

WATERVLIET BICYCLE MASTER PLAN

MOHAWK HUDSON BIKE HIKE TRAIL CONNECTION



December 2013

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The recommendations in this study are conceptual in nature and do not commit NYSDOT to the proposed projects. The concepts presented in this report (or in an illustration) may need to be investigated in more detail before any funding commitment is made. Undertaking additional engineering or other follow up work will be based upon funding availability.

Executive Summary

The City of Watervliet Bicycle Master Plan is intended to serve as the guiding document for the development of a network of bicycle routes linking activity centers within the City, as well as to the larger regional network. The City of Watervliet Bicycle Master Plan was developed in two parts: this report that focuses on the Mohawk Hudson Bike Hike Trail through the City of Waervliet, and another report that focuses on an intracity bicycle network.

The section of the Mohawk Hudson Bike Hike Trail in Watervliet has been the subject of planning efforts for several years. The Watervliet Comprehensive Plan, adopted in 2011 calls for the completion of the trail segment. The 2003 Crossroads Connection Study identified filling this gap in the regional trail system a high priority. The Albany Hudson River Water Front Strategy Study also called for the development of a more detailed plan for the Watervliet trail segment. Both east and west side alternatives are evaluated to determine the most beneficial alternative for Watervliet.

Four alternatives for the MHBHT were considered. All of these alternatives started at the 4th Street Trailhead and continued north to Hudson Shores Park.

- A combination of shared lane markings and bike lanes
- A combination of shared lane markings and a cycle track along Broadway
- A shared use path on the east side of Broadway, along I-787.
- A shared use path along the Hudson River, on the east side of I-787.

Based on cost, ease of maintenance, and protection and separation from vehicles, the cycle track is recommended at the short term alternative. At the 4th Street trailhead, the MHBHT would continue along Broadway with shared lanes. At the intersection of 3rd Avenue, a cycle track would continue along Broadway on the east side of the roadway. Existing storm grates will need to be replaced with bicycle friendly grates and a buffer with bollards installed as shown below. After the Congress Street Bridge, the cycle track will transition to a shared use path that will follow the I-787 right-of-way to 23rd Avenue and lead into Hudson Shores Park. The river alternative should continue to be pursued as a long term alternative as funding becomes available.



1 Introduction

The City of Watervliet Bicycle Master Plan is intended to serve as the guiding document for the development of a network of bicycle routes linking activity centers within the City, as well as to the larger regional network. The City of Watervliet Bicycle Master Plan was developed in two parts: this report that focuses on the Mohawk Hudson Bike Hike Trail through the City of Waervliet, and another report that focuses on an intracity bicycle network.

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The proposed project will advance various local planning goals. It will become part of the City's comprehensive planning process and help achieve regional goals of promoting alternative transportation and smart growth.

1.1 Public Involvement

The 1st Public Meeting was held on May 6th 2013 at the Watervliet Senior Center. The community was presented with key project objectives, and discussed opportunities for creating a complete bicycle network in the City as well as an improved connection to the Mohawk Hudson Bike Hike Trail. Meeting attendees discussed opportunities and challenges in groups and presented their comments at the end of the meeting.

The 2nd public meeting was held on October 8th, 2013 at the Watervliet Senior Center to gather feedback on the proposed bicycle network and Mohawk Hudson Bike Hike Trail alternatives. The meeting began with a presentation describing the existing conditions analysis including the bicycle level of service analysis and crash analysis. The recommended City-wide bicycle network was described, along with a summary of the different types of bicycle accommodations proposed throughout the City, such as shared lanes, bike lanes, cycle tracks, and bicycle boulevards. Lastly, the four alternatives for the Mohawk Hudson Bike Hike Trail were described. For each alternative, the alignment, cross sections, and costs were presented. Following the presentation, the attendees at the public meeting discussed the alternatives that were presented.

In addition to these two public meetings, comments could be provided through the project website. Maps and deliverables were posted and an online survey was also included to gather information related to current bicycle use.

2 Existing Conditions

2.1.1 Comprehensive Plan

The City of Watervliet completed a Comprehensive Plan in 2010. The Plan documents existing conditions and goals for several aspects of the City including: demographics, housing, economy, land-use, infrastructure, environment, and community assets. The overarching vision for the City of Watervliet is to become a sustainable community with economic opportunities and a high quality of life.

Nine goals results from the Comprehensive Plan. Five of these goals can be supported directly and indirectly through improving the Mohawk Hudson Bike Hike Trail infrastructure and use within the City of Watervliet. These goals include:

Goal 1: Create an attractive and functional built environment that meets the needs of existing residents and businesses while creating opportunities to attract new residents and economic opportunities.

Goal 4: Offer high-quality recreation amenities.

Goal 5: Maintain and upgrade the City's infrastructure.

Goal 6: Preserve and promote Watervliet's community character and the City's rich cultural and historic resources.

Goal 9: Improve access to the waterfront by implementing the City's Local Waterfront Revitalization Program (LWRP).

2.1.2 Local Waterfront Revitalization Program (LWRP)

The LWRP was approached in 2005. The LWRP describes 6 acres of freshwater wetlands located near the City's southern border known as the Little River. Two Class D streams, one in the southern end and one in the northern end, were also identified. Both of these streams run into the Hudson River. The LWRP also identifies the 100-year flood zone that includes most of Broadway and 1st Street, and portions of 13th, 14th, 15th Streets and 1st, 2nd, 3rd Avenues. Key issues and opportunities that were identified in the LWRP include the Hudson Shores Park, access to the Hudson River waterfront, and a connection to the history of the City's waterfront. Several projects were proposed as part of the process and include improvements to the Hudson Shores Park and the Mohawk Hudson Bike-Hike Trail. Projects to improve waterfront accessibility for both vehicles and pedestrians were included, along with preservation and economic development projects.

2.1.3 The Mohawk Hudson Bike-Hike Trail Crossroads Connections Study

A study to enhance the Mohawk Hudson Bike-Hike Trail, and continue the off-road portions of the trail was completed in 2003. The study recommends an off-road alternative on the east side of I-787 along the Hudson River through the City of Watervliet. An 8 foot shared use path is identified for this limited right-of-way, partially of asphalt and partially of concrete. This section includes over 7,500 feet of shoreline. Approximately 1,600 feet of this section is severely limited in area and slope. The installation of a bulkhead is recommended in this section. The total cost to complete the trail, bulkhead, and Hudson Shores Park trail-head, as estimated in 2003, would be \$1.4 million.



2.2 Existing Conditions

Although the pedestrian network is robust, there are few bicycle accommodations available within the City of Watervliet. Bike racks are present in several locations, typically in conjunction with CDTA bus stops. A bike rack is also located at the Fourth Street trailhead for the Mohawk Hudson Bike-Hike Trail. There are no shared-use paths through the City. NYS Bike Route 9 is located along 3rd Avenue and 2nd Avenue, following NYS Route 32. The only on-road bicycle accommodations are the Mohawk Hudson Bike-Hike Trail wayfinding signs. Even though signage and striping for bicyclists is not present, the majority of the City's street network is low-volume residential streets, which lend themselves well to bicyclists. Section 2.2.1 describes the Mohawk Hudson Bike Hike Trail through the City of Watervliet in detail.

Demographics reported in the 2011 American Communities Survey (ACS) show that approximately 9% of households in Watervliet do not own a vehicle and 34% of households only own one vehicle. While a majority of people living in Watervliet travel more than 10 minutes or more, 10% have a travel time between 5 and 9 minutes and approximately 2.5 % have a travel time less than 5 minutes. Currently, only 0.2% of the population bike to work,

while 5% walk. The current demographic data related to travel times and vehicle ownership show that there is room for improvement to the mode share for walking and bicycling.

2.2.1 Mohawk Hudson Bike Hike Trail

History of the Trailway

The Mohawk Hudson Bike Hike Trail (MHBHT) has provided Capital District residents and tourists with scenic views of the Mohawk and Hudson rivers and access to surrounding river communities since the early 1980s. With construction commencing in the late 1970s, the trail was built along the historic Erie Canal towpath and segments of abandoned railroad rights of way.¹ When completed, the MHBHT became the easternmost segment of the Erie Canalway National Heritage Area Corridor, which includes over 260 miles of multi-use, recreational trails across upstate New York from Albany to Buffalo. Today, the MHBHT is one of the longest uninterrupted and most popular segments of the corridor.²

Trail Description

The MHBHT stretches for about 42 miles, from the Erastus Corning Riverfront Preserve in downtown Albany in the south, to the Hamlet of Pattersonville in the Town of Rotterdam in the west. The MHBHT is part of the NYS Erie Canal Trail. Many trail users choose to begin their experience on the MHBHT at the Corning Preserve and head north along the trail towards Watervliet. This approximately five mile section of the trail is a paved, shared use path that provides inspiring views of the Hudson River. The trail continues on-road north through Watervliet, Green Island, and Cohoes for about four miles, and again connects in Cohoes to a long off-road segment along a historic rail corridor following the Mohawk River.

Trail Cross Sections

Of the trails 42 total miles, approximately 33 miles of the trail are routed along paved asphalt shared-use paths, separating trail users from motorized traffic. The width of these portions of the trail ranges from 8-10 feet wide. Approximately nine miles of the trail are routed on streets, with trail users travelling alongside motorized vehicles. For these segments of the trail, the traffic and pavement conditions, signage, and safety levels vary. Trail users have lamented those sections of the on-road portions of the MHBHT are not well signed, making navigation and connection to the off-road portions difficult.³

Trail Users

In terms of trail uses allowed, all non-motorized modes of travel are permitted with the exception of horseback riding. Popular trail uses include walking, jogging, bicycling and rollerblading, and cross country skiing and snowshoeing in the winter months. The trail system is wheelchair accessible. A trail user survey for the Mohawk Hudson Bike Hike Trail, conducted by the City of Schenectady in 1998, estimated that the trail attracts about 458,000 annual trail user visits. A more recent trail user survey published by the Capital District Transportation Committee in 2006, estimated that the trail attracts 241,000 individual user sessions per year. The 2006 CDTC survey polled almost double the amount of trail users as compared to the 1998 Schenectady led effort (1,775 trail users in 2006 compared to 928 trail users in 2008).

The 1998 City of Schenectady survey concluded that the majority of trail users (64.5 percent) travel 5 miles or less to access the trail, indicating that most the people who use the trail live nearby. Only a very small minority of trail users surveyed, about 4 percent, traveled from outside of the Capital District to use the trail system – showing that the great majority of trail users live within the Capital District. This is important because the report noted that the further people travelled to use the trail, the more economic activity they were estimated to generate.

¹ (Stephen J. Feeney, 1998)

² (Schenectady County, 2007)

³ (Rails-to-Trails Conservancy, 2011)

The 2006 CDTC survey posed a different question to determine where trail users were coming from to access the trail system. This survey asked the users if they, A) Lived in a Trail Community, B) Lived in the Capital District, or C) Lived Outside the Region. Of the trail users surveyed, 62 percent reported that they lived within a Trail Community, and 96 percent reported that they lived in the Capital District. The results of this survey again indicated that the great majority of Mohawk Hudson Hike Bike Trail users are from the Capital District, and that more than half of the users live within a Trail Community.

2.2.2 The Mohawk Hudson Bike Hike Trail in Watervliet

Off-Road Segment

The off-road segment of the Mohawk Bike Hike Trail that travels through the City of Watervliet is approximately .22 miles long. This portion of the trail is paved with asphalt and is 10 feet wide. The off-road portion of the trail in Watervliet ends at a trailhead/parking lot, and then continues on-road northbound. The Watervliet trailhead is well equipped to service trail users, providing parking, benches, and beautiful views of the Hudson River, but does not provide bathroom facilities. The trail running between the Watervliet trailhead and Albany's Corning Preserve is a very popular route, but fewer trail users chose to continue north along the on-road portion of the trail.



On-Road Portion

The on-road portion of the Mohawk Bike Hike Trail travels approximately 1.9 miles along Broadway in the City of Watervliet. Road, traffic, and bicycle and pedestrian accommodations vary within the corridor. Several Mohawk Hudson Bike Hike Trail wayfinding signs are placed along the length of the corridor to guide trail users (see map).

To continue along the trail from the Watervliet Trailhead, trail users must head west under a small bridge and up a slight hill to Broadway. The users then turn right onto Broadway and continue north. Between 4th street and the intersection of Broadway and 3rd Ave (Route 32), Broadway is a two-lane road, providing one travel lane in each direction with an approximate cross-section of 33 feet from curb to curb. Traffic volumes and speeds are low, and on street parking is permitted on both sides of the street. A narrow sidewalk, between 3-4 feet, is present on the western side of Broadway in this section of the road. There is no sidewalk present on the western side of the street and there are no striped shoulders in this section.

The intersection of Broadway and Route 32 is signalized. Sidewalks are present on three of the intersection approaches, and there are two crosswalks. One crosswalk is positioned north/south across 3rd Ave, and the other is positioned east/west across Broadway. Pedestrian crossing buttons are provided all four crosswalk approaches.

North of the intersection of Route 32 and Broadway, traffic volumes and speeds along the roadway increase. Between this intersection and the intersection of Broadway and 13th Street, Broadway continues as a two-lane road providing one travel lane in each direction, with an approximate cross-section of 38-40 feet from curb to curb. Parking is only permitted on the western side of the street. A sidewalk is present on the western side of Broadway that varies in size. South of the Watervliet Arsenal, the western sidewalk is 4-5 feet wide. In front of the Arsenal, the sidewalk widens to 10 feet for .3 miles, and then again narrows to 5 feet past the Arsenal. Striped shoulders are provided on both sides of the street in this section of Broadway. The western shoulder is wide to accommodate parking, measuring approximately 10 feet, while the eastern shoulder is narrow, at approximately 2 feet. Several sewer grates are placed within the eastern shoulder forcing bicyclist to enter the roadway to avoid the gutters (see map). There are no sidewalks present on the western side of the street. In front of the Arsenal, a long

(unused) queue lane is present in the southbound direction for 500 feet. Parking is not permitted on either side of the street.

The intersection of Broadway and 13th Street is a signalized intersection. Sidewalks are present on three of the intersection approaches, and there are two crosswalks. One crosswalk is positioned north/south across 13th St, and the other is positioned east/west across Broadway. Pedestrian crossing buttons are provided at all four crosswalk approaches.

Between 13th Street and 16th street, Broadway continues as a two-lane road providing one travel lane in each direction, with an approximate cross-section of 38-40 feet from curb to curb. Again, parking is only permitted on the western side of the street, and a 5 foot sidewalk is present on this side of the street as well. Shoulders are provided on both sides of the street, and the widths of the shoulder vary, with the western shoulder averaging 10 feet and the eastern shoulder 2 feet.

The intersection of Broadway and 16th Street is not signalized. Sidewalks are present on all four of the intersection approaches, and there is one crosswalk positioned north/south across 16th Street. At the intersection, the northbound approach of Broadway provides a left turn lane, as does the eastbound approach of 16th street. A pedestrian refuge median is provided on 16th street, and a striped median is present on the southbound approach to the intersection along Broadway.

Between 16th Street and 23rd street, Broadway continues as a two-lane road providing one travel lane in each direction, with an approximate cross-section of 38-40 feet from curb to curb. Parking is only permitted on the western side of the street, and sidewalks are present on both sides of the street. Shoulders are striped directly north of 16th street, but do not continue past the 19th Street Bridge.

The intersection of Broadway and 23rd Street is signalized and heavily trafficked, providing direct access to I-787. Sidewalks are present at three of the intersection approaches. The total number of lanes at the intersection is fourteen. There are three crosswalks present: the first is positioned east/west across Broadway (northbound approach), the second is positioned north/south across 23rd street, and the third is positioned east/west across Broadway (southbound approach). Pedestrian crossing buttons are provided at all four crosswalk approaches, but there are no pedestrian count signals. Crossing this intersection as a pedestrian or bicyclist is difficult, with heavy traffic volumes and no indication to the pedestrian of when it is safe to cross.

Between 23rd Street and 25th street, Broadway continues as a two-lane road providing one travel lane in each direction, with an approximate cross-section of 38-40 feet from curb to curb. Parking is permitted on both sides of the street, and sidewalks are present on both sides as well. The western sidewalk is slightly wider and in better condition. Shoulders are not present in this section of Broadway.

The intersection of Broadway and 25th Street is signalized. Sidewalks are present on all four of the intersection approaches, with the exception of the south side of the westbound approach. There are two crosswalks provided at the intersection. The first is positioned east/west across Broadway and the second is positioned north/south across 25th street. Pedestrian crossing buttons are not provided at any of the crosswalk approaches. The Mohawk Hudson Bike Hike Trail then continues northeast on-road into Green Island.

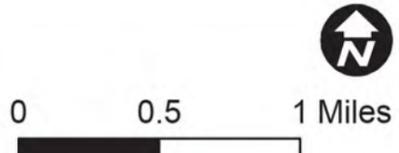


Mohawk Hudson Bike Hike Trail

City of Watervliet Southern Portion



Source: NY State GIS Clearinghouse,
CDTC, NYSDOT
Date: May 2013
Authors: Sam Piper



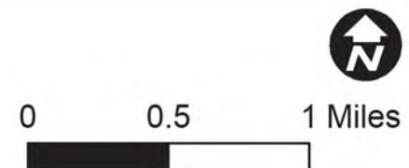


Mohawk Hudson Bike Hike Trail

City of Watervliet Northern Portion



Source: NY State GIS Clearinghouse, CDTC, NYSDOT
 Date: May 2013
 Authors: Sam Piper



2.2.3 Crash Data Summary and Analysis

Crash Data for crashes involving pedestrian and bicycles within the City of Watervliet's Mohawk Hudson Bike Hike Trail Corridor, was extracted from the NYS ALIS LESQR/QRA database containing data from the NYS DMV and DOT for the 5 year time period from January 1st 2008 to December 31st, 2012. Data is complete for the 5 year time period. Data was also extracted for the incomplete period between December 31st, 2012 and August 19th 2013.

A total of 6 crashes involving pedestrians and bicycles occurred within the City's MHBHT Corridor in the 5 year period. 4 of the 6 crashes involved pedestrians and 2 involved bicyclists. The data is summarized in an Excel table and displayed on a map. Further analysis including many factors such as demographics, geography, and human behavior and led to the following highlights:

Severity

5 of the 6 crashes (83%) involved injuries. There were a total of 5 persons injured. Of those injuries 2 were classified as a possible injury, 2 as non-incapacitating and one as incapacitating.

Demographics

50% of the 4 pedestrian crashes involved children under the age of 18. This included 4 total pedestrians and one driver. Two of the 6 crashes (33%) included seniors over 65, one as a pedestrian and one as a driver in a bicycle crash.

Geography

In terms of frequency, there were no locations within the City's MHBHT Corridor where multiple crashes involving bicyclists or pedestrians occurred within the given time period.

Human Behavior

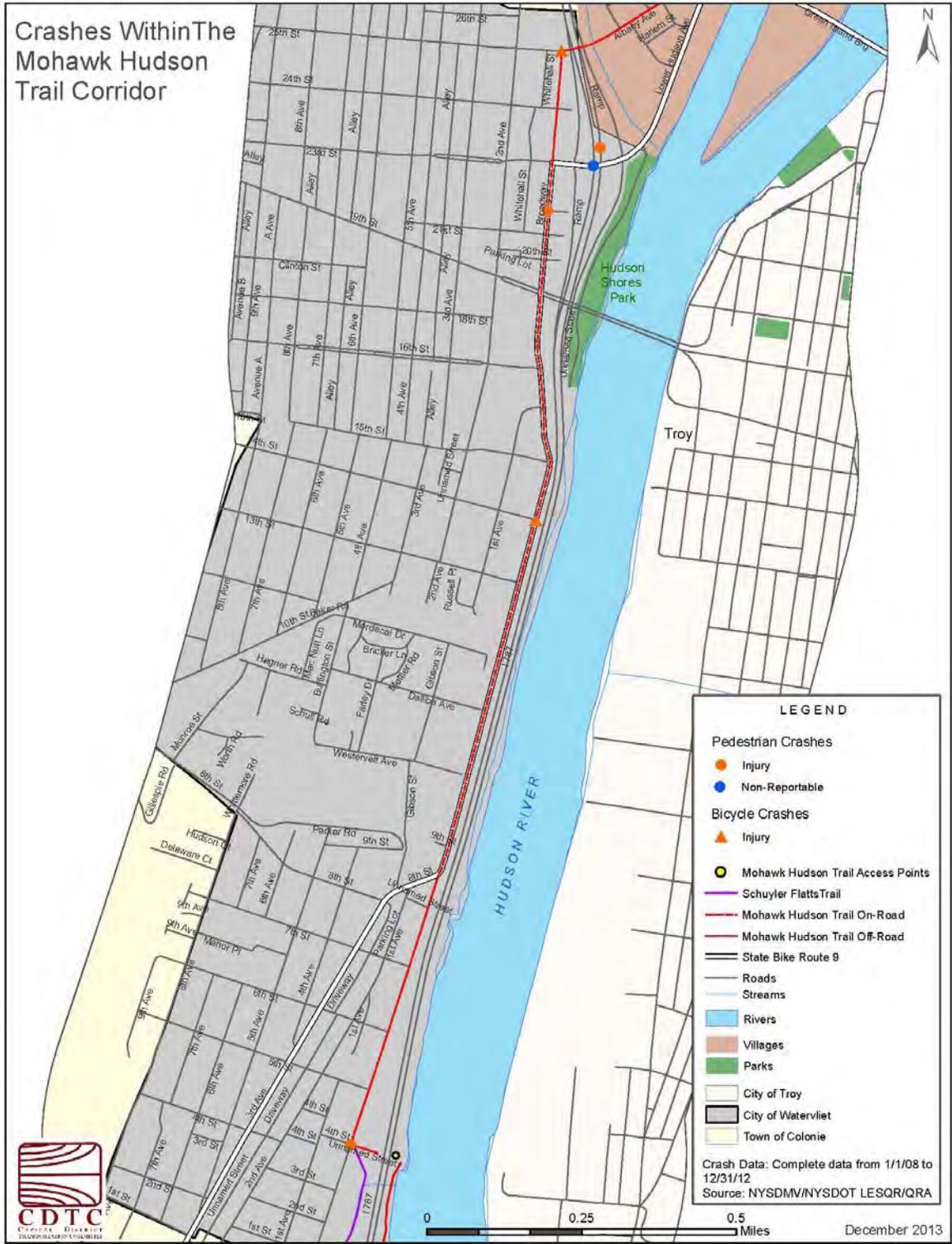
The contributing or associated factors assigned to drivers and pedestrians were similar in both bicycle and pedestrian crashes. For Drivers, Driver Inattention and Failure to Yield the Right of Way contributed to half of all crashes. In terms of fault from what can be gathered from the apparent or contributing factors, drivers were at fault alone in at least 50% of the crashes. For bicyclists and pedestrians, 5 of the 6 crashes (83%) had no contributing factor assigned to the bicyclist or pedestrian, however in two of the pedestrian crashes, the action and/or location of the pedestrian may have contributed to the crash (Playing in Roadway and Walking Along Highway with Traffic).

Enforcement

Citations were issued to drivers in 3 of the 6 crashes (50%). Two of those for crashes involving a pedestrian and one for crashes involving a bicyclist.

Environment

All of crashes occurred on dry roads. Five of the six crashes occurred in daylight, one at dawn. Half of the crashes occurred in areas where there was no traffic control device and half occurred at locations controlled by traffic signals. 50% of crashes occurred at intersections. Crashes were fairly evenly dispersed throughout the years. Seasonally, all but one crash occurred between July and September.



3 Benefits of Trails

An improved MHBHT through the City of Watervliet will help to improve the health and fitness of residents, enhance environmental conditions, decrease traffic congestion, and contribute to a greater sense of community. Scores of studies from experts in the fields of public health, urban planning, urban ecology, real estate, transportation, and economics consistently back-up such claims and affirm the value of supporting trails as it relates to active living and alternative transportation.

3.1.1 Increased Health and Physical Activity

A growing number of studies show that the design of our communities—including neighborhoods, towns, transportation systems, parks, trails and other public recreational facilities—affects people’s ability to reach the recommended daily 30 minutes of moderately intense physical activity (60 minutes for youth). According to the Centers for Disease Control and Prevention (CDC), “physical inactivity causes numerous physical and mental health problems, is responsible for an estimated 200,000 deaths per year, and contributes to the obesity epidemic.”⁴ The increased rate of disease associated with inactivity reduces quality of life for individuals and increases medical costs for families, companies, and local governments.

The CDC determined that creating and improving places to be active could result in a 25% increase in the number of people who exercise at least three times a week.⁵ This is a significant consideration for people who are inactive. Even small increases in physical activity can bring measurable health benefits. Establishing a safe and inviting MHBHT through the City of Watervliet will positively impact the health of local residents. The Rails-to-Trails Conservancy puts it simply: “Individuals must choose to exercise, but communities can make that choice easier.”⁶

3.1.2 Economic Benefits

Bicycling is an affordable form of transportation. According to the Pedestrian and Bicycle Information Center (PBIC), of Chapel Hill, NC, the cost of operating a bicycle for a year is approximately \$120, compared to \$7,800 for operating a car over the same time period.⁷ Bicycling becomes even more attractive from an economic standpoint when the unstable price of oil is factored into the equation (e.g., in spring 2010, gasoline prices approached \$4 a gallon).⁸ The fluctuating cost of fuel reinforces the idea that local communities should be built to accommodate people-powered transportation, such as walking and biking. Linking the City of Watervliet’s residential neighborhoods to the MHBHT and providing a more protected facility could facilitate a substantial local reduction in auto- and oil-dependency.

From a real estate standpoint, the MHBHT could have a considerable impact. According to a 2002 survey of homebuyers by the National Association of Home Realtors and the National Association of Home Builders, trails ranked as the second most important community amenity out of a list of 18 choices.⁹ Additionally, the study found that ‘trail availability’ outranked 16 other options including security, ball fields, golf courses, parks, and access to shopping or business centers. Findings from the American Planning Association (How Cities Use Parks

⁴ U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (1996). Physical Activity and Health: A Report of the Surgeon General.

⁵ U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. (2002). Guide to Community Preventive Services.

⁶ Rails-to-Trails Conservancy. (2006) Health and Wellness Benefits.

⁷ Pedestrian and Bicycle Information Center. (2008). Economic Benefits: Money Facts. Retrieved 8/8/2008 from www.bicyclinginfo.org/why/benefits_economic.cfm

⁸ King, Neil. The Wall Street Journal: Another Peek at the Plateau. (2/27/08): In February 2008, the Wall Street Journal quoted industry experts, stating, “supply constraints could push the price of oil to \$150 a barrel by 2010”.

⁹ National Association of Realtors and National Association of Home Builders. (2002). Consumer’s Survey on Smart Choices for Home Buyers.

for Economic Development, 2002), the Rails-to-Trails Conservancy (Economic Benefits of Trails and Greenways, 2005), and the Trust for Public Land (Economic Benefits of Parks and Open Space, 1999) further substantiate the positive connection between trails and property values across the country.

Finally, from a tourism perspective, cyclists can add real value to local economies. For example, in the Outer Banks, NC, bicycling is estimated to have an annual economic impact of \$60 million; 1,407 jobs are supported by the 40,800 visitors for whom bicycling was an important reason for choosing to vacation in the area. The annual return on bicycle facility development in the Outer Banks is approximately nine times higher than the initial investment.⁷ Similarly, Damascus, VA, the self-proclaimed 'Friendliest Trail Town', features 34 miles of trail where approximately \$2.5 million is spent annually related to recreation visits. Of this amount, non-local visitors spend about \$1.2 million directly into the economies of Washington and Grayson counties.¹⁰ While these examples feature beach and mountain destinations, the City of Watervliet also has key advantages, such as its parks system, the Hudson River, and proximity to Albany and Troy. This supports the need to enhance the MHBHT through the City of Watervliet and provide connections and signage from the trail to local businesses.

3.1.3 Environmental Improvements

As demonstrated by the Southern Resource Center of the Federal Highway Administration, when people get out of their cars and onto their bicycles, they reduce measurable volumes of pollutants.¹¹ Other environmental impacts include a reduction in overall neighborhood noise levels and improvements in local water quality as fewer automobile-related discharges wind up in the local rivers, streams, and lakes. Trails and greenways convey unique environmental benefits. Greenways protect and link fragmented habitat and provide opportunities for protecting plant and animal species. Aside from connecting places without the use of air-polluting automobiles, trails and greenways also reduce air pollution by protecting large areas of plants that create oxygen and filter air pollutants such as ozone, sulfur dioxide, carbon monoxide and airborne particles of heavy metal. Finally, greenways improve water quality by creating a natural buffer zone that protects streams, rivers and lakes, such as the Hudson River, preventing soil erosion and filtering pollution caused by road runoff.

3.1.4 Transportation Benefits

In 2001, the National Household Travel Survey found that roughly 40% of all trips taken by car are less than 2 miles. By taking these short trips on a bicycle, rather than in a car, citizens can substantially impact local traffic and congestion. Traffic congestion reduces mobility, increases auto-operating costs, adds to air pollution, and causes stress. Bicycle users can help alleviate overall congestion because each cyclist is one less car on the road. Incidentally, cyclists take up significantly less space on the road.

Additionally, many people do not have access to a vehicle or are not able to drive. According to the National Household Travel Survey (NHTS), one in 12 U.S. households do not own an automobile and approximately 12 percent of persons 15 or older do not drive.¹² Connecting the MHBHT to the City of Watervliet provides greater and safer mobility for these residents.

¹⁰ Virginia Department of Conservation. (2004). The Virginia Creeper Trail: An Assessment of User Demographics, Preferences, and Economics.

¹¹ Federal Highway Administration, Southern Resource Center. (1999). Off-Mode Air Quality Analysis: A Compendium of Practice. To calculate air quality benefits of bicycling, first calculate the Daily VMT reduction. $VMT\ Reduction = PD * Area * L * BMS$, where PD = Population density, persons/mile; Area = Project length * 1 mile radius, mile; L = Round trip length, one-half of the project length times 2 daily trips, miles; BMS = Bike mode share, %. Last, calculate the Daily Emission reductions for a pollutant. $Ed = Efx * VMT\ Reduction$, where Ed = Daily Emissions, grams/day; Efx = Emission factor for pollutant x, grams/mile; VMT = vehicle mile/day.

¹² U.S. Department of Transportation (DOT), Bureau of Transportation Statistics (BTS) and the Federal Highway Administration (FHWA). (2002). National Household Travel Survey.

3.1.5 Quality of Life

Many factors go into determining quality of life for the citizens of a community: the local education system, prevalence of quality employment opportunities, and affordability of housing are all items that are commonly cited. Increasingly though, citizens claim that access to alternative means of transportation and access to quality recreational opportunities such as parks, trails, greenways, and bicycle routes, are important factors for them in determining their overall pleasure within their community. Communities with such amenities can attract new businesses, industries, and in turn, new residents. Furthermore, quality of life is positively impacted by bicycling through the increased social connections that take place by residents being active, talking to one another and spending more time outdoors and in their communities.

According to the Brookings Institution, the number of older Americans is expected to double over the next 25 years.¹³ All but the most fortunate seniors will confront an array of medical and other constraints on their mobility even as they continue to seek both an active community life, and the ability to age in place. Trails built as part of the bicycle transportation network generally do not allow for motor vehicles; however, they do accommodate motorized wheelchairs, which is an important asset for the growing number of senior citizens who deserve access to independent mobility.

¹³ Brookings Institution. 2003. The Mobility Needs of Older Americans: Implications for Transportation Reauthorization.

5 Mohawk Hudson Bike Hike Trail

Four alternatives have been considered for the Mohawk Hudson Bike Hike Trail (MHBHT) through the City of Watervliet. Three of the four alternatives follow the same alignment of the existing MHBHT with a range of proposed accommodations. Each of these alternatives includes a shared lane treatment on Broadway, from the existing trailhead at 4th Street to the intersection of NYS Route 32. The proposed shared lanes will include updated signage, pavement markings, and traffic calming devices.

5.1 On-Road Alternative

The On-Road alternative will provide bicycle lanes along Broadway, from the intersection of NYS Route 32, north to 20th Street (just north the Congress Street Bridge). In front of the Watervliet Arsenal, a parking lane is provided but not necessary. In this section, the parking lane will be removed to provide buffered bike lanes, with a 3 foot separation between the bike lane and the travel lanes. Beyond the Watervliet Arsenal, the cross section will return to bike lanes, travel lanes, and a parking lane. At 20th Street, Broadway becomes too narrow to provide bicycle lanes. Shared lane markings are proposed on Broadway to 25th Street. Bicycle lanes will be provided on 23rd Street, through the intersections with I-787, to provide a connection to Hudson Shores Park.



Planning Level Cost Estimate: \$250,000

5.2 Cycle Track Alternative

The Cycle Track alternative will provide a two-way cycle track on the east side of Broadway, from the intersection of NYS Route 32, north to 20th Street (just north of the Congress St Bridge). The proposed cross section will allow for parking to be maintained the length of Broadway to 20th Street. In areas where parking is not required, this extra roadway width can be allocated to a western shoulder and wider travel lanes. At 20th Street, either shared lane markings on Broadway or a shared use path along the I-787 right-of-way will provide access to 23rd

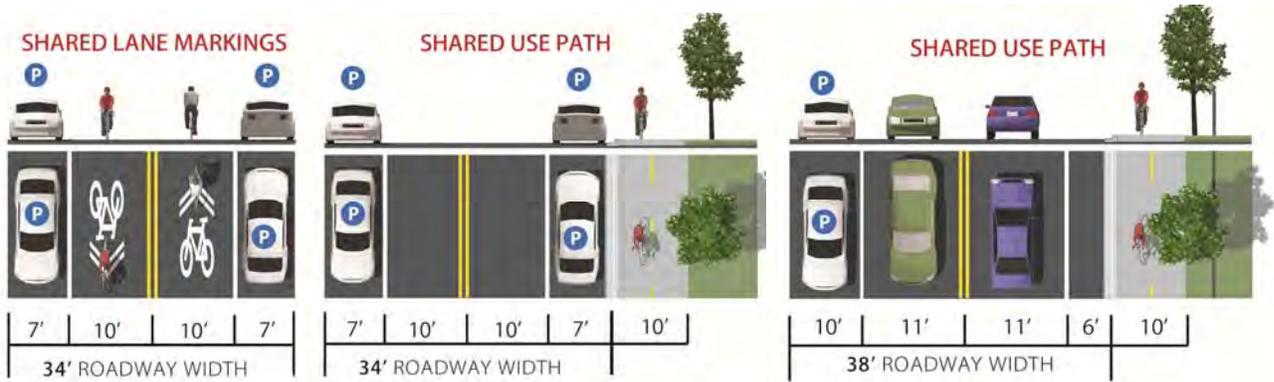
Street, and Hudson Shores Park.



Planning Level Cost Estimate: \$370,000

5.3 Off Road Alternative

The side path alternative will provide an 8 foot shared use path on the east side of Broadway, from the intersection of 6th Street, north to 20th Street (just north of the Congress St Bridge). Some grading and tree removal will be required and additional screening will needed along the I-787 right-of-way. In some locations, the ROW fence will need to be relocated and a retaining wall may be needed. Alternatively, the curb could be moved west, but this would require extensions to the existing drainage structures. At 20th Street, a shared use path along the I-787 right-of-way will provide access to 23rd Street, and Hudson Shores Park.



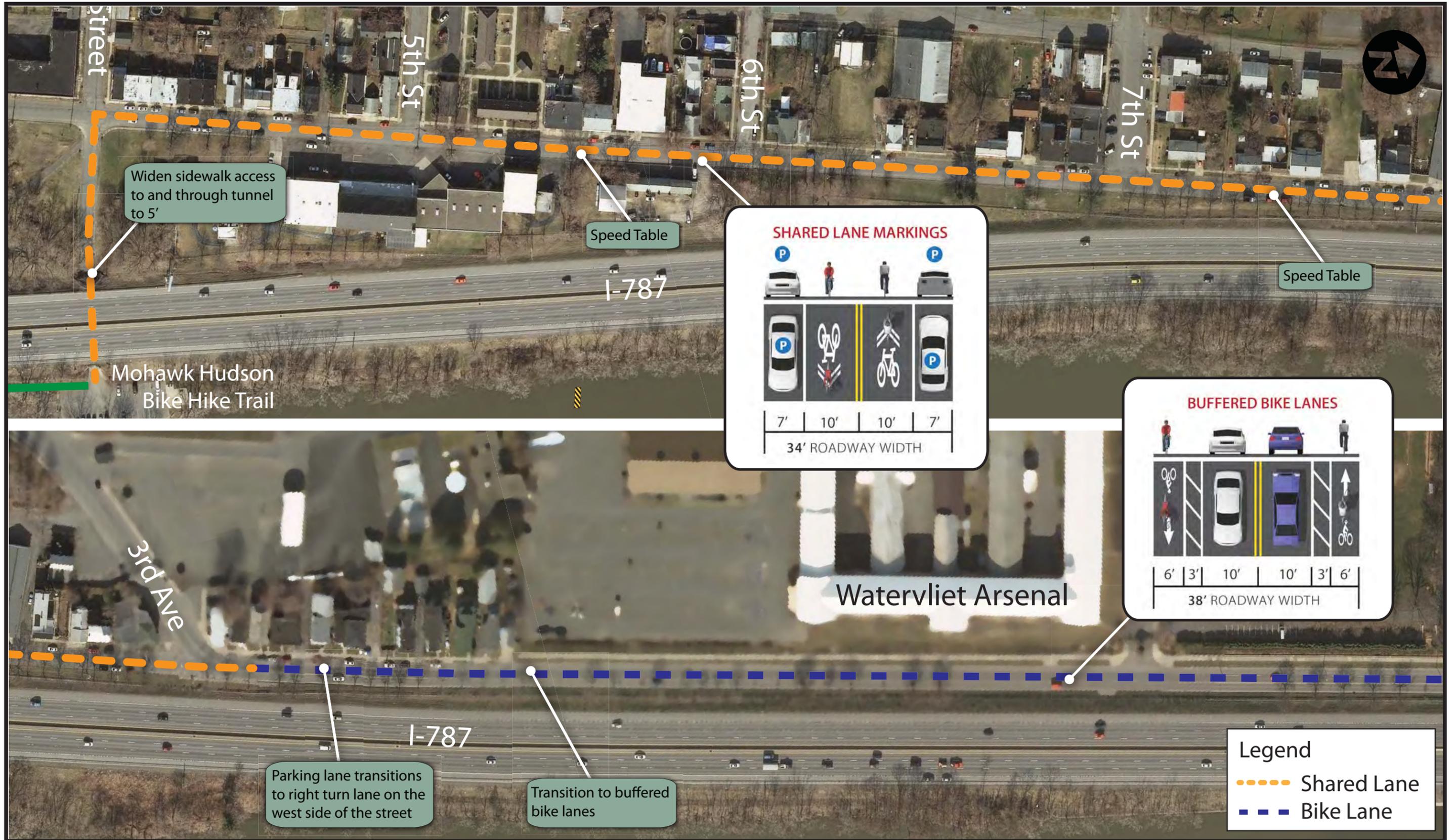
Planning Level Cost Estimate: \$640,000

5.4 River Alternative

The river alternative is an extension of the existing Mohawk Hudson Bike Hike Trail, north along the Hudson River. This 10 foot wide asphalt trail will be located to the east of I-787 along the shores of the Hudson River. There is only a small portion of land between the highway and the river in the City of Watervliet until Hudson Shores Park. This ranges from approximately 15 feet of land to 85 feet of land from the edge of I-787. For a significant portion of this section of the MHBHT, only grading and paving will be required. For approximately 1600 feet of the shoreline, a bulkhead or pier system will need to be installed. When significant reconstruction of I-787 takes place in future years, the river alternative will become easier and more cost effective to construct.



Planning Level Cost Estimate:
\$1,930,000



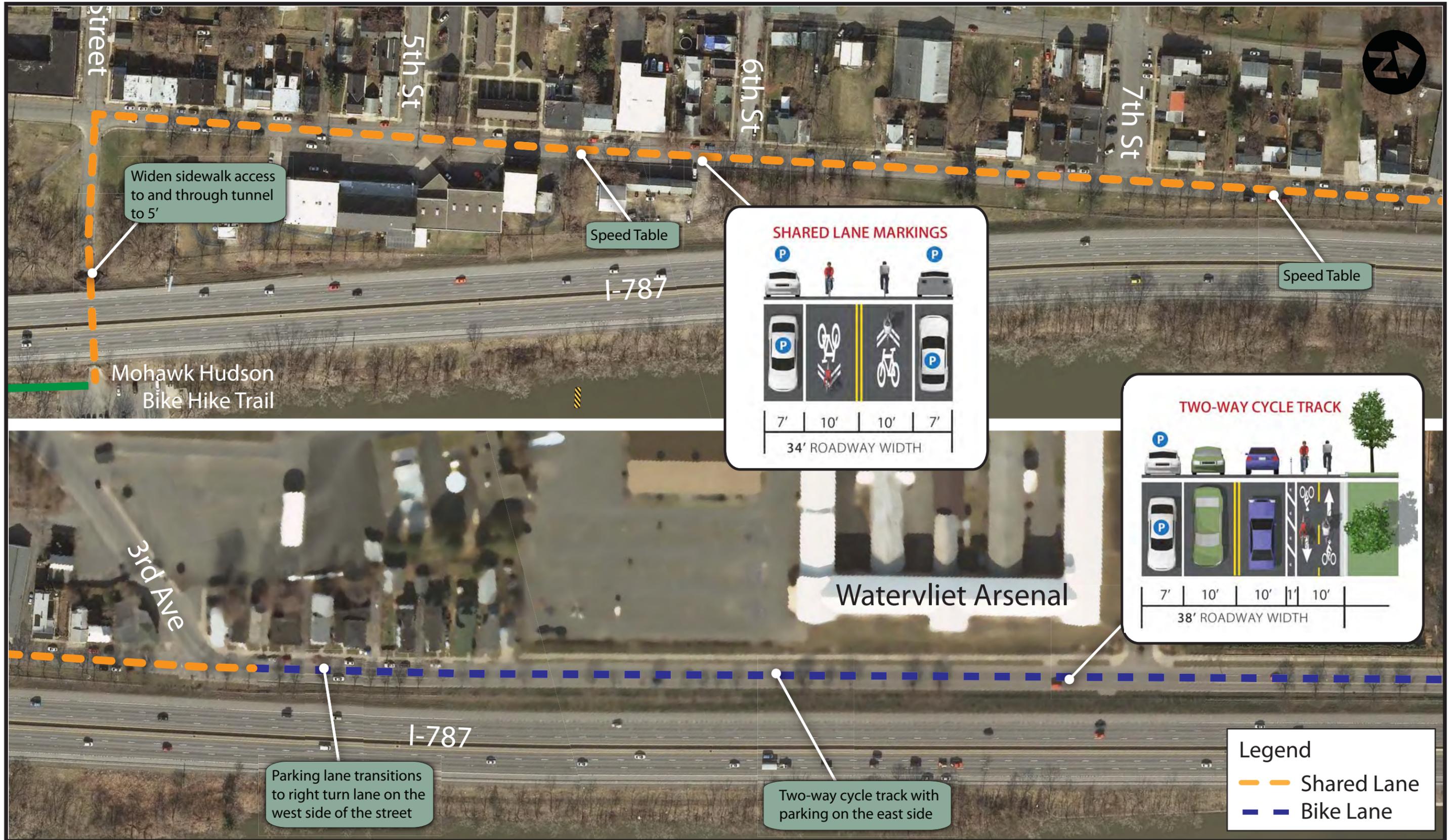
**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Bike Lanes - Map 1 of 2**



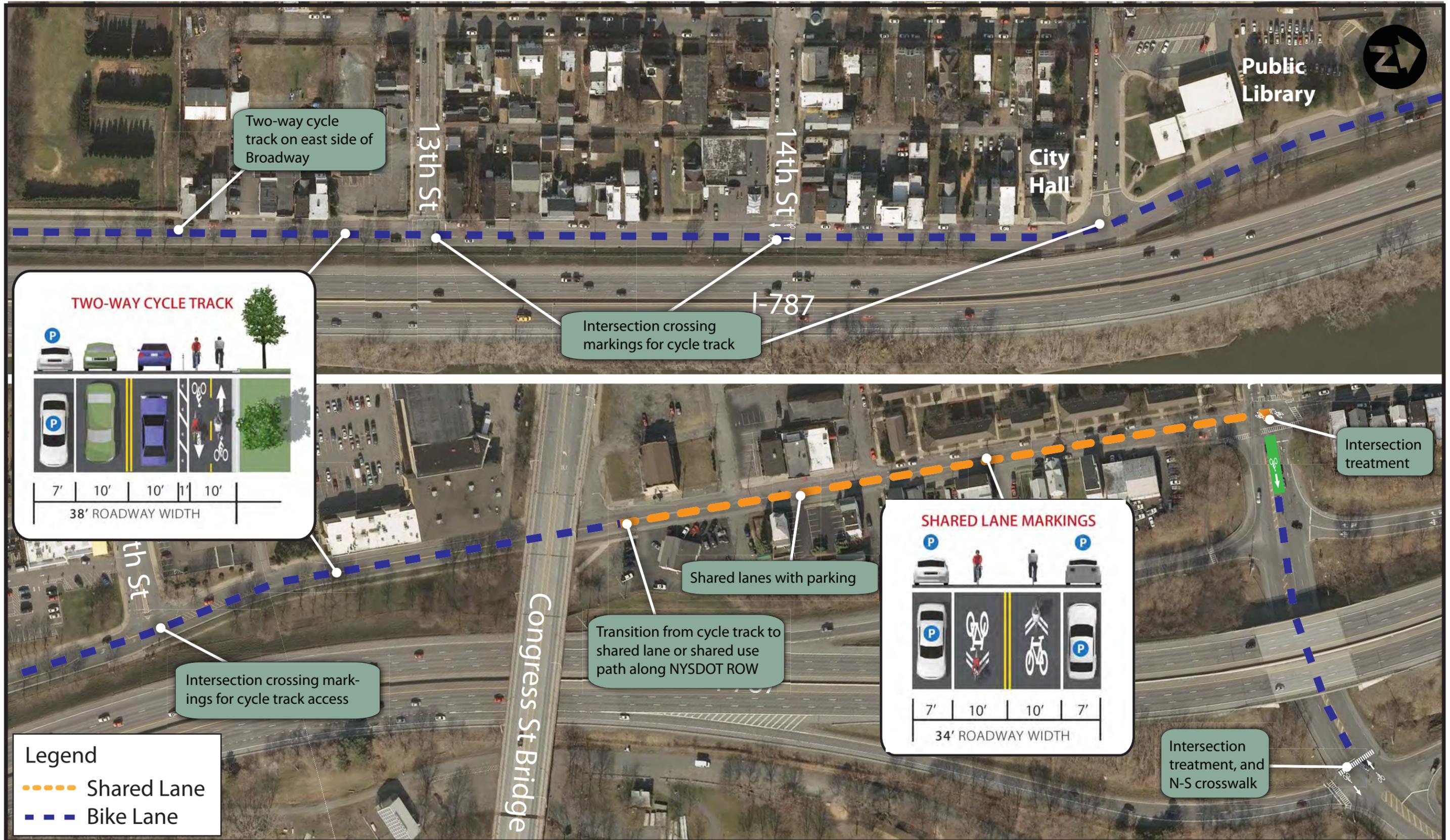
**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Bike Lanes - Map 2 of 2**

0 250 500 ft



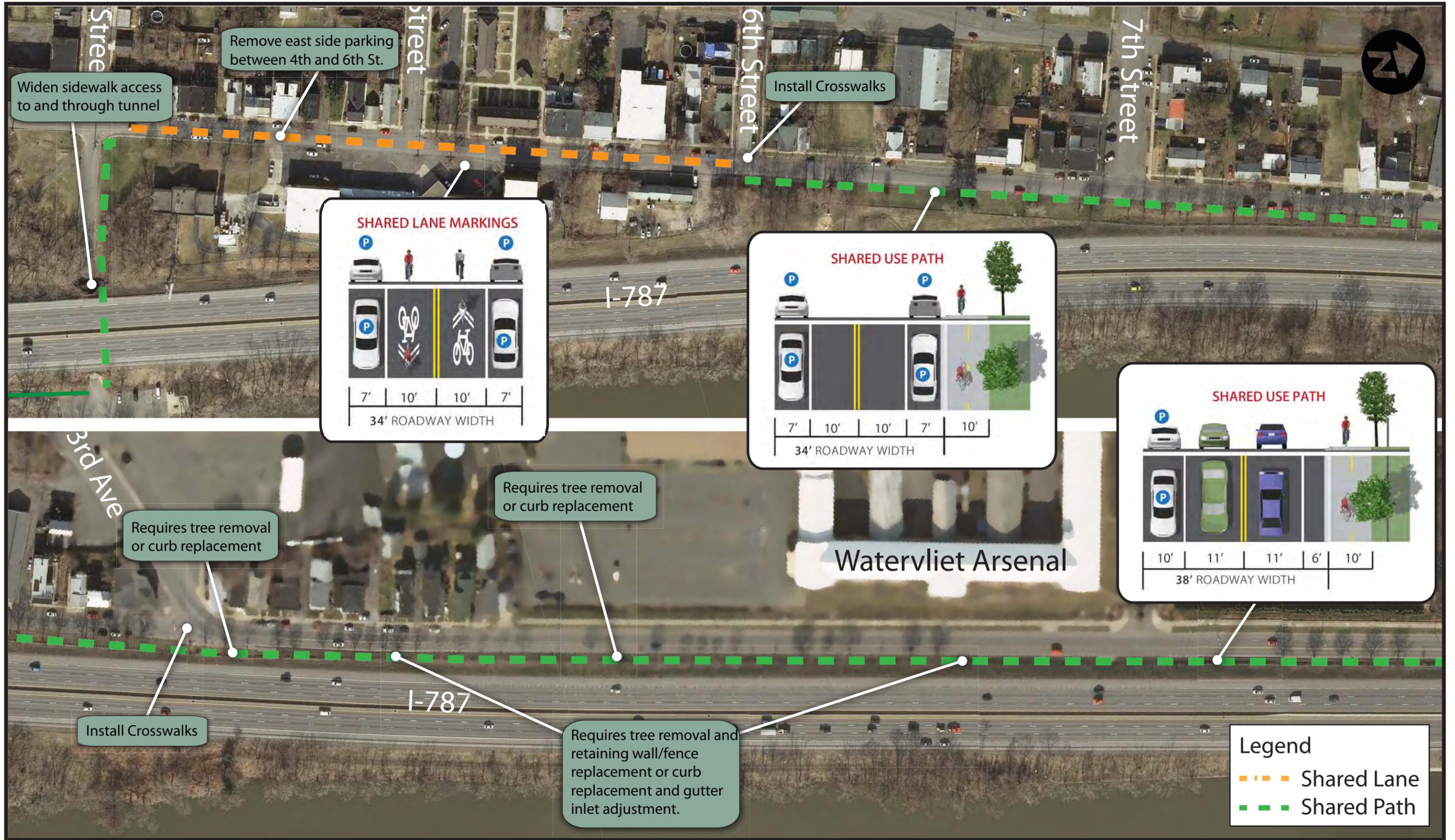


**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Cycle Track - Map 1 of 2**

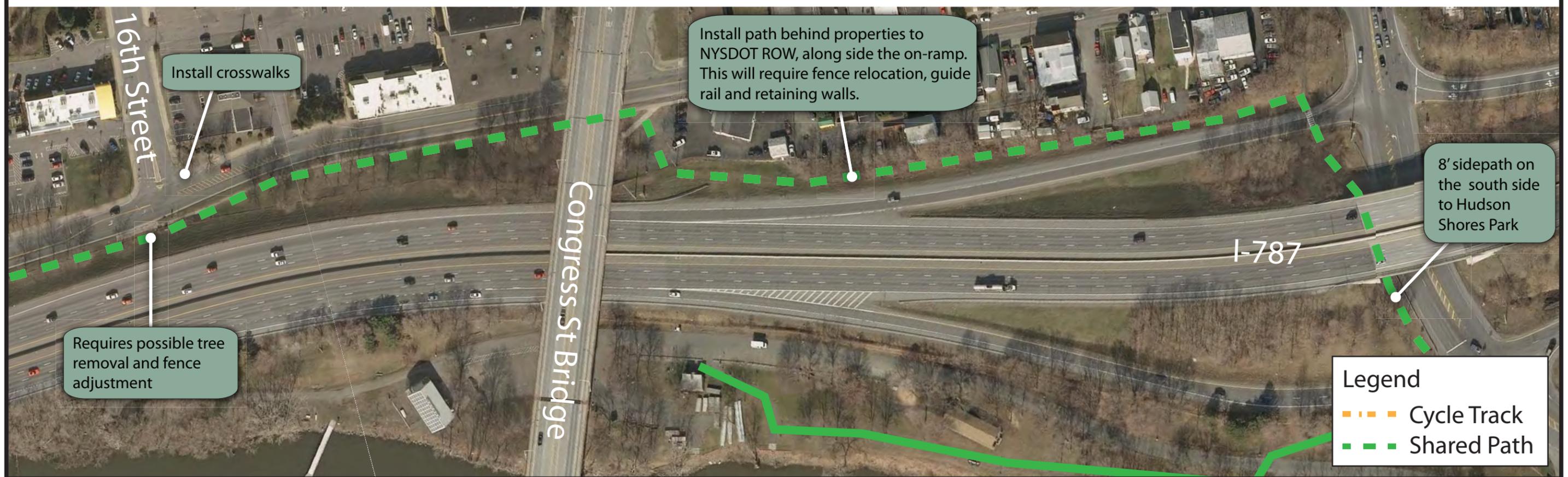
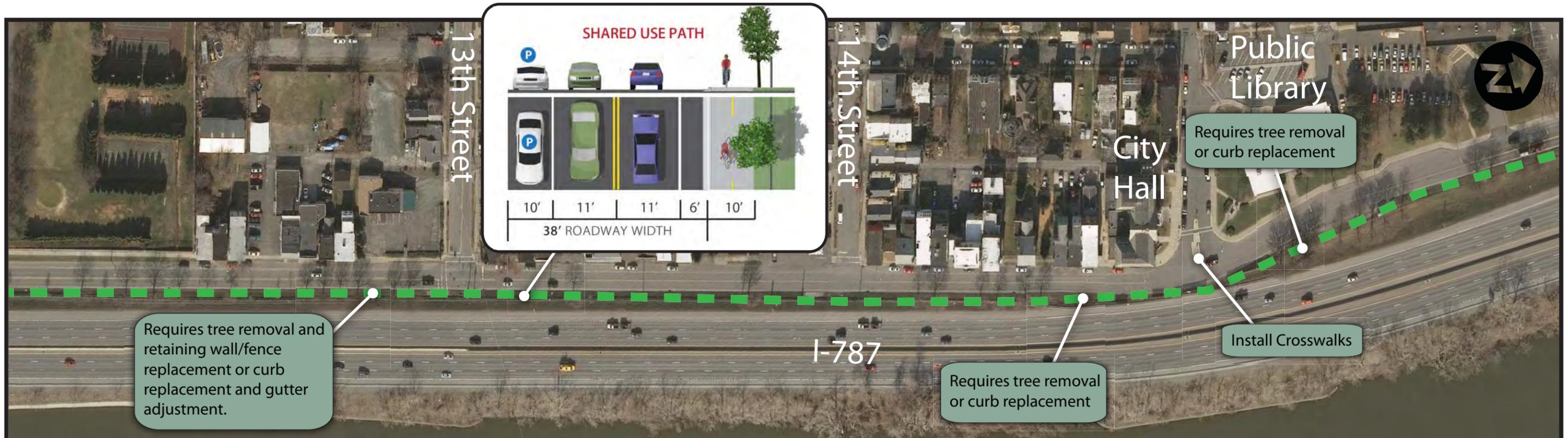


**Mohawk Hudson Bike Hike Trail, City of Watervliet
 On-Street Alternative - Cycle Track - Map 2 of 2**

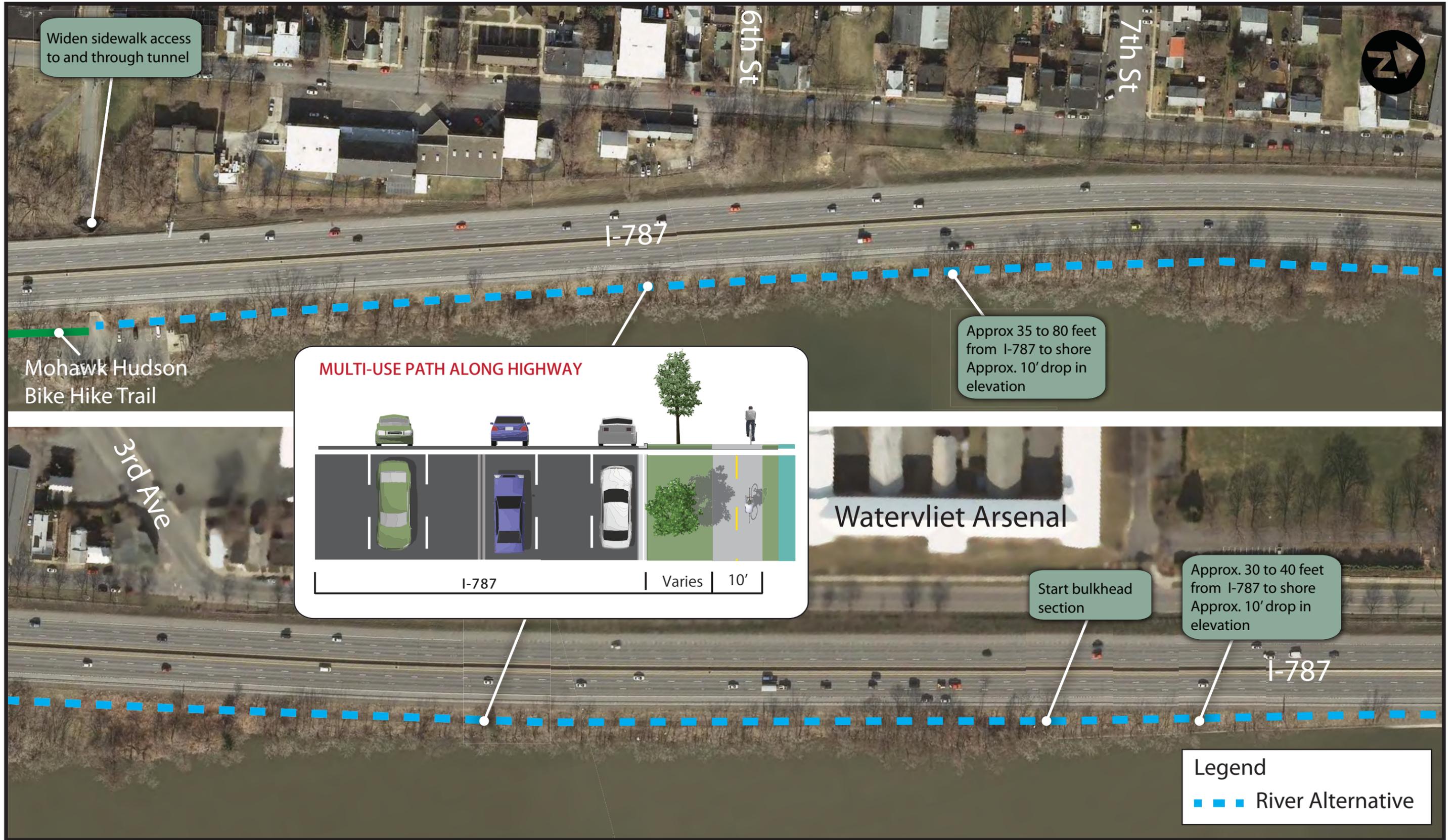




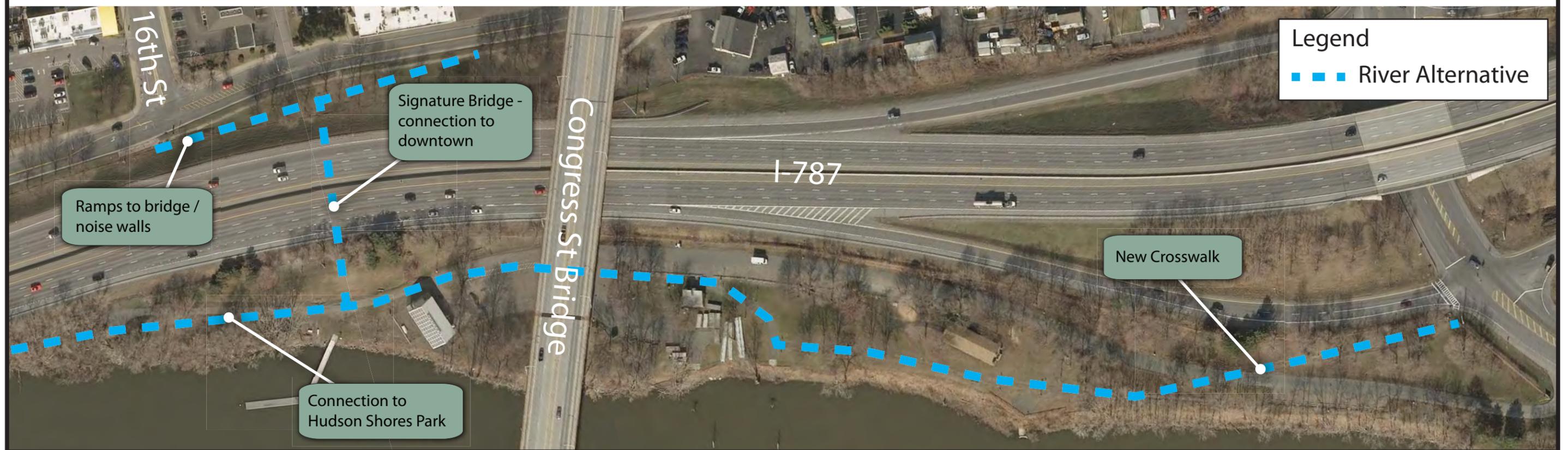
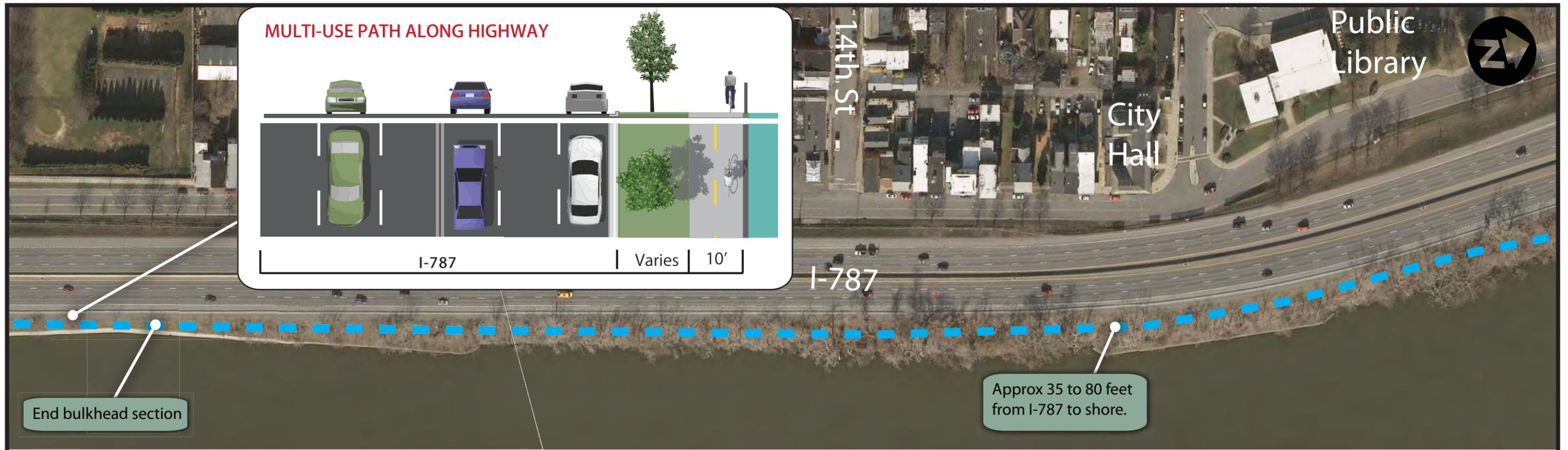
**Mohawk Hudson Bike Hike Trail, City of Watervliet
 Off Street Alternative - Map 1 of 2**



**Mohawk Hudson Bike Hike Trail, City of Watervliet
Off Street Alternative - Map 2 of 2**



**Mohawk Hudson Bike Hike Trail, City of Watervliet
River Alternative - Map 1 of 2**



**Mohawk Hudson Bike Hike Trail, City of Watervliet
River Alternative - Map 2 of 2**



5.5 Decision Matrix

The steering committee developed a set of criteria for evaluating each of the MHBHT alternatives for short term implementation. Each of these was given 5 points that were assigned to each alternative depending on how they met each criterion. The first table below describes each criteria and the method for scoring each one. A weight was assigned based on the importance of each criterion. The cycle track alternative is shown to be the most advantageous alternative given the current conditions. The shared use path adjacent to Broadway can be considered at an interim step as usage increases if the River Alternative is still cost prohibitive. The cost and maintenance of the shared use path adjacent to the river makes this alternative prohibitive at this time.

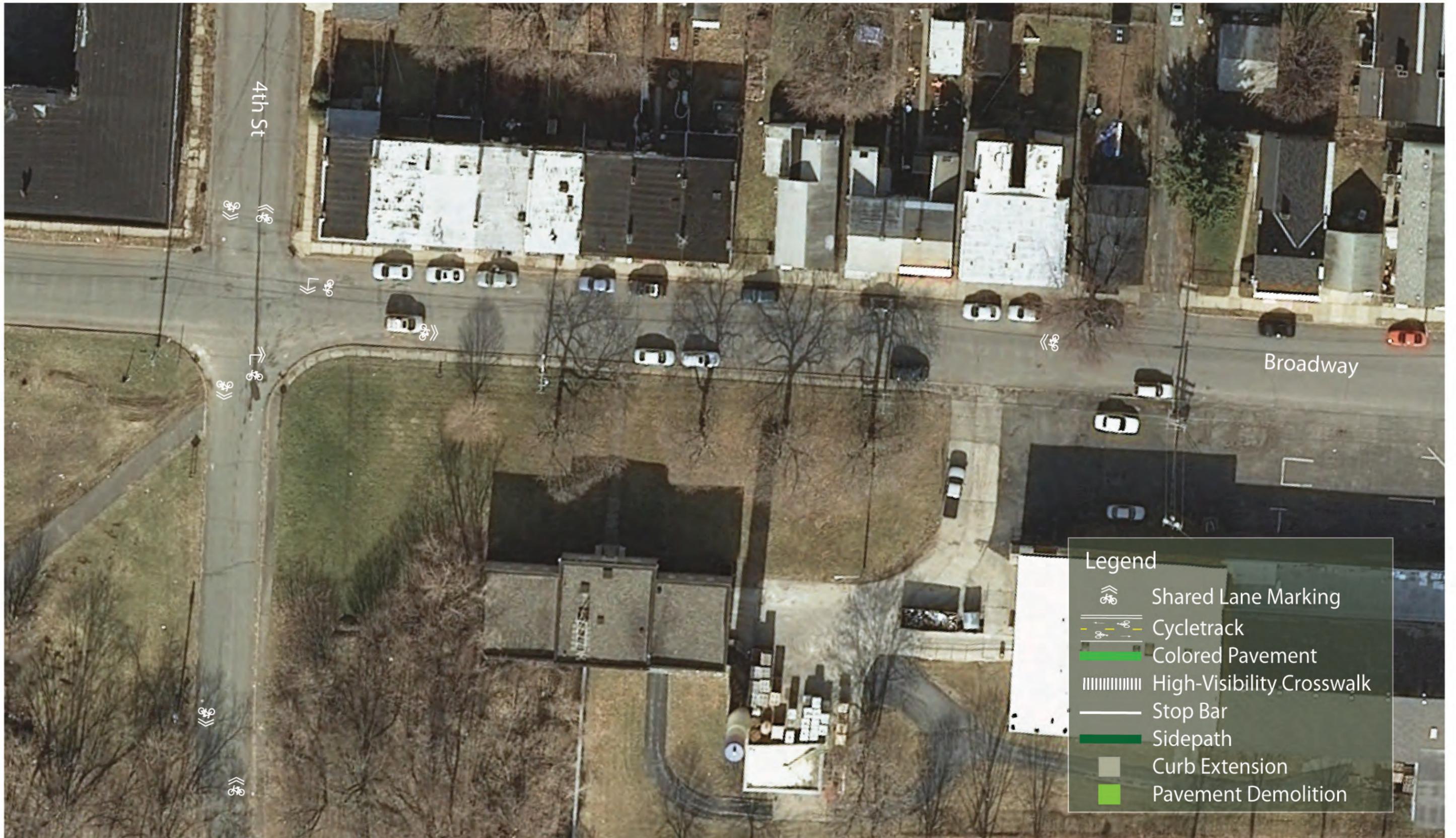
<p>Trail Connectivity <i>Prioritizes options that connect most seamlessly to the off-road portions of the MHBHT</i></p>	<p>User Experience/ Aesthetics <i>Prioritizes Options that offer the most scenic, recreational, and educational experience for the trail user</i></p>	<p>Degree of Separation <i>The degree of separation from motorized traffic improves the safety and comfort level of trail users</i></p>	<p>Number of At-Grade Conflicts <i>Prioritizes options that limit the number of at grade conflicts, such as intersections</i></p>
<p>5: Connects Directly to other portions of MHBHT, without diversion 3-4: Maintains same surface material as other portions of the MHBHT, but diverts from river bank route 1-2: Connects to existing portions of MHBHT, but the facility type changes and thus level of the continuity of the trail is diminished</p>	<p>5: Entire trail option has high quality of user experience, providing vistas and safety 3-4: Majority of the trail option has high quality user experience 1-2: Diminished degree of user experience; potentially uncomfortable for some trail users</p>	<p>5: Entirely separated from motorized traffic 3-4: Majority of alignment separated from motorized traffic 1-2: Little to no separation from motorized traffic; Trail users share road with traffic</p>	<p>5: Less than two at grade conflicts 2-4: Two to ten at grade conflicts: 1: Ten+ at grade conflicts</p>
<p>Emergency Response Speed <i>Prioritizes options where emergency response vehicles can quickly access the trail facility, an important consideration voiced at the 1st Public Open House</i></p>	<p>Economic Development <i>Prioritizes options that provide access to local businesses in Watervliet, and provide additional economic development opportunities</i></p>	<p>Level of Regional Support <i>Prioritizes options that have a high level of regional support, and are most feasible from a regional political and financial perspective</i></p>	<p>Level of City Support <i>Prioritizes options that have a high level of local support, and are most feasible from a local political and financial perspective</i></p>
<p>5: Emergency vehicles can directly access trail option 1: Due to limited access to trail facility, emergency response speed will be delayed</p>	<p>5: Option provides direct access to local businesses, and has a high likelihood of attracting new businesses 3-4: Option provides access to local businesses, and could potentially attract new businesses 1: Option does not provide access to local businesses and may not attract new businesses</p>	<p>5: Option has a high level of regional support, and is deemed to be both financially and politically feasible 3-4: Option has regional support, but there are some concerns with the feasibility of the option 2-1: Option has limited regional support due to implementation challenges, such as cost and politics</p>	<p>5: Option has a high level of local support and is deemed to be both financially and politically feasible 3-4: Option has local support, but there are some concerns with the feasibility of the option 2-1: Option has limited local support due to implementation challenges, such as cost and politics</p>
<p>Ease of Construction <i>Prioritizes options with fewer engineering challenges and inconveniences to the community</i></p>	<p>Estimated Construction Cost <i>Prioritizes options with a lower cost to complete the trail</i></p>	<p>Ease of Maintenance <i>Prioritizes options that require less maintenance</i></p>	
<p>5: Can be built easily with little or no inconvenience 3-4: Construction has some engineering challenges and will create minor inconvenience 2-1: Construction has major engineering challenges and will entail significant challenges</p>	<p>5: Less than \$300,000 3-4: \$300,000 - \$900,000 1-2: Greater than \$900,000</p>	<p>5: Option will require little maintenance, and will entail few new responsibilities/expenditures for the City's DPW 3-4: Option will require some maintenance that may entail new responsibilities/expenditures for the City's DPW 1-2: Option will require significant maintenance that will result in new responsibilities and significant costs for the City's DPW</p>	

Evaluation Matrix			Weighted score			
Criteria	Maximum Number of Points	Weight (1 to 3)	Alternative Option 1:	Alternative Option 2:	Alternative Option 3:	Alternative Option 4:
			On-Road Treatments	Cycle Track	Shared-Use Path adj. to Broadway	Shared-Use Path adj. to River
Trail Connectivity <i>Prioritizes options that connect most seamlessly to the off-road portions of the MHBHT</i>	5	2	4	6	8	10
User Experience/ Aesthetics <i>Prioritizes Options that offer the most scenic, recreational, and educational experience for the trail user</i>	5	2	4	6	8	10
Degree of Separation <i>The degree of separation from motorized traffic improves the safety and comfort level of trail users</i>	5	2	4	6	8	10
Number of At-Grade Conflicts <i>Prioritizes options that limit the number of at grade conflicts, such as intersections</i>	5	2	2	8	10	10
Emergency Response Speed <i>Prioritizes options where emergency response vehicles can quickly access the trail facility, an important consideration voiced at the 1st Public Open House</i>	5	2	10	10	10	2
Economic Development <i>Prioritizes options that provide access to local businesses in Watervliet, and provide additional economic development opportunities</i>	5	3	12	12	12	9
Level of Regional Support <i>Prioritizes options that have a high level of regional support, and are most feasible from a regional political and financial perspective</i>	5	3	15	12	9	6
Level of City Support <i>Prioritizes options that have a high level of local support, and are most feasible from a local political and financial perspective</i>	5	3	9	12	9	6
Ease of Construction <i>Prioritizes options with fewer engineering challenges and inconveniences to the community</i>	5	1	5	4	2	1
Estimated Construction Cost <i>Prioritizes options with a lower cost to complete the trail</i>	5	3	15	12	9	3
Ease of Maintenance <i>Prioritizes options that require less maintenance</i>	5	1	4	4	3	2
Total Score	55		84	92	88	69
Rank			3	1	2	4

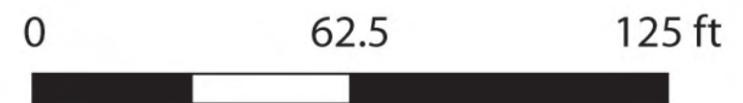
5.6 Short Term MHBHT Alternative

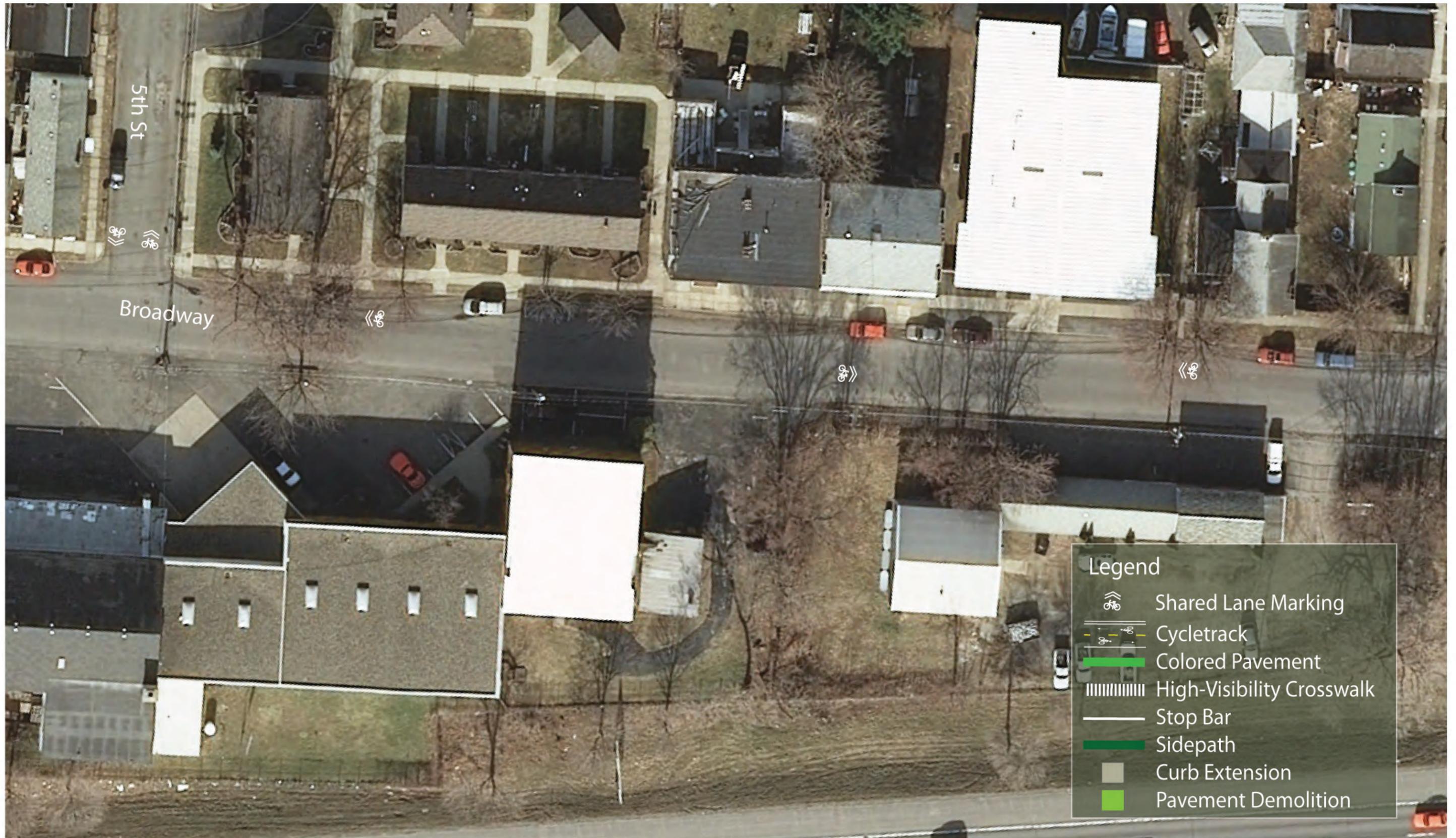
The short term alternative for the Mohawk Hudson Bike Hike Trail is the cycle track option. Rather than continuing on Broadway with shared lane markings after the Congress Street Bridge, as proposed in the alternative analysis, the MHBHT would continue along a shared use path along I-787 to 23rd Street. This alignment will avoid the 23rd Street and Broadway intersection and provide a greater degree of separation. The MHBHT will then extend along the south side of 23rd Street on a shared use path to Hudson Shores Park. The planning level cost estimate for this alignment is \$370,000. The short term alternative is shown on the following pages.





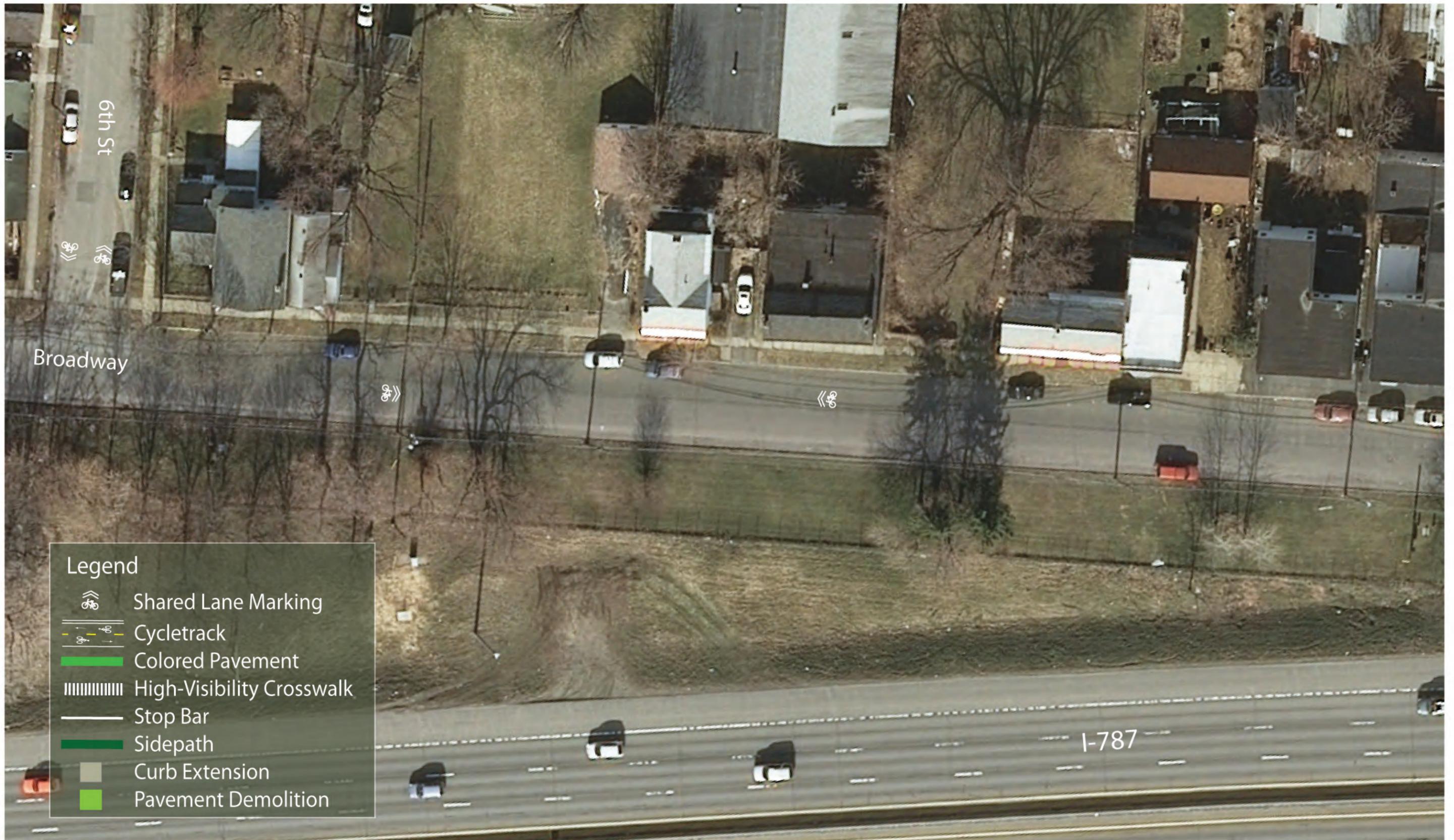
Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 1 of 16





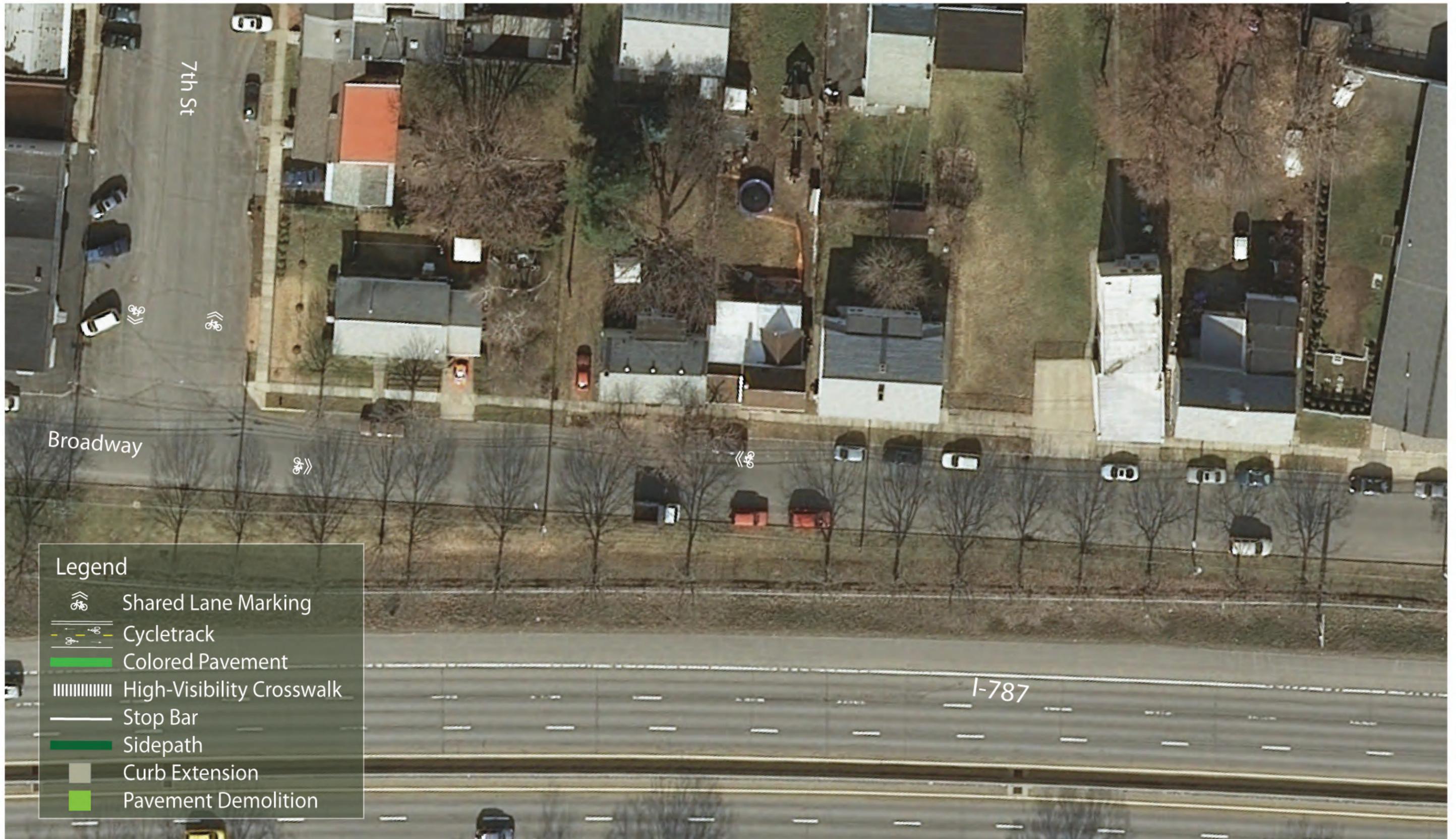
**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 2 of 16**





**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 3 of 16**

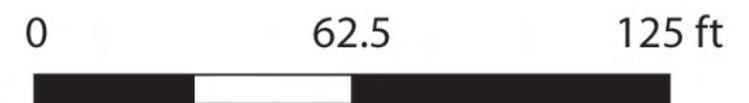




**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 4 of 16**

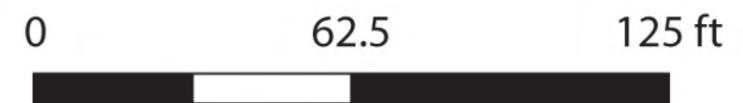


**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 5 of 16**

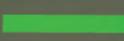
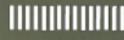
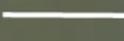
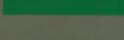
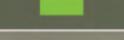




**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 6 of 16**



Legend

-  Shared Lane Marking
-  Cycletrack
-  Colored Pavement
-  High-Visibility Crosswalk
-  Stop Bar
-  Sidepath
-  Curb Extension
-  Pavement Demolition

Watervliet Arsenal

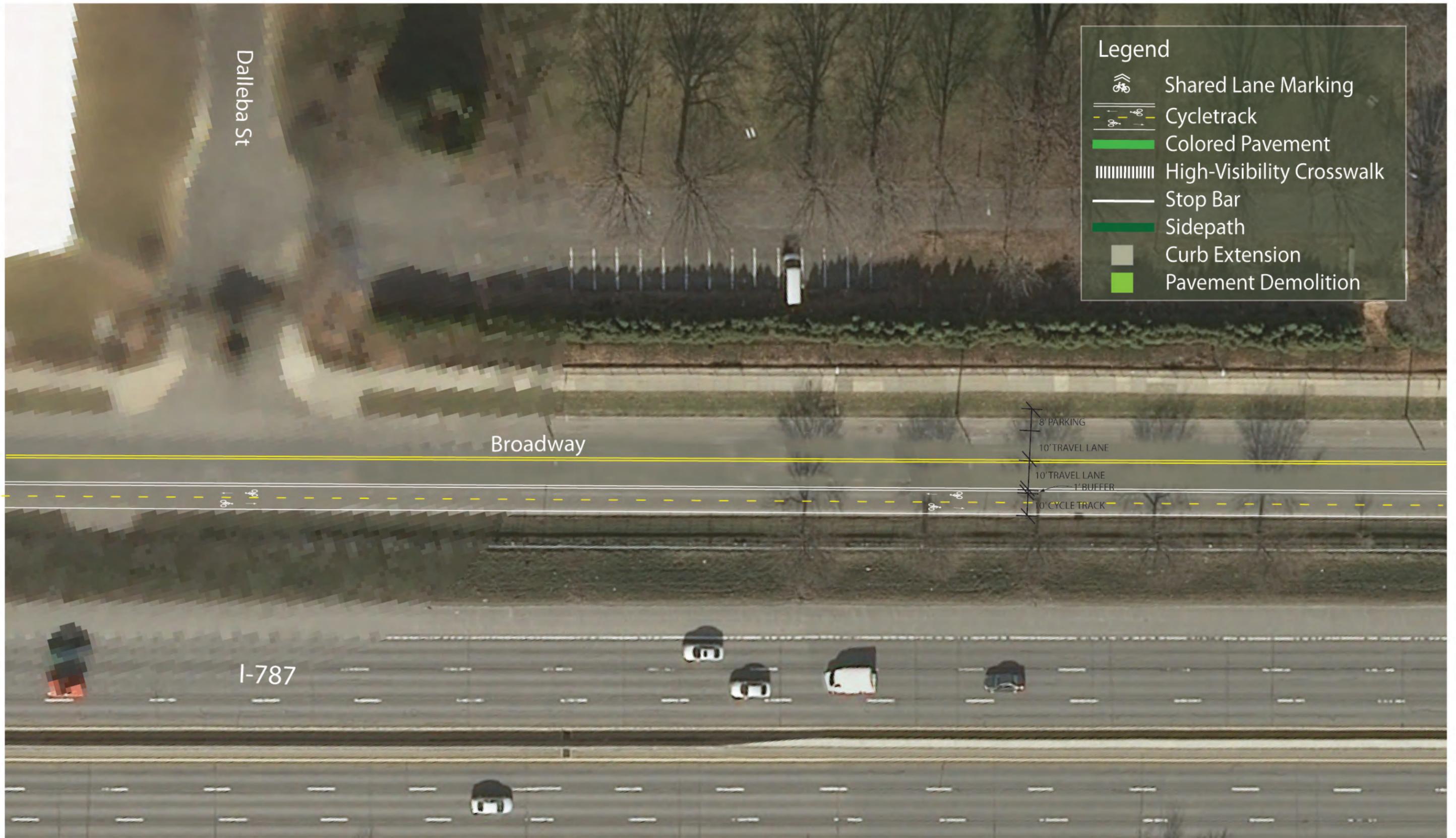
Broadway



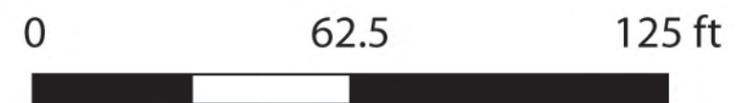
I-787

**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 7 of 16**





**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 8 of 16**



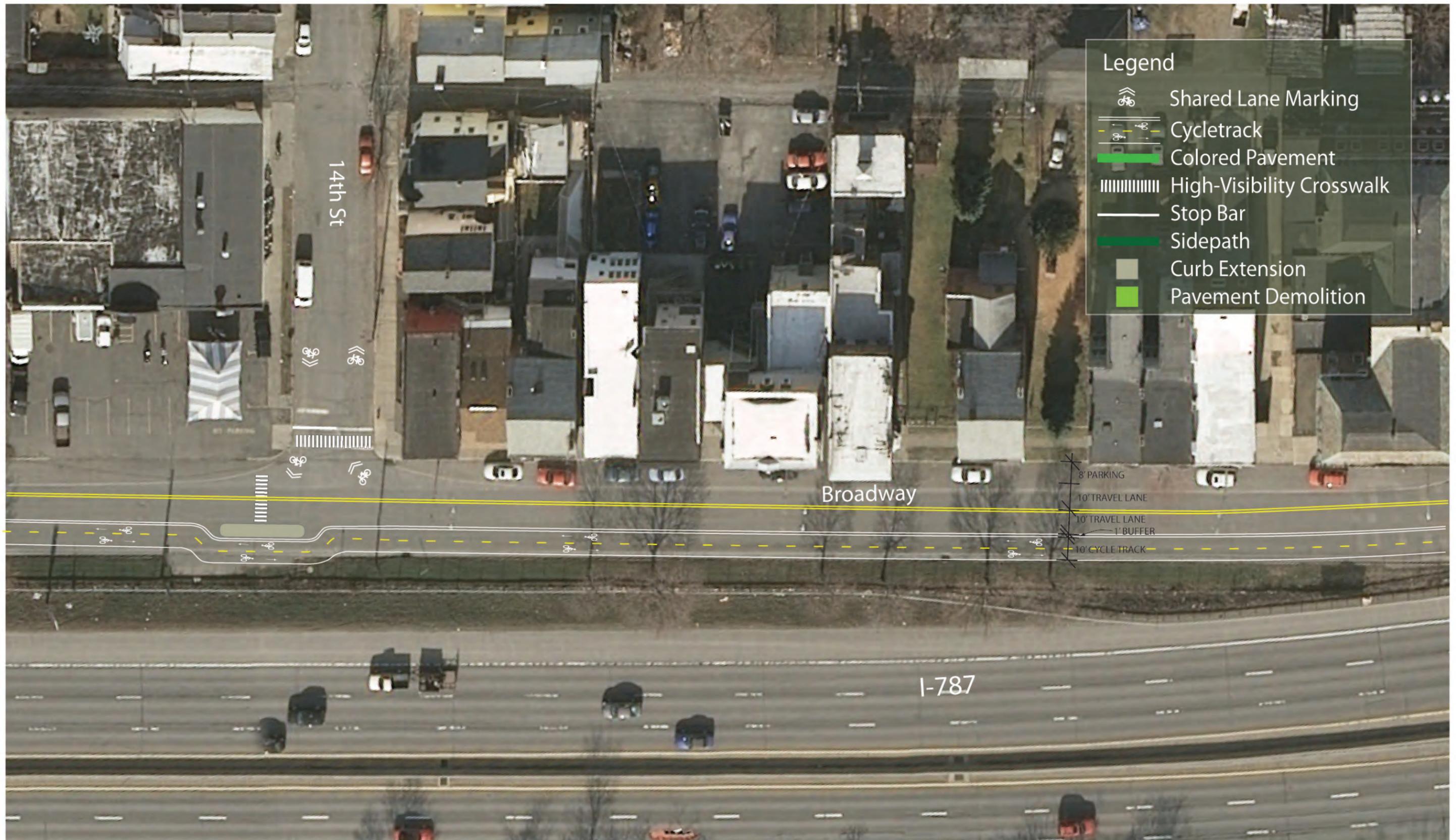


**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 9 of 16**

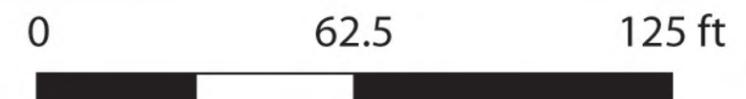




**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 10 of 16**

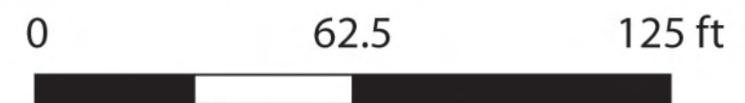


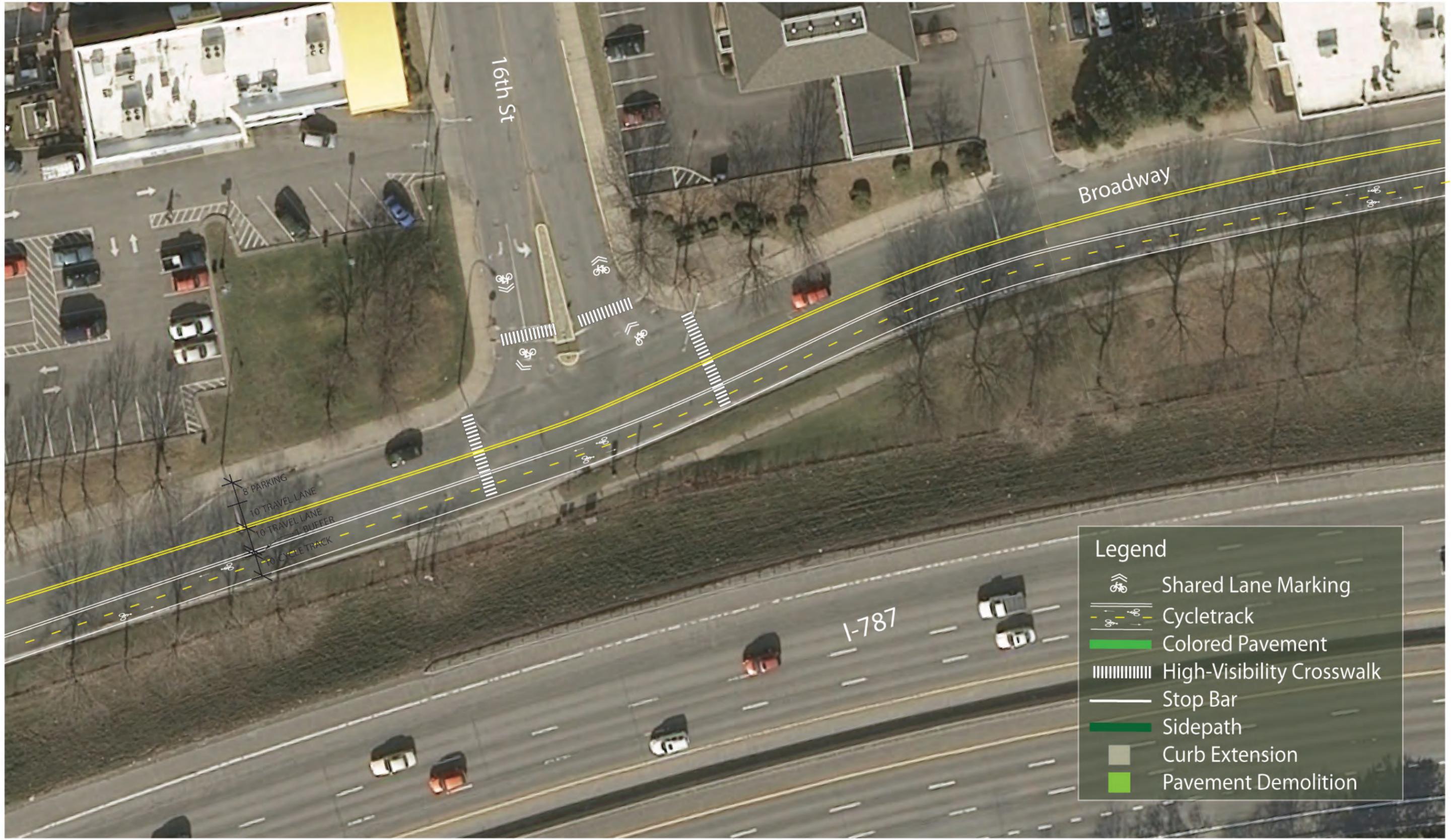
**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 11 of 16**



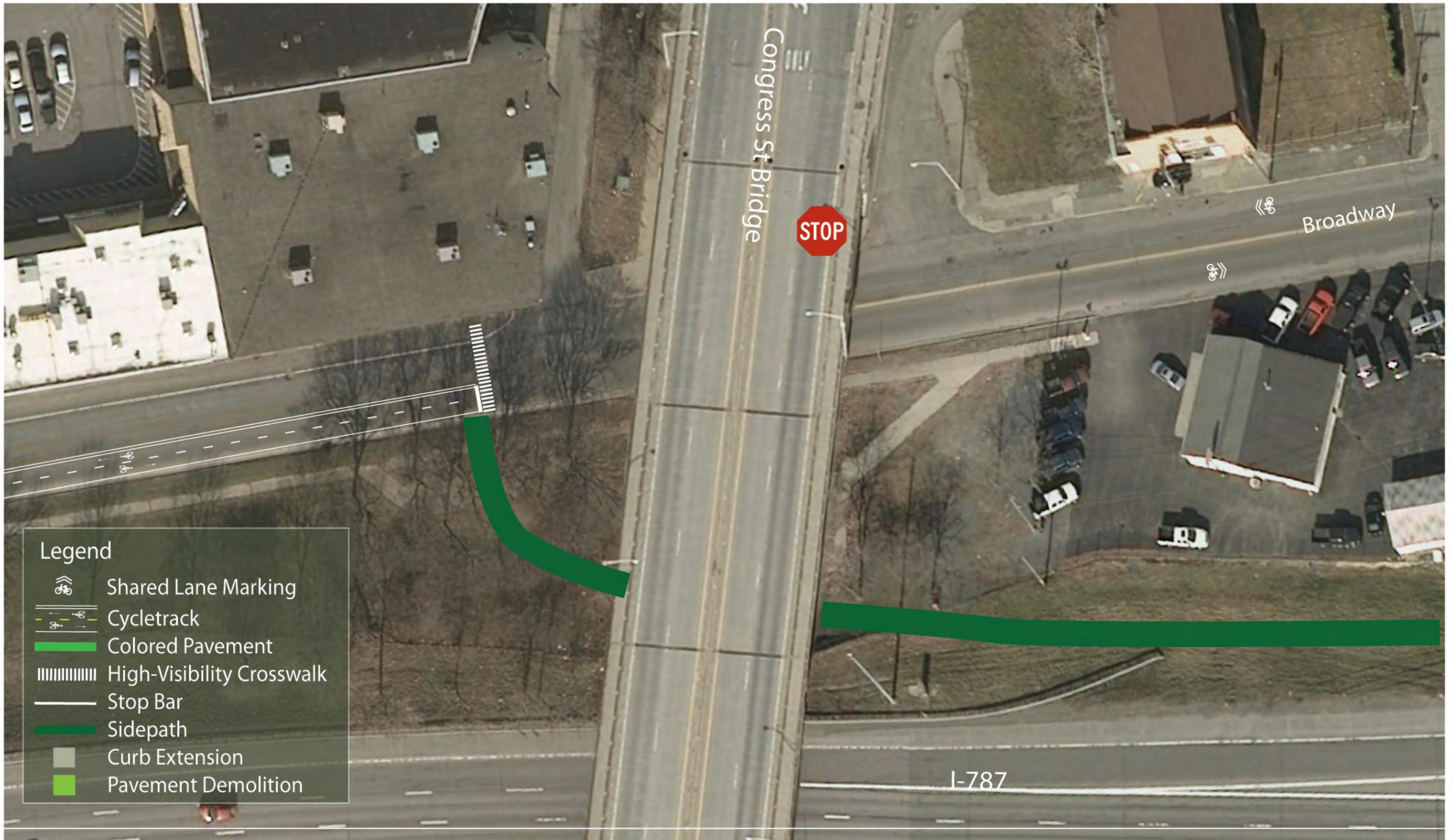


**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 12 of 16**





**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 13 of 16**



Congress St Bridge

STOP

Broadway

I-787

Legend

-  Shared Lane Marking
-  Cycletrack
-  Colored Pavement
-  High-Visibility Crosswalk
-  Stop Bar
-  Sidepath
-  Curb Extension
-  Pavement Demolition



**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 14 of 16**





**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 15 of 16**





**Mohawk Hudson Bike Hike Trail, City of Watervliet
On-Street Alternative - Map 16 of 16**



5.7 Long Term MHBHT Alternative

Access to the river is also important to the City of Watervliet, even if it is cost prohibitive at this time. The long term alternative for the MHBHT is the shared use path adjacent to the river, on the east side of I-787. Reconstruction of I-787 is inevitable and the river path should be included in these plans. Additionally, better access between the City of Watervliet and the river should be considered.





Mohawk Hudson Bike Hike Trail, City of Watervliet
River Trail Alternative, Section 1 of 10



Mohawk Hudson Bike Hike Trail, City of Watervliet
River Trail Alternative, Section 2 of 10



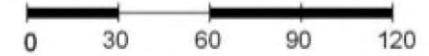
PROPOSED 10' WIDE
8900' (1.68 MILE) TRAIL

HUDSON RIVER

I-787

RETAINING WALL WHERE REQUIRED
PROPOSED TRAIL

Mohawk Hudson Bike Hike Trail, City of Watervliet
River Trail Alternative, Section 3 of 10



USE A RETAINING WALL ON
THE HIGHWAY SIDE WHEN
REQUIRED BY STEEP SLOPES

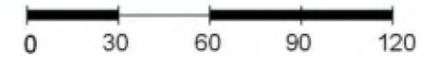
HUDSON RIVER

I-787

PROPOSED TRAIL
RETAINING WALL WHERE REQUIRED

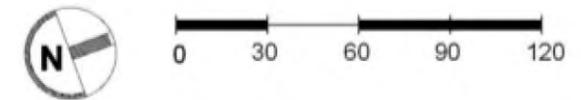
TRANSITION TO A 12' WIDE
BOARDWALK TRAIL AT THE
EXISTING BULKHEAD

Mohawk Hudson Bike Hike Trail, City of Watervliet
River Trail Alternative, Section 4 of 10

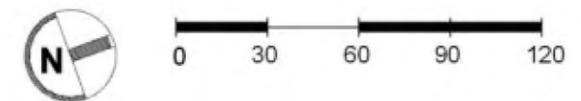




Mohawk Hudson Bike Hike Trail, City of Watervliet
River Trail Alternative, Section 5 of 10

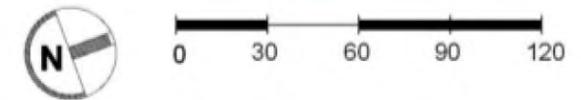


Mohawk Hudson Bike Hike Trail, City of Watervliet
River Trail Alternative, Section 6 of 10

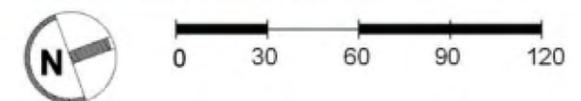




Mohawk Hudson Bike Hike Trail, City of Watervliet
River Trail Alternative, Section 7 of 10

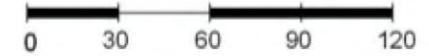


Mohawk Hudson Bike Hike Trail, City of Watervliet
River Trail Alternative, Section 8 of 10

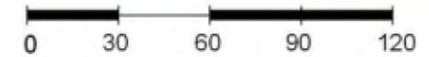




Mohawk Hudson Bike Hike Trail, City of Watervliet
River Trail Alternative, Section 9 of 10



Mohawk Hudson Bike Hike Trail, City of Watervliet
River Trail Alternative, Section 10 of 10



5.8 MHBHT Wayfinding

5.8.1 Existing Wayfinding

There is existing bike route signage for the Mohawk Hudson Bike Hike Trail on Broadway. This also includes the state bike route signage. An inventory of existing signage is summarized below.

Existing Sign Inventory

SIGN INVENTORY	LOCATION	QTY
 D11-1	4 TH St, btw Trailhead & Broadway 4 th St, btw Broadway & 1 st Ave Broadway, btw 4 th St & 3 rd St Broadway, btw 7 th St & 8 th St Broadway, btw Dalleba St & 13 th St Broadway, btw 15 th St and 16 th St Broadway & 23 rd St Broadway, btw 14 th St and 13 th St Broadway, btw 9 th St and 8 th St 5 th Street, btw Broadway & 1 st Ave	2 1 1 1 1 1 2 (NB & SB) 1 1 1
 M1-8	Broadway, btw Dalleba St & 13 th St Broadway, btw 15 th St and 16 th St Broadway & 23 rd St 23 rd St & Broadway	1 2 (NB & SB) 1 1
 D11-1BP	Broadway, btw 7 th St & 8 th St Broadway, btw Dalleba St & 13 th St Broadway, btw 15 th St and 16 th St Broadway & 23 rd St Broadway, btw 14 th St and 13 th St Broadway, btw 9 th St and 8 th St	1 1 1 2 (NB & SB) 1 1
 M6-3	Broadway Btw 4 th St & 3 rd St Broadway, btw 7 th St & 8 th St Broadway, btw Dalleba St & 13 th St Broadway, btw 15 th St and 16 th St Broadway & 23 rd St Broadway, btw 14 th St and 13 th St Broadway, btw 9 th St and 8 th St 5 th Street, btw Broadway & 1 st Ave	1 1 1 1 2 (NB & SB) 1 1 1
M6-6 	Broadway Btw 4 th St & 3 rd St	1
M5-1 	5 th Street, btw Broadway & 1 st Ave 23 rd St & Broadway	1 1

5.8.2 Route Destinations

- Watervliet Arsenal
- Public Library
- City Hall
- Schuyler Flatts Trail
- Restaurants:

- McIntyre’s Pub on 3rd Avenue
- Papa’s Corners Restaurant on Broadway
- Gianna’s Pizza & Subs on Broadway

5.8.3 Sign Types

A complete wayfinding system is primarily composed of three sign types (See Figure 1).

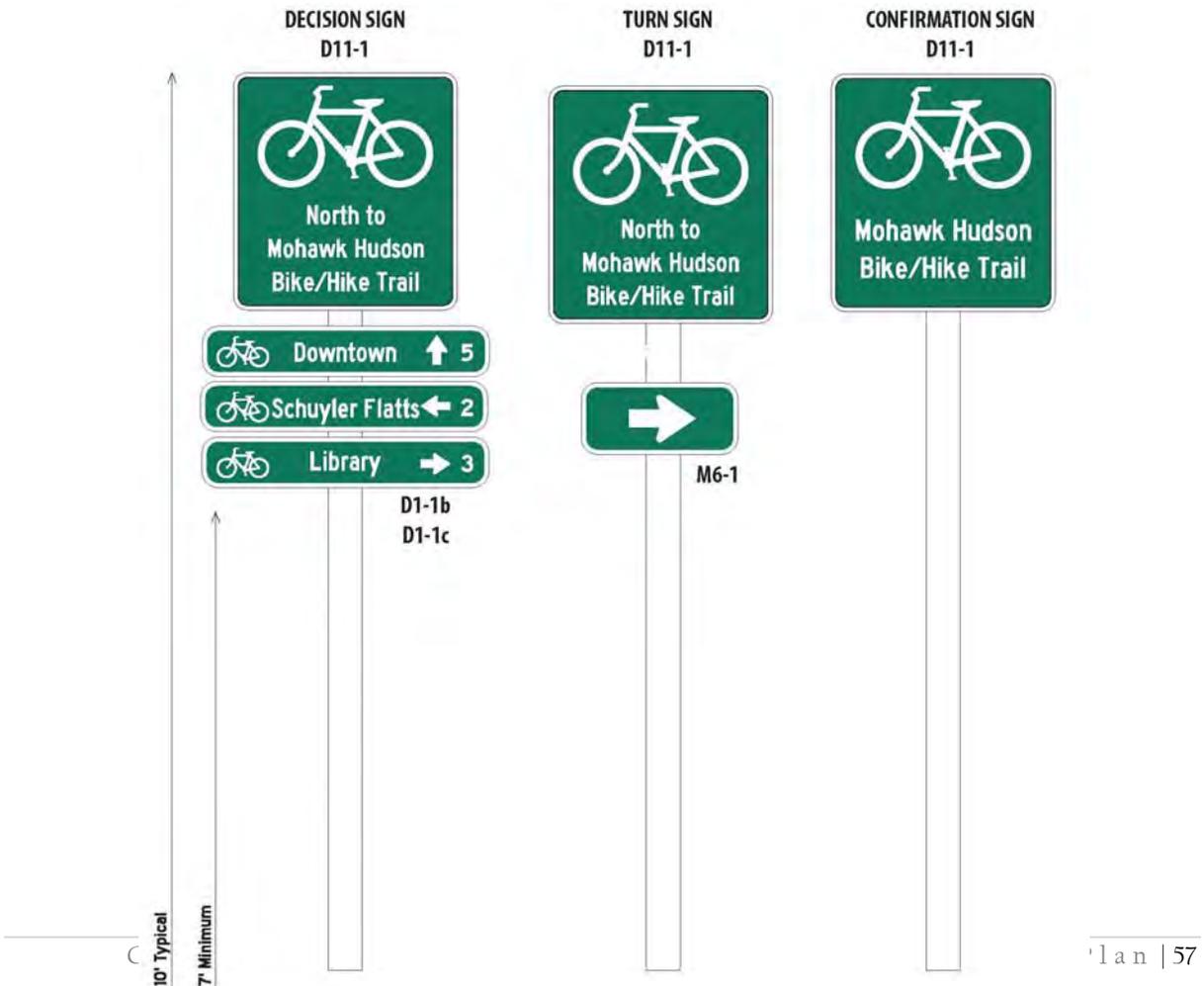
Confirmation signs confirm that a cyclist is on a designated bikeway. Each confirmation sign includes a Bicycle Route Guide Sign (D11-1) and a Destination Supplemental Sign (D1-1b). Confirmation signs are located mid-block or on the far-side of intersections. Confirmation signs include destinations and their associated distances, but not directional arrows.

Action (Turn) signs indicate where a bikeway turns from one street onto another street. (They are not used at the junction of intersecting bikeways.) Turn signs are located on the near-side of intersections. Each Turn sign includes a Bicycle Route Guide Sign (D11-1) and the appropriate Direction Arrow Supplemental Sign (M7-1 to M7-7).

Decision signs mark the junction of two or more bikeways. Decision signs are comprised of a Bicycle Route Guide Sign (D11-1) and a Destination Supplemental Sign (D1-1b). Decision signs are located on the nearside of intersections. They include destinations and their associated directional arrows, but not distances.

Decision signs are placed at points where the bicyclist has a choice to continue on their present route or change direction onto another bikeway and destination. These decision points are located at the intersection between two corridors and at intersections with other bikeways. Decision signs are Route Guide Signs type D11-1 and include Destination Signage (D1-1b) on the same post.

Figure 1: MUTCD Guide Signs for Bicycle Facilities



5.8.4 Sign Placement Guidelines and Standards

This section describes the types and placement of wayfinding signs along a given route. In this plan, decision signs are placed along the corridor to inform bicyclists of connections with other routes or exiting destinations. Action (Turn) signs are placed along the corridor where the alignment makes a major change of direction. Confirmation signs are placed at regular intervals along the corridor and to confirm turn or connecting corridor situations. See Figure 2, for sign placement guide, per MUTCD 2009.

5.8.4.1 Sign Types and Placement

D-11-1 (Bike Route Guide and Decision Signs)

- D-11-1 Signs will appear in this plan as Destinations signs, Turn signs, as well as Confirmation signs.
- Per the MUTCD:
 - “Route Guide (D-11-1-1) signs may be provided along designated bicycle routes to inform bicyclists of bicycle route direction changes and the confirm route direction, distance and destination.
 - If used, Bike Route Guide signs may be repeated at regular intervals so that bicyclists entering from side streets will have an opportunity to know that they are on a bicycle route. Similar guide signing may be used for shared roadways with intermediate signs placed for bicyclist guidance.
 - Alternative Bike Route Guide (D-11-1c) signs may be used to provide information on route direction, destination, and/or route name in place of “BIKE ROUTE” wording on D11-1 sign.”
- Signs typically are placed:
 - Approximately every 0.25 mile
 - After every turn in a route, unless the next turn is 0.125 mile away or less
 - After all signalized intersections
 - Within 160 feet after an intersection
 - On existing poles (if practical)

D1-1b (Destination signs mounted below Bike Route Guide Signs)

- The D1-1b is only used below Decision signs.
- Non-Channelized
 - Place 40 feet before the intersection
 - Ensure sign is at least 20 feet, preferably 30 to 40 feet, from the stop sign or stop light
 - Ensure sign is not blocking the stop sign or stop light.
- Channelized
 - Sign is placed based on engineering judgment
 - Place between taper and bay
 - Ensure sign cannot be misinterpreted (e.g. turn into alley)
- Specific
 - 4 signs max on one pole
 - No more than 2 signs in one direction

Signed Route

- A route with D-11-1 signs placed every 0.25 mile.



Figure 2: MUTCD Bicycle Guide Signing

5.8.5 Sign Guidance for Decision Signs

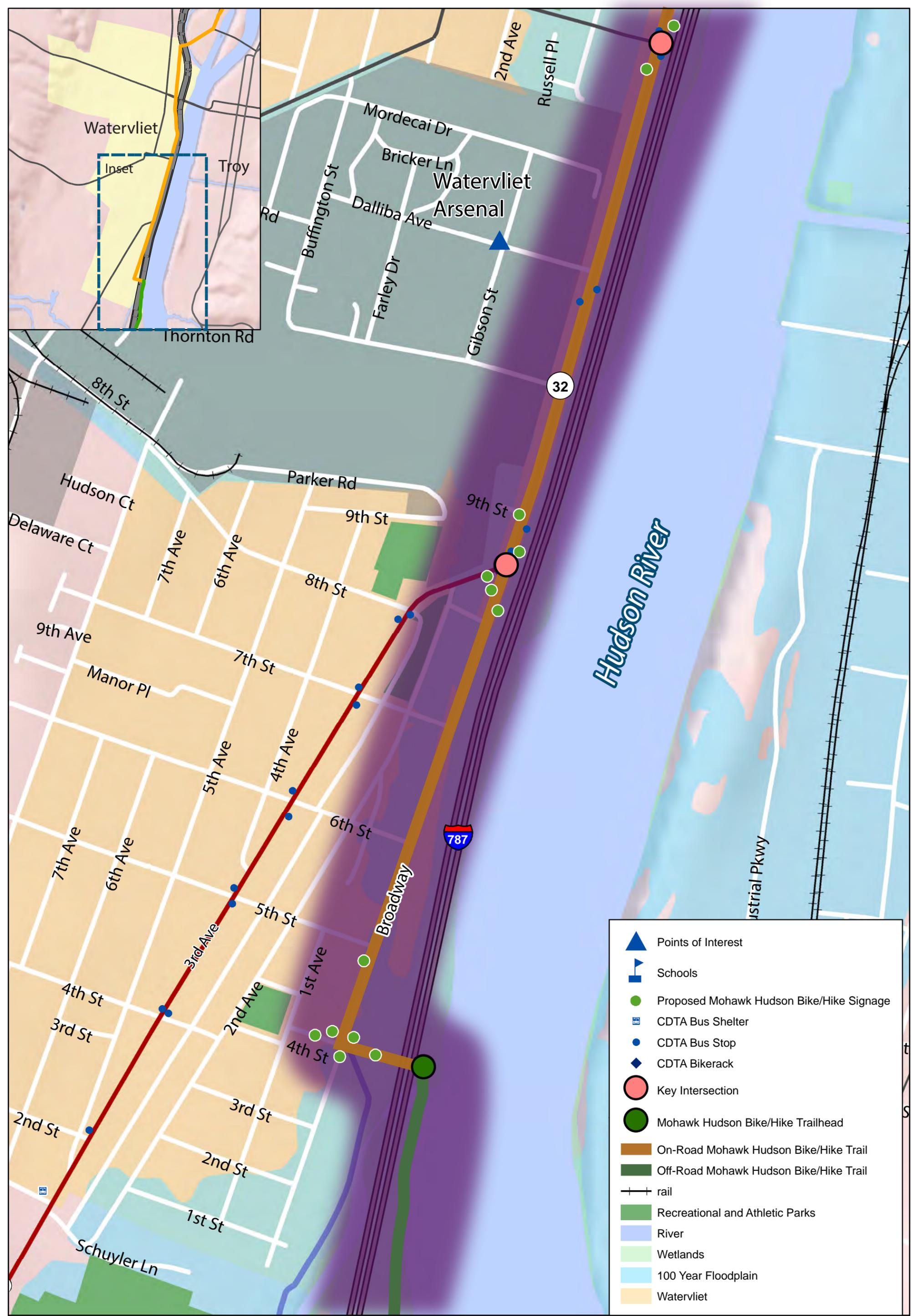
- Distance Estimates should be displayed consistently.
- Destination names may be stacked or abbreviated in order to accommodate longer destination names.
- The number of destinations provided on a given sign array are not to exceed four, and the number of signs on a given array pointing in the same direction are not to exceed two.
- Mileage for each destination will be listed when text is stacked, if possible. Time and distance may be listed as a single line of text to the right of or below the destination if necessary.
- Destinations that are straight ahead go on top, left turns are second, and rights are last. Within each direction, destinations are listed by increasing distance.
- In locations where a bike route turns or makes a difficult transition, should consider using a directional change/route reinforcement sign or pavement marking in place of a destination/distance sign. Standard bike route directional signs are shown in Figure 1 of this Plan. Sign D11-1 should be used in combination with one of the arrow placards (series M5 and M6) shown in the same figure.
- Pavement markings may be used to help reinforce routes and directional signage.

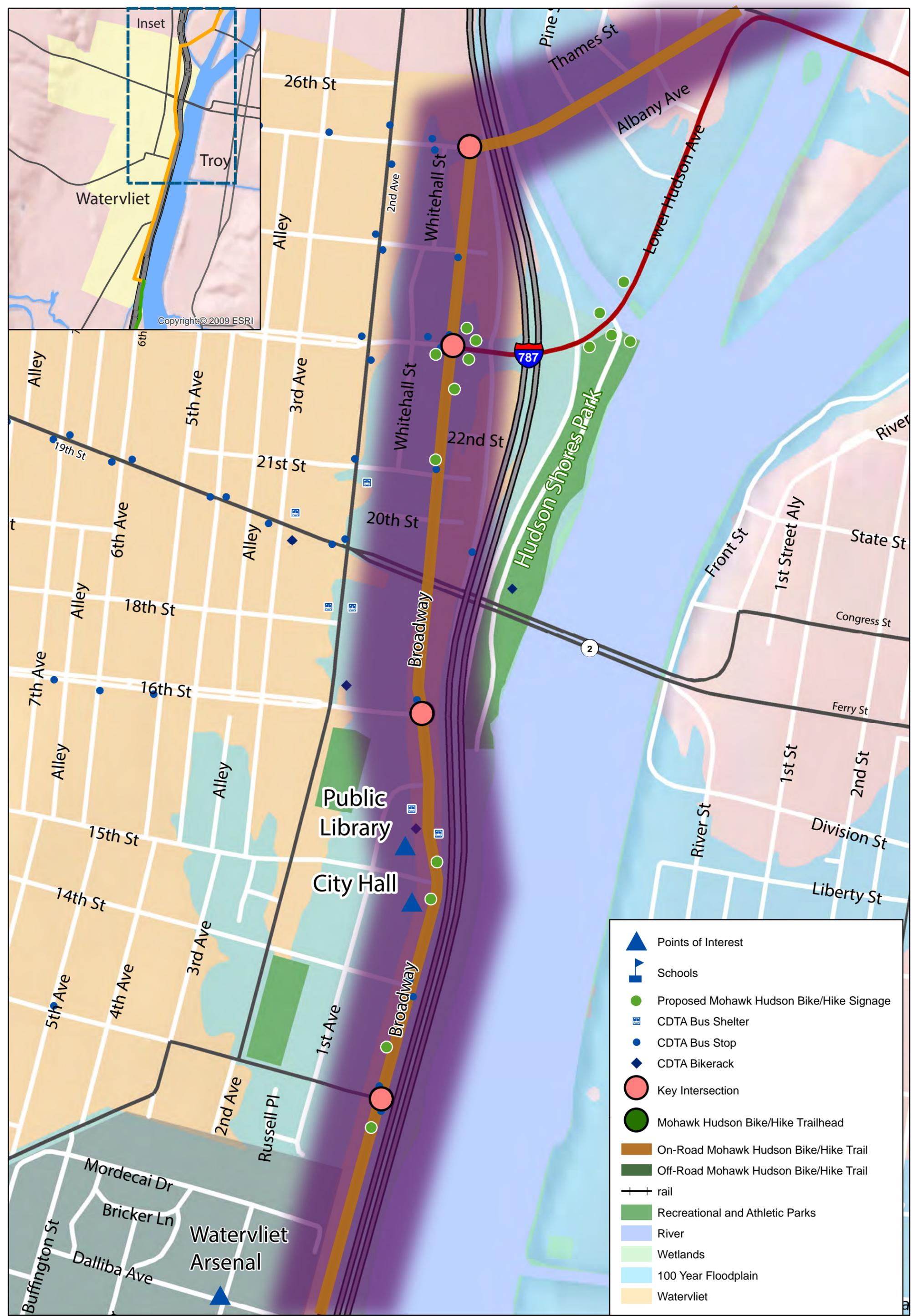
5.8.6 Signage Recommendations and Quantities

The following recommendations are based on the wayfinding standards and guidelines consistent with the MUTCD guidelines. The table below provides a summary of the three sign types that are suggested for the cycle track alternative. This information is given to provide an overall perspective as to the type and quantity of signs that would be necessary and ideal once the corridor is completed.

Location	Action Turn Signs	Confirmation Signs	Decision Signs
Westbound 4 th Street	1, Indicating change of street (from 4 th to Broadway) on the corridor		1, indicating the destinations and their direction along the route. (e.g. Library to right)
Eastbound 4 th Street			1, indicating the destinations and their direction along the route ahead
Broadway @ 4 th Street - Northbound		1, after the intersection	
Broadway @ 4 th Street - Southbound	1, indicating the left turn to continue on the MHBT	1, after the intersection	
Broadway @ 5 th Street - Southbound			1, indicating the destinations and their direction along the route (e.g.: Schuyler Flatts Trail)
Broadway @ 3 rd Ave - Northbound			1, indicating a decision point to continue on Broadway or turn onto 3 rd Ave (add to exiting sign).
Broadway @ 3 rd Ave - Northbound		1, after the intersection	
Broadway @ 3 rd Ave - Southbound		1, after the intersection	
Broadway @ 3 rd Ave			1, indicating the destinations and

Location	Action Turn Signs	Confirmation Signs	Decision Signs
- Eastbound			their direction along the route ahead
Broadway @ 9 th St - Southbound			1, indicating a decision point to continue on Broadway or turn onto 3 rd Ave to other destinations (add to existing sign).
Broadway @ 13 th St- Northbound			1, indicating the destinations and their direction along the route (add to existing sign).
Broadway @ 13 th St- Southbound			1, indicating the destinations and their direction along the route (add to existing sign).
Broadway @ 15 th St- Northbound		1, after the intersection	
Broadway @ 15 th St- Southbound		1, after the intersection	
Broadway btw 21 st St and 23 rd St Northbound			1, indicating the destinations and their direction along the route (add to existing sign).
Broadway btw 21 st St and 23 rd St Southbound			1, indicating the destinations and their direction along the route.
23 rd St @ Broadway Eastbound		1, after the intersection	1, before the intersection, indicating the destinations and their direction along the route ahead.
23 rd St @ Broadway Westbound	1, indicating the left turn to continue on the Cycle Track (add to existing sign).		1, indicating the destinations and their direction along the route ahead (add to existing sign).
Hudson Ave @ NHBT entrance	3. One at each approach of the intersections indicating the change of street on the route.		
Westbound Hudson Ave		1, after the turn	
Entrance to NHBT park		1, after the turn	
Totals	6	9	12





5.9 Bikes and Transit

The Mohawk Hudson Bike Hike Trail is an important amenity that links many residential and employment centers throughout the Capital Region. Trail users currently can access the trail using multiple modes of transportation including personal vehicles, transit, bicycles and by walking. Improving connections between transit and the trail system, and considering bicycling needs concurrently, would have the potential to increase transit, bicycling and trail use overall, while decreasing the need to drive to access the trail.

Currently, several sections of the MHBHT are accessible via transit. Specifically, in the City of Watervliet, the 22 bus runs along Broadway, a primary corridor upon which the trail is routed. The bus also provides convenient access to the Watervliet trailhead for the MHBHT that proceeds south to the Erastus Corning Waterfront Preserve, at both the 3rd Ave and 4th St and the Broadway and 3rd Ave stops. Increased usage of the trail for transportation and recreation could be realized if CDTA provides increased service to this trailhead during peak travel (AM and PM commute periods) and prime recreational times (weekends). Promotional campaigns could be developed that encourage the use of transit to access the trail, such as maps detailing which bus routes service the trail could also be located at trailheads. Clearly identifying which routes connect to the trail would increase non-motorized access to the MHBHT, and potentially boost transit ridership and trail use. Additionally, signage for bus stops can be added to the wayfinding signage described in the previous section.

Since CDTA busses are equipped with bike racks, bicyclists could ride the bus to the trail if they live in an area that is not easily accessible by bicycle, and then continue on the trail to their final destination, such as downtown Albany. Appropriate bicycle parking facilities should also be provided at MHBHT trailheads so that trail users can secure their bikes at the trailhead and experience Watervliet and the trail on foot.

6 Implementation

6.1 Plan Adoption

The Watervliet City Council should adopt a resolution in support of the bike master plan. This will allow for public support of the catalyst projects and help continue the momentum created by the development of the plan. It will also support future funding applications.

6.2 Bicycle Friendly Community Goals

The City of Watervliet can begin by comparing current programs to those of other similarly sized bicycle friendly communities. Watervliet should complete an application in the coming years and set a goal for achieving bronze, silver, gold or even platinum status within a set time frame. Even a bronze level designation would make Watervliet the first BFC in the Capital Region.

6.3 Performance Measures

Performance measures are a means of gauging the effectiveness of bicycle improvements. They can be used to evaluate progress towards adopted goals. The performance measures should be based on the following principles:

- A process that is policy-driven and can be supported by data.
- The measures reflect the users' experience on the system.
- The results are understandable to the general public.
- The application of the performance measures to programs and projects result in data that can be projected into the future.

The key to a successful benchmarking program is to have data that can be collected within the available resources, that is consistently available over time, and is reported in a format that allows year-to-year comparisons. With careful planning, the data system can serve as a core tool for system management in the long term, both to track performance and to ensure that resources are available and well managed. Performance measures can be

collected through user counts, user surveys, land use, and land values. Vehicle miles traveled and vehicle counts on adjacent streets can also help to determine if vehicle trip are being replaced by trail use.

6.4 Funding Opportunities

The following section outlines sources of funding for bicycle and pedestrian projects in New York State. Federal, state, local, and private sources of funding are identified. The following descriptions are intended to provide an overview of available options and do not represent a comprehensive list. Funding sources can be used for a variety of activities, including: planning, design, implementation and maintenance. Additionally, the City should take advantage of funding provided for other roadway projects, such as repaving and water/sewer main replacement to install bicycle and pedestrian accommodations. It should be noted that this section reflects the funding available at the time of writing. The funding amounts, fund cycles, and even the programs themselves are susceptible to change without notice.

While waiting for larger funds to become available, the City can implement minor improvements along the MHBHT such as replacing worn or damaged wayfinding signage and filling gaps in the existing signage. The City can also replace existing storm grates with more bicycle friendly storm grates.

Federal transportation funding is typically directed through state agencies to local governments either in the form of grants or direct appropriations, independent from state budgets. Federal funding typically requires a local match of 20%, although there are sometimes exceptions, such as the recent American Recovery and Reinvestment Act stimulus funds, which did not require a match.

The following is a list of possible Federal funding sources that could be used to support construction of many pedestrian and bicycle improvements. Most of these are competitive and involve the completion of extensive applications with clear documentation of the project need, costs, and benefits. However, it should be noted that the FHWA encourages the construction of pedestrian and bicycle facilities as an incidental element of larger ongoing projects. Examples include providing paved shoulders on new and reconstructed roads, or building sidewalks, on-street bikeways, trails and marked crosswalks as part of new highways.

6.4.1 Moving Ahead for Progress in the Twenty-First Century (MAP-21)

The largest source of federal funding for bicycle and pedestrian is the US DOT's Federal-Aid Highway Program, which Congress has reauthorized roughly every six years since the passage of the Federal-Aid Road Act of 1916. The latest act, Moving Ahead for Progress in the Twenty-First Century (MAP-21) was enacted in July 2012 as Public Law 112-141. The Act replaces the Safe, Accountable, Flexible, Efficient Transportation Equity Act – a Legacy for Users (SAFETEA-LU), which was valid from August 2005 - June 2012.

MAP-21 authorizes funding for federal surface transportation programs including highways and transit for the 27 month period between July 2012 and September 2014. It is not possible to guarantee the continued availability of any listed MAP-21 programs, or to predict their future funding levels or policy guidance. Nevertheless, many of these programs have been included in some form since the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991, and thus may continue to provide capital for active transportation projects and programs.

In New York State, federal monies are administered through the New York State Department of Transportation (NYSDOT) and metropolitan planning organizations (MPOs). Most, but not all, of these programs are oriented toward transportation versus recreation, with an emphasis on reducing auto trips and providing inter-modal connections. Federal funding is intended for capital improvements and safety and education programs, and projects must relate to the surface transportation system.

There are a number of programs identified within MAP-21 that are applicable to bicycle and pedestrian projects. These programs are discussed below.

More information: <http://www.fhwa.dot.gov/map21/summaryinfo.cfm>

Transportation Alternatives

Transportation Alternatives (TA) is a new funding source under MAP-21 that consolidates three formerly separate programs under SAFETEA-LU: Transportation Enhancements (TE), Safe Routes to School (SR2S), and the Recreational Trails Program (RTP). These funds may be used for a variety of pedestrian, bicycle, and streetscape projects including sidewalks, bikeways, multi-use paths, and rail-trails. Unless the Governor of a given state chooses to opt out of Recreational Trails Program funds, dedicated funds for recreational trails continue to be provided as a subset of TA. MAP-21 provides \$85 million nationally for the RTP.

Complete eligibilities for TA include:

1. **Transportation Alternatives** as defined by Section 1103 (a)(29). This category includes the construction, planning, and design of a range of bicycle and pedestrian infrastructure including “on-road and off-road trail facilities for pedestrians, bicyclists, and other non-motorized forms of transportation, including sidewalks, bicycle infrastructure, pedestrian and bicycle signals, traffic calming techniques, lighting and other safety-related infrastructure, and transportation projects to achieve compliance with the Americans with Disabilities Act of 1990.” Infrastructure projects and systems that provide “Safe Routes for Non-Drivers” is a new eligible activity. For the complete list of eligible activities, visit: http://www.fhwa.dot.gov/environment/transportation_enhancements/legislation/map21.cfm
2. **Recreational Trails.** TA funds may be used to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Examples of trail uses include hiking, bicycling, in-line skating, equestrian use, and other non-motorized and motorized uses. These funds are available for both paved and unpaved trails, but may not be used to improve roads for general passenger vehicle use or to provide shoulders or sidewalks along roads.

Recreational Trails Program (RTP) funds may be used for:

- Maintenance and restoration of existing trails
- Purchase and lease of trail construction and maintenance equipment
- Construction of new trails, including unpaved trails
- Acquisition or easements of property for trails
- State administrative costs related to this program (limited to seven percent of a state’s funds)
- Operation of educational programs to promote safety and environmental protection related to trails (limited to five percent of a state’s funds)

Under MAP-21, dedicated funding for the RTP continues at FY 2009 levels – roughly \$85 million annually. New York State will receive \$2.2 million in RTP funds per year through FY2014.

3. Planning, designing, or constructing roadways within the right-of-way of former Interstate routes or divided highways. At the time of writing, detailed guidance from the Federal Highway Administration on this new eligible activity was not available.

Average annual funds available through TA over the life of MAP-21 equal \$814 million nationally, which is based on a 2% set-aside of total MAP-21 authorizations. Projected apportionments for New York State total \$32.4 million for FY 2013 and \$32.7 million for FY 2014. Note that state DOT’s may elect to transfer up to 50% of TA funds to other highway programs, so the amount listed above represents the maximum potential funding. Remaining TA funds (those monies not re-directed to other highway programs) are disbursed through a separate competitive grant program administered by NYSDOT. Local governments, school districts, tribal governments, and public lands agencies are permitted to compete for these funds.

Surface Transportation Program

The Surface Transportation Program (STP) provides states with flexible funds which may be used for a variety of highway, road, bridge, and transit projects. A wide variety of bicycle and pedestrian improvements are eligible, including on-street bicycle facilities, off-street trails, sidewalks, crosswalks, bicycle and pedestrian signals, parking, and other ancillary facilities. Modification of sidewalks to comply with the requirements of the Americans with Disabilities Act (ADA) is also an eligible activity. Unlike most highway projects, STP-funded bicycle and pedestrian facilities may be located on local and collector roads which are not part of the Federal-aid Highway

System. 50% of each state's STP funds are suballocated geographically by population; the remaining 50% may be spent in any area of the state.

Highway Safety Improvement Program

MAP-21 doubles the amount of funding available through the Highway Safety Improvement Program (HSIP) relative to SAFETEA-LU. HSIP provides \$2.4 billion nationally for projects and programs that help communities achieve significant reductions in traffic fatalities and serious injuries on all public roads, bikeways, and walkways. MAP-21 preserves the Railway-Highway Crossings Program within HSIP but discontinues the High-Risk Rural roads set-aside *unless* safety statistics demonstrate that fatalities are increasing on these roads. Bicycle and pedestrian safety improvements, enforcement activities, traffic calming projects, and crossing treatments for non-motorized users in school zones are eligible for these funds. NYSDOT estimates that they will receive an average of \$92.8 million annually for this program through the lifetime of MAP-21.

Enhance Mobility of Seniors and Individuals with Disabilities

MAP-21 continues a formula grant program that provides capital and operating costs to provide transportation services and facility improvements that exceed those required by the Americans with Disabilities Act. Examples of pedestrian/accessibility projects funded in other communities through "Enhance Mobility of Seniors and Individuals with Disabilities" include installing Accessible Pedestrian Signals (APS), and enhancing transit stops to improve accessibility.

More information: <http://www.fta.dot.gov>

Pilot Transit-Oriented Development Planning

MAP-21 establishes a new pilot program to promote planning for Transit-Oriented Development. At the time of writing the details of this program are not fully clear, although the bill text states that the Secretary of Transportation may make grants available for the planning of projects that seek to "facilitate multimodal connectivity and accessibility," and "increase access to transit hubs for pedestrian and bicycle traffic."

Partnership for Sustainable Communities

Founded in 2009, the Partnership for Sustainable Communities is a joint project of the Environmental Protection Agency (EPA), the U.S. Department of Housing and Urban Development (HUD), and the U.S. Department of Transportation (USDOT). The partnership aims to "improve access to affordable housing, more transportation options, and lower transportation costs while protecting the environment in communities nationwide." The Partnership is based on five Livability Principles, one of which explicitly addresses the need for bicycle and pedestrian infrastructure ("Provide more transportation choices: Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health").

The Partnership is not a formal agency with a regular annual grant program. Nevertheless, it is an important effort that has already led to some new grant opportunities (including both TIGER I and TIGER II grants). The City of Watervliet should track Partnership communications and be prepared to respond proactively to announcements of new grant programs. Initiatives that speak to multiple livability goals (such as partnerships with CDTA, or with affordable housing groups) are more likely to score well than initiatives that are narrowly limited in scope to bicycle and pedestrian efforts.

More information: <http://www.sustainablecommunities.gov/grants.html>

Community Transformation Grants

Community Transformation Grants administered through the Center for Disease Control support community-level efforts to reduce chronic diseases such as heart disease, cancer, stroke, and diabetes. Active transportation

infrastructure and programs that promote healthy lifestyles are a good fit for this program, particularly if the benefits of such improvements accrue to population groups experiencing the greatest burden of chronic disease.

More info: <http://www.cdc.gov/communitytransformation/>

Land and Water Conservation Fund

The Land and Water Conservation Fund (LWCF) provides grants for planning and acquiring outdoor recreation areas and facilities, including trails. Funds can be used for right-of-way acquisition and construction. The program is administered by the NYS Office of Parks, Recreation, and Historical Preservation as a grant program. Any Pedestrian and Bicycle Master Plan projects located in future parks could benefit from planning and land acquisition funding through the LWCF. Trail corridor acquisition can be funded with LWCF grants as well.

More info: <http://www.nps.gov/lwcf/>

Rivers, Trails, and Conservation Assistance Program

The Rivers, Trails, and Conservation Assistance Program (RTCA) is a National Parks Service (NPS) program providing technical assistance via direct NPS staff involvement to establish and restore greenways, rivers, trails, watersheds and open space. The RTCA program provides only for planning assistance—there are no implementation monies available. Projects are prioritized for assistance based on criteria including conserving significant community resources, fostering cooperation between agencies, serving a large number of users, encouraging public involvement in planning and implementation, and focusing on lasting accomplishments. This program may benefit trail development in the City of Watervliet indirectly through technical assistance, particularly for community organizations, but should not be considered a future capital funding source.

More info: <http://www.nps.gov/pwro/rtca/who-we-are.htm>

6.4.2 Additional Federal Funding

The landscape of federal funding opportunities for bicycle and pedestrian programs and projects is always changing. A number of Federal agencies, including the Bureau of Land Management, the Department of Health and Human Services, the Department of Energy, and the Environmental Protection Agency have offered grant programs amenable to bicycle and pedestrian planning and implementation, and may do so again in the future. For up-to-date information about grant programs through all federal agencies, see <http://www.grants.gov/>

6.4.3 New York State Funding

Several specific NYS funding sources are detailed below; however, the best source of state funding is the consolidated funding application (CFA). The CFA's are typically due in August of each year and the application applies for a variety of state programs and funding.

NYSDOS – Local Waterfront Revitalization Program (LWRP)

The Department of State works with communities in the Hudson Valley Region through the Local Waterfront Revitalization Program to promote community revitalization and resource protection through community-based plans and projects. The Department of State provides funding through the Environmental Protection Fund for projects that enhance public access to waterways and state lands, promote sustainable economic development, protect and improve water quality, and revitalize hamlets and downtowns. Eligible activities include planning, feasibility, design and construction of trails, and streetscape enhancements.

Consolidated Local Street and Highway Improvement Program (CHIPS)

A New York State-funded program administered through the NYSDOT to assist localities in financing the construction, reconstruction or improvement of local highways, bridges, highway-railroad crossings and other local facilities. Eligible CHIPS bicycle and pedestrian projects include: bike lanes and wide curb lanes, shoulder im-

provements, roundabouts, new signs, new or upgraded traffic signals and traffic calming installations (www.dot.ny.gov/programs/chips).

NYS Department of Health- Preventative Health and Health Services (PHHS) Block Grant

The Preventive Health and Health Services (PHHS) Block Grant provides funding for health problems in the state of New York that range from tuberculosis to adult physical activity. PHHS Block Grant dollars fund a total of 19 different New York State health programs, including the Healthy Heart Program. PHHS Block Grant funds are used to promote and evaluate increases in the number of adults participating in regular sustained physical activity. From 1995-2004, nearly 1.2 million New York State residents received help from local HHP contractors to increase their physical activity levels (www.health.ny.gov/funding/grants/block_grant.htm).

6.4.4 Private Foundations

Private foundations are an increasingly important source of funds for bicycle and pedestrian planning and implementation. More info: <http://www.foundationcenter.org/>