CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

SCOPING REPORT

FOR

MAIN STREET BRIDGE (US ROUTES 2 & 7) OVER THE WINOOSKI RIVER

May 30, 2019

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I. EXECUTIVE SUMMARY

The purpose of this Scoping Report was to develop alternatives for the improvements to the Main Street Bridge connecting the Cities of Burlington and Winooski, VT over the Winooski River. The conclusion and recommendations outlined in this Scoping Report have been developed through coordination with the Chittenden County Regional Planning Commission, an Advisory Committee comprised of project stakeholders and local leaders, and public input. The development and review of this study is outlined in this report, and an executive summary is provided below.

- Preferred Alternative .... Alternative 4 & Alternative 5
- Roadway Width............................... 52’ (four 11’ Lanes with two 2’ Shoulders)
- Pedestrian/Bike Accommodation .... Protected Multi-Use Path on Each Side of the Bridge Which Tie-In to Existing Sidewalks
- Traffic Accommodation................... Offsite Detour During Bridge Closure
- Method of Construction.................. Accelerated Bridge Construction
- Estimated Project Cost.................... $18.3 Million (Alternative 4), $22.7 Million (Alternative 5)

Both Alternative 4 & 5 do not preclude future reconstruction projects of the Colchester Avenue/Riverside Avenue intersection re-configuration project or other future projects in the nearby vicinity.

II. INTRODUCTION

The Chittenden County Regional Planning Commission (CCRPC) requested the services of McFarland Johnson Inc. (MJ) to develop a scoping study for the improvement of the bridge carrying Main Street and US Route 2 & 7 over the Winooski River. This Scoping Report identifies the short- and long-term needs of the bridge, traveling public and resource agencies, and develops alternatives to address the stakeholder concerns. A recommended alternative is then presented to the City Councils of both Burlington and Winooski for approval of the final Scoping Report.

The scoping process includes developing and working in conjunction with a project advisory committee made of community leaders, City of Burlington and Winooski staff, CCRPC staff and neighborhood representatives. Advisory Committee members for this project are listed below:

Jon Griffin ....VTrans
Dick Hosking ....VTrans
Amy Bell ....VTrans
Peter Wernsdorfer ....Winooski
Jon Rauscher... Winooski
Heather Carrington.................................. Winooski
Ryan Lambert ....Winooski
Nicole Losch ....Burlington
Sharon Bushor ....Burlington City Council
Richard Deane... Burlington City Council
Dave Armstrong ....GMT

Rachel Kennedy......................................GMT
Sandy Thibault..CATMA
Katelin Brewer-Colie ....Local Motion
Allegra Williams ....Local Motion
David Keelty ....UVM Medical Center
Richard Hillyard......................................Burlington Ward 1 NPA
Wayne Senville.......................................Alternate for Ward 1
Eleni Churchill ....CCRPC
Peter Keating..CCRPC
Marshall Distell ....CCRPC
Jason Charest ....CCRPC

The advisory committee assisted the CCRPC & MJ staff in reviewing and developing alternatives and recommending a preferred alternative.

III. PROJECT BACKGROUND

The Main Street Bridge carrying US Route 2 and 7 over the Winooski River is a principal arterial structure which carries approximately 25,000 vehicles per day between the cities of Burlington and Winooski, Vermont. The existing structure, constructed in 1929, is a 3-span steel multi-girder system supported by reinforced concrete abutments and piers which are founded on bedrock.

The Main Street Bridge is the only crossing over the Winooski River that connects the downtown communities of two of Vermont's most densely populated cities: Burlington and Winooski. As the bridge approaches the end of its service life, it has become apparent that it no longer meets the needs of the communities it serves. The existing structure features narrow vehicle travel lanes, no shoulders, and narrow sidewalks. There is no buffer separating vehicular traffic from pedestrians and bicyclists, creating unsafe conditions for all travelers. Due to the urban environment and existing infrastructure, improvements to the Main Street Bridge have become a priority to the ongoing initiatives to improve connectivity and safety for multi-modal transportation in the region.

This scoping study builds upon the recommendations outlined in the documents below to develop a preferred alternative which addresses the needs of the existing bridge, while accommodating the future needs of the surrounding area. The reports that have been reviewed and incorporated are:

- Colchester Riverside Avenue Scoping Report (2018)
- Winooski River Bicycle & Pedestrian Bridge (2017)
- Winooski Main Street Corridor Plan (2014)
- Load Rating Report (2012)

The study area for the bridge was determined at the early outset of the project and is summarized in Figure 3. **Error! Reference source not found.** shows a broader overview of the region with the project location denoted by a star. Note the limited alternate crossing locations over the Winooski River. The study area that was used for the bridge study differs in size from the resource impact study area, since the resource identification typically takes a larger view to ensure there will not be impacts beyond the bridge study area.

Figure 1: Regional Project Study Area

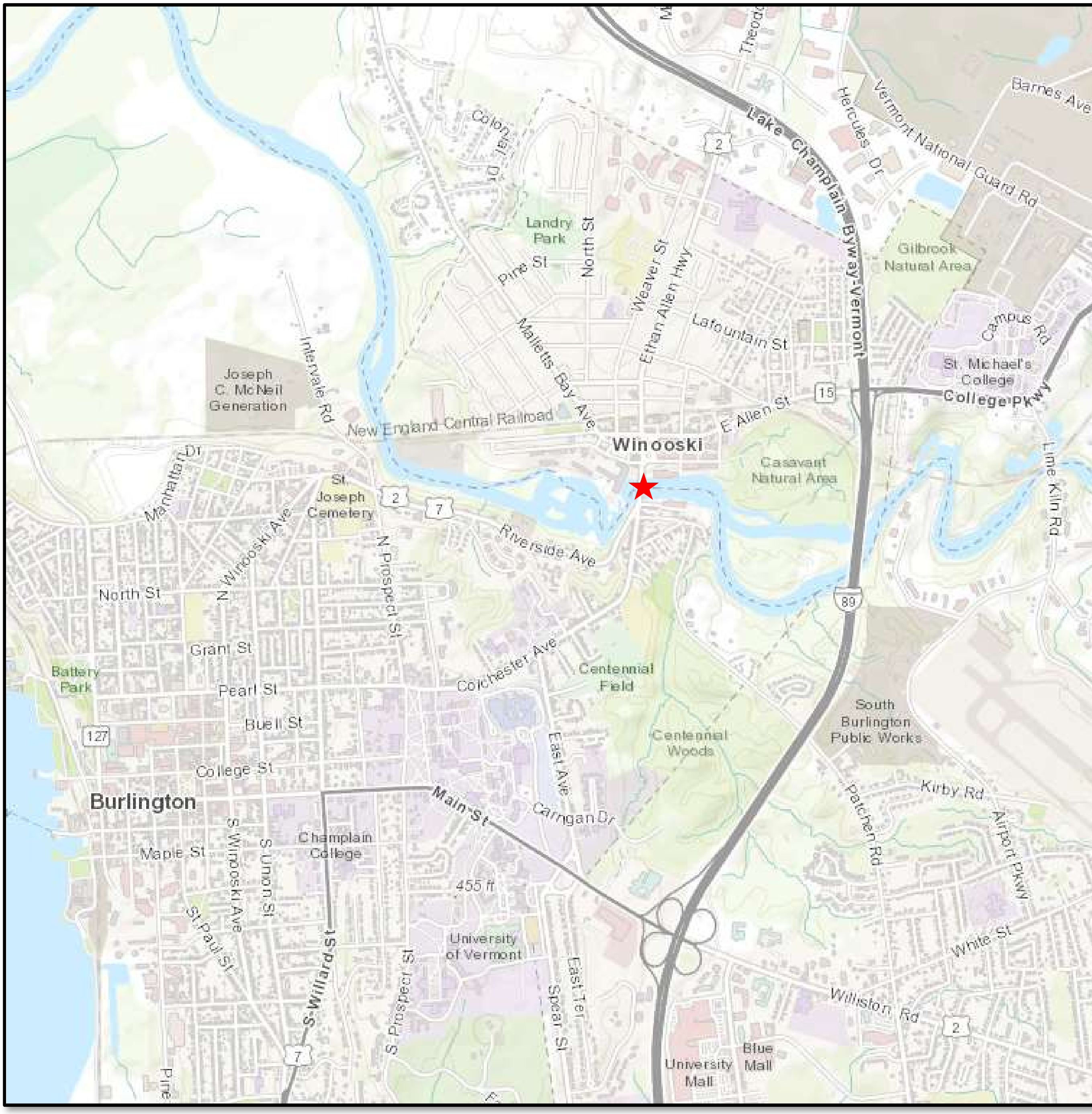
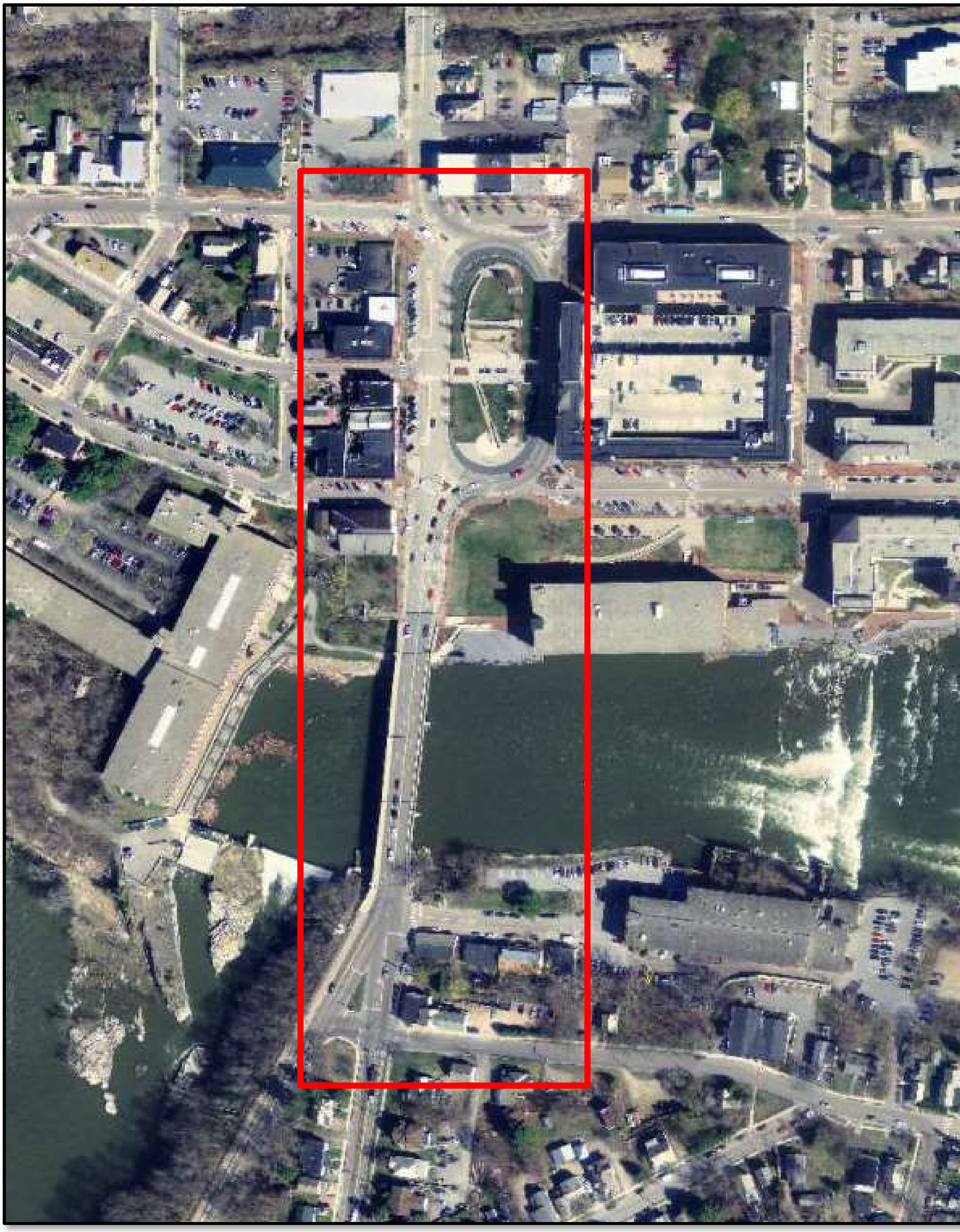


Figure 2: Project Study Area



PURPOSE AND NEED

A responsibility of the Advisory Committee, in conjunction with the CCRPC, was to develop a Purpose and Need statement to define the objective of the Scoping Report during the initial phases of the project. The purpose and needs for this Scoping Report are developed upon the different aspects and perspectives of the community, which are represented through the Advisory Committee. The following purpose statement was developed:

Purpose:

The purpose of the project is to improve safety while maintaining structural integrity and continuity of this integral link between Winooski and Burlington across the Winooski River. The project will address deficiencies in the bridge while improving multi-modal (bike, pedestrian, vehicular) travel for people and goods. Project recommendations will also complement the context of the natural and cultural environment and provide an aesthetically appealing bridge structure(s) to link the two Cities.

Need:

The project needs that were identified by the Advisory Committee define the guidelines for evaluating the alternatives that are developed. The following needs were identified and used as a guideline for the alternative evaluation:

1. Provide designated lanes for bicyclists:
    - The lack of bicycle lanes on the bridge leads to bicyclists riding on the sidewalk creating an unsafe condition for both bicyclists and pedestrians.
2. Provide two lanes of traffic in both direction:
    - The high traffic demand on the crossing requires two lanes of traffic in both directions to minimize delay and queuing of traffic across the bridge and through the Winooski and Burlington intersections at either end.
3. Improve safety for pedestrians:
    - The lack of shoulders produces an unsafe feeling for pedestrians given the close proximity to the vehicular travel way.
    - The bridge rail is also below standard height for a pedestrian rail.
4. Address the conditional deficiencies of this aging bridge structure:
    - The bridge, originally constructed in 1929, is in the latter stage of its design service life.
    - The bridge deck, rated in satisfactory condition, has isolated areas of concrete spalling and delamination that need patching, repair, or partial replacement.
    - Significant portions of the concrete bridge railing are in poor condition and require immediate repair and replacement. In addition, the historic rail was not designed to current structural design code standards.
    - The structural steel superstructure, rated in satisfactory condition, has isolated areas requiring repair, cleaning and painting.
    - The concrete sidewalks and curbs require cleaning, patching and repair to address spalls and cracks to its top and vertical surfaces.

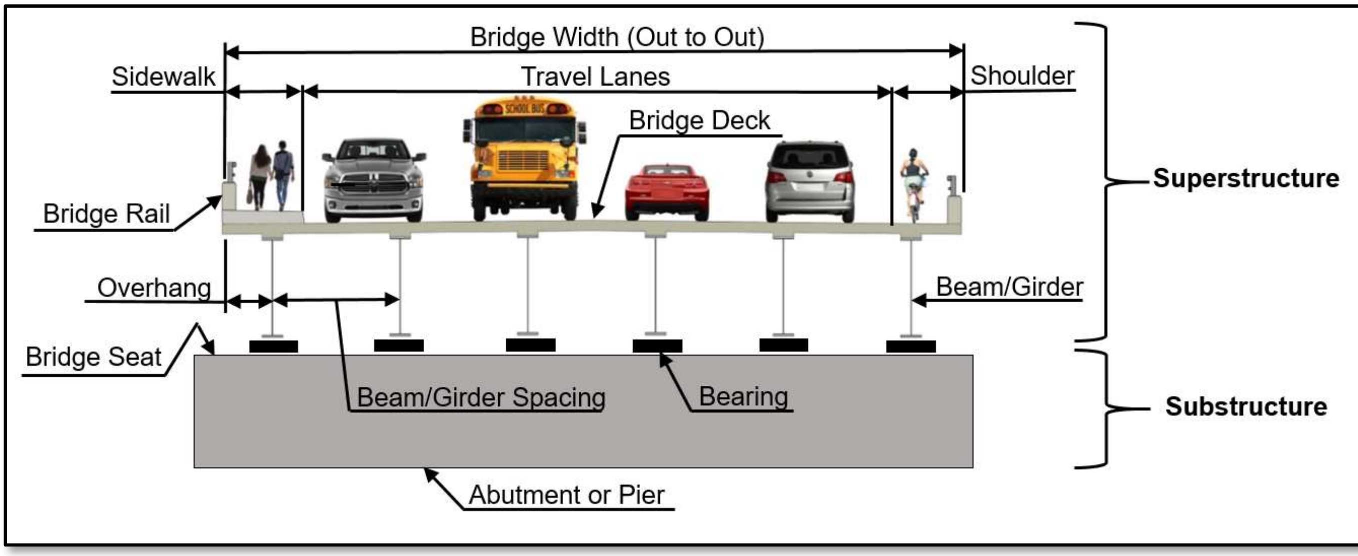
- The concrete substructure piers and abutments, rated in good condition, have minimal need of patching and repair.

This Purpose and Need statement was presented at a public meeting and comments received were incorporated into the final version.

IV. TYPICAL BRIDGE SECTION DESCRIPTION

Various components of a bridge and its individual components will be referenced throughout this report. A sample typical bridge section is provided in Figure 3, with callouts defining the standard components of a bridge.

Figure 3 - Typical Bridge Section Definitions



V. EXISTING SITE INFORMATION

TRAFFIC

The Main Street Bridge experiences relatively heavy traffic with an average volume of traffic of over 25,000 vehicles per day. The high volume of traffic is a result of the roadway being an important connection between Burlington and Winooski and one of the few Winooski River crossings in the area. Traffic crossing the bridge experiences travel delay, especially during the morning and afternoon peak periods, but the delay is mainly attributed to the intersections immediately adjacent the bridge in both Burlington and Winooski.

Table 1 below summarizes the traffic data for the Main Street Bridge. Traffic counts were obtained from the Vermont Agency of Transportation's (VTrans) Transportation Management System count location D039, located at the North end of the bridge. The traffic volumes are projected to the years 2018 and 2038. The estimated percent truck value is based on the 2016 Functional Class Averages from the VTrans 2016 Automatic Vehicle Classification Report. The percent directional (%D) was calculated by averaging the %D for the AM and PM existing conditions peak hour model results from "Burlington and Winooski US-2/7 Bridge Traffic Assessment Model Documentation and Results", which was prepared by Resource Systems Group, Inc. (RSG) in 2017 for CCRPC (see Appendix G). Peak traffic flows are heading Southbound in the AM and Northbound in the PM.

Table 1 - Traffic Summary

US ROUTE 7 – Main Street		
TRAFFIC DATA	**2018**	**2038**
Annual Average Daily Traffic (AADT)	25,400 Vehicles per Day	27,700 Vehicles per Day
Design Hourly Volume (DHV)	2,286 Vehicles per Hour	2,493 Vehicles per Hour
% Trucks (%T)	7%	7%
% Directional (%D)	57% (SB in AM, NB in PM)	57% (SB in AM, NB in PM)

ROADWAY DESIGN CRITERIA

Minimum roadway design criteria for this bridge project are taken from the Vermont State Standards, dated October 22, 1997 are based on an ADT > 2000 and a design speed of 25 mph. These criteria have been established to provide a baseline for safety and accommodations for vehicles, bicycles, and pedestrians. Providing elements that do not meet the minimum standard could result in an increased number of crashes or different modes of transportation needing to use the same space. For instance, with substandard shoulder widths, bicyclists do not have their own dedicated space and so they either must share the lane with vehicles or ride on the sidewalk with pedestrians.

Table 2 - Roadway Design Criteria Summary

Design Criteria	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	11'/Varies (2'min) (48')	11'/4' (52')	***Substandard***
Bridge Lane and Shoulder Widths	10.5'/0' (42')	11'/5' (54')	***Substandard***
Speed	25 mph (Posted)	25	
Horizontal Alignment	Bridge and Approaches on Tangent	R_{min} = 134' @ 8.0%	
Vertical Grade	1%	9% Max	
K Values for Vertical Curves	K_{Crest} = 50	20 Crest / 30 Sag	
Stopping Sight Distance	Greater than Required	150	
Bicycle/Pedestrian Criteria	2' min on approaches 0' on bridge	4' on approach 5' on bridge	***Substandard on Bridge Approaches***
Bridge Railing (and Approach Railing)	Historic Railing	MASH Compliant TL-2 Railing w/Pedestrian Railing	***Substandard on Bridge and Approaches***
Sidewalk Width	6'	5'	

EXISTING BRIDGE INSPECTION REPORT SUMMARY

VTrans inspects all bridges every two years in accordance with the National Bridge Inspection Standards (NBIS). The information gathered during an inspection is summarized in a Structure Inventory and Appraisal (SIA) sheet, which then helps agencies determine bridge safety and required maintenance work. A summary of the condition rating of the Main Street Bridge based on the 2017 SIA report is summarized below:

Deck Rating .... 6 (Out of 9, Satisfactory Condition)

Superstructure Rating .... 6 (Out of 9, Satisfactory Condition)

Substructure Rating .... 7 (Out of 9, Good Condition)

Channel Rating .... 8 (Out of 9, Very Good Condition)

Sufficiency Rating .... 65.3 (Out of 100)

Deficiency Status .... Functionally Deficient (i.e. the existing bridge does not meet current functional design criteria)

The bridge has been determined to be functionally deficient because it does not provide the minimum required shoulder width.

The inspection summary provided below summarizes the findings of the 2017 Inspection Report

> *05/24/2017 – Structure is in fair to good condition. Damaged rail on the upstream side has been repaired. Sidewalk has areas of spalling that should be cleaned and patched. Beams should be spot cleaned and painted. Spalling in the spindles in the rail on the upstream side should be repaired. ~FRE/JAS/MC*

In addition to the condition ratings noted above, steel coupon sample testing was performed as part of the load rating report in 2012. Steel coupon sample testing is performed by removing 2”x6” pieces of steel from non-critical areas of the bridge and performing strength tests on the sample to determine its material properties. These tests are conducted so that actual material strength properties can be used for evaluating the capacity of the bridge. The results of the steel coupon sample testing showed that the steel strength is within the expected strength range for structures constructed during that time-frame. This indicates that the assumptions made during the load rating process were accurate, and that there are no immediate concerns with the capacity of the bridge in its current condition.

HYDRAULICS

The existing bridge structure bottom of steel low point elevation sits approximately 8’ above the 100-year storm elevation. The Winooski river upstream and downstream of the existing structure is dam controlled, and therefore the probability of floodwater encroachment on the bottom of the steel beams is considered remote. The current bridge design criteria require a minimum of 1’ of clearance between the steel low point and the water surface elevation of the 100-year storm. Any future bridge replacement will meet or exceed the existing low chord elevation. Figure 4 below shows the bridge during the extreme flooding from Hurricane Irene in 2011; note the bridge has substantial clearance above the flood waters.

Figure 4 - Hurricane Irene (August 2011) Below the Existing Bridge

UTILITIES

The following utilities are currently located on the bridge:

- Telecommunications

In addition to the utilities located on the bridge, overhead and buried utilities are located in both approach roadways. A summary of the utilities located in the south (City of Burlington) approach roadway are:

- Electric Lines (Unknown size conduits)
- Water Mains (Unknown size)
- Gas Lines (Unknown size)

Utilities under or above the approach roadway may require to be relocated during construction to allow for equipment access or for necessary excavation. At the time of this study, the owners of all utilities were not known. Further coordination with utility companies will be required during the design phase of the chosen alternative.

RESOURCES

A preliminary review of the natural resources present within and near the project study area was performed at the start of development of the Scoping Report. As part of the investigation, the following resources were identified and characterized:

- Wetlands & Surface Waters
- Floodplains and Floodways
- Hazardous Materials Sites
- Habitat & Wildlife Corridors

- Rare, Threatened and Endangered Species
- Conservation & Recreation Lands
- Historic & Archaeological Sites

Refer to Appendix F for a complete summary of the study's findings.

Wetlands & Surface Waters

The study investigated impacts to any wetlands or surface waters within the project area. There are no Vermont Significant Wetland Inventory (VSWI) wetlands within the project study area. The Winooski River is the only surface water within the project area. Temporary impacts to the Winooski River will be necessary for any improvements to the Main Street Bridge. A summary of the wetlands and surface waters is shown in Figure 5 below:

Floodplains and Floodways

The study identified the floodplains and regulatory floodways of the Winooski River using information from the Federal Emergency Management Agency (FEMA). The alternatives proposed in this scoping study will have no permanent negative impacts to the floodplain. See Figure 6 below for a map showing floodplains and floodways in the project area.

Hazardous Materials Sites

The resource study identified one low potential hazardous material site within the vicinity of the bridge. This site is located east of the north approach in Winooski Falls Way, circled in yellow in Figure 7 below, and "has known petroleum contamination." This location could be impacted by construction activities.

Habitat Blocks & Wildlife Corridors

It is important to consider a project's potential disturbances to wildlife habitats in the surrounding area. Based on the study's findings, due to the urban environment surrounding the Main Street Bridge, there are no habitat blocks or wildlife corridors within the project study area, shown in Figure 8 below.

Rare, Threatened & Endangered Species

The resource study examined potential impacts to rare, threatened, and endangered species located in the project area. Based on the study's findings, there are no rare, threatened or endangered species within the immediate vicinity of the Main Street Bridge. There are several downstream of the hydroelectric dam, but they are located outside the project study area and will not be impacted. See Figure 9 for more details.

Conservation & Recreation Lands

The resource study identified two potential areas where impacts to conservation and recreation land may occur, both on the north (Winooski) side of the bridge and are noted in Figure 10. Falls Terrace Park and Riverfront Park may be impacted due to construction activities of the preferred alternative, and therefore will require Section 4(f) evaluation. Per the guidance of the Federal Highway Administration (FHWA), the purpose of Section 4(f) evaluation is to verify that "there is no feasible and prudent avoidance alternative to the use of land; and the action includes all possible planning to minimize harm to the property resulting from such use."

Historic & Archaeological Identification

Due to the notable history of the surrounding area, it is important that any disturbance to historically significant areas or structures are minimized. Based on the study's findings, there is one potential area where impacts to potentially historic or archaeologically sensitive land may occur, on the northwest (Winooski) side of the bridge at Falls Terrace Park.

Figure 5 - Wetlands and Surface Waters

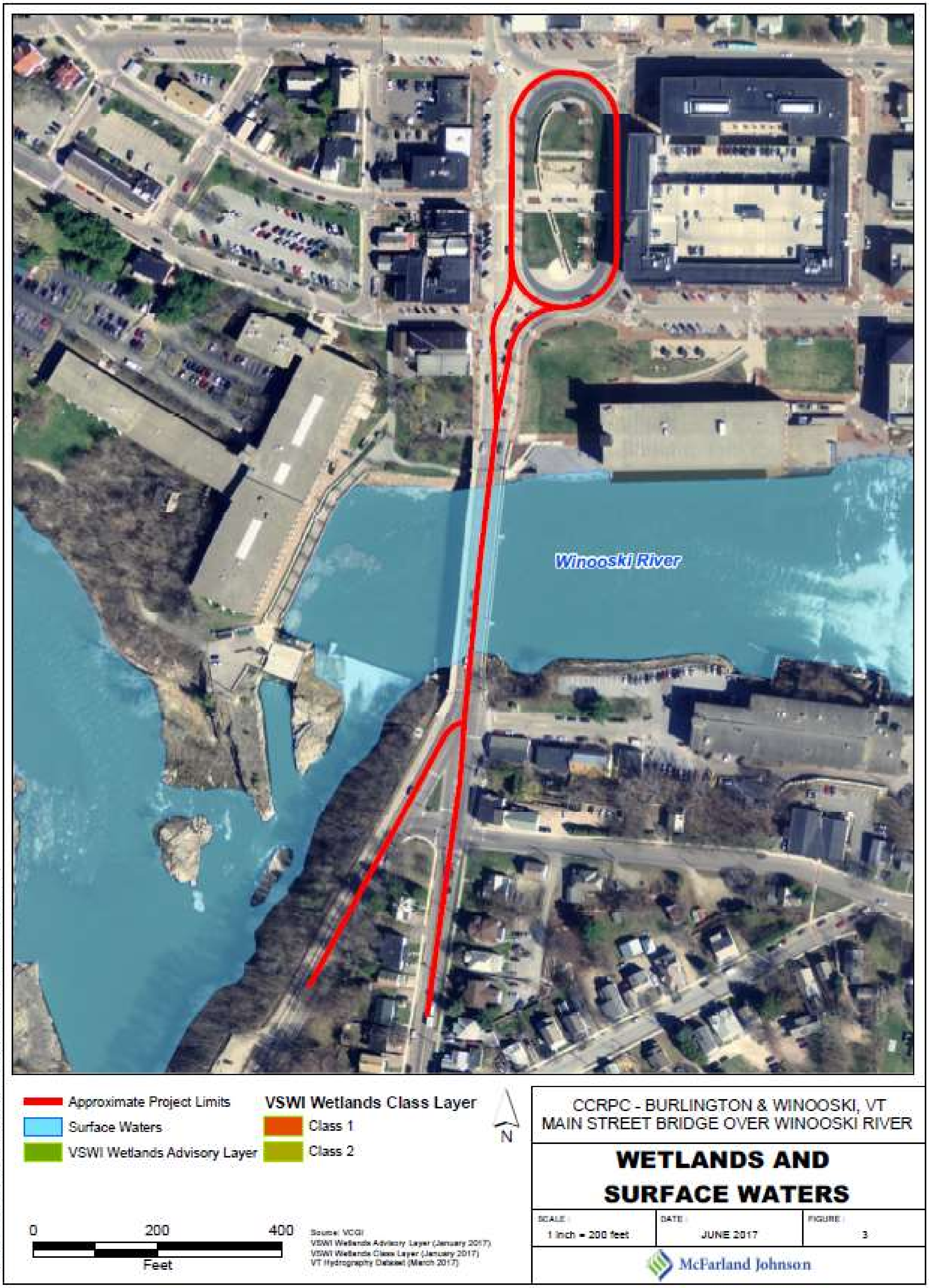


Figure 6 – Floodplains & Floodways

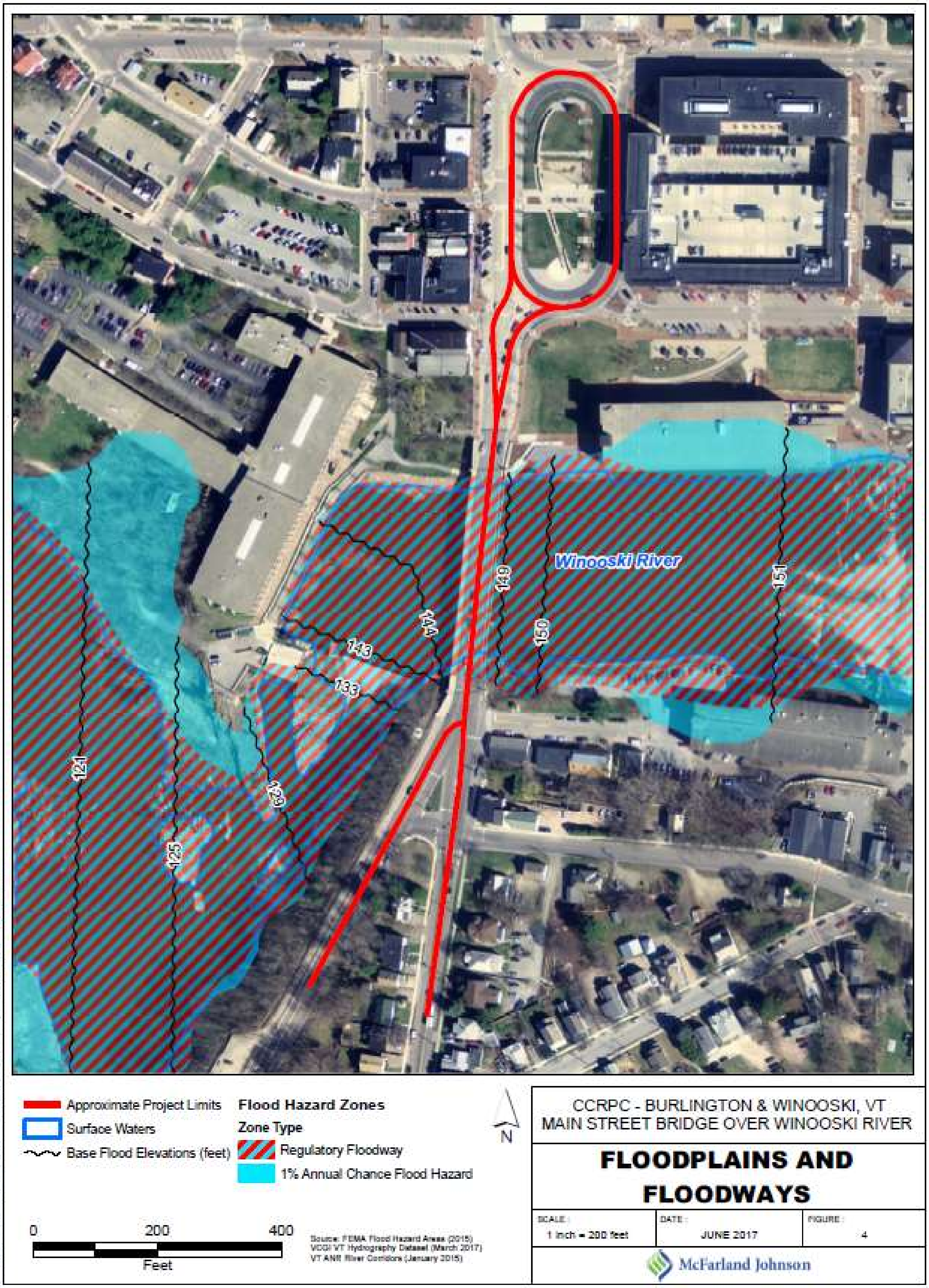


Figure 7 – Hazardous Material Sites

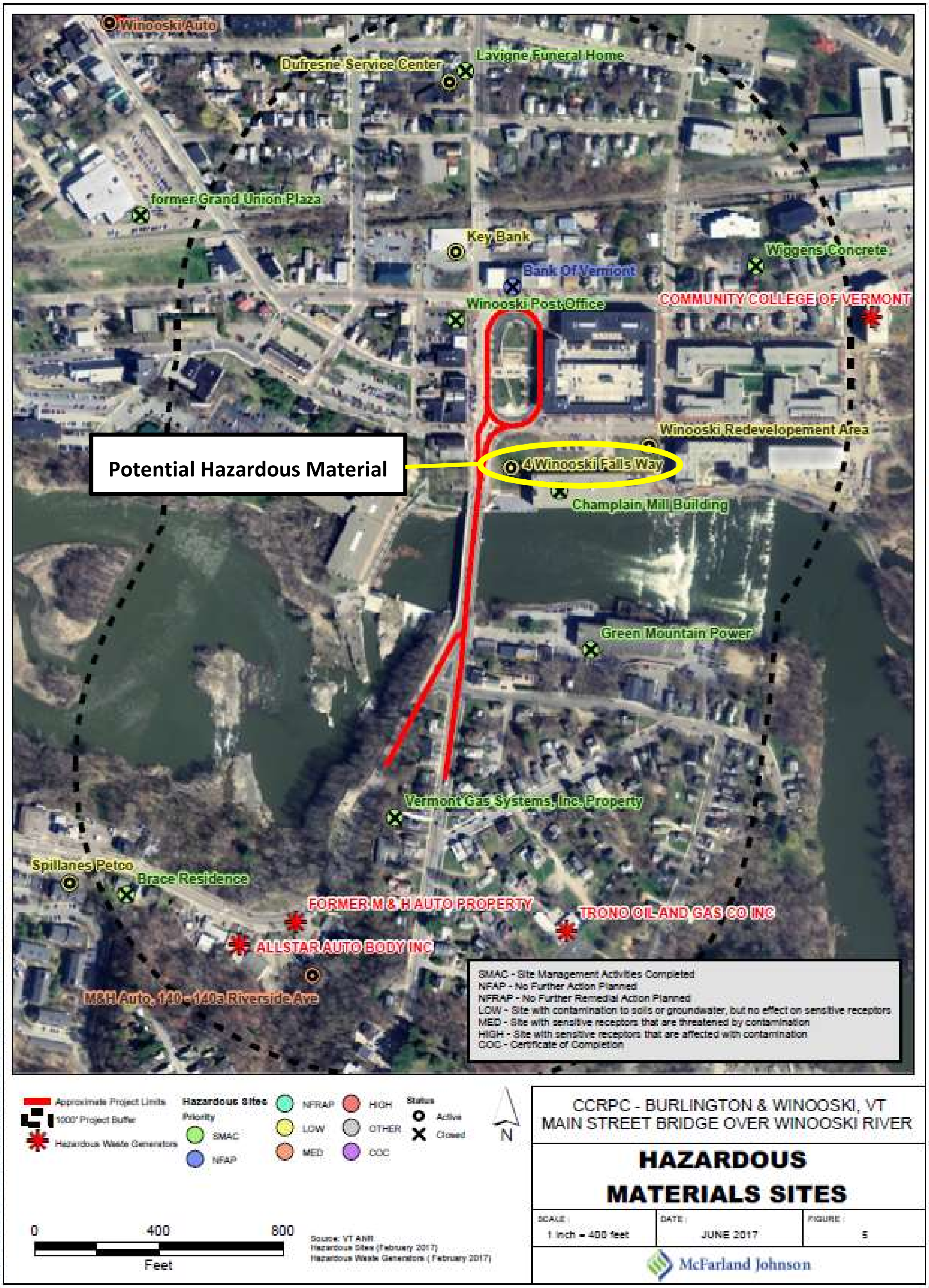


Figure 8 – Habitat Blocks & Wildlife Corridors

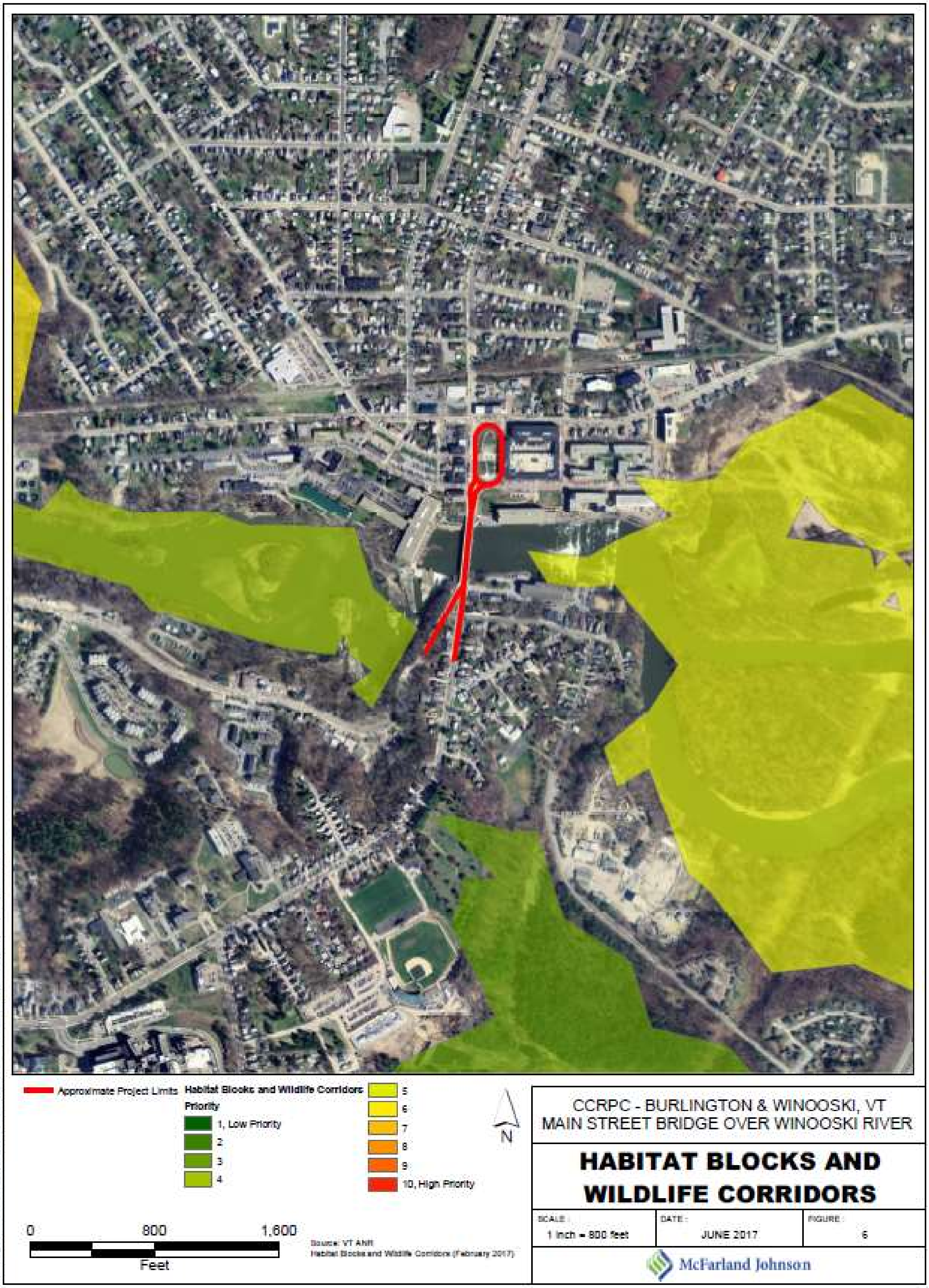


Figure 9 – Rare, Threatened & Endangered Species

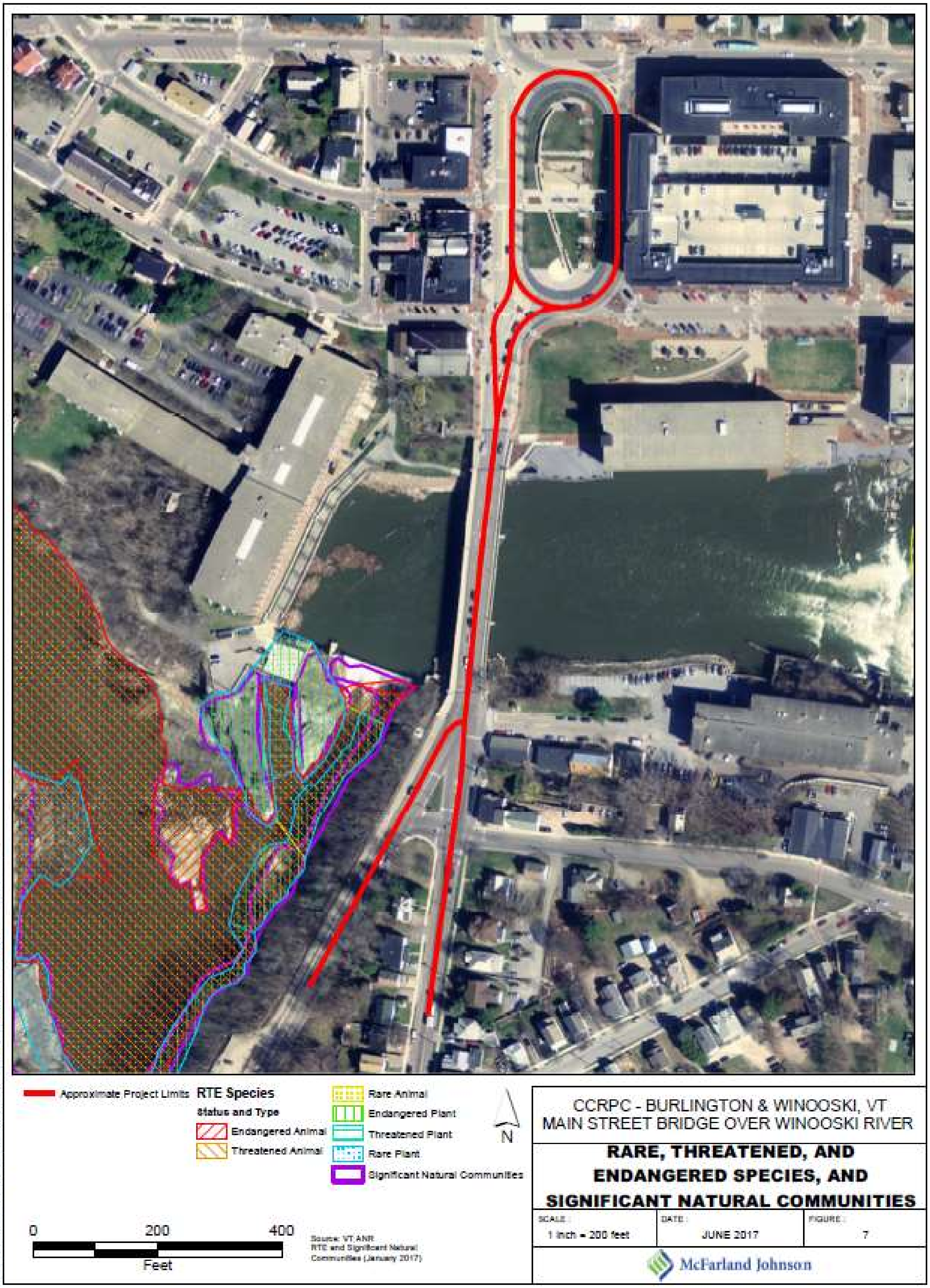
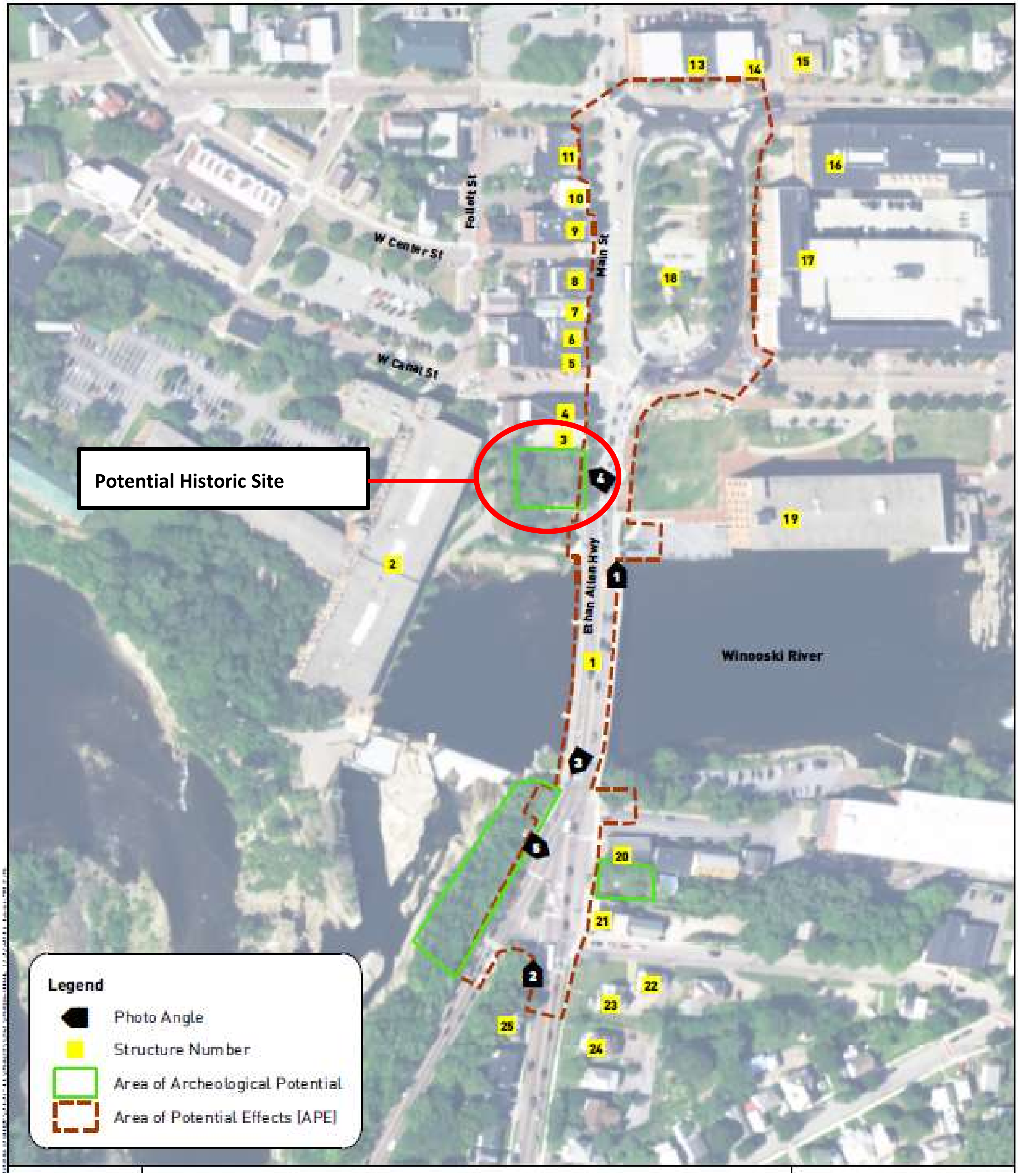


Figure 10 – Conservation & Recreation Lands

Figure 11 – Historic & Archaeological Identification



VI. MAINTENANCE OF TRAFFIC

Due to the urban environment, restrictive site, and transportation capacity demands surrounding the project area, the maintenance of traffic during construction, both vehicular and pedestrian/bike, will be a complex task. Several maintenance of traffic (traffic control) options were identified early in the Scoping Report development process. It was quickly determined that maintaining four lanes of traffic during construction would not be feasible due to the resources adjacent to the bridge. Therefore, four options were investigated including a full bridge closure, maintaining one lane of alternating one-way traffic, maintaining one lane of traffic in each direction, and maintaining one lane of traffic in one direction with two lanes of traffic in the other direction. Since all these options limit the capacity of the roadway over the bridge due to a reduction in travel lanes, it is anticipated that drivers will seek alternate routes during construction. The CCRPC developed a regional traffic model to estimate which alternate routes traffic would use to bypass the construction site. The models showed a majority of traffic using I-89 or Lime Kiln Road to cross the Winooski River and avoid the construction site, both of which are already near capacity during peak travel times. Maps showing the impacts of the additional traffic on the alternate routes are included in Appendix G.

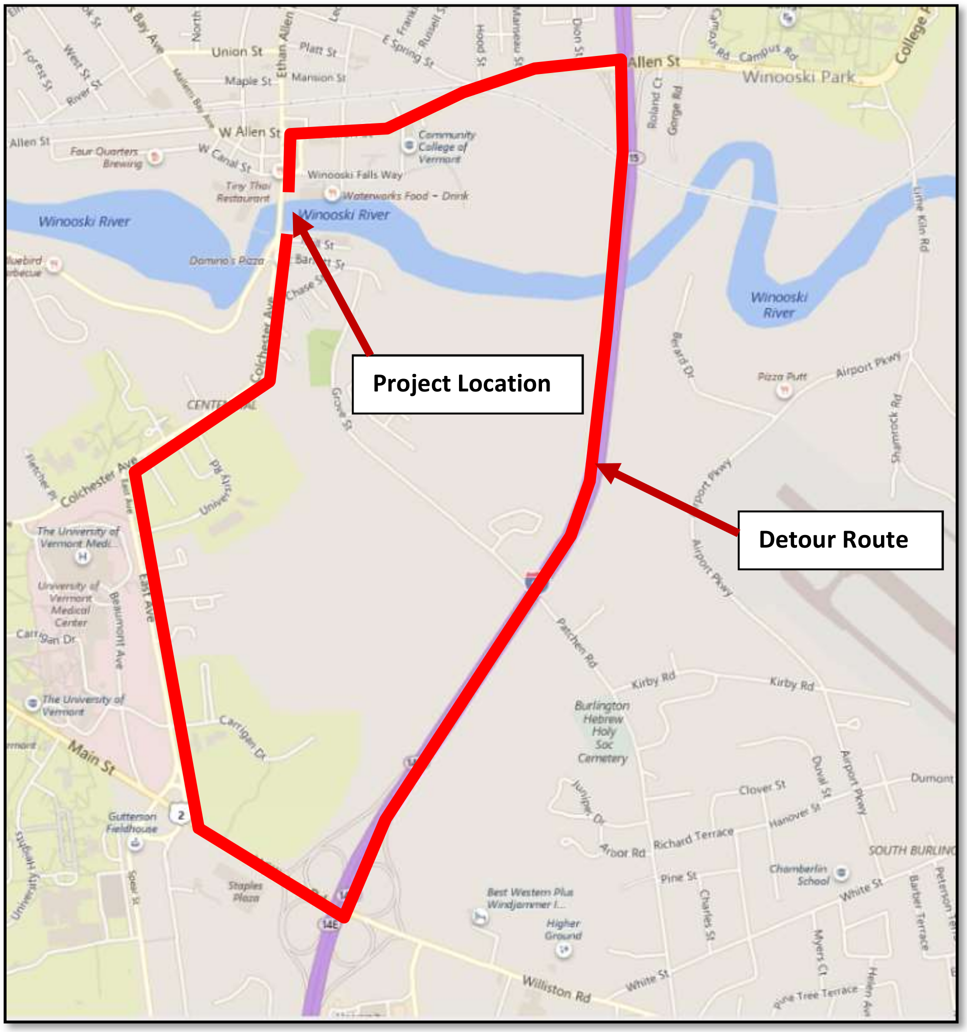
Since the level of traffic diversion between a full bridge closure and maintaining one lane of alternating one-way traffic were similar, the option of maintaining one lane of alternating one-way traffic was discarded. The construction duration of this option would be significantly longer than the full bridge closure option while still having major impacts to regional traffic. Also, the operations of this option would be further complicated due to the proximity of the Riverside Avenue traffic signal in Burlington and the Circulator in Winooski. Therefore, due to providing no project benefits and comparable performance to closing the bridge, alternating one-way traffic was eliminated from consideration.

The remaining traffic control options that have been considered and assessed are summarized below:

OPTION 1: FULL BRIDGE CLOSURE WITH OFF-SITE DETOUR

A full bridge closure would detour vehicular traffic onto I-89 using local streets and is shown in Figure 12 below. The end-to-end detour length of a full bridge closure is approximately 4.5 miles. Pedestrian and bicycle traffic would be maintained on a separate bicycle/pedestrian bridge or through a shuttle service. A summary of this traffic control option assessment, advantages and disadvantages is provided below:

Figure 12 – Full Bridge Closure Traffic Detour



Full Bridge Closure Assessment Summary:

- In addition to utilizing the detour, traffic would also divert to other non-signed detour routes over the Winooski River at Lime Kiln Road and Plattsburg Road (Shown in Appendix G). These roads are already at or near capacity during peak travel times, so the additional traffic would cause additional congestion.
- Some local roadways would see additional volume as the diverted traffic travels to the other Winooski River bridge crossings.
- Traffic volumes in the immediate vicinity of the Main Street bridge would be reduced, leading to less drive-by traffic near local businesses.

A full bridge closure would allow for the use of Accelerated Bridge Construction (ABC), a method of construction which significantly reduces the construction duration, and thus minimizes impacts to traffic. VTrans created the

Accelerated Bridge Program (ABP) in 2012 in an effort to rapidly replace the 13 bridges destroyed by Tropical Storm Irene. Since then, the ABP has been an innovative program whose goal is to reduce impacts to the traveling public by using proven ABC technologies. Typical ABC involves constructing portions of the bridge, commonly referred to as prefabricated bridge elements (PBEs), in advance of the closure off site nearby. The PBEs are then brought to the bridge site during the closure and quickly installed, allowing the bridge to reopen much faster compared to conventional construction methods. The use of ABC has been done throughout the country for over 20 years and has been successfully performed in Vermont on over 80 bridge replacement projects.

The ABC technology being proposed in the alternatives for replacing the Main Street Bridge utilize Lateral Slide Construction methods (also known as Slide-In Bridge Construction). This method of construction requires that the bridge (concrete deck and steel girders) be built directly adjacent to the existing bridge on temporary supports in advance of the bridge closure. The bridge is closed to traffic and the concrete deck and steel girders of the old, existing bridge are removed. The beam seats are reconstructed, and the new bridge is then slid from the temporary supports onto the existing abutment/piers. The approach roadway work is then completed, and the new bridge is then opened to traffic.

One factor in determining if the use of ABC is appropriate for a specific bridge is by placing a monetary value on the expected impacts and delays that traffic will see, typically called the roadway user cost. A full roadway user cost estimate has not been performed for this specific project with a potential ABC bridge replacement option but based on previous projects that have been constructed in Vermont with ABC and the level of traffic on this structure, it can be safely assumed that the roadway user costs will be significantly lower with an ABC replacement compared to conventional construction.

Full Bridge Closure Advantages:

- A full bridge closure would minimize the duration of construction as traffic will not be maintained on the bridge and the Contractor would have full access to the bridge during construction.
- A full bridge closure allows the bridge to be replaced with ABC technology, which will reduce the duration of impacts to traffic from a few years down to a few months when compared to conventional construction.
- The roadway user costs will likely be lowest with a full bridge closure and accelerated bridge construction based on the results of similarly sized projects, as compared to conventional construction.
- ABC construction using the lateral slide technique is easier from a constructability perspective compared to phased construction adjacent to moving traffic.
- ABC construction is the safest method of construction for both roadway users and construction personnel.

Full Bridge Closure Disadvantages:

- Many roads, both primary and secondary arterials, in the surrounding region will see increased traffic with a full bridge closure.
- The traffic impacts with a full bridge closure extend beyond the cities of Burlington and Winooski and into the surrounding communities.

- Less drive-by traffic for local businesses.
- Emergency vehicle response times could be increased due to the detour.
- The long detour makes accommodations through a shuttle service for pedestrians and bicyclists necessary, adding significant pedestrian travel time.

OPTION 2: PHASED CONSTRUCTION WITH TWO LANES OF TRAFFIC MAINTAINED (1 LANE IN EACH DIRECTION)

Phased construction would maintain one lane of traffic in each direction throughout the duration of the project. Depending on the phase and alternative chosen, multiple traffic shifts would be required between the existing and new bridge during construction. Since the capacity of the bridge would be reduced by approximately fifty percent, additional congestion at the Riverside Avenue traffic signal in Burlington and in the Circulator in Winooski would be expected. For this reason, some diversion of traffic to other Winooski River bridge crossings would occur. One sidewalk would be provided to maintain the pedestrian crossing during construction and bicycle traffic would continue to need to "take the lane" while crossing the bridge. A summary of this traffic control option assessment, advantages and disadvantages is provided below:

Two Lanes Maintained Assessment Summary:

- Traffic would divert to the other Winooski River bridge crossings at I-89, Lime Kiln Road, and Plattsburg Road. These roads are already at or near capacity during peak travel times, so the additional traffic could cause additional congestion.

Some local roadways would see additional volume as diverted traffic travels to the other Winooski River bridge crossings. Traffic volumes in the immediate vicinity of the Main Street bridge would be reduced, leading to less drive-by traffic near local businesses.

Two Lanes Maintained Advantages: Traffic is maintained on the structure during construction

- Traffic congestion on diversion routes is substantially less compared to a full bridge closure.
- Maintaining one lane of traffic in each direction allows for a larger area for construction activities to occur on the bridge, thereby shortening the construction duration compared to maintaining three lanes of traffic during construction.
- Emergency vehicle access is maintained during construction.

Two Lanes Maintained Disadvantages:

- One lane of traffic in each direction still results in congestion to numerous roadways in the area, and several roadways, particularly I-89, being over capacity.
- With some traffic diversion, there would be less drive-by traffic for local businesses.
- Phased construction may require multiple years of construction activity on the bridge depending on the Alternative developed and chosen.
- Emergency vehicle response times could be increased due to congested conditions.

OPTION 3: PHASED CONSTRUCTION WITH THREE LANES OF TRAFFIC MAINTAINED (1 SOUTH BOUND LANE AND 2 NORTHBOUND LANES)

Phased construction would maintain one southbound lane of traffic and two northbound lanes of traffic throughout the duration of the project. This orientation was selected since providing two lanes entering the Circulator would provide better traffic operations than only providing a single lane entering the Circulator. Traffic would be maintained, and the bridge would be built using phased construction. Depending on the phase and alternative chosen, multiple traffic shifts would be required between the existing and new bridge during construction. Since the capacity of the bridge would be reduced by approximately twenty five percent, some additional congestion at the Riverside Avenue traffic signal in Burlington and in the Circulator in Winooski would be expected. For this reason, some diversion of traffic to other Winooski River bridge crossings would occur, although not nearly as much as the other traffic control scenarios. One sidewalk would be provided to maintain the pedestrian crossing during construction and bicycle traffic would continue to need to “take the lane” while crossing the bridge. A summary of this traffic control option assessment, advantages and disadvantages is provided below

Three Lanes Maintained Assessment Summary:

- Traffic would divert to the other Winooski River bridge crossings at I-89, Lime Kiln Road, and Plattsburg Road. These roads are already at or near capacity during peak travel times, so the additional traffic would cause additional congestion.
- Some local roadways would see additional volume as diverted traffic travels to the other Winooski River bridge crossings.
- Traffic volumes in the immediate vicinity of the Main Street bridge would be reduced, leading to less drive-by traffic near local businesses.

Three Lanes Maintained Advantages:

- Traffic can be maintained through the existing corridor.
- Impacts to traffic would be slightly reduced compared to Option 2.
- Emergency vehicle access is maintained during construction.

Three Lanes Maintained Disadvantages:

- Construction would require multiple construction phases and take significantly longer than Options 1 & 2 due to the limited work area available to the Contractor.
- The increase in the number of phases increases the amount of construction joints in the bridge deck, which may create a long-term maintenance issue.
- Multiple traffic lane shifts from the old bridge onto the new bridge would be required.

VII. ALTERNATIVES DISCUSSION

Although the bridge is in overall satisfactory condition, it is approaching the end of its design life. The structure is classified as functionally deficient due to sub-standard travel lane widths, no shoulders, and no designated bike lanes, all of which pose safety concerns for all modes of travel. In 2017, RSG completed a traffic assessment (see Appendix G) to evaluate the feasibility of permanently reducing the bridge to three travel lanes to better accommodate pedestrian and bicycle traffic within the existing bridge curb-to-curb width. The traffic assessment concluded that three permanent lanes would result in unacceptable levels of congestion within the study area. Therefore, only alternatives with four travel lanes across the bridge were evaluated. The following alternatives were identified and evaluated based on how well they address the purpose and needs of the project.

NO BUILD

The No Build Alternative leaves the bridge in its current condition and does not address any of the conditional or functional deficiencies of the bridge. The No Build Alternative anticipates that the existing bridge will not require any major rehabilitation work in the next 15 years, which is not a feasible option as the existing superstructure will require both steel and concrete repairs in the near future. In the interest of safety to the traveling public, the No Build Alternative is not recommended. No cost estimate has been developed for this alternative as there are no immediate costs. Early in the process it was determined that the No Build Alternative did not meet the requirements of the Purpose and Need statement, and therefore the ***No Build Alternative was eliminated from consideration***.

ALTERNATIVE 1 - BRIDGE SUPERSTRUCTURE REHABILITATION WITH OFFLINE PEDESTRIAN/BIKE BRIDGE

The Bridge Superstructure Rehabilitation Alternative will address the immediate conditional deficiencies as found in the latest inspection report. Rehabilitation work will include the following:

- Cleaning and patching of loose and deteriorated (spalled) concrete on the bridge deck and sidewalks. This will also include spalled areas on the underside of the deck.
- Spot cleaning and painting of the existing steel girders.

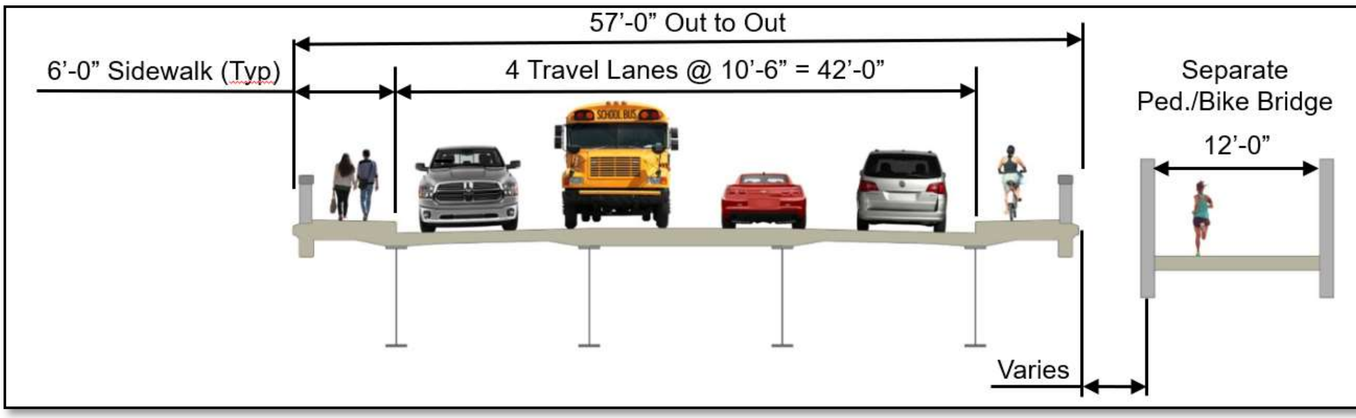
With the repairs listed above and given that the deck and superstructure have a satisfactory condition rating, it is anticipated that the service life of the bridge will be extended 50 years. These repairs will improve the overall structural condition of the bridge, but do not address the current functional deficiencies, as the bridge will still have sub-standard travel lane, shoulder and sidewalk widths.

In addition to the superstructure rehabilitation, this alternative will include the construction of an off-alignment pedestrian/bike bridge, based on the recommendations provided in the Bike & Pedestrian study published in 2017. Since the bridge rehabilitation does not address the safety concerns for pedestrians, a separate pedestrian/bike bridge will provide a safe crossing for bicyclists and pedestrians as defined in the project's Purpose and Need statement. The recommendations for the proposed location of this separate structure based on the 2017 study were reviewed, and through discussions with the Advisory Committee, the following recommendations were made:

- The ideal location for the separate pedestrian/bicycle bridge is immediately adjacent to and at the same elevation as the existing bridge. This location is defined as Alignment A in the 2017 Bike & Pedestrian Study.
- Locating the separate bridge immediately downstream (west) of the existing bridge is the preferred location due to the large volume of pedestrians and bicyclists using Riverside Avenue.

A typical bridge section of Alternative 1 is provided in Figure 13 below:

Figure 13 - Alternative 1 Typical Bridge Section (Looking South toward Burlington)



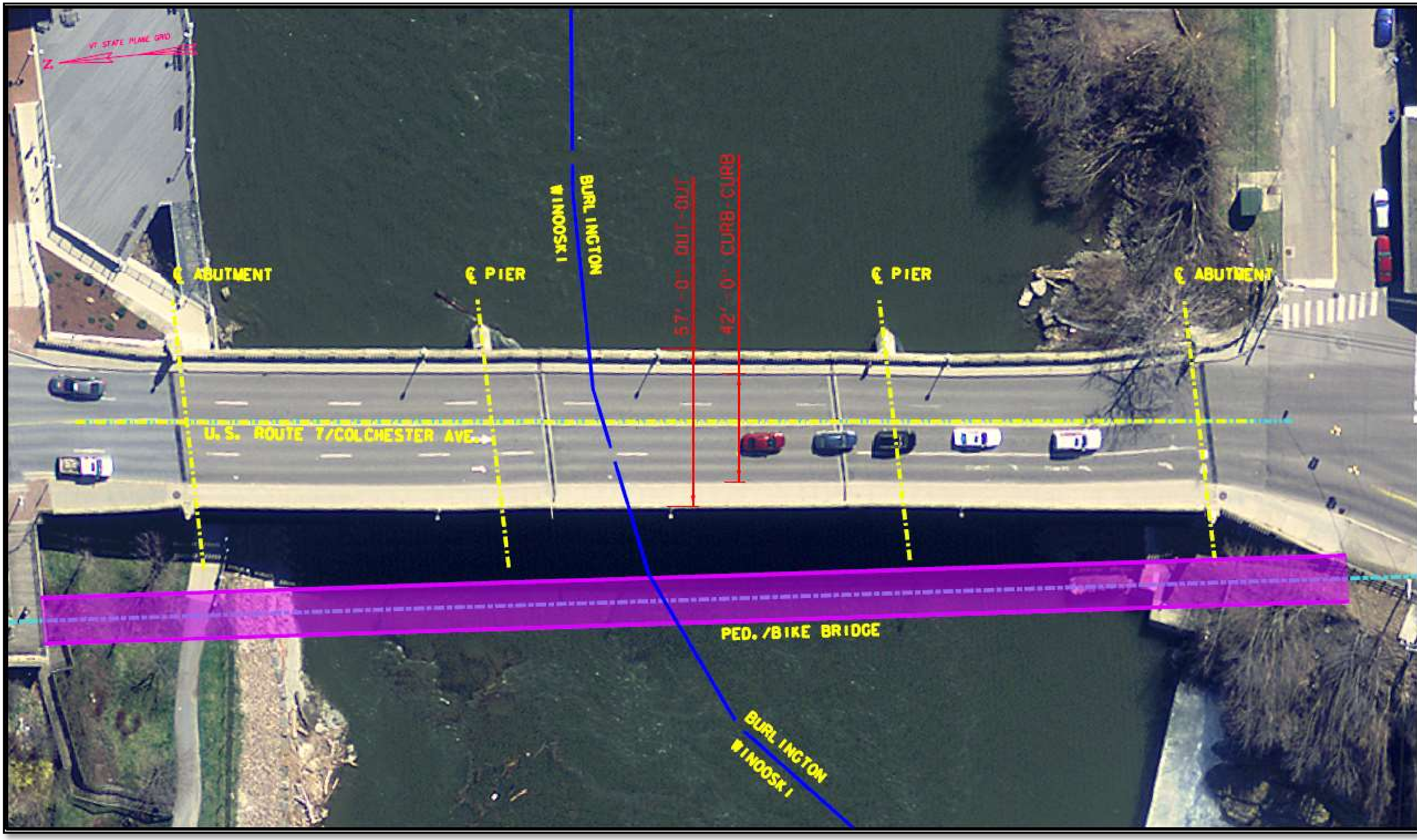
One configuration that was briefly explored was to remove one of the existing sidewalks to provide additional shoulder width across the bridge. However, this option is not feasible due to the existing girder locations and overhang brackets. The existing structure cannot safely support placed outside of the exterior girders on the overhang.

This alternative will require that pedestrians and bicyclists on the upstream (east) side of the bridge who wish to use the newly constructed bike and pedestrian bridge use nearby crosswalks. These crosswalks are not anticipated to be located at the immediate ends of both bridges and is therefore an additional safety hazard for bicyclists and pedestrians who wish to use the separate pedestrian/bike structure.

The existing piers and abutments are in overall good condition and are not in need of any immediate extensive concrete repairs. Since all substructure units are cast directly onto bedrock they have little susceptibility to scour, and therefore no scour control measures will be provided for the piers. For the purposes of this study, it is reasonable to assume the existing substructure units can safely carry traffic loads for another 50 years without requiring significant maintenance and rehabilitation.

See Figure 14 below for a plan view illustrating Alternative 1.

Figure 14 – Alternative 1 Plan View



ALTERNATIVE 2 - BRIDGE SUPERSTRUCTURE REPLACEMENT WITH OFFLINE PED./BIKE BRIDGE

This alternative will entail replacing the superstructure of the existing bridge. This alternative requires the following major construction items:

- Replacing the existing deck with a new concrete bridge deck.
- Replacing the existing steel girders with new steel girders.
- Rehabilitating the existing steel girder seats (beam seats) on the existing piers and abutments to accommodate the proposed steel girders.
- Rehabilitating the existing abutment backwalls and beam seats to accommodate the proposed steel girders.

Due to the unconventional steel overhang brackets that support the existing sidewalks, it is not feasible to increase the bridge width without widening the existing substructure units. For that reason, this alternative reduces the overall width of the bridge, reduces sidewalk width, maintains the current lane and shoulder widths, and maintains the existing horizontal and vertical alignments. Like Alternative 1, this alternative will locate a separate pedestrian/bicycle bridge adjacent to the proposed structure to satisfy the project's purpose and need statement of providing dedicated facilities for bicycle and pedestrian traffic in both directions of the bridge. The location of pedestrian and bicycle bridge will be similar to Alternative 1, which is adjacent to the proposed bridge on the downstream (west) side of the structure.

Since vehicular traffic can be reconfigured given the new girder layout and a pedestrian/bicycle bridge will be provided adjacent to the bridge structure, different combinations of shoulders and sidewalks could be provided. Through discussions with the Advisory Committee, it was determined that for this Alternative, it would be preferred to provide both a sidewalk and a bike lane on the northbound (east) side of the bridge. Pedestrians and bicyclists traveling northbound on the bridge would utilize their respective paths provided on the Main Street Bridge, while pedestrians and bicyclists traveling southbound would utilize the adjacent pedestrian/bicycle bridge Figure 15 below shows the proposed typical bridge section for Alternative 2.

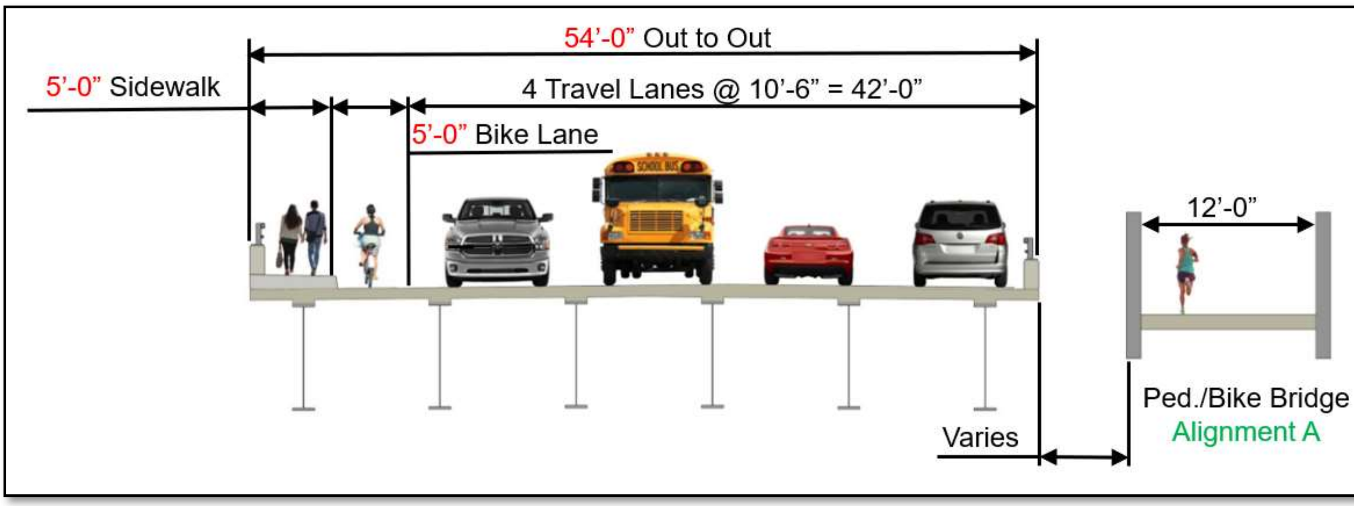
This bridge typical section will require that pedestrians and bicyclists on the upstream (east) side of the bridge who wish to use the newly constructed bike and pedestrian bridge use nearby crosswalks. These crosswalks are not anticipated to be located at the immediate ends of both bridges and is therefore an additional safety hazard for bicyclists and pedestrians who wish to use the separate pedestrian/bike structure.

A summary of the proposed widths provided on the bridge for this alternative compared to the existing structure is provided in Table 3 below:

Table 3 - Alternative 2 Comparison to Existing Bridge

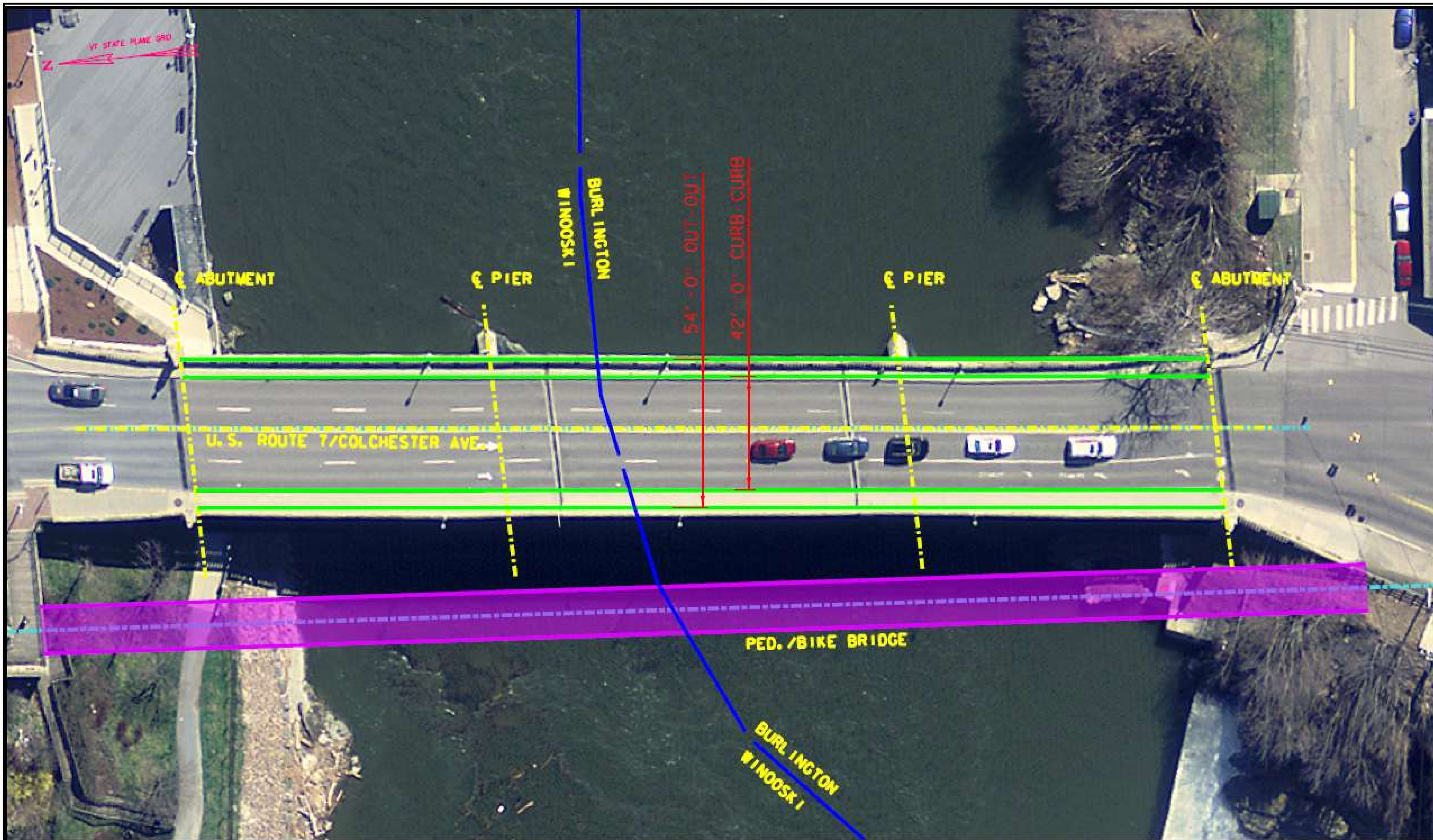
Bridge Widths - Alternative 2 vs Existing Bridge		
Description	**Alternative 2**	**Existing Bridge**
Total Bridge Width	54'-0"	57'-0"
Northbound Sidewalk Width	5'-0"	6'-0"
Travel Lane Width	10'-6"	10'-6"
Northbound Shoulder Width	5'-0" Bike Lane	None Provided

Figure 15 - Alternative 2 Typical Bridge Section (Looking South toward Burlington)



The existing piers and abutments are in overall good condition and are not in need of any immediate extensive concrete repairs. The existing piers and abutments will undergo minor repairs to any cracking or surface deficiencies. Modifications to the bridge seats of each substructure unit will be required to accommodate the new superstructure depth and bearing configuration. Since all substructure units are cast directly onto bedrock, they have little susceptibility to scour, and therefore no scour control measures will be provided. For the purposes of this study, it is reasonable to assume the existing substructure units can safely carry traffic loads for another 50 years without requiring significant maintenance and rehabilitation. See Figure 16 below for a plan view illustrating Alternative 2.

Figure 16 – Alternative 2 Plan View



ALTERNATIVE 3 - BRIDGE SUPERSTRUCTURE REPLACEMENT WITH UPSTREAM ALIGNMENT SHIFT

This alternative will replace the existing superstructure and widen the existing piers and abutments to allow for a wider bridge. The majority of the widening will occur on the upstream (east) side of the bridge and will require the horizontal alignment of the roadway to be shifted upstream approximately 11 feet. The vertical roadway alignment will remain unchanged.

The bridge width will increase to 76’-0” to meet current roadway design guidelines. A summary of the proposed widths provided on the bridge for this alternative compared to the existing structure is provided in Table 4 below:

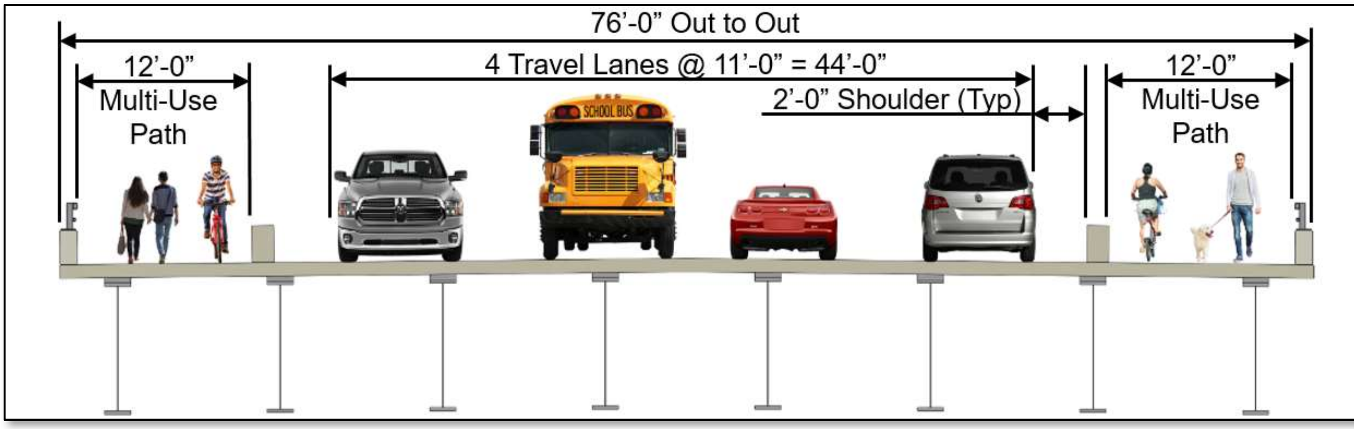
Table 4 – Alternative 3 Comparison to Existing Bridge

Bridge Widths - Alternative 3 vs Existing Bridge		
Description	Alternative 3	Existing Bridge
Total Bridge Width	76’-0”	57’-0”
Northbound Sidewalk Width	12’-0” (Multi-Use Path)	6’-0” Sidewalk
Travel Lane Width	11’-0”	10’-6”
Shoulder Widths	2’-0”	None Provided
Southbound Sidewalk Width	12’-0” (Multi-Use Path)	6’-0” Sidewalk

With an increased bridge width, different pedestrian/bicycle treatments could be provided such as designated bicycle lanes, raised sidewalks, or protected multi-use paths. Through discussions with the Advisory Committee, it was determined that a protected multi-use path should be provided on each side of the bridge. This path would be at the same elevation as the roadway but would be protected from adjacent vehicular traffic via a concrete barrier system. Each multi-use path would connect to existing sidewalks on each side of the bridge as well as the Riverside Avenue shared use path on the Burlington side.

A typical bridge section of Alternative 3 is provided in Figure 17 below:

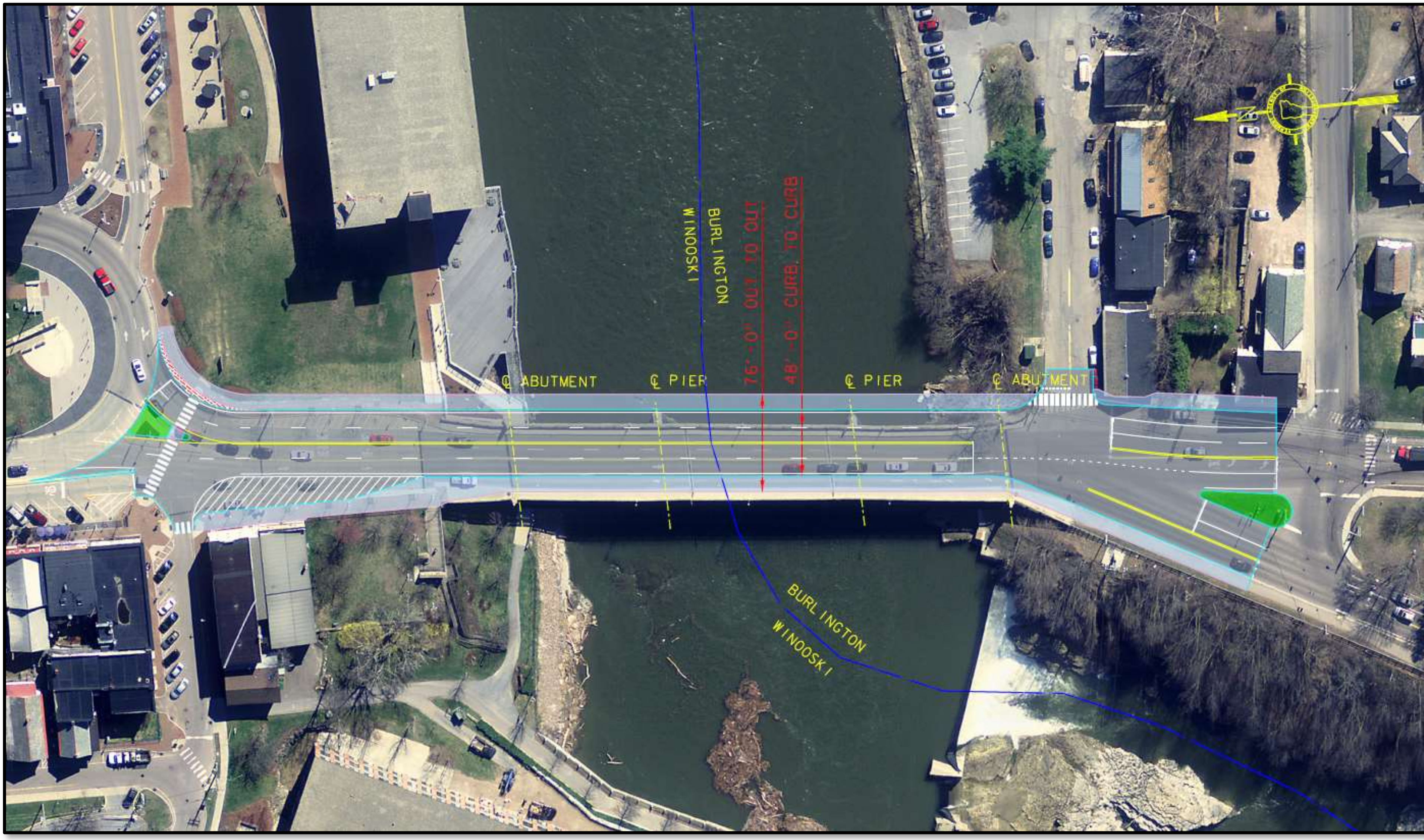
Figure 17 - Alternative 3 Typical Bridge Section (Looking South toward Burlington)



Modifications to the existing piers and abutments will include minor repairs, bridge seat modifications, and widening. Minor repairs to any cracking or surface deficiencies are expected to be necessary prior to casting the widened portion. Bridge seat modifications will be required to accommodate the new superstructure depth and bearing configuration. Pier widening will be accomplished by drilling and grouting dowels into the existing piers and pouring new concrete to act monolithic with existing concrete. Widened sections of substructure units will be supported by either bearing directly onto bedrock or by some form of rock doweling or drilled rock socket. The exact method of construction will be finalized after the subsurface exploration (borings) has been completed.

Due to the bridge width required to accommodate the proposed facilities, this alternative would widen the existing piers and abutments on each side. The alignment shift to the east of approximately 11 feet will require widening the existing piers and abutments primarily on the upstream side. The amount of widening required will not be fully determined until the final detailed design phase of the project. This alignment shift of the bridge requires some modifications to both approach roadways. This shift was reviewed, and it was determined that it will not preclude any alternatives that may be constructed at the future Colchester/Riverside Avenue intersection. An aerial plan view of Alternative 3 is provided in Figure 18 below:

Figure 18 – Alternative 3 Plan View



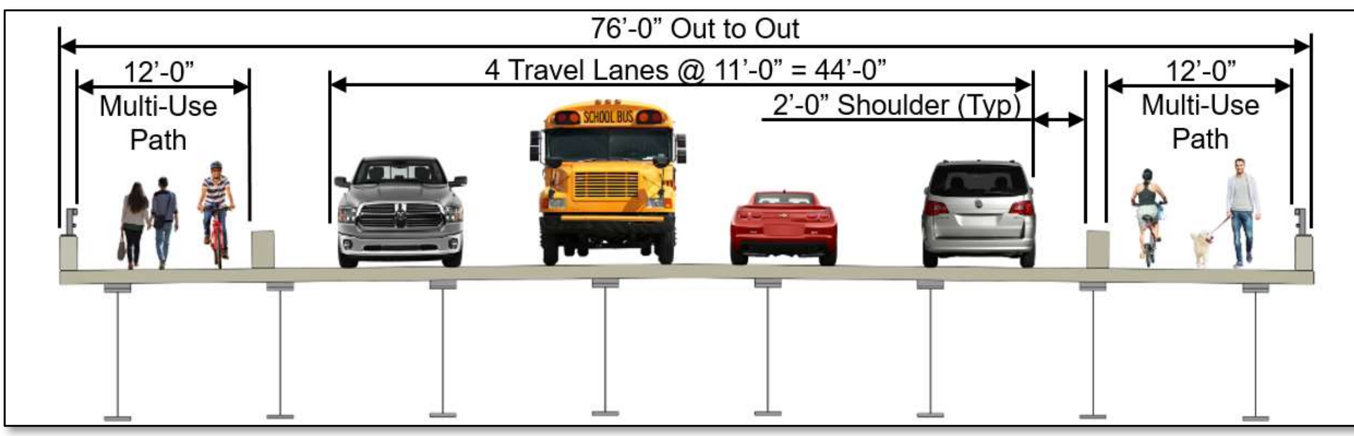
ALTERNATIVE 4 - BRIDGE SUPERSTRUCTURE REPLACEMENT WITH DOWNSTREAM ALIGNMENT SHIFT (WITH ABC CONSTRUCTION TECHNIQUES)

Alternative 4 is similar to Alternative 3, however the existing substructure units are widened downstream rather than upstream. The alignment for Alternative 4 is also shifted downstream (to the west) to accommodate this wider structure. The proposed bridge width would be similar to Alternative 3, and is summarized in Table 5 and shown in Figure 19 below:

Table 5 - Alternative 4 Comparison to Existing Bridge

Bridge Widths - Alternative 4 vs Existing Bridge		
Description	**Alternative 4**	**Existing Bridge**
Total Bridge Width	76'-0"	57'-0"
Northbound Sidewalk Width	12'-0" (Multi-Use Path)	6'-0" Sidewalk
Travel Lane Width	11'-0"	10'-6"
Shoulder Widths	2'-0"	None Provided
Southbound Sidewalk Width	12'-0" (Multi-Use Path)	6'-0" Sidewalk

Figure 19 - Alternative 4 Typical Bridge Section (Looking South toward Burlington)

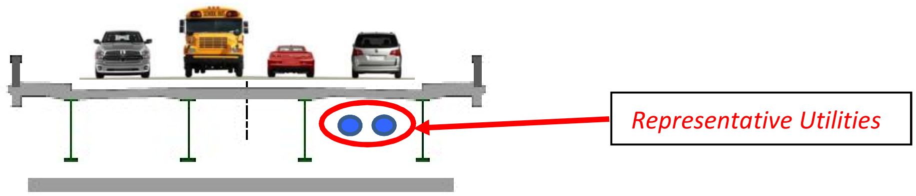


A full bridge closure was evaluated for this alternative, due to the traffic impacts associated with maintaining two lanes or three lanes of traffic for several (2-3) construction seasons. The use of Accelerated Bridge Construction (ABC) techniques was evaluated to determine if it was a feasible option. ABC is a method of construction where elements of the bridge are fabricated in advance of the bridge closure, and then shipped/moved to the site and assembled during a relatively short bridge closure, substantially reducing the impacts to the public using the bridge. The use of ABC techniques is very common in the state of Vermont and is considered the default method of construction statewide for bridge replacement projects.

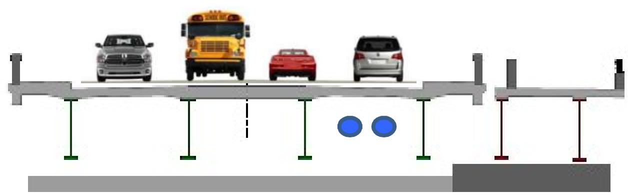
For this structure, the method of ABC construction that was determined to be most ideally suited for this site is the bridge lateral slide method. This method of construction requires that the bridge (concrete deck and steel girders) be built directly adjacent to the existing bridge on temporary supports in advance of the bridge closure. Once the bridge is closed, the concrete deck and steel girders are removed from the existing bridge. The beam seats are reconstructed, and the new bridge is then slid from the temporary supports onto the existing abutment/piers. The approach roadway work is then completed, and the new bridge is then opened to traffic.

The downstream alignment shift with Alternative 4 allows for a portion of the new bridge to be built downstream of the existing bridge on the widened piers and abutments in advance of the full bridge closure. This section can potentially be used as a pedestrian/bike bridge and provide emergency vehicle access during the bridge closure. Another benefit of building a portion of the new bridge in advance is that the utilities can be relocated prior to the bridge closure, which is a substantial savings in construction time, coordination, and impacts to traffic. The rest of the bridge will be constructed using bridge lateral slide ABC methods, which will further reduce the impacted traffic duration. A phasing diagram showing the assumed sequence of construction using ABC methods for Alternative 4 is shown in Figure 20 below:

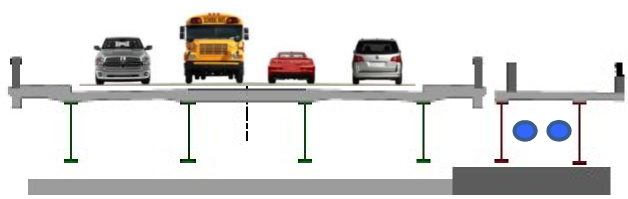
Figure 20 - Alternative 4 ABC Phasing



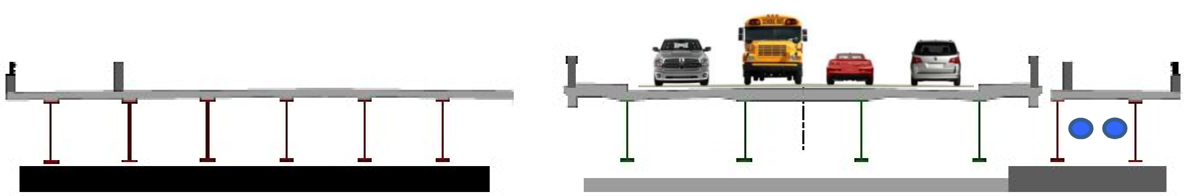
Existing Condition



Phase 1 – Widened Portion of Substructure Units and Superstructure Constructed

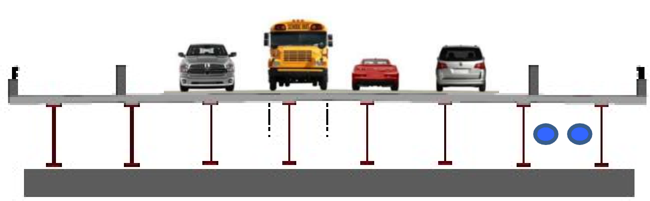


Phase 1a – Utilities Relocated



Phase 2 – New Bridge Superstructure Built Adjacent to Existing Bridge on Temporary Supports

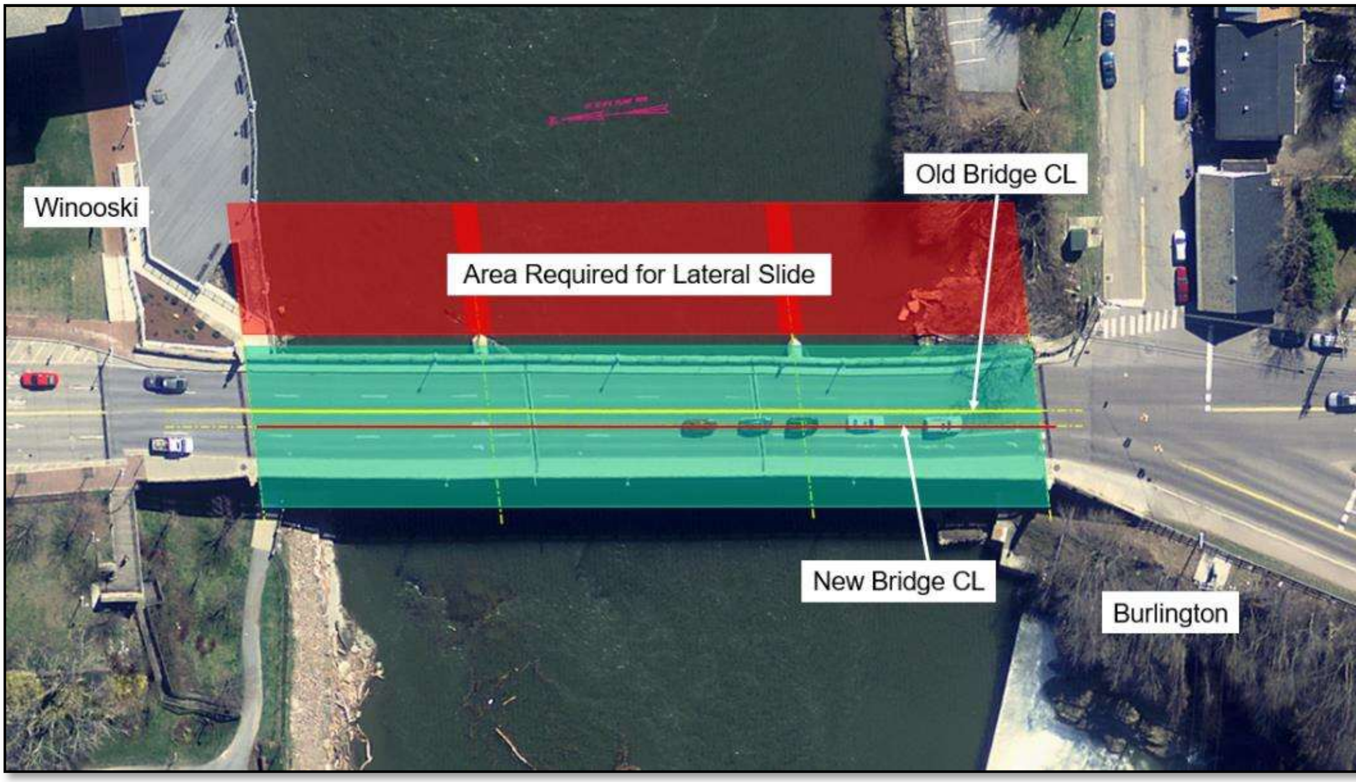
Phase 3 – Bridge Closed to Traffic, Existing Bridge Superstructure Removed, and New Bridge Superstructure Slid to Final Location



Phase 4 - New Bridge Opened to Traffic

The use of ABC techniques with Alternative 4 would require a substantial area for the bridge superstructure to be constructed prior to the bridge closure. Due to the proximity of the dam structure, the only available location to construct the bridge would be upstream of the existing bridge (this is why ABC is not possible with the upstream shift of Alternative 3). The approximate location of the area required to construct the bridge is shown in Figure 21 below:

Figure 21 – Alternative 4 Aerial View with Lateral Slide

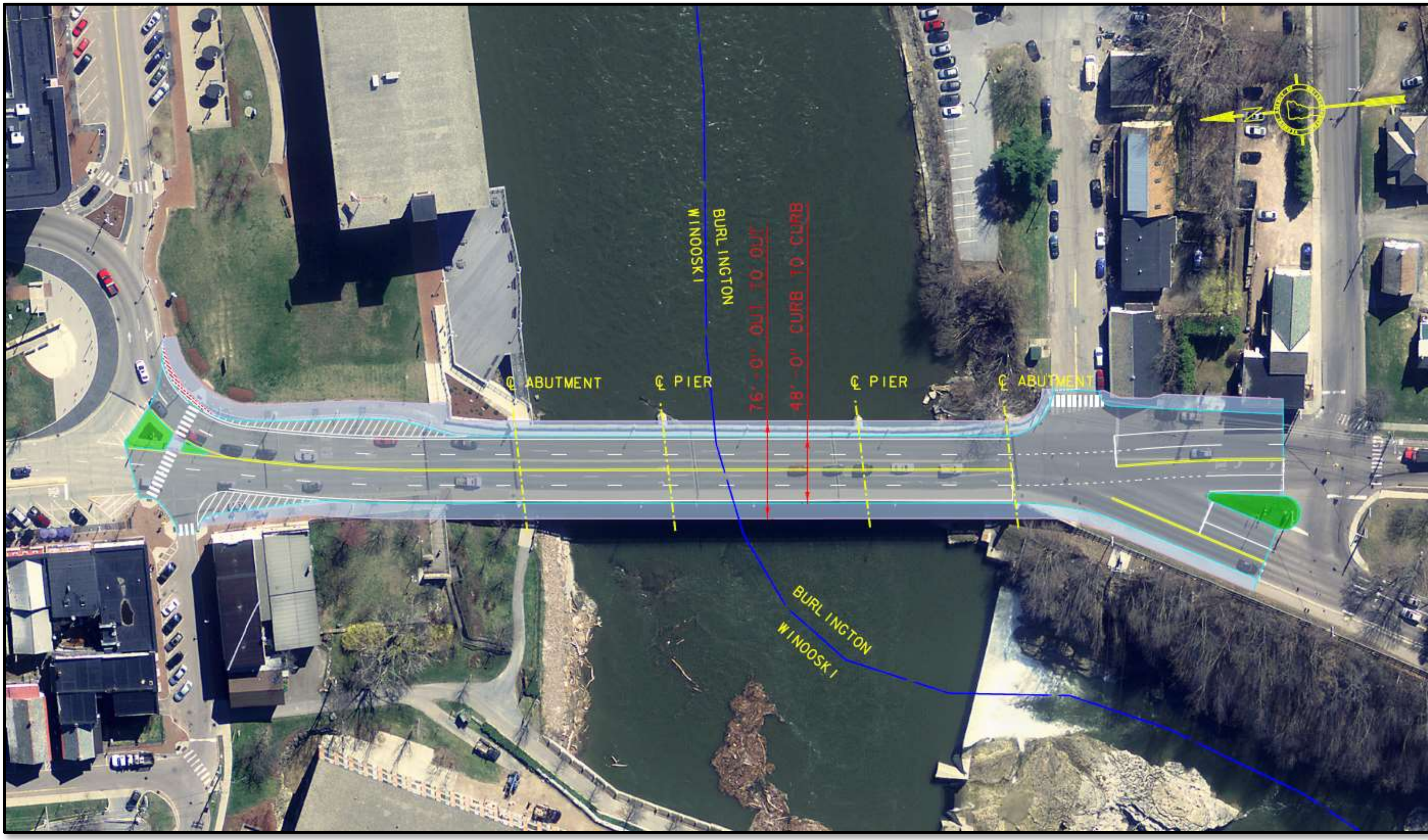


It is anticipated that a portion of the parking lot on Mill Street and the Winooski Riverfront Park at the southeast and northeast corners of the bridge, respectively, would require closure. Both will require reconstruction after the bridge is re-opened to traffic.

The use of ABC techniques would require complete closure of the bridge, which would have large traffic impacts to the surrounding communities. The duration of the bridge closure cannot be determined until final design; however, it is anticipated that a closure duration of 4-6 weeks would be required to remove the old bridge, slide the new bridge into place and reopen the structure to traffic. This is a major reduction in duration of traffic impacts when compared to the estimated construction duration of 2-3 years for conventional construction.

Due to the bridge width required to accommodate the proposed facilities, this alternative would widen the existing piers and abutments on each side. Alternative 4 would widen the existing piers primarily to the downstream side. By widening to the downstream side, the alignment of the existing bridge would shift to the west by approximately 7'. This alignment shift of the bridge requires some modifications to both approach roadways. This shift was reviewed, and it was determined that it will not preclude any alternatives that may be constructed at the future Colchester/Riverside Avenue intersection. An aerial plan view of Alternative 4 is provided in Figure 22 below:

Figure 22 – Alternative 4 Plan View



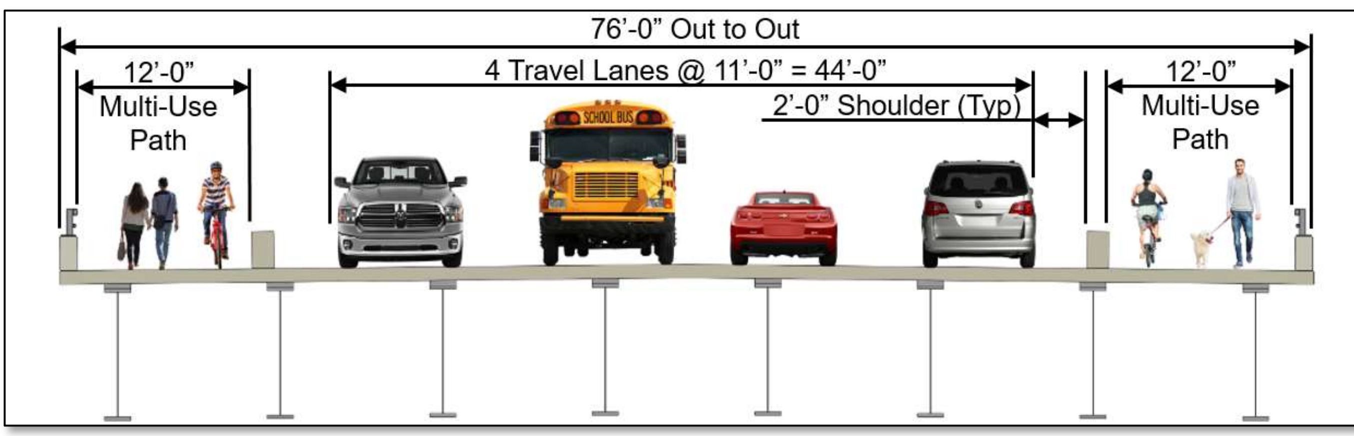
ALTERNATIVE 5 - COMPLETE BRIDGE REPLACEMENT WITH 2 SPAN STRUCTURE (WITH ABC CONSTRUCTION TECHNIQUES)

Alternative 5 is a complete bridge replacement which removes the superstructure, piers, and abutments of the existing three-span structure and replaces it with a completely new two span structure. The proposed superstructure of this alternative is similar to Alternatives 3 & 4, and is summarized in Table 6 & Figure 23 below:

Table 6 - Alternative 5 Comparison to Existing Bridge

Bridge Widths - Alternative 5 vs Existing Bridge		
Description	**Alternative 5**	**Existing Bridge**
Total Bridge Width	76’-0”	57’-0”
Northbound Sidewalk Width	12’-0” (Multi-Use Path)	6’-0” Sidewalk
Travel Lane Width	11’-0”	10’-6”
Shoulder Widths	2’-0”	None Provided
Southbound Sidewalk Width	12’-0” (Multi-Use Path)	6’-0” Sidewalk
Number of Spans	2	3

Figure 23 - Alternative 5 Typical Bridge Section (Looking South)



The proposed abutments for Alternative 5 would be placed in the same location as the existing abutments. Maintaining the same location is preferred due to the following:

- Locating the proposed abutments behind the existing ones would require extensive utility relocation in the south (Burlington) approach roadway. This utility relocation would have substantial negative impacts to the maintenance of traffic in this intersection during construction.
- Locating the proposed abutments in front of the existing abutments would interfere with the pedestrian path underneath the bridge on the north (Winooski) approach. Utility relocations would

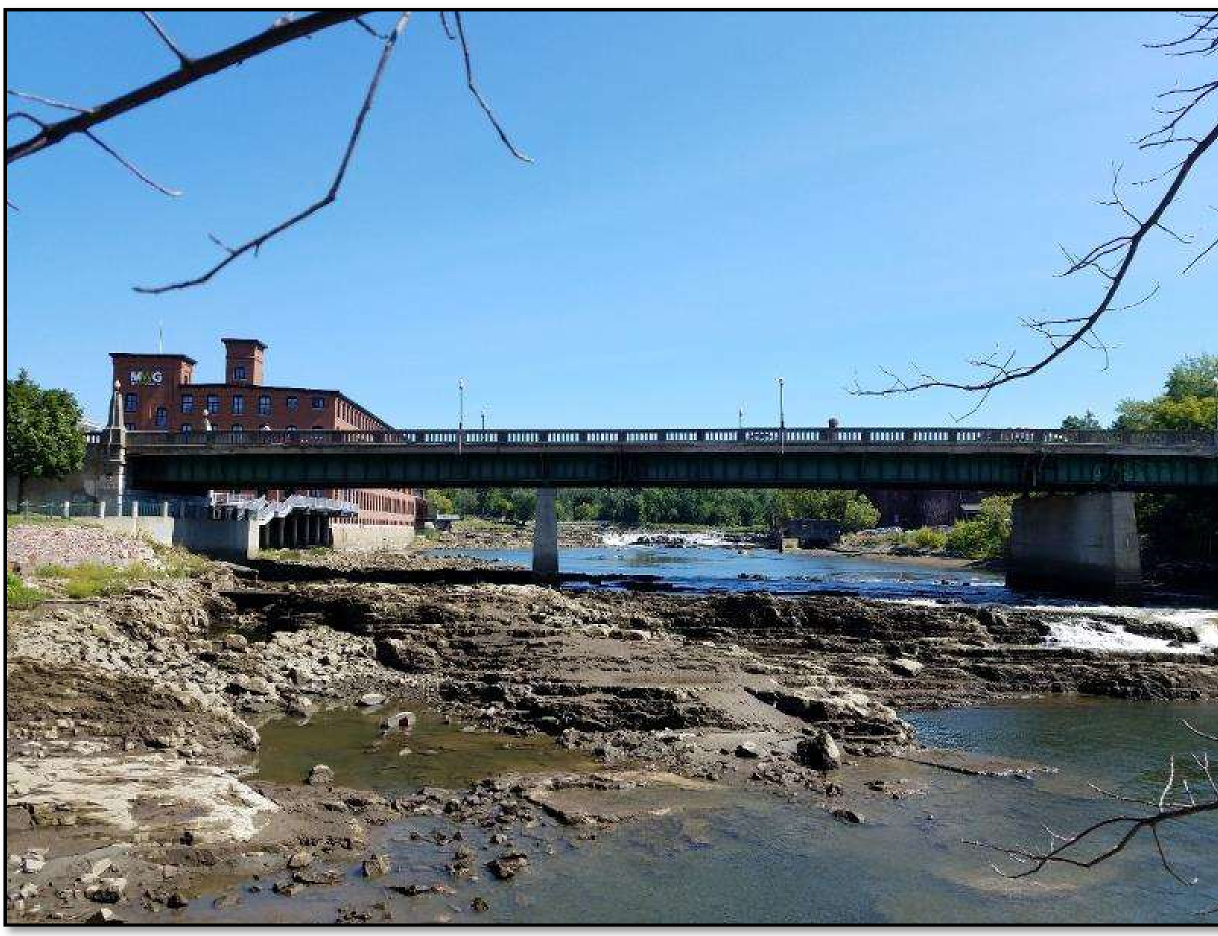
also be required at the south abutment due to the electric lines running underneath the bridge to the adjacent dam structure.

- Locating the new abutments in front of the existing abutments would negatively impact the floodway of the Winooski River.

A two-span replacement was chosen for Alternative 5 as it allows the new pier to be constructed between the existing piers. The new pier can be constructed under the existing structure prior to removing the existing bridge, which reduces impacts to traffic above and shortens the construction duration.

In addition, during the scoping process, the option of constructing the pier during a dam drawdown was discussed and evaluated. During a dam drawdown, the water level is low enough that de-watering for the construction of the proposed pier may not be required (See Figure 24 below). Constructing a pier during a drawdown could reduce the costs and associated impacts of temporary works required in the Winooski River. In addition, construction vehicles may be able to travel on the exposed ledge to access the location of the proposed pier. The existing piers can also be removed during a dam drawdown to potentially reduce the removal costs. As the development of this project progresses, additional coordination will be required with the dam operators to assess the feasibility of constructing portions of the bridge during a dam drawdown and how an extended dam drawdown would impact the operations and financial performance of the hydroelectric functions of the dam as well as potential impacts to fish passage.

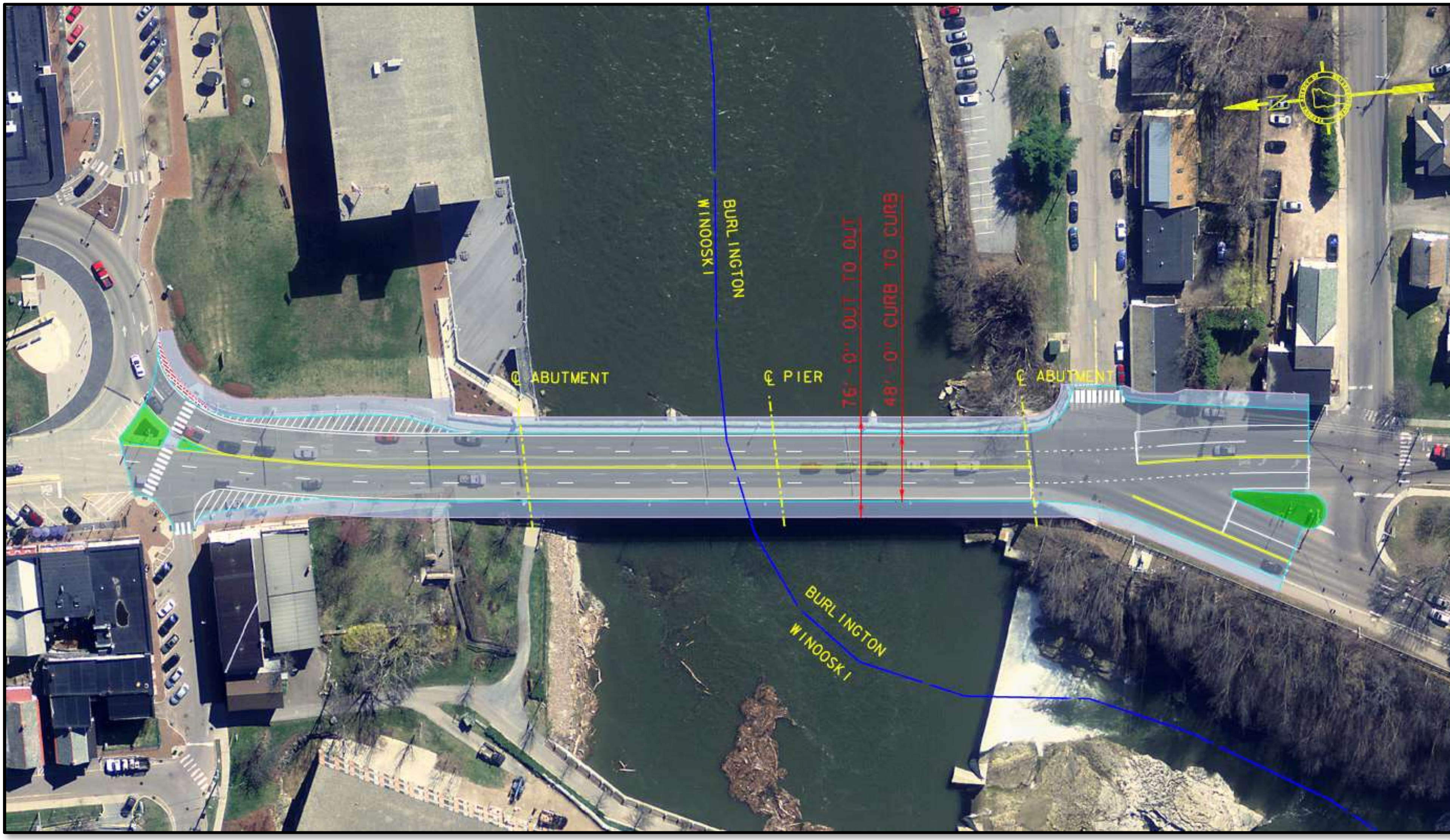
Figure 24 – Exposed Winooski River Ledge During Dam Drawdown



The use of ABC techniques would require complete closure of the bridge, which would have large traffic impacts to the surrounding communities. The duration of the bridge closure cannot be determined until final design; however, it is anticipated that a closure duration of 4-6 weeks would be required to remove the old bridge, slide the new bridge into place and reopen the structure to traffic. This is a major reduction in duration of traffic impacts when compared to the estimated construction duration of 2-3 years for conventional construction.

An additional benefit to constructing a new bridge will be the removal of a pier from the river. The piers are considered obstructions to the river channel and the removal of any obstruction from the river is considered a substantial improvement over the existing condition. In addition, the removal of a pier will slightly reduce the 100-year flood elevation compared to what is published by FEMA.

Figure 25 - Alternative 5 Plan View



VIII. ALTERNATIVES ANALYSIS SUMMARY

Each of the proposed alternatives were evaluated based on numerous criteria, particularly how well the requirements of the Purpose and Need statement were addressed. Alternatives 1-5 were evaluated, based on input from the CCRPC, the Advisory Committee, and a public information session, as well as with VTrans and Agency of Natural Resource staff. Each alternative was given a value ranking for each criterion and placed in an evaluation matrix for comparison with the other alternatives. This evaluation matrix is shown in Figure 27 and Figure 28 . A detailed description of selected evaluation criteria is provided in the following sections. The value ratings that were used are summarized below:

- Highest Positive Value Rating
- Slight Positive Value Rating
- Neutral Value Rating
- Slight Negative Value Rating
- Lowest Negative Value Rating

In addition to the criteria noted in the Purpose and Need statement, traffic control during construction was expressed to be a major concern by the Advisory Committee and therefore included in the evaluation. A summary of the evaluation matrix is provided in Figure 26. A summary description of the primary evaluation criteria is provided below:

Improve Traffic Safety – Is safety for the motorists improved for each alternative?

Maintain/Improve Structural Integrity – Is the structural integrity of the bridge improved to meet the design life requirements for the next 100 years.

Improve Bike & Pedestrian Travel Connectivity – Is pedestrian connectivity on each side of the bridge improved for adjacent and future trails/sidewalks which are nearby to the bridge.

Minimize Resource Impacts – Are the impacts to natural and historic resources being avoided or are resources being disturbed due to the proposed alternative?

Provide Designated Lanes for Bicyclists – Are separate lanes provided for bicyclists in both directions?

Maintain Two Lanes of Traffic in Each Direction – Are two lanes in each direction provided in the final condition?

Improve Pedestrian Safety – Is safety of the pedestrians improved on each side of the bridge from the current condition?

Traffic Control During Construction – What are the impacts to vehicular traffic during construction?

Figure 26 - Evaluation Matrix Executive Summary

Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Improve Traffic Safety					
Maintain/Improve Structural Integrity					
Improve Bike & Pedestrian Travel Connectivity					
Maintain/Improve Resource Impacts					
Provide Designated Lanes for Bicyclists					
Maintain 2 Lanes Traffic in Each Dir.					
Improve Pedestrian Safety					
Traffic Control During Construction					
Total Project Costs	**$10.7 Million**	**$12.8 Million**	**$17.4 Million**	**$18.3 Million**	**$22.7 Million**

EVALUATION MATRIX

The criteria that were used to evaluate each alternative is summarized in a matrix and is presented in Figure 27 & Figure 28 below. A summary description of each criteria for each Alternative is presented in Appendix E.

Figure 27 - Evaluation Matrix

CHITTENDEN COUNTY REGIONAL PLANNING COMMISION
MAIN STREET (US ROUTES 2 & 7) OVER WINOOSKI RIVER – SCOPING REPORT STUDY
EVALUATION MATRIX

	Criteria	No Build	Alternative 1 Bridge Rehabilitation w/ Offline Ped Bridge	Alternative 2 Superstructure Replacement w/ Offline Ped Bridge	Alternative 3 Superstructure Replacement w/ Substructure Widening	Alternative 4 Superstructure Replacement w/ Substructure Widening (Possible ABC)	Alternative 5 Full Bridge Replacement w/ Two-Span Structure (Possible ABC)
PURPOSE & NEED	Improve Traffic Safety	No	Not Met (No Shoulder)	Not Met (No Shoulder)	Yes	Yes	Yes
	Maintain/Improve Structural Integrity	No	Minor Improvements	Yes	Yes	Yes	Yes
	Address Bridge Condition Deficiencies	No	Minor Improvements	Yes	Yes	Yes	Yes
	Improve Bike & Pedestrian Travel	No	Yes (On Separate Structure)	Yes (On Separate Structure)	Yes	Yes	Yes
	Maintain/Improve Resource Impacts	Yes	Minor Permanent Impacts	Minor Permanent Impacts	Minor Permanent Impacts	Minor Permanent Impacts	Yes
	Provide Designated Lanes for Bicyclists	No	Yes (On Separate Structure)	Yes (On Separate Structure)	Yes (On Bridge w/ Protected Path)	Yes (On Bridge w/ Protected Path)	Yes (On Bridge w/ Protected Path)
	Maintain 2 Lanes Traffic in Each Direction	Yes	Yes	Yes	Yes	Yes	Yes
	Improve Pedestrian Safety	No	Yes (On Separate Structure)	Yes (On Separate Structure)	Yes	Yes	Yes
COST	Bridge Cost	$0	$3,520,000	$4,380,000	$7,600,000	$8,270,000	$10,720,000
	Removal of Structure	$0	$810,000	$810,000	$810,000	$1,010,000	$1,310,000
	Roadway	$0	$200,000	$200,000	$200,000	$200,000	$200,000
	Temporary Works/Causeway	$0	$100,000	$350,000	$750,000	$750,000	$750,000
	Maintenance of Traffic	$0	$750,000	$1,000,000	$1,250,000	$960,000	$960,000
	Construction Costs	**$0**	**$5,380,000**	**$6,740,000**	**$10,610,000**	**$11,190,000**	**$13,940,000**
	Construction Engineering + Contingencies	$0	$1,620,000	$2,030,000	$3,720,000	$3,920,000	$4,880,000
	Total Construction Costs w/ CEC	**$0**	**$7,000,000**	**$8,770,000**	**$14,330,000**	**$15,110,000**	**$18,820,000**
	Preliminary Engineering	$0	$1,350,000	$1,690,000	$2,660,000	$2,800,000	$3,490,000
	Bike/Pedestrian Bridge (*Ref. D&K Report*)	$0	$1,900,000 (Average)	$1,900,000 (Average)	N/A	N/A	N/A
	Right of Way	$0	$30,000	$30,000	$50,000	$50,000	$50,000
	Public Participation	$0	$350,000	$350,000	$350,000	$300,000	$300,000
	Total Project Costs	**$0**	**$10,700,000 (Approx.)**	**$12,800,000 (Approx.)**	**$17,400,000 (Approx.)**	**$18,300,000 (Approx.)**	**$22,700,000 (Approx.)**
	Life-Cycle Cost ($/SF of Bridge Deck)	$0	$746	$734	$714	$746 w/ABC ($714 w/o ABC)	$883 (w/ABC)
SCHEDULING	Project Development Duration	N/A	TBD	TBD	TBD	TBD	TBD
	Bridge Closure Duration (If Applicable)	N/A	N/A	N/A	N/A	TBD (Weeks for ABC)	TBD (Weeks for ABC)
	Overall Project Construction Duration	N/A	2-3 Years	2-3 Years	2-3 Years	2-3 Years	2-3 Years
	Bridge Lane Reductions Required	N/A	Yes	Yes	Yes	No (With ABC)	No (With ABC)
	Bridge Closure Required	N/A	No	No	No	Possible (with ABC)	Possible (with ABC)

Figure 28 - Evaluation Matrix (Continued)

Criteria		No Build	Alternative 1 Bridge Rehabilitation w/ Offline Ped Bridge	Alternative 2 Superstructure Replacement w/ Offline Ped Bridge	Alternative 3 Superstructure Replacement w/ Substructure Widening	Alternative 4 Superstructure Replacement w/ Substructure Widening (Possible ABC)	Alternative 5 Full Bridge Replacement w/ Two-Span Structure (Possible ABC)
ROADWAY & PEDESTRIAN IMPACTS	Typical Section - Bridge & Roadway	4 – 10'-6" Lanes (42' Roadway Width)	4 – 10'-6" Lanes (42' Roadway Width)	4 – 10'-6" Lanes (42' Roadway Width)	4 – 11' Lanes with 2 – 2' Shoulders (48' Roadway Width)	4 – 11' Lanes with 2 – 2' Shoulders (48' Roadway Width)	4 – 11' Lanes with 2 – 2' Shoulders (48' Roadway Width)
ROADWAY & PEDESTRIAN IMPACTS	Roadway Geometric Design Criteria	Not Met (No Shoulder)	Not Met (No Shoulder)	Not Met (No Shoulder)	Meets Current Roadway Criteria	Meets Current Roadway Criteria	Meets Current Roadway Criteria
ROADWAY & PEDESTRIAN IMPACTS	Traffic Safety	No Change	No Change	Small Improvement (If Sidewalk Removed on 1 Side of Bridge)	Improvement	Improvement	Improvement
ROADWAY & PEDESTRIAN IMPACTS	Roadway Alignment Change	No	No	No	Horizontal Shift East	Horizontal Shift West	Horizontal Shift West
ROADWAY & PEDESTRIAN IMPACTS	Accommodates Colchester/Riverside Intersection Reconstruction	Yes	Yes	Yes	Yes	Yes	Yes
ROADWAY & PEDESTRIAN IMPACTS	Bicycle Access	No Change	Yes (On Separate Pedestrian Bridge)	Yes (On Separate Pedestrian Bridge)	Yes (One Bridge)	Yes (One Bridge)	Yes (One Bridge)
ROADWAY & PEDESTRIAN IMPACTS	Bike Lane Width (on Bridge)	N/A	N/A	5' (On One Side of Bridge Only)	12' (Approximate)	12' (Approximate)	12' (Approximate)
ROADWAY & PEDESTRIAN IMPACTS	Pedestrian Access	No Change	No Change (On Bridge)	No Change (On Bridge)	Large Improvement	Large Improvement	Large Improvement
LIFE CYCLE ANALYSIS	Design Life/ Expected Longevity	10-15 Years	50 Years	100 Years (Superstructure) 50-75 Years (Abutments & Pier)	100 Years (Superstructure Only) 50-75 Years (Abutments & Pier)	100 Years (Superstructure Only) 50-75 Years (Abutments & Pier)	100 Years (Entire Structure)
LIFE CYCLE ANALYSIS	Expected Long Term Repair Costs	N/A	High	Moderate	Moderate	Moderate	Low
LIFE CYCLE ANALYSIS	Future Abutment/Pier Rehab Requirement	High	High	Moderate	Moderate	Moderate	Low
RESOURCE IMPACTS & PERMITTING REQUIREMENTS (See Note 1)	Future River Access Requirements	N/A	Moderate	High	High	High	Low
RESOURCE IMPACTS & PERMITTING REQUIREMENTS (See Note 1)	Farmland Soils	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
RESOURCE IMPACTS & PERMITTING REQUIREMENTS (See Note 1)	Wetlands & Surface Waters	No Impact	No Impact	No Impact	Minor Permanent Impact	Minor Permanent Impact	Minor Permanent Impact
RESOURCE IMPACTS & PERMITTING REQUIREMENTS (See Note 1)	Floodplains & Floodways	No Impact	No Impact	No Impact	Minor Permanent Impact	Minor Permanent Impact	Minor Permanent Impact
RESOURCE IMPACTS & PERMITTING REQUIREMENTS (See Note 1)	Hazardous Material Sites	No Impact	Possible Impact	Possible Impact	Possible Impact	Possible Impact	Possible Impact
RESOURCE IMPACTS & PERMITTING REQUIREMENTS (See Note 1)	Habitat Blocks & Wildlife Corridors	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
RESOURCE IMPACTS & PERMITTING REQUIREMENTS (See Note 1)	Rare, Threatened & Endangered Species	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
RESOURCE IMPACTS & PERMITTING REQUIREMENTS (See Note 1)	Conservation & Recreation Lands	No Impact	Possible Temporary Impact	Possible Temporary Impact	Possible Temporary Impact	Possible Temporary Impact	Possible Temporary Impact
RESOURCE IMPACTS & PERMITTING REQUIREMENTS (See Note 1)	Historic/Archaeological Resource Impacts	No Impact	Mitigation Required	Mitigation Required	Mitigation Required	Mitigation Required	Mitigation Required
OTHER	Utility Impacts	No Change	No Change	Temp. Relocation Required	Relocation Required	Relocation Required	Relocation Required
OTHER	Hydraulic Performance	No Change - Adequate	No Change - Adequate	No Change - Adequate	No Change - Adequate	No Change - Adequate	Improvement
OTHER	ROW Acquisition	N/A	Yes	Yes	Yes	Yes	Yes
OTHER	Seismic Vulnerability	Low	Low	Lower	Lower	Lower	Lowest

Notes

1. Impacts due to separate bike/pedestrian bridge *are not* included in the impacts and permitting requirements

Key

- Lowest Negative Value Rating
- Slight Negative Value Rating
- Neutral Value Rating
- Slight Positive Value Rating
- Highest Positive Value Rating

IX. COST SUMMARY

PROJECT COST SUMMARY

A summary of the project cost estimates has been developed and is provided in **Table 7** below. Costs have been developed based on recent Vermont weighted average unit prices and bid results from recently constructed projects. A complete breakdown of the cost estimates for each alternative is provided in Appendix C.

Table 7 – Summary of Project Costs

Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Construction Costs	$5,380,000	$6,740,000	$10,610,000	$11,900,000	$13,940,000
Construction Engineering & Contingencies	$1,620,000	$2,030,000	$3,720,000	$3,920,000	$4,880,000
Prelim Engineering	$1,350,000	$1,690,000	$2,660,000	$2,800,000	$3,490,000
Ped/Bike Bridge	$1,900,000 (Average)	$1,900,000 (Average)	N/A	N/A	N/A
Right-of-Way	$30,000	$30,000	$50,000	$50,000	$50,000
Public Participation	$350,000	$350,000	$350,000	$300,000	$300,000
Total Project Costs (Approx.)	**$10,700,000**	**$12,800,000**	**$17,400,000**	**$18,300,000**	**$22,700,000**

LIFE CYCLE COST ESTIMATES

A Life cycle cost analysis is an economic analysis tool which is useful in comparing the relative merit of competing project alternatives. Total project costs are assumed over the expected life of the project (100-year design life for this project) for each alternative, and then compared to see what the total expected cost over the life of the structure is. Costs were developed for all alternatives based on FHWA guidelines for a life-cycle cost analysis. All costs were developed on a conceptual level, however the following general assumptions were made regarding the life cycle cost analysis:

- Present worth (2018 dollars) are calculated.
- 4% inflation rate is used per year.

- A 100-year life cycle analysis was used
- Costs are shown in dollars per square foot of proposed bridge area due to the various sizes of the proposed bridges.
- Roadway user costs are not included in the life cycle analysis
- A 50-year remaining service life is assumed for Alternative 1.
- There will be no residual value for any alternative after 100 years.

A summary of the life cycle cost for each alternative is provided in Table 8 below:

Table 8 - Life Cycle Cost Summary

Criteria	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Life Cycle Cost ($/SF of Bridge Deck)	**$752**	**$734**	**$698**	**$730 (w/ABC)** **$698 (w/o ABC)**	**$871 (w/ABC)**

It is important to note that with a life-cycle cost analysis, it is typical for the cost of future rehabilitation items (required for Alternatives 1-4), which are deferred to future years, to be shown as being more cost effective than a structure replacement with minimal future rehabilitations. However, these costs do not consider unanticipated emergency repairs due to the age of the structure, the risk of deferring project costs, site constraint changes and roadway user costs. A more detailed breakdown of the life-cycle user costs is provided in Appendix D.

X. PUBLIC & ADVISORY COMMITTEE INPUT

PUBLIC CONCERNS MEETING SUMMARY

A public concerns meeting was held on February 6, 2018 to review the alternatives developed, gather public input regarding the alternatives, and to choose a preferred alternative. Only Alternatives 1 through 4 were discussed at the Public Concerns Meeting. Alternative 5 was developed and reviewed after the local Public Concerns Meeting, and therefore was not included in the discussion. A summary of the public concerns is provided below:

- Impacts to nearby residences and businesses should be minimized as much as possible
- Environmental impacts to the Winooski River should be minimized as much as possible and mitigated as required.
- Mill Street access should be maintained during construction, and parking along Mill Street and in the Mill Street parking lot should be maintained as much as possible.
- How will this project connect into existing travel ways and proposed roadway improvement projects in the nearby vicinity?
- Traffic impacts should be minimized as much as possible.
- A short duration full bridge closure is more favorable than years of reduced lanes and traffic shifts with phased construction.
- Traffic plans, well signed detour routes and public shuttles should be established in advance of the closure.

- A public outreach plan should be made to reach out to local businesses and residents prior to the bridge closure.
- The projects should connect to the existing multi-use path on Riverside Avenue.

After the formal discussion, the public was asked to provide their vote as to the preferred alternative. **Alternative 4 was the unanimous choice of the 18 attendees who voted**.

PUBLIC CONCERNS MEETING CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations were established from the Public Concerns meeting:

- **Alternative 4 with accelerated bridge construction is the preferred alternative** and method of construction.
- Local residences, businesses and commuters should be kept informed through all phases of the project through a dedicated public input official and process.
- A shuttle or other means of connecting local bicyclists and pedestrians should be established during the closure period.
- The portion of the new bridge constructed prior to demolition of the existing bridge should be wide enough for emergency vehicle access.

ADVISORY COMMITTEE RECOMMENDATIONS

On July 12th and August 9th, the Advisory Committee met to provide input and recommendations as to a preferred alternative based on the evaluation matrix developed and summarized in Figure 27 and Figure 28 of this report. **Following considerable discussion, the Advisory Committee unanimously selected both Alternatives 4 and 5 to move forward as locally recommended alternatives and that the bridge should be constructed using an accelerated bridge construction method.** The decision to recommend both Alternatives 4 and 5 was based on two basic factors:

1) The roadway configuration (vehicle lanes and bicycle & pedestrian facilities) is identical for both Alternatives 4 and 5 (reference Figure 19 & Figure 23).

2) Making a recommendation on the structural design of the bridge was not possible or prudent at this point due to:

- Unknown factors regarding the condition of the existing substructure (piers and abutments) which will be determined during future phases of the project design process.
- Unknown future Winooski River access constraints from either the Winooski or the Burlington side which could significantly impact construction methods.
- Unknown timeframe of project construction.

Due to these unknown factors, the construction estimates provided in the evaluation matrix may change as more information becomes available during the design phase of the project. More consultation will take place with the communities and elected officials of both Winooski and Burlington when this project progresses into the design phase.

BURLINGTON AND WINOOSKI CITY COUNCIL RECOMMENDATIONS & RESOLUTIONS

On October 15, 2018, CCRPC and McFarland Johnson staff presented the scoping report and Advisory Committee recommendation for the preferred alternative to the **Winooski City Council**. On November 5, 2018, those recommendations, to move forward with **Alternatives 4 & 5 were approved** by the Council on a vote of 4-0.

On March 25, 2019, the recommendations of the Advisory Committee were also presented to the **Burlington City Council** by CCRPC staff for the Council's review and approval. As in Winooski, the Council passed a resolution at their March 25th meeting and was signed by the Mayor on March 29th. That resolution recommended **Alternatives 4 & 5 as the preferred alternatives for the bridge replacement**.

XI. APPENDICES

CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

SCOPING REPORT

FOR

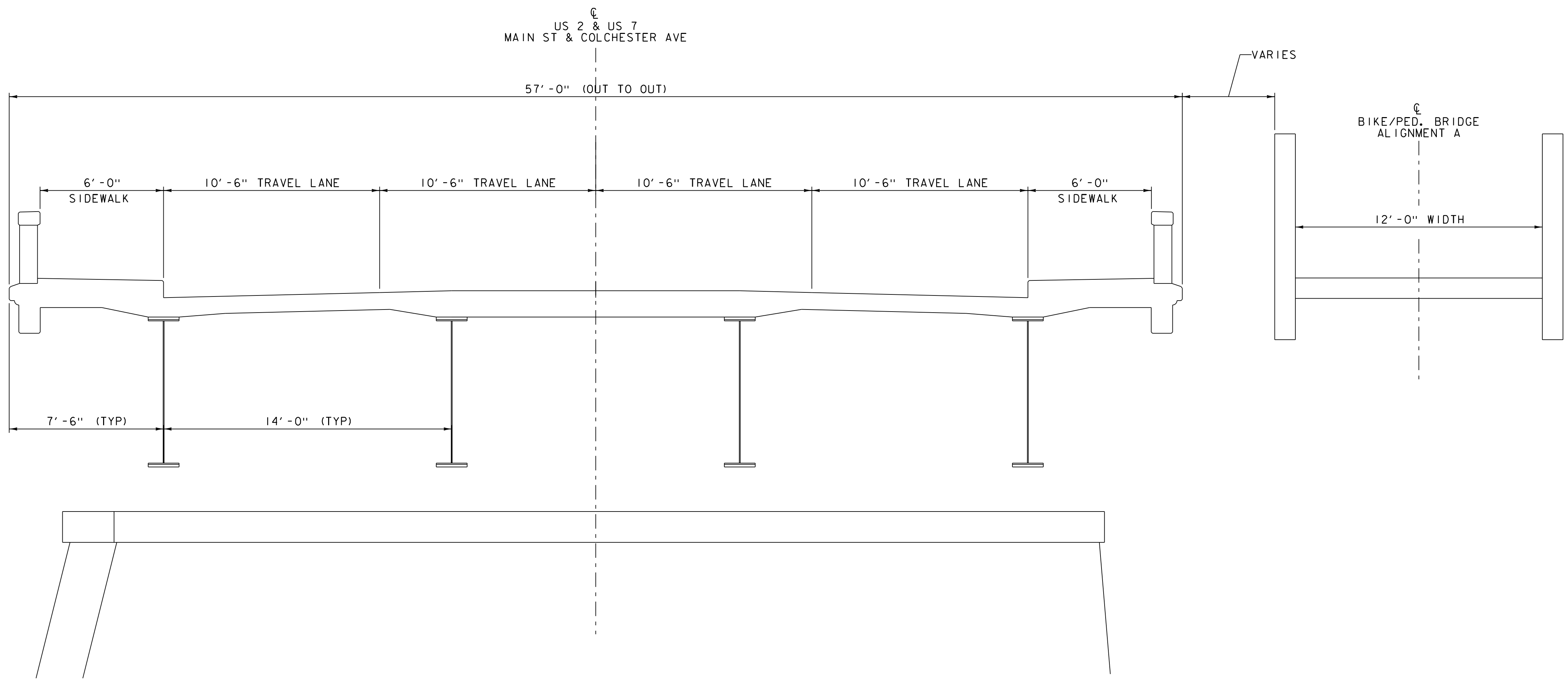
MAIN STREET (US ROUTES 2 & 7) OVER WINOOSKI RIVER

Appendix A

Typical Bridge Sections

CHITTENDEN COUNTY RPC
Communities Planning Together

McFarland Johnson



ALTERNATIVE 1 - SUPERSTRUCTURE REHABILITATION W/ BIKE/PED. BRIDGE

NOT TO SCALE

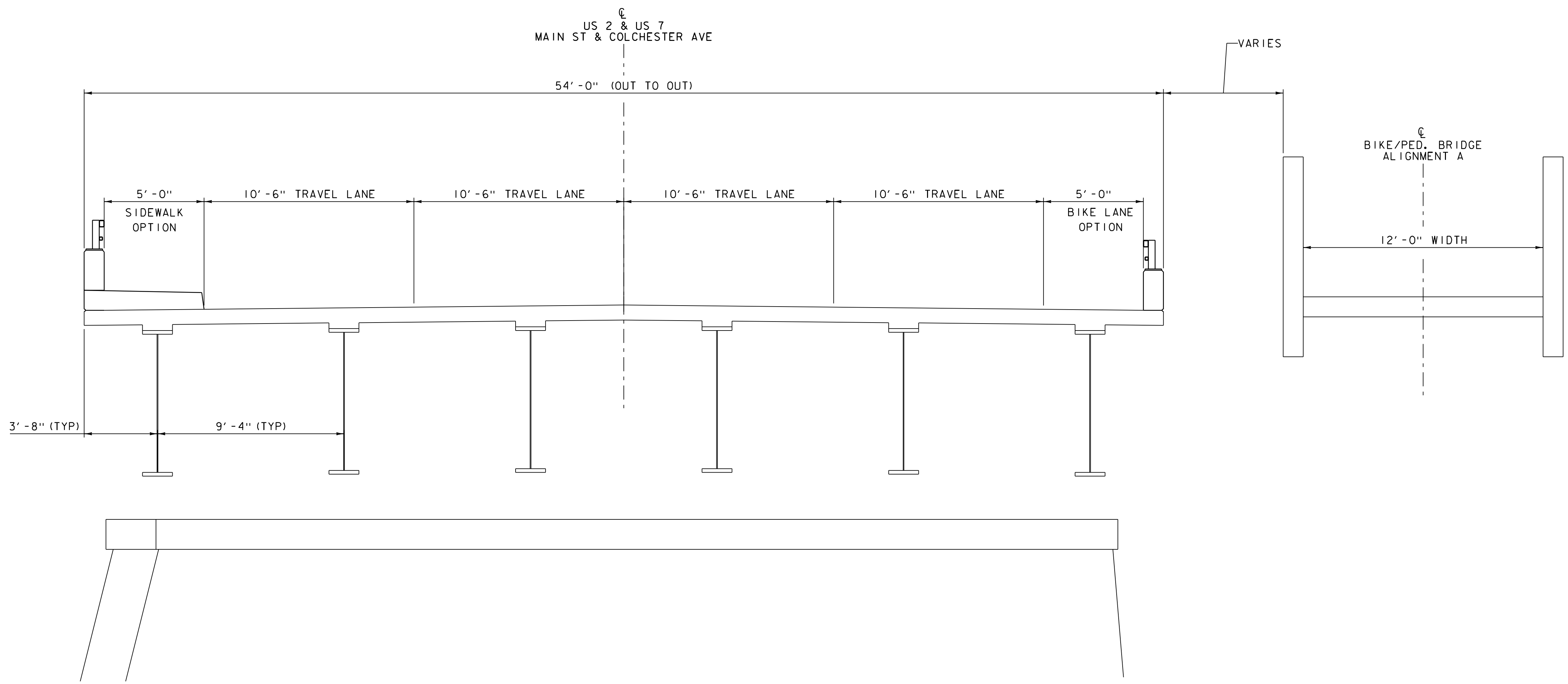
PROJECT NAME:
MAIN STREET BRIDGE OVER WINOOSKI RIVER
SCOPING STUDY

PLOT DATE: OCTOBER 1, 2018

McFarland Johnson

ALTERNATIVE 1
TYPICAL SECTION

DESIGNED BY: D. WHITE
DRAWN BY: D. WHITE
CHECKED BY: D. KULL
SHEET 1 OF 5



ALTERNATIVE 2 - SUPERSTRUCTURE REPLACEMENT W/ BIKE/PED. BRIDGE

NOT TO SCALE

PROJECT NAME:

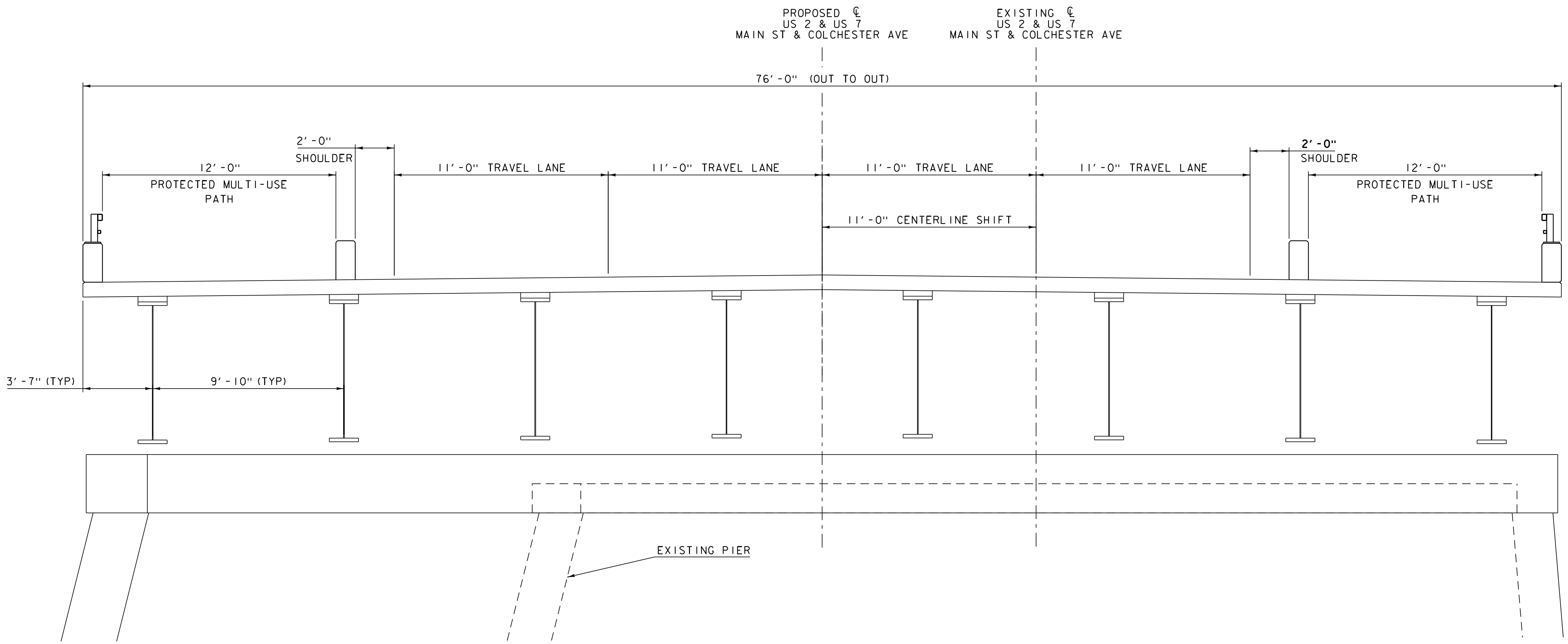
MAIN STREET BRIDGE OVER WINOOSKI RIVER
SCOPING STUDY

PLOT DATE: OCTOBER 1, 2018

ALTERNATIVE 2
TYPICAL SECTION

McFarland Johnson

DESIGNED BY: D. WHITE
DRAWN BY: D. WHITE
CHECKED BY: D. KULL
SHEET 2 OF 5



ALTERNATIVE 3 - SUPERSTRUCTURE REPLACEMENT W/ SUBSTRUCTURE WIDENING,
UPSTREAM ALIGNMENT SHIFT, AND ALL TRANSPORTATION MODES ON BRIDGE

NOT TO SCALE

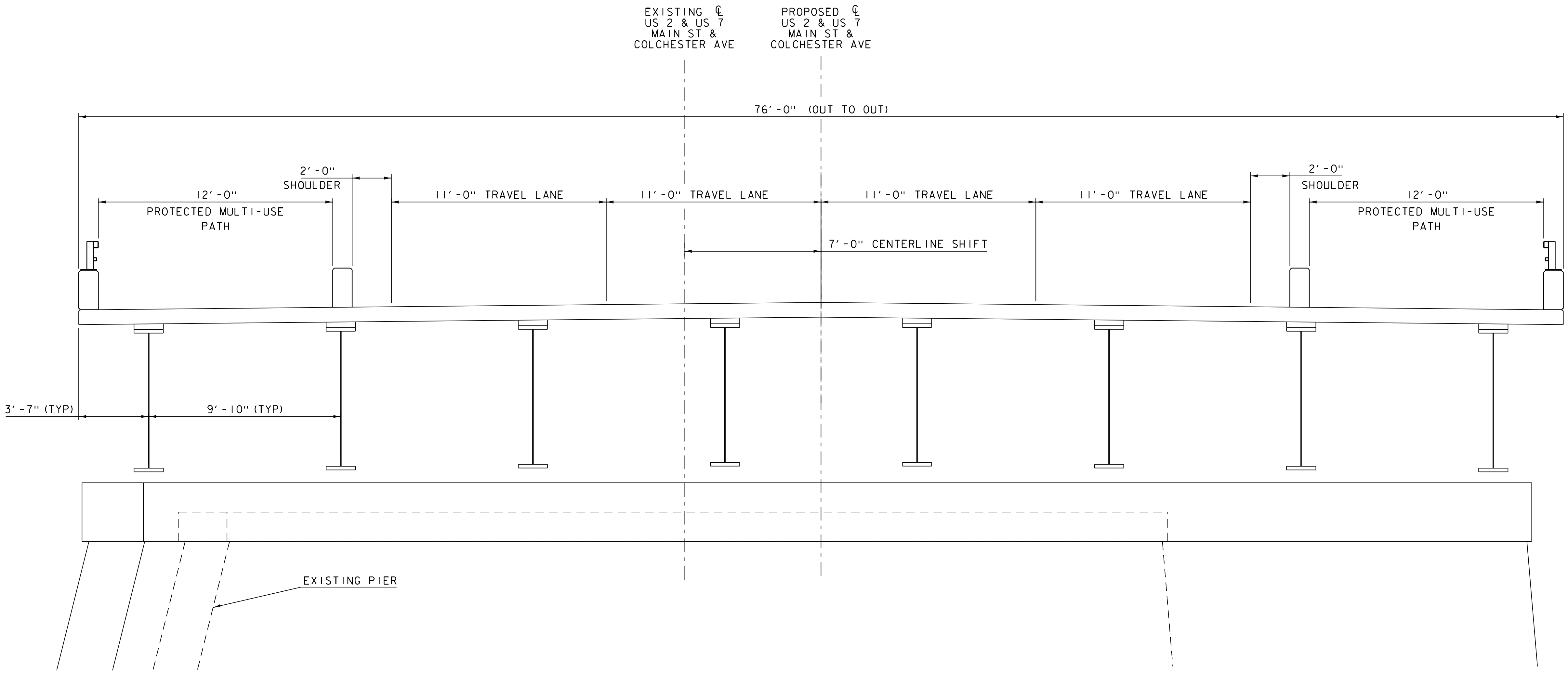
McFarland Johnson

PROJECT NAME:
MAIN STREET BRIDGE OVER WINOOSKI RIVER
SCOPING STUDY

PLOT DATE: OCTOBER 1, 2018

ALTERNATIVE 3
TYPICAL SECTION

DESIGNED BY: D. WHITE
DRAWN BY: D. WHITE
CHECKED BY: D. KULL
SHEET 3 OF 5



ALTERNATIVE 4 - SUPERSTRUCTURE REPLACEMENT W/ SUBSTRUCTURE WIDENING,

DOWNSTREAM ALIGNMENT SHIFT, AND ALL TRANSPORTATION MODES ON BRIDGE

NOT TO SCALE

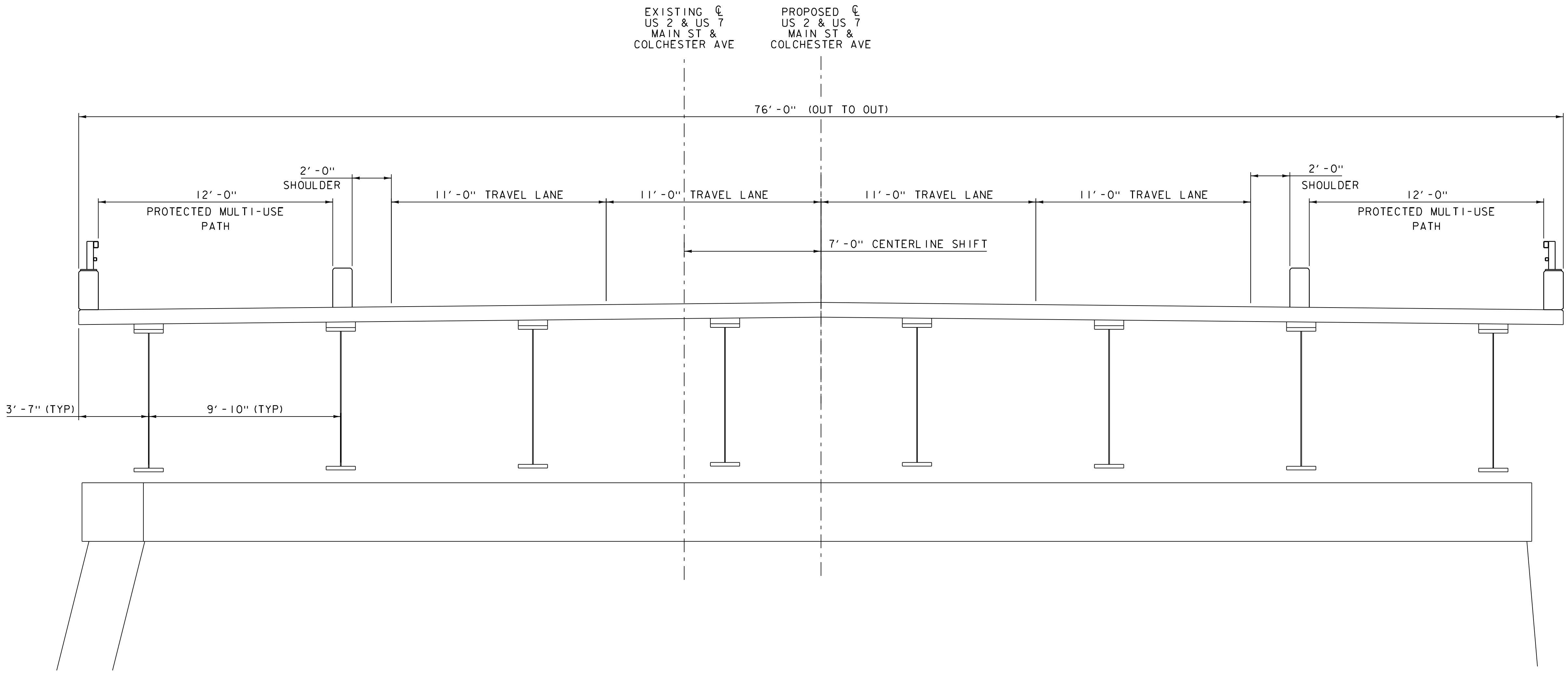
PROJECT NAME:
MAIN STREET BRIDGE OVER WINOOSKI RIVER
SCOPING STUDY

PLOT DATE: OCTOBER 1, 2018

ALTERNATIVE 4
TYPICAL SECTION

McFarland Johnson

DESIGNED BY: D. WHITE
DRAWN BY: D. WHITE
CHECKED BY: D. KULL
SHEET 4 OF 5



ALTERNATIVE 5 - 2-SPAN BRIDGE REPLACEMENT WITH NEW PIER AND ABUTMENTS

DOWNSTREAM ALIGNMENT SHIFT, AND ALL TRANSPORTATION MODES ON BRIDGE

NOT TO SCALE

McFarland Johnson

PROJECT NAME:
MAIN STREET BRIDGE OVER WINOOSKI RIVER
SCOPING STUDY

PLOT DATE: OCTOBER 1, 2018

ALTERNATIVE 5
TYPICAL SECTION

DESIGNED BY: D. WHITE
DRAWN BY: D. WHITE
CHECKED BY: D. KULL
SHEET 5 OF 5

CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

SCOPING REPORT

FOR

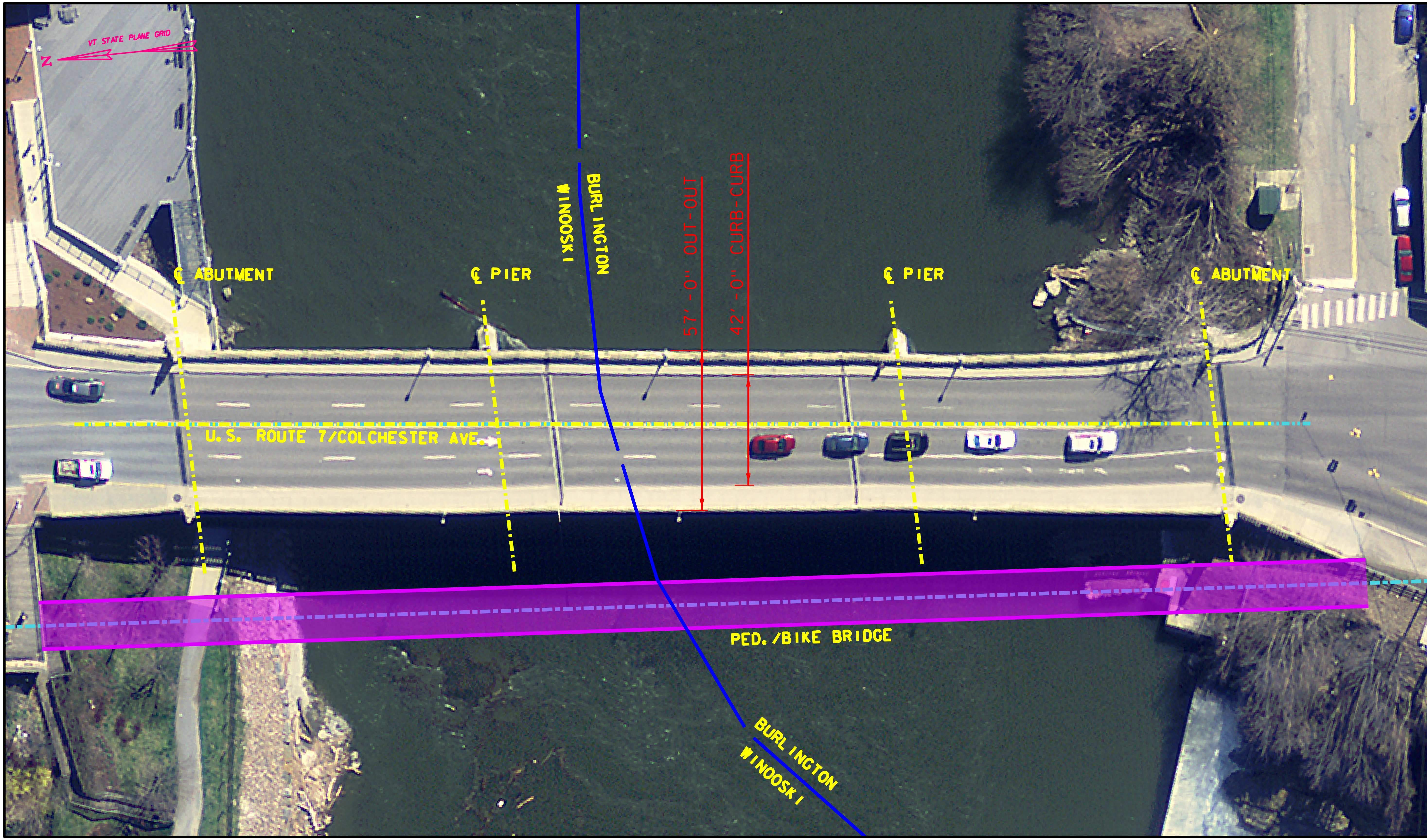
MAIN STREET (US ROUTES 2 & 7) OVER WINOOSKI RIVER

Appendix B

Alternative Plan Views

CHITTENDEN COUNTY RPC
Communities Planning Together

McFarland Johnson



ALTERNATIVE 1 - SUPERSTRUCTURE REHABILITATION W/ BIKE/PED. BRIDGE

NOT TO SCALE

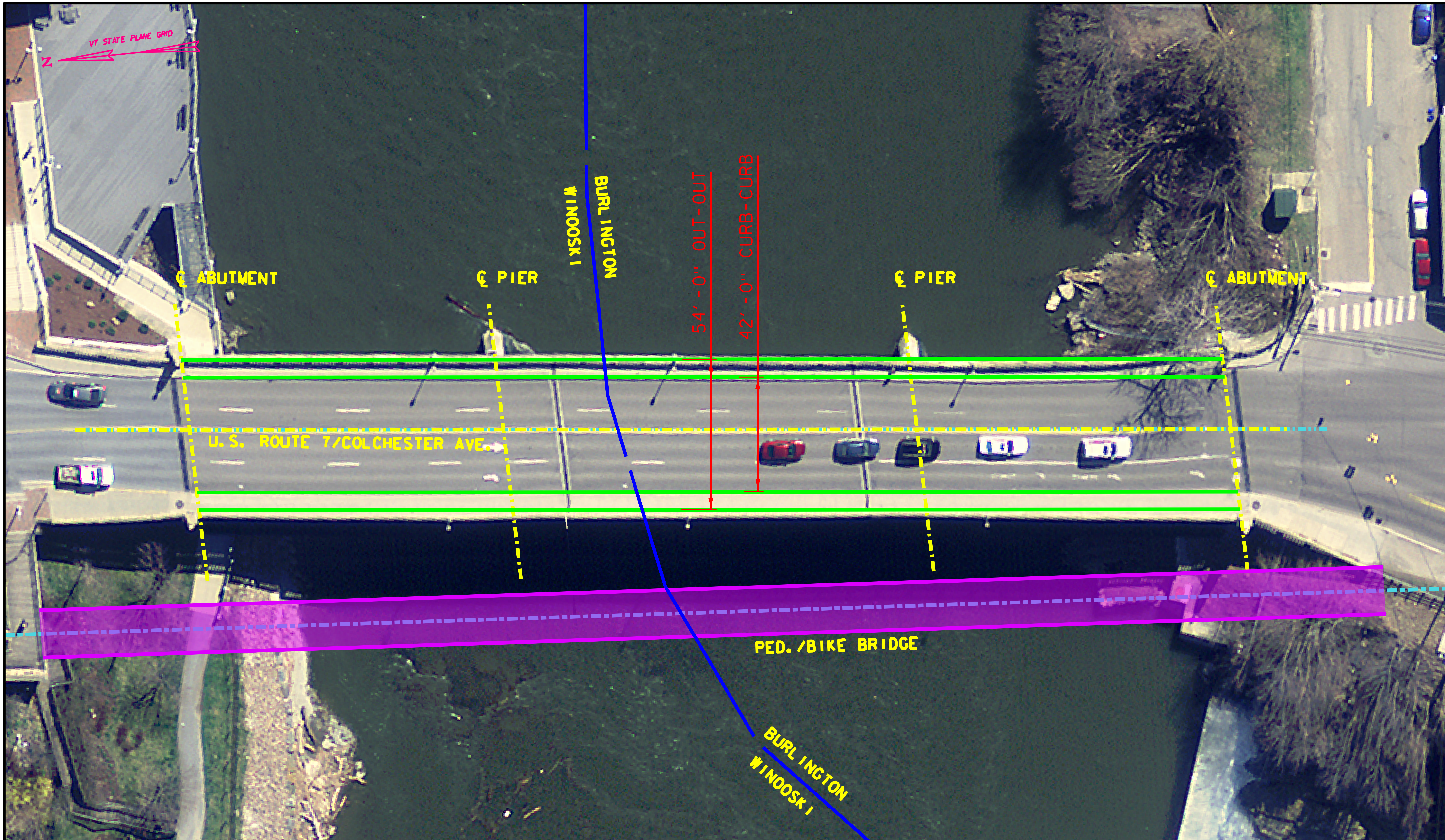
McFarland Johnson

PROJECT NAME:
MAIN STREET BRIDGE OVER WINOOSKI RIVER
SCOPING STUDY

PLOT DATE: 8/20/2018

ALTERNATIVE 1

DESIGNED BY: D. WHITE
DRAWN BY: D. WHITE
CHECKED BY: D. KULL
SHEET 1 OF 5

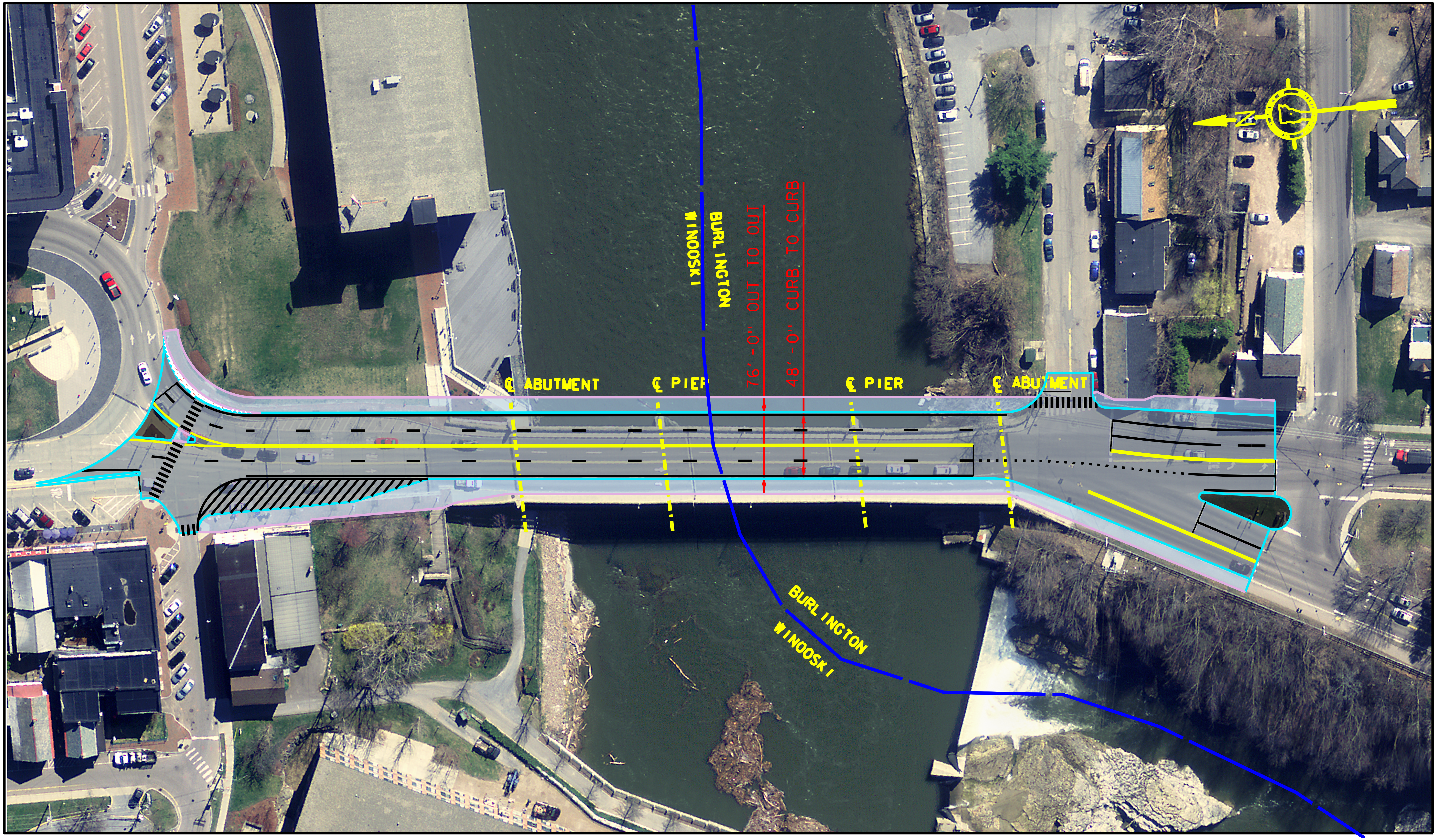


ALTERNATIVE 2 - SUPERSTRUCTURE REPLACEMENT W/ BIKE/PED. BRIDGE

NOT TO SCALE

McFarland Johnson

PROJECT NAME: MAIN STREET BRIDGE OVER WINOOSKI RIVER SCOPING STUDY	
PLOT DATE: 8/20/2018	DESIGNED BY: D. WHITE
ALTERNATIVE 2	DRAWN BY: D. WHITE
	CHECKED BY: D. KULL
	SHEET 2 OF 5



ALTERNATIVE 3 - SUPERSTRUCTURE REPLACEMENT W/ ALL TRANSPORTATION MODES ON BRIDGE

NOT TO SCALE

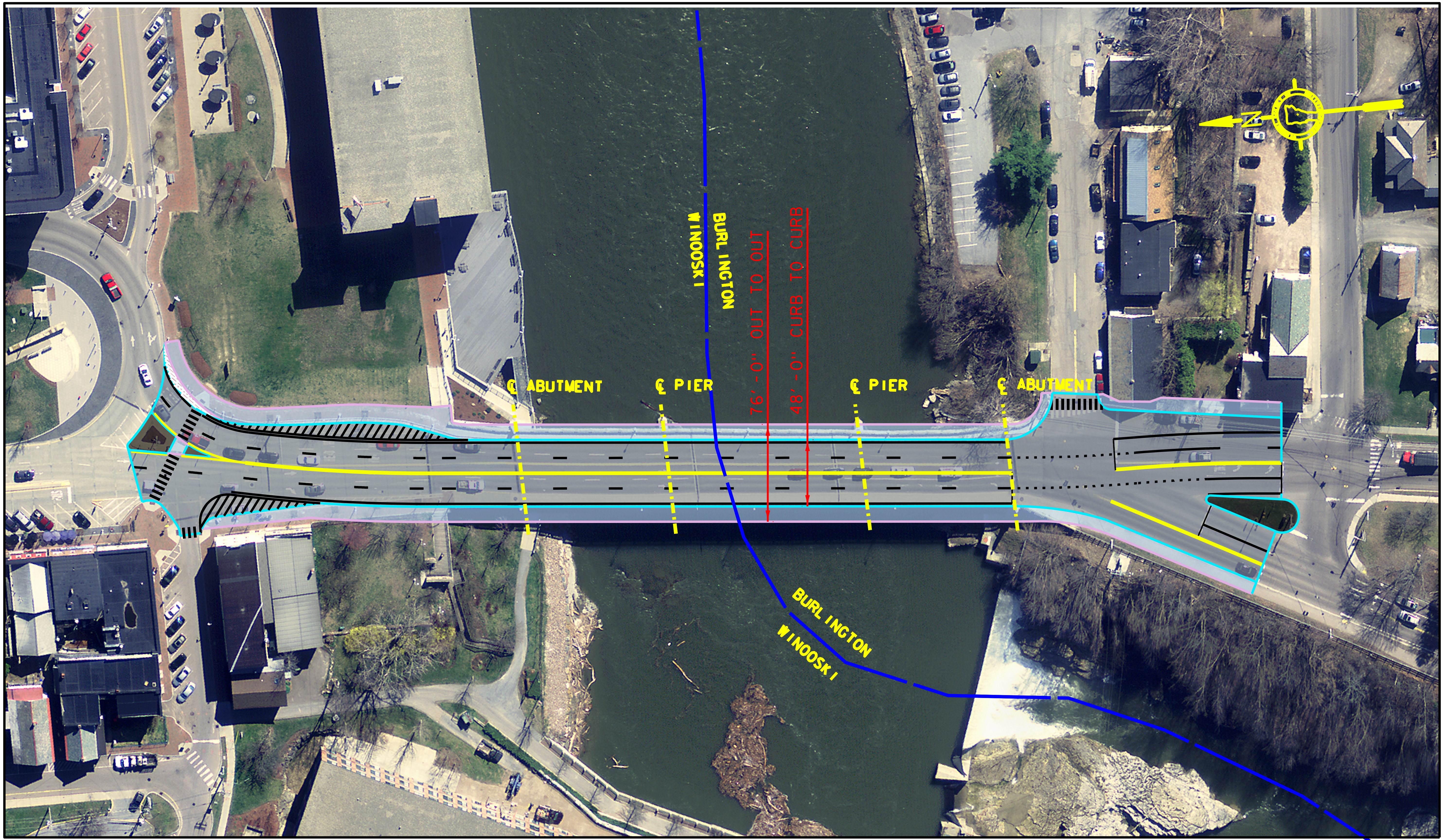
PROJECT NAME:
MAIN STREET BRIDGE OVER WINOOSKI RIVER
SCOPING STUDY

PLOT DATE: 8/20/2018

McFarland Johnson

ALTERNATIVE 3

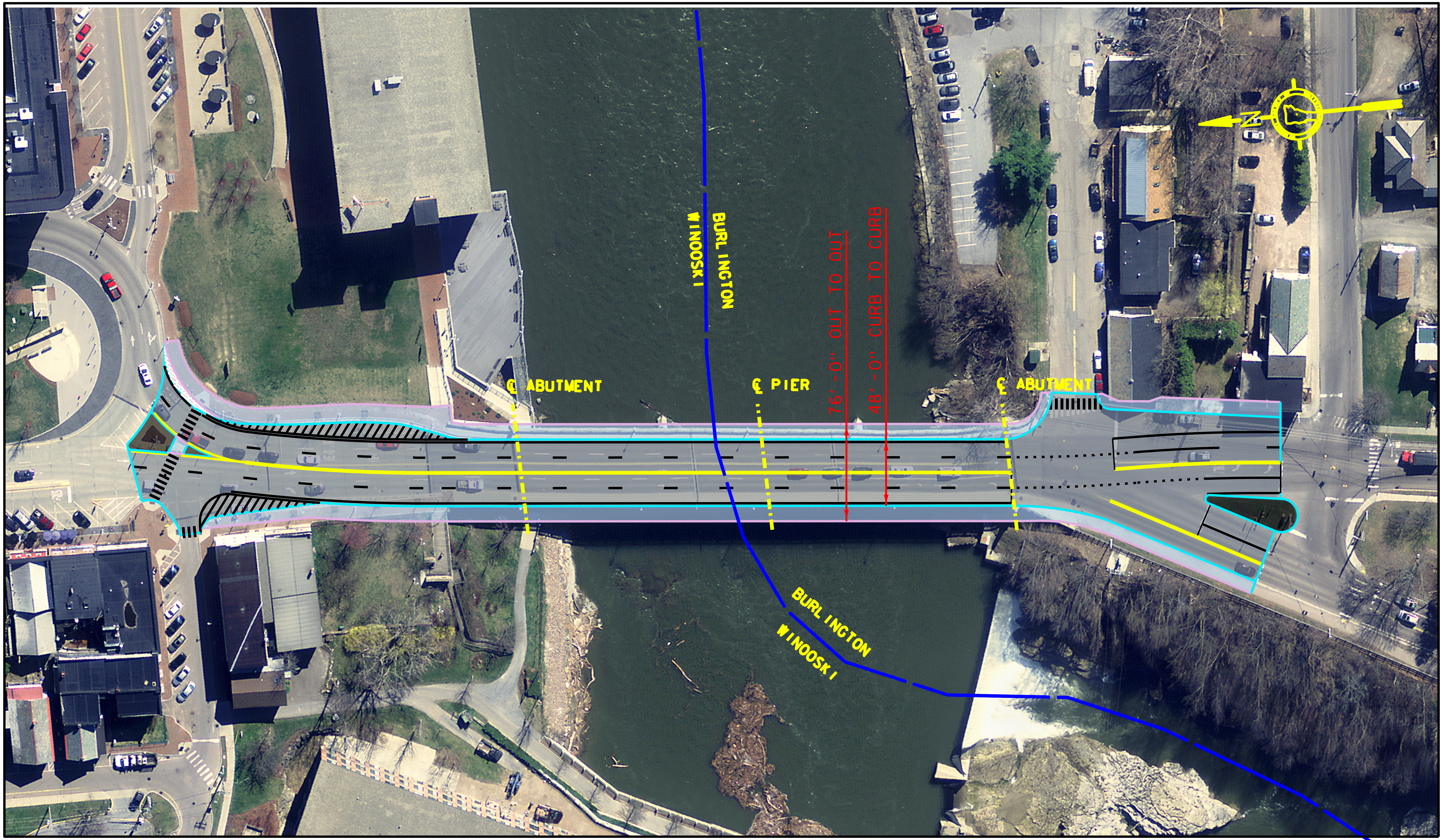
DESIGNED BY: D. WHITE
DRAWN BY: D. WHITE
CHECKED BY: D. KULL
SHEET 3 OF 5



ALTERNATIVE 4 - SUPERSTRUCTURE REPLACEMENT W/ ALL TRANSPORTATION MODES ON BRIDGE

NOT TO SCALE

PROJECT NAME: MAIN STREET BRIDGE OVER WINOOSKI RIVER SCOPING STUDY	
PLOT DATE: 8/20/2018	DESIGNED BY: D. WHITE
	DRAWN BY: D. WHITE
McFarland Johnson — ALTERNATIVE 4	CHECKED BY: D. KULL
	SHEET 4 OF 5



ALTERNATIVE 5 - COMPLETE BRIDGE REPLACEMENT WITH 2-SPAN BRIDGE

NOT TO SCALE

PROJECT NAME: MAIN STREET BRIDGE OVER WINOOSKI RIVER SCOPING STUDY	
PLOT DATE: 8/20/2018	DESIGNED BY: D. WHITE
	DRAWN BY: D. WHITE
ALTERNATIVE 5	CHECKED BY: D. KULL
	SHEET 5 OF 5

McFarland Johnson

CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

SCOPING REPORT

FOR

MAIN STREET (US ROUTES 2 & 7) OVER WINOOSKI RIVER

Appendix C
Cost Estimates

CHITTENDEN COUNTY RPC
Communities Planning Together

McFarland Johnson

MAIN STREET (US 2 & 7) OVER WINOOSKI RIVER
DRAFT SCOPING REPORT

PROJECT: Main Street Bridge carrying US Routes 2 &7 over Winooski River between Burlington and Winooski, VT Alternative 1: Bridge Superstructure REHAB with Ped/Bike Bridge (352.5 ft Span x 57.0 ft Width = 20,093 SF)	**ALTERNATIVE COST ESTIMATE** **ALTERNATIVE 1** **ESTIMATED BY: DRW** **CHECKED BY: DMK**		
BRIDGE COST	$3,516,188	**Say**	$3,520,000
REMOVAL OF STRUCTURE	$803,700	**Say**	$810,000
ROADWAY	$191,000	**Say**	$200,000
TEMPORARY WORKS & CONSTRUCTION ACCESS	$100,000	**Say**	$100,000
MAINTENANCE OF TRAFFIC	$747,000	**Say**	$750,000
CONSTRUCTION COSTS SUBTOTAL		**=**	**$5,380,000**
CONSTRUCTION ENGINEERING + CONTINGENCIES (CEC)	30%	**=**	$1,620,000
TOTAL CONSTRUCTION COSTS W/ CEC		**=**	**$7,000,000**
PRELIMINARY ENGINEERING:	25%	**=**	$1,350,000
BIKE/PEDESTRIAN BRIDGE	$1,823,100	**Say**	$1,900,000
RIGHT OF WAY	$25,000	**Say**	$30,000
PUBLIC PARTICIPATION	$350,000	**Say**	$350,000
TOTAL PROJECT COST		**=**	**$10,700,000**

MAIN STREET (US 2 & 7) OVER WINOOSKI RIVER
DRAFT SCOPING REPORT

PROJECT: Main Street Bridge carrying US Routes 2 &7 over Winooski River between Burlington and Winooski, VT Alternative 2: Bridge Superstructure REPLACEMENT with Ped/Bike Bridge (352.5 ft Span x 54.0 ft Width = 19,035 SF)	**ALTERNATIVE COST ESTIMATE** **ALTERNATIVE 2** **ESTIMATED BY: DRW** **CHECKED BY: DMK**		
BRIDGE COST	$4,378,050	**Say**	$4,380,000
REMOVAL OF STRUCTURE	$803,700	**Say**	$810,000
ROADWAY	$191,000	**Say**	$200,000
TEMPORARY WORKS & CONSTRUCTION ACCESS	$350,000	**Say**	$350,000
MAINTENANCE OF TRAFFIC	$996,000	**Say**	$1,000,000
	CONSTRUCTION COSTS SUBTOTAL	**=**	**$6,740,000**
CONSTRUCTION ENGINEERING + CONTINGENCIES (CEC)	30%	**=**	$2,030,000
	TOTAL CONSTRUCTION COSTS W/ CEC	**=**	**$8,770,000**
PRELIMINARY ENGINEERING:	25%	**=**	$1,690,000
BIKE/PEDESTRIAN BRIDGE	$1,823,100	**Say**	$1,900,000
RIGHT OF WAY	$25,000	**Say**	$30,000
PUBLIC PARTICIPATION	$350,000	**Say**	$350,000
	TOTAL PROJECT COST	**=**	**$12,800,000**

MAIN STREET (US 2 & 7) OVER WINOOSKI RIVER
DRAFT SCOPING REPORT

PROJECT: Main Street Bridge carrying US Routes 2 &7 over Winooski River between Burlington and Winooski, VT Alternative 3: Bridge Superstructure REPLACEMENT with Substructure widening and UPSTREAM Shift (352.5 ft Span x 76.0 ft Width = 25,380 SF)	**ALTERNATIVE COST ESTIMATE** **ALTERNATIVE 3** **ESTIMATED BY: DRW** **CHECKED BY: DMK**		
BRIDGE COST	$7,599,900	**Say**	$7,600,000
REMOVAL OF STRUCTURE	$803,700	**Say**	$810,000
ROADWAY	$191,000	**Say**	$200,000
TEMPORARY WORKS & CONSTRUCTION ACCESS	$750,000	**Say**	$750,000
MAINTENANCE OF TRAFFIC	$1,245,000	**Say**	$1,250,000
	CONSTRUCTION COSTS SUBTOTAL	**=**	**$10,610,000**
CONSTRUCTION ENGINEERING + CONTINGENCIES (CEC)	35%	**=**	$3,720,000
	TOTAL CONSTRUCTION COSTS W/ CEC	**=**	**$14,330,000**
PRELIMINARY ENGINEERING:	25%	**=**	$2,660,000
BIKE/PEDESTRIAN BRIDGE	$0	**Say**	$0.00
RIGHT OF WAY	$50,000	**Say**	$50,000
PUBLIC PARTICIPATION	$350,000	**Say**	$350,000
	TOTAL PROJECT COST	**=**	**$17,400,000**

MAIN STREET (US 2 & 7) OVER WINOOSKI RIVER
DRAFT SCOPING REPORT

PROJECT: Main Street Bridge carrying US Routes 2 &7 over Winooski River between Burlington and Winooski, VT Alternative 4: Bridge Superstructure REPLACEMENT with Substructure widening and DOWNSTREAM Shift (352.5 ft Span x 76.0 ft Width = 25,380 SF)	**ALTERNATIVE COST ESTIMATE** **ALTERNATIVE 4** **ESTIMATED BY: DRW** **CHECKED BY: DMK**		
BRIDGE COST	$8,269,650	**Say**	$8,270,000
REMOVAL OF STRUCTURE	$1,004,625	**Say**	$1,010,000
ROADWAY	$191,000	**Say**	$200,000
TEMPORARY WORKS & CONSTRUCTION ACCESS	$750,000	**Say**	$750,000
MAINTENANCE OF TRAFFIC	$954,500	**Say**	$960,000
CONSTRUCTION COSTS SUBTOTAL		**=**	**$11,190,000**
CONSTRUCTION ENGINEERING + CONTINGENCIES (CEC)	35%	**=**	$3,920,000
TOTAL CONSTRUCTION COSTS W/ CEC		**=**	**$15,110,000**
PRELIMINARY ENGINEERING:	25%	**=**	$2,800,000
BIKE/PEDESTRIAN BRIDGE	$0	**Say**	$0.00
RIGHT OF WAY	$50,000	**Say**	$50,000
PUBLIC PARTICIPATION	$300,000	**Say**	$300,000
TOTAL PROJECT COST		**=**	**$18,300,000**

PROJECT: Main Street Bridge carrying US Routes 2 &7 over Winooski River between Burlington and Winooski, VT Alternative 5: Full Bridge REPLACEMENT (352.5 ft Span x 76.0 ft Width = 25,380 SF)	**ALTERNATIVE COST ESTIMATE** **ALTERNATIVE 5** **ESTIMATED BY: DRW** **CHECKED BY: DMK**		
BRIDGE COST	$10,716,000	**Say**	$10,720,000
REMOVAL OF STRUCTURE	$1,306,013	**Say**	$1,310,000
ROADWAY	$191,000	**Say**	$200,000
TEMPORARY WORKS & CONSTRUCTION ACCESS	$750,000	**Say**	$750,000
MAINTENANCE OF TRAFFIC	$954,500	**Say**	$960,000
CONSTRUCTION COSTS SUBTOTAL		**=**	**$13,940,000**
CONSTRUCTION ENGINEERING + CONTINGENCIES (CEC)	35%	**=**	$4,880,000
TOTAL CONSTRUCTION COSTS W/ CEC		**=**	**$18,820,000**
PRELIMINARY ENGINEERING:	25%	**=**	$3,490,000
BIKE/PEDESTRIAN BRIDGE	$0	**Say**	$0.00
RIGHT OF WAY	$50,000	**Say**	$50,000
PUBLIC PARTICIPATION	$300,000	**Say**	$300,000
TOTAL PROJECT COST		**=**	**$22,700,000**

CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

SCOPING REPORT

FOR

MAIN STREET (US ROUTES 2 & 7) OVER WINOOSKI RIVER

Appendix D

Life Cycle Cost Estimates

CHITTENDEN COUNTY RPC
Communities Planning Together

McFarland Johnson

Winooski - 100 Year Life Cycle Cost Analysis

LIFE CYCLE COST ANALYSIS OF BASE OPTIONS

(PRESENT WORTH METHOD)

Project Winooski River Bridge Rehab/Replacement
Location Winooski/Burlington, Vermont

PROJECT LIFE CYCLE (YEARS) **100**
DISCOUNT RATE (% in decimals) **4%**

			Alternative 1 Bridge Structure Rehab with Ped/Bike Bridge		**Alternative 2** Superstructure Replacement with Ped/Bike Bridge		**Alternative 3** Superstructure Replacement with Upstream Shift		**Alternative 4** ABC Superstructure Replacement with Downstream Shift		**Alternative 5** ABC Structure Replacement with Downstream Shift	
Construction Costs			Est.	PW	Est.	PW	Est.	PW	Est.	PW	Est.	PW
A) Structure and Approaches			5,380,000	5,380,000	6,740,000	6,740,000	10,610,000	10,610,000	11,190,000	11,190,000	13,940,000	13,940,000
B) Ped/Bike Bridge			1,900,000	1,900,000	1,900,000	1,900,000						
Other Initial Costs (5)												
A) Preliminary Engineering			1,350,000	1,350,000	1,690,000	1,690,000	2,660,000	2,660,000	2,800,000	2,800,000	3,490,000	3,490,000
B) Construction Engineering			1,620,000	1,620,000	2,030,000	2,030,000	3,720,000	3,720,000	3,920,000	3,920,000	4,880,000	4,880,000
C) R.O.W. & Public Participation			380,000	380,000	380,000	380,000	400,000	400,000	350,000	350,000	350,000	350,000
Total Initial Cost Impact (IC)				10,630,000		12,740,000		17,390,000		18,260,000		22,660,000
Initial Cost PW Savings						(2,110,000)		(6,760,000)		(7,630,000)		(12,030,000)
Replacement/Rehabilitation/Salvage Costs	Year	Factor										
A) Repainting	25	0.3751										
B) Major Rehab of Ex. Structure (3)	25	0.3751	3,520,000	1,320,411								
C) Minor Rehab of New Structure (2)	25	0.3751			955,000	358,236	1,340,000	502,656	1,340,000	502,656	1,075,000	403,250
D) Minor Rehab of Ped/Bike Structure (2)	25	0.3751	345,000	129,415	345,000	129,415						
E) Existing Bridge Replacement (4)	50	0.1407	22,700,000	3,194,176								
F) Major Rehab of New Structure (3)	50	0.1407			1,910,000	268,761	2,680,000	377,109	2,680,000	377,109	1,610,000	226,547
G) Major Rehab of Ped/Bike Structure (3)	50	0.1407			1,040,000	146,341						
H) Minor Rehab of New Structure (2)	75	0.0528	1,075,000	56,742	955,000	50,408	1,340,000	70,730	1,340,000	70,730	1,075,000	56,742
I) Minor Rehab of Ped/Bike Structure (2)	75	0.0528			345,000	18,210						
J) Major Rehab of SubStructure	75	0.0528			4,760,000	251,250	6,700,000	353,650	6,700,000	353,650		
M) Residual Value (5)	100	0.0198	(11,350,000)	(224,730)								
Total Replacement/Salvage PW Costs				4,476,014		1,222,621		1,304,145		1,304,145		686,539
Operation/Maintenance Cost	Escl.	PWA										
A)												
B)												
C)												
Total Operation/Maintenance (PW) Costs												
Total Life Cycle Costs for O&M and Replacement				**4,476,014**		**1,222,621**		**1,304,145**		**1,304,145**		**686,539**
Total Cost - Present Worth Life Cycle Costs				**15,106,014**		**13,962,621**		**18,694,145**		**19,564,145**		**23,346,539**
Life Cycle (PW) Savings						**1,143,393**		**(3,588,131)**		**(4,458,131)**		**(8,240,525)**
Total Life Cycle Costs for O&M and Replacement per SF				**223**		**64**		**49**		**49**		**26**
Total Cost - Present Worth Life Cycle Costs per SF				**752**		**734**		**698**		**730**		**871**
Life Cycle (PW) Savings per SF						**18**		**54**		**22**		**(120)**

PW - Present Worth PWA - Present Worth of Annuity

Notes:
1). Assume Existing Bridge design life can be extended until 50 years after the initial time of Rehab.
2). Minor rehabilitation cost assumes $60 and $30 per square foot of bridge deck for main bridge and ped/bike bridge, respectively.
3). Major rehabilitation cost assumes $100 and $60 per square foot of bridge deck for main bridge and ped/bike bridge, respectively.
4). Assume future bridge replacement will be Alternative 5
5). Assume value of bridge replacement linearly depreciates.
6). Right of way costs are not included in the life cycle cost analysis.

Standard Assumptions:
- Use current and constant dollars.
- User costs are assumed to be the same for all alternatives and are ignored in the analysis.
- Routine operation and maintenance costs are assumed to be the same for all alternatives and are ignored in the analysis.
- Discount rate = 4%
- Replacement bridge design life = 100 years

CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

SCOPING REPORT

FOR

MAIN STREET (US ROUTES 2 & 7) OVER WINOOSKI RIVER

Appendix E

Alternatives Analysis

CHITTENDEN COUNTY RPC
Communities Planning Together

McFarland Johnson

ALTERNATIVE 1 - BRIDGE SUPERSTRUCTURE REHABILITATION WITH OFFLINE PEDESTRIAN/BIKE BRIDGE

Improve Traffic Safety – Traffic safety is not improved for this alternative due to the following criteria:

- 10’-6” travel lanes provided on the existing structure, 11’-0” minimum lane widths required based on current roadway design criteria
- No shoulder is provided on either side of the bridge.

Improve Traffic Safety Value Rating – Alternative 1

Maintain/Improve Structural Integrity & Address Bridge Condition Deficiencies – The structural integrity of the bridge and conditional deficiencies are only slightly improved with this alternative due to the following criteria:

- A rehabilitation of the concrete deck will be performed, which will improve the roadway surface.
- The proposed improvements to the existing steel girders will halt current deterioration, and limit future deterioration, but does not increase the overall structural capacity of the existing steel girders.
- Even though the seismic vulnerability for this area and this structure is very low, the existing bridge was not designed to meet current seismic design criteria.
- This Alternative retains the fracture critical detail of a suspended span in span 2. This detail is no longer in current bridge design practice and is considered to be obsolete.

Maintain/Improve Structure Integrity & Address Br. Condition Deficiencies Value Rating – Alt. 1

Improve Bike & Pedestrian Travel Connectivity – This criteria was evaluated assuming the construction of a separate bike/pedestrian bridge adjacent to the existing bridge immediately downstream of the bridge. This criteria had a neutral value rating for this alternative due to the following:

- The construction of a separate bike and pedestrian bridge adjacent to the existing bridge would greatly reduce the bike and pedestrian traffic on the west side of the bridge, particularly for users of the Riverside Avenue bike path (Riverside Trail).
- The existing sidewalk on the west side of the bridge would still be in service and would still be able to be used by pedestrians who do not wish to use the newly constructed structure.
- Pedestrian and bicycle traffic on the east side of the bridge would have to cross traffic on both approaches to access this newly constructed structure. Requiring users to cross traffic poses safety hazards to both the pedestrian/bike and vehicular traffic.
- Many users will still prefer to use the existing sidewalk, rather than the newly constructed off-alignment bridge due to convenience.

Improve Pedestrian & Bike Travel Value Rating – Alternative 1

Maintain/Improve Resource Impacts – The resource impacts due to the Main Street bridge ONLY were reviewed. Impacts required due to the construction of a separate pedestrian/bike structure were not included in the impacts and permitting requirements. This criteria had a slight negative rating due to the following:

- There will be possible temporary impacts to conservation and recreation lands, particularly Falls Terrace Park due to the Contractor requiring a staging area during construction. The extent of the impacts will not be known for this Alternative until the final design phase.
- Rehabilitation to the existing bridge may require historical mitigation due to changes or replacement of the historic bridge rail.

Maintain/Improve Resource Impacts – Alternative 1

Provide Designated Lanes for Bicyclists – This criteria was evaluated assuming the presence of the separate pedestrian/bicycle structure. This criteria had a slightly positive value rating based on the following:

- A separate structure would be provided for bicyclists on the west side of the bridge, which is currently used extensively by bikers accessing Riverside Trail.
- Bicyclists would still be required to share the lane with vehicular traffic or use the sidewalk on the east side of the bridge.

Provide Designed Lanes for Bicyclists Value Rating – Alternative 1

Maintain 2 Lanes Traffic in Each Direction – 2 Lanes of traffic will be maintained in the final condition since the existing structure is being rehabilitated.

Maintain 2 Lanes Traffic in Each Direction Value Rating – Alternative 1

Improve Pedestrian Safety – Pedestrian safety was evaluated based on the assumption a separate pedestrian structure being constructed adjacent to the existing structure. This criteria had a slightly positive value rating based on the following:

- East (upstream) side of bridge: Pedestrian safety is not improved due to no changes made to the sidewalk. It is expected that pedestrians on the east side of the bridge will still use this sidewalk because it will be faster to cross the bridge than use the signed crosswalks to access the separate pedestrian bridge.
- West (downstream) side of bridge (sidewalk): Pedestrian safety is not improved on the sidewalk. It is expected that even with the construction of the new separate ped/bike bridge, pedestrians will still use the sidewalk.
- West (downstream) side of bridge (separate ped/bike bridge): Pedestrian safety is greatly improved for users of this newly constructed bridge.

Improve Pedestrian Safety Value Rating – Alternative 1

Traffic Control During Construction – Traffic control was evaluated assuming a conventional method of construction would be used. A summary of the traffic control evaluation is below:

- Bridge lane reductions will be required to rehabilitate portions of the concrete deck. It is assumed that partial and full depth concrete deck repairs will be required, and that lanes on the bridge will require closure for multiple days to allow time for the concrete to cure. The extent of the repairs required, a configuration of the lane closures would be determined during the final design phase.

- A full bridge closure will not be required but could be utilized to minimize the construction duration.
- If 3 lanes are required to be maintained during construction, then construction activities and traffic impacts will most likely extend across 2 or 3 construction seasons (minimum), depending on the extent of the repairs required.

The traffic control value rating for this criteria was evaluated and determined to have the lowest possible value rating based on the unknown extent of repairs, and expected construction duration.

Traffic Control During Construction Value Rating – Alternative 1

ALTERNATIVE 2 - BRIDGE SUPERSTRUCTURE REPLACEMENT WITH OFFLINE PED./BIKE BRIDGE

Improve Traffic Safety – Traffic safety is not improved for this alternative due to the following criteria:

- 10'-6" travel lanes provided on the existing structure, 11'-0" minimum lane widths required based on current roadway design criteria
- No shoulder is provided on the west side of the bridge.
- The overall bridge width is reduced by approximately 3' (reduced from 57- to 54')

Improve Traffic Safety Value Rating – Alternative 2

Maintain/Improve Structural Integrity & Address Bridge Condition Deficiencies – The structural integrity of the bridge and conditional deficiencies are substantially improved with this alternative due to the following:

- The existing concrete deck is replaced with a new concrete deck.
- The existing steel girders are replaced with new steel girders.
- The existing abutments and piers would be rehabilitated but would not be replaced.
- Even though the seismic vulnerability for this area and this structure is very low, the proposed bridge superstructure replacement and substructure rehabilitation would significantly reduce the seismic vulnerability of the structure with the installation of seismic isolation on the existing abutments and piers. These bearings can potentially reduce the seismic loads on the existing abutments and piers.

Maintain/Improve Structure Integrity & Address Br. Condition Deficiencies Value Rating – Alt. 2

Improve Bike & Pedestrian Travel – This criteria was evaluated assuming the construction of a separate bike/pedestrian bridge adjacent to the existing bridge immediately downstream of the bridge. This criteria had a neutral value rating for this alternative due to the following:

- The construction of a separate bike and pedestrian bridge adjacent to the existing bridge would provide the facilities for bicycle and pedestrian traffic on the west side of the bridge, particularly for users of the Riverside Trail.
- The sidewalk on the west side of the bridge will be removed and replaced with an at-grade 5' wide bike lane on the east side of the bridge adjacent to the existing sidewalk.

- Pedestrian and bicycle traffic on the east side of the bridge would utilize the sidewalk and bike lane and therefore, would not have to cross traffic on both approaches to access this newly constructed structure.
- Some bicyclist may still prefer to use the main bridge on the west side of the bridge and ride with traffic, rather than the newly constructed pedestrian/bike bridge.

Improve Pedestrian & Bike Travel Value Rating – Alternative 2

Maintain/Improve Resource Impacts – The resource impacts due to the Main Street bridge ONLY were reviewed. Impacts required due to the construction of a separate pedestrian/bike structure were not included in the impacts and permitting requirements. This criteria had a slight negative rating due to the following:

- There will be possible temporary impacts to conservation and recreation lands, particularly Falls Terrace Park due to the Contractor requiring a staging area during construction. The extent of the impacts will not be known for this Alternative until the final design phase.
- Replacement of the existing bridge rail will require historical mitigation due to the historic designation of the bridge rail.

Maintain/Improve Resource Impacts – Alternative 2

Provide Designated Lanes for Bicyclists – This criteria was evaluated assuming the presence of the separate pedestrian/bicycle structure. This criteria had a slightly positive value rating based on the following:

- A separate structure would be provided for bicyclists on the west side of the bridge, which is currently used extensively by bikers accessing Riverside Trail.
- The sidewalk would be eliminated on the west side of the bridge providing a space for a bike lane on the east side of the bridge.

Provide Designed Lanes for Bicyclists Value Rating – Alternative 2

Maintain 2 Lanes Traffic in Each Direction – 2 Lanes of traffic will be maintained in the final condition on the new structure.

Maintain 2 Lanes Traffic in Each Direction Value Rating – Alternative 2

Improve Pedestrian Safety – Pedestrian safety was evaluated based on the assumption a separate pedestrian structure being constructed adjacent to the existing structure. This criteria had a slightly positive value rating based on the following:

- East (upstream) side of bridge: Pedestrian safety is slightly improved due to the introduction of some separation between the vehicular lane and the sidewalk. It is expected that pedestrians on the east side of the bridge will still use this sidewalk because it will be faster to cross the bridge than use the signed crosswalks to access the separate pedestrian bridge.
- West (downstream) side of bridge: Pedestrian safety is improved with the addition of a new separate pedestrian/bicycle bridge.

Improve Pedestrian Safety Value Rating – Alternative 2

Traffic Control During Construction – Traffic control was evaluated assuming a conventional method of construction would be used. A summary of the traffic control evaluation is below:

- Maintaining 3 lanes of traffic would require an extensive construction phasing sequence, in excess of 10 phases. The existing girder spacing is 14'-0", which restricts the construction area available because of the large deck overhangs that would require temporary support. Because of the number of phases required, maintaining a minimum of 3 lanes of traffic during construction was determined to be unfeasible and was eliminated from consideration for Alternative 2.
- Maintaining 2 lanes of traffic would reduce the number of construction phases required. The approximate number of phases required is 7-8. The expected construction duration for this alternative maintaining 2 lanes of traffic is approximately 2-3 years.
- A full bridge closure and accelerated bridge construction (ABC) methods, such as a lateral slide could be used for this alternative.

The traffic control value rating for this criterion was evaluated and determined to have the lowest possible value rating based on anticipated length of construction, and traffic impacts to the community with 2 lanes maintained on the bridge.

Traffic Control During Construction Value Rating – Alternative 2

ALTERNATIVE 3 - BRIDGE SUPERSTRUCTURE REPLACEMENT WITH UPSTREAM ALIGNMENT SHIFT

Improve Traffic Safety – Traffic safety is improved for this alternative due to the following criteria:

- 11' minimum lane widths (meets current design criteria) provided.
- 2' Shoulders are provided on each side of the bridge.
- 12' protected shared multi-use paths are provided on each side of the bridge for pedestrians and bicyclists.
- The bridge width is increased from 57' to 72'.

Improve Traffic Safety Value Rating – Alternative 3

Maintain/Improve Structural Integrity & Address Bridge Condition Deficiencies – The structural integrity of the bridge and conditional deficiencies are substantially improved with this alternative due to the following:

- The existing concrete deck is replaced with a new concrete deck.
- The existing steel girders are replaced with new steel girders.
- The existing abutments and piers would be widened and rehabilitated but would not be replaced.
- Even though the seismic vulnerability for this area and this structure is very low, the proposed bridge superstructure replacement and substructure widening, and rehabilitation would significantly reduce the seismic vulnerability of the structure.

Maintain/Improve Structure Integrity & Address Br. Condition Deficiencies Value Rating – Alt. 3

Improve Pedestrian & Bike Travel – The bicyclists and pedestrian travel is improved with this alternative due to the following:

- A protected multi-use path on both sides of the bridge provides substantial room on either side of the bridge (approximately 12' wide area depending on bridge barrier system chosen).
- The protected multi-use path will connect into existing sidewalks on the east side of the bridge, and with the Riverside trail on the west side of the bridge.
- Equal facilities provided on both sides of the bridge which should reduce the amount of users crossing the roadway at either end of the bridge.

Improve Pedestrian & Bike Travel Value Rating – Alternative 3

Maintain/Improve Resource Impacts – The resource impacts criteria had the lowest negative rating due to the following:

- A substantial causeway in the Winooski River will have to be placed (assumed to be clean stone fill) for the Contractor to access the piers and abutments for the proposed substructure rehabilitation.
- Access from either side of the bridge will be required for construction of the causeway, and also for Contractors access to perform the pier rehabilitation. For the Contractor to access the existing piers, a staging area (or areas) will be required, with the most likely areas being from Mill Street on the south (Burlington) side, or from the Winooski Riverfront Park on the north (Winooski) side. Access from the Winooski side will require demolition and reconstruction of the river promenade adjacent to the existing bridge.
- Due to the age of the existing piers and abutments, even with a rehabilitation performed, it is unrealistic to assume that the service life of the piers and abutments can be extended 100 years without substantial rehabilitation being performed in the future. Therefore, it is assumed that 50 and 75 years from now, rehabilitation of the abutments and piers will be required, with this rehabilitation requiring future river access (causeways).
- Replacement of the existing bridge rail will require historical mitigation due to the historic designation of the bridge rail.

Maintain/Improve Resource Impacts – Alternative 3

Provide Designated Lanes for Bicyclists –This criteria had the highest positive value rating based on the following:

- A protected shared multi-use path will be provided on each side of the bridge, with the path tying into existing facilities on either side of the bridge.

Provide Designed Lanes for Bicyclists Value Rating – Alternative 3

Maintain 2 Lanes Traffic in Each Direction – 2 Lanes of traffic will be maintained in the final condition since the existing structure is being rehabilitated.

Maintain 2 Lanes Traffic in Each Direction Value Rating – Alternative 3

Improve Pedestrian Safety – This criteria had the highest positive value rating based on the following:

- A protected shared multi-use path will be provided on each side of the bridge, with the path tying into existing pedestrian facilities on either side of the bridge.

Provide Designed Lanes for Bicyclists Value Rating – Alternative 3

Traffic Control During Construction – Traffic control was evaluated assuming a conventional method of construction would be used. A summary of the traffic control evaluation is below:

- Maintaining 3 lanes of traffic would require a 6-phase construction sequence. The existing girder spacing is 14'-0", which restricts the construction area available because of the large deck overhangs that would require temporary support. It is assumed that the widened portion of the proposed bridge (which occurs upstream of the existing bridge on the widened piers) would be able to be constructed in advance during evening and weekend lane closures.
- Maintaining 2 lanes of traffic would require a 4-phase construction sequence, with the widened portion of the bridge constructed in advance of the lane closure during weekend/evening closures.
- Maintaining 2 lanes and 3 lanes during construction would require multiple full construction seasons, with the construction duration most likely lasting 3 years.
- A full bridge closure using Accelerated Bridge Construction techniques could be utilized for this alternative. However, a lateral slide from the west side of the bridge is not possible due to the close proximity of the dam.

The traffic control value rating for this criterion was evaluated and determined to have the lowest possible value rating based on anticipated length of construction, and traffic impacts to the community with 2 lanes maintained on the bridge.

Traffic Control During Construction Value Rating – Alternative 3

ALTERNATIVE 4 - BRIDGE SUPERSTRUCTURE REPLACEMENT WITH DOWNSTREAM ALIGNMENT SHIFT (WITH ABC CONSTRUCTION TECHNIQUES)

Improve Traffic Safety – Traffic safety is improved for this alternative due to the following criteria:

- 11' minimum lane widths (meets current design criteria) provided.
- 2' Shoulders are provided on each side of the bridge.
- 12' protected shared multi-use paths are provided on each side of the bridge for pedestrians and bicyclists.
- The bridge width is increased from 57' to 72'.

Improve Traffic Safety Value Rating – Alternative 4

Maintain/Improve Structural Integrity & Address Bridge Condition Deficiencies – The structural integrity of the bridge and conditional deficiencies are substantially improved with this alternative due to the following:

- The existing concrete deck is replaced with a new concrete deck.
- The existing steel girders are replaced with new steel girders.
- The existing abutments and piers would be widened and rehabilitated, but would not be replaced.
- Even though the seismic vulnerability for this area and this structure is very low, the proposed bridge superstructure replacement and substructure widening, and rehabilitation would greatly reduce the seismic vulnerability of the structure.

Maintain/Improve Structure Integrity & Address Br. Condition Deficiencies Value Rating – Alt. 4

Improve Pedestrian & Bike Travel – The bicyclists and pedestrian travel is substantially improved with this alternative due to the following:

- A protected multi-use path on both sides of the bridge provides substantial room on either side of the bridge (approximately 12' wide area depending on bridge rail system chosen).
- The protected multi-use path will connect into existing sidewalks on the east side of the bridge, and with the Riverside Trail on the west side of the bridge.

Improve Pedestrian & Bike Travel Value Rating – Alternative 4

Maintain/Improve Resource Impacts – The resource impacts criteria had the lowest negative rating due to the following:

- A substantial causeway in the Winooski River will have to be placed (assumed to be clean stone fill) for the Contractor to access the piers and abutments for the proposed substructure rehabilitation.
- Access from either side of the bridge will be required for construction of the causeway, and also for Contractors access to perform the pier rehabilitation. For the Contractor to access the existing piers, a staging area (or areas) will be required, with the most likely areas being from Mill Street on the south (Burlington) side, or from the green space on the north (Winooski) side. Access from the Winooski side will require demolition and reconstruction of the river promenade adjacent to the existing bridge.
- Due to the age of the existing piers and abutments, even with a rehabilitation performed, it is unrealistic to assume that the service life of the piers and abutments can be extended 100 years without substantial rehabilitation being performed in the future. Therefore, it is assumed that 50 and 75 years from now, rehabilitation of the abutments and piers will be required, with this rehabilitation requiring future river access (causeways).
- Replacement of the existing bridge rail will require historical mitigation due to the historic designation of the bridge rail.

Maintain/Improve Resource Impacts – Alternative 4

Provide Designated Lanes for Bicyclists –This criteria had the highest positive value rating based on the following:

- A protected shared multi-use path will be provided on each side of the bridge, with the path tying into existing pedestrian facilities on either side of the bridge.

Provide Designed Lanes for Bicyclists Value Rating – Alternative 4

Maintain 2 Lanes Traffic in Each Direction – 2 Lanes of traffic will be maintained in the final condition.

Maintain 2 Lanes Traffic in Each Direction Value Rating – Alternative 4

Improve Pedestrian Safety – This criteria had the highest positive value rating based on the following:

- A protected shared multi-use path will be provided on each side of the bridge, with the path tying into existing pedestrian facilities on either side of the bridge.

Provide Designed Lanes for Bicyclists Value Rating – Alternative 4

Traffic Control During Construction – A summary of the traffic control evaluation is below:

- Maintaining 3 lanes of traffic would require a 6-phase construction sequence. The existing girder spacing is 14'-0", which restricts the construction area available because of the large deck overhangs that would require temporary support. It is assumed that the widened portion of the proposed bridge (which occurs downstream of the existing bridge on the widened piers) would be able to be constructed in advance during evening and weekend lane closures.
- Maintaining 2 lanes of traffic would require a 4-phase construction sequence, with the widened portion of the bridge be constructed in advance of the lane closure during weekend/evening closures.
- Maintaining 2 lanes and 3 lanes during construction would require multiple full construction seasons, with the construction duration most likely lasting 3 years.

A full bridge closure was evaluated for this alternative, due to the traffic impacts associated with maintaining 2 lanes or 3 lanes of traffic for several (2-3) construction seasons. The use of Accelerated Bridge Construction (ABC) techniques was evaluated to determine if it was a feasible option. The use of ABC techniques is a method of construction where elements of the bridge are fabricated in advance of the bridge closure, and then shipped/moved to the site and connected together during the bridge closure, substantially reducing the impacts to the public using the bridge. The use of ABC techniques is very common in the state of Vermont and is considered the default method of construction statewide for bridge replacement projects.

For this structure, the method of ABC construction that was determined to be most ideally suited for this site is the bridge lateral slide method. This method of construction requires that the bridge (concrete deck and steel girders) be built directly adjacent to the existing bridge on temporary supports in advance of the bridge closure. The bridge is closed to traffic, with the concrete deck and steel girders removed. The beam seats are reconstructed, and the new bridge is then slid from the temporary supports onto the existing abutment/piers. The approach roadway work is then completed, and the new bridge is then opened to traffic.

The use of ABC techniques with Alternative 4 allows for a portion of the new bridge, the widened portion downstream of the existing bridge, to be built in advance and used as a pedestrian/bike bridge until the new structure is constructed and slid into place. By building a portion of the new bridge in advance, the utilities can be relocated prior to the bridge closure, which is a substantial savings in construction time and coordination. In addition, an added benefit to constructing the shared use path in advance is the ability for bikes and pedestrians to use the bridge during portions of the bridge closure.

The traffic control value rating for this criteria was evaluated and determined to have the highest positive rating. This was based on reducing significant traffic impacts to several weeks, rather than several years. Traffic impacts would occur prior to and after the bridge closure, but they can be limited to off-peak timeframes.

Traffic Control During Construction Value Rating – Alternative 4

ALTERNATIVE 5 - COMPLETE BRIDGE REPLACEMENT WITH 2 SPAN STRUCTURE (WITH ABC CONSTRUCTION TECHNIQUES)

Improve Traffic Safety – Traffic safety is improved for this alternative due to the following criteria:

- 11'-0" minimum lane widths (meets current design criteria) provided.
- 2' Shoulders are provided on each side of the bridge.
- 12' protected shared multi-use paths are provided on each side of the bridge for pedestrians and bicyclists.
- The bridge width is increased from 57' to 72'.

Improve Traffic Safety Value Rating – Alternative 5

Maintain/Improve Structural Integrity & Address Bridge Condition Deficiencies – The structural integrity of the bridge and conditional deficiencies are substantially improved with this alternative due to the following:

- The existing concrete deck is replaced with a new concrete deck.
- The existing steel girders are replaced with new steel girders.
- The existing abutments would be replaced.
- The existing piers would be removed and replaced with a single pier.
- Even though the seismic vulnerability for this area and this structure is very low, the proposed bridge structure replacement and would be designed to resist all current seismic loads.

Maintain/Improve Structure Integrity & Address Br. Condition Deficiencies Value Rating – Alt. 5

Improve Pedestrian & Bike Travel – The bicyclists and pedestrian travel is substantially improved with this alternative due to the following:

- A protected multi-use path on both sides of the bridge provides substantial room on either side of the bridge (approximately 12' wide area depending on bridge rail system chosen).
- The protected multi-use path will connect into existing sidewalks on the east side of the bridge, and with the Riverside Trail on the west side of the bridge.

Improve Pedestrian & Bike Travel Value Rating – Alternative 5

Maintain/Improve Resource Impacts – The resource impacts criteria had a positive rating due to the following:

- Constructing a new pier in the river significantly reduces the need for future river access to perform substructure rehabilitations.
- The existing piers can possibly be removed during the construction of the new bridge structure, which limits access requirements to the Winooski River.
- Constructing a new structure which has 1 pier in the river rather than 2 is an overall positive impact. The potential for debris accumulation is substantially reduced, and the floodplain elevations will also be slightly reduced due to the removal of a river obstruction.

Maintain/Improve Resource Impacts – Alternative 5

Provide Designated Lanes for Bicyclists –This criteria had the highest positive value rating based on the following:

- A protected shared multi-use path will be provided on each side of the bridge, with the path tying into existing pedestrian facilities on either side of the bridge.

Provide Designed Lanes for Bicyclists Value Rating – Alternative 5

Maintain 2 Lanes Traffic in Each Direction – 2 Lanes of traffic will be maintained in the final condition.

Maintain 2 Lanes Traffic in Each Direction Value Rating – Alternative 5

Improve Pedestrian Safety – This criteria had the highest positive value rating based on the following:

- A protected shared multi-use path will be provided on each side of the bridge, with the path tying into existing pedestrian facilities on either side of the bridge.

Provide Designed Lanes for Bicyclists Value Rating – Alternative 5

Traffic Control During Construction – Traffic control during construction will be similar to Alternatives 3 & 4. Alternative 5 was not evaluated with the use of phased construction and conventional construction techniques due to the number of phases required, which would require substantial temporary earth supports at both abutments. This was determined to be too cost prohibitive, therefore phased construction for Alternative 5 was eliminated from consideration. The use of ABC or conventional construction techniques are possible with this Alternative. The expected bridge closure duration with Alternative 5 is longer than Alternative 4 however. This is due to the need to remove the existing abutments and construct new abutments in the same location. The expected closure duration of Alternative 5 with ABC techniques is approximately 4-8 weeks, several weeks longer than Alternative 4.

This criterion had the highest positive value rating due to the overall short traffic impacts compared to several years required for phased construction.

Traffic Control During Construction Value Rating – Alternative 5

CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

SCOPING REPORT

FOR

MAIN STREET (US ROUTES 2 & 7) OVER WINOOSKI RIVER

Appendix F

Resource Identification Report

CHITTENDEN COUNTY RPC
Communities Planning Together

McFarland Johnson

CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

Winooski/Burlington, US RTs 2 & 7 Bridge

RESOURCE IDENTIFICATION

Prepared by:
McFarland Johnson
53 Regional Drive
Concord, NH 03301

October 27, 2017

RESOURCE IDENTIFICATION

Environmental and cultural resources were reviewed in a preliminary screening level analysis. Resources were identified based on publicly available information and various site visits. The results of the resource identification are shown on the accompanying figures. The project location has been depicted on a USGS topographic map (see Figure 1). A description of the resources and the methods used for identifying each resource are described below.

Farmland Soils

Farmland soils were identified using the Natural Resource Conservation Service (NRCS) Soil Survey mapping (see Figure 2). An area of Statewide important farmland soil (Adams and Windsor loamy sands, 5 to 12 percent slopes) is mapped in Burlington, in the southern portion of the project area, over Colchester Avenue and Riverside Road (VT Route 7). This area is currently a highly developed residential area. An area of Prime farmland (Agawam fine sandy loam, 0 to 5 percent slopes) is mapped in Winooski, east of the roundabout. This area is also highly developed, and consists of Winooski Falls Way, Cascade Way, and the large commercial building adjacent to these streets.

The Farmland Protection Policy Act (FPPA) does not apply to lands identified as urbanized areas (UA) on US Census Bureau maps. The 2010 US Census Bureau UA map was overlaid onto the soils map, and the entire project area is located within the Burlington, Vermont UA. Therefore, while NRCS has mapped prime and statewide important farmland within the project area, these areas are not covered by the FPPA because they are located within a UA. No further analysis of farmland soil impacts is required.

Land currently in agricultural use was identified based off aerial photos. No active agricultural farmland was identified within the project area. The project area consists primarily of residential and commercial development.

Wetlands

Wetlands were identified during the desktop review using existing mapping, including the Vermont Significant Wetland Inventory Wetlands Class Layer and Wetlands Advisory Layer. Neither wetland mapping layer identified any wetlands in the vicinity of the project area (see Figure 3). An inspection of the project site has also revealed that wetlands are not present within the immediate vicinity of the bridge.

Surface Waters

The Winooski River is the main surface water in the project area (see Figure 3). At the location of the Main Street Bridge crossing the Winooski River is a seventh order river with a watershed size of approximately 1,050 square miles. The Winooski River begins in the town of Cabot and flows northwest for approximately 90 miles before draining into Lake Champlain. The project area is located in the lower portion of the watershed, approximately 3.25 miles upstream of the mouth at Lake Champlain. The Winooski River is the largest tributary watershed to Lake Champlain. The river is popular for recreational uses including fishing and paddling. The lower reaches of the river support a warm water fishery and is a popular fishing destination in the state. Common species include smallmouth and largemouth bass, walleye, perch, panfish, landlocked salmon and trout. The river is also used for hydroelectric power generation. The Winooski One Hydroelectric Plant is located just downstream, to the west, of the Main Street Bridge. This facility consists of a 7.4 Mw generating station with a refurbished spillway with a rubber dam abutting a historic timber crib dam, a fish lift, and a riverside park. No other surface waters are located within the project area.

Floodplains and Floodways

Floodplains and floodways were identified using the Federal Emergency Management Agency's (FEMA) National Flood Hazard Layer. The regulatory floodway of the Winooski River occurs in the project area (see Figure 4).

Hazardous Materials

According to the Vermont Agency of Natural Resources Hazardous Sites data layer, there are 13 recorded hazardous waste sites within 1,000 feet of the project area (see Figure 5). Seven of these sites (three in Burlington, and four in Winooski) are currently closed and listed as Site Management Activities Completed (SMAC). One site in Winooski is closed and the status is No Further Action Planned (NFAP). There are four Low Priority sites in Winooski, and one Medium Priority site in Burlington.

Low Priority Sites

4 Winooski Falls Way: This site is located adjacent to the project area in the northeast bridge quadrant and has known petroleum contamination.

Winooski Redevelopment Area: This site is located approximately 375 feet east of the project area, in Winooski, and has petroleum and chlorinated solvent contamination. Site construction is now complete with new apartments and office buildings.

Key Bank: This site is located approximately 240 feet north of the roundabout in Winooski, and is part of Vermont's Brownfields Reuse and Environmental Liability Limitation Program (BRELLA). The contaminants at this site were not identified.

Dufresne Service Center: This site is located approximately 750 feet north of the roundabout in Winooski, and is contaminated with gasoline/methyl tertiary butyl ether (MTBE) from an underground storage tank.

Medium Priority Site
M&H Auto (140-140a Riverside Ave): This site is located approximately 700 feet south of the project area in Burlington. Contamination at this site is from floor drains at an auto repair shop and includes lead, tetrachloroethylene (PCE), benzene, and gasoline.

Hazardous Waste Generators
There are three hazardous waste generators located approximately 500-750 feet south of the project area in Burlington. These areas include Trono Oil and Gas Company, Allstar Auto Body, and the Former M&H Auto Property.

The presence of several active and inactive hazardous materials sites, hazardous waste generators, and the past industrial history of the area, suggests that encountering hazardous or contaminated materials during construction is possible.

Fish and Wildlife Habitats

The Winooski River provides valuable habitat for a variety of species and supports a warm water fishery. The area surrounding the Main Street Bridge in both Burlington and Winooski is highly developed urban land consisting of a mix of residential, commercial, and industrial development. Terrestrial wildlife habitat value in the project area is low due to the amount of disturbance and habitat fragmentation at this location.

The Vermont Agency of Natural Resources has identified low to medium priority habitat blocks in the vicinity of the project area, including: the Winooski River below the hydroelectric dam; the Winooski River and associated floodplain forests east of the Main Street Bridge, upstream from the falls; and Centennial Woods Natural area, a large forested patch of land south of the project area in Burlington (see Figure 6).

Rare, Threatened, and Endangered Species, and Significant Natural Communities

State-Listed
According to the Vermont Agency of Natural Resource mapping there are two Significant Natural Communities located downstream of the Main Street Bridge and the hydroelectric dam (see Figure 7). These communities include a calcareous riverside outcrop and a calcareous riverside seep, which are ranked as rare and very rare in Vermont, respectively. The outcrop is located in the vicinity of the dam and along the eastern bank of the Winooski River. The seep is located in the vicinity of the spillway of the dam.

Downstream from the Main Street Bridge and the hydroelectric dam there are several species of state-listed rare, threatened, and endangered species associated with the Winooski River (see Figure 7). In this vicinity, there is one state-endangered plant, one state-threatened plant, and three rare plant species. There are also four state-endangered invertebrate species, two state-endangered vertebrate species, one state-threatened invertebrate, two state-threatened vertebrates, one rare invertebrate, and five rare vertebrate species.

Federally-listed

A US Fish and Wildlife Service Information for Planning and Consultation (IPaC) webtool was utilized to request an official species list for federally-listed species or critical habitats that could potentially occur within the project area. According to the official species list, there are no federally listed species or critical habitats protected under the Endangered Species Act located within the project area.

Cultural Resources

Archeology

Archeological potential is the likelihood of locating intact archeological remains within an area. The consideration of archeological potential takes into account subsequent uses of an area and the affect those uses would likely have on archeological remains.

The archeological potential of the project is limited due to the extensive disturbance of the Area of Potential Effect (APE). Project work involving existing sidewalks in front of the buildings along Colchester Avenue, Main Street and East Allen Street are unlikely to encounter undisturbed soils beneath the existing disturbance.

Outside of the limits of the current streets and sidewalks, however, are areas of archeological potential that include the early 19th-century Burlington Flouring Company Grist Mill Site at the southwest corner of the bridge (refer to Photo 3 in Appendix A), the former site of a 19th-century Engine House that was once located at the northwest corner of the bridge (refer to Photo 4 in Appendix A) and between Structures 20 and 21 where a carriage house from 1894 to 1906, a shed from 1912 to 1919 and a garage in 1926, are depicted on the Sanborn maps (refer to Photo 5 in Appendix A).

Refer to the attached *Archeological Resources Assessment* prepared by Hartgen Archeological Associates, dated July 2017 for the full summary and support documentation, enclosed as Appendix A.

Historic Structures

A total of 25 resources, located within or adjacent to the project APE, were surveyed for this study (refer to Table 1 in Appendix B). Six of these (structures 1, 2 and 4, and 19 thru 21 in Table 1) are already listed on the National Register as part of the Winooski Falls Mill Historic District (1978) or its boundary expansion in 1993 (Visser and Larson 1993). The Winooski Block (Structure 13) is individually listed on the National Register (1974). Five structures (5 thru 8 and 10) are listed on the Vermont State Register. Four resources (structures 22 thru 25) would contribute to a previously identified southern expansion of the Winooski Falls Mill Historic District which would encompass not only mill structures, but the institutional, residential and commercial structures which were part of the context of the daily life of mill workers and owners (Wheeler 2016). This same approach informed the initial boundary increase of 1993.

Using the same rational, an additional eight structures (structures 3, 5 thru 8, 10, 13 and 14), including those five structures already listed on the Vermont State Register and the NRL Winooski Block, could contribute to a northern expansion of the Winooski Falls Mill Historic District. A total of seven buildings or structures (structures 9, 11, 12, and 15 thru 18) are ineligible for listing on the National Register due to insufficient age.

Refer to the attached *Historic Resources Identification* prepared by Hartgen Archeological Associates, dated September 2017 enclosed as Appendix B.

Public Lands

<u>Section 4(f)</u>
Public lands are located in the vicinity of the proposed project (see Figure 8) and will therefore require a Section 4(f) evaluation. At the Main Street Bridge, the Winooski Riverfront Park lies along the northern shore of the Winooski River on both the east and west sides of Main Street. This park includes several parcels with different ownership status, but all are part of an interconnected park development that includes walkways under the bridge and along the river, and a patio area with picnic tables overlooking the river. Salmon Hole Park is located off Route 7 south of the project area just downstream from the hydroelectric dam. This area is owned and maintained by the Winooski Valley Park District.

<u>Section 6(f)</u>
Research on the presence or absence of Section 6(f) parcels within project area is still underway. (Once confirmed, this draft report will be updated).

Socioeconomic and Environmental Justice

Greater than 21 percent of the population in the area surrounding the Main Street Bridge has an income below the poverty level. In this same area, 6-10 percent of the households are linguistically isolated. This area is also more racially diverse than the rest of Chittenden County. In areas of Burlington and Winooski surrounding the project area, 9-15 percent of the population is non-white, and in areas of Winooski 16-20 percent of the population is non-white.

Air Quality

The project is not expected to substantially alter air quality or result in an increase of 10,000 vehicles per day over 10 years.

Noise Sensitive Land Uses

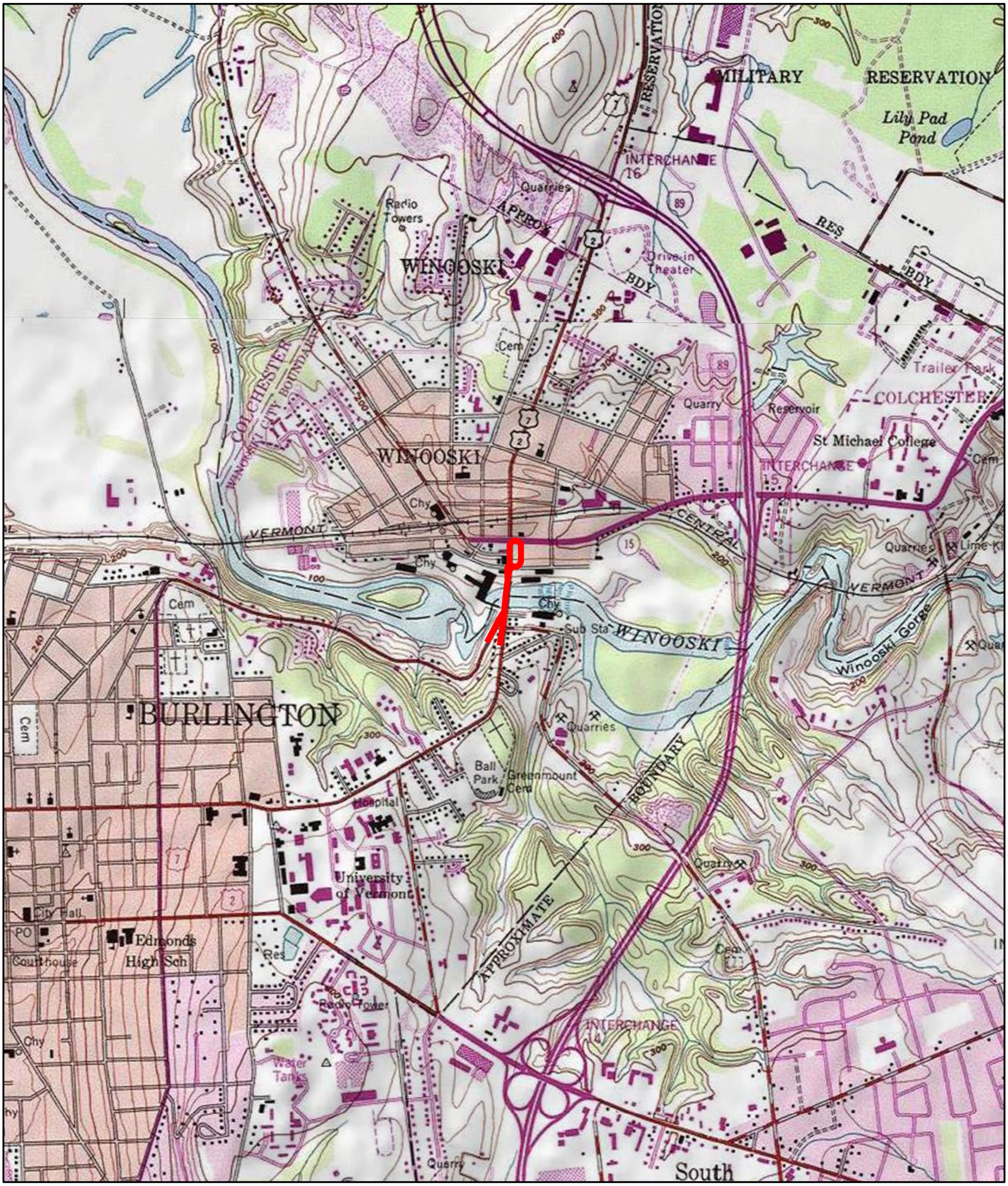
There are no schools, libraries, hospitals, churches, or other sensitive receptors in the immediate vicinity of the project. On the north side of the bridge in Winooski the land use is primarily commercial with some residential apartments, and industrial use along the Winooski River. This area is zoned as Downtown Core, and Central Business District (C-1). On the south side of the bridge in Burlington the land use is a mix of residential and commercial. This area is zoned as Neighborhood Mixed Use (NMU) along Mill Street, Residential Low Density (RL) south of Barrett Street, and Conservation (RCO-C) between the Winooski River and VT Route 7.

The proposed project does not involve the construction of a highway on a new location, substantial horizontal or vertical alterations, or the addition of through-traffic or auxiliary lanes. Therefore, the project is not expected to qualify as a Type 1 Federal Highway Administration project requiring a noise analysis. The project is not expected to significantly affect the noise environment.

Aesthetics and Community Character

Views north from the bridge include the historic Winooski Falls Mill District. Looking east from the bridge are views of the Winooski River and the falls. The view to the west is of the Winooski One Hydro dam. Views looking south over the bridge are of the Burlington side of the historic Winooski Falls Mill district and a more residential area. The views of this area are more obscured by trees and vegetation. The bridge has a concrete railing with lighting installed on metal lamp posts. Overall the area has a high aesthetic value, with large historic brick mill buildings set along the scenic Winooski River falls. This area exemplifies the quintessential early American industrial mill town.

REPORT FIGURES



Approximate Project Limits

N

CCRPC - BURLINGTON & WINOOSKI, VT
MAIN STREET BRIDGE OVER WINOOSKI RIVER

PROJECT LOCATION MAP

SCALE :	DATE :	FIGURE :
1 inch = 2,000 feet	JUNE 2017	1

McFarland Johnson

0 2,000 4,000
Feet

Source: USGS Quad

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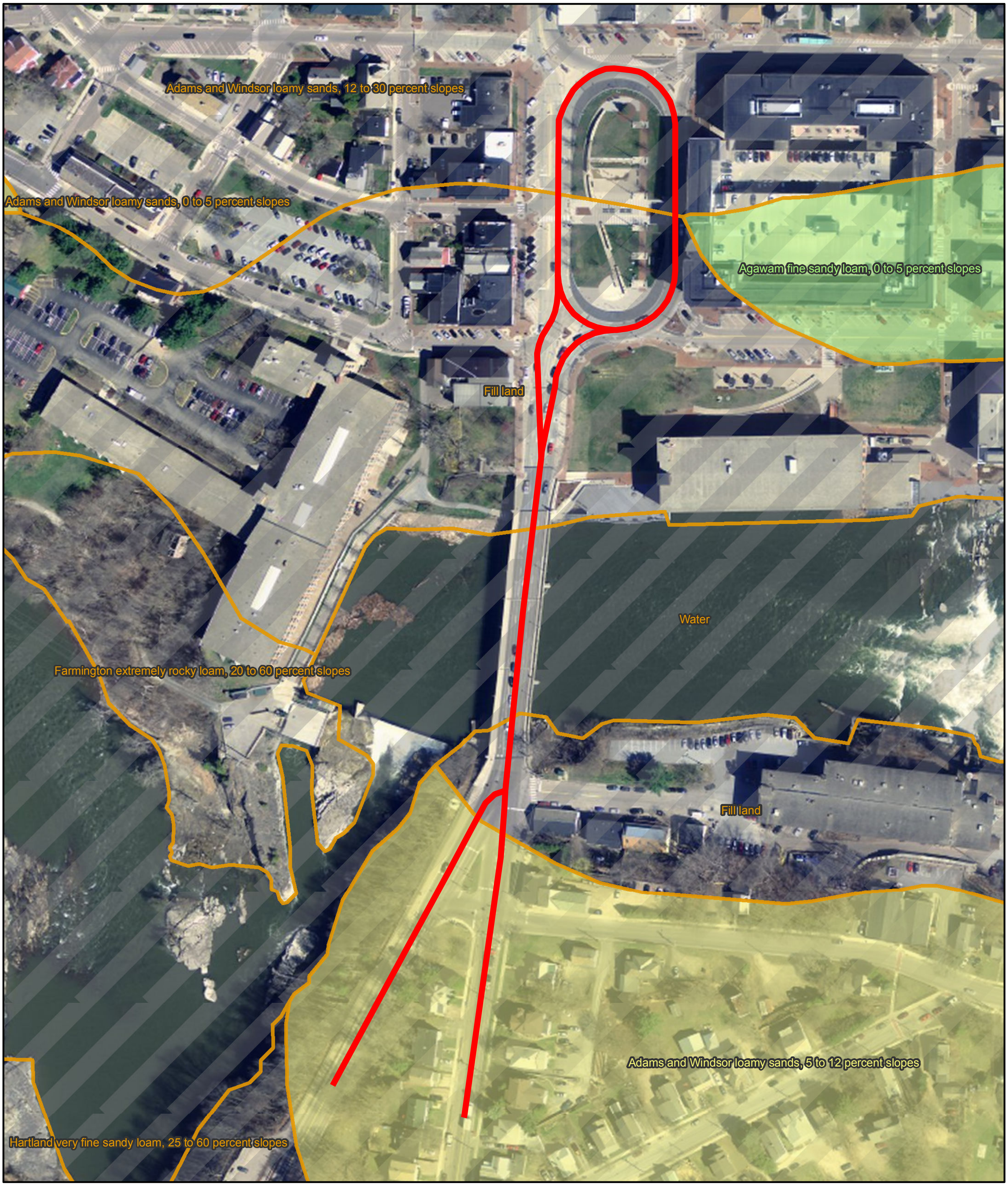

Approximate Project Limits

2010 Census Burlington, VT UA

Soil Map Units

Farmland Soils

Prime

Statewide

N

0 200 400

Feet

Source: VCGI
VT NRCS Soil Survey Units (March 2017)
VT Agriculturally Important Soil Units (March 2017)
2010 US Census Urban Areas

CCRPC - BURLINGTON & WINOOSKI, VT
MAIN STREET BRIDGE OVER WINOOSKI RIVER

FARMLAND SOILS

SCALE :	DATE :	FIGURE :
1 inch = 200 feet	JUNE 2017	2

McFarland Johnson

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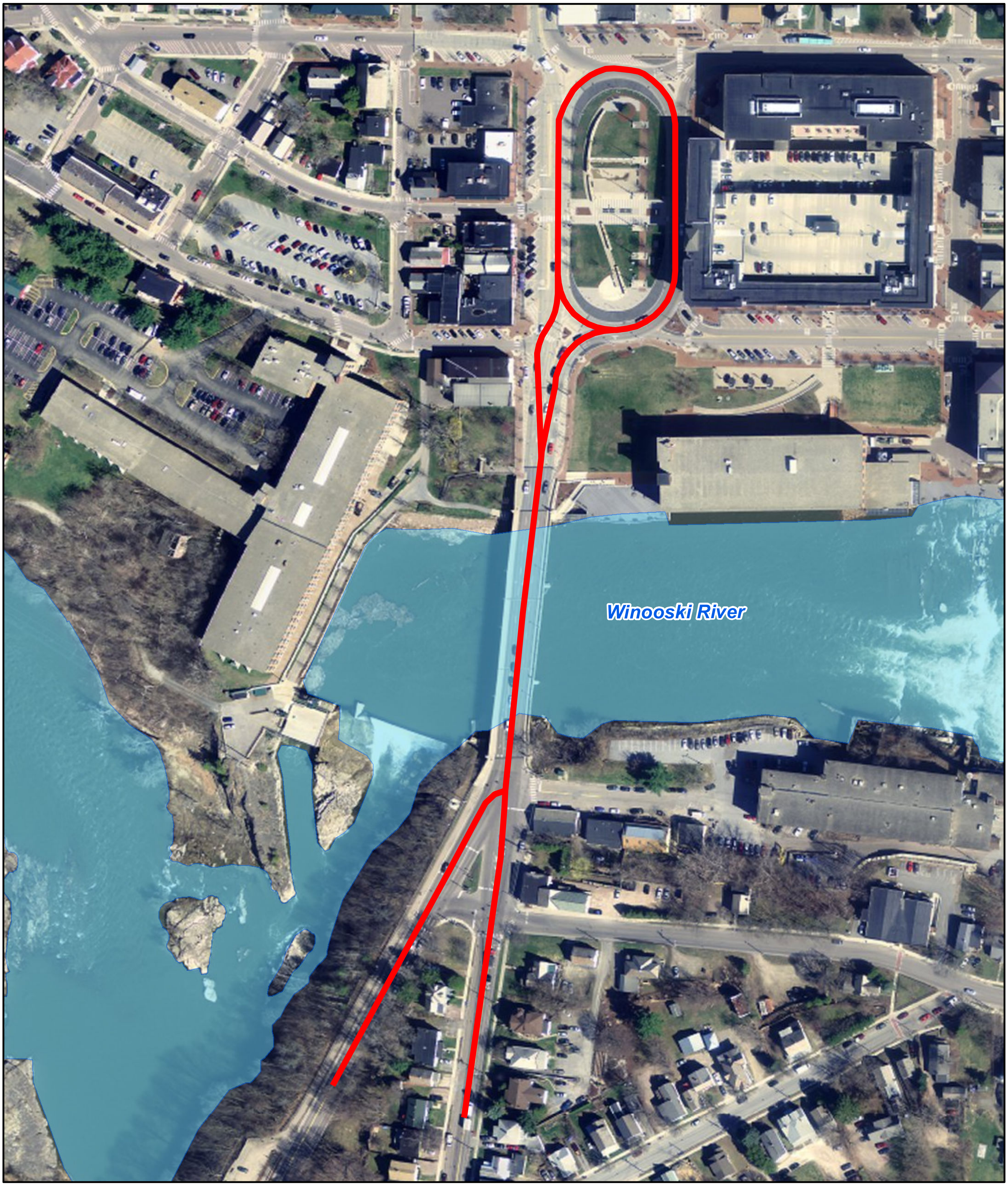

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Approximate Project Limits
Surface Waters
VSWI Wetlands Advisory Layer

VSWI Wetlands Class Layer
Class 1
Class 2

0 200 400
Feet

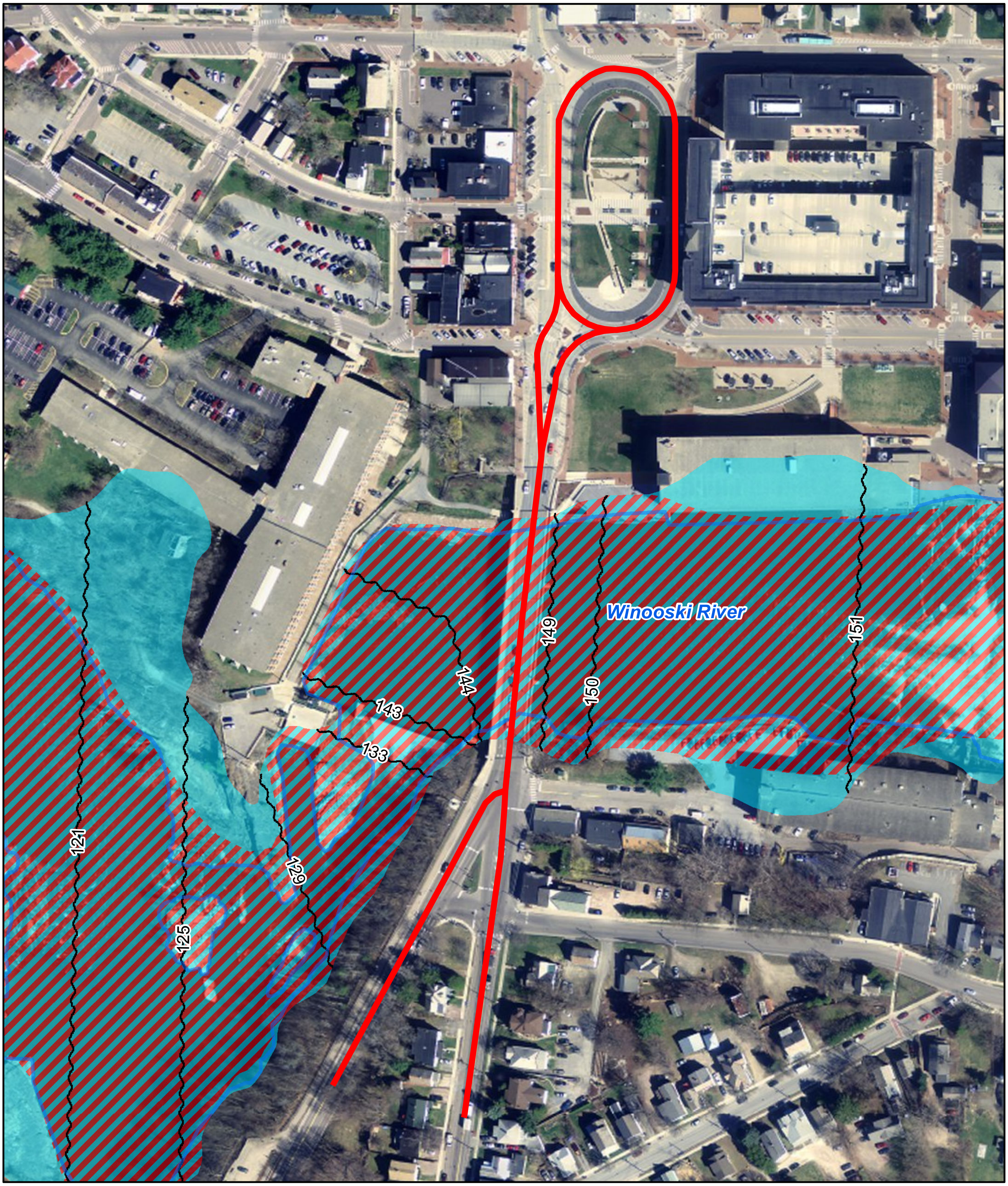
Source: VCGI
VSWI Wetlands Advisory Layer (January 2017)
VSWI Wetlands Class Layer (January 2017)
VT Hydrography Dataset (March 2017)

CCRPC - BURLINGTON & WINOOSKI, VT
MAIN STREET BRIDGE OVER WINOOSKI RIVER

WETLANDS AND SURFACE WATERS

SCALE :	DATE :	FIGURE :
1 inch = 200 feet	JUNE 2017	3

McFarland Johnson



Approximate Project Limits
Surface Waters
Base Flood Elevations (feet)

Flood Hazard Zones

Zone Type

Regulatory Floodway
1% Annual Chance Flood Hazard

0 200 400
Feet

N

Source: FEMA Flood Hazard Areas (2015)
VCGI VT Hydrography Dataset (March 2017)
VT ANR River Corridors (January 2015)

CCRPC - BURLINGTON & WINOOSKI, VT
MAIN STREET BRIDGE OVER WINOOSKI RIVER

FLOODPLAINS AND FLOODWAYS

SCALE :	DATE :	FIGURE :
1 inch = 200 feet	JUNE 2017	4

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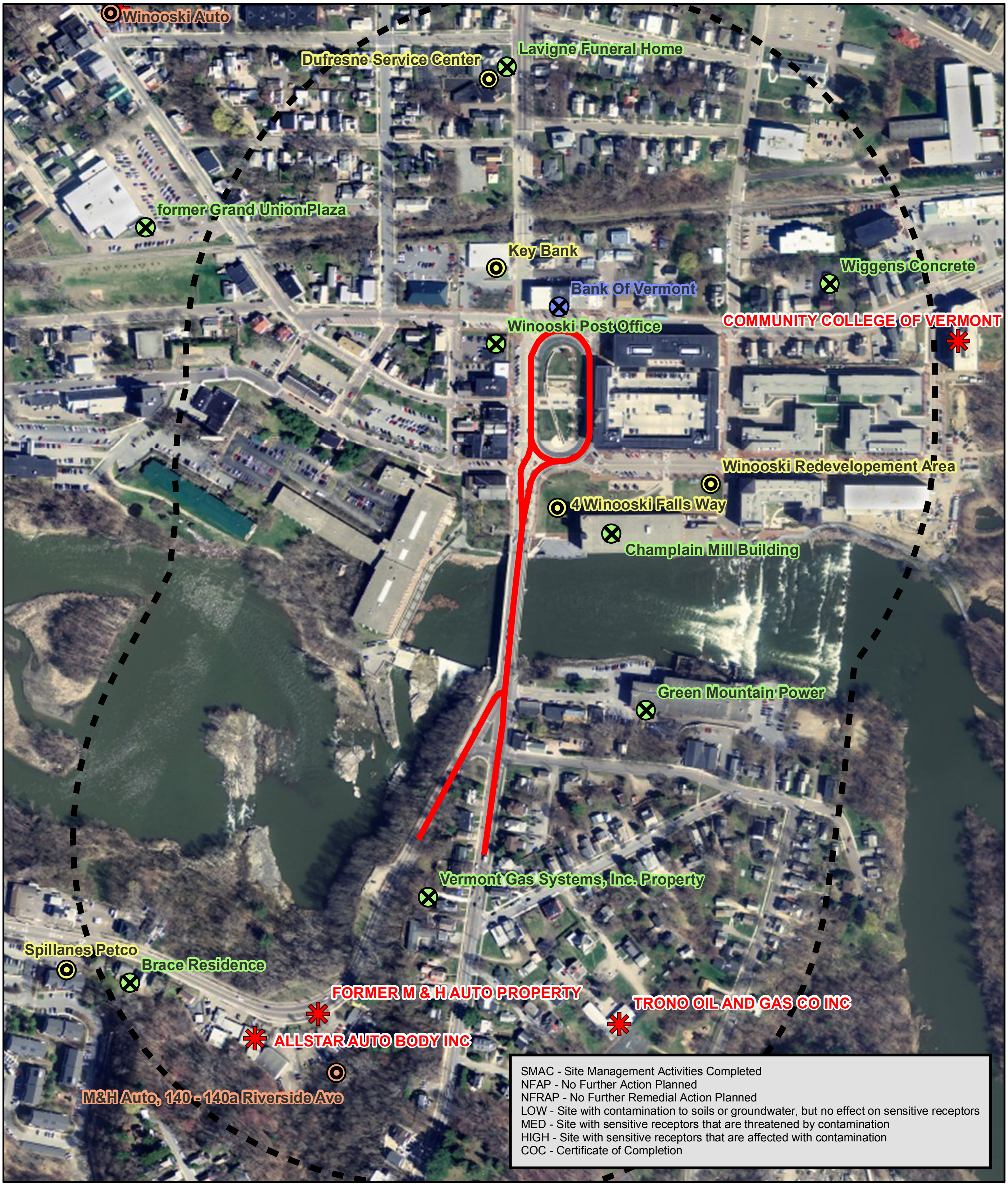

Approximate Project Limits
1000' Project Buffer
Hazardous Waste Generators

Hazardous Sites

Priority

SMAC
NFAP
NFRAP
LOW
MED
HIGH
OTHER
COC

Status

Active
Closed

N

0 400 800
Feet

Source: VT ANR
Hazardous Sites (February 2017)
Hazardous Waste Generators (February 2017)

CCRPC - BURLINGTON & WINOOSKI, VT
MAIN STREET BRIDGE OVER WINOOSKI RIVER

HAZARDOUS MATERIALS SITES

SCALE :	DATE :	FIGURE :
1 inch = 400 feet	JUNE 2017	5

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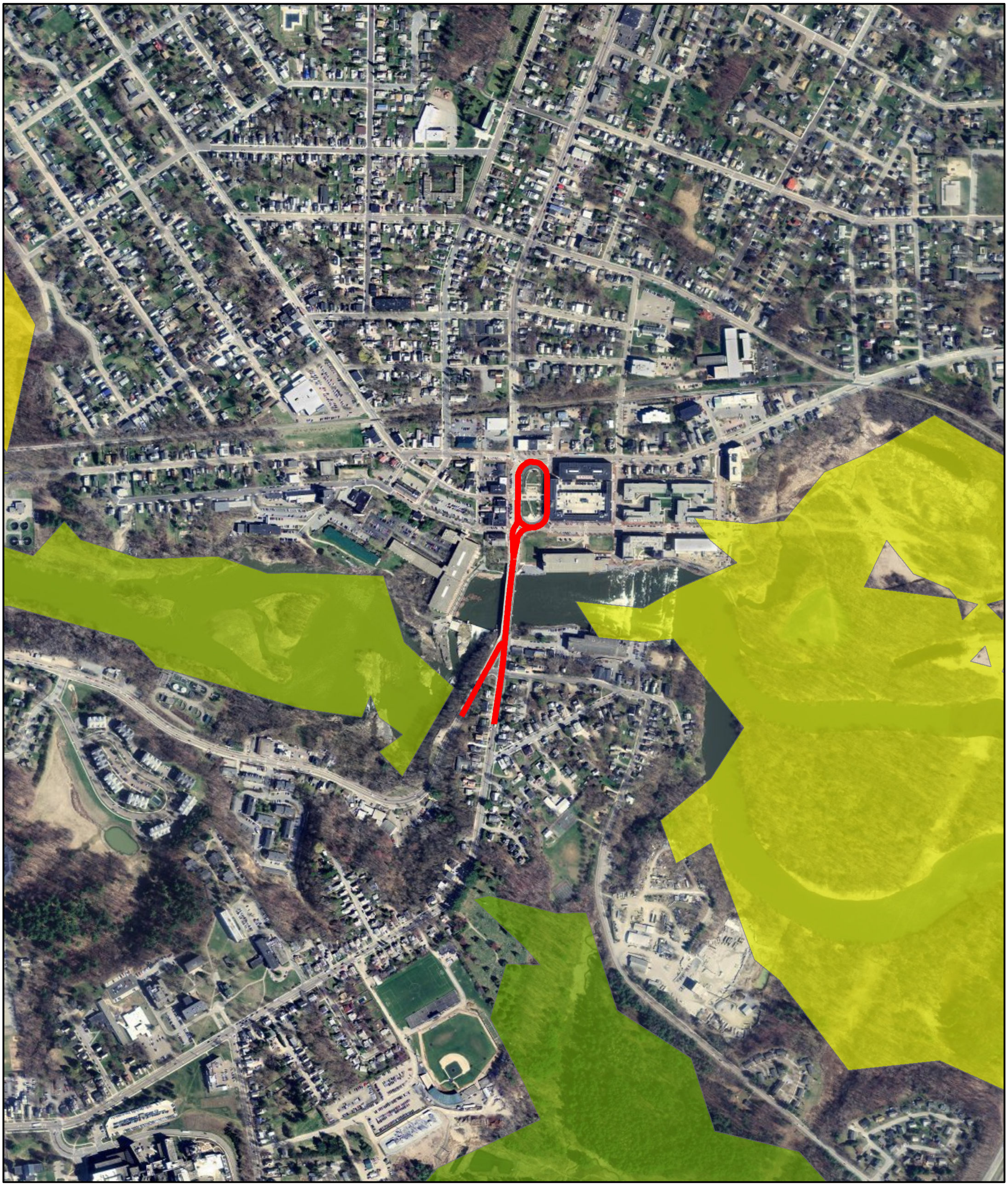

Approximate Project Limits

Habitat Blocks and Wildlife Corridors

Priority

- 1, Low Priority
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10, High Priority

N

0 800 1,600

Feet

Source: VT ANR
Habitat Blocks and Wildlife Corridors (February 2017)

CCRPC - BURLINGTON & WINOOSKI, VT
MAIN STREET BRIDGE OVER WINOOSKI RIVER

HABITAT BLOCKS AND WILDLIFE CORRIDORS

SCALE :	DATE :	FIGURE :
1 inch = 800 feet	JUNE 2017	6

McFarland Johnson

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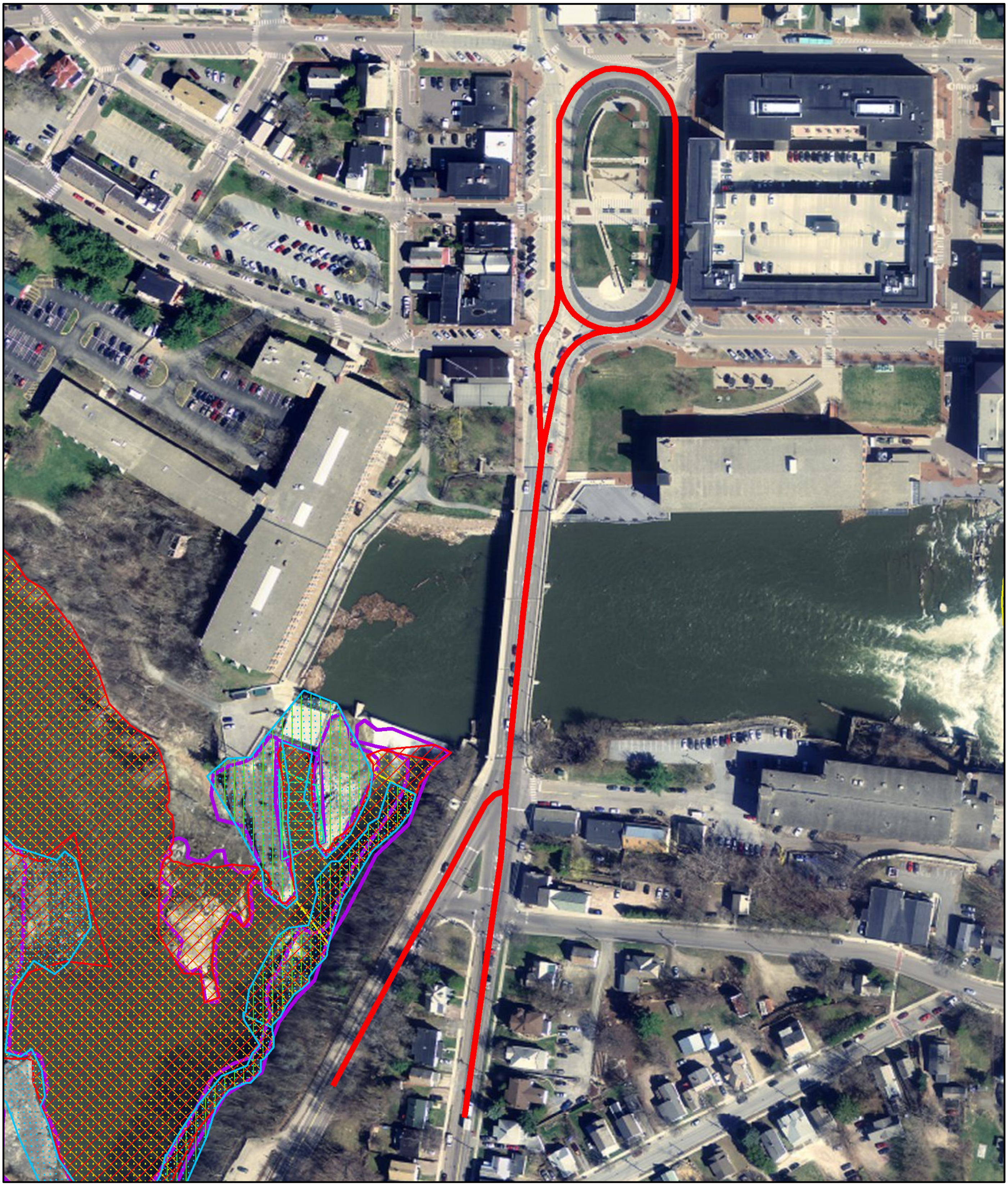

Approximate Project Limits

RTE Species

Status and Type

Endangered Animal

Threatened Animal

Rare Animal

Endangered Plant

Threatened Plant

Rare Plant

Significant Natural Communities

N

0 200 400

Feet

Source: VT ANR
RTE and Significant Natural
Communities (January 2017)

CCRPC - BURLINGTON & WINOOSKI, VT
MAIN STREET BRIDGE OVER WINOOSKI RIVER

RARE, THREATENED, AND ENDANGERED SPECIES, AND SIGNIFICANT NATURAL COMMUNITIES

SCALE :	DATE :	FIGURE :
1 inch = 200 feet	JUNE 2017	7

McFarland Johnson

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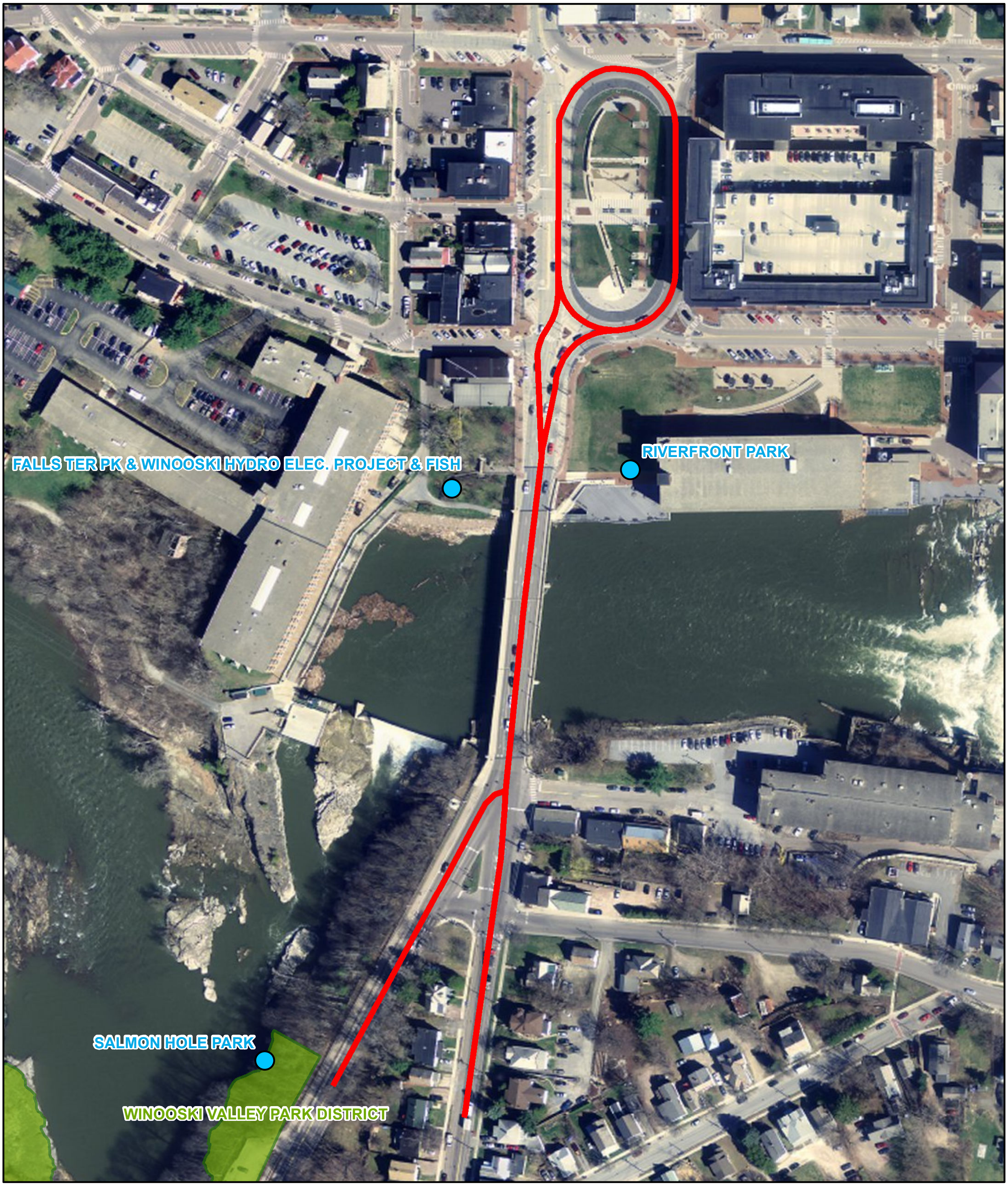

Approximate Project Limits

Outdoor Recreation Sites

VT Protected Lands

N

0 200 400

Feet

Source: VT ANR
Outdoor Recreation Sites Inventory (February 2017)
VT Protected Lands (March 2017)

CCRPC - BURLINGTON & WINOOSKI, VT
MAIN STREET BRIDGE OVER WINOOSKI RIVER

CONSERVATION AND RECREATION LANDS

SCALE :	DATE :	FIGURE :
1 inch = 200 feet	JUNE 2017	8

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APPENDIX A

ARCHEOLOGICAL RESOURCE ASSESSMENT

Winooski Bridge Project

Cities of Burlington and Winooski
Chittenden County, Vermont

HAA # 5137-11

Submitted to:
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July 2017

MANAGEMENT SUMMARY

VTrans Project Number: *Not yet assigned*
Involved State and Federal Agencies: *Vermont Agency of Transportation (VTrans)*
Phase of Survey: *Archeological Resource Assessment*

LOCATION INFORMATION

Municipality: *Cities of Burlington and Winooski*
County: *Chittenden County*

SURVEY AREA

Length: *1,400 feet (427 m)*
Width: *up to 238 feet (73 m)*
Area: *4.66 acres (1.89 ha)*

RESULTS OF RESEARCH

Archeological sites within one mile: *18*
Surveys in or adjacent: *4*
NR/NRE sites in or adjacent: *2 NR listed properties, 5 SR listed properties*
Precontact Sensitivity: *high in undisturbed areas*
Historic Sensitivity: *high*

RECOMMENDATIONS

If the project disturbance will extend into undisturbed areas outside of existing pavement, sidewalk or other disturbance, Phase IB archeological reconnaissance survey is recommended. Such areas include the vicinity of the former grist mill at the southwest corner of the bridge and current lawn areas at the northwest corner of the bridge and along between 467 and 475 Colchester Avenue.

Report Authors: *Thomas R. Jamison, PhD, RPA*
Date of Report: *July 2017*

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Photo 5. Overgrown area between Structures 20 and 21 that once contained a carriage house from 1894 to 1906, a shed from 1912 to 1919 and a garage in 1926, as depicted on the Sanborn maps. View to the east. 16

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ARCHEOLOGICAL RESOURCE ASSESSMENT

1 Introduction

Hartgen Archeological Associates, Inc. (Hartgen) conducted an Archeological Resource Assessment for the proposed Winooski Bridge Project (Project) located in the Cities of Burlington and Winooski, Chittenden County, Vermont (Map 1). The Project requires approvals by the Chittenden County Regional Planning Commission (CCRPC) and the Vermont Agency of Transportation (VTrans). This investigation was conducted to comply with Section 106 of the National Historic Preservation Act of 1966, as amended, and will be reviewed by VTrans. This investigation adheres to the Vermont State Historic Preservation Office's (SHPO) *Guidelines for Conducting Archeology in Vermont* (VDHP 2017).

2 Project Information

A site visit was conducted by Thomas R. Jamison on May 24, 2017 to observe and photograph existing conditions within the Project Area. The information gathered during the site visit is included in the relevant sections of the report.

2.1 Project Location

The project is located at the boundary between the City of Burlington and the City of Winooski, where the Winooski Bridge crosses the Winooski River. In addition to the bridge, the project extends north and south into both cities (Map 2).

2.2 Description of the Project

Several different alternatives are being considered for the Winooski Bridge:

- No Build
- Bridge Rehabilitation (retain existing typical section)
- Bridge Superstructure Replacement with Substructure Widening
- Bridge Replacement (a total of three different replacement alternatives)

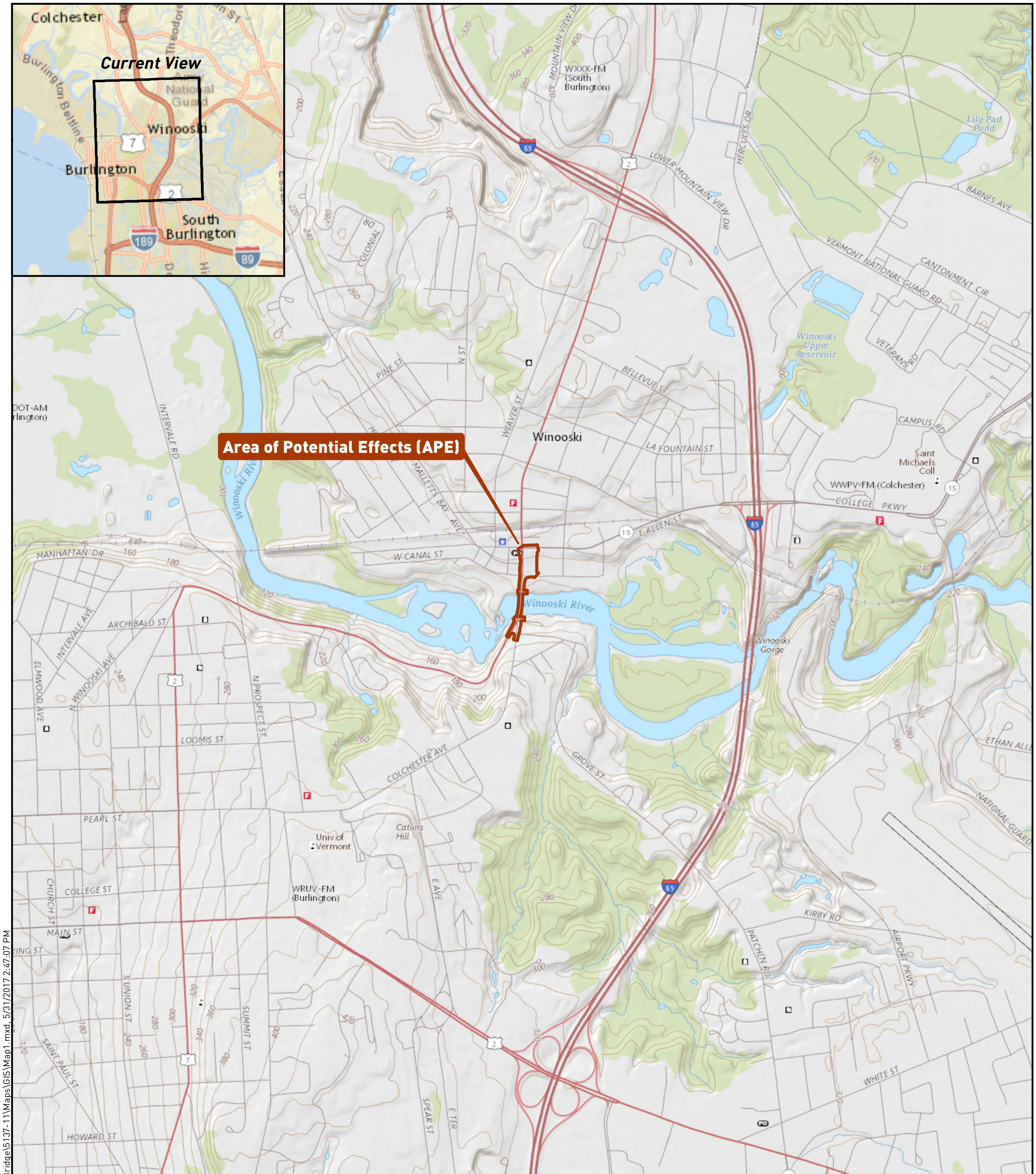
The project is also expected to include repaving and minor earthwork to the north and south of the bridge, within currently paved streets, as well as potential work in the area of the existing sidewalks. Temporary and permanent easements may be established at each end of the bridge, depicted as small bump outs at each corner of the bridge on Map 2.

2.3 Description of the Area of Potential Effects (APE)

The area of potential effects (APE) includes all portions of the property that will be directly or indirectly altered by the proposed undertaking. The APE includes the following (Map 2):

- The bridge – approximately 128 meters (420 ft) in length
- Burlington roads – approximately 90 meters (295 ft)
- Winooski roads – approximately 178 meters (583 ft)
- Temporary and permanent easements – 8,000 square feet (743 sq m)

Total APE encompasses approximately 3.42 acres (1.39 ha).



R:\Active Projects\5137 Winooski Bridge\5137-11\Maps\GIS\Map1.mxd, 5/31/2017 2:47:07 PM

1,000 0 1,000 2,000 Feet

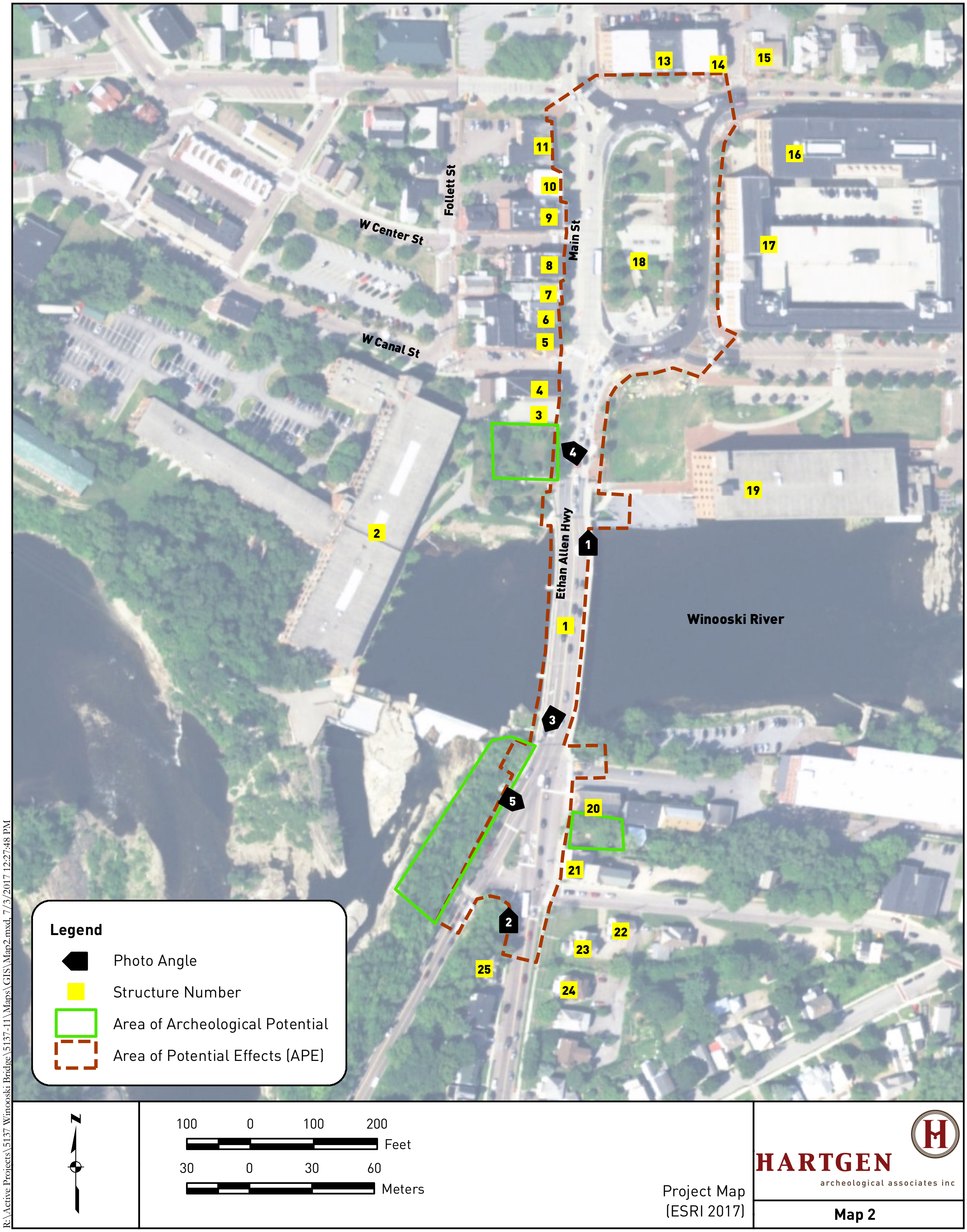
300 0 300 600 Meters

Note: Contour interval is 20 feet.

Project Location (USGS 2017)

HARTGEN archeological associates inc

Map 1



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3 Environmental Background

The environment of an area is significant for determining the sensitivity of the Project Area for archeological resources. Precontact and historic groups often favored level, well-drained areas near wetlands and waterways. Therefore, topography, proximity to wetlands, and soils are examined to determine if there are landforms in the Project Area that are more likely to contain archeological resources. In addition, bedrock formations may contain chert or other resources that may have been quarried by precontact groups. Soil conditions can provide a clue to past climatic conditions, as well as changes in local hydrology.

3.1 Present Land Use and Current Conditions

Currently, the project area is highly developed with few open areas (Photo 1 and Photo 2). Recent redevelopment has established park areas adjacent to the Champlain Mill at the northeast corner of the bridge, at the northwest corner of the bridge and within the roundabout between the bridge and the Winooski Block. The surrounding buildings are a combination of small 19th- and 20th-century commercial blocks, former 19th-century mill buildings and residences and large recent developments.

Photo 1. Project APE north of the bridge in Winooski. View to the north.

Photo 2. Project APE south of the bridge in Burlington. View to the north.

3.2 Soils

Soil surveys provide a general characterization of the types and depths of soils that are found in an area. This information is an important factor in determining the appropriate methodology if and when a field study is recommended. The soil type also informs the degree of artifact visibility and likely recovery rates. For example, artifacts are more visible and more easily recovered in sand than in stiff glacial clay, which will not pass through a screen easily.

The soils of the project area are primarily the Adams and Windsor loamy sands deposited by glaciofluvial action on the terraces currently along the Winooski River. These deposits were laid down by the glacial meltwater precursor to the Winooski River. The USDA soil mapping identifies the areas immediately adjacent to both sides of the river as fill related to the historic development of that area (USDA 2017). The soil mapping can be broad brush so that the detailed accuracy may be such that parts of the APE defined as fill are likely to retain intact Adams and Windsor loamy sand soils.

Table 1. Soils in Project Area

Symbol	Name	Textures	Slope	Drainage	Landform
AdB	Adams and Windsor	Loamy sands	5-12%	Somewhat excessively drained	Glaciofluvial deposits
AdD	Adams and Windsor	Loamy sands	12-30%	Somewhat excessively drained	Glaciofluvial deposits
Fu	Fill land	Sandy gravelly loam	n/a	n/a	n/a

3.3 Bedrock Geology

The bedrock in the immediate project area is the Winooski dolomite, exposed as ledges in the river adjacent to the APE. To the east is the Danby formation and to the west is Monkton quartzite (Ratcliffe 2011). The Danby formation consists of vitreous quartzite interbedded with sandy dolostone. Although none of these formations have been documented as being exploited during the precontact period, the Danby formation and the Monkton quartzite could have provided materials for formal stone tools and all the bedrock in the area could have been utilized for groundstone tools or fragments may have been used on an expedient basis.

3.4 Physiography and Hydrology

The project area gradually slopes down to the Winooski River from the north and south as Winooski's Main Street and Burlington's Colchester Avenue approach the river. In Winooski, the APE generally slopes down from north to south. In Burlington, the area between Colchester Avenue and Riverside Avenue slopes down to the west toward the river. West of Riverside Avenue, the landscape drops off precipitously to the river. Steep slopes and cliffs line the river along this section of Riverside Avenue.

The only waterway in the area is the Winooski River that passes under the Winooski Bridge. The APE is located at the first falls in the river from Lake Champlain, rising from about 100 feet (30.5 m) above mean sea level (amsl) below the falls to 137 feet (41.8 m) above the falls east of the bridge and then to 154 feet (47 m) further to the east above a smaller set of falls. Tributaries to the Winooski flow into the river from Burlington and Winooski, but they are located well outside of the APE.

4 Documentary Research

Hartgen conducted research at the Vermont Division for Historic Preservation (VDHP) to identify previously reported archeological sites, State and National Register (NR) properties, properties determined eligible for the NR (NRE), and previous cultural resource surveys.

4.1 Archeological Sites

The archeological site files at VDHP contained 18 sites within one mile (1.6 km) of the project area (Table 2). Previously reported archeological sites provide an overview of both the types of sites that may be present in the APE and the relationship of sites throughout the surrounding region. The presence of few reported sites, however, may result from a lack of previous systematic survey and does not necessarily indicate a decreased archeological sensitivity within the APE.

Seventeen of the sites date to the precontact era. They include sites dating from the Early Archaic (c. 7050 to 5550 BC) through the Late Woodland (c. AD 1050 to 1600). In addition, one of these sites appears to have a Late Paleoindian component. These sites range from simple flake scatters to complex stratified sites and burials. There is only one historic site reported for the project vicinity, a 19th-century foundry that was located along the river in Winooski. However, 19th- and 20th-century flour and textile mill foundation remains have been identified along the west edge of the APE slightly south of the bridge (Wilson 1992). These foundations have apparently not been assigned site numbers.

Table 2. Vermont Archeological Inventory (VAI) sites within one mile (1.6 km) of the Project Area

VAI Site No.	Site Identifier	Description	Proximity to Project Area
VT-CH-0046	Winooski	Late Archaic, Middle Woodland, ceramics, lithics, botanical and faunal remains, features	0.7 mi/1.1 km W
VT-CH-0075	Zedeck	Unknown precontact, chert and quartzite flakes, bone fragments	0.73 mi/1.2 km W
VT-CH-120		Archaic and Woodland, flakes, tools, projectile points, ceramic, FCR	0.79 mi/1.3 km to NW
VT-CH-127		Early and Middle Woodland, ceramics, quartzite, quartz, chert, rhyolite flakes, Meadowood, Fox Creek and Levanna projectile points, calcined bone, butternut shell	0.2 mi/0.33 km W/SW
VT-CH-128		Middle Woodland, chert flakes, ceramics, calcined bone	0.32 mi/0.51 km W
VT-CH-129		Woodland, chert and quartzite flakes, ceramic fragments	0.38 mi/0.61 km W
VT-CH-132		Late Archaic, Otter Creek projectile points found by	0.7 mi/1.1 km N

		collector	
VT-CH-283	Stevens Foundry	Mid to late 19th-century foundry	0.04 mi/0.06 km E
VT-CH-285	Niquette Burial	Unknown precontact, Native American burial	0.4 mi/0.64 km NW
VT-CH-293		Late Archaic, Middle and Late Woodland, pos. Contact, hearths, flakes and tools, pottery, FCR, bone	0.87 mi/1.4 km NW
VT-CH-294		Early and Late Archaic, lithic workshops, hearths	0.92 mi/1.5 km N
VT-CH-295		Two chert flakes, unclear significance	0.88 mi/1.4 km N
VT-CH-663	Mansfield	Unknown precontact, chert, quartzite and quartz flakes, calcinced bone	0.68 mi/1.09 km SE
VT-CH-789		Unknown precontact, quartzite flakes	0.81 mi/1.3 km SW
VT-CH-900	Upper Falls	Late Paleoindian, Archaic and Woodland, features and artifacts	0.45 mi/0.72 km NE
VT-CH-0990		Unknown precontact, chert and quartzite flakes, chert utilized flake, fire cracked rock , hearth feature	0.32 mi/1.13 km W
VT-CH-1110		Middle Woodland, ceramics, Levanna projectile point, hearth features	0.52 mi/0.8 km W
VT-CH-1171		Middle Woodland, isolated find of Fox Creek stemmed projectile point	0.58 mi/0.9 km NE

4.2 Historic Properties

An examination of the files at VDHP identified two NR listed properties, five SR listed properties and no properties previously determined to be ineligible within or adjacent to the APE (Tables 3 and 4). The NR listed properties are the 1867 Winooski Block at the north end of the APE and is the Winooski Falls Historic District that includes structures on both sides of the river and one archeological site within and adjacent to the APE. The Winooski Falls Historic District is focused on the late 19th- to early 20th-century textile mills and workers housing located on either side of the Winooski River and includes the archeological remains of a flour mill adjacent to the south end of the bridge and west of Riverside Avenue. The National Register and State Register listed structures adjacent to the APE are shown on Map 2, keyed to Tables 3 and 4 below.

Within the historic district seven properties are within or adjacent to the APE. They are listed in Table 3. Structure 15 has recently been rehabilitated and raised to give it a two story façade facing Colchester Avenue.

State Register listed structures include five commercial blocks adjacent to the APE in Winooski. In addition, a recent Historic Resources Identification Report completed for an intersection scoping study at the south end of the Winooski Bridge (Hartgen 2016) identified three structures adjacent to the APE that would contribute to an expanded Winooski Falls Historic District, if that was undertaken. All of these structures are listed in Table 4.

Table 3. National Register Listed properties within or adjacent to the APE

NRHD No.	Structures on Map 2	Property Name/Address	Description
		Winooski Falls Historic District, NRL 2/7/1979, 9/30/1993, 11/12/2009	19th- to 20th-century textile mills and worker's housing, on either side of the river (contributing properties adjacent to APE listed below)
2	19	Champlain Mill/20 Winooski Falls Way	1912 brick textile mill
5	4	22 Main Street	c. 1845 Greek Revival commercial structure
13	1	The Winooski Bridge	1928 poured concrete and steel bridge
14		Burlington Flouring Company Grist Mill Site	c. 1823, 1854, 1927 brick foundation remains of mill and associated structures
15	20	Duncan Blacksmith Shop/495-497 Colchester Avenue	c. 1841, 1928 brick veneer former store and blacksmith shop, currently being rehabilitated with an added story

NRHD No.	Structures on Map 2	Property Name/Address	Description
20	21	Hickcock-Burlington Cotton Company Tenement Building/485 Colchester Avenue and 8-10 Barrett Street	1811, 1853, 1924, 1961 vernacular former store, tavern, tenement
	13	Winooski Block/1-19 East Allen Street, NRL 11/20/1974	1867 commercial block at north end of APE

Table 4. State Register Listed and properties that could contribute to an expanded Winooski Falls Historic District within or adjacent to the APE

SR No.	Structures on Map 2	Property Name/Address	Description
0418-1	5	Pi Express/24-26 Main Street	c. 1884 Queen Anne commercial block
0418-2	6	Trono Block/28-30 Main Street	c. 1938 commercial block
0418-3	7	Monkey House/30-32 Main Street	c. 1880 Italianate commercial block
0418-4	8	Our House Restaurant/36-38 Main Street	c. 1880 Italianate commercial block
0418-6	10	Misery Loves Company/46 Main Street	c. 1875/c. 1910 façade Colonial Revival commercial block
	25	460 Colchester Avenue	c. 1915 single family residence
	23	475 Colchester Avenue	c. 1875 "Upright and Wing" vernacular residence
	24	467 Colchester Avenue	c. 1920 multi-family residence

4.3 Previous Surveys

On file at VDHP are four previous surveys within the immediate vicinity of the Project (Table 5). All of these surveys identified areas of archeological potential, specifically, the area west of Riverside Avenue and south of the bridge where several 19th- to 20th-century mill foundations are located and the area east of Champlain Mill where areas of archeological potential were identified and site VT-CH-0900 was identified. Wilson's background research identified the location of several mills that were once along the west side of Riverside Avenue adjacent to the APE (Wilson 1992). The Arnott et al. study was a broad review of proposed transportation upgrades between Burlington, Winooski and South Burlington and only briefly mentions the mill foundations in the project area (Arnott, et al. 1995). Frink's studies for the Winooski Redevelopment Plan identified several areas of archeological potential for precontact and historic deposits east of Main Street/Route 2 on the north side of the river. At the west end of the city center precontact site VT-CH-0900 was encountered (Frink 2002; Frink and Hathaway 2000; Frink, et al. 2005).

Table 5. Relevant previous surveys within or adjacent to the Project

Year	Investigator	Methodology	Results	Notes
1992	Wilson (UVM-CAP)	Background research and site visit	Areas of archeological potential and disturbance/filling identified	Identified location of several historic mill foundations adjacent to the west side of Riverside Avenue
1995	Arnott et al.	Historical and archeological research	Identified general areas of archeological potential	Did not address APE in detail, but mentioned mill foundations adjacent to Riverside Avenue
2000	Frink	Background research and shovel tests	Champlain Mill Riverwalk: Shovel tests encountered extensive fill with no precontact materials and only late 19th-century to early 20th-century artifacts in fill.	No additional work recommended for this location on the north side of the river east of the current APE
2000	Frink and Hathaway	Background research and site visit	Winooski Redevelopment Plan, identified several areas for excavation and monitoring	Recommended areas for boring, shovel testing and monitoring
2002	Frink	Shovel tests	Winooski Redevelopment Plan, identified precontact site (VT-CH-0900) at the east end of Winooski	Recommended further Phase IB survey in other areas

			Falls Way	
2005	Frink, et al.	Shovel tests and units	Winooski Redevelopment Plan, encountered deposits of VT-CH-0900 dating from the Late Paleoindian to Late Woodland/Contact periods	Recommended site preservation or full scale mitigation excavation

5 Historical Map Review

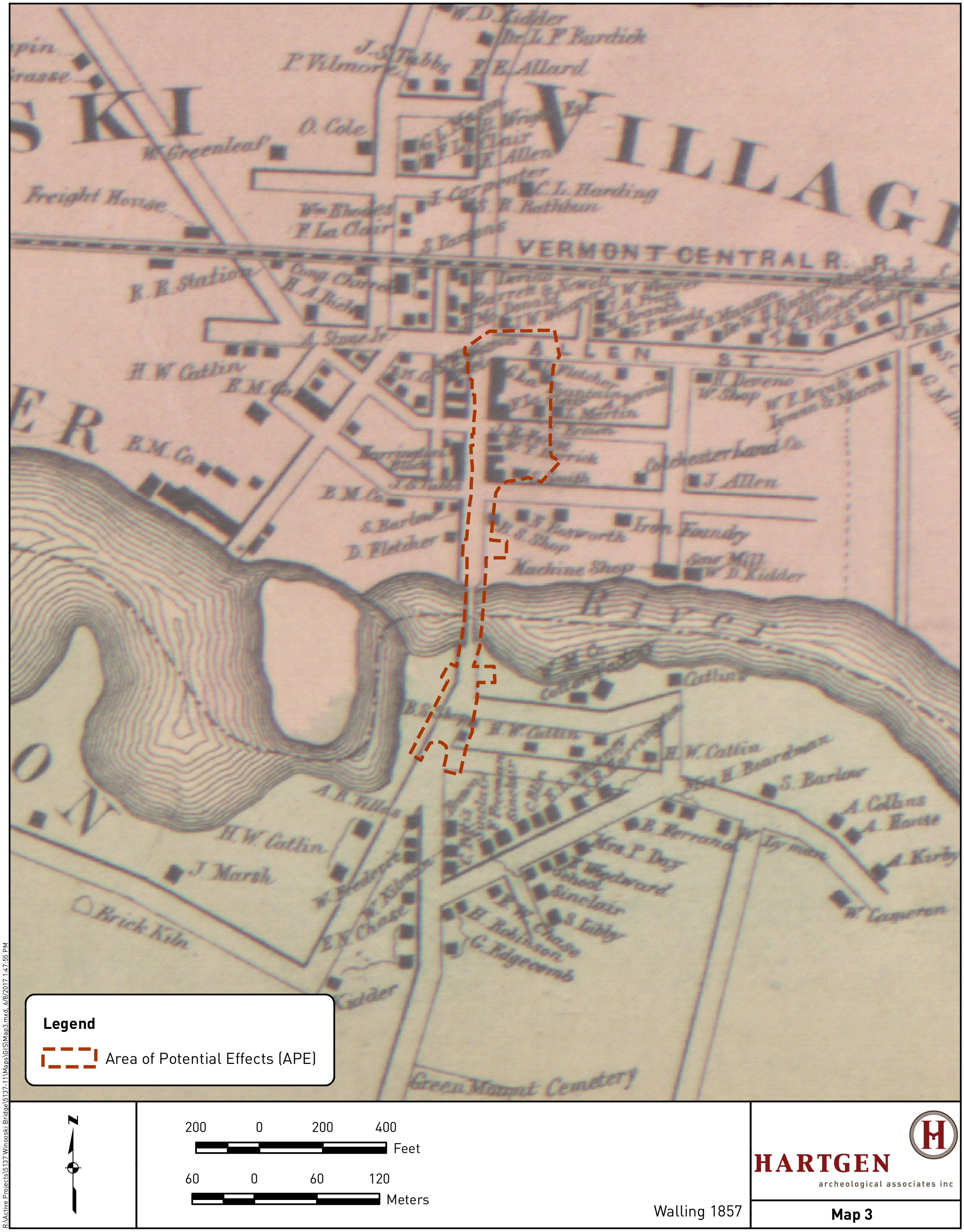
As a densely occupied industrial, commercial and residential zone, the project area is well documented on historic maps. The basic street layout was established by 1857 (Walling 1857). In Winooski, a small structure labeled Barlow is depicted that is probably the Greek Revival commercial structure at 22 Main Street (NRHD #5). Many other structures are depicted along the project alignment, but none that are known to remain standing. They include a hotel, a blacksmith shop, several commercial blocks and other unidentified structures. In Burlington, the 1857 map depicts a blacksmith shop (NRHD #15) at the south corner of Mill Street and Colchester Avenue, an unlabeled structure south of it, the Woolen Mill Co. Cotton Factory at the end of Mill Street and several residences extending south along Colchester Avenue (Map 3). One residence labeled A. R. Villas is shown in the point of the intersection of Riverside and Colchester Avenues. The 1869 Beers map of the area, however, depicts a structure with the same label to be located further to the south, a probably more accurate depiction of its location (Map 4). The 1869 map also shows the blacksmith shop (NRHD #15), a structure labeled C. P. W & Co. at the northeast corner of Barrett Street and Colchester Avenue (NRHD #20) and several City Flouring Mill and Burlington Woolen Mill structures along the west side of Riverside Avenue at the southwest corner of the bridge (NRHD #14).

The Sanborn maps of the area provide even greater detail. From 1889 to 1900 the structures are much like those shown in 1869 (Sanborn Map Company 1889a). Map 5 depicts the project area in 1889. The map shows the development along Main Street in Winooski, the east half of which has been replaced by the current roundabout. Of particular note are the structures located at either side of the north end of the bridge, including the Stevens Hotel and associated outbuildings on the east and an Engine House on the west.

In Burlington, the Burlington Flouring Company buildings (NRHD #14) continue to be present and the early configuration of the Burlington Cotton Mills buildings is present (now the Chase Mill area; NRHD #1). NRHD #20 is shown as a tenement building with a small residence and two sheds to the east. No structure is depicted on the lot at the point of the intersection of Riverside and Colchester Avenues (460 Colchester Avenue) or on the south side of Barrett Street where #17 and 21 Barrett is located.

From 1906 to 1926 a few structures were added or modified. In Winooski, the 1926 Sanborn map shows the Stevens Hotel has become the Brunswick Hotel and a tenement building has been added adjacent to the river. The Engine House has been removed. South of the river has been added the current 1892 Chase Mill building (NRHD #1), an addition to NRHD #20 and the presence of the structure at 460 Colchester Avenue (Map 6). In addition, a no longer extant structure labeled garage has been added between NRHD #15 and 20.

The Burlington Flouring Company buildings were still standing in 1926 and were labeled Johnson Grain Company. But they were removed in 1928 after having been heavily damaged by the 1927 flood (Visser and Larson 1993).



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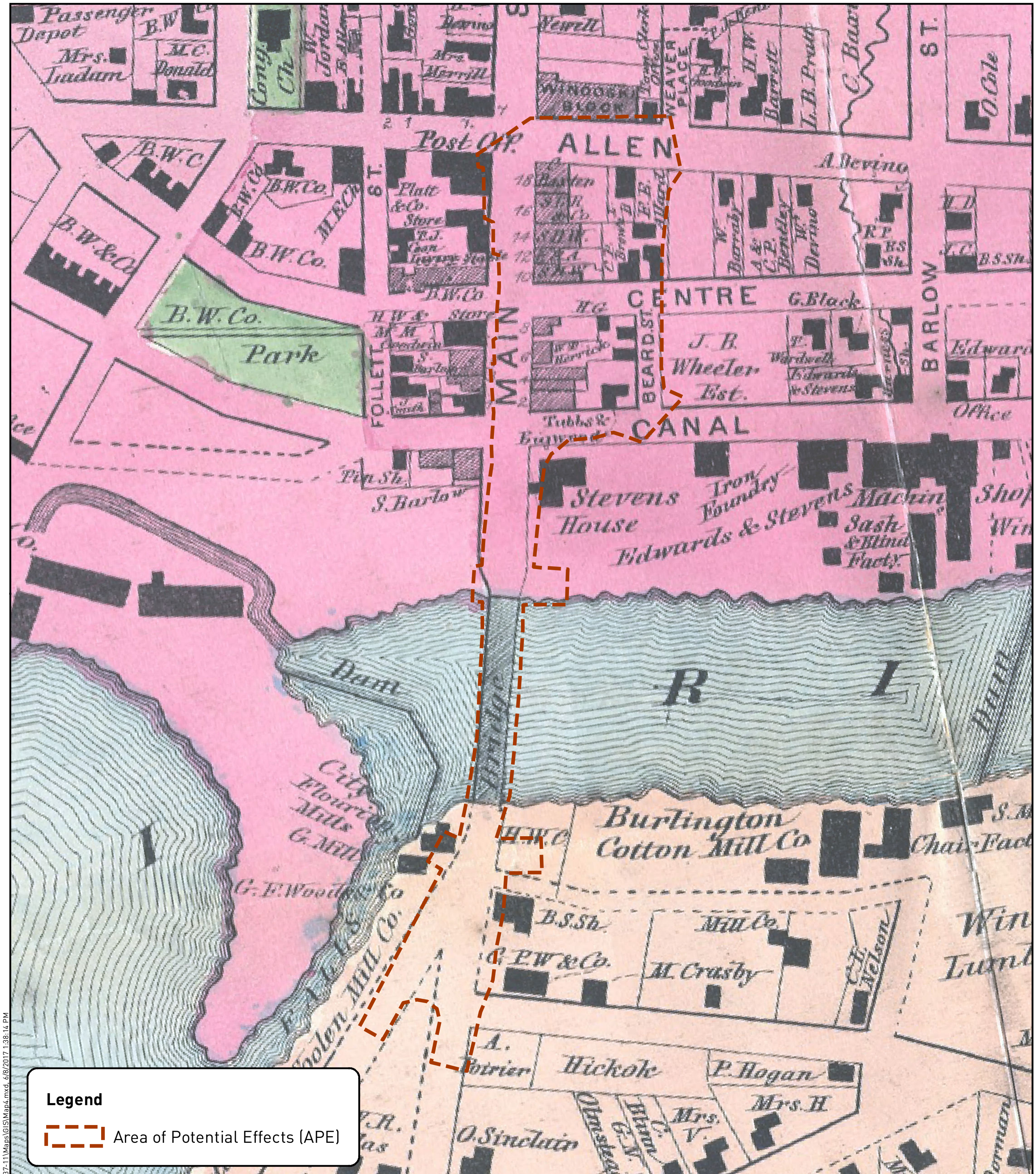


N

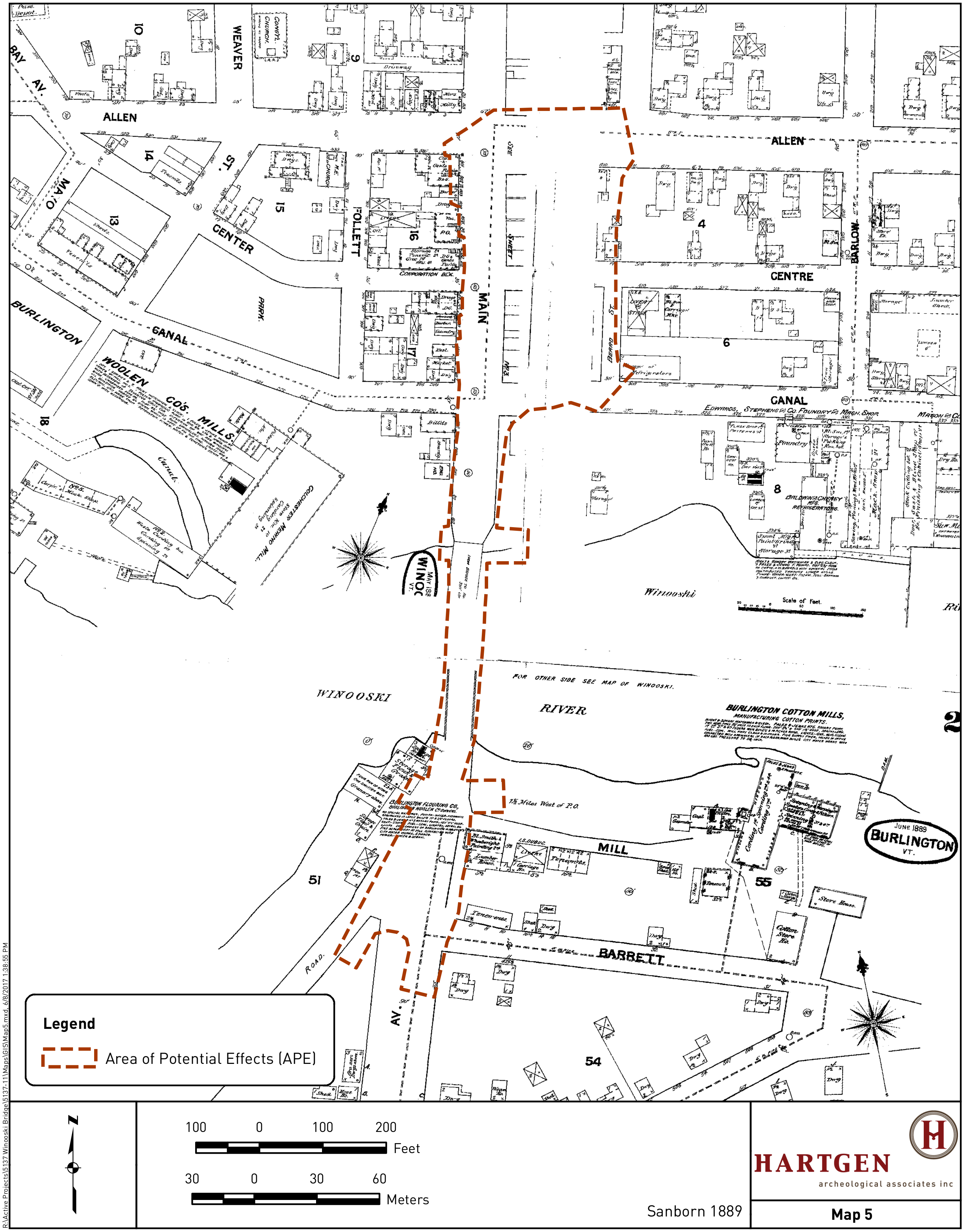
100	0	100	200	Feet

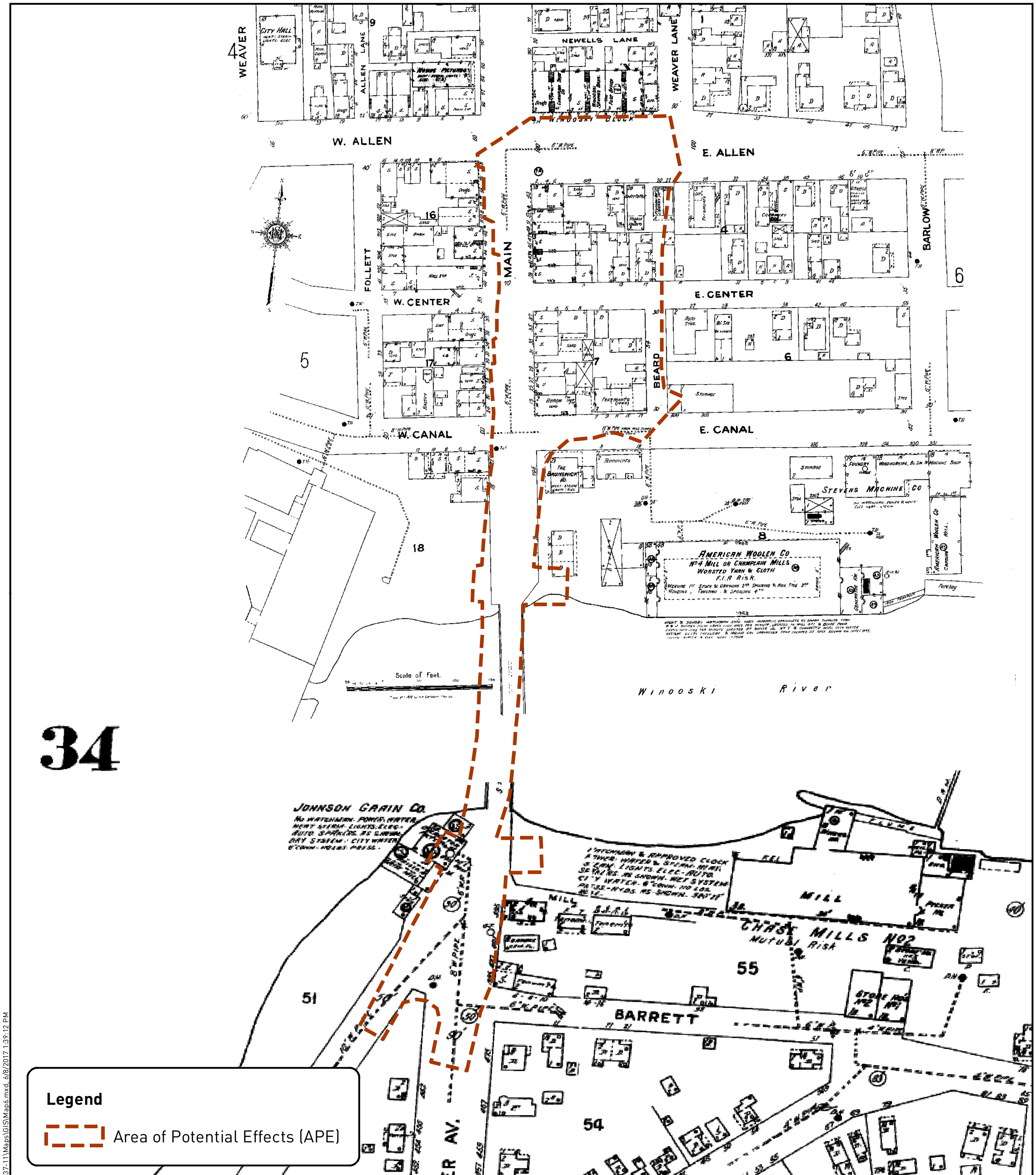
30	0	30	60	Meters

Beers 1869

HARTGEN archeological associates inc

Map 4


BAY AV.
ALLEN
MAYO
WEAVER
ST.
CENTER
PARK.
FOLLETT
CORPORATION BLK.
MAIN
STREET
BURLINGTON
CANAL
WOOLEN COS. MILLS
Canal
COLCHESTER MERINO MILL
CENTRE
BARLOW
BEARD ST.
EDWARDS, STEPHENS & Co. FOUNDRY & MACH. SHOP
BALDWIN & CHENEY MFG. REFRIGERATORS
Winooski
Scale of Feet
WINOOSKI
RIVER
FOR OTHER SIDE SEE MAP OF WINOOSKI.
BURLINGTON COTTON MILLS, MANUFACTURING COTTON PRINTS.
BURLINGTON FLOURING CO.
1½ Miles West of P.O.
MILL
BARRETT
ROAD
AV.
JUNE 1889 BURLINGTON VT.
Store House.
Cotton Store Ho.
Legend
Area of Potential Effects (APE)
100 0 100 200 Feet
30 0 30 60 Meters
Sanborn 1889
HARTGEN archeological associates inc
Map 5



100 0 100 200 Feet

30 0 30 60 Meters

Sanborn 1926

HARTGEN
archeological associates inc

Map 6

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6 Archeological Discussion

6.1 Precontact Archeological Sensitivity Assessment

Completion of the VDHP Environmental Predictive Model provides a measure of the precontact archeological sensitivity of the project area (Appendix 1). The Project Area is sensitive for proximity to the Winooski River, the falls in the river and the adjacent delta deposits on either side of the river. Points were also added for the Project Area being on a natural travel corridor, at a special environmental location and in an area with many known precontact sites. The score was reduced due to disturbance from historic residential, commercial and industrial development. The Project Area has a score of 76. A score of 32 and above is considered to indicate precontact sensitivity.

6.2 Historic Archeological Sensitivity Assessment

The historic sensitivity of an area is based primarily on proximity to previously documented historic archeological sites, map-documented structures, or other documented historical activities (e.g. battlefields).

The historic sensitivity of the project area can include deposits and features dating from the beginning of European settlement in the area c. 1772 to 20th-century deposits and features associated with the industrial development of the area. Ira Allen and Remember Baker reportedly built a timber blockhouse within approximately 130 feet (40 m) east of the northeast corner of the bridge (Child 1882:185). In 1786, Allen constructed a dam across the river and sawmills at either end (Boyd and Brevoort 1978:8-1). At the southwest corner of the bridge is an archeological site listed as contributing to the National Regsiter Winooki Falls Historic District, that originally housed a grist mill c. 1823 and served multiple industrial uses until it was heavily damaged in the 1927 flood and subsequently demolished (Visser and Larson 1993).

Elsewhere around the APE historic sensitivity could relate to the various residential, commercial and industrial developments that have taken place in the area, both north and south of the bridge.

6.3 Archeological Potential

Archeological potential is the likelihood of locating intact archeological remains within an area. The consideration of archeological potential takes into account subsequent uses of an area and the affect those uses would likely have on archeological remains.

The archeological potential of the project is limited due to the extensive disturbance of the APE. Project work involving existing sidewalks in front of the buildings along Colchester Avenue, Main Street and East Allen Street are unlikely to encounter undisturbed soils beneath the existing disturbance. Outside of the limits of the current streets and sidewalks, however, are areas of archeological potential that include the early 19th-century Burlington Flouring Company Grist Mill Site at the southwest corner of the bridge (Photo 3), the former site of a 19th-century Engine House that was once located at the northwest corner of the bridge (Photo 4) and between Structures 20 and 21 where a carriage house from 1894 to 1906, a shed from 1912 to 1919 and a garage in 1926, are depicted on the Sanborn maps (Photo 5).

6.4 Archeological Recommendations

If the project APE remains within the limits of the existing road and sidewalks, no further archeological review is recommended. If areas outside of the existing sidewalks are to be disturbed, particularly those locations identified above, further archeological review may be warranted.

Photo 3. Location of the former Burlington Flouring Company grist mill (contributing to the Winooski Falls Historic District). View to the south/southwest.

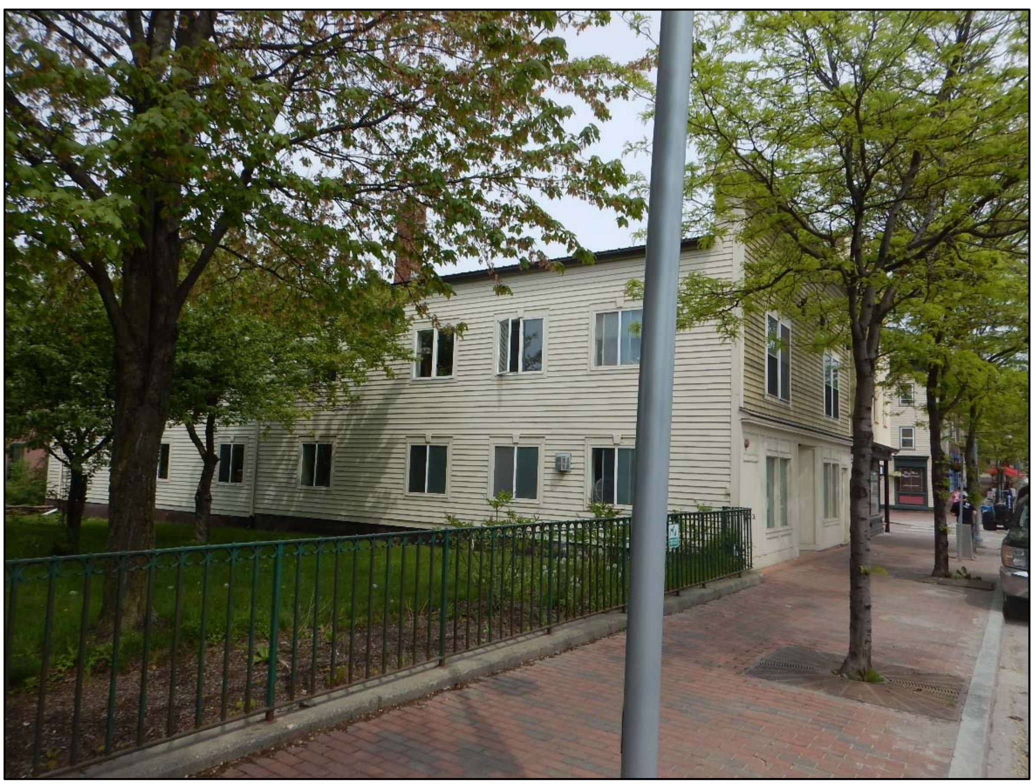

Photo 4. Lawn are is the former site of the Engine House depicted on the late 1889 Sanborn map. View to the northwest.

Photo 5. Overgrown area between Structures 20 and 21 that once contained a carriage house from 1894 to 1906, a shed from 1912 to 1919 and a garage in 1926, as depicted on the Sanborn maps. View to the east.

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Appendix 1: VDHP Environmental Predictive Model

VERMONT DIVISION FOR HISTORIC PRESERVATION

Environmental Predictive Model for Locating Pre-contact Archaeological Sites

Project Name **County** **Town**
DHP No. **Map No.** **Staff Init.** **Date**

Additional Information

Environmental Variable	Proximity	Value	Assigned Score
A. RIVERS and STREAMS (EXISTING or RELICT):			
1) Distance to River or Permanent Stream (measured from top of bank)	0- 90 m 90- 180 m	12 6	
2) Distance to Intermittent Stream	0- 90 m 90-180 m	8 4	
3) Confluence of River/River or River/Stream	0-90 m 90 –180 m	12 6	
4) Confluence of Intermittent Streams	0 – 90 m 90 – 180 m	8 4	
5) Falls or Rapids	0 – 90 m 90 – 180 m	8 4	
6) Head of Draw	0 – 90 m 90 – 180 m	8 4	
7) Major Floodplain/Alluvial Terrace		32	
8) Knoll or swamp island		32	
9) Stable Riverine Island		32	
B. LAKES and PONDS (EXISTING or RELICT):			
10) Distance to Pond or Lake	0- 90 m 90 -180 m	12 6	
11) Confluence of River or Stream	0-90 m 90 –180 m	12 6	
12) Lake Cove/Peninsula/Head of Bay		12	
C. WETLANDS:			
13) Distance to Wetland (wetland > one acre in size)	0- 90 m 90 -180 m	12 6	
14) Knoll or swamp island		32	
D. VALLEY EDGE and GLACIAL LAND FORMS:			
15) High elevated landform such as Knoll Top/Ridge Crest/ Promontory		12	
16) Valley edge features such as Kame/Outwash Terrace**		12	

17) Marine/Lake Delta Complex** 18) Champlain Sea or Glacial Lake Shore Line**		12 32	
E. OTHER ENVIRONMENTAL FACTORS: 19) Caves /Rockshelters 20) [ ] Natural Travel Corridor [ ] Sole or important access to another drainage [ ] Drainage divide 21) Existing or Relict Spring 22) Potential or Apparent Prehistoric Quarry for stone procurement 23)) Special Environmental or Natural Area, such as Milton acquifer, mountain top, etc. (these may be historic or prehistoric sacred or traditional site locations and prehistoric site types as well)	 0 – 90 m 90 – 180 m 0 – 180 m	 32 12 8 4 32 32	
F. OTHER HIGH SENSITIVITY FACTORS: 24) High Likelihood of Burials 25) High Recorded Site Density 26) High likelihood of containing significant site based on recorded or archival data or oral tradition		 32 32 32	
G. NEGATIVE FACTORS: 27) Excessive Slope (>15%) or Steep Erosional Slope (>20) 28) Previously disturbed land as evaluated by a qualified archeological professional or engineer based on coring, earlier as-built plans, or obvious surface evidence (such as a gravel pit)		 - 32 - 32	

**** refer to 1970 Surficial Geological Map of Vermont**

Total Score:

Other Comments :

0- 31 = Archeologically Non- Sensitive
32+ = Archeologically Sensitive

APPENDIX B

HISTORIC RESOURCES IDENTIFICATION

WINOOSKI BRIDGE PROJECT

CITIES OF BURLINGTON AND WINOOSKI, CHITTENDEN COUNTY, VERMONT

HARTGEN
archeological associates inc
www.hartgen.com

Historic Resources Identification, Winooski Bridge Project, Cities of Burlington and Winooski, Chittenden County, Vermont

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September 2017

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INTRODUCTION

Hartgen Archeological Associates, Inc. (Hartgen) conducted an historic resources identification survey for the proposed Winooski Bridge Project located in the cities of Burlington and Winooski, in Chittenden County, Vermont. A site visit was conducted by Walter R. Wheeler and Roberta S. Jeracka on 7 September 2016 and by Tom R. Jamison on 24 May 2017. Information gathered during these site visits is included in the relevant sections of this report.

PROJECT LOCATION AND DESCRIPTION

The project is located at the boundary between the City of Burlington and the City of Winooski, where the Winooski Bridge crosses the Winooski River. In addition to the bridge, the project extends north and south into both cities.

Description of the Project

Several different alternatives are being considered for the Winooski Bridge:

- No Build
- Bridge Rehabilitation (retain existing typical section)
- Bridge Superstructure Replacement with Substructure Widening
- Bridge Replacement (a total of three different replacement alternatives)

The project is also expected to include repaving and minor earthwork to the north and south of the bridge, within currently paved streets, as well as potential work in the area of the existing sidewalks. Temporary and permanent easements may be established at each end of the bridge, depicted as small bump outs at each corner of the bridge on Map 2. Final project plans are not presently available.

Description of the Area of Potential Effects (APE)

The area of potential effects (APE) includes all portions of the property that will be directly or indirectly altered by the proposed undertaking. The APE includes the following (Map 2):

The bridge – approximately 128 meters (420 ft) in length
Burlington roads – approximately 90 meters (295 ft)
Winooski roads – approximately 178 meters (583 ft)
Temporary and permanent easements – 8,000 square feet (743 sq m)

Total APE encompasses approximately 3.42 acres (1.39 ha).

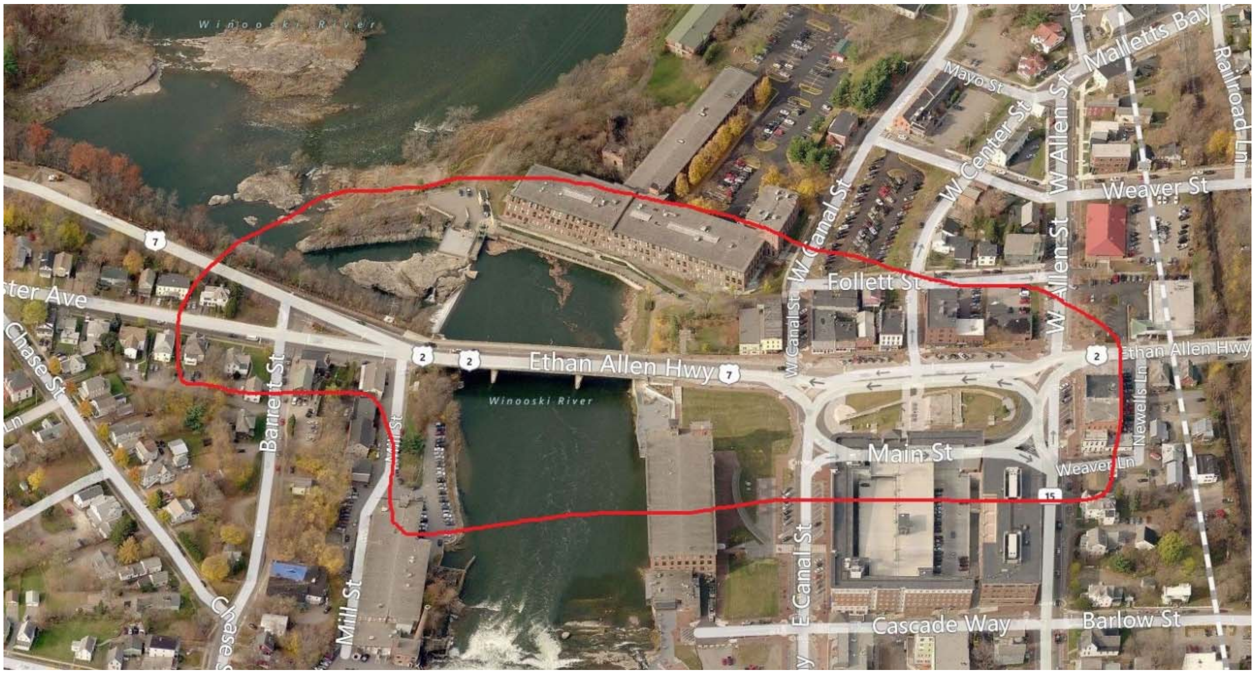

Figure 1. The study area (slightly larger than the project area—see Map 2) roughly outlined on aerial imagery.

HISTORICAL BACKGROUND

The falls of the Winooski River have been an important site for human habitation and activity from the pre-European contact period through to the present. Historically, the falls were the locus of an 18th-century settlement by Ira Allen and others, where a fort was built on the Winooski side in 1772 (Rann 1886:555). During the Revolution the settlement was abandoned. After the war, Allen returned and with his brothers Ethan and Levi, they started the Onion River Company at the falls and reportedly built the upper dam, two saw mills, a grist mill, two forges and a furnace for smelting bog iron (Rann 1886:555; Visser and Larson 1993). Much of the lands and business interests on the Burlington side of the falls had been transferred to Moses Catlin (a relative by marriage to Ira Allen) by the end of the 18th century, due to business failures. Catlin and his brothers Lynde and Guy constructed a grist and wool-carding mill on the site of the present Chase mill building. Additional manufacturing concerns, including a distillery, paper mill, patent oil mill, and cut nail manufactory, located in the neighborhood during the first decades of the 19th century (Visser and Larson 1993).

Figure 2. ***Winooski Falls near Burlington*****, Drawing, 1840. Project area, including the covered bridge over the Winooski River, is seen at right center in this view (www.uvm.edu).**

Development of mill sites occurred simultaneously on both sides of the Winooski River, and the two fledgling communities which grew up around these industrialized sites were connected from an early date by a covered bridge (Figure 2). In 1849, the two communities were collectively known as "Winooski City" and were described at that time as "situated on both sides of the Winooski River…about two miles from the village of Burlington"(Hayward 1849: 38).

The near-total absence of institutional structures—a small schoolhouse was located on Chase Street but there were no churches or public buildings located on the Burlington side of the river—and the fact that the neighborhood was separated from the rest of the City of Burlington by steep changes in topography and the early presence of a cemetery (Greenmount Cemetery), supports the affirmation that the residents on the south side of the river were socially and economically affiliated with their neighbors to the north in Winooski.

During the course of the 19th century textile mills came to dominate the local economy (Boyd and Brevoort 1978). In 1849 the largest was the Burlington Company, which had grown from its establishment in 1836 to an enterprise employing 450 people producing annually 600,000 pounds of wool fabrics of different grades on 16 sets of looms. A number of other mills had been established by that date, including two woolen mills, a cotton mill, two saw mills, a grist mill and an "extensive" flour mill (Hayward 1849: 38). This trend continued into the latter 19th century, with the "cotton famine" of the 1860s resulting in a dramatic expansion of the textile mills on both sides of the river. Earlier industries including flour and plaster milling became less profitable, contemporaneously with the expansion of the cotton textile industry.

As a densely-occupied industrial zone, the project area is well documented on historic maps. On the Burlington side of the project area, Hill Street, Barrett Street, Chase Street and Chase Lane were all established by 1857, as were principal north-south roads Colchester and Riverside avenues (Walling 1857). Grove Street was established but no houses had been constructed on it at that time. Houses were initially concentrated along Chase Street and Colchester Avenue, closest to the mills; during the course of the 19th century a series of short streets were established off of these principal public ways. Similarly, the core of the Winooski street grid had already been established by the mid-19th century.

Large numbers of French Canadian and Irish workers settled in the area to take advantage of the employment opportunities presented by the mills, and a large Catholic church (St. Francis Xavier) was constructed on the Winooski side of the river to serve their spiritual needs in the 1870s. An iron bridge was built over the Winooski River, replacing the earlier covered wood span, in the 1880s. Continuing success brought construction of newer, larger and more modern mill facilities, including the Chase mill (1892, Figure 3).

Figure 3. The Chase Mill, looking east, 2016.

The presence of these thriving industries resulted in the construction of dwellings, retail shops and mixed-used buildings in close proximity to the mills, including structures which were built by manufacturers as tenements for their workers. Although some housing was constructed by mill owners (Figure 45), the greater number of dwellings appear to have been built by individuals, or as rental properties by private owners. The earliest dwellings were typically wood-frame vernacular cottages (Figure 47). Although most of the earliest of these structures are now gone, many remain which date to the mid-19th to the early 20th centuries (Figures 46 and 48). Houses constructed later in the 19th century occasionally partook of historicist styles popular during that period, and generally reflect the prosperity of the locale through their increased size and pretention (Figures 50 and 51). On the Winooski side of the river, development was decidedly of a denser character, and included a number of multistory wood or brick masonry mixed-use buildings which filled their lots. The urban character that developed on the Winooski side of the river was a direct reflection of higher land values in close proximity to the principal employers of the community.

The mill industry continued to thrive into the 1920s, when the dual disasters of the 1927 flood and 1929 stock market crash put an end to its long period of success. The flood resulted in the destruction of the two dams located on the river, destroyed the Winooski bridge, and extensively damaged the mills (Visser and Larson 1993). The crash of 1929 resulted in a changing business environment, which, together with the cheap availability of air conditioning, sent much of America's textile businesses to the south. The last major mill concern, the American Woolen Company, closed in 1954. The Urban Renewal program destroyed a significant portion of downtown Winooski, leaving a large surface parking lot in its wake.

Beginning in the 1980s some of the former industrial buildings were converted into commercial, office or residential purposes. These ventures were only partially successful, however the adoption of the "Winooski Downtown Redevelopment Project" in 2004 has resulted in the renovation of other buildings in downtown Winooski, and in the construction of a parking garage and new office and residential structures, chiefly in the areas cleared by Urban Renewal (Vermont 2017).

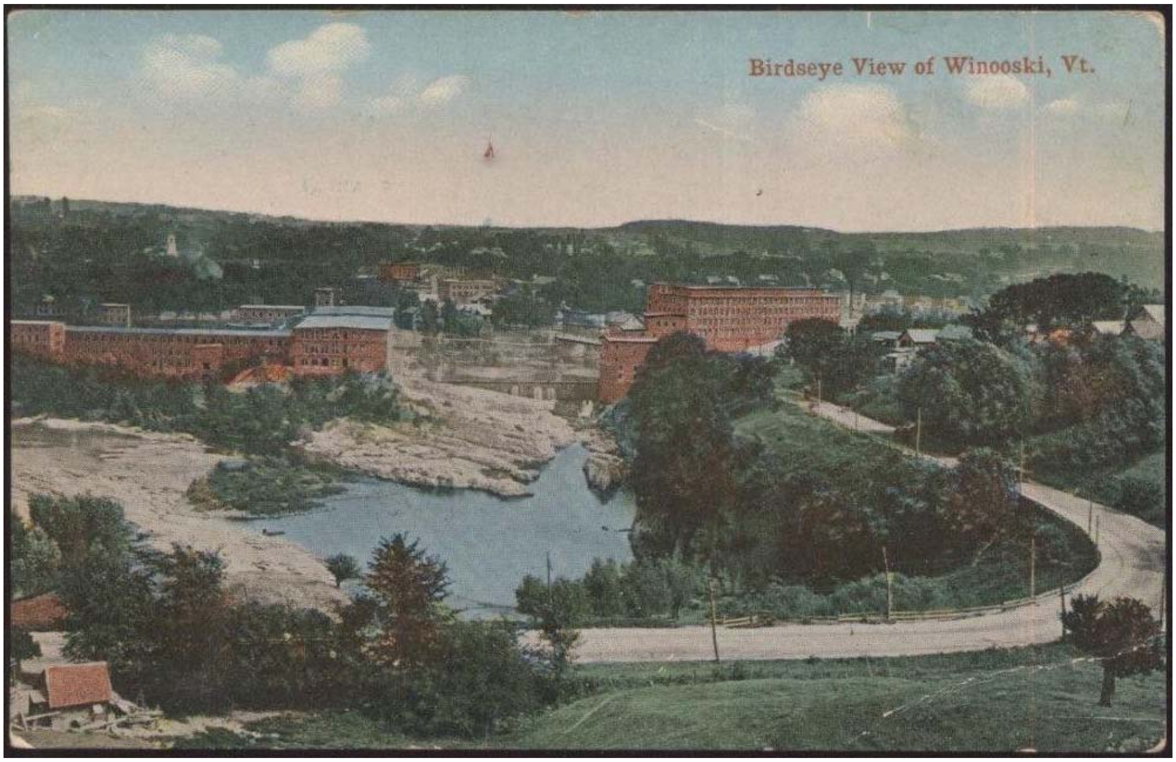

Figure 4. View taken from the same location as that in Figure 2, c. 1915. The project area is at right. Road winding along right and at bottom of this image is Riverside Avenue, formerly Winooski Road (Private Collection).

Figure 5. Winooski Bridge destroyed in 1927 flood. A portion of the now-razed Burlington Flouring Company mill is seen at left in this view toward Winooski (Private Collection).

Figure 6. View south on Colchester Avenue, 1 September 1929 (McAllister photograph, http://www.uvm.edu/~hp206/2005oldnorthend/Innamorati/pair10.html).

Figure 7. Looking north on Colchester Avenue, c. 1930 (http://www.uvm.edu/~hp206/2005oldnorthend/Innamorati/pair6.html).

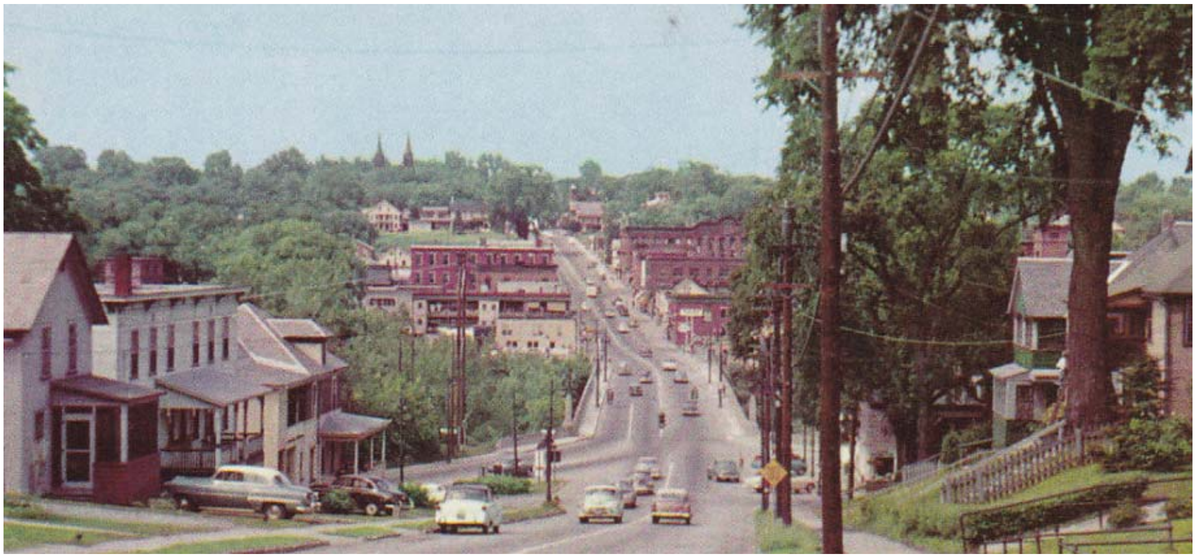

Figure 8. Looking north on Colchester Avenue, c. 1960 (www.delcampe.net) .

STREETSCAPE VIEWS

Figure 9. A similar view, looking north, 2016.

Figure 10. Looking south-southeast from the south end of the Winooski Bridge up Colchester and Riverside avenues, 2016.

Figure 11. Looking south-southwest from the northeast corner of Barret Street and Colchester Avenue, 2016.

Figure 12. View looking north, from a site near the north abutment of the bridge (May 2017).

Figure 13. View northwest from Winooski Falls Way (May 2017).

ARCHITECTURAL DESCRIPTIONS

Structure 1. Burlington-Winooski Bridge (NRL)

Figure 14. 4 August 1928 opening day of the bridge. (http://cashmanhistory.com/showmedia.php?mediaID=25964&medialinkID=61637 accessed 27 September 2016).

The Winooski Bridge is a poured concrete and steel deck plate girder bridge, constructed in 1928 (Figures 14 thru 17). It replaced an earlier span located along the same alignment, which was destroyed during flooding in 1927. The deck of the present bridge is at a higher elevation; fill at the south approach necessitated the removal of some structures, and resulted in the partial burial of 495-97 Colchester Avenue (Figures 41 and 42).

A contemporary newspaper article provides a description of the span:

> "The contract for the erection of a reinforced concrete ridge [sic] which now crosses the Winooski river near the lime kilns and is known as the "high bridge," has been awarded to James E. Cashman. The bridge is to be 278 feet in length and 20 feet wide on the inside. The entire structure will be of cement construction and will be 76 feet above the river. This height is necessary in order to have the bridge clear the railroad track at the

> proper elevation, for an overhead pass is to be a part of the work. The historic old structure now spanning the river was erected at least 100 years ago and did duty until it was condemned, within a few months…. The new bridge is to be a handsome affair, according to the specifications, and will be something of an attraction for sightseers, on account of its height above the river. The arch upon which it is to be supported across the river will have a span of 93 feet. Mr. Cashman will put a large force of men on the work at once, as the time set for its completion is October next." (http://cashmanhistory.com/showmedia.php?mediaID=25972&medialinkID=61645 accessed 27 September 2016).

The bridge remains essentially as originally constructed, except for the replacement of original standards with modern "cobra headed" lamps, noted in the National Register nomination for the boundary expansion of the Winooski Falls Mill Historic District (Visser and Larson 1993). These were more recently replaced with lamps whose design is more compatible with that of the bridge.

Figure 15. Winooski Bridge, looking northwest, 2016.

Figure 16. Winooski Bridge, detail looking north showing railing and lamp standard, 2016.

Figure 17. Bridge plaque, 2016.

Structure 2. 20 West Canal Street—Colchester Mill (NRL)

The Colchester Mill is a three-story tall brick masonry structure, of rectangular plan with a shallow gable roof (Figure 18). It was completed in 1880 as a factory for producing merino goods. In 1902 the building received an addition at its south end, 150 feet in length and spanning a raceway. It was originally a component in the Colchester Millyard, a complex of structures initially constructed c. 1860 (Boyd and Brevoort 1978). At the time the National Register nomination for the Winooski Falls Mill District was completed in 1979, this structure had 20-pane double-hung sash; today these have been replaced with two-over-two sash. Corbelled brick stringcourses indicate each floor level on the otherwise unadorned facades whose closely-spaced windows maximize natural light to the interior. The portion of the building completed in 1880 is 21 bays in width; the 1902 addition is 18 bays wide. Large concrete buttresses have been added to the south gable end wall in an effort to stabilize that part of the building. The slightly banked site results in the northern end of the building having only two stories of brick superstructure, the lower floor at that end of the building is rendered in fieldstone.

Attached to the west is the Winooski Worsted Mill, built in 1895 and incorporating portions of an earlier mill from c. 1860 (Boyd and Brevoort 1978). It is a brick masonry building of rectangular plan with shallow gable roof, three stories in height and 35-bays in width along its greater length. The end wall is four bays in width. Bays on all elevations are articulated by slightly projecting pilasters placed at regular intervals. In most cases the resulting bays contain vertical ranges of two-over-two double-hung sash, however, in some instances—an example being the gable end wall—one of the bays is without fenestration. As with the 1902 addition, concrete buttresses have been added to stabilize a portion of the south wall of this portion of the building.

Both portions of the Colchester Mill complex have heavy timber internal frames; that of the Worsted Mill is supplemented by a system of metal tie-rods.

A two-story brick masonry office building with four story entrance tower is attached to the north end of the 1880 mill. It is detailed to match that structure, although its double-hung sash are narrower than those used in the mill. The office building has a shallow gable roof; the tower a flat roof. The banked site results in the building being three stories in height at its south end. An arched entrance gives access to the complex from West Canal Street, which is today occupied by a health club and professional offices.

Figure 18. The Colchester Mill, looking west-northwest, 2017.

Structure 3. 8 Main Street

Described as an "intrusion" on the Winooski Falls Mill District National Register nomination form in 1978, this structure appears to have been constructed after 1926 (Figure 19). A two-story wood-frame store previously occupied the site and was constructed between 1869 and 1889; it is possible that the present building is a remodeling of that structure, if so its relationship to the street was altered at that time among other significant changes to its form (Boyd and Brevoort 1978).

A two-story wood-framed mixed-used building of rectangular plan, it has a single-sloped, or shed, roof concealed behind a parapet wall on the street elevation. The exterior is sheathed with clapboards; window surrounds have moulded surrounds with applied keystones, which appear to be a recent addition to the building. The building is two broad bays in width on the Main Street face; the south elevation has four bays of similar dimension. A two-story addition, of identical design to the earlier portion of the structure although about a foot shorter in height, extends from the west end. It is also four broad bays in width.

The first floor of the Main Street elevation is remodeled to evoke a storefront, and contains paired double-hung sash and a recessed entrance, together with an entrance to the second floor of the building all set within a paneled surround. A secondary cornice extends across the façade at the second floor level. Unlike the windows on the side elevation, which have sliding two-part sash, those on the second floor of the street elevation consist of paired double-hung windows. These are in line with the windows of the first floor. An entablature consisting of a bracketed cornice with dentils extends the width of the Main Street elevation.

Figure 19. 8 Main Street, looking northwest, 2017.

Structure 4. 22 Main Street (NRL)

A three-story brick masonry building of three stories with a flat roof, and of rectangular plan (Figure 20). Originally built c. 1845 as a 2 ½ story Greek Revival commercial block with a gable facing Main Street, the third floor was added c. 1890. In 1889 this structure was occupied as a billiards hall (Map 5).

The first floor is largely given over to three storefronts; one of which extends across much of the Main Street elevation, and wraps around the corner to the West Canal Street elevation. Two smaller storefront with recessed entrances are located on the West Canal Street façade. All are detailed similarly, with large plate glass windows with leaded transoms over paneled knee walls flanking entries. The storefronts are surmounted by simple neoclassical cornices.

Windows of the upper floors have jack arches and are set within a wall laid in common bond. Throughout, windows have been replaced with sliding two-part sash which are set into reduced openings. An entablature and cornice are formed by corbeled brick. A stepped parapet wall caps the Main Street elevation.

This building was listed on the National Register in 1978 as part of the Winooski Falls Mill Historic District.

Figure 20. View looking west-southwest at 22 Main Street, 2016.

Structure 5. 24 Main Street (VSR)

A three-story wood-frame mixed-use building, constructed in the early 1880s, this structure is rectangular in plan and has a flat roof (Map 5). When it was built, the city of Winooski was experiencing great growth due to the success of the mill industries. A three-bay addition was constructed in 1950, with an entrance on West Canal Street. The Moose Creek Collective restored the building in the late 1970s (Page 1979).

The building is four irregularly-spaced bays in width on its Main Street elevation; openings are irregularly-spaced on the West Canal Street elevation, which could be loosely described as six bays in width. The building is faced with clapboards and has an entablature with paired bracketed cornice extending along the length of both street elevations. Window are typically double-hung undivided sash; several of these are paired on the West Canal Street elevation.

Alterations undertaken subsequent to 1979 included a redesign of the storefront on the Main Street elevation, and addition of two smaller storefronts on the West Canal Street face of the building. Today a storefront with paneled bases, plate glass windows and a recessed entrance extends across the Main Street elevation; the cornice seen in the 1979 photograph (Figure 21) appears to have been retained, and was replicated for new storefronts inserted on the West Canal Street elevation, and which also replicate the details used in the design of the new Main Street shop front (Figure 22).

This building was listed on the Vermont State Register in 1993 as 24-26 Main Street.

Figure 21. View looking northwest of 24 Main Street in 1979 (Page 1979).

Figure 22. View looking northwest at 24 Main Street, 2017.

Structure 6. 28 Main Street—Sneakers Bistro—John Trono Block (VSR)

A two-story brick masonry building with shed, or single-sloped roof, and rectangular in plan (Figures 23 and 24). Brick of the Main Street elevation is laid up in modified common bond. Slightly projecting pilasters are located at each end of the street façade. A row of soldier course brick serves as a subtle cornice and incorporates two vents with decorative grilles above the end bay windows. A plaque declaring the owner's name and date of construction is located in the stepped parapet wall surmounting the building.

A storefront with paneled base extends across the façade; it is of simple design and lacks a cornice. This storefront replaced the original treatment after 1979 (Figures 23 and 24).

The second floor of the Main Street elevation is three bays in width; end bays have paired sash. Originally windows throughout were double-hung sash, with six-over-one divisions; while the window of the central bay survives, the end bay windows have been replaced with a combination of casements and undivided double-hung sash.

This building was constructed for John Trono in 1938. Trono owned a bakery on West Canal Street, and appears to have constructed this building as an investment property. It was listed on the Vermont State Register in 1993.

Figure 23. View looking west of 28 Main Street in 1979 (Page 1979).

Figure 24. View looking west of 28 Main Street, 2017.

Structure 7. 30 Main Street—The Monkey House (VSR)

A three-story wood-frame mixed-use building of rectangular plan with a gable roof. The gable is hidden behind a parapet wall which widens at the base of the third floor to cover the cornice of the side walls of the building. These step-outs are visually supported by scrolled brackets; paired brackets with turned drops support the moulded cornice atop the Main Street elevation. The building is sheathed with narrow clapboards on its principal and secondary elevations.

This building was constructed in the third quarter of the 19th century, possibly c. 1880. It was built during a period of rapid development of downtown Winooski, and reflected the success of the local mill industry. A one-story, one-bay storefront was added in the early 20th century to the north side of the building. This wood-frame addition has a flat roof. Its storefront, now filled with an anodized metal frame with two doors, is surmounted by a broad frieze of diagonal boards set within panels surmounted by a moulded cornice.

Since 1979 this structure has undergone alterations to its fenestration and first floor storefronts. Formerly the storefront had a recessed entrance; today that entrance has been filled with an anodized aluminum vestibule, and the flanking plate glass windows have been replaced by groups of six windows set within an anodized aluminum frame. Second and third floor windows, formerly two-over-two double-hung sash, were initially replaced with casement windows having false divided lights; most of these have, since 2012, been replaced with undivided double-hung sash (Figures 24 and 25).

In 1979 this structure was identified as 30-32 Main Street. It was listed on the Vermont State Register in 1993.

Figure 25. View looking west-northwest at 30 Main Street, 1979 (Page 1979).

Structure 8. 36-38 Main Street—Our House Bistro and Mule Bar (VSR)

A three-story brick masonry block constructed c. 1880 at the height of Winooski's commercial success (Figures 26 and 27). This structure presents a four bay wide façade on Main Street, above a pair of storefronts at the first floor level. The southern of the two storefronts was constructed after 1979; the other, occupying the corner, appears to date to the early 20th century and includes a recessed corner entrance and transomed plate glass display windows over paneled bases. The upper floors of the Main Street elevation are vertically subdivided by recessed panels, each of which contains two bays of fenestration, and extend from the second to the third floors. Windows on each of the elevations have corbelled brick arched lintels and consist of two-over-two double-hung sash. A deep entablature with moulded cornice supported on paired brackets caps all faces of the building except the west elevation.

Figure 26. 36-38 Main Street, looking west-northwest, in 1979 (Page 1979).

Figure 27. 36-38 Main Street, looking southwest, 2017.

Structure 9. 40 Main Street—Optum

A four-story brick masonry mixed-use building, having retail stores on the first floor (Figure 28). This structure was built c. 1990 and replaces a late-19th Vermont State Register-listed building of similar size which formerly occupied the site. Fenestration and bay widths are irregularly spaced; the design of the elevations of this building take their inspiration from the nearby 36-38 Main Street, which features an elevation with recessed panels similar to those used on both the Main Street and West Center Street elevations of this building. Windows are two-over one double-hung sash, a number of which are conjoined in pairs.

Figure 28. 40 Main Street, looking west-northwest, 2017.

Structure 10. 46 Main Street—Misery Loves Company (VSR)

According to the inventory form prepared for this building in 1979

> This commercial block terminates the streetscape of commercial structures on lower Main St. Originally built in the post-Civil War economic boom, it housed the Winooski Post Office in the late 19th century. The present façade was added c. 1910, in an attempt to "modernize" the building. The interior appointments, including ornate pressed metal ceilings, wood display cases, and a turn-of-the century cash register, date from a 1921 renovation (Page 1979).

Occupation of this building by the post office continued until at least 1889 (Map 5). By 1926 it was occupied by two stores at the first floor level (Map 6).

A three-story brick masonry building, six irregularly-spaced bays in width, of rectangular plan, with a flat roof. The first floor is divided into two storefronts, separated by a door giving access to the upper floors of the building. The two storefronts are of similar design, both having recessed entrances flanked by large plate glass display windows with transoms; the southern of the two is much wider, however. A simple entablature with cornice is above the storefronts, extending uninterrupted across the entire length of the façade.

The upper floors have undivided double-hung sash set within segmentally-arched openings in irregularly-spaced bays. The spacing of the bays may reflect aspects of the internal arrangement; the lack of windows above the upper floor's entry door may be an indication of a hallway in that part of the building, for example. A corbelled brick cornice extends the full width of the façade and is supported at its ends by corbeled brackets (Figures 29 and 30).

This building was listed on the Vermont State Register in 1993.

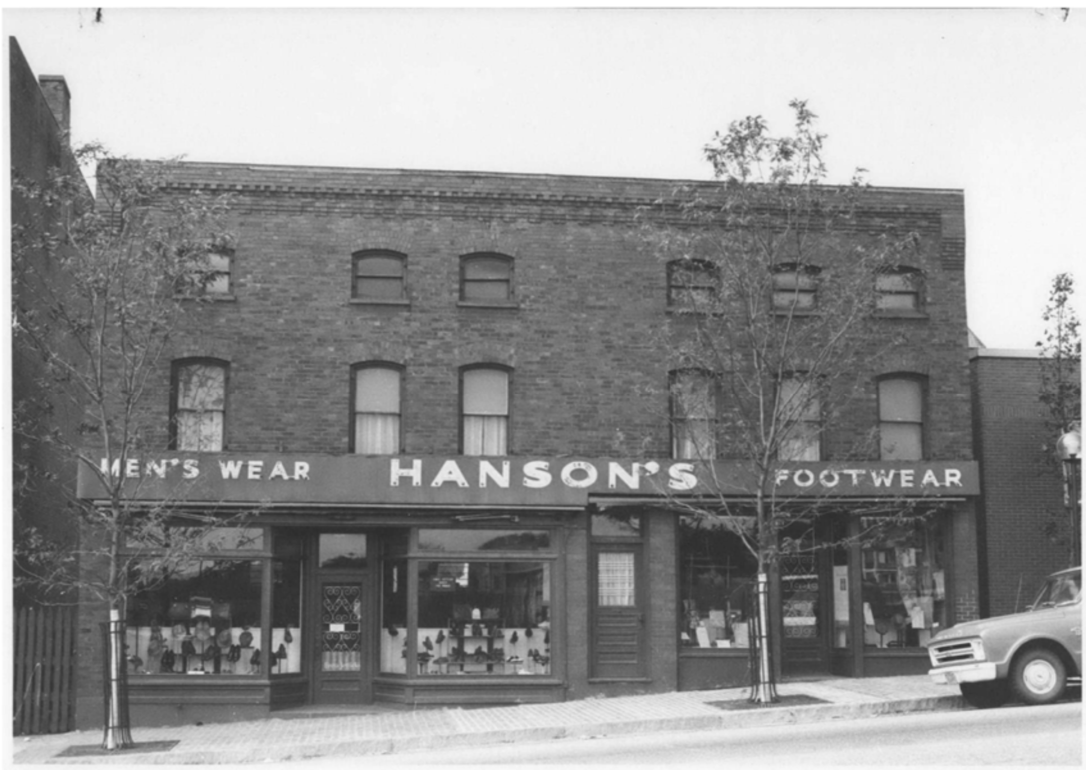

Figure 29. 46 Main Street in 1979, looking west (Page 1979).

Figure 30. View looking northwest at 46 Main Street, 2017.

Structure 11. 50 Main Street—U. S. Post Office

A one-story brick masonry building of rectangular plan on a poured concrete foundation, with a flat roof (Figure 31). Orange-red brick was used on the two street elevations which feature an irregular pattern of single and paired double-hung undivided aluminum sash. Entrance is at the north end of the Main Street elevation, and is inset within a corbelled surround. The building lacks ornamental detail; the common bond brick of the façade is relieved only by the use of a soldier course of brick directly above the window openings. This building was constructed c. 1970.

Figure 31. View looking southwest at 50 Main Street, 2017.

Structure 12. 70 Main Street—former Key Bank

A one-story bank building, comprised of a rectangular concrete block commercial structure remodeled by the addition of a shed-roofed drive-through pavilion with standing-seam copper roof and monitor (Figure 32). Large areas of dark glass extend the scale of the drive-through into the body of the building, which is otherwise without ornament. Modifications to its current form occurred c. 1985.

Figure 32. View looking northwest at 70 Main Street, 2017.

Structure 13. 1-17 East Allen Street—the Winooski Block (NRL)

Built in 1867, the Winooski Block is a brick masonry mixed-use building, 18-bays wide on its East Allen Street elevation and six bays deep (Figures 33 and 34). It has a flat roof with a number of interior chimneys. It contains several businesses, above which are more than 20 apartments.

The Winooski Block is notable for its Italianate detailing, including an elaborate bracketed cornice and window hoods, and its first floor storefronts, which have been restored. The National Register nomination form for this structure contains a detailed description of the exterior:

> The Block is outstanding for its ornamental detail in a variety of materials. Most distinctive is the bracketed wooden cornice which crowns the East Allen Street facade with a partial return on the east and west elevations. This cornice runs horizontally along the outer thirds of the facade, then curves and steps up to twice its original height. It levels off again, until, above the two central bays of the facade, both sides curve up and meet to form a half circle. A pair of inverted brick buttresses give additional support to this raised

> and elaborated section of the cornice. Within the space formed by the rise of the cornice, "Winooski 1867 Block" appears in large wooden letters. Directly above the date and within the central arch of the cornice is an eagle with a body over five feet tall, carved from a single piece of wood.
>
> The highly sculptural quality of the boldly projecting ornate cornice is reflected in the cast iron sills and caps which adorn each of the windows on the East Allen and Main Street elevations. The caps reflect the overall composition of the cornice as well; a semi-circular arch rises from the center of a dentilated horizontal bar which is supported by brackets on either side. The Block's fifty pairs of caps and sills were manufactured at the Edwards and Stevens Foundry on Fast Canal Street and represented the single most costly item of construction for the building. Like the wooden cornice, they project far enough from the surface plane of the building to create a play of light and shadow upon it.
>
> The windows which these cast iron units frame are quite elongated and serve to counteract the strong horizontal form of the building. Those windows on the eastern half of the principal, East Allen Street facade, are triple hung; those on the western half are double hung.

Designed by Warren Thayer and built by Frank Peppin and Peter Villemere, this structure was individually listed on the National Register in 1974 (Roomet 1974). The storefronts were restored more than 30 years ago.

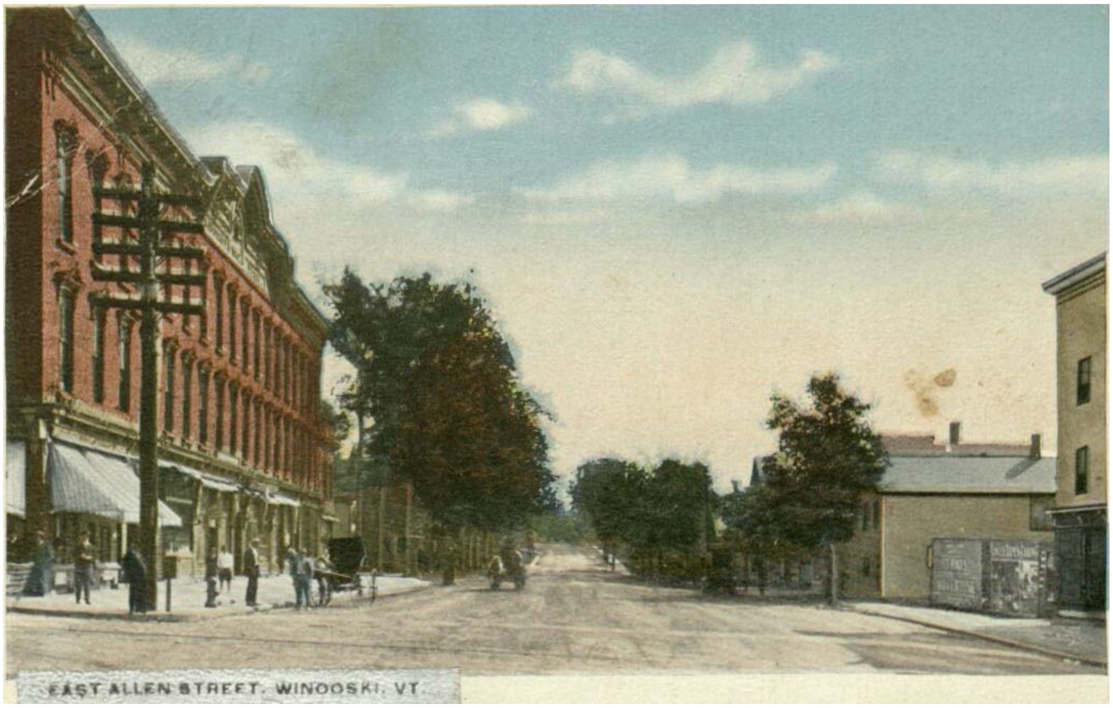

Figure 33. View east on East Allen Street, c. 1905 (postcard view, private collection).

Figure 34. The Winooski Block, looking northeast, 2017.

Structure 14. 19 East Allen Street—McKee's Pub

A two-story brick masonry building, two bays in width on East Allen Street, and four bays wide along its Weaver Lane face (Figure 35). The first floor is largely occupied by a retail store, the storefront of which faces East Allen Street and is comprised of paneled doors with transoms flanking a large central opening filled with a later anodized aluminum frame holding a combination of metal panels and fixed plate glass. An entablature with moulded cornice extends across the width of the East Allen Street façade above this storefront, and returns along the Weaver Lane face of the building. Two pairs of undivided double-hung windows light the second floor on this elevation.

The Weaver Lane elevation is four bays in width, each bay occupied by an undivided double-hung sash. Windows throughout have brick jack arches and stone sills. Both street elevations are capped with a bold cornice with modillions and dentils, above which is a plain brick parapet wall. A one-story concrete block wing with flat roof, apparently housing the kitchen for the present commercial tenant, is attached to the north face of the building.

The building appears in close to its present form in a c. 1905 postcard view (Figure 33).

Figure 35. View looking northwest at 19 East Allen Street, 2017.

Structure 15. 27 East Allen Street—TD Bank

A one-story brick-faced bank structure, rectangular in plan, and occupying a poured concrete foundation (Figure 36). The building's hipped roof has broad eaves which are supported on thin brackets. This roof appears to be a later addition, and probably replaces a flat roof; the International Style evidenced by the proportions, detailing and placement of the seven vertically attenuated plate glass windows and metal-framed entrance suggest that this is the case. This small branch bank, now occupied by TD Bank, was constructed c. 1975.

Figure 36. View looking northeast at 27 East Allen Street, 2017.

Structure 16. 10 East Allen Street—Vermont Student Assistance Corporation

A four-story brick veneer office building of rectangular plan with a flat roof, this structure was completed c. 2006 and was built to house the offices of the Vermont Student Assistance Corporation, which currently has over 400 employees (Figure 37). The building was built by PC Construction Company (formerly Pizzagalli Construction), of South Burlington, VT. Construction of this building took place in conjunction with the West Block Housing and West Block Parking Garage projects, as part of the Winooski Downtown

Redevelopment project. It was constructed on a site that had remained undeveloped since having been cleared under the Urban Renewal program.

Figure 37. View looking southeast at 10 East Allen Street, 2017.

Structure 17. 38 Main Street and 25 Winooski Falls Way—Spinner Place and Winooski Parking Garage

Constructed 2004-06, this brick and stucco veneered structure is six stories in height and is C-shaped in plan, wrapping around a multi-deck parking garage at the center of the block (Figure 38). Both were constructed as part of the Winooski Downtown Redevelopment project. The first floor is given over to commercial spaces, entrances to the parking garage, and to the upper floors of the building. Student apartments, marketed to University of Vermont students but also occupied by students of Champlain College in Burlington, are located in the upper floors.

Figure 38. View northwest of 38 Main Street and 25 Winooski Falls Way (Google streetview imagery, April 2012).

Structure 18. Rotary Park

WagnerHodgson, landscape architects, designed this park as part of their work as landscape consultants on the master plan for revitalizing downtown Winooski generated by Truex Cullins & Partners of Burlington in 2002. This project was part of a $175 million dollar initiative broadly named the Winooski Downtown Redevelopment project, which included proposals for new mixed-used construction in downtown, in addition to this park.

The park incorporates a long curved stone wall as a unifying feature, connecting a series of stepped or sloped planted areas and a central paved plaza with stone retaining wall containing a water feature (Figure 39).

Figure 39. View looking north-northwest toward Rotary Park, 2017.

Structure 19. 20 Winooski Falls Way—Champlain Mill (NRL)

The Champlain Mill is a four-story brick masonry industrial building 28 bays (280 feet) long on its north and south faces and approximately 100 feet wide across the eight bays of its east and west end walls (Figure 40). The building has a nearly-flat gabled roof. A monitor, lit on north and south faces by a continuous range of windows was an original feature of the building and was removed in 1980.

A circulation tower is located in the northwest corner of the building. It contains a staircase, and a secondary entrance, and extends one story taller than the remainder of the building. Its north and west faces have pilasters with corbelled tops which engage corbelled cornices. A second tower, rising two stories above the body of the building, is located above the middle of the west elevation. It has a corbelled cornice above a projecting corbelled stringcourse. It appears that this feature of the building was constructed at a later date; it is not evident in a photograph taken in 1927 (Figure 5). It was extant, however, when the National Register nomination form for the Winooski Falls Mill Historic District was completed in 1978.

The majority of the windows in the building were described in the nomination form as

> set within segmental arches. Each window is centrally divided by a heavy mullion and each has a transom bar approximately one-third of the distance from the top. Each window thus contains a total of 42 panes. Basement windows on the river façade are shortened due to the foundation, and consist of only the 12 panes above the transom bar (Boyd and Brevoort 1978).

The present windows, installed in 2011, follow the general design of the originals but have only 36 divisions; the lower portions are tilt-out casements having 12 lights. The principal entrance is in the fifth bay from the east end of the north elevation. A two-story wing of square plan and with a flat roof, constructed in the later 20th century, is attached to the east end of the building.

The Champlain Mill was constructed in 1912. It remained operational until 1954, closing as a result of declining Defense Department orders, foreign competition and other factors. It was subsequently rented by small manufacturing concerns and as a storage facility before being taken by the Urban Renewal Program in 1972.

Renovated in 1980, the building became the site of an urban mall, containing restaurants, shops, and office space. The Mill Museum was established in the building in 1998. Many tenants had left by 2000 and in 2011 the building was purchased by My Web Grocer, and underwent a renovation which included the installation of replacement windows (Mill History 2017).

Figure 40. View looking southeast at the Champlain Mill, 2017.

Structure 20. 495-97 Colchester Avenue (NRL)

Identified in the boundary increase nomination form for the Winooski Falls Historic District as the "Duncan Blacksmith Shop" with initial construction date as c. 1841.

As originally built, this structure was a gable-entry commercial building of two-and-a-half stories in height. Visser and Larson provide a history of the building's use up to the early 20th century:

> "The building was originally constructed as a store between 1841 and 1846 to serve the rapidly expanding manufacturing and commercial center developing around Winooski Falls. From 1851 to 1882, the building was a forge and blacksmith shop operated by Albert and George Duncan. In 1883, the shop was purchased by I. S. Dubuc, who continued to use the building as a blacksmith and wheelwright shop with a painting shop on the second floor. By 1889, Dubuc had expanded his operations and built lumber drying sheds, which were connected with a carriage house to the south and a livery next door. Insurance maps indicate the building was used to sell second hand goods from 1894 until about 1912, when Dubuc converted the building into a grocery store" (Visser and Larson 1993).

Alterations to the topography undertaken to create an approach to the Winooski Bridge in 1928 buried the first floor of this structure, reducing its exterior height to one-and-a-half stories (Figure 41). During 2014-16 the present owner undertook a project to jack up the upper floor of the structure, disassemble the buried first floor of this building, construct a new foundation extending up to the present elevation of Colchester Avenue, and insert a new first floor between the two (Figure 42). The goal has been to return the building essentially to its appearance and relationship to the surrounding topography as it was in the 19th century. To this end, the fenestration pattern of the original first floor has been replicated in the remodeled building, and the original materials have been used wherever possible. This work is now complete (Figure 43).

In its present configuration, the building is a two-and-one-half story brick-veneered concrete and block masonry (at the basement and first floor levels, respectively) and wood frame (at the second floor level) gable-entry vernacular commercial building. The building is three bays wide on its Colchester Avenue face; the central bay contains a loading door at the second floor level. The Mill Street elevation is five bays wide at the second floor level; first floor fenestration is irregularly spaced, and consists of four windows and a double-door entry.

The south elevation was not visible at the time of the site visit due to construction activity; in 1993 it was described as "composed of a second story at street level with four unevenly spaced windows separating entrances near each end. The facade is screened by a two story, four bay, shed-roofed porch, which was added between 1894 and 1900 and features turned Tuscan columns rising from its second story railing. An additional bay supported by a manufactured, wrought iron post was more recently added to the west end, allowing access to the street. Covered storage areas sheathed with wooden shingles were added on the porch's first story, between which rise two sets of wooden stairs" (Visser and Larson 1993). It is likely that the configuration of the porch (which was partially visible at the time of the site visit) has been modified somewhat by the recent alterations undertaken to the building. The east elevation, which previously had porches attached to it, has two windows at each floor level, and an entry at the basement level.

In place of display windows visible in 20th century photographs of the Colchester Avenue elevation (Figure 41), a central door flanked by single windows has been installed in the new first floor. These windows are double-hung 6-over-six sash; the remainder of the windows in the building are also double-hung, but are 2-over-2 sash. Divisions of the interior created to convert the building into apartments have been removed, leaving an open plan. It is anticipated that the building will be used for commercial purposes and office space.

Figure 41. View looking east, showing 495-97 Colchester Avenue previous to 1927.

Figure 42. Lifting the second floor of 495-97 Colchester Avenue, c. 2015. View looking southwest.

Figure 43. View looking southeast at 495-97 Colchester Avenue, 2016.

Structure 21. 485 Colchester Avenue/ 8-10 Barrett Street (NRL)

Visser and Larson provided a comprehensive description of this building and its evolution in their National Register nomination for a boundary increase to the Winooski Falls Mill Historic District, which is extensively quoted, below. They identified the structure as the "Hickock-Burlington Cotton Company Tenement Building" (Visser and Larson 1993).

Visser and Larson found that components of this three-part structure were built as early as 1811, with additions in 1853. The westernmost portion of the building, along Colchester Avenue, was constructed in 1924 and was subsequently razed in 1993 (Sanborn 1926; Visser and Larson 1993). They described the building and its history as follows:

> The two-story-high main block is sheathed with wooden clapboards and covered by a slate-shingled, gable roof. On the main block's east side, a 2-story, clapboarded wing extends along Barrett Street and is covered by a slated gable roof whose ridgeline is perpendicular to the ridgeline of the main block's roof. …The exterior appearance of the main block and east wing has changed little since 1853, when the main block's southern half was removed to allow space for the construction of Barrett Street and the building was converted into a tenement. The original structure sits on a high foundation built of local limestone and poured concrete on the south and east and nearly a full story of concrete blocks on the north. The main block and east wing's north and south facades contain six unevenly spaced bays and its east facade contains three bays. The building's 2/2 windows with their plain trim and simple projecting caps date from the 1853 renovations when the east wing was raised to two stories and the entire building received new wooden clapboards, windows and cornice trim. The only windows not dating from this period are a boarded over window in the attic's north gable…and two second-story windows above the west addition, which were filled with small, fixed-sash windows in 1924. The building's cornice and gable trim feature wide sloping soffits without gable returns, which are typical of mid-19th century vernacular buildings in the area.…The Hickock-Burlington Cotton Company Tenement Building is probably one of the oldest surviving buildings at Winooski Falls. The structure was originally constructed to serve as a store for Reuben Harmon in 1811. Although Harmon lost the store to creditors less than seven months after it opened, the building continued to serve as a store and tavern during the early commercial development of Winooski Falls. By the 1830s, the building had come under the ownership of Burlington merchant Oziah Buell, who rented it out as a tavern, store, and dwelling. Upon Buell's death, the building was inherited by his daughter, Maria Buell Hickock, who with her husband, Merchant's Bank president Henry Hickock, converted the building into a tenement after moving the southern half of the main block next door to allow for the construction of Barrett Street in 1853. In 1866, the Burlington Woolen Company acquired the building for worker housing, and it served as a multi-family tenement through the 1960s. The most notable change to the building after 1866 was the construction in 1924 of the west addition, which housed a fruit and grocery store until the early 1960s. Significant alterations to the addition in 1961 made it

noncontributing and this part was demolished in 1993. The building was in the process of being rehabilitated in 1993 (Visser and Larson 1993).

Rehabilitation in 1993 also included the removal of a gable-roofed porch, believed to have dated to the 1960s, which was located on the Barrett Street elevation. The fenestration pattern on the Barrett Street elevation was altered; three doors on this elevation were removed and replaced with windows. In place of the razed 1924 west addition, a two-story wood-framed flat-roofed structure was built. It is five bays wide on Colchester Avenue, and two bays deep along Barrett Street, and has a storefront with display windows on both elevations at the first floor level. A small bracketed cornice extends along the top of the Colchester Avenue façade (Figures 44 and 45).

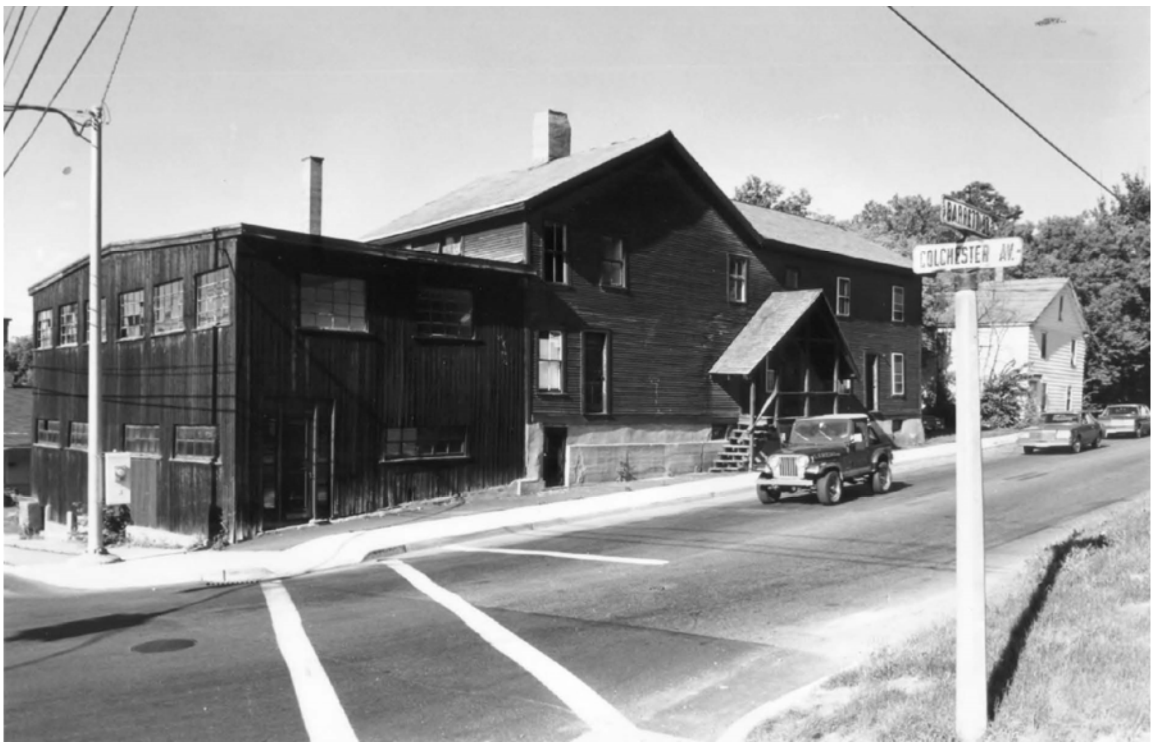

Figure 44. View looking northeast, August 1986 (Thomas D. Visser, from the 1993 National Register boundary expansion nomination form).

Figure 45. Looking northeast at 485 Colchester Avenue/ 8-10 Barrett Street, 2017.

Structure 22. 11 Barrett Street

The house at 11 Barrett Street was constructed between 1869 and 1889 (Maps 4 and 5). It is a one-and-one-half story wood-frame side-gable dwelling, three bays wide on its principal (street) elevation, with a central passage and end chimneys (Figures 46 and 47). Gable end elevations feature two windows on the first and second floors. It is covered with aluminum siding and sits on a parged stone foundation. Mapping from 1906 to 1942 depicts a one-story frame addition to this structure, which no longer stands. A door in the west elevation is probably indicative of the structure having been divided into two apartments at a more recent date, although it was initially constructed as a single-family dwelling.

Figure 46. 11 Barrett Street, looking southwest, 2017.

Figure 47. 11 Barrett Street, looking south-southeast, 2016.

Structure 23. 475 Colchester Avenue

The house at 475 Colchester Avenue first appears on mapping in 1889. Previous to that, in 1869 the lot now occupied by the house was owned by "J. Potrier" (Map 4). The house was likely constructed in the 1870s. It is a one-and-a-half story wood-frame "upright and wing" type vernacular house sheathed with aluminum siding (Figures 48 and 49). The principal sections of the house, originally constructed on a "T" plan, are covered with gable roofs. A later one-story addition, filling the northeast corner of the plan, has a shed roof. An enclosed one-story gable-roofed porch extends across the two-bay wide façade of the "upright" portion of the building; it appears to have been constructed in the 20th century. A covered porch with shed roof shelters the entrance to the "wing" portion of the house, and has a recently replaced turned baluster railing. The house occupies a stone foundation, and brick or block chimneys surmount the three gabled elevations. All windows are double-hung undivided sash.

Figure 48. Looking east-southeast at 475 Colchester Avenue, 2017.

Figure 49. Looking southwest at 475 Colchester Avenue, 2016.

Structure 24. 467 Colchester Avenue

The dwelling at 467 Colchester Avenue was constructed between 1919 and 1926. It was designated as "flats" type apartments on the Sanborn map of the latter year, its first appearance on mapping (Sanborn 1926).

The building is two stories in height, rectangular in plan with a prominent six-sided tower located at its northwest corner (Figure 50). It is banked into its site so that portions of the basement are at grade and can be occupied as an apartment. The main body of the house is covered with a hipped roof, which features a shed-roofed dormer in its southern slope. A two-story enclosed porch with gable roof is the most prominent feature of the street (west) façade. The building is currently sheathed with vinyl siding. It retains its original three-over-one double hung sash.

Figure 50. Looking east at 467 Colchester Avenue, 2016.

Structure 25. 460 Colchester Avenue

The dwelling at 460 Colchester Avenue was constructed between 1912 and 1919 (Sanborn 1912). Although it appears to have been initially constructed as a single-family dwelling, it is presently divided into apartments (Figures 51 and 52).

The house is wood-framed, and is rectangular in plan. A truncated pyramidal roof with dormers intersecting with a gable roof crowns a façade sheathed with clapboards at the first floor level and shingles on the second floor. A one-story covered porch wraps around the northeast corner of the house; its roof is supported on turned Tuscan columns. Fenestration chiefly consists of double-hung undivided sash; fixed undivided sash with a transom lights one of the rooms on the east façade, however. Late-20th century alterations include changes to the fenestration on the east façade, where two sliding sash have been installed, and on the north façade where a wide tripartite window has been inserted within the area sheltered by the porch.

Figure 51. Looking south at 460 Colchester Avenue, 2016.

Figure 52. Looking west at 460 Colchester Avenue, 2017.

NATIONAL REGISTER ELIGIBILITY SUMMARY

A total of 25 resources, located within or adjacent to the project APE, were surveyed for this study (Table 1). Six of these (structures 1, 2 and 4, and 19 thru 21 in Table 1) are already listed on the National Register as part of the Winooski Falls Mill Historic District (1978) or its boundary expansion in 1993 (Visser and Larson 1993). The Winooski Block (Structure 13) is individually listed on the National Register (1974). Five structures (5 thru 8 and 10) are listed on the Vermont State Register.

Four resources (structures 22 thru 25) would contribute to a previously identified southern expansion of the Winooski Falls Mill Historic District which would encompass not only mill structures, but the institutional, residential and commercial structures which were part of the context of the daily life of mill workers and owners (Wheeler 2016). This same approach informed the initial boundary increase of 1993. Using the same rational, an additional eight structures (structures 3, 5 thru 8, 10, 13 and 14), including those five structures already listed on the Vermont State Register and the NRL Winooski Block, could contribute to a northern expansion of the Winooski Falls Mill Historic District. A total of seven buildings or structures (structures 9, 11, 12, and 15 thru 18) are ineligible for listing on the National Register due to insufficient age.

Eligibility as part of a potential district

A previous Historic Resources Identification Report by this author (Wheeler 2016), identified a potential southern boundary increase of the Winooski Falls Mill Historic District, established in 1978 with an expansion in 1993. The distinct neighborhood consisting of Chase, Barret, Mill and Grove streets, Chase Lane and Rumsey Lane, Colchester Court and Colchester Avenue up to its intersection with Calarco Court, and the north side of Calarco Court, is an identifiable entity whose development is closely related to the development and expansion of the mills along the Winooski River and to the City of Winooski, rather than to the City of Burlington, despite its legal incorporation into the latter community. The neighborhood's location on a wide peninsula, separated from the balance of Burlington by a steep hill, emphasizes its distinct nature and serves to orient it to the north, across the Winooski River to the City of Winooski.

The houses located throughout this neighborhood were chiefly constructed during the period c. 1825-1925, with few examples built during the second quarter of the 20th century, and none later than that period. Vernacular mechanic's cottages are prevalent among the neighborhood's housing stock, and together with tenement houses, represent the earliest examples of surviving dwellings. A variety of house types and forms were constructed in the later 19th and early 20th centuries, including dwellings for middle class and more affluent families; this variety is reflected in the eleven structures surveyed for this report. The structures within this potential district expansion thus reflect dwelling types popular throughout the most successful period of the mills' operation, and represent the dwellings of those who both worked, and managed, the mills. Additional research would be necessary to verify the relationship between the occupants of specific dwellings and particular industries, but their close proximity—both temporal and spatial—to the center of industrial production on the Winooski River, is strongly suggestive of this connection.

A northern expansion of the Winooski Falls Mill Historic District would also logically take in similar residential, commercial and institutional structures located in downtown Winooski constructed up to c. 1940, which marked the end of the period of prosperity of the mill industry in the region. Such an expansion would potentially take in much of the downtown core of the City of Winooski, and include adjacent residential neighborhoods. A conservative northern boundary of such an expansion might follow the east-west course of the railroad tracks, just south of Railroad Lane; its configuration within that area would need to take into consideration the large amount of new construction that has occurred in downtown Winooski, greatly altering just about every streetscape as a result. Such a boundary expansion would, however, provide an opportunity to include some of the oldest standing structures in the city within an historic district, including the stone house at 73 East Allen Street, reputedly built in 1790.

A more extensive district would include areas as far north as Pine Street, in the northwest, and LaFountain Street in the northeast portion of the city, taking in residential neighborhoods constructed in the early 20th century. However, such a district would better constitute a separate “Winooski Historic District” and it would extend southward to be contiguous with the Winooski Falls Mill Historic District. Because of the potential extent of this district, its exact outlines have not been determined to any greater detail.

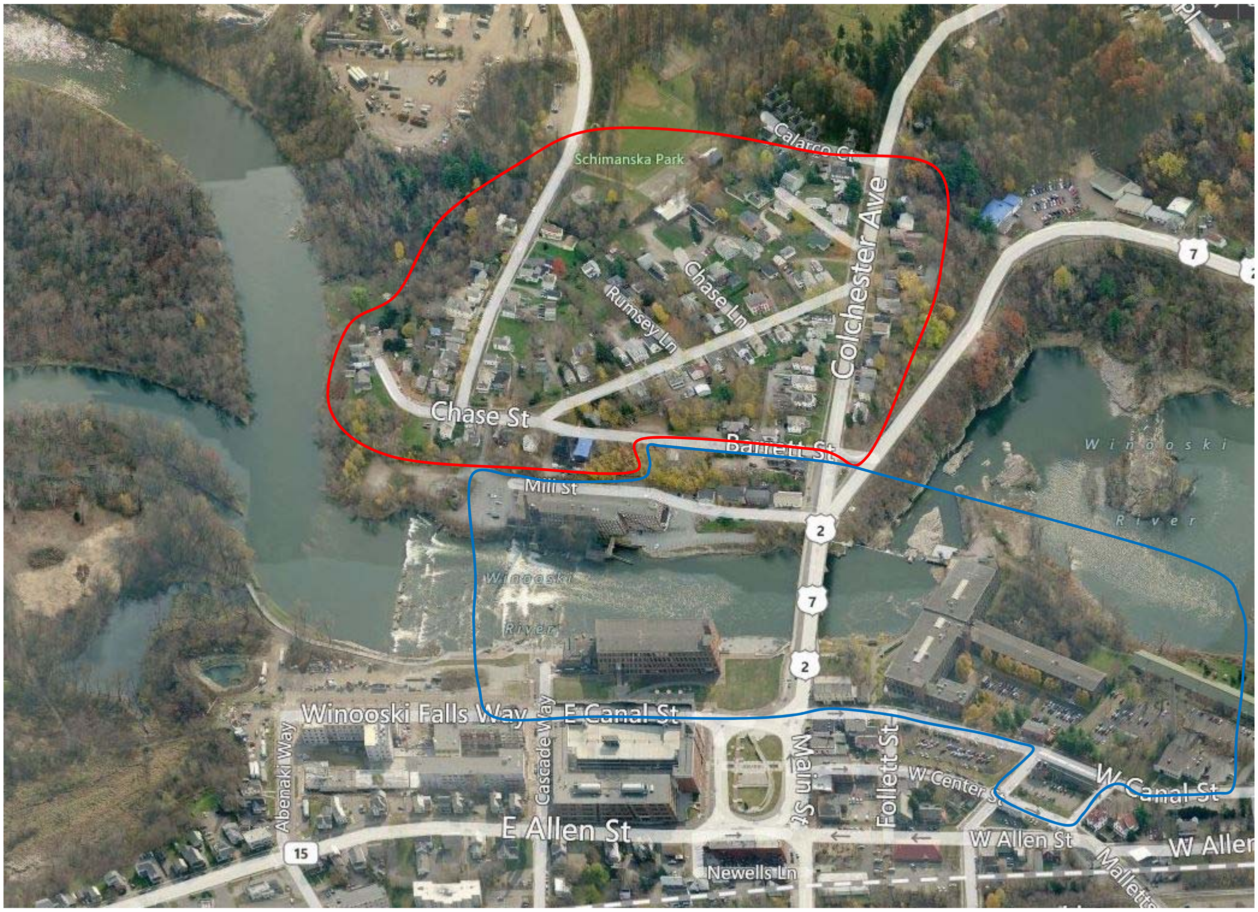

Figure 53. Aerial view looking south, showing the boundaries of a proposed expansion of the Winooski Falls Mill Historic District, in red. The southern edge of the already-listed Winooski Falls Mill Historic District is indicated with a blue outline. A potential northern expansion of the Winooski Falls Mill Historic District would encompass the parts of the city visible in the bottom of this image.

Table 1. Summary of Resources Surveyed for the Winooski Bridge Project

Building Number (see Map 2 for locations)	**Resource Address**	**Construction Date**	**Historic Use**	**Recommended National Register Listing**
1	Burlington-Winooski Bridge	1928	Vehicular and pedestrian bridge	Listed as part of the Winooski Falls Mill Historic District
2	20 West Canal Street	c. 1860, 1880, 1902	Colchester Mill	Listed as part of the Winooski Falls Mill Historic District
3	8 Main Street	c. 1930	Mixed use residential and commercial	An "intrusion" in the Winooski Falls Mill Historic District in 1978; contributing to a proposed Winooski Falls Mill Historic District expansion
4	22 Main Street	c. 1845; c. 1890	Commercial	Listed as part of the Winooski Falls Mill Historic District
5	24 Main Street	c. 1880	Mixed use residential and commercial	SRL 0418-1; contributing to a proposed Winooski Falls Mill Historic District expansion
6	28 Main Street	1938	Mixed use residential and commercial	SRL 0418-2; contributing to a proposed Winooski Falls Mill Historic District expansion
7	30 Main Street	c. 1880	Mixed use	SRL 0418-3; contributing to a proposed Winooski Falls Mill Historic District expansion
8	36-38 Main Street	c. 1880	Mixed use	SRL 0418-4; contributing to a proposed Winooski Falls Mill Historic District expansion
9	40 Main Street	c. 1990	Mixed use	Not eligible for listing on the National Register
10	46 Main Street	c. 1875	Mixed use residential and commercial	SRL 0418-6; contributing to a proposed Winooski Falls Mill Historic District expansion
11	50 Main Street	c. 1970	US Post Office	Not eligible for listing on the National Register
12	70 Main Street	c. 1985	bank	Not eligible for listing on the National Register

Building Number (see Map 2 for locations)	Resource Address	Construction Date	Historic Use	Recommended National Register Listing
13	1-17 East Allen Street	1867	Winooski Block, mixed use	NRL 1974; contributing to a proposed Winooski Falls Mill Historic District Boundary Expansion
14	19 East Allen Street	c. 1900	Mixed use residential and commercial	Contributing to a proposed Winooski Falls Mill Historic District Boundary Expansion
15	27 East Allen Street	c. 1975	bank	Not eligible for listing on the National Register
16	10 East Allen Street	c. 2006	Vermont Student Assistance Corporation office building	Not eligible for listing on the National Register
17	38 Main Street and 25 Winooski Falls Way	2004-06	Student housing and retail	Not eligible for listing on the National Register
18		2005	Rotary Park	Not eligible for listing on the National Register
19	20 Winooski Falls Way	1912	Champlain Mill	Listed as part of the Winooski Falls Mill Historic District
20	495-497 Colchester Avenue	c. 1841; 2016	Blacksmith shop	Listed as part of the Winooski Falls Mill Historic District
21	485 Colchester Avenue/ 8-10 Barrett Street	1811; 1853; 1993	Tenement housing; commercial	Listed as part of the Winooski Falls Mill Historic District
22	11 Barrett Street	c. 1875	Single family dwelling	Contributing to a previously proposed Winooski Falls Mill Historic District Boundary Expansion (Wheeler 2016)
23	475 Colchester Avenue	c. 1875	Single family dwelling	Contributing to a previously proposed Winooski Falls Mill Historic District Boundary Expansion (Wheeler 2016)
24	467 Colchester Avenue	c. 1920	Flats (apartments)	Contributing to a previously proposed Winooski Falls Mill Historic District Boundary Expansion (Wheeler 2016)

Building Number (see Map 2 for locations)	Resource Address	Construction Date	Historic Use	Recommended National Register Listing
25	460 Colchester Avenue	c. 1915	Single family dwelling	Contributing to a previously proposed Winooski Falls Mill Historic District Boundary Expansion (Wheeler 2016)

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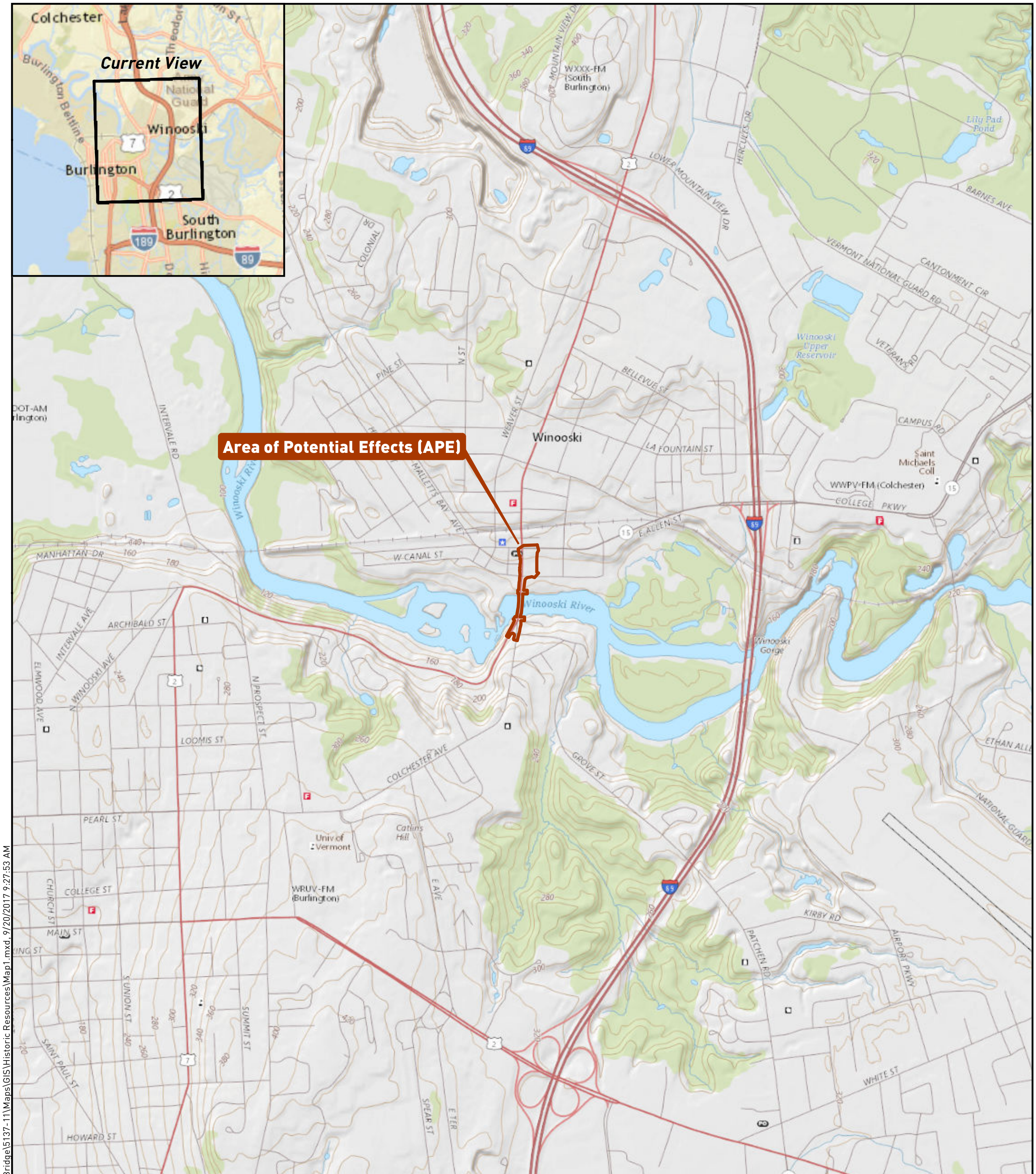

N

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Note: Contour interval is 20 feet.

Project Location (USGS 2017)

HARTGEN
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Map 1

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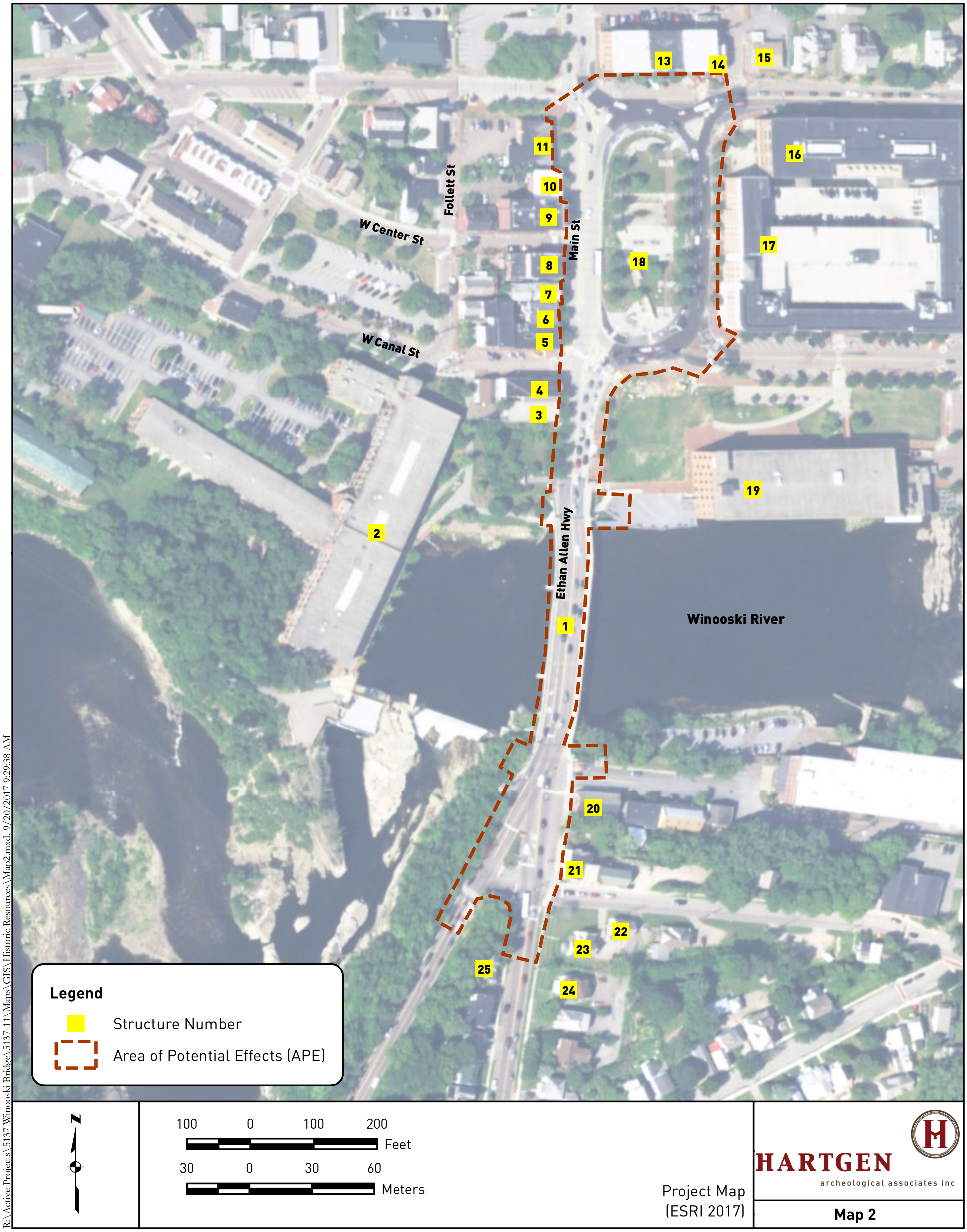

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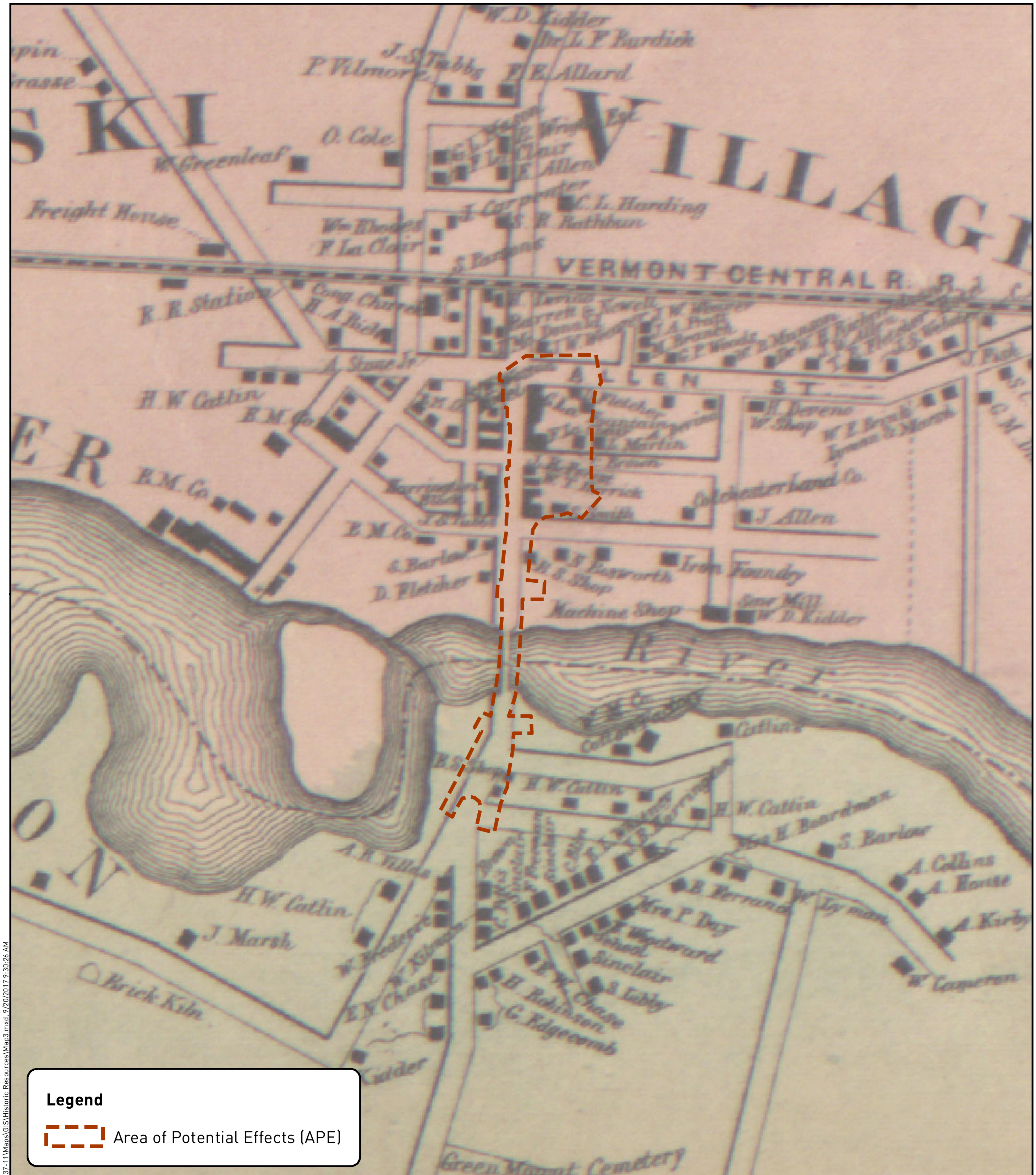

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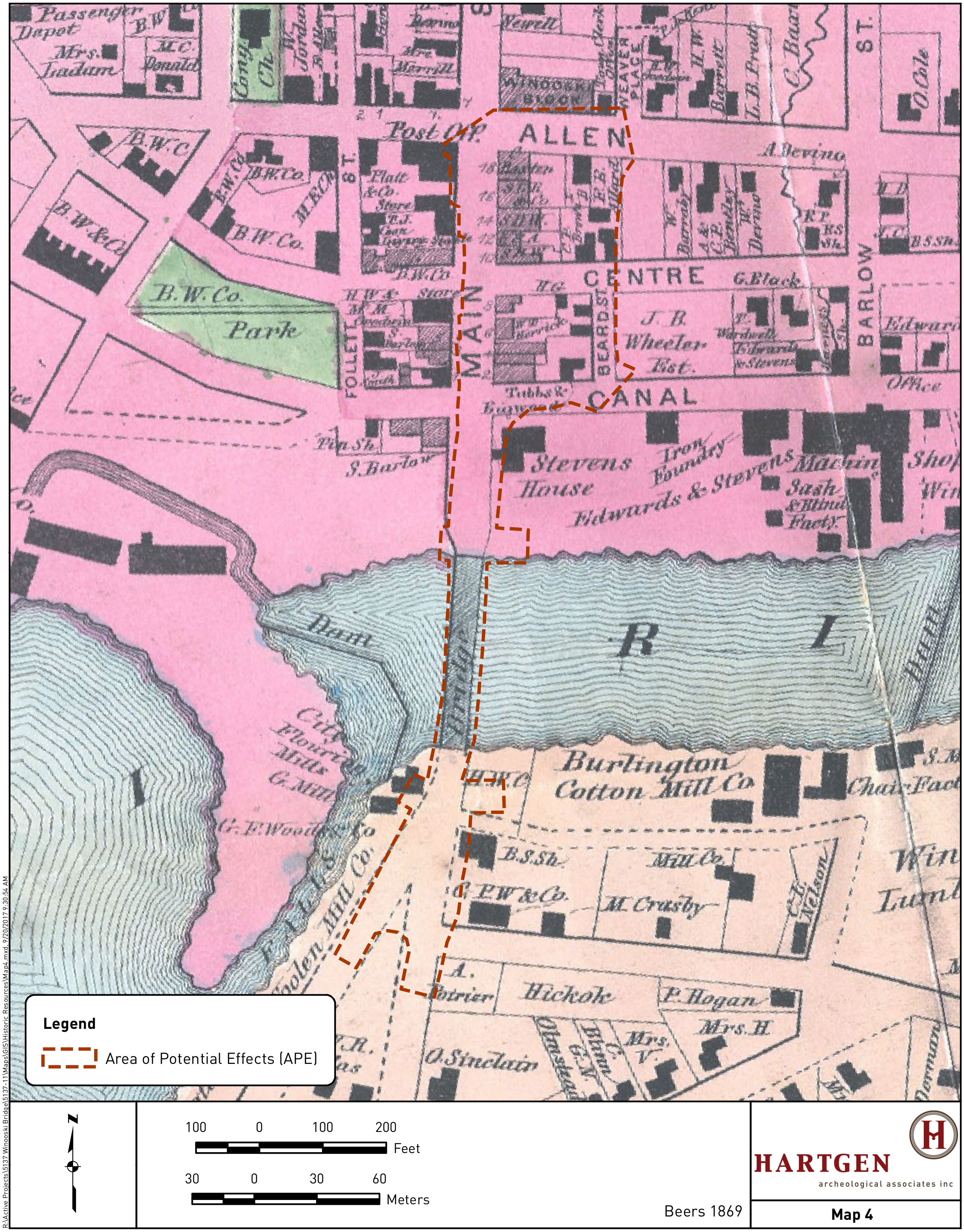
Walling 1857

HARTGEN
archeological associates inc

Map 3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Park
B. W. Co.
ALLEN
CENTRE
CANAL
MAIN
BARLOW ST.
FOLLETT ST.
BEARD ST.
WEAVER PLACE
WINOOSKI BLOCK
Post Off.
Stevens House
Iron Foundry
Edwards & Stevens
J. B. Wheeler Est.
Dam
Bridge
City Flouring Mills
Burlington Cotton Mill Co
Woolen Mill Co.
M. Crosby
Hickok
P. Hogan
O. Sinclair
Legend
Area of Potential Effects (APE)
100 0 100 200 Feet
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Beers 1869
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archeological associates inc
Map 4
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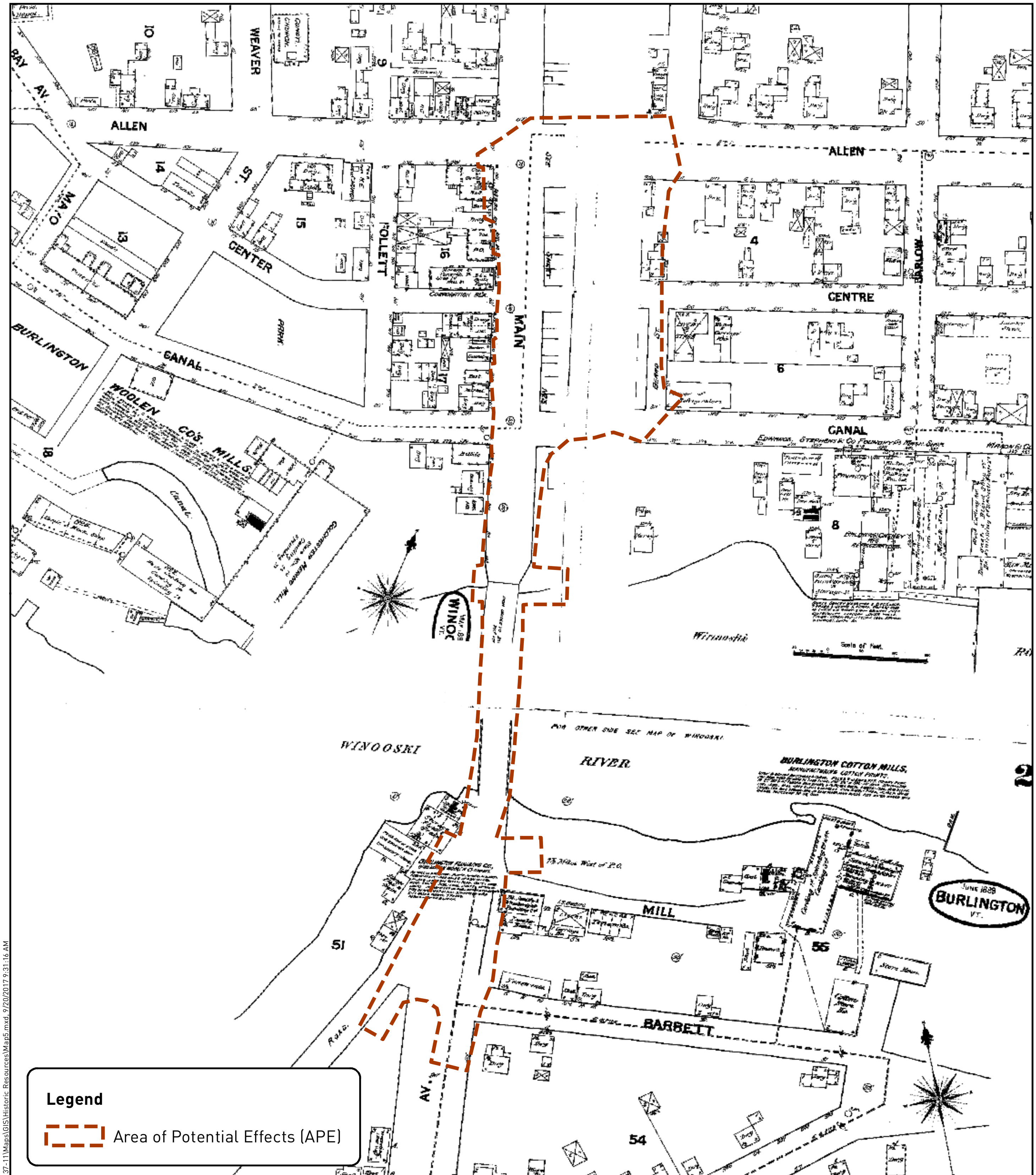

N

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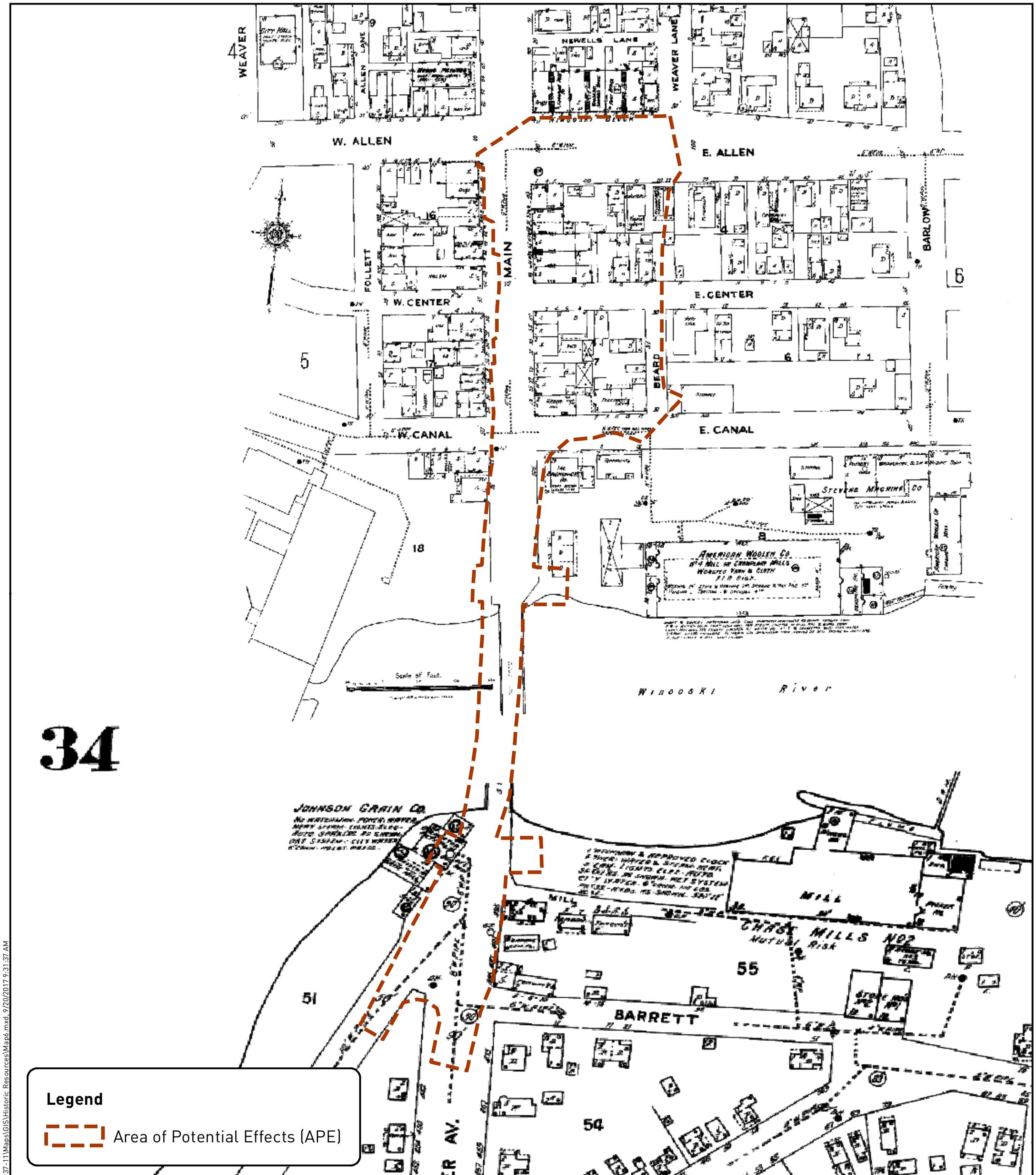
30 0 30 60 Meters

Sanborn 1889

HARTGEN archeological associates inc

Map 5



100 0 100 200 Feet

30 0 30 60 Meters

Sanborn 1926

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Map 6

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CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

SCOPING REPORT

FOR

MAIN STREET (US ROUTES 2 & 7) OVER WINOOSKI RIVER

Appendix G

Traffic Model Report

CHITTENDEN COUNTY RPC
Communities Planning Together

McFarland Johnson

BURLINGTON WINOOSKI US-2/7 BRIDGE TRAFFIC ASSESSMENT

MODEL DOCUMENTATION AND RESULTS

the science of insight

7.7.2017

PREPARED FOR:
CITIES OF WINOOSKI AND BURLINGTON
CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

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Burlington, VT 05401
802.383.0118
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SUBMITTED BY:
RSG

MODEL DOCUMENTATION AND RESULTS

PREPARED FOR:
CITIES OF WINOOSKI AND BURLINGTON
CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

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1.0 MODEL DEVELOPMENT

1.1 | INTRODUCTION / PROJECT BACKGROUND

The Winooski-Burlington Bridge connects the City of Burlington to the City of Winooski via US 2 & 7, with 4 narrow traffic lanes, no shoulders, and a curbed sidewalk on either side. Because the bridge cross section limits the possible lane configurations entering and exiting the Winooski Circulator to the north, and the signalized intersection to the south, bridge design alternatives could significantly impact traffic operations.

Figure 1 presents the analysis area, which includes the Riverside Avenue/Colchester Avenue/Barret Street/Mill Street intersection, as well as the Winooski Circulator.

Figure 1.1. Traffic Model Study Area, and Automatic Traffic Recorder Station (ATR) Locations

1.2 | DATA COLLECTION

RSG collected available data for this project including:

- An existing VISSIM model for the Winooski Circulator developed for previous CCRPC projects.
- SYNCHRO files and existing conditions report from the Colchester /Riverside/Barrett/Mill Intersection Scoping Study (Stantec 2017).
- The latest available turning movement counts from the VTrans website (http://vtrans.ms2soft.com), including % trucks and pedestrian counts at;
    - The circulator (4 intersections): counted Wednesday, June 24, 2015
        - NW Corner -Main St. US2/7 (including the W. Allen approach)
        - SW Corner – Main St. (US2/7)
        - SE Corner – Winooski Way
        - NE Corner – East Allen (VT15)
    - The Colchester/Barrett intersection counted Thursday, July 30, 2015
    - The Riverside/Barrett intersection counted Thursday, July 30, 2015
    - The Colchester/Riverside/Mill intersection counted Thursday, July 30, 2015
- Additional PM peak hour turning movement counts were collected on the NE and SW corner of the circulator by RSG on Thursday, June 1, 2017.
- Lane configurations and widths from orthophoto images.
- Speed and grade conditions – from field observations. Posted speed is 25 mph throughout. Observed speed through the circulator is between 18 and 23 mph.
- Vehicle queuing observations during peak hours in May and June 2017.
- Signal timings/phasing for the Colchester /Riverside/Barrett/Mill Intersection received from the City of Burlington DPW.

1.3 | ADJUSTMENTS AND BALANCING

Traffic counts were adjusted to the 2017 DHV based on station D039 in the 2015 VTrans Route Log of State Highways. This DHV matched the count RSG performed at the southwest Circulator intersection. Based on the heavy flows at these intersections, it is assumed that these volumes represent intersection capacity rather than the demand on the network. DHV adjustments increase intersection count volumes by up to 3% depending on intersection count date. Counts were balanced to the Colchester/Riverside/Mill intersection and the southwest Circulator corner intersections.

Traffic for the future build year of 2040 was obtained using the VTrans "Red Book" long term growth factor of 14% to adjust the 2017 counts further to 2040.

1.4 | EXISTING CONDITIONS MODEL

For this analysis, a new Vissim (v8) traffic model was constructed for the project study area. The existing Vissim (v5) model was not used, due to outdated features and attributes.

Relevant initial assumptions for new VISSIM (v8) model include:

- 2% trucks
- Speed profile: 24-30 mph
- Right turn speed: 7-12 mph
- Left turn speed: 10-15 mph
- Speed in Circulator: 15-22 mph (up to 30 mph on the downhill/SB leg)
- Input volumes based on 15-minute flow profile at individual intersections

Both AM and PM existing conditions models were created.

1.5 | CALIBRATION

The adjusted and balanced traffic volumes representing the 2017 DHV were used to create vehicle routes through the project area.

Routing values were then aggregated and compared to the turning movement volumes, and adjusted iteratively until they were all within 1% of the adjusted and balanced ground counts.

Queueing at several critical approaches were observed in the field and compared to the results of the model output to ensure that the existing model is performing as expected. Critical approaches include:

- West Allen Street approach to Main Street
- Main Street approach to the Circulator (from Colchester)
- Main Street approach to the Circulator (from Burlington)
- East Allen approach to the Circulator
- Riverside Avenue approach to Barrett Street
- Colchester Avenue approach to Barrett Street
- Barrett Street approach to Colchester Ave

Model intersection volumes were targeted to be within 5% of the DHV volumes.

Changes to the initial default values to bring the model into conformance with observed queues and volumes include:

- Speed
- Gap acceptance

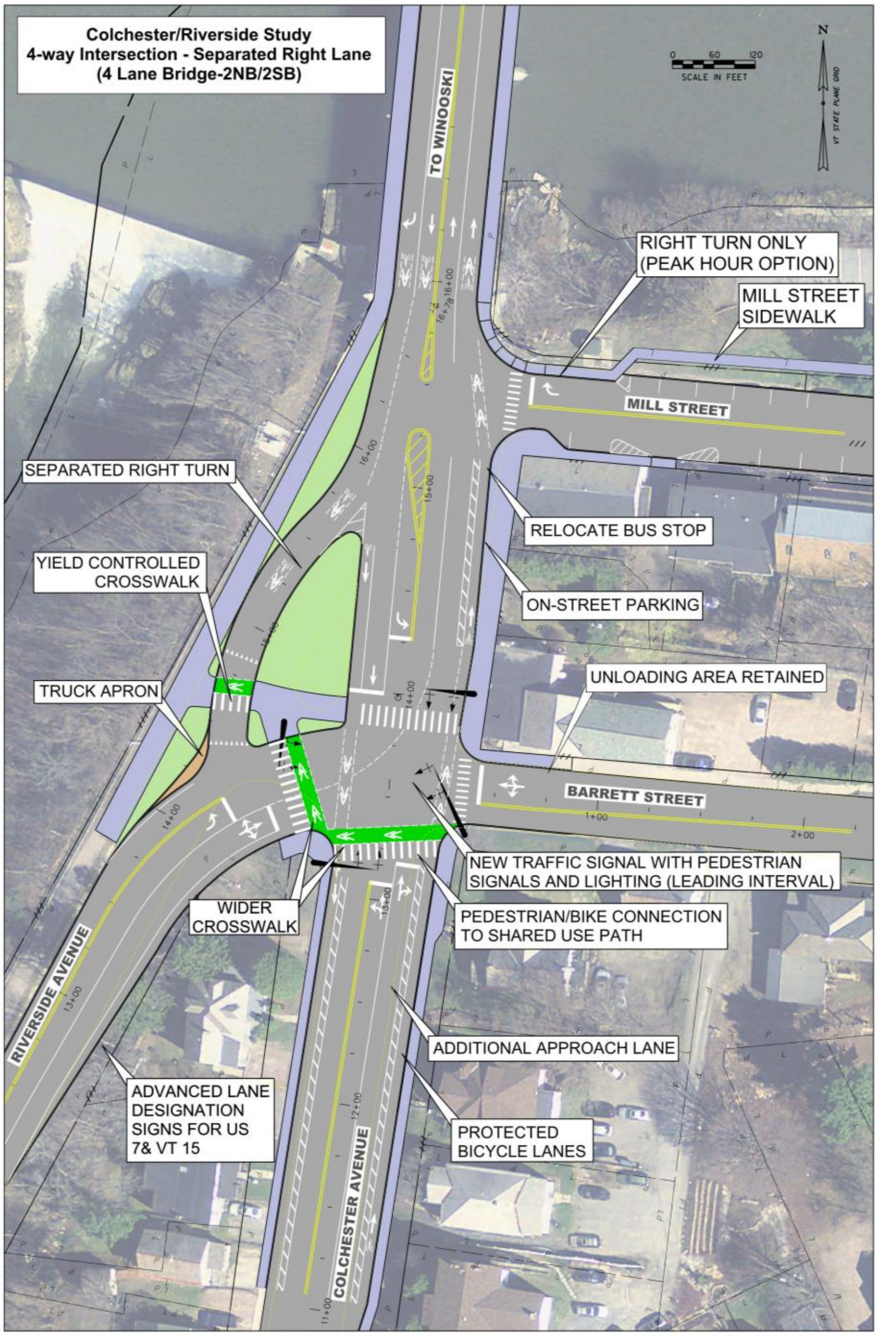
Due to some intersections being over-capacity, there were times where we could not meet volume and queue targets at the same time. In such cases, volume targets took precedence over queue targets.

1.6 | BUILD SCENARIOS

The Build scenarios examine either 3 or 4 lanes on the Winooski Bridge (2 northbound and 2 southbound or 2 northbound and 1 southbound). All Build scenarios assume an upgraded intersection at the Riverside Avenue/Colchester Avenue/Barrett Street/Mill Street intersection, which is based on the preferred alternative from a recent CCRPC scoping study at this location. The geometry for this intersection is shown in Figure 2. For this analysis it was assumed both right and left turns are allowed from Mill Street.

Traffic signal timings were adjusted to provide each approach with similar amounts of delay. Signal timings could be changed to promote flow from a particular direction at the expense of another. Actuated leading pedestrian intervals are provided at each crosswalk. The southbound left turn onto Barrett Street is phased as permitted-protected with an actuated lagging protected phase.

Figure 2: Build Scenario Intersection Geometry at Riverside, Mill, & Barrett



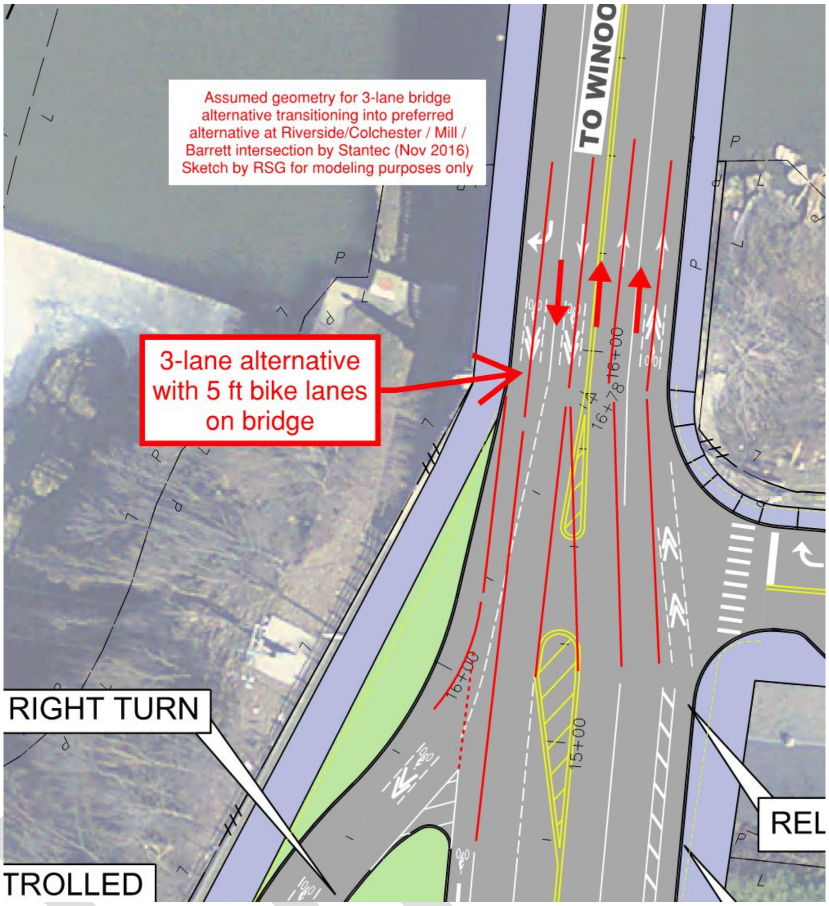
4-LANE BRIDGE

The Build 4-Lane Bridge scenario uses the existing bridge geometry, including 10-foot lanes, in conjunction with the Build intersection.

3-LANE BRIDGE

The Build 3-Lane Bridge scenario is the same as the 4-Lane Bridge scenario except that only one south lane is provided on the bridge (Figure 3). Two lanes of southbound traffic still exit the circulator to provide maximum storage and they merge before the bridge.

Figure 3. Geometry with 3-Lane Bridge Alternative



1.7 | 2040 FUTURE SCENARIOS

The 2040 future scenarios are the same as 2017 scenarios except that traffic volumes have been increased by 14% in accordance with the 2015 VTrans Red Book.

1.8 | FULL LIST OF SCENARIOS

The scenarios modeled are:

- 2017 AM No Build
- 2017 AM 4-Lane Build
- 2017 AM 3-Lane Build
- 2017 PM No Build
- 2017 PM 4-Lane Build

- 2017 PM 3-Lane Build
- 2040 AM No Build
- 2040 AM 4-Lane Build
- 2040 AM 3-Lane Build
- 2040 PM No Build
- 2040 PM 4-Lane Build
- 2040 PM 3-Lane Build

2.0 MODEL OUTPUT

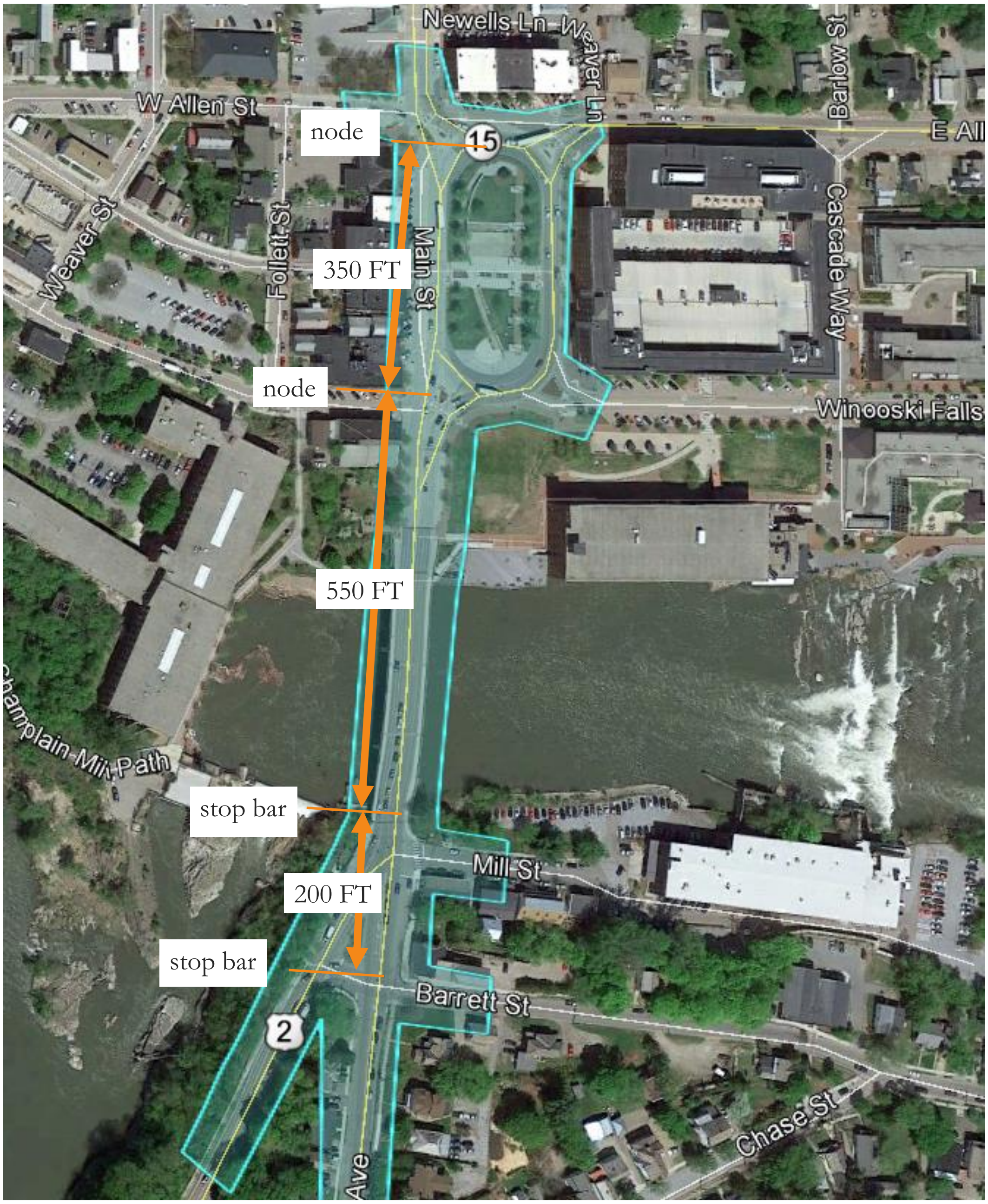
2.1 | MODEL OUTPUT

We report three performance measures for model output: delay in seconds, level of service (LOS), and queue length in feet. LOS is based on the 2010 Highway Capacity Manual designations for signalized and unsignalized intersections. Intersections in the circulator use the unsignalized intersection standards. The reported queue is the average of the maximum queues recorded every 120 seconds in 10 simulations. A 120-second interval was chosen as this is also the cycle length of the signalized intersection.

The key intersection(s) that determine(s) performance of the network is the confluence of Colchester Avenue, Riverside Avenue, and Barrett Street. In the build scenario, this confluence goes from three intersections to one, and this can make comparing performance between the Existing Conditions and Build scenarios difficult. Existing Conditions results are presented below in Table 1 and Table 2. Build scenario results are presented in Table 3 through Table 8.

Link distances between Barret Street and the Circulator are shown in Figure 4. In some cases, the southbound queues exceed the link they are on and spill back into the previous intersection(s).

Figure 4: Link Distances



2.2 | EXISTING CONDITIONS MODEL OUTPUT

Table 1 summarize the average delay, Level of Service and queueing in the AM and PM peak hours as modeled for the existing condition (2017 DHV).

Table 1: 2017 AM Existing Conditions Performance Measures

Intersection Name	Approach	Volume	Average Delay	LOS	Ave Max Queue
Colchester/ Barrett	NB	328	23	C	146
	SB	603	3	A	23
	EB	189	8	A	33
	WB	173	37	D	95
Riverside/ Barrett	NB	670	36	D	223
	SB	593	1	A	32
	WB	99	8	A	18
Colchester/ Riverside/ Mill	NB	395	4	A	35
	SB	1213	15	B	184
	EB	482	1	A	8
	WB	14	3	A	5
Main/ US-2/ West Canal (SW)	NB	873	5	A	32
	SB*	1413	2	A	30
US-2/ Winooski Falls (SE)	EB*	1024	0	A	71
	WB	80	3	A	3
Main/ East Allen (NE)	NB*	953	2	A	13
	WB	639	14	B	171
Main/ West Allen (NW)	SB	414	65	F	399
	EB	298	48	E	149
	WB*	1148	1	A	46

*Free movement

Table 2: 2017 PM Existing Conditions Performance Measures

Intersection Name	Approach	Volume	Average Delay	LOS	Ave Max Queue
Colchester/ Barrett	NB	631	39	D	522
	SB	472	12	B	35
	EB	137	10	B	24
	WB	277	97	F	302
Riverside/ Barrett	NB	876	46	D	316
	SB	597	2	A	44
	WB	184	9	A	38
Colchester/ Riverside/ Mill	NB	716	6	A	64
	SB	1053	27	C	200
	EB	740	4	A	26
	WB	80	19	B	28
Main/ US-2/ West Canal (SW)	NB	1475	12	B	112
	SB*	1282	4	A	55
US-2/ Winooski Falls (SE)	EB*	1648	1	A	102
	WB	224	38	E	93
Main/ East Allen (NE)	NB*	1701	4	A	48
	WB	401	98	F	672
Main/ West Allen (NW)	SB	471	36	E	287
	EB	478	39	E	302
	WB*	1357	1	A	36

*Free movement

2.3 | BUILD AND FUTURE YEAR SCENARIO PERFORMANCE MEASURES

Table 3 to **Error! Reference source not found.** show performance measures for the Build scenarios and the 2040 scenarios (including the No Build scenarios).

Table 3: 2017 AM 4-Lane and 3-Lane Build Performance Measures

Intersection Name	Approach	Volume	Average Delay	LOS	Ave Max Queue	Average Delay	LOS	Ave Max Queue
			4-Lane			3-Lane		
Colchester/ Barrett/ Riverside	NB	328	33	C	110	28	C	100
	SB	603	16	B	202	20	C	213
	EB	671	30	C	201	28	C	193
	WB	173	31	C	90	29	C	87
Colchester/ Mill	NB*	877	0	A	0	0	A	1
	SB**	1213	11	B	73	36	D	557
	WB	14	2	A	5	4	A	6
Main/ US-2/ West Canal (SW)	NB	873	5	A	33	3	A	28
	SB*	1413	2	A	29	30	D	334
US-2/ Winooski Falls (SE)	EB*	1024	0	A	74	1	A	60
	WB	80	5	A	4	5	A	3
Main/ East Allen (NE)	NB*	953	2	A	8	3	A	16
	WB	639	14	B	165	35	E	501
Main/ West Allen (NW)	SB	414	64	F	423	254	F	1180
	EB	298	44	E	143	223	F	1029
	WB*	1148	1	A	45	5	A	53

*Free movement

**Free movement except left turns

Table 4: 2017 PM 4-Lane and 3-Lane Build Performance Measures

Intersection Name	Approach	Volume	Average Delay	LOS	Ave Max Queue	Average Delay	LOS	Ave Max Queue
			4-Lane			3-Lane		
Colchester/ Barrett/ Riverside	NB	631	43	D	251	39	D	225
	SB	472	22	C	188	26	C	204
	EB	876	38	D	290	36	D	277
	WB	277	46	D	176	42	D	168
Colchester/ Mill	NB*	1455	1	A	14	0	A	8
	SB**	1053	12	B	46	38	D	499
	WB	80	21	C	30	67	E	62
Main/ US-2/ West Canal (SW)	NB	1475	13	B	136	11	B	121
	SB*	1282	2	A	25	20	C	217
US-2/ Winooski Falls (SE)	EB*	1648	1	A	103	1	A	99
	WB	224	53	F	118	56	F	119
Main/ East Allen (NE)	NB*	1701	3	A	17	3	A	31
	WB	401	94	F	656	123	F	834
Main/ West Allen (NW)	SB	471	32	D	255	89	F	806
	EB	478	32	D	209	87	F	919
	WB*	1357	1	A	36	2	A	38

*Free movement

**Free movement except left turns

Table 5: 2040 AM No Build Performance Measures

Intersection Name	Approach	Volume	Average Delay	LOS	Ave Max Queue
Colchester/ Barrett	NB	374	27	C	184
	SB	688	4	A	24
	EB	216	8	A	36
	WB	197	42	D	117
Riverside/ Barrett	NB	763	40	D	272
	SB	676	1	A	31
	WB	114	9	A	21
Colchester/ Riverside/ Mill	NB	450	4	A	42
	SB	1381	16	B	199
	EB	548	2	A	15
	WB	14	3	A	4
Main/ US-2/ West Canal (SW)	NB	995	6	A	39
	SB*	1610	2	A	28
US-2/ Winooski Falls (SE)	EB*	1167	1	A	72
	WB	91	4	A	4
Main/ East Allen (NE)	NB*	1086	2	A	18
	WB	728	30	D	544
Main/ West Allen (NW)	SB	454	152	F	1254
	EB	327	130	F	667
	WB*	1308	1	A	49

*Free movement

Table 6: 2040 PM No Build Performance Measures

Intersection Name	Approach	Volume	Average Delay	LOS	Ave Max Queue
Colchester/ Barrett	NB	723	50	D	1036
	SB	536	17	B	36
	EB	156	12	B	32
	WB	316	160	F	707
Riverside/ Barrett	NB	985	78	E	999
	SB	679	2	A	42
	WB	210	11	B	57
Colchester/ Riverside/ Mill	NB	820	9	A	87
	SB	1199	40	D	231
	EB	829	11	B	57
	WB	80	22	C	30
Main/ US-2/ West Canal (SW)	NB	1670	19	C	219
	SB*	1460	13	B	134
US-2/ Winooski Falls (SE)	EB*	1867	2	A	104
	WB	255	123	F	245
Main/ East Allen (NE)	NB*	1928	5	A	73
	WB	458	217	F	1571
Main/ West Allen (NW)	SB	552	83	F	1024
	EB	530	86	F	1123
	WB*	1541	2	A	36

*Free movement

Table 7: 2040 AM 4-Lane and 3-Lane Build Performance Measures

Intersection Name	Approach	Volume	Average Delay	LOS	Ave Max Queue	Average Delay	LOS	Ave Max Queue
			4-Lane			3-Lane		
Colchester/ Barrett/ Riverside	NB	374	36	D	129	30	C	117
	SB	689	16	B	205	22	C	211
	EB	764	33	C	253	30	C	236
	WB	197	34	C	110	31	C	104
Colchester/ Mill	NB*	999	0	A	1	0	A	1
	SB**	1381	14	B	93	40	D	565
	WB	14	3	A	6	3	A	5
Main/ US-2/ West Canal (SW)	NB	995	5	A	43	4	A	37
	SB*	1610	2	A	28	35	D	379
US-2/ Winooski Falls (SE)	EB*	1167	1	A	75	1	A	62
	WB	91	6	A	6	7	A	7
Main/ East Allen (NE)	NB*	1086	2	A	11	4	A	28
	WB	728	32	D	605	71	F	1283
Main/ West Allen (NW)	SB	454	152	F	1280	325	F	1462
	EB	327	112	F	545	325	F	1348
	WB*	1308	1	A	47	6	A	59

*Free movement

**Free movement except left turns

Table 8: 2040 PM 4-Lane and 3-Lane Build Performance Measures

Intersection Name	Approach	Volume	Average Delay	LOS	Ave Max Queue	Average Delay	LOS	Ave Max Queue
			4-Lane			3-Lane		
Colchester/ Barrett/ Riverside	NB	723	63	E	568	56	E	460
	SB	536	25	C	197	29	C	206
	EB	985	54	D	567	49	D	498
	WB	316	58	E	235	56	E	227
Colchester/ Mill	NB*	1650	3	A	69	2	A	52
	SB**	1199	17	B	71	44	D	534
	WB	80	32	C	35	93	F	80
Main/ US-2/ West Canal (SW)	NB	1670	20	C	301	17	C	248
	SB*	1460	2	A	28	23	C	254
US-2/ Winooski Falls (SE)	EB*	1867	1	A	108	2	A	105
	WB	255	171	F	294	189	F	299
Main/ East Allen (NE)	NB*	1928	3	A	25	4	A	42
	WB	458	185	F	1562	223	F	1586
Main/ West Allen (NW)	SB	552	51	F	682	92	F	1078
	EB	530	51	F	605	93	F	1120
	WB*	1541	1	A	38	2	A	41

*Free movement

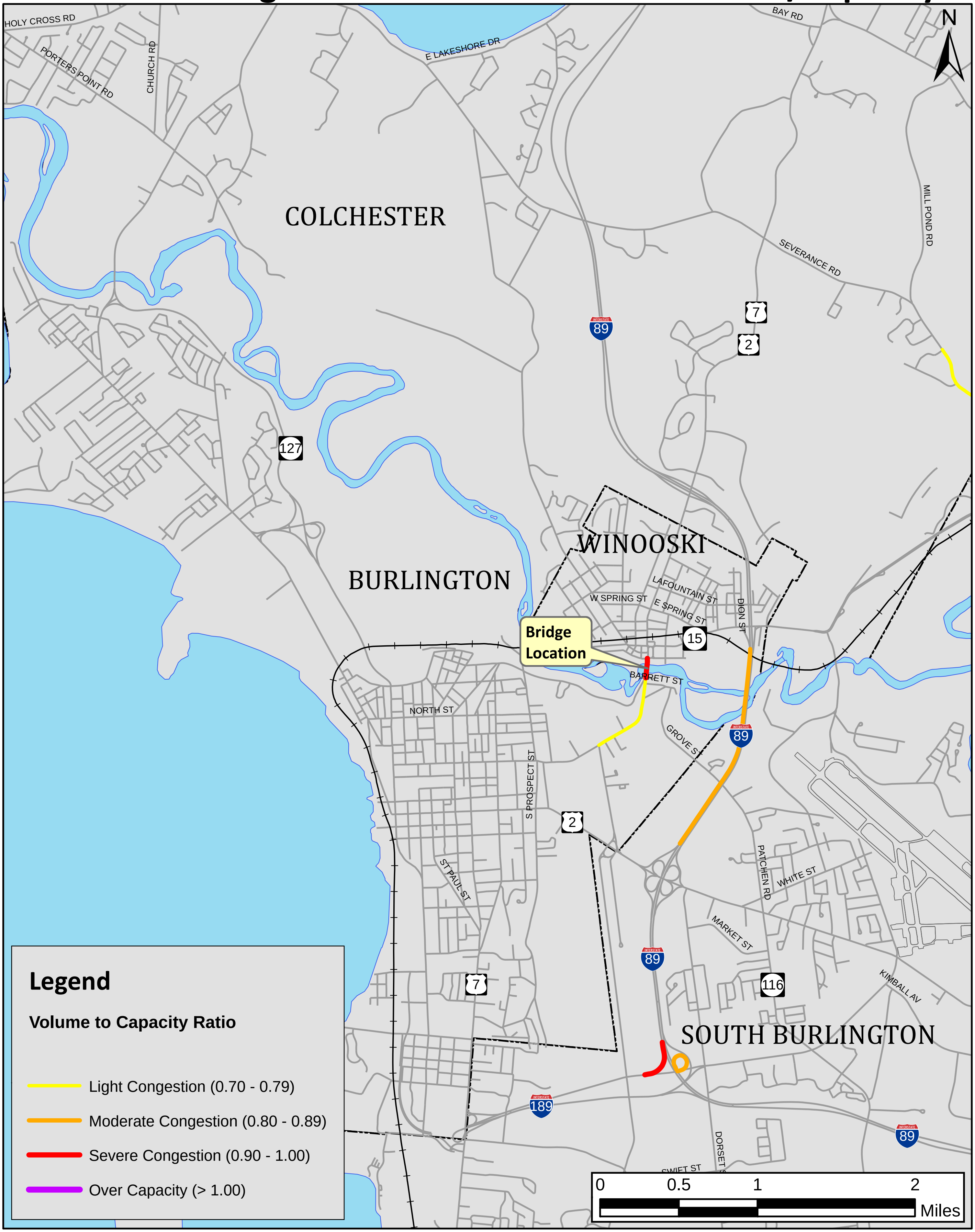
**Free movement except left turns

3.0 CONCLUSIONS

The current road network is often over capacity and experiences significant peak hour congestion in the project area. This congestion will only worsen in the future with a 14% increase in traffic volume. Improving the intersections on the south side of the bridge as proposed by the recent CCRPC scoping study preferred alternative and maintaining the current 4-lane configuration on the bridge is projected to increase the capacity of the intersection and generally improve circulation in the area. This intersection design will also provide significantly improved pedestrian accommodations. Depending on the degree of pent up demand, which is difficult to estimate, this improvement may not completely solve the congestion issues in the area.

Reducing the bridge to 3 lanes is projected to significantly degrade traffic conditions in the study area. Southbound queues on the Winooski bridge are projected to spill back into the Circulator often. In the future scenarios, projected southbound queues on the Winooski Bridge frequently reach back to and into the Circulator. This condition is expected to be tolerable with a 4-lane bridge but would create unacceptable levels of congestion with a 3-lane bridge.

Winooski River Bridge Scoping Study - Construction Scenarios
Two Lane Bridge - 2025 AM Peak Traffic Volume/Capacity



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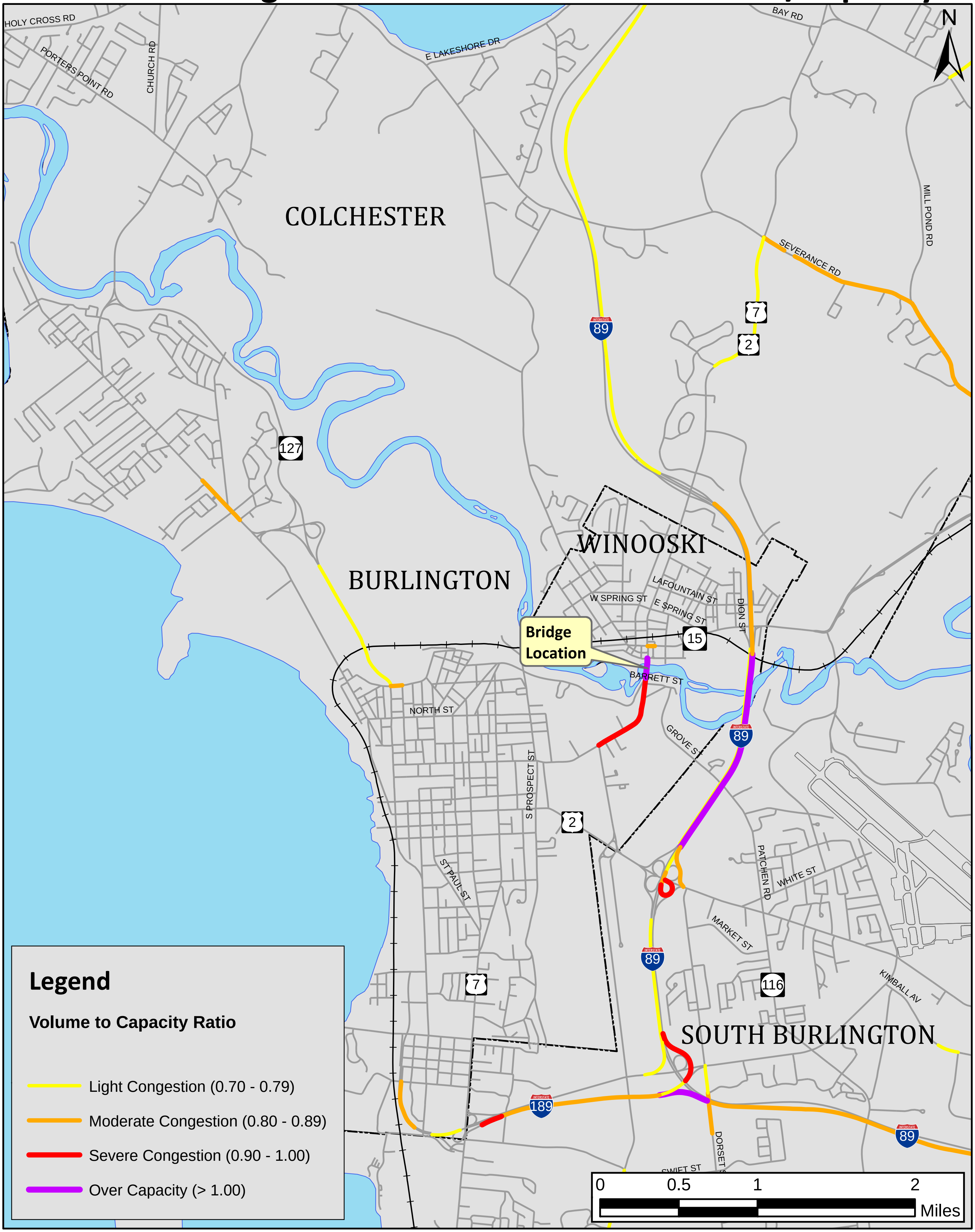
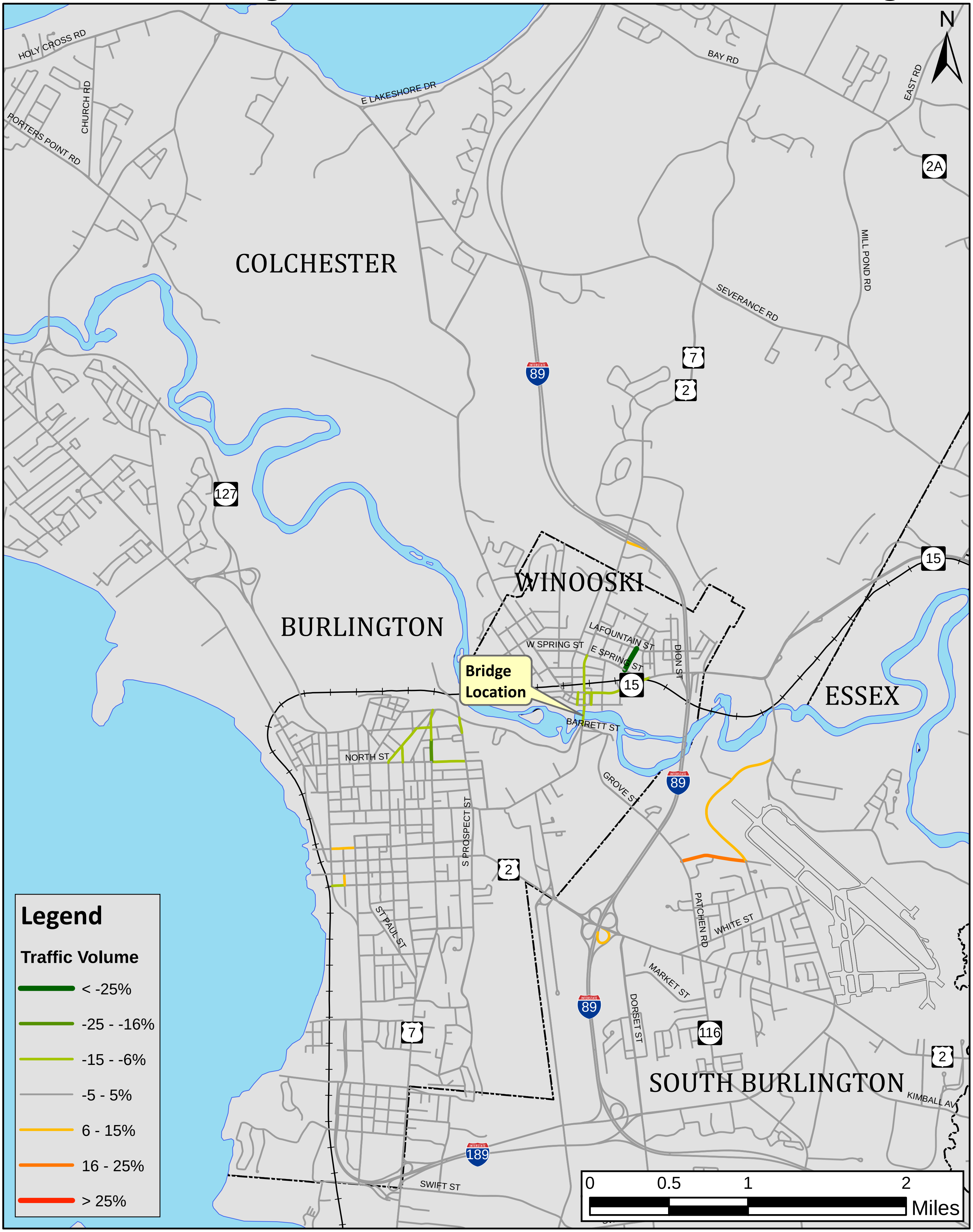


Winooski River Bridge Scoping Study - Construction Scenarios
Two Lane Bridge - 2025 AM Peak Traffic Percent Changes



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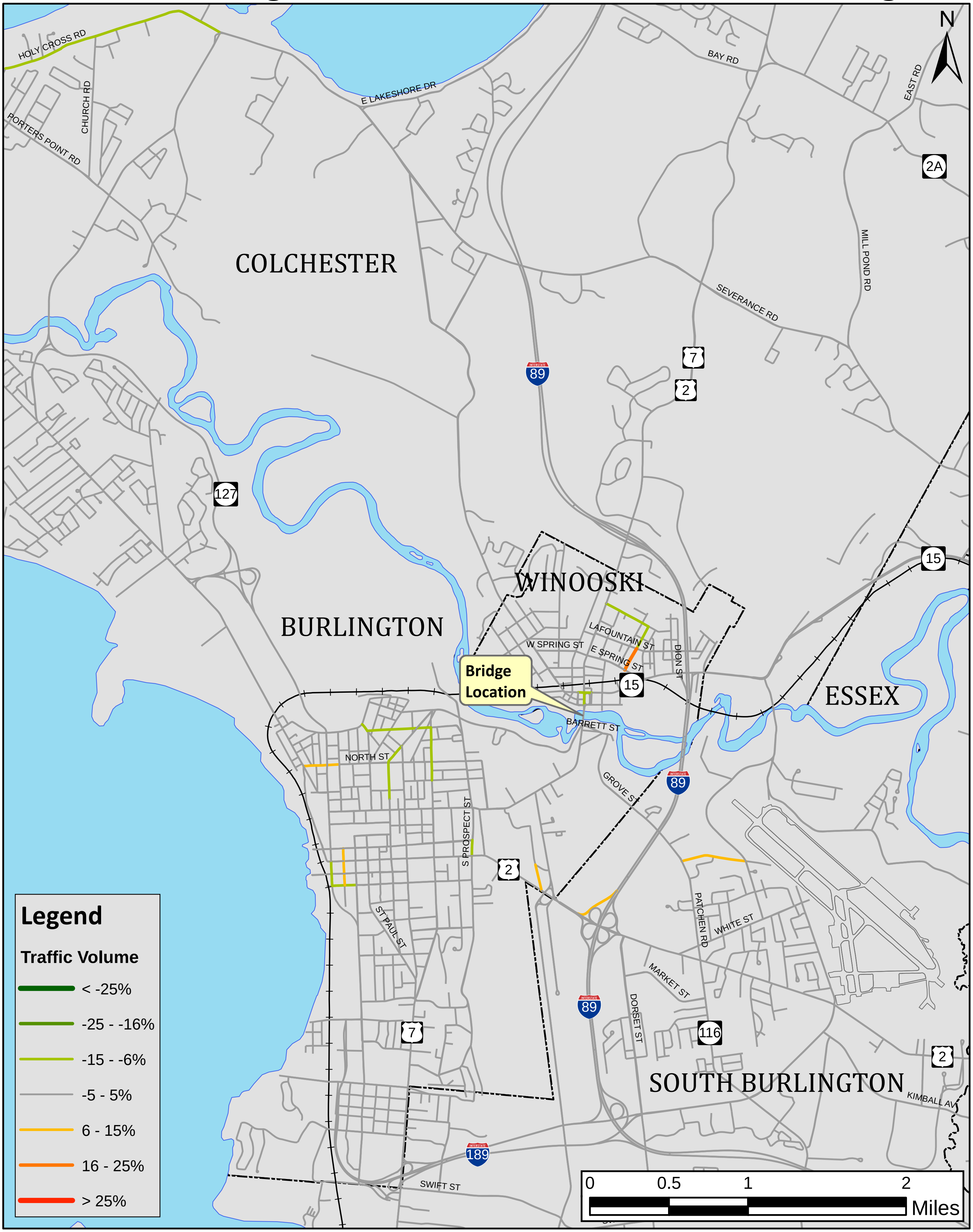

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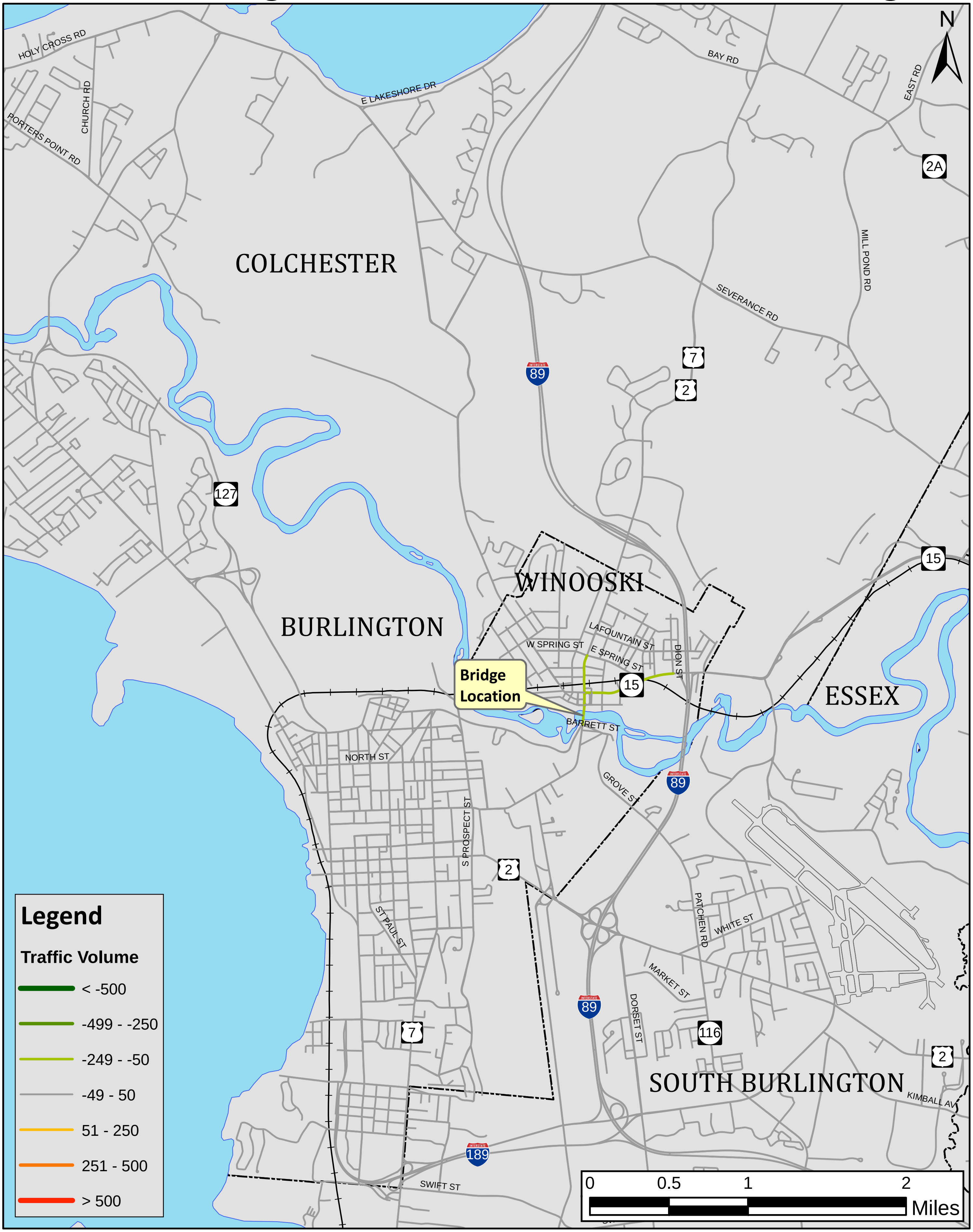
Two Lane Bridge - 2025 AM Peak Traffic Volume Changes



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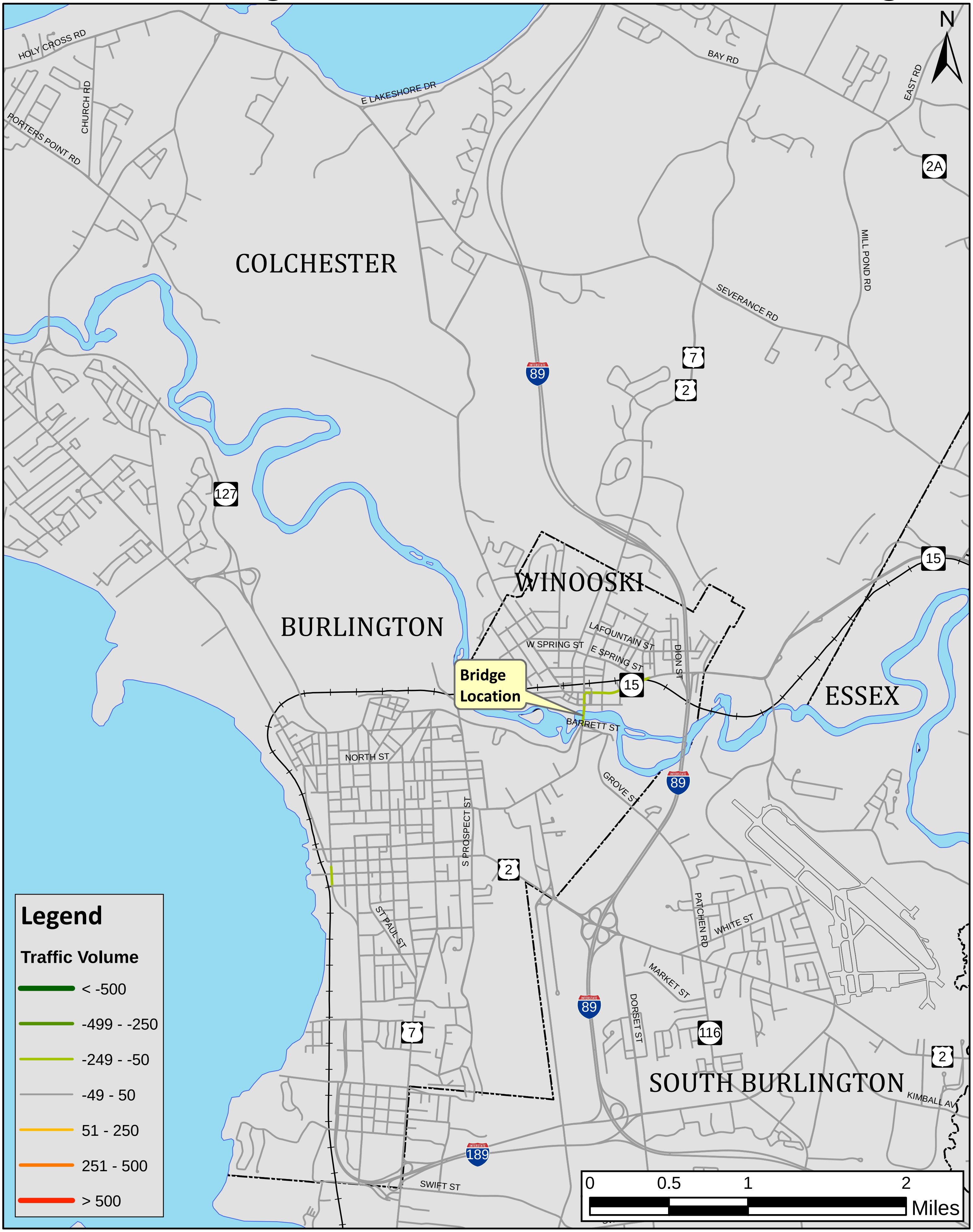

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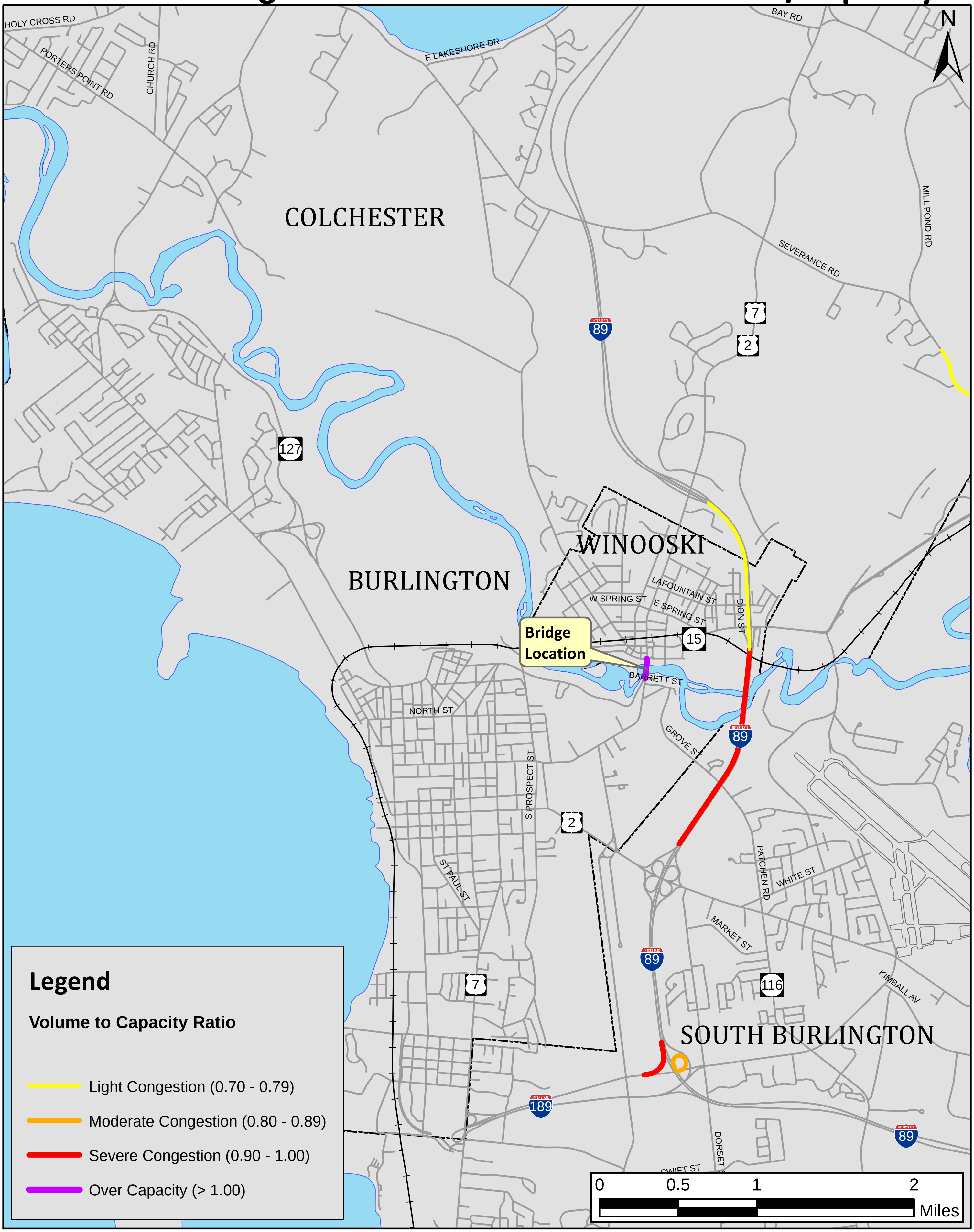

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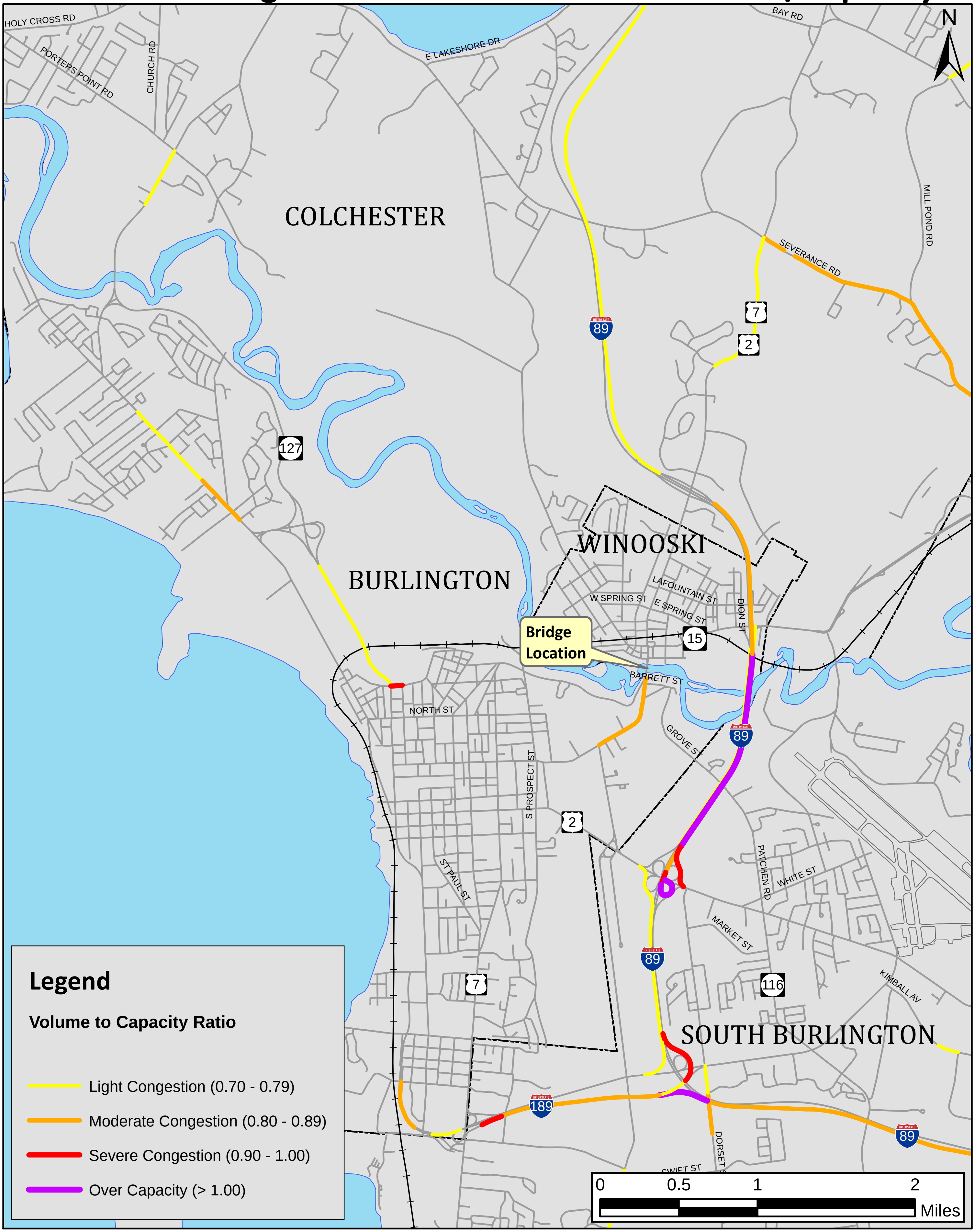

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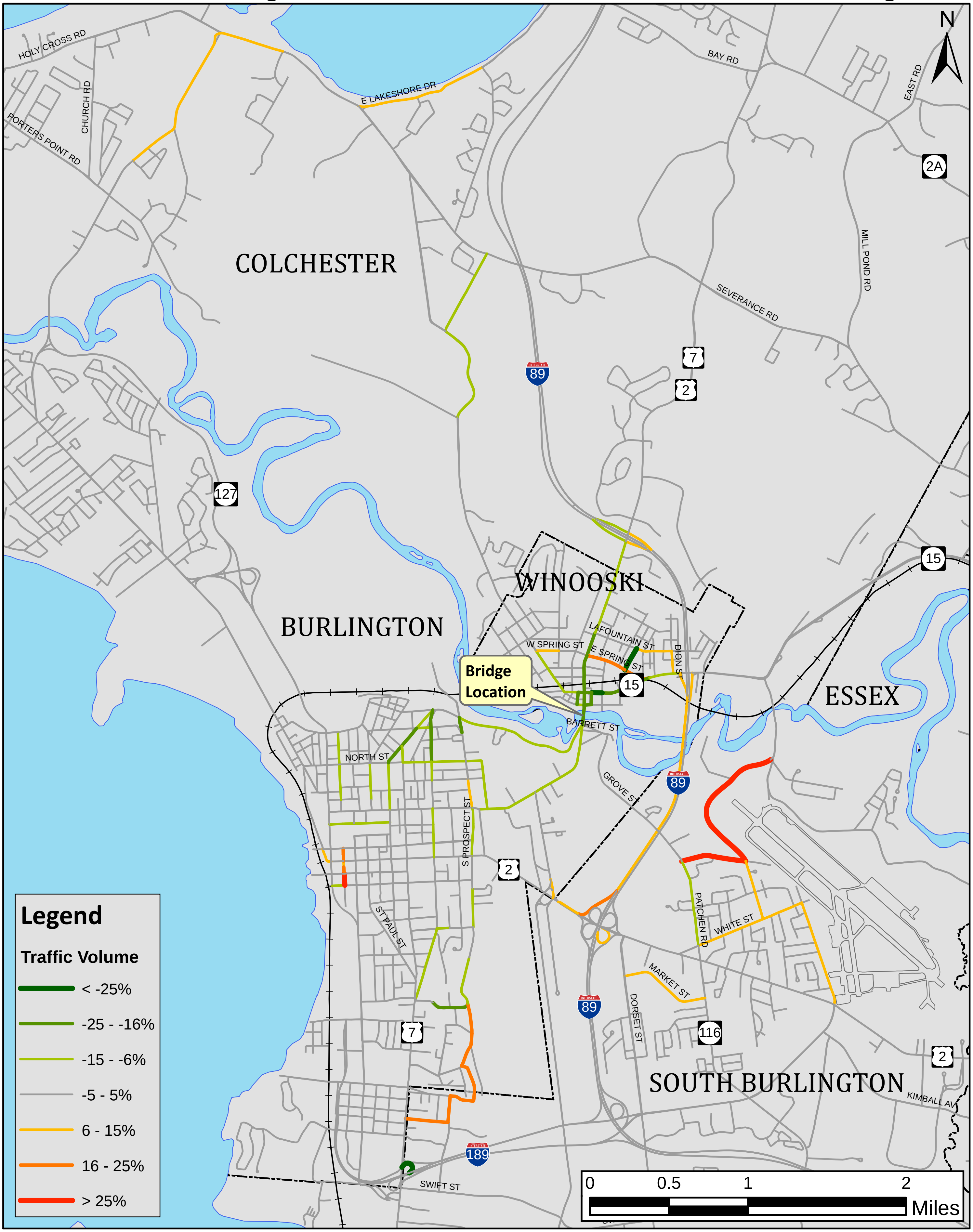

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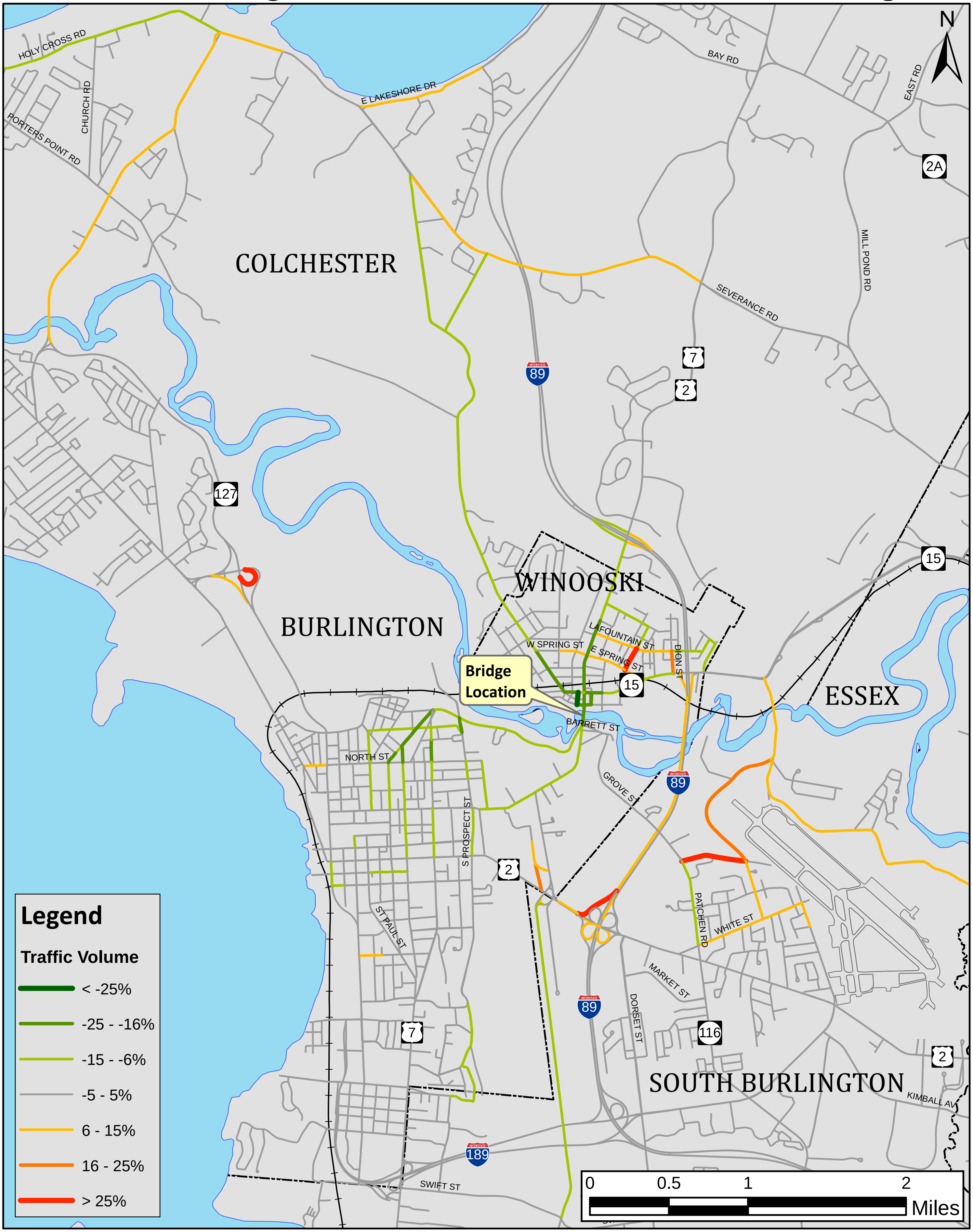

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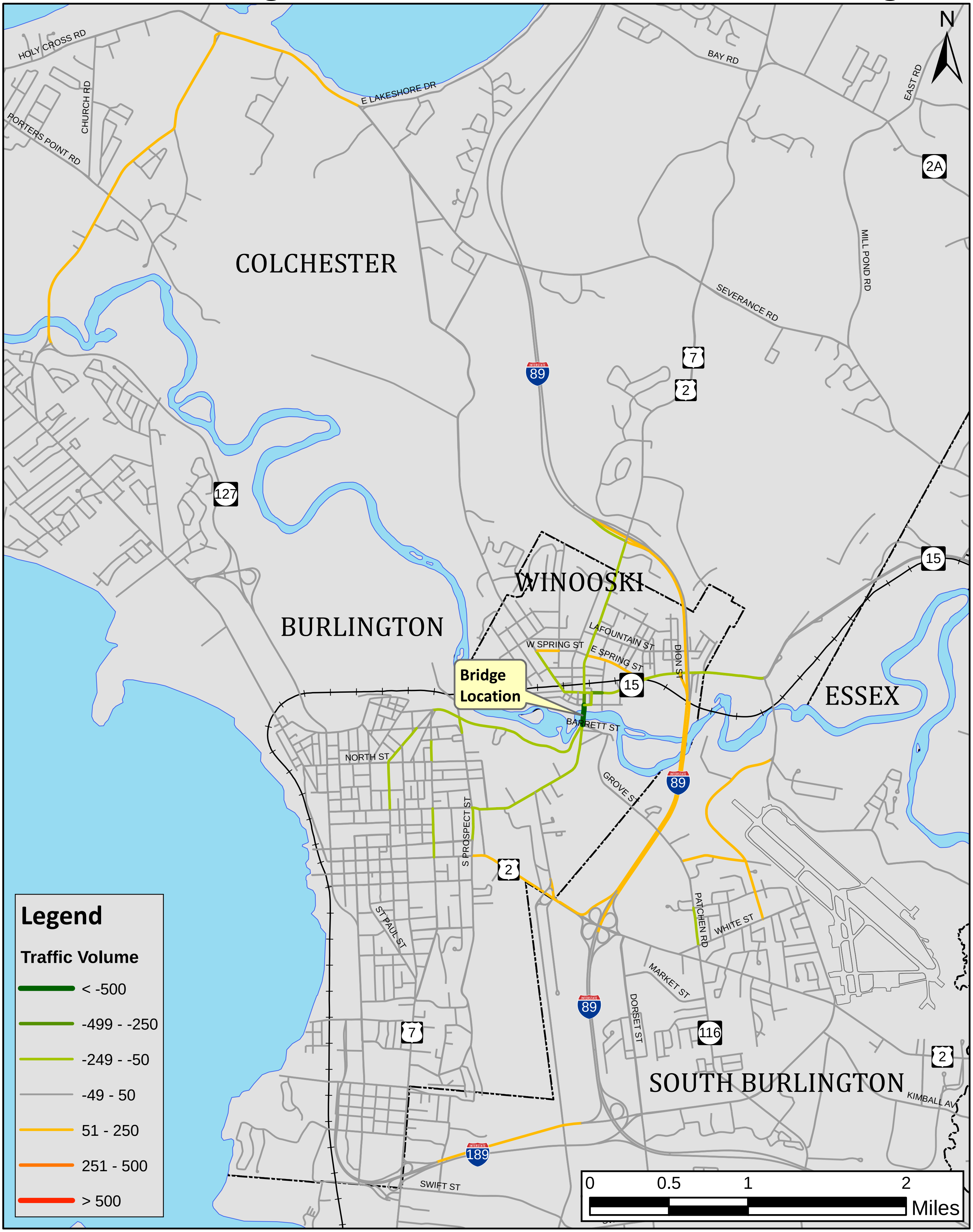

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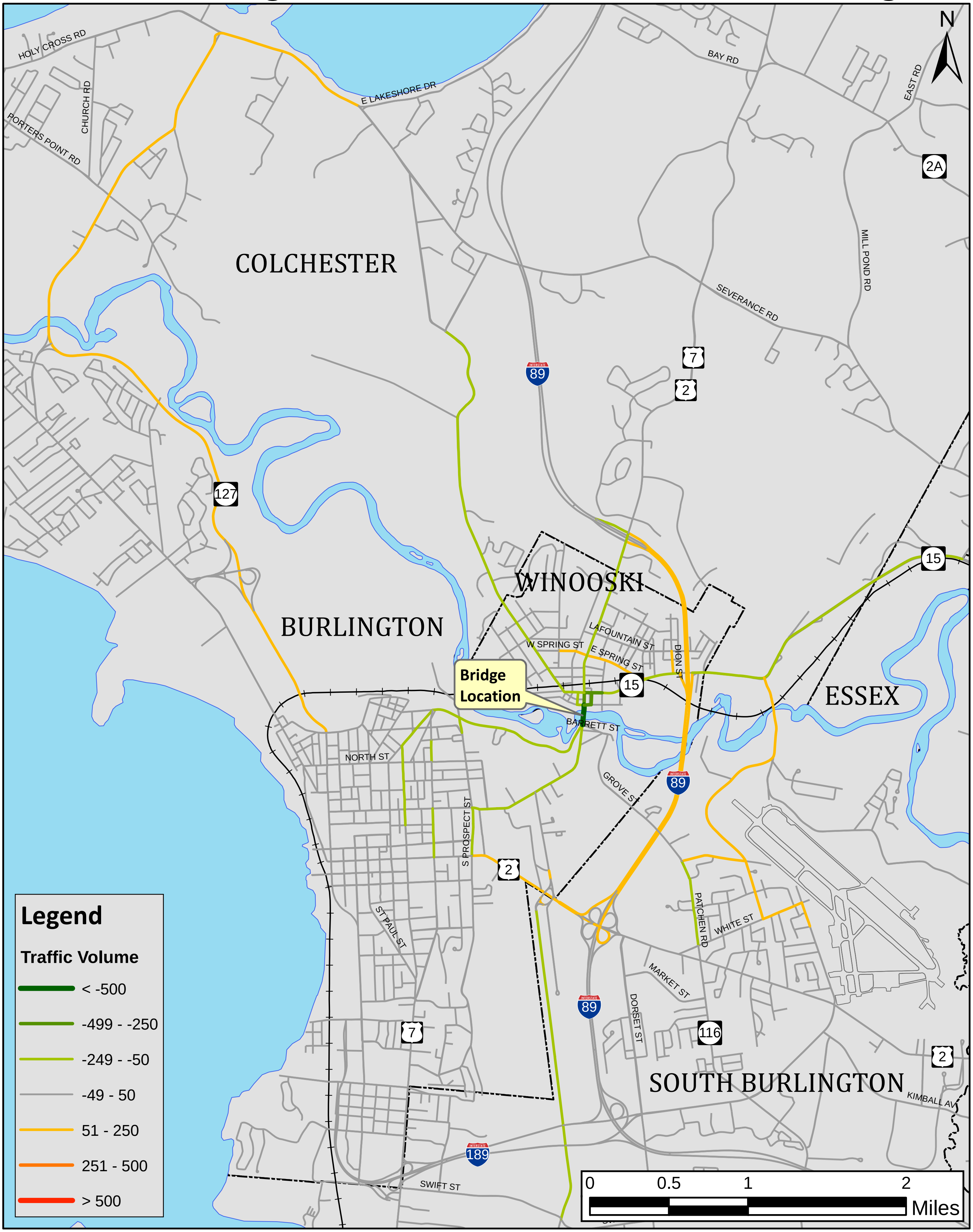
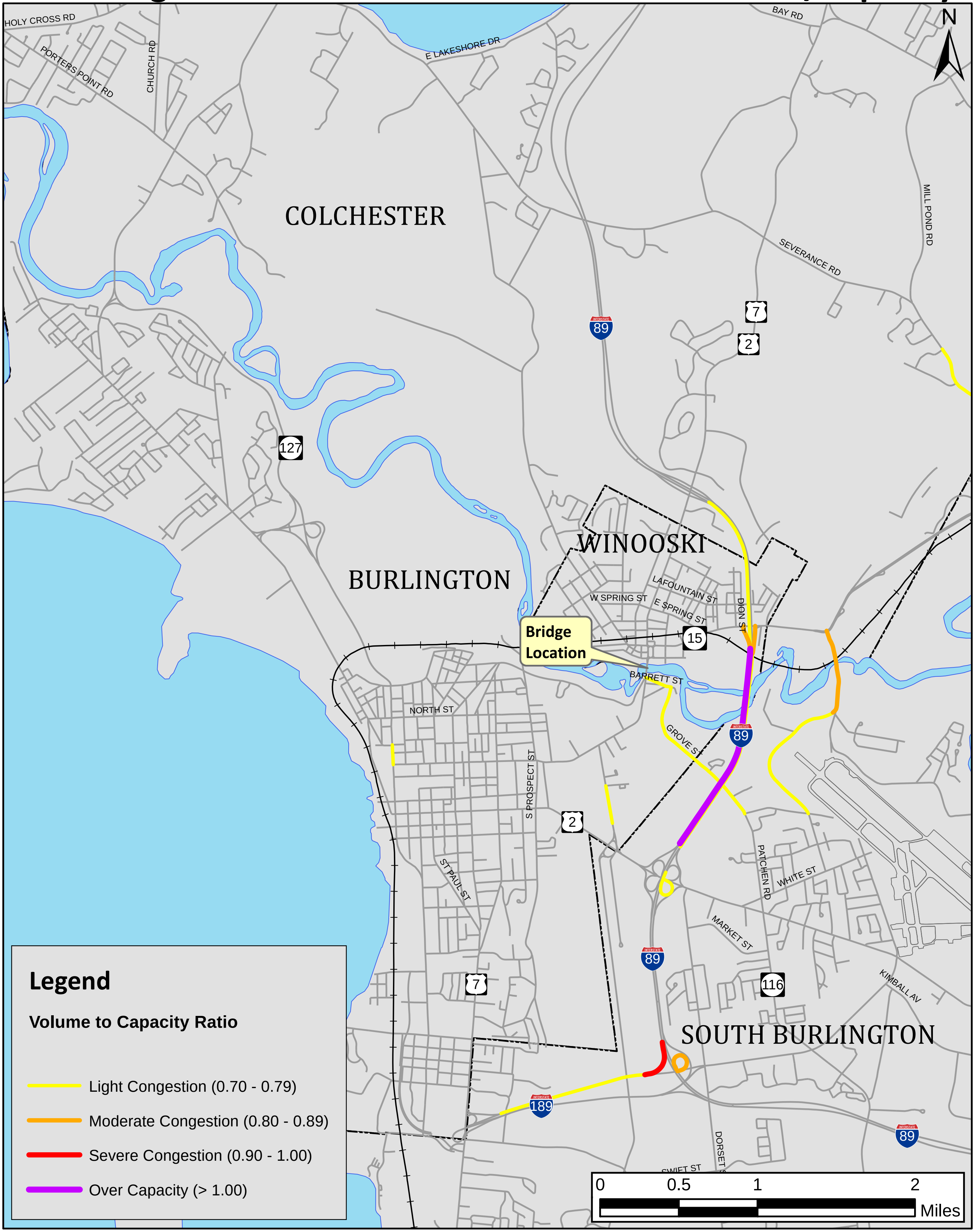


Winooski River Bridge Scoping Study - Construction Scenarios
Full Bridge Closure - 2025 AM Peak Traffic Volume/Capacity



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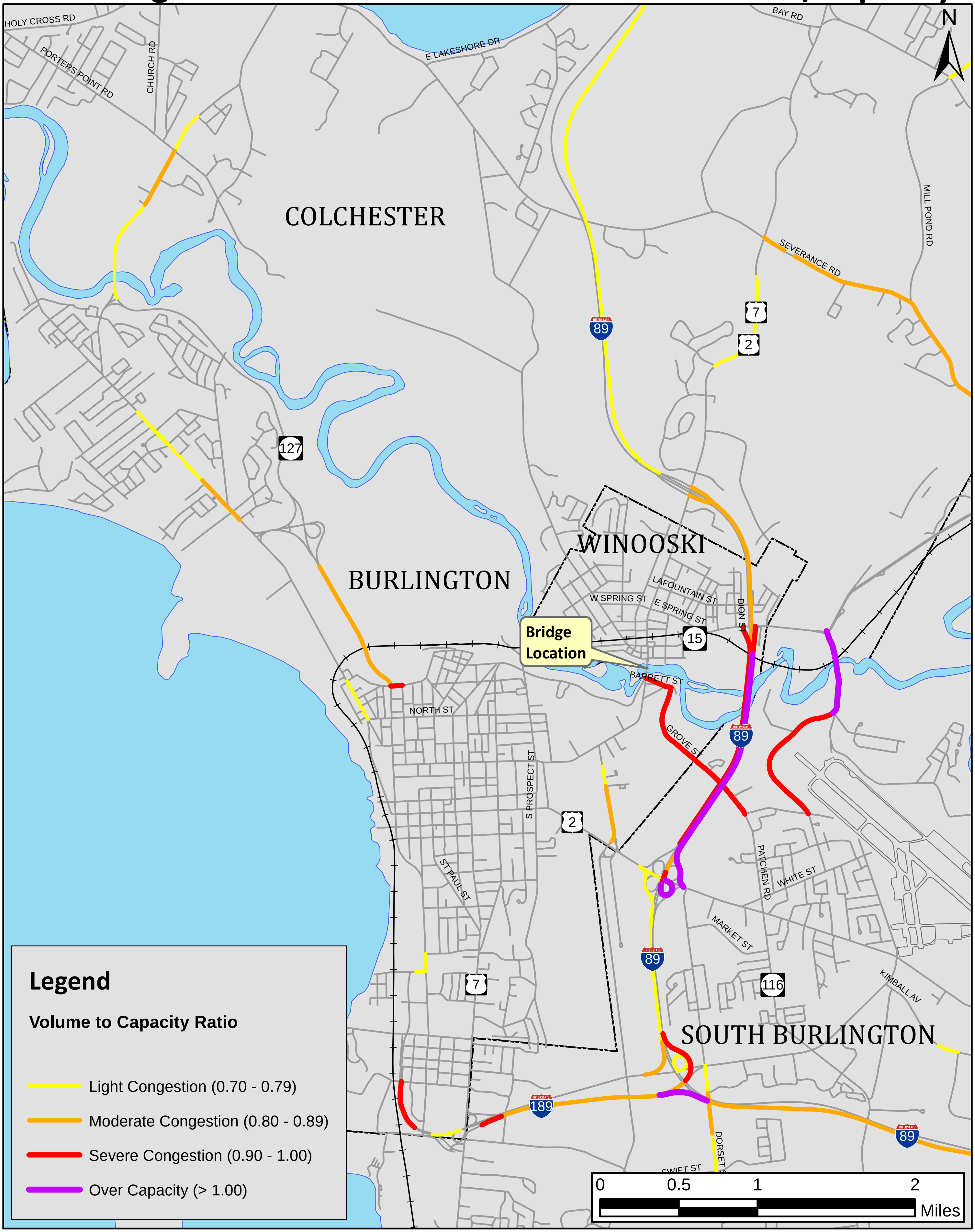

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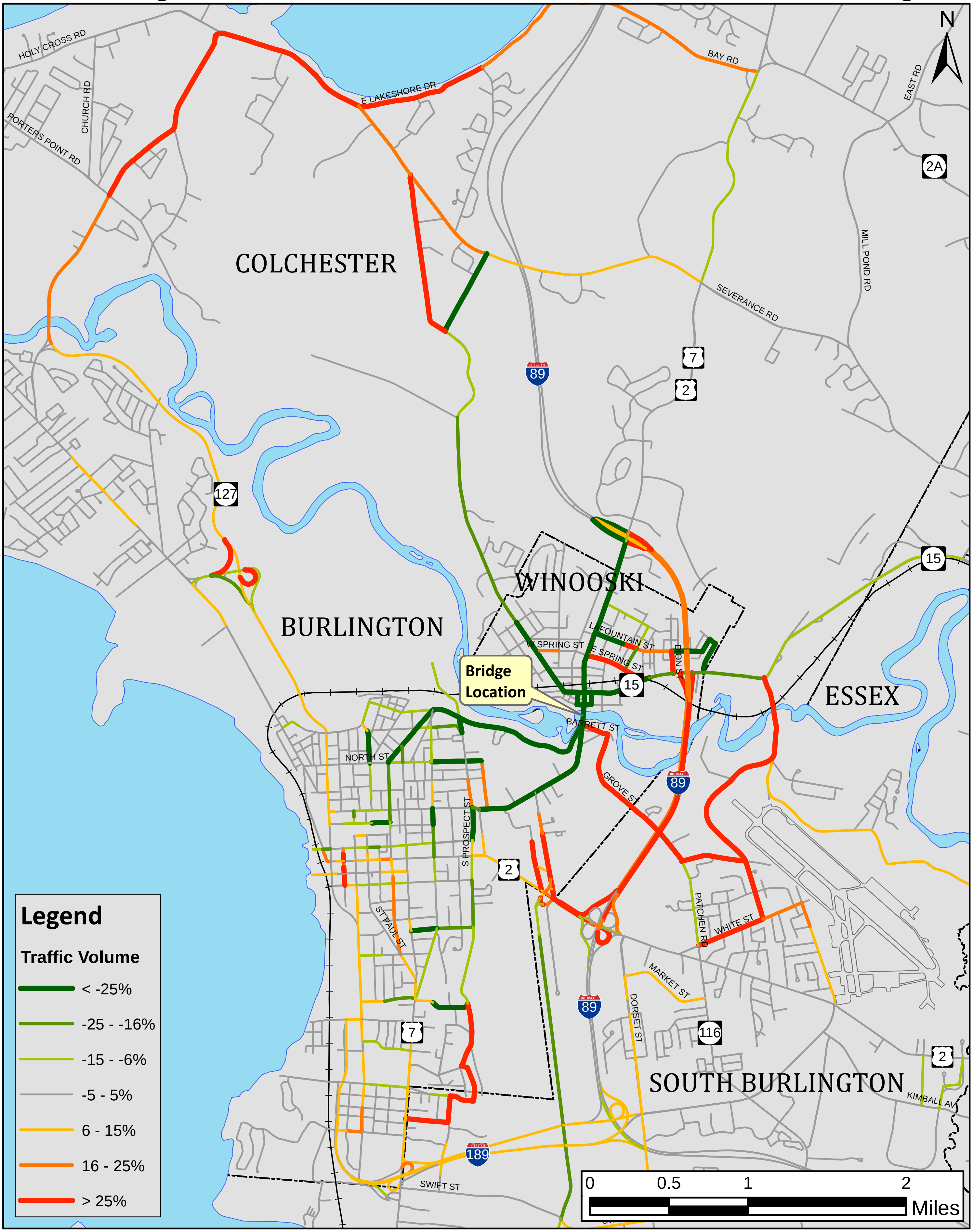

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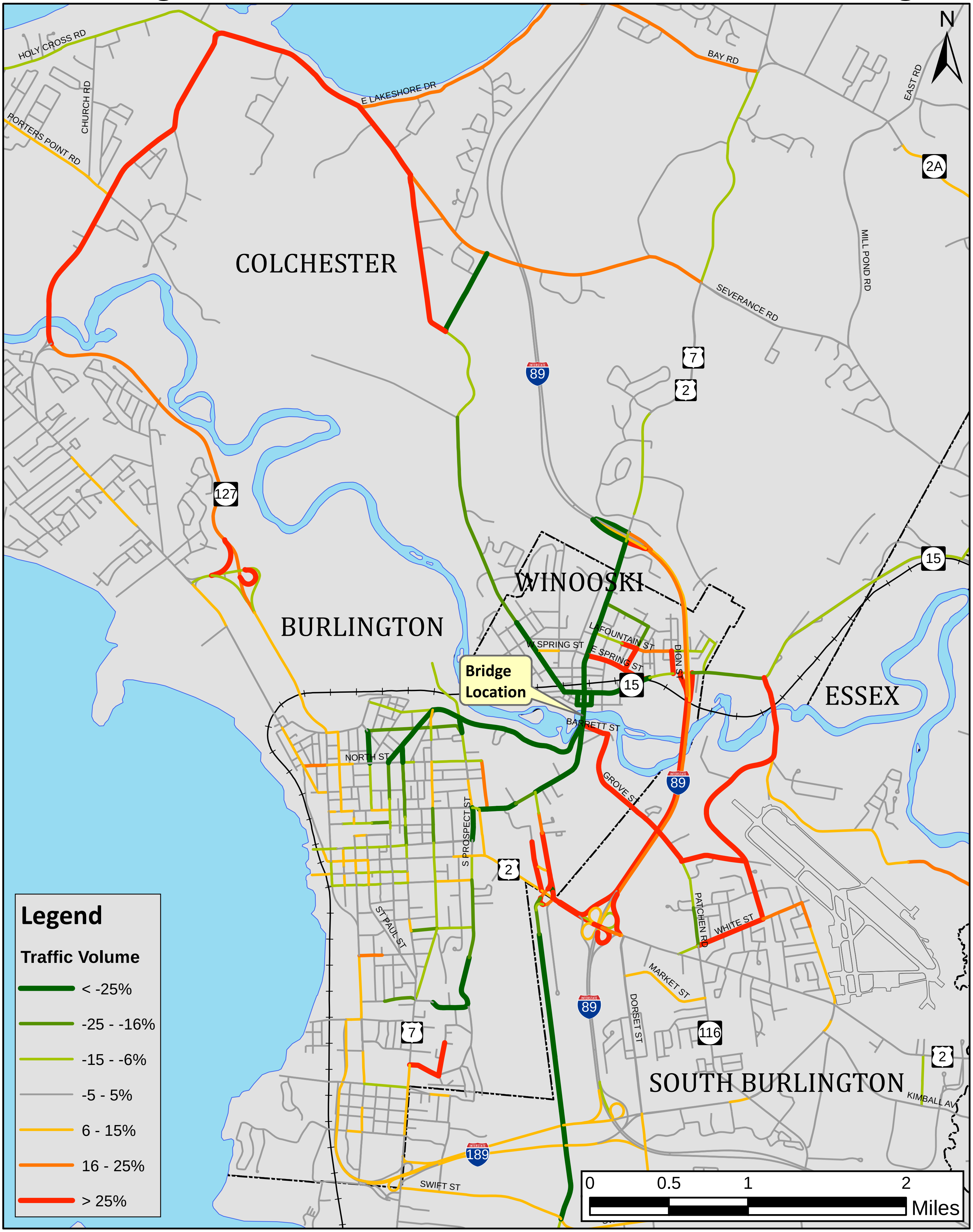

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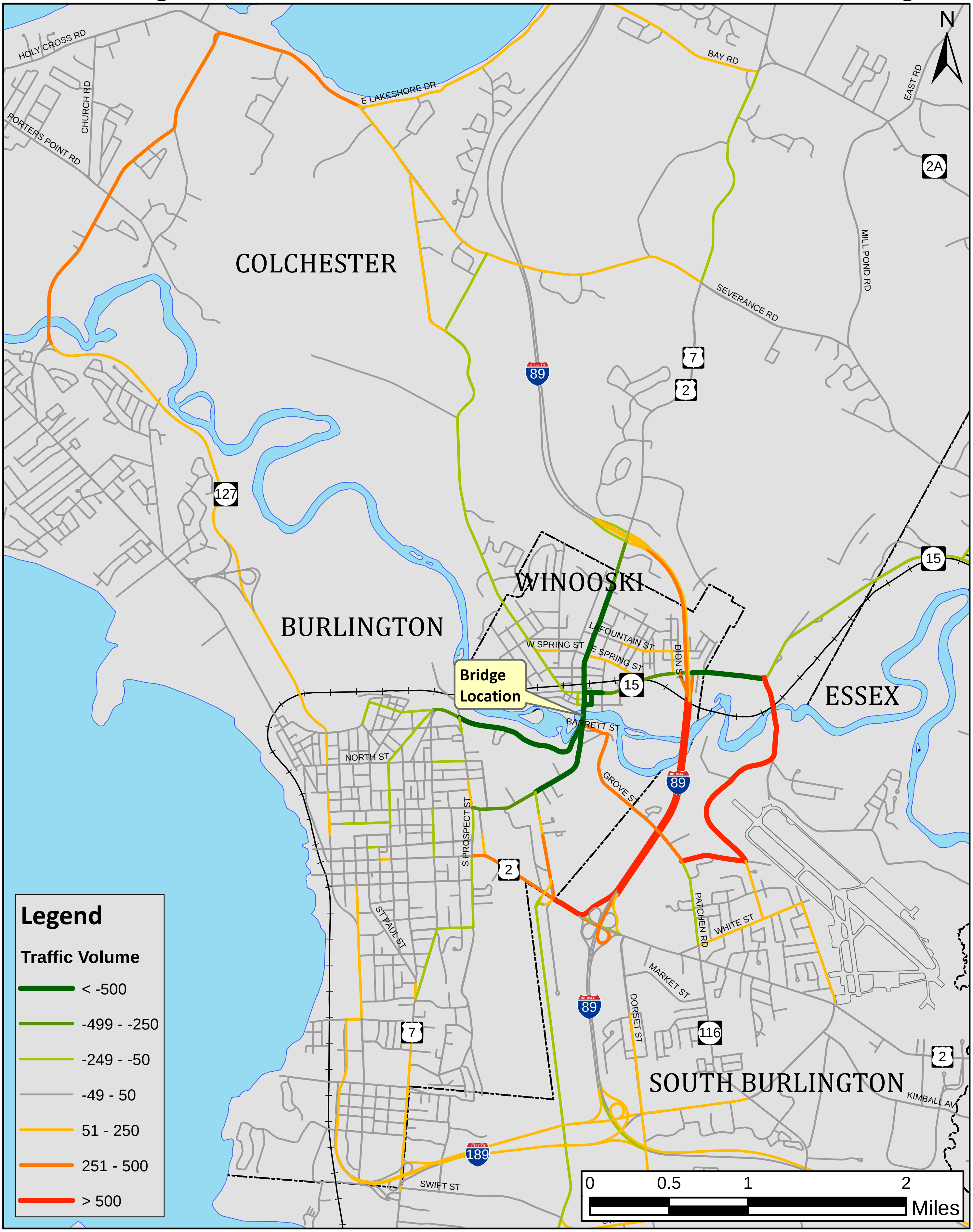

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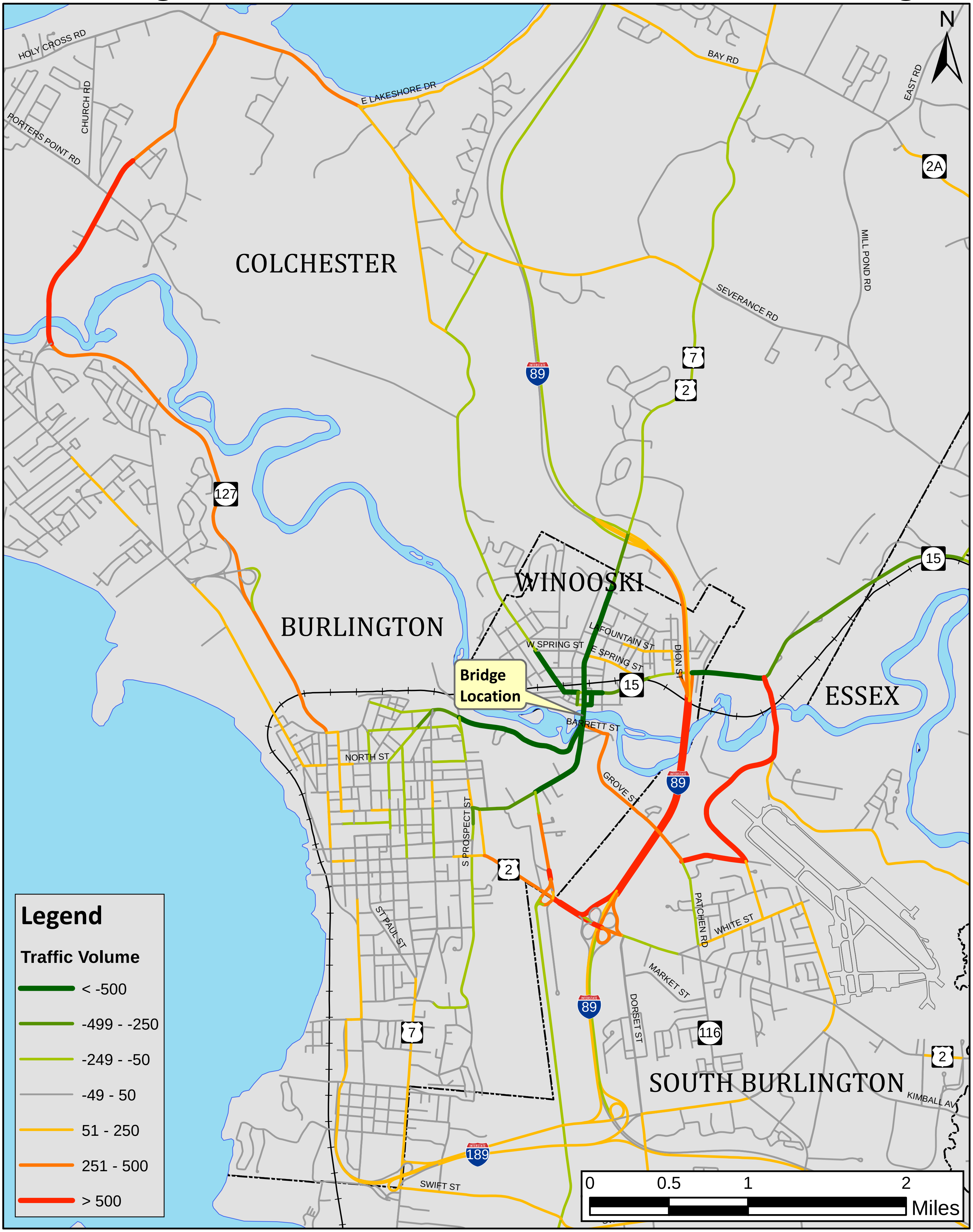

CHITTENDEN COUNTY REGIONAL PLANNING COMMISSION

SCOPING REPORT

FOR

MAIN STREET (US ROUTES 2 & 7) OVER WINOOSKI RIVER

Appendix H

Winooski & Burlington City Council Minutes and Resolution

CHITTENDEN COUNTY RPC
Communities Planning Together

McFarland Johnson

CITY OF WINOOSKI

27 WEST ALLEN STREET
WINOOSKI, VERMONT 05404
(802) 655-6410
(802) 655-6414 (fax)

JESSIE BAKER
CITY MANAGER

MAYOR SETH LEONARD
sleonard@winooskivt.org
DEPUTY MAYOR NICOLE MACE

CITY COUNCIL

COUNCILOR HAL COLSTON
COUNCILOR ERIC COVEY
COUNCILOR KRISTINE LOTT

Agenda
Monday, November 5, 2018
6:05 P.M.
CLAIRE BURKE COUNCIL CHAMBERS

I. **Call to Order**
II. **Pledge of Allegiance**
III. **Agenda Review**
IV. **Public Comment**
V. **Consent Agenda**
   a. Approval: City Council Minutes of October 15, 2018
   b. Approval: Warrants: Payroll for period 10/07/18 & 10/20/2018 , Warrant ending 11/02/2018
   c. Approval: Request for use of Senior Center Program Budget Reserves – R Coffey
   d. Approval: Request to Correct Manifest Errors in Grand List – J Baker
   e. Approval: SHARP Grant for OP/DUI/Equipment Support – R Hebert
   f. Approval: National Recreation and Park Association – 10 Minute Walk Grant – R Coffey
   g. Approval: Winooski Bridge Replacement Scoping Study Preferred Option – J Rauscher
VI. **City Update**
VII. **Council Reports**
VIII. **Regular Items:**
   a. Discussion: Pete Soons – Acknowledge Retirement from the Police Dept. – R Hebert
   b. Approval: Treasurer Appointment – S Leonard
   c. Discussion: Annual Update: Channel 17/Town Meeting Television – P Sarne
   d. Discussion: Winooski Valley Parks District (WVPD) Annual Presentation – R Coffey
   e. Discussion/Approval: Non-Union and Fire Compensation Policies and Plan – J Hulburd
   f. Approval: Fraternal Order of Police Contract – J Baker
      - Potential Executive Session Pursuant to 1V.S.A.§ 313 (1) (B) labor relations agreements with employees: Fraternal Order of Police
   g. Approval: Chittenden County Public Safety Authority Update and Fund Balance Allocation Request – J Baker
   h. Discussion: CIP Preview including Debt Service Modeling – J Rauscher
   i. Discussion: FY19 Policy Priorities and Strategy Update: Economic Vitality – H Carrington

IX. **Adjourn**

570

City of Winooski

27 West Allen Street
Winooski, VT 05404
(802) 655-6410

City Council Agenda Item

Agenda Item	**Winooski Bridge Replacement Scoping Study Preferred Option**
Date	**November 5, 2018**
Submitting Department	**Community and Economic Development/ Department of Public Works**
Recommended Action	**Select preferred Alternative(s)**
Strategic Vision Area and Strategy	**Municipal Infrastructure and Safe, Healthy, Connected People**
Expenditure Required (amount and source)	**$0**
Background Information	**On October 15th, 2018 The Chittenden County Regional Planning Commission (CCRPC) and McFarland Johnson presented an overview of the scoping study report, and the Winooski Bridge Advisory Committee's preferred alternatives for Council discussion and approval.** **Per CCRPC's recommendation, we are requesting that the Council formally accept the findings of the Winooski Bridge Advisory Committee as the preferred design concept.** **As discussed during the October 15th presentation, the findings are as follows;** **Select both Alternative 4 (existing piers widened) and Alternative 5 (new pier construction) as the recommended concept designs and that the bridge should be constructed using an accelerated bridge construction approach.**
Supporting Documents	**October 15th Winooski Powerpoint Presentation:** https://www.ccrpcvt.org/wp-content/uploads/2018/10/Winooski-City-Council-Meeting_20181015_V3.pdf **Winooski River Bridge Scoping Study Report is available at:** https://www.ccrpcvt.org/wp-content/uploads/2018/09/Winooski-River-Bridge-Scoping-Study-Draft-Final-Report.pdf
Interested Parties	**City of Winooski, City of Burlington, CCRPC**
City Manager Approval	

MINUTES

The Mayor call the meeting to order at 6:07 P.M. The meeting began with the Pledge of Allegiance by Deputy Mayor Mace.

Members Present:
Mayor Seth Leonard
Councilors: Nicole Mace, Eric Covey, Kristine Lott and Hal Colston
Officers Present:
Jessie Baker, City Manager; Angela Aldieri, Staff Accountant; Jon Rauscher, Public Works Director; Rick Hebert, Police Chief; John Audy, Fire Chief; J. Spittle, Battalion Chief; Ray Coffey, Community Services Director; Heather Carrington, Economic Development Director; Julie Hulburd, Human Resource Director; Angel Lane, Assistant City Clerk.
Others Present:
Peter and Kate Soons, Lauren Glenn- Davitian, Nick Warner, Erin Dupuis, Deborah Ragione, Ron Shakor, Dan Logan, Howard Wooden

III. Agenda Review – None
IV. Public Comment – None
V. Consent Agenda

MOTION by Councilor Mace seconded by Councilor Lott to approve the City Council Minutes of October 15, 2018 as presented. Voted and passed 4-0.

MOTION by Councilor Covey seconded by Councilor Lott to approve items b. – g. of the Consent Agenda as presented. Voted and passed 4-0.

VI. City Update

- Tomorrow is Election Day! Voting at the Senior Center (123 Barlow Street) from 7 am to 7 pm. We have already processed over 560 absentee ballots!
- All- Resident Voting Charter Change Commission landing page and advertisement for Commission members were published today. Interesting parties can submit applications on-line or come to City Hall.
- Community Services:
    - Many thanks to the nearly 600 people who braved the rainy weather to join us for the City's Halloween Event! It was an awesome time, and would not have been possible without the help of the many staff, volunteers, and partner organizations who hung decorations, scooped ice cream, ran activities, and handed out candy. Particular thanks to VSAC for allowing us to host the event in their space this year, and to Recreation and Parks Manager Alicia Finley for all her hard work to pull the event together!
    - Community Services recently issued a "Recreation Survey". It is available on our website and all social media platforms. Community Services will also be making it available in all City locations over the next few weeks.
    - Community Services is currently seeking volunteers for the following positions:

      Nepali Translator and Companion for the new American Senior Lunch and Learn, which happens every Friday from 11am-2pm at the Winooski Senior Center. The translator will

Resolution Relating to

SCOPING STUDY OF THE MAIN STREET/ WINOOSKI RIVER BRIDGE

RESOLUTION 4.01

Sponsor(s): Transportation, Energy Utilities Committee

Introduced: 03/25/19

Referred to: ____________

Action: adopted

Date: 03/25/19

Signed by Mayor: 03/29/19

CITY OF BURLINGTON

In the year Two Thousand Nineteen ....

Resolved by the City Council of the City of Burlington, as follows:

That WHEREAS, the City of Burlington partnered with the City of Winooski and the Chittenden County Regional Planning Commission to initiate a Scoping Study of the Main Street/Winooski River Bridge; and

WHEREAS, a Project Advisory Committee was established at the onset to include community leaders, neighborhood representatives, and community members in the decision-making process with local and regional staff; and

WHEREAS, the *Purpose and Need for the Scoping Study* was established by the Project Advisory Committee after input from the public at community meetings; and

WHEREAS, after public meetings and State agency meetings, the Project Advisory Committee considered five alternatives before selecting Alternatives 4 and 5 as the preferred alternatives; and

WHEREAS, Alternatives 4 and 5 will provide a roadway width of 52', pedestrian and bicycle accommodations on 12' shared-use paths on each side of the bridge, will be constructed using accelerated bridge construction, and final design will be coordinated with the Vermont Agency of Transportation; and

WHEREAS, the Transportation, Energy and Utilities Committee (TEUC) of the City Council has reviewed and supports Alternatives 4 and 5 for improvements to the Main Street/Winooski River Bridge;

NOW, THEREFORE, BE IT RESOLVED that the City Council directs the Department of Public Works to work with the State of Vermont and the City of Winooski to implement Alternatives 4 or 5 and keep the City Council's TEUC and project area Councilors informed of this work.

lb/NL/Resolutions 2019/DPW – Scoping Study of the Main Street - Winooski River Bridge
3/19/19

* * * * * * * * * * * * *

DISTRIBUTION:

I hereby certify that this resolution has been sent to the following department(s) on

DPW Director Spencer
DPW, Nicole Losch

Attest:

Lori Olberg
Licensing, Voting and Records Coordinator

* * * * * * * * * * * * *

ORIGINAL

RESOLUTION RELATING TO

Scoping Study Of The Main Street/Winooski River Bridge

Adopted by the City Council

March 25, 2019

.... Clerk

Approved March 29, 2019

.... Mayor

Vol. .... Page ....