades, significant vehicle volumes, and narrow roads. It also discusses the aforementioned Upper Valley Loop Trail (Figure 8 and Figure 10).

Figure 10: Sign identifying the Upper Valley Bike Loop

The Wilder Multi-Use Pathway is part of the Upper Valley Loop Trail, although formally listed as a parallel path. In addition, the previously discussed railroad connection was also proposed to serve as part of the loop. The plan notes that Amtrak trains permit bicycles on board and the region's buses have bicycle racks. The plan identified that the Town of Hartford had ten miles of sidewalk, primarily in village centers, noting that the community strives "for a continuous system of high-quality, connective sidewalk…" The planning document also highlights that the town primarily takes on the responsibility of maintaining any installed sidewalks, noting that state and federal grants do not support the cost to reconstruct sidewalks.

The 2019 Hartford Town Plan identified eight projects that include sidewalk as capital improvement projects (CIPs):

1) Sykes Mt. Ave Sidewalk/Butternut to Walsh Ave (North Side) [$30,000]
2) Quechee Main St. Sidewalk - = +$150,000/FY2023 * $370,000 State Grant [$80,000]
3) Waterman Hill Sidewalk + $300,000 State Grant [$60,000]
4) Bike/Ped Plan Reserve to Initiate Work for Projects Beyond 2025 [$30,000]
5) RT 14/West Hartford Sidewalks + $35,000 Grant * Radar Feedback and Ped Path Implementation [$25,000]
6) Rt. 4 Sidewalk/Waterman Hill to Jake's Market [$34,000]
7) Hartford Ave Sidewalk [$15,000]
8) Rt. 4 Sidewalk/Waterman Hill to Gorge [$220,000]

The town plan contained the following goal: "Improve safety and availability of pedestrian and bicycle routes." Within this goal, it identified a need to update the 2009 Hartford Pedestrian and Bicycle Plan. The plan also suggests an action to design and engineer pedestrian and bicycle facilities in case construction funds become available. Under a goal and strategy focused on growing the three villages of Hartford, White River Junction and Wilder, the following action was identified, "Enhance pedestrian accessibility in village areas."

CLIMATE ACTION PLAN

In 2021, the Town of Hartford released a Climate Action Plan with the overall goal to achieve net-zero greenhouse gas emissions town-wide by 2030. Implementation of the strategies listed within the plan are anticipated within the next one to seven years. Within the Transportation and Land Use section, several of the strategies and supporting actions relate to walking and bicycling. For example, within the strategy, "Decrease community wide VMT [Vehicle Miles Traveled] by 2.9% by 2030," the following actions relate to walking and biking:

1) "Create mobility hubs for enhanced mobility options….bike share,"
2) "Continue to support Safe Routes to Schools programs,"
3) "Develop an Active Transportation Plan (ATP) to facilitate the expansion of strong bicycle and transit connections within and between villages…a seamless regional bike network that favors protected bike lanes," and
4) "Prioritize transportation funding for Vision Zero engineering improvement projects to create safe streets for people walking, biking…"

A second strategy, related to increasing battery electric vehicles, specifically calls out the use of e-bikes. Finally, a third strategy has the following action, "Support a new regional (Vermont and New Hampshire) multimodal transportation funding source for transit, bicycle and pedestrian services and facilities." At the conclusion of the section, the plan identifies ways that the reader can support the plan, with the following four actions related to walking and bicycling identified:

1) "Walk to work, an appointment, a group activity or event,"
2) "Ride a bike, electric bike or scooter to work, an appointment, a group activity or event,"
3) "Buy or tune up a used bike," and
4) "Sell or donate a bike (in good condition) you aren't using."

EXISTING BICYCLE & PEDESTRIAN INFRASTRUCTURE

Overall, the Villages of Hartford, White River Junction, and Wilder all have a good sidewalk network. In contrast, the Village of Quechee has limited sidewalks and West Hartford, which is in proximity to the Appalachian Trail, has none. The Town of Hartford's Department of Public Works maintains all sidewalks within the town's boundaries.

At the time of data collection during the summer of 2021, Upper Sykes Mountain Avenue was undergoing construction. It was reported as one of three on-going projects. The planning for that project began in 2004. Two businesses adjoining the project are paying for the installation of the sidewalk and bike lane along their road frontage that was a requirement of an earlier Site Development Plan approval. However, because of the delay between when the project was proposed and present day, the original cost estimate approximately doubled.

Table 3 summarizes bicycle and pedestrian infrastructure identified across all case study communities, noting which ones were observed while on-site in the Town of Hartford, Vermont.

Table 3: Bicycle and pedestrian infrastructure in case study communities.

Bicycle and/or Pedestrian Infrastructure in Case Study Communities	Presence in the Town of Hartford
Bicycle Lane	
Bike Rack	X
Shared Lane Markings	
Sidepath	
Defined Bike Route (by signage)	X
Multi-Use Pathway	X
Trail (soft surface)	X
Rectangular Rapid Flashing Beacon (RRFB) Crossing	X
Mid-Block Crossing	X
Crosswalk	X
Sidewalks	X
Bridges that enable walking or biking	X
Underpasses that enable walking or biking	X
Parklet	X
Benches	X
Repair Station/Air Pump	
Speed Bump/Speed Table	X
Speed Feedback Sign – Permanent	X
Speed Feedback Sign – Portable	X
Signage	
Bike/Ped Crossing Sign with light emitting diode (LED) lights	X
Bicycle May Use Full Lane	
Share the Road	
State Law, Yield/Stop for Pedestrian in Crosswalk	
Steep Grade	
Drive Slow in Residential Areas/Please Slow Down	
Traffic Calming Area	
Weight Limitations	
Interpretative/ Wayfinding Information	X
Walking Routes	X
Entertainment District	

White River Junction has an engaging mural, which allows one to provide input with chalk regarding something they would like to accomplish in their life (#1 in Figure 12). A parklet (curb side parking spaces that were repurposed into public seating; see the National Association of City Transportation Officials' *Urban Street Design Guide*) in White River Junction extends the seating of a popular local restaurant (#2 in Figure 12 and bottom left photo on the cover).

In Wilder, a low-volume bridge over a railroad track provides one lane for motor vehicles and a sidewalk for pedestrians (#3 in Figure 12). Wilder is also home to the one-mile Wilder Multi-Use Pathway. It passes residences that have a direct connection to the facility (#4 in Figure 12). The Wilder Multi-Use Pathway is also identified as a potential parallel

trail as a part of the Upper Valley Loop Trail. The Pathway has a bicycle and pedestrian only bridge (#5 in Figure 12), and it eventually terminates at the Dothan Brook School, a local elementary school, which provides bicycle racks (#7 in Figure 12). While this multi-use pathway provides a great connection for students living within Wilder, Dothan Brook School also serves students in the Village of Hartford, which does not have a similar multi-use pathway or sidewalk connection via Christian Street.

A scoping study, discussed previously, had been conducted. However, no infrastructure changes have been made to date due to the lack of public support and cost considerations.

A limited number of public transportation shelters have a rack for bicycles (#6 in Figure 12). However, as reported in the Town of Hartford Comprehensive Plan, every bus has a bicycle rack. A park in the Village of Hartford provides a bicycle rack (#8 in Figure 12).

Quechee's picturesque, covered bridge (Figure 11) has a separate walkway for pedestrians (#9 in Figure 12), even though the pedestrian network on either side of the bridge is limited.

Figure 11: Quechee covered bridge over the Quechee Gorge

A rectangular rapid flashing beacon (RRFB) assists pedestrians with crossing US4 so they can view the Quechee Gorge from either side of the roadway (#10 in Figure 12).

BICYCLE & PEDESTRIAN INFRASTRUCTURE MAP

Figure 12: Town of Hartford Bicycle and Pedestrian Infrastructure Map.

SUPPORTING PROGRAMS FOR BICYCLE AND PEDESTRIAN INFRASTRUCTURE

The Town of Hartford has implemented several programs that support walking and bicycling within the community that were observed while on-site or documented in reports (Table 4).

Table 4: Bicycle and pedestrian supporting programs in case study communities.

Bicycle and/or Pedestrian Supporting Programs in Case Study Communities	Presence in Hartford
Demonstration/Pilot Projects	X
Art Walks/Historical Walk/Children's Walk/Health Walk	X
Sculpture(s)/Statue(s)	
Mural(s)	X
Little Free Library	

The Vital Communities Transportation Program coordinates the Upper Valley Transportation Management Association (UVTMA). Members include employers, transportation providers (i.e., transit providers), municipalities, and planners. The Town of Hartford is a member of UVTMA. Vital Communities currently has two programs that are trying to make electric bicycles (e-bicycles) more accessible. The first is a bicycle library program, conducted in cooperation with Local Motion, composed of e-bicycles. It allows participants to try out an e-bicycle for free. The second program provides subsidies for purchasing an e-bicycle. The subsidies can range from an interest-free loan to an overall reduction in the cost of the e-bicycle. It is reflective of more than just one's income, taking into account one's net assets (i.e., is the person a monthly renter or do they own a home that is paid for). In addition to the subsidy or interest-free loan, participants of the program receive training on how to safely bicycle with vehicles on the roadway. The program provides a workshop on how to maintain e-bicycles, including special winter considerations. The e-bike program is subsidized by the Vermont Agency of Transportation from a Mobility Transportation Initiative (MTI) grant. The e-bicycle subsidy program is in its pilot phase, with a goal of getting twelve Vermonters to participate. The program will potentially be made available to more Vermonters by the UVTMA if it is successful.

Rather than the more traditional active living committees or very specific bicycle and/or pedestrian committees, Hartford has a Climate Advisory Committee. This committee has been promoting walking and bicycling as an alternative to driving. Due to the many hills in town that pose a challenge to bicycling, the Committee has promoted the use of e-bicycles by the community with free e-bicycle loan events.

Prior to the coronavirus pandemic, the Dothan Brook School had a bike and walk to school program. Once a week, volunteer parent monitors would help with crossing some of the major thoroughfares along the route. School children would walk to school from Wilder's village center and travel along the mile-long multi-use pathway. About seventy-five school

children would participate. In addition, Dothan Brook School made use of Local Motion's bike trailer annually, for at least six to seven years. (Note: A bicycle trailer stores bicycles and other supplies to aid in the deployment of bicycle rodeos at schools.) During school hours, the focus is on children in second through fifth grade. They also offer lessons on how to ride a bicycle as a part of after school programs for third graders and older.

PARTNERSHIPS TO PLAN & IMPLEMENT BICYCLE & PEDESTRIAN INFRASTRUCTURE

One aspect unique to the region are the numerous agencies working to support bicycle and pedestrian infrastructure. These including Vital Communities, the Vermont Agency of Transportation (VTrans), and the Two Rivers-Ottauquechee Regional Commission. Vital Communities reports that if a transportation solution is found to work well in one of the communities, it may be piloted in another. However, sometimes differing laws in New Hampshire and Vermont may limit transferability.

The Town of Hartford reports having lots of success in working with VTrans to conduct bicycle/pedestrian scoping studies. It allows for a relatively small amount of money (VTrans funded) to scope out projects and to better understand how much community support a project may have. Scoping studies "look at purpose & need for a project, conceptual alignment, right-of-way, property owner & utility impacts, natural & cultural resources; and include public involvement, project viability & provide preliminary cost estimates." The Town of Hartford has completed at least seven scoping studies: 1) Maple Street (2001), 2) Christian St. (Dothan Brook School to Norwich, 2002), 3) Sykes Mountain Ave/Rte 5 (2004), 4) Route 5/I-91 Interchange (2013), 5) Christian Street/Bugbee Street/US 5 (2013), 6) Quechee Village (2015), and 7) West Hartford Village (2017).

The Two-Rivers Ottauquechee Regional Commission was identified as providing support with the town's 2009 Bicycle and Pedestrian Plan and 2014 Comprehensive Plan.

FUNDING FOR BICYCLE & PEDESTRIAN INFRASTRUCTURE

The Town of Hartford has leveraged a myriad of funding sources to support the implementation of bicycle and pedestrian programs and infrastructure. A Federal Public Lands Highways grant; a National Park Service Rivers, Trails, and Conservation Assistance (RTCA) program challenge grant; transportation alternatives program funding; a Vermont Municipal Planning Grant; Safe Routes to School; a tax improvement district; and capital improvement program funds were all identified as contributing to planning or implementing projects within the Town of Hartford.

In addition, the Town of Hartford zoning regulations have set site plan review standards which may require a developer to make improvements to the sidewalk network or address bicycle and pedestrian accessibility.

The Quechee Gorge Master Plan, created in 1996, was funded by a Federal Public Lands Highways grant. It recommended, among other enhancements, sidewalks along Route 4.

Funding from a National Park Service RTCA program's challenge grant funded the feasibility study of using part of the railroad crossing over the Connecticut River as a rail with trail connection between White River Junction, Vermont and West Lebanon, New Hampshire.

The Town of Hartford reports primarily relying on grants available at the state level, like the Transportation Alternatives Program (TAP) funding in addition to the Town's Capital Improvements Program. Identifying the Vermont Bicycle/Pedestrian Program as the funding source, the Town of Hartford put out a request for bids for "sidewalk, curbing, bike lane and retaining wall for Sykes Mountain Ave. from South Main St. to Butternut" in July of 2017. Figure 13 shows the sidewalk along Lower Sykes Mountain Avenue identified in August of 2021.

Figure 13: Lower Sykes Mountain Avenue sidewalk.

The Bicycle and Pedestrian Master Plan developed in 2009 was funded by a Vermont Municipal Planning Grant. The plan itself was developed by the Regional Planning Commission.

The Wilder Multi-Use Pathway was funded in the 1990's through the former Transportation Enhancement Grant program. In addition, $27,000 in Safe Routes to School funding was awarded by VTrans to the Dothan Brook School to conduct a feasibility study.

The Town of Hartford also identified funding as being received from VTrans to conduct the Quechee Village Bicycle/Pedestrian Scoping Study in 2014.

A tax increment financing district was created in downtown White River Junction. Funding from this district, $900,000, was used to reconstruct and realign Prospect Street, including the creation of pedestrian walkways and the installation of lighting.

Within the 2019 Hartford Town Plan, as a part of the Capital Improvement Program, $494,000 was set aside to support eight different projects that have a sidewalk component to them.

LESSONS LEARNED

From the Town of Hartford's experience, scoping studies have served as a useful tool to understand the potential impact of walking and bicycling alternatives more fully.

The Town of Hartford has been very effective at leveraging a myriad of funding. The Capital Improvement Program (CIP) line item provides a constant stream of match funding for projects that allows the community to respond quickly to funding that may be available. In addition, developing preliminary design and engineering also allows the community to get bicycle and pedestrian infrastructure built.

One challenge that the Town of Hartford identified is changes in the estimated price for a project if the implementation lagged from what it was originally conceptualized. With the many shocks to the economy (i.e., Great Recession; coronavirus pandemic), estimating the costs of projects will likely remain challenging.

THE FUTURE OF BICYCLE & PEDESTRIAN INFRASTRUCTURE IN THE COMMUNITY

The community had three on-going projects in August of 2021 (Upper Sykes Mountain Avenue, S. Main Street, and US54) that support walking and bicycling in the town. As these are completed, the community expects to pursue more funding for applications that are supported by the community. The Town of Hartford Selectboard has also set aside money that can be used to fund future bicycle and pedestrian projects. In addition, the town has outlined in their most recent update that they intend to update their bicycle and pedestrian plan.

KEY POINTS

The following are key points identified from this case study:

1. Scoping studies can provide information on the level of support that a community has towards a proposed project and is a relatively low-cost investment to gauge this information.

2. The Town of Hartford highlighted the need to repair the sidewalk infrastructure it had before expanding the sidewalk infrastructure.

3. Setting aside funding annually, as part of the community's budget, allows the community to leverage funding that may become available.

4. The Town of Hartford has made it a priority to develop more detailed designs of potential projects to enable them to take advantage of last-minute funding that may be made available.

5. The community has taken a multi-pronged approach to implementing and maintaining its infrastructure, noting that when projects were done using only community-funds, they often had lower budgets because there were fewer requirements. Similarly, the community has noted that private funding also provides more flexibility when considering requirements.

6. The Town of Hartford has made it a priority to improve their network both within and between communities, understanding that some people must travel longer distances between communities to access work, school and necessary services.

7. The Town of Hartford is unique in their interest in connecting walking and bicycling with a desire to address climate change.

8. The Town of Hartford created a ranking system to support prioritizing bicycle and pedestrian improvements. This scoring system considers traffic volumes, land use, bicycle and walking conditions, and other factors to ensure that future plans prioritize infrastructure in areas that make the most sense.

SUCCESSFUL STRATEGIES TO APPLY IN OTHER SMALL COMMUNITIES

The Town of Hartford approach is unique. In addition to recognizing the health and mobility benefits of walking and bicycling there has been a recent focus on the importance of walking and bicycling in response to climate change. As a result, the Town of Hartford has integrated considerations related to walking and bicycling into the Hartford Climate

Action Plan. Therefore, a community may want to consider how encouraging walking and bicycling may more broadly support other community objectives.

Scoping studies have been an effective tool for the Town of Hartford to determine if there is community support for bicycle and pedestrian infrastructure. It also provides a better understanding of the magnitude of the cost.

The Town of Hartford has pursued a wide variety of funding opportunities. Therefore, if one fund is suspended, they have other alternatives that can support the implementation of bicycle and pedestrian infrastructure.

REFERENCES

F.X. Flinn. (March 27, 2014). Quechee Village Bicycle/Pedestrian Scoping Study. Retrieved August 10, 2021 from website: http://www.flinn4vt.com/index.php/archives/429

National Association of City Transportation Officials (NACTO). *Urban Street Design Guide*. Retrieved January 3, 2022, from NACTO website: https://nacto.org/publication/urban-street-design-guide/interim-design-strategies/parklets/

paleBluedotLLC. (August 24, 2021). Town of Hartford Climate Action Plan. Retrieved November 19, 2021, from Town of Hartford website: https://www.hartford-vt.org/CivicAlerts.aspx?AID=629

Resource Systems Group, Inc. (July 2013). Christian Street – Bugbee Street – US 5 Pedestrian and Bicycle Study.

Stephens, M., Emil, E., Blair, A., Middleton, S., Schroeckenthaler, K., Pildes, R., Goldberg, J., Bruno, C., Piercy, B., Villwock-Witte, N., Clouser, K., Sullivan, J., Kack, D., and C. Little. (September 3, 2021). Emerging Technologies and Opportunities for Improved Mobility and Safety for Rural Areas. U.S. Department of Transportation, Federal Highway Administration (FHWA), Publication No. FHWA-PL-022-004. Retrieved February 3, 2022, from FHWA website: https://www.fhwa.dot.gov/policy/otps/FHWA-PL-022-004.pdf

Town of Hartford Pedestrian and Bicycle Steering Committee. (July 28, 2009. Town of Hartford Pedestrian and Bicycle Plan. Retrieved November 22, 2021, from Town of Hartford website: https://www.hartford-vt.org/DocumentCenter/View/3341/631-Hartford-Bike-Ped-Plan-2009-Page-8_9?bidId=

Town of Hartford. (2008). Ordinances of the Town of Hartford, Vermont – Chapter 4 Zoning Regulations. Retrieved January 19, 2022, from the Two Rivers-Ottauquechee Regional Commission website: https://www.trorc.org/wp-content/uploads/2013/10/hfzo101408.pdf

Town of Hartford. (December 20, 2016). West Hartford Village Bicycle/Pedestrian Scoping Study. Retrieved August 10, 2021, from the Town of Hartford website: https://www.hartford-vt.org/DocumentCenter/View/718/West-Hartford-BP-Study-122016-SB-Meeting?bidId=

Town of Hartford. (July 6, 2017). Construction of Sidewalks & Bike Lane – Sykes Mountain Avenue. Retrieved August 10, 2021, from Town of Hartford website: https://www.hartford-vt.org/bids.aspx?bidID=37

Town of Hartford. (May 27, 2014). Master Plan. Retrieved November 19, 2021 from Two Rivers-Ottauquechee Regional Commission's website: https://www.trorc.org/wp-content/uploads/2013/10/HARTFORD-MASTER-PLAN-2014-FINAL-BRENDA.pdf

Town of Hartford. (March 11, 2019). Draft Town Plan. Retrieved from https://www.hartford-vt.org/2394/2019-Town-Plan-Revision

Town of Hartford. 2020 Annual Report. Retrieved July 21, 2021, from Town of Hartford website: https://hartford-vt.org/DocumentCenter/View/4964/2020-Hartford-Town-and-School-Annual-Report-

U.S. Census Bureau. (2018). OnTheMap. Retrieved from Us. Census Bureau website: https://onthemap.ces.census.gov/

U.S. Census Bureau. (2020). American Community Survey 2019 – 5-Year Estimates, Commuting Characteristics by Sex. Retrieved from: https://data.census.gov/cedsci/all?q=S0801

U.S. Census Bureau. (2020). American Community Survey 2019 – 5-Year Estimates, Employment Status. Retrieved from: https://data.census.gov/cedscki/all?q=S2301

U.S. Census Bureau. (2020). American Community Survey 2019 – 5-Year Estimates, Income in the Past 12 Months (In 2019 Inflation-Adjusted Dollars). Retrieved from: https://data.census.gov/cedsci/all?q-S1901

U.S. Census Bureau. (2020). American Community Survey 2019 – 5-Year Estimates, Population Estimates. Retrieved from: https://data.census.gov/cedsci

U.S. Census Bureau. (2020). American Community Survey 2019 – 5-Year Estimates, Poverty Status in the Past 12 Months. Retrieved from: https://data.census.gov/cedsci/all?q=S1701

U.S. Census Bureau. (2020). American Community Survey 2019 – 5-Year Estimates, Selected Housing Characteristics. Retrieved from: https://data.census.gov/cedscki/all?q=DP04

U.S. Census Bureau. (2020). Quickfacts – United States. Retrieved from https://www.census.gov/quickfacts/fact/table/US/PST045221

U.S. Census Bureau. (October 8, 2021). How the Census Bureau Measures Poverty. Retrieved November 4, 2021, from US Census Bureau website: https://www.census.gov/topics/income-poverty/poverty/guidance/poverty-measures.html

Upper Valley Trail Alliance. (n/d). Upper Valley Loop Trail. Retrieved December 7, 2021, from Trail Finder website: https://www.trailfinder.info/trails/trail/upper-valley-loop-trail

Vanasse Hangen Brustlin, Inc. (December 21, 2007). Pedestrian/Bicycle Trail Linking Lebanon, NH and Hartford, VT via Railroad Bridge over Connecticut River. Retrieved November 19, 2021, from website: https://static1.squarespace.com/static/5ffee85ab1c4a52c404cafe5/t/603c25f74b9054350980fe83/1614554630381/Final.+2007+UVTA+Pedestrian-Bicycle+Trail+Feasibility+Study+Report.pdf

Vermont Business Magazine. (July 14, 2010). $1.3 million granted to Vermont schools for safety projects. Retrieved August 11, 2021, from Vermont Business Magazine website: https://vermontbiz.com/news/2010/july/14/13-million-granted-vermont-schools-safety-projects

Vital Communities. (n/d). Need Help Buying an E-Bike? Retrieved November 16, 2021, from Vital Communities website: https://vitalcommunities.org/need-help-buying-an-e-bike/

Vital Communities. (n/d). Launching Year 2 of the Upper Valley E-Bike Library! Retrieved November 16, 2021, from Vital Communities website: https://vitalcommunities.org/launching-year-2-of-the-upper-valley-e-bike-library/

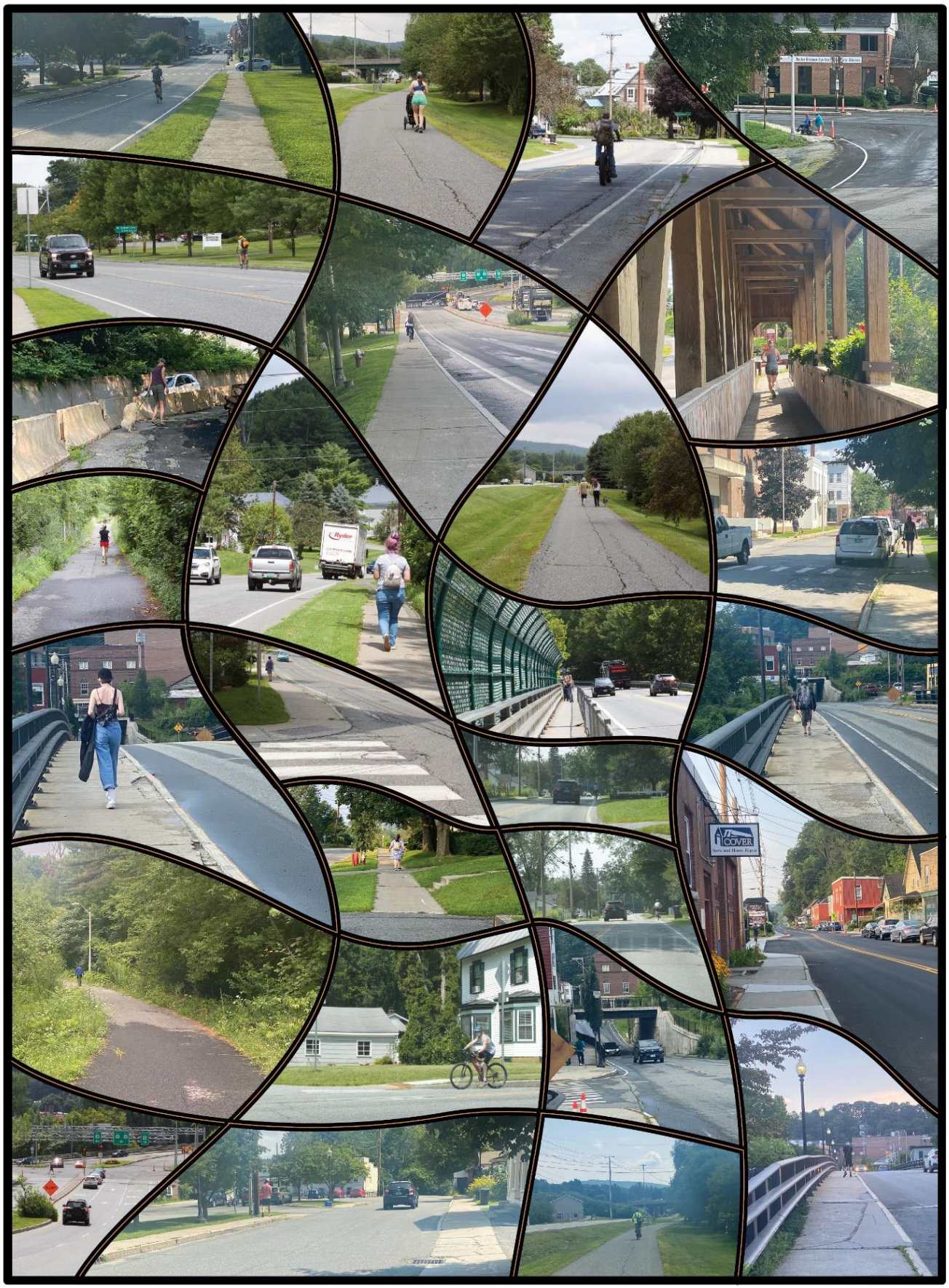
Vital Communities. (n/d). About Vital Communities. Retrieved November 16, 2021, from Vital Communities website: https://vitalcommunities.org/about/

Map Credits:

Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community. 2022. World Navigation Map. Retrieved February 16, 2022 from: https://www.arcgis.com/home/item.html?id=63c47b7177f946b49902c24129b87252

Google. (n.d.). [Google Maps Points of Interest Data – Vermont]. Retrieved February 16, 2022 from:

https://www.google.com/maps/d/edit?mid=1LTcVqYYeIywXOUoIbAtojIFx6XS1zekc&usp=sharing


Ryder