TOD Pilot Program:

Bicycle & Pedestrian Improvements for the Derby-Shelton TOD Area

Alternatives Assessment: Volume 1

Valley Council of Governments

December 2014

Prepared by: AECOM

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Clare Falcha, Financial Officer
Jan Jadach, Administrative Assistant
Yi Ding, Transportation Planner
Sean Kelleher, Policy Coordinator
Christian Nielsen, Planning Intern**

*Project Manager
**Photo Credit

AECOM

Michael McCarthy, Project Director
Noel Pagan, Project Manager
Deborah Howes, Director of Community Planning
Jonie Fu, Urban Design
Jeffrey Maxtutis, Traffic Engineer
Allison Rachleff, Sr. Architectural Historian & Environment

Sources of Copies

Valley Council of Governments
49 Leavenworth Street, Suite 303
Waterbury, Connecticut 06702

Phone: (203) 757-0535
Email: nvcog@nvcogct.org
Website: www.nvcogct.org

For more information

For more information about the VCOG's TOD Pilot Program, please visit the VCOG's website at: www.nvcogct.org.

Acknowledgements

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Abstract

The Valley Council of Governments (VCOG) was awarded state grant funds under the Connecticut TOD Pilot Program. The intent of the program is to assess the opportunities for promoting land uses that would support the creation of transit oriented developments, referred to as TODs. The VCOG has a key role in evaluating TOD strategies and implementing transportation improvement projects that expand mobility choice and enhance the linkages between mixed-use developments, higher density residential areas and public transit facilities and services.

The TOD Pilot Program is organized into three main tasks that will complete multiple and interrelated but independent planning studies to assess alternative transportation modes, harness public transit, and create livable and sustainable communities. The project will develop TOD station area plans and conduct infrastructure studies to determine strategies, policies and improvements needed to incentivize and promote TOD districts. An alternate transit modes study will be conducted to identify new transit opportunities to better serve the underserved portion of the Route 8 Corridor and Waterbury branch line from the Derby-Shelton commuter rail station, also known as the Derby-Shelton Multi-Modal Center (DSMMC), to the Bridgeport Transportation Center.

The first task focuses on how to enhance pedestrian and bicycle connections between new housing opportunities in the downtown area of Shelton and the DSMMC. The project will tie together the redevelopment areas and foster visual and physical connections. The key element of the proposed project is the rehabilitation and renovation of the Derby-Shelton Bridge (Bridge Street). The proposed action would create a pedestrian promenade and public space on the bridge and re-image it as a visual, as well as, a physical connection between the two cities.

The project study area extends from the DSMMC to downtown Shelton. The corridor was divided into four segments to facilitate the assessment of alternatives. The four (4) segments are:

- East Side Segment: from the DSMMC to Water Street;
- Downtown Derby Segment: along Main Street from Water Street to Bridge Street;
- Derby-Shelton Bridge Segment: from Main Street to Canal Street Ramps; and
- West Side Segment: from the Canal Street Ramps to Howe Avenue.

For each segment, several alternatives/options were identified and assessed. Presentations of alternatives were made at two stakeholder meetings and separately to the staff of the Connecticut Department of Transportation at two other meetings.

This report documents the planning process to determine the preferred alignment and alternative for connecting Derby and Shelton.

Glossary and Acronyms

Bicycle – In Connecticut, a bicycle is considered a vehicle, and is required to follow the rules of the road.

Bicycle Boulevard – A street segment, or series of contiguous street segments, that has been modified to accommodate through bicycle traffic and minimize through motor traffic.

Bicycles Facilities – A general term denoting improvements and provisions to accommodate or encourage bicycling, including parking and storage facilities, and shared roadways not specifically defined for bicycle use.

Bicycle Lane or Bike Lane – A portion of roadway that has been designated for preferential or exclusive use by bicyclists by pavement markings and, if used, signs. It is intended for one-way travel, usually in the same direction as the adjacent traffic lane, unless designed as a contra-flow or bi-directional lane.

Bicycle Locker or Bike Locker – A secure, lockable container used for individual bicycle storage.

Bicycle Network – A system of bikeways designated by the jurisdiction having authority. This system may include bike lanes, bicycle routes, shared use paths, and other identifiable bicycle facilities.

Bicycle Rack or Bike Rack – A stationary fixture to which a bicycle can be securely attached.

Bicycle Route or Bike Route – A shared roadway or bicycle facility designated by the jurisdiction having authority, either with a unique route designation or with Bike Route signs, along which bicycle guide signs may provide directional and distance information. Signs that provide directional, distance, and destination information for bicyclists do not necessarily establish a bicycle route.

Bikeway or Bike Path – A bike path shall mean an off-road facility for the exclusive use of bicycle travel.

CTDOT – Connecticut Department of Transportation

Cycle Tracks – A form of cycling infrastructure, that may or may not be raised, that separates a bicycle lane from the motorized traffic lane or right-of-way.

Derby-Shelton Multi-Modal Center (DSMMC)- The Derby-Shelton Multi-Modal Center is the commuter rail station on the Waterbury Branch Lane (WBL) serving the cities of Derby and Shelton. Daily rail service is provided to Bridgeport and Stamford. The WBL joins the New Haven Main rail lines out of the DSMMC at Derby. Connections to local bus service, operated by CT Transit, and Greater Bridgeport Transit, can be made at the DSMMC.

Manual on Uniform Traffic Control Devices (MUTCD)-Published by the Federal Highway Administration, this manual defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways and private roads open to public traffic.

No-build Alternative-The existing conditions and/or assumption that planned and funded projects, including the Route 34 reconstruction project, will be part of existing conditions by the build date of a proposed action.

Roadway – The portion of the highway, including shoulders, intended for vehicular use.

Shared Lane / Bicycle Facility – A lane of roadway that is open to both bicycle and motor vehicle travel, in the same direction of travel and designated by shared lane markings; also referred to as "sharrows". The marking assists bicyclists with lateral positioning in the shared lane.

Transit Oriented Development (TOD) – Section 13b-79o of the Connecticut General Statutes defines "Transit-Oriented Development" as "the development of residential, commercial and employment centers within one-half mile or walking distance of public transportation facilities, including rail and bus rapid transit and services, that meet transit supportive standards for land uses, built environment densities and walkable environments, in order to facilitate and encourage the use of those services."

Plans of Conservation and Development (POCD) – A Plan of Conservation and Development is a tool for guiding the future of a community and provides the framework for making land use decisions. CT statutes require a community to update its plan every 10 years.

Valley Council of Governments (VCOG) – The VCOG is the designated regional planning organization for the Valley planning region. It is comprised of the cities of Ansonia, Derby and Shelton and the Town of Seymour. (Note: since the completion of this study and release of the final report, the VCOG merged with the Council of Governments of the Central Naugatuck Valley. The new organization is called the Naugatuck Valley Council of Governments – NVCOG – and is responsible for transportation planning for a 19-town region. The City of Waterbury is the largest municipality on the region.)

Americans with Disabilities Act (ADA) – Federal law that prohibits discrimination based on disability and affords persons with disabilities with protection from discrimination. As it relates to transportation improvement projects, the US Department of Transportation regulations require compliance with certain design standards and guidelines to ensure the mobility of persons with disabilities.

National Association of City Transportation Officials (NACTO) – An association that represents large cities on transportation issues of local, regional and national significance and facilitates the exchange of transportation ideas, insights and best practices among large cities. NATCO has prepared a bicycle facilities design guide based on state-of-the-practices and solutions from around the country.

American Association of State Highway Transportation Officials (AASHTO) – An association of that represents state highway and transportation departments to foster the development, operation, and maintenance of an integrated national transportation system. AASHTO has developed a bicycle facilities design guideline to accommodate bicycle travel and operations.

National Committee on Uniform Traffic Control Devices – The committee assists in the development of standards, guides and warrants for traffic control devices and practices used to regulate, warn and guide traffic on streets and highways and recommends amendments to the *Manual on Uniform Traffic Control Devices*.

Introduction

As a partner in the New York and Connecticut Sustainable Communities Consortium (www.sustainablenyct.org), funded under a $3.5 million initiative of the US Department of Housing and Urban Development (HUD), the Valley Council of Governments (VCOG) has been active in implementing the Six Livability Principles promoted jointly by HUD, US Environmental Protection Agency and US Department of Transportation (USDOT). To assist the implementation of policies and actions that advance livability goals, extend sustainable communities and promote transit supportive land uses, the VCOG applied for and was awarded special grant funds available from the state under Section 13b-79ll of the Connecticut General Statutes. The grant was provided to complete a transit-oriented development plan for the Valley planning region and to develop a strategy for implementing TOD-supportive actions.

The Valley planning region is located in southwestern Connecticut midway between the City of Bridgeport to the south and Waterbury to the north. It is a relatively small region with a geographic area of about 58 square miles and a combined population (2010 Census) of 88,250. The region is comprised of four lower Naugatuck valley communities:

- City of Ansonia;
- City of Derby;
- Town of Seymour; and
- City of Shelton.

Historically, the region supported a robust manufacturing economy based on its location along the Naugatuck and Housatonic Rivers and access to water power and waterborne transportation. During the peak period of manufacturing, the region developed the infrastructure to support the manufacturing sector, including public water supply and sanitary sewers. Dense residential developments were also built to provide work force housing in proximity of the manufacturing plants. Businesses and manufacturing plants were located in town centers and the downtown areas became the focal points for residents and met all of their essential needs.

Before the proliferation of the automobile, transportation was dominated by the Waterbury rail line that provided intercity and inter-regional connections and trolley lines for localized travel. The expansion of the road network following World War II changed the character of the region. Manufacturing businesses began to relocate to areas with less expensive operating costs and residents also began to shift their travel to other communities for shopping and social activities. The construction of Route 8 in the early 1960s provided an efficient and convenient means to travel to other areas. As a result, the downtown areas declined and became less desirable places to work and live. These areas are now under-populated and contain Brownfield sites; however, they retain well-developed infrastructure and are served by both bus and rail. Because of the infrastructure and land patterns, there are opportunities to transform these centers back into vibrant communities through the implementation of catalytic projects and enhanced transit services.

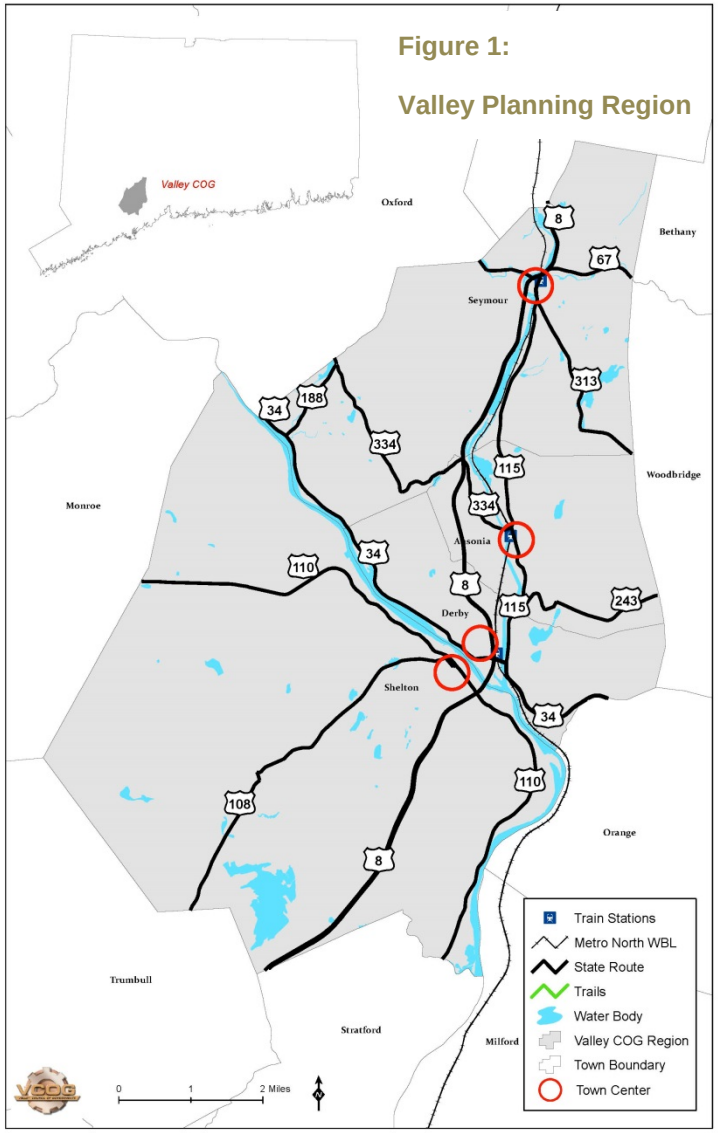


Figure 1:

Valley Planning Region

The VCOG's TOD Pilot Program is divided into three distinct tasks:

1. Task 1: Identification of concepts for enhancing pedestrian and bicycle connections between downtown Shelton and the DSMMC. This task also includes preparation of a study of the condition of the Derby-Shelton Bridge and opportunities to renovate and enhance the bridge to re-image it as an attractive and aesthetically pleasing structure for pedestrians and bicyclists, in addition to its function as the linkage between downtown Shelton and downtown Derby;
2. Task 2: A Regional Model Transit Oriented Development (TOD) Regulations Project to research regulations, policies and strategies that have been successfully used in other communities to promote and incentivize TODs; and
3. Task 3: An Assessment of Alternate Transportation Options along the Route 8 and Waterbury Rail Line Corridors to identify the alternate transit services and improvements needed along both corridors that will advance the development of residential, commercial and employment opportunities and new town centers in Derby, Shelton, Ansonia and Seymour within walking distance of new and enhanced public transit facilities, including local bus service, bus rapid transit routes and commuter rail.

This report documents the findings and recommendations for Task 1 work. AECOM completed a thorough investigation of the current conditions along the corridor and assessed traffic operations, safety and historic and cultural issues.

The vision for the future of the region recognizes that land use development planning that focuses on the single occupancy vehicle is detrimental to the environment and is unsustainable at the municipal and state level. This is, in large part, because of ongoing maintenance costs associated with housing developments away from the transit services and public infrastructure. The vision of responsible growth in the Valley region is based on creating connections between housing and economic development with transit options that increase ridership on the system and encourage compact sustainable development in support of the local, regional, and state plans.

The goal of the TOD Pilot Program is to effectuate a fundamental change in how the city centers in the region are perceived and construct transformative improvements that will be the catalysts for economic revitalization, livable communities and sustainable transportation choices. As a small region with compact urban cores, these communities are well situated to realize the benefits from strategic transportation investments that take full advantage of existing infrastructure and opportunities to create vibrant communities for residents to live and work. The first task of the TOD Program focuses on the linkages between downtown Derby and downtown Shelton. The major program goals are:

1. Analyze the existing bicycle and pedestrian connections to the Derby-Shelton Multi-Modal Center (DSMMC) from downtown Shelton via the Derby-Shelton Bridge and the Derby Greenway;
2. Identify the *"Preferred Alternative"* for improving and enhancing connections, while creating an attractive, safe and convenient path between the new housing developments in Shelton and the rail station; and
3. Identify additional connectivity opportunities along the Main Street/Route 34 corridor with the existing Housatonic River and Naugatuck River trail network, Howe Avenue in Shelton and the DSMMC in Derby.

These project goals stem from the recognition of fragmentation within the corridor, particularly between the downtown Shelton and the DSMMC in Derby, and the potential impact that this fragmentation may have on future development and transit utilization. The challenges in addressing the fragmentation underlie the identification of options and selection of the preferred alternative.

Both town centers have good urban fabric and strong pedestrian-oriented street and block structures. However, the downtowns are separated by the Housatonic River and the block structure needs to extend to include Bridge Street in Shelton and Main Street in Derby. For this reason, the Derby-Shelton Bridge is a key focus of the study and a critical asset for linking the two communities.

Building frontages and a mix of uses are important elements in a transit-oriented street design. The value of transit facilities, such

as the DSMMC, residential, retail and entertainment land uses, and regional open spaces and parks can be greatly enhanced by increasing the accessibility and connections within the TOD area. This study looks at the opportunities bicycle and pedestrian improvements will have on achieving the enhanced accessibility needed within the TOD area.

The study area is divided into four (4) segments defined by logical termini. Several options were developed for each segment. Some segments allow for the consideration of more alternatives than others. The study corridor extends from the Derby Shelton Multi-Modal Center (DSMMC) to Canal Street in downtown Shelton. From the DSMMC, the route continues westward through downtown Derby, either along Main Street/Route 34 or via a connection to the Greenway, over the Derby-Shelton Bridge to Canal Street, and then north, west or south to connect with the new residential developments along the west bank of the Housatonic River.

The four (4) segments are described as follows and shown in Figure 2. Descriptions of the segments and options in this report typically go from east to west.

- East Side Segment: from the DSMMC to Water Street;
- Downtown Derby Segment: along Main Street from Water Street to Bridge Street;
- Derby-Shelton Bridge Segment: from Main Street to Canal Street Ramps; and
- West Side Segment: from the Canal Street Ramps to Howe Avenue.

An aerial overview is provided for each segment, followed by one or more options that have been developed for that segment. For each of the developed options, there is an aerial and a plan view, showing, as appropriate, the transportation elements included in the option such as travel lanes, sidewalks, turning lanes and other relevant information.

Along the study corridor, there are three critical intersections that bicyclists need to negotiate:

- Main Street at Ausonio Drive;
- Main Street at Water Street and Factory Street; and
- Main Street at Bridge Street.

For each, an example of intersection treatments that would allow for bicyclists to safely and logically cross through the intersection is shown.

Other considerations and amenities that would enhance the bicycling experience along the corridor are identified and included in the report. These items include lighting, wayfinding, bicycle signage, pavement markings, and street furniture.

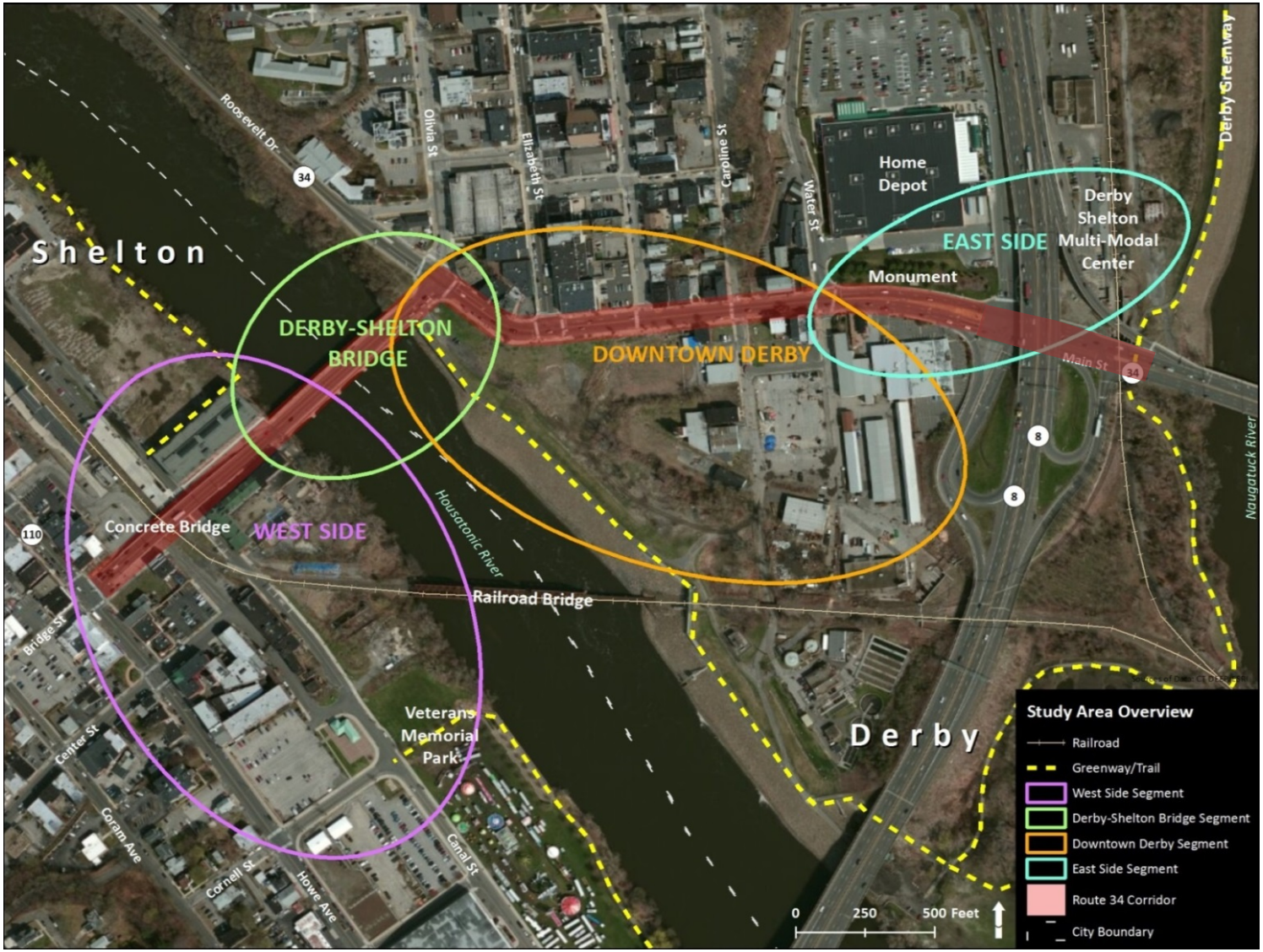


Figure 2:

The Four Segments of the Study Area

The concept of enhancing the pedestrian and bicycle linkages and renovation of the Derby-Shelton Bridge to create an attractive gateway to the downtown areas of Derby and Shelton was presented in a visual design study sponsored by the Shelton Economic Development Corporation and the Derby Shelton Rotary Club. This study formed the basis for the request of TOD Pilot Program funds and early discussions on alternatives and options. In addition to the visual design study, AECOM reviewed other various reports and studies previously completed on the study area. An extensive data collection effort was completed to ascertain travel patterns, both motorized and non-motorized modes, safety and existing conditions.

Also early in the project development phase, the Project Team held a meeting with interested Stakeholders to present an overview of the study's scope and existing conditions within the corridor. The meeting also served as a means for soliciting comments on the study's direction and mission. In attendance were the mayors of Shelton and Derby. The consensus of the Stakeholders was the unanimous support for renovation and aesthetic upgrade of the Derby-Shelton Bridge. The enhancement of the structure was viewed as one of the more critical aspects in efforts to revitalize the downtowns of both communities.

Based on the assessment of existing conditions and direction from the Stakeholders, the Project Team developed a long list of options for each segment. Review meetings were held with the VCOG and CTDOT to refine the criteria for evaluating the options and eliminate actions that were deemed to be infeasible, either based on cost or for not meeting the purpose and needs of the study. The action also needed to be consistent with the planned Route 34 reconstruction project (refer to Appendix L).

The shorter list of options underwent a more in-depth review and is the subject of this Alternatives Assessment report. The short list of possible actions was reviewed by the Stakeholder Committee and CTDOT. A consensus was reached regarding the preferred alternative. The estimated costs for implementing the short list options, as well as, the preferred action were developed.

Throughout the study, the Project Team coordinated with CTDOT and addressed issues and concerns expressed by the Department. CTDOT staff also offered valuable suggestions and comments to ensure proposed improvements would blend seamlessly with the existing roadway, as well as, with any future planned roadway improvements.

Volume II of the TOD Pilot Program, *Technical Supplement*, is comprised of appendices containing data, technical memoranda, and correspondences collected during the study accompanies this report. Reports of all meetings and attendance lists are included, as are summaries of the issues raised at those meetings and subsequent responses to issues and concerns.

Included in Volume II are the following:

- Appendix A: Connecticut State Historic Preservation Office (CTSHPO) Correspondence
- Appendix B: Accident Data
- Appendix C: Traffic Counts
- Appendix D: Origin – Destination Data
- Appendix E: Synchro and Traffic Signal Warrant Results
- Appendix F: Minutes and PowerPoint for 2-20-2014 Stakeholders Meeting
- Appendix G: Photographs of the Study Area
- Appendix H: Traffic Analysis
- Appendix I: CTDOT 4-9-2014 Presentation, Minutes & Review Comments
- Appendix J: Stakeholders 6-25-2014 Presentation, Minutes & Comments
- Appendix K: Technical Task Protocols (Design Criteria)
- Appendix L: Summary of Options Deemed Not Feasible
- Appendix M: Construction Costs

Baseline Conditions

The purpose and needs of the TOD Pilot Program are to improve and enhance the pedestrian and bicycle conditions along Main Street in Derby to better connect the DSMMC with the residential development occurring in downtown Shelton.

The study area consists of Main Street and several intersecting streets in downtown Derby. Main Street is designated as State Route 34, which extends from I-95 in New Haven to I-84 in Newtown. It is classified as a principle arterial and serves as a major travel route for commuters. An interchange with the Route 8 Expressway is located at the east end of the study corridor. Bridge Street serves to connect downtown Derby with the city of Shelton and the Derby-Shelton Bridge carries Bridge Street over the Housatonic River.

The Derby Greenway is a multi-use path that begins at the Route 34 and Bridge Street intersection. It extends through the southern portion of Derby and then northward to Division Street at the Ansonia town line, a distance of about 1.7 miles. The path is completely separated from the roadway and runs along the banks of the Housatonic River and Naugatuck River. The greenway does not connect directly with the DSMMC. Users need to exit the trail on the east side of the Waterbury branch line tracks, cross the Route 8 on-ramp, and follow an existing sidewalk along Route 34 into the station's parking lot. While this path is only about 800 feet, it is somewhat circuitous and not a convenient connection for bicyclists wanting to access the rail station.

Sidewalks are provided along both sides of Main Street over the entire length of the study area. In addition, sidewalks are on both sides of the Derby-Shelton Bridge. However, only a narrow sidewalk is provided along the remainder of Bridge Street to Howe Avenue. No bicycle facilities are provided along Main Street within the project area, and, given the traffic volumes along the corridor, especially on the east end, and the number of conflict

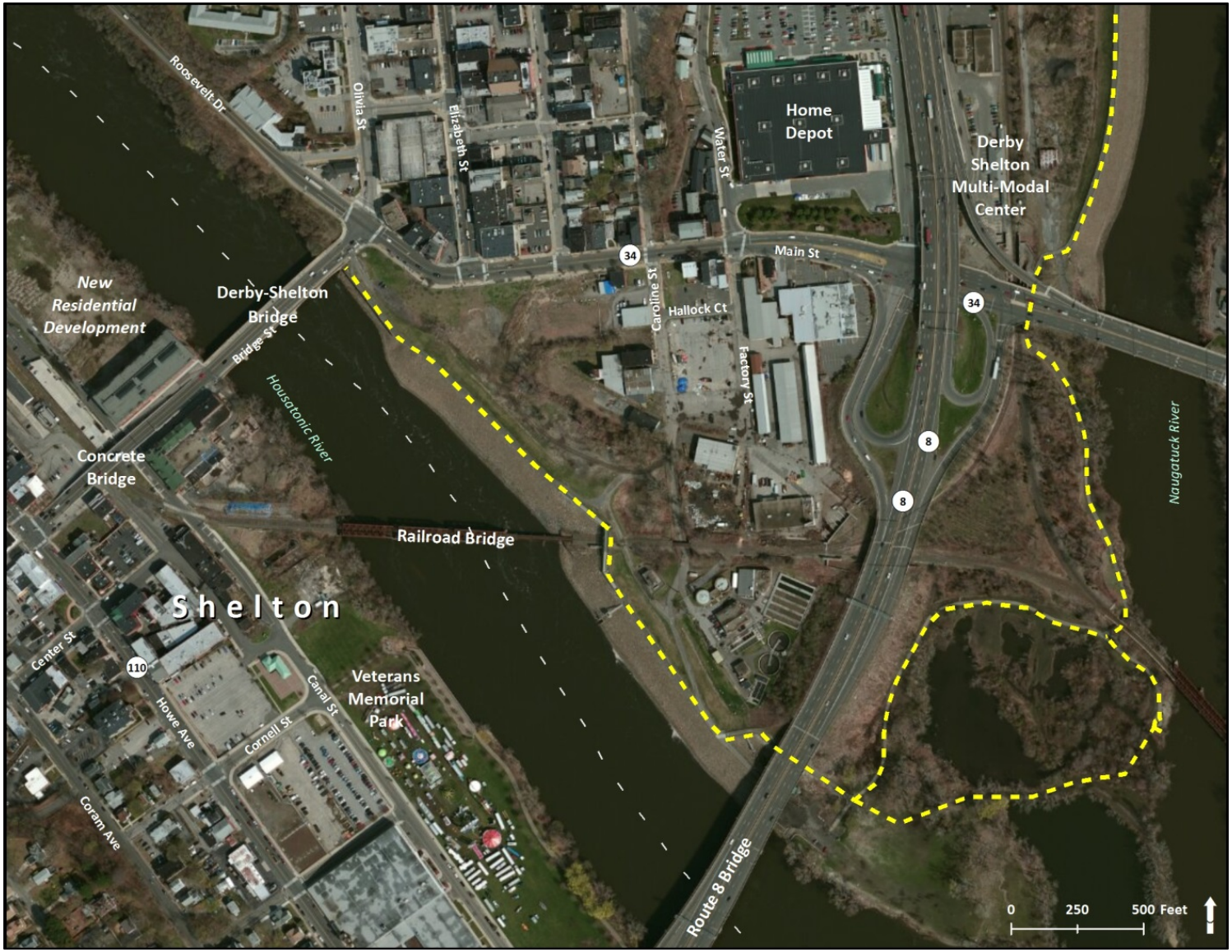


Figure 3:

Derby Greenway

Photo Perspectives of the Derby Greenway

Figure 4:

Near Bridge Street and Small Informal Parking Area

Figure 5:

Looking North toward the Derby-Shelton Bridge

Figure 6:

Looking South near the Route 8 Overpass

Figure 7:

Looking North along Naugatuck River

points, such as signalized intersections and on-street parking, bicycling is problematic.

The proposed actions from this project are not expected to affect or alter motorized travel within the corridor. Vehicular traffic will continue to operate on the existing street network. Pedestrians will be accommodated on the existing or planned sidewalks. For the most part, bicycles can travel in the road, either sharing the lane with traffic or using the shoulder area of the road. Main Street has a marked edge line delineating the travel lanes and the shoulder area. While this space is fairly wide, it is available for on-street parking, limiting its usefulness as a bicycle facility. For other roads within the project, shared road bicycle facilities will be acceptable. These roads, including Caroline Street, Factory Street, Hallock Court, Canal Street and Bridge Street, have low traffic volumes and accommodate the shared use by bicycles and automobiles. Where practical, dedicated bicycle lanes will be recommended to enhance separation.

Because of the high volume of traffic carried on Route 34 and the congestion that occurs during the peak commuting periods, the VCOG and the City of Derby have completed several traffic assessments and corridor studies on the roadway. These studies identified substantial safety concerns and issues, as well as severe operational capacity problems. The current roadway configuration is incapable of adequately moving existing traffic at acceptable levels of service. Congestion and vehicle queues are common at the signalized intersection during peak hours.

Additionally, as the City redevelops land south of Route 34, traffic generated by redevelopment will further strain operations and adversely impact economic opportunities.

To address existing operating problems, accommodate future traffic generation and improve safety, while better coordinating land use and transportation and creating a more livable corridor, a major reconstruction, widening and rehabilitation of Route 34 is being planned. Preliminary design plans have been prepared and the project is expected to advance to final design in October, 2014.

The preliminary design plan for Route 34 is depicted in Figure 8. Improvements include widening the roadway to provide four travel lanes, with turn lanes at the key intersections. A raised median, curb extensions, new sidewalks, decorative lighting and defined on-street parking spaces would be installed. While the project would include various complete street elements to enhance pedestrian travel, the project, as currently designed, would not include any bicycle facilities or accommodations.

Because the Route 34 reconstruction project is funded and design is underway, the planned widening is considered a part of the no build alternative. All options and alternatives presented in this report assume the widening and reconstruction of Route 34 will occur and reflect the implementation of the planned improvements of that project.

Currently, bike parking is provided at the DSMMC in the form of a three-loop, five-bike wave style bike rack. It is located near the station boarding area along the tracks. For each option and alternative, secure facilities for bicycle parking and storage would be provided at the DSMMC.

For orientation purposes, the Housatonic River flows in a north-to-south direction, with Route 34, Bridge Street and the Derby-Shelton Bridge aligned in an east-west direction. The bridge has a south side facing down river and a north side facing up river.

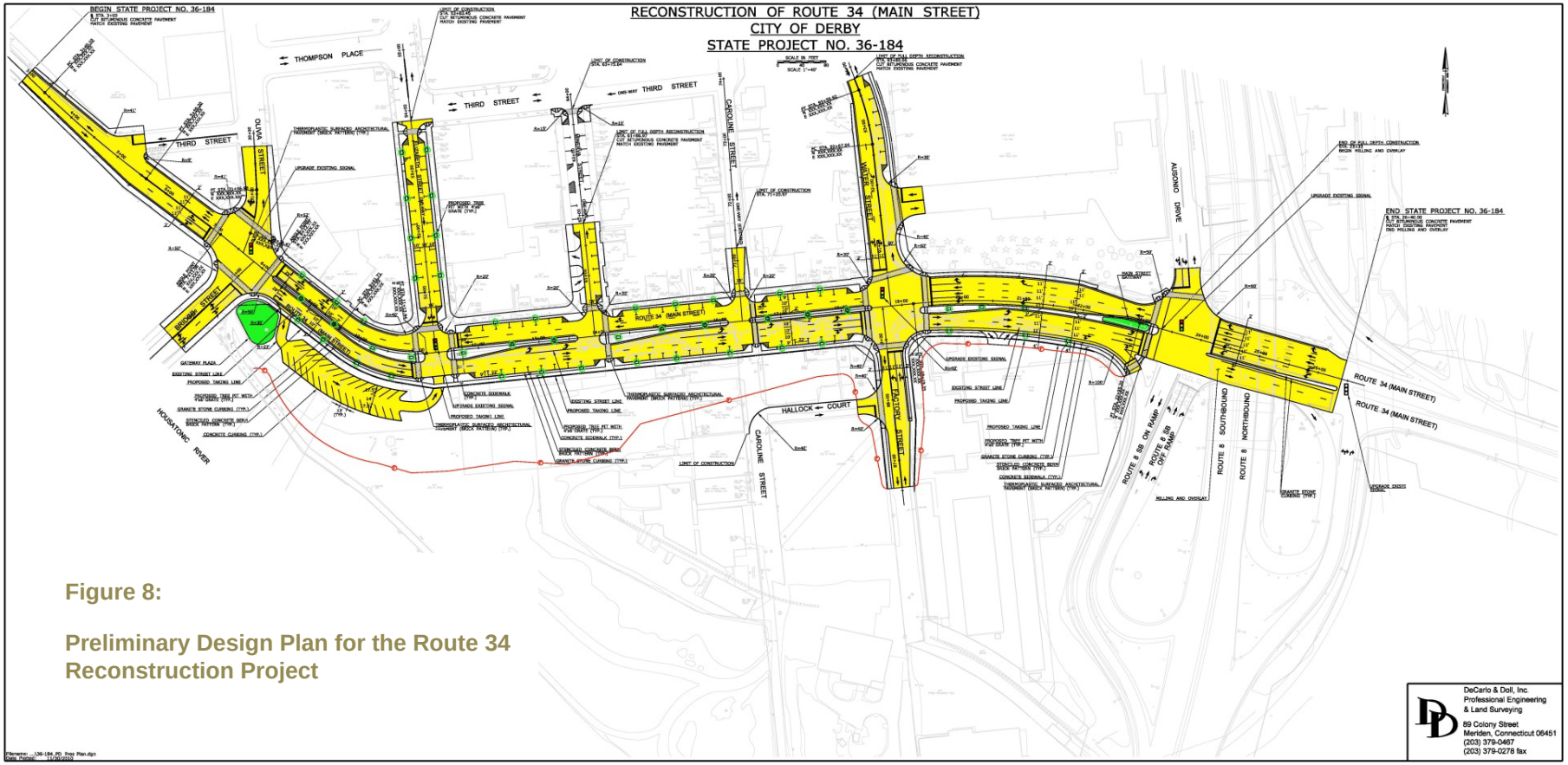


Figure 8:

Preliminary Design Plan for the Route 34 Reconstruction Project

Design Evaluation Principles

As described above, the project area was divided into four segments and various options were developed for each. The evaluation of the alternatives was based on a set of criteria derived from input obtained from the first stakeholder meeting and in discussions with CTDOT and VCOG staff. A clearly articulated concept was that any option needs to supplement traffic operations and not affect or alter motorized travel within the corridor.

The following is the evaluation criteria that was used in selecting and identifying options:

- Minimize actions that may delay the design of the Route 34 Reconstruction Project (State Project No. 0036-0184);
- Options would supplement operations on Route 34 and not impact operations proposed under the Route 34 Reconstruction Project;
- Current traffic operations on other local roads, especially on the Derby-Shelton Bridge, would not be impacted by the option;
- The safe movement of bicyclists, pedestrians, and vehicles across Route 34 at key intersections is crucial to maintaining safety and operational goals;
- On street parking is critical to the economic well being of the businesses located along Main Street and the loss of parking from an option must be minimized, particularly near and in vicinity of Canal Street and the residential developments;
- Address maintenance of proposed options; and
- Since pedestrian facilities exist throughout the corridor and will be enhanced as part of the Route 34 Reconstruction Project, selected options should focus on providing new bicycle facilities and enhancing existing bike ways.

In addition, the following issues and information were raised at the first stakeholder meeting and were integrated into the evaluation of options:

- The Derby-Shelton Bridge should become an attractive and distinctive gateway to both Derby and Shelton; and renovation of the bridge is the top priority;
- The Derby-Shelton Bridge has been determined to be eligible for listing on the National Registry of Historic Places. Any modifications to the bridge will include mutually agreeable mitigation measures developed by VCOG, CTDOT, and Connecticut State Historic Preservation Office to preserve the resource's historic character;
- Right-of-way and property acquisitions need to be identified;
- Provide consistent facility type throughout the project

area and avoid switching the bike way type at inappropriate locations;

- Period, historic lighting fixtures should be installed on the Derby-Shelton Bridge and along roadways and should be consistently applied;
- Appropriate bike way and wayfinding signage needs to be provided; and
- Any realignment or shifting of the travel or turn lanes will adhere to design standards and match any and all modifications being designed as part of the Route 34 Reconstruction Project.

Bicycle and Pedestrian Improvement Alternatives

Summary of Options by Segment

The following is a brief description of the options, by segment, that have been fully explored:

East Side Segment

Option 1: Provides an exclusive bicycle path through the landscaped buffer behind the Home Depot's delivery service road and loading docks and adjacent to the north side of Route 34.

Option 2: Installs a secured bicycle parking area on the east side of the rail tracks near the Derby Greenway and the Route 8 northbound on-ramp, and creates a pedestrian path to connect to the DSMMC.

Downtown Derby Segment

Option 1: Proposes a shared-road bicycle route from Water Street across Main Street and along Factory Street, Hallock Court and Caroline Street. A bike path segment would be constructed from Caroline Street to the Derby Greenway.

Option 2: Proposes to widen the sidewalk on the south side of Main Street from Water Street to Bridge Street from ten feet (10') to twenty feet (20') and install a cycle track for bicycles in both directions. An additional fourteen feet (14') of right-of-way would be required to accommodate the cycle track and four foot buffer.

Option 3: Constructs a new frontage road and bicycle boulevard along the south side of Main Street consisting of bi-directional bicycle lanes, a one-way frontage road in the eastbound direction, angle parking bay, a pedestrian zone and landscaped buffers on either side of the bicycle lanes. On-street parking along the south side curb of Main Street would be removed.

Derby-Shelton Bridge Segment

Option 1: Converts the existing ten foot wide sidewalks on both

the north and south sides of the bridge into a combination sidewalk and cycle track to accommodate both bicyclists and pedestrians.

Option 2: Expands the width of the sidewalk on the south side of the bridge to provide a raised shelf to accommodate a fifteen foot sidewalk/pedestrian plaza and ten foot (10') bi-directional bike lanes. The sidewalk on the north side would be narrowed from ten feet to five feet. This would create a gathering place or public plaza area on the south side of the bridge.

Option 3: Designates bicycle lanes in both the westbound and eastbound directions. The lanes would be installed on the road surface between the sidewalks and the travel lanes, and would be separated from the travel lanes and designated with pavement markings. No change in the existing sidewalks would be made.

Option 4: Expands the sidewalk on the south side of the bridge to fifteen feet and narrows the north side sidewalk. Five-foot bicycle lanes would be designated with pavement markings in both directions, at-grade with the travel lanes and adjacent to the raised sidewalks.

West Side Segment

Option 1: Continues bicycle lanes from the west end of the Derby-Shelton Bridge along the roadway ramps that connect Bridge Street and Canal.

Option 2: Aligns the bicycle facility from the west end of the Derby-Shelton Bridge through the parcel at the rear of the corner of Bridge Street and Canal Street. The parcel is planned for redevelopment and the existing roadway through the parcel is closed at Bridge Street. Therefore, this option is only viable if the redevelopment project is implemented.

If the parcel is redeveloped, the existing eastbound ramp between Canal Street and Bridge Street would be closed and traffic diverted to a new road through the development. Under that scenario, the ramp would be converted to a multi-use facility to accommodate both pedestrians and bicyclists.

Segment 1: East Side

The East Side Segment includes the Derby-Shelton Multi-Modal Center (DSMMC) and the Waterbury branch rail line, Route 8 and its infrastructure, including the bridge over Route 34, and the short section of Main Street between Ausonio Drive and Water Street, including the landscaped area behind the Home Depot.

The area is depicted in the following figure; as well as in the following photographs.

Option 1:

This option includes the construction of a bi-directional, exclusive bicycle path through the landscaped buffer behind the Home Depot (Figure 15). The buffer is adjacent to the north side Main Street and extends from Ausonio Drive and Water Street. There is

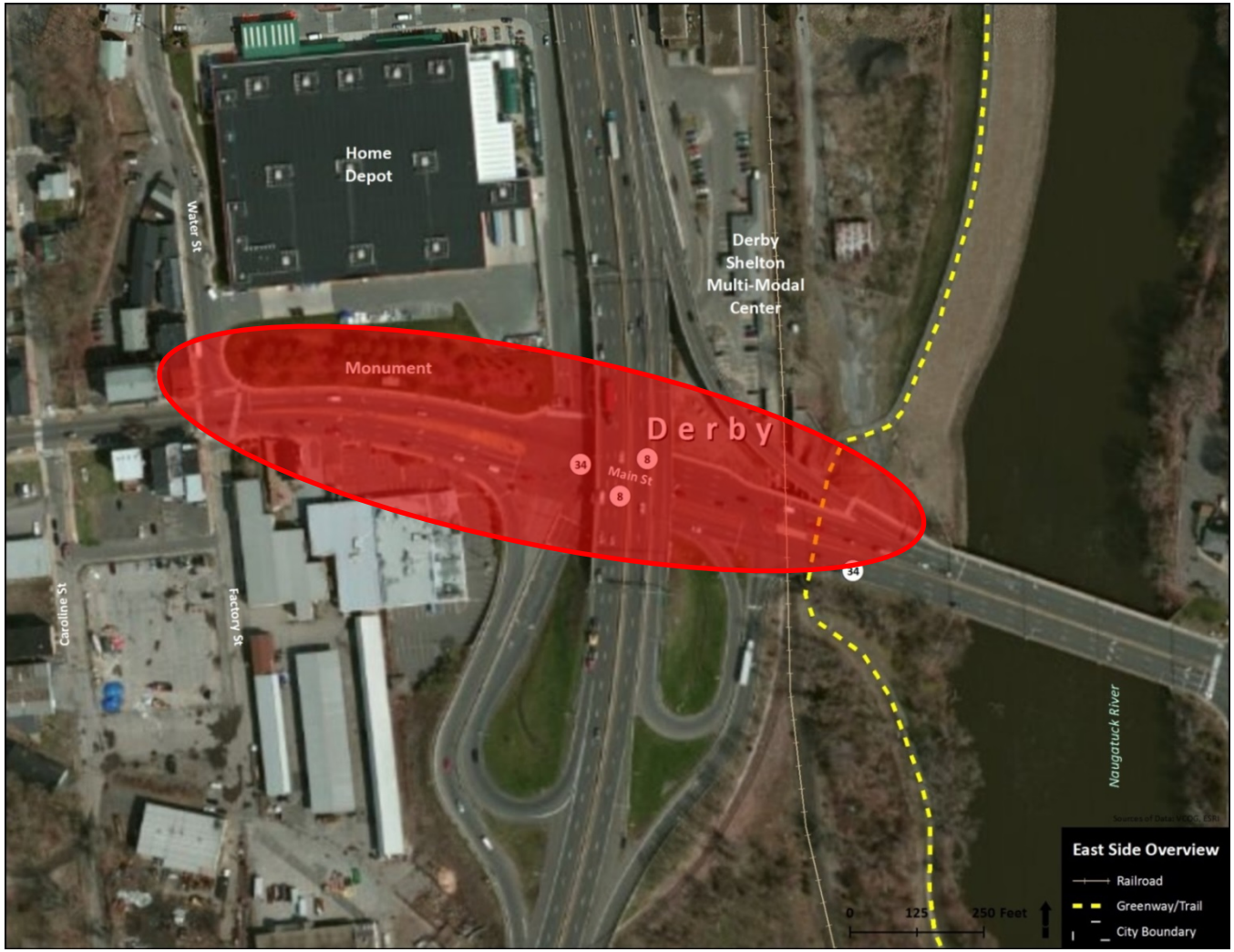


Figure 9:

East Side Segment Overview

East Side Segment Photographs

Figure 10:

Looking West at Ausonio Drive

Figure 11:

DSMMC Looking North Up the Tracks

Figure 12:

Landscaped Buffer behind The Home Depot

Figure 13:

Ausonio Drive North from Route 34

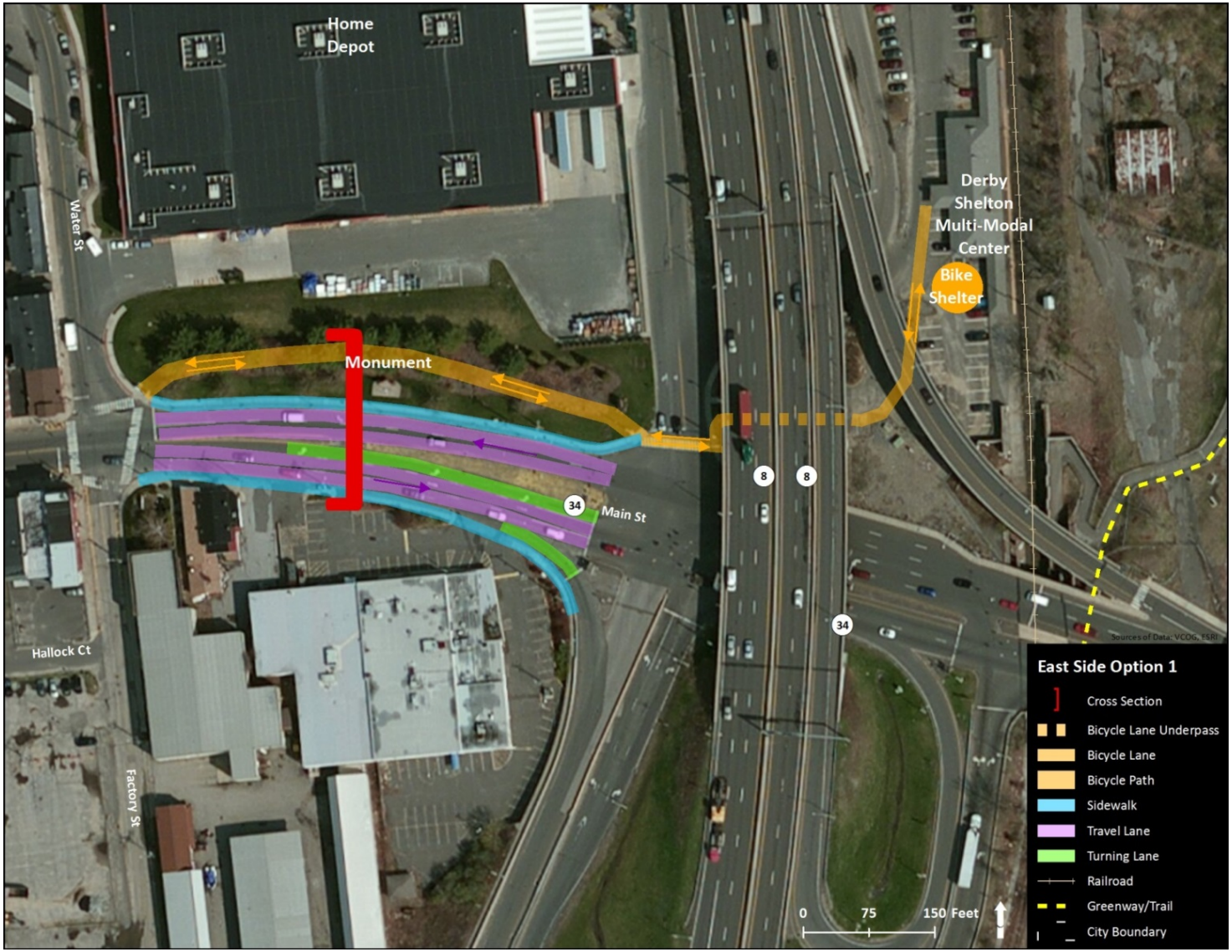


Figure 14:

East Side Segment Option 1 Overview

an existing sidewalk that would be enhanced to create a distinctive walkway and gateway path into the downtown Derby area. While the buffer has been landscaped and a World War II memorial has been placed along the sidewalk, the area is somewhat cluttered with utility poles and sign posts that detract from the aesthetic quality of the area. To enhance this section, the sidewalk will be widened, benches installed and utilities placed underground. The World War II monument would be preserved and retain its position within the area. The existing period lighting would be upgraded.

The concept would create a bikeway separated from the roadway and provide bicyclists a safer way to travel through a high volume section of Main Street (about 22,300 vehicles per day) and the complex intersection formed by Main Street, Ausonio Drive and the southbound ramps of Route 8. There are five lanes on the westbound approach and four on the eastbound; the southbound off-ramp has three lanes.

At Ausonio Drive, upgrades to the crosswalk would be made to

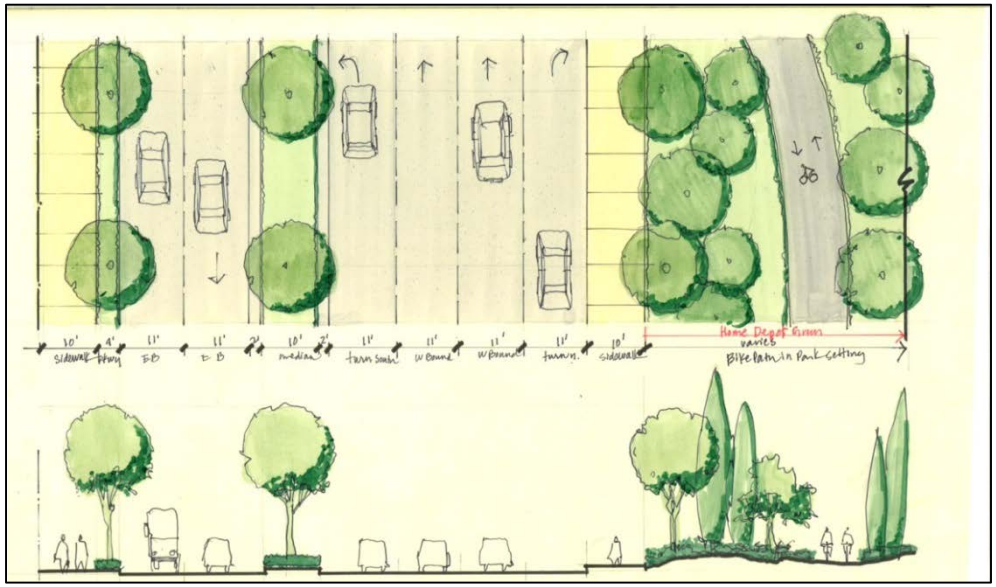


Figure 15: East Side Option 1 Cross Section

Figure 16: Main Street, Ausonio Drive & Route 8 Intersection

provide distinct and separate paths for pedestrians and bicyclists. The stop bar would be pulled back to allow the installation of a bike lane across Ausonio Drive. The bike path across the landscaped berm would bring bicyclists to a crossing away from Main Street and slightly south of and about opposite the entrance road into the DSMMC. Because bicyclists would likely continue directly across Ausonio Drive, a physical barrier would be installed along the west side of Ausonio Drive to prevent walkers and bicyclists from crossing diagonally toward the station. The barrier would consist of either fencing or landscaping.

The proposed plan for crossing Ausonio Drive is shown in Figure 18. The concept would require all pedestrian and bicycle movements crossing Ausonio Drive to occur on the north side of Main Street. Due to the heavy turning traffic to and from the Route 8 ramps, it is recommended that pedestrians and bicyclists be prohibited from crossing on the south side along this segment of Main Street.

Figure 17:

Bike Lanes with Pedestrian Crosswalk

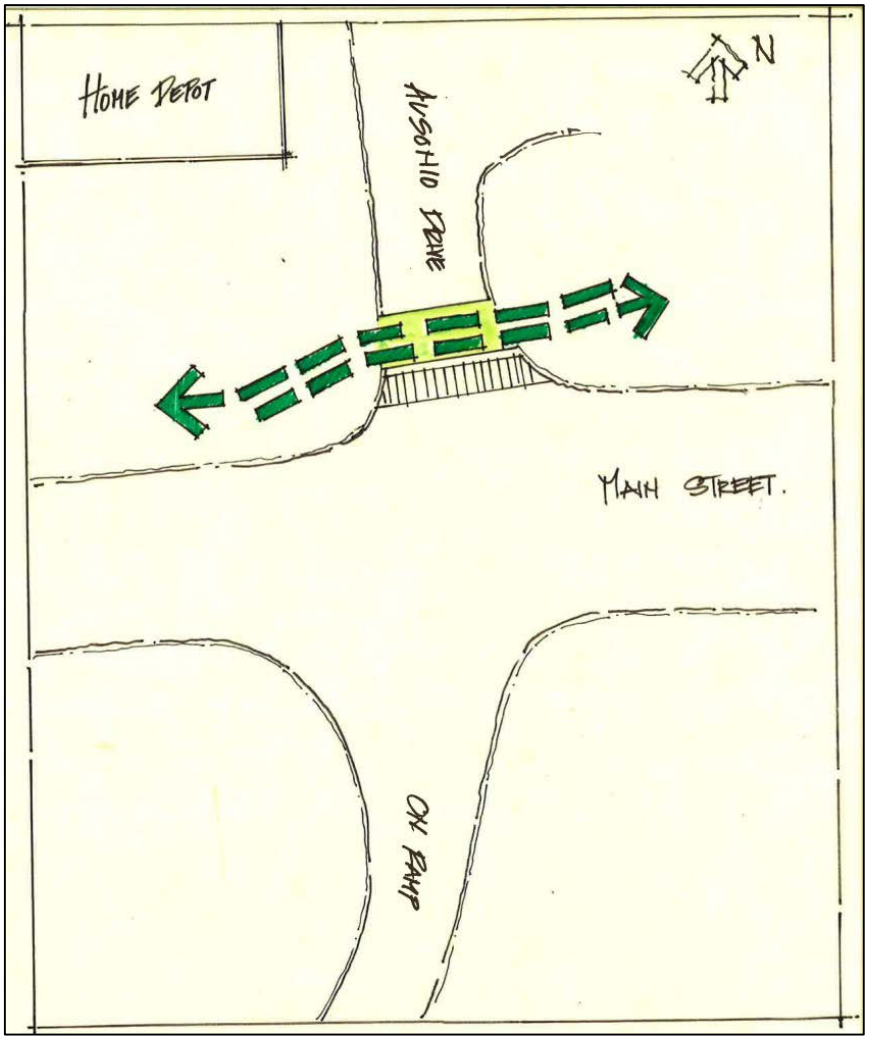


Figure 18: Ausonio Drive Intersection Treatment

The current layout of the station property includes parking areas under the Route 8 overpass and ramps and along the tracks. A sidewalk runs along the edge of the parking lot from Main Street, ending at the access lane to the parking lot. A pedestrian path does not continue to the boarding area. To facilitate access to the DSMMC, the bicycle path and pedestrian walkway would be continued from Ausonio Drive into the station property with a terminus at the boarding area. The sidewalk and bike path would be delineated and separated to avoid conflicts. Decorative elements would be installed to visually highlight the distinct paths for walkers and bicyclists and alert drivers of their presence in the area.

Figure 19: Access Road to DSMMC

Enhancements would also be made at the DSMMC, including additional bike racks, information kiosks for Waterbury branch line rail service and local bus service, heated waiting-shelter and wayfinding signage.

Figure 20: Parking Area at DSMMC under Route 8

Option 2:

An objective of the TOD Pilot Program is to provide a direct connection between the Derby Greenway and the DSMMC. Currently the trail passes along the east side of the Waterbury branch line and users that want to travel to the station either need to leave the greenway and follow Main Street or access the existing sidewalk along Main Street from an access point near the Route 8 northbound on-ramp. While this latter option is viable, it is not well marked or convenient.

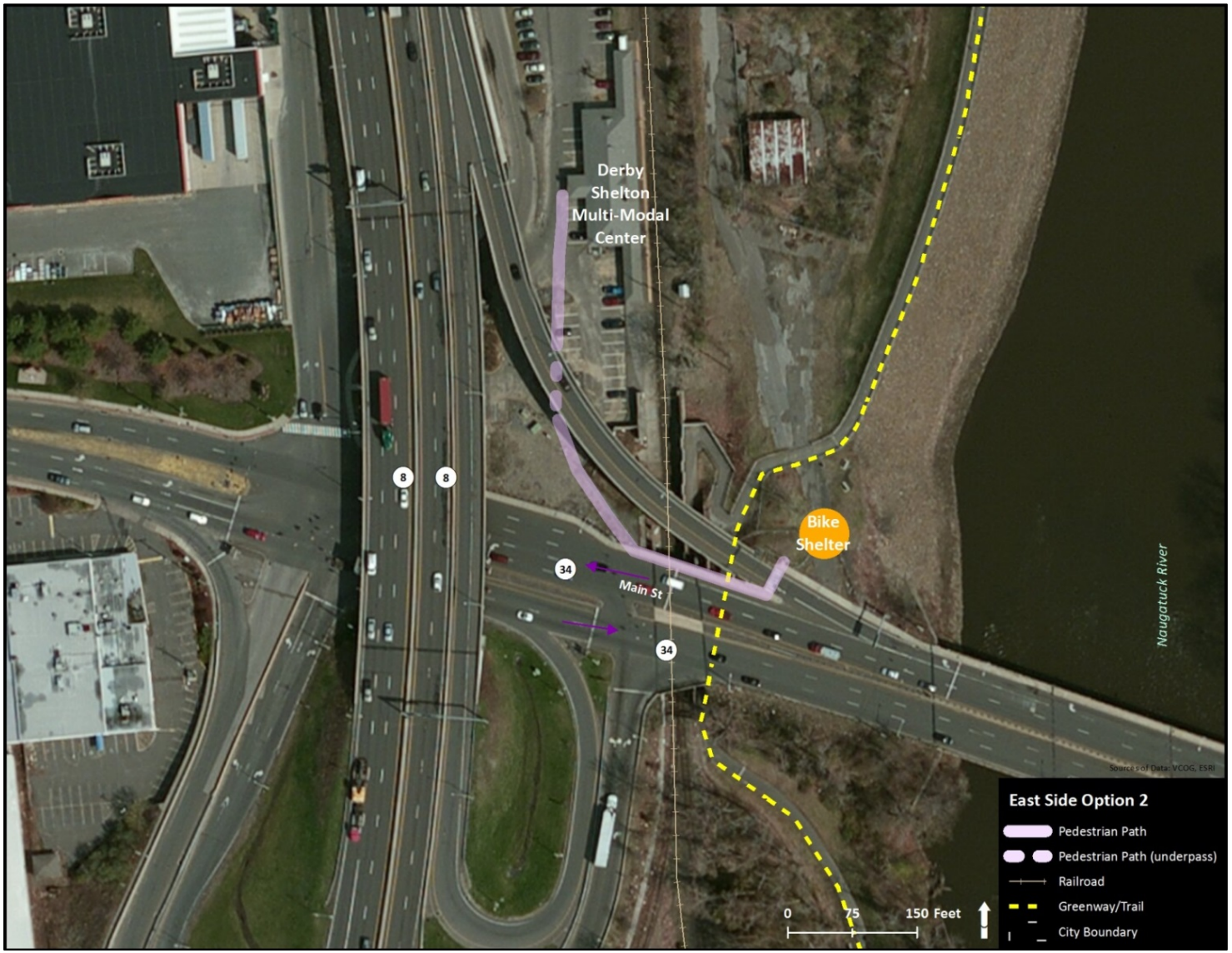


Figure 21:

East Side Segment Option 2 Overview

This option would formalize a pedestrian and bicycle path from the Derby Greenway to the DSMMC and provide a connection for users coming from the north, east and west along the greenway. The concept would install a secure bicycle shelter and parking area on a small green space adjacent to the greenway near the entrance to the Route 8 northbound on-ramp from Route 34. A driveway is located at this site to allow access to a land-locked parcel owned by the City of Derby from Route 34. The driveway also serves as an accessway to the greenway. Bicyclists would secure their bikes at the shelter and then walk to the DSMMC, along the access driveway, across the on-ramp (a crosswalk is provided but the pedestrian signals have been disconnected), and along the existing sidewalk. To formalize and enhance the path, a new walkway would be constructed from the greenway to Route 34 and the crosswalk on the entrance would be upgraded. The existing pedestrian signals need to be removed and replaced by a rectangular rapid flash LED beacon (RRFB). The beacon would display a rapid "wig-wag" flash when activated by pedestrians and bicyclists. Advance warning signs would be installed to alert motorists of the trail crossing.

Figure 22: East Side Option 2 Perspective of a Formalized Path from Route 34 to the DSMMC

The existing sidewalk would be upgraded from the on-ramp to Ausonio Drive and along the curb line into the DSMMC property. New curb ramps, period lighting and buffers would be installed, as necessary and appropriate. To provided a shorter and more direct connection into the DSMMC, a new staircase and path would be constructed from the sidewalk at about the point it crosses over the Waterbury branch line tracks. The path would land in the southern end of the parking lot at the DSMMC and would be continued to the boarding area. There is steep grade differential from the sidewalk and the station parking lot. To comply with ADA requirements and ensure wheelchair accessibility, the path would either gently follow the slope of the bank in a curving alignment or include switchbacks that meet a maximum five percent grade. A complementary staircase would be constructed adjacent to the ADA ramp. A bicycle wheel channel (Figure 23) would be installed along the side of the stairway to facilitate walking a bicycle up or down the stairs.

Figure 23: Example of Bicycle Wheel Channels along a Stairway

Source: www.pedbikeimages.org

Photographer: Kathy Eiseman

Preferred Alternative:

The two options considered for the East Side Segment are complementary and do not represent exclusive actions. The preferred alternative for this section is the implementation and construction of all elements described above. These actions achieve the purpose and needs of the study by providing an enhanced and more direct connection for pedestrians and bicyclists to the DSMMC. The actions will also improve safety and separate bicyclists and walkers from motorized traffic, and will eliminate existing deficiencies and problems, especially the crossing of the Route 8 northbound on-ramp. While the landscaped buffer was required for the Home Depot development and is currently an attractive area, the bike path can be accommodated within the area without impacting the purpose of the buffer. Proposed actions will provide a dedicated path for bicyclists, separated from the high traffic volumes on Main Street and transform the buffer into a significant gateway into downtown Derby.

Photo Perspectives of the Derby-Shelton Multi-Modal Center Area

Figure 24:

Looking from the Top of the Bank along Main Street

Figure 26:

Crossing of Route 8 NB On-ramp – Pedestrian Signal Deactivated

Figure 25:

Site for Bike Shelter Near the Derby Greenway

Figure 27:

Example of a Rectangular Rapid Flash LED Beacon

In addition to the intersection treatments recommended for the Main Street and Ausonio Drive intersection, bicyclists need to be accommodated at the west end of the planned bike path where it crosses Water Street. The traffic volumes on Water Street on the north side of Main Street and on Factory Street on the south side of the intersection are very low. Water Street has an average daily traffic (ADT) volume of about 1,500 vehicles per day (vpd) with a peak hour volume of only 125 vehicles. The traffic on Factory Street is even less with an ADT less than 300 vpd and a peak hour volume of only 16 vehicles.

Because of the low volumes, bicyclists can be safely and easily accommodated without any special or dedicated treatments. Bicycle traffic will move in an east and west direction along the planned bike path, stop at Water Street and enter the roadway when a gap in traffic allows. The crossing of Main Street will occur on the concurrent green phase. As the area south of Main Street is redeveloped and traffic flows increase, there will be a need to install more advanced and dedicated elements to ensure safe movement of bicyclists. At a minimum, the installation of bike boxes on Water Street and Factory Street should be considered. A bike box creates a reserved space in front of one or more lanes of traffic to allow bicyclists to wait for a green signal at a signalized intersection. It is located upstream of a crosswalk, if present.

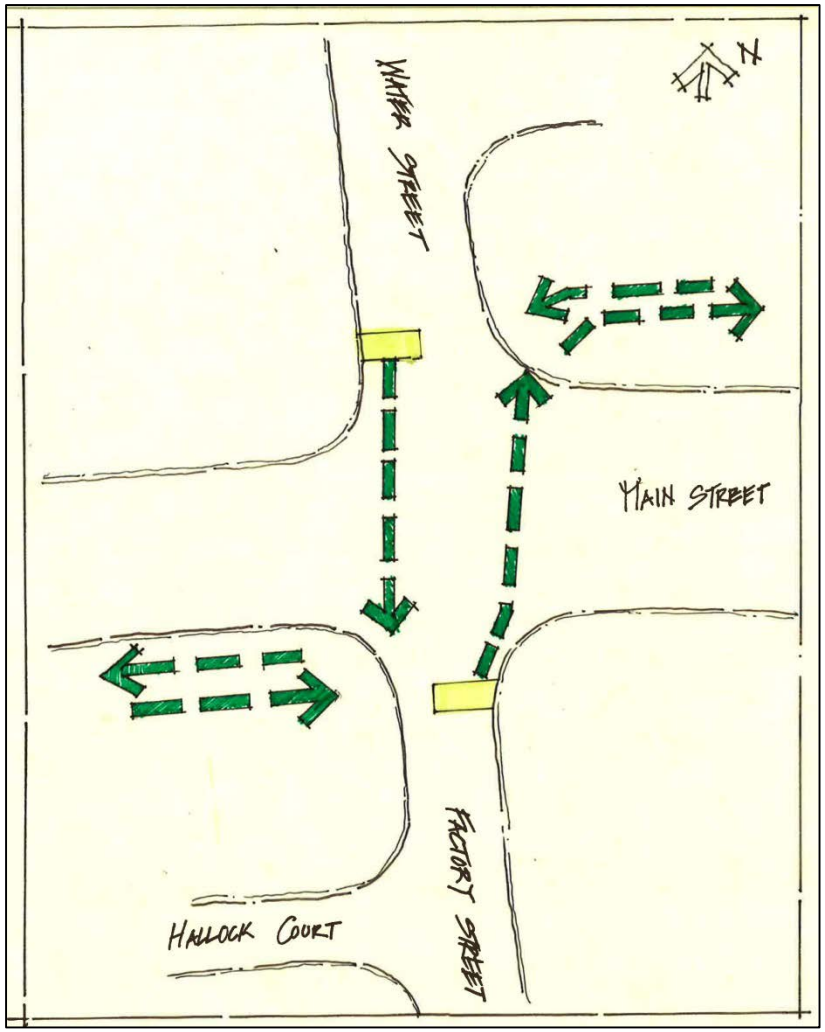


Figure 28: Intersection Treatment for Main Street, Water Street and Factory Street

Photo Perspectives of Main Street at Ausonio Drive & Main Street at Water Street & Factory Street

Figure 29:

Looking East at Ausonio Drive

Figure 30:

Looking West at Water Street & Factory Street

Figure 31:

Looking West along Main Street from Ausonio Drive

Figure 32:

Looking North along Water Street

Figure 33: Bicycle Box in Portland, Oregon with Green Color

Segment 2: Downtown Derby

The Downtown Derby Segment runs through Derby's downtown and extends along Main Street between Water Street and Bridge Street. The segment includes the intersecting streets between the termini, as well as, the area south of Main Street. This area is a prime redevelopment zone and the city already owns a substantial portion of the area. Several local streets extend into this area that are included in this study: Factory Street, Hallock Court, and Caroline Street.

The area is depicted in Figure 34 and in the photographs of the main intersections and area south of Main Street.

Option 1:

Because of the high traffic volumes on Main Street and the presence of on-street parking, a preliminary concept of installing bicycle lanes was determined to be unacceptable and failed to meet the purpose and needs of the study. As an alternative, an on-road bicycle route connection was devised that would be aligned from the East Side Segment along Factory Street, Hallock Court, and Caroline Street. At this point, an off-road segment would be constructed to extend the bike way to the Derby Greenway. Bicyclists would continue along the greenway to the Derby-Shelton Bridge.

This option starts with a crossing of Main Street, with the elements described above for the East Side Segment, Option 1. Bike boxes would be installed on both the Factory Street and Water Street approaches.

The alignment would be designated as a shared-lane, on-road facility. Shared-lane markings, also known as a "*Sharrow,*" would be installed along the route to assist bicyclists with lateral positioning in the shared lane and alert motorists that the road has been designated for shared use by bicycles.

Pedestrians would use existing sidewalks along Main Street between Water Street and Bridge Street.

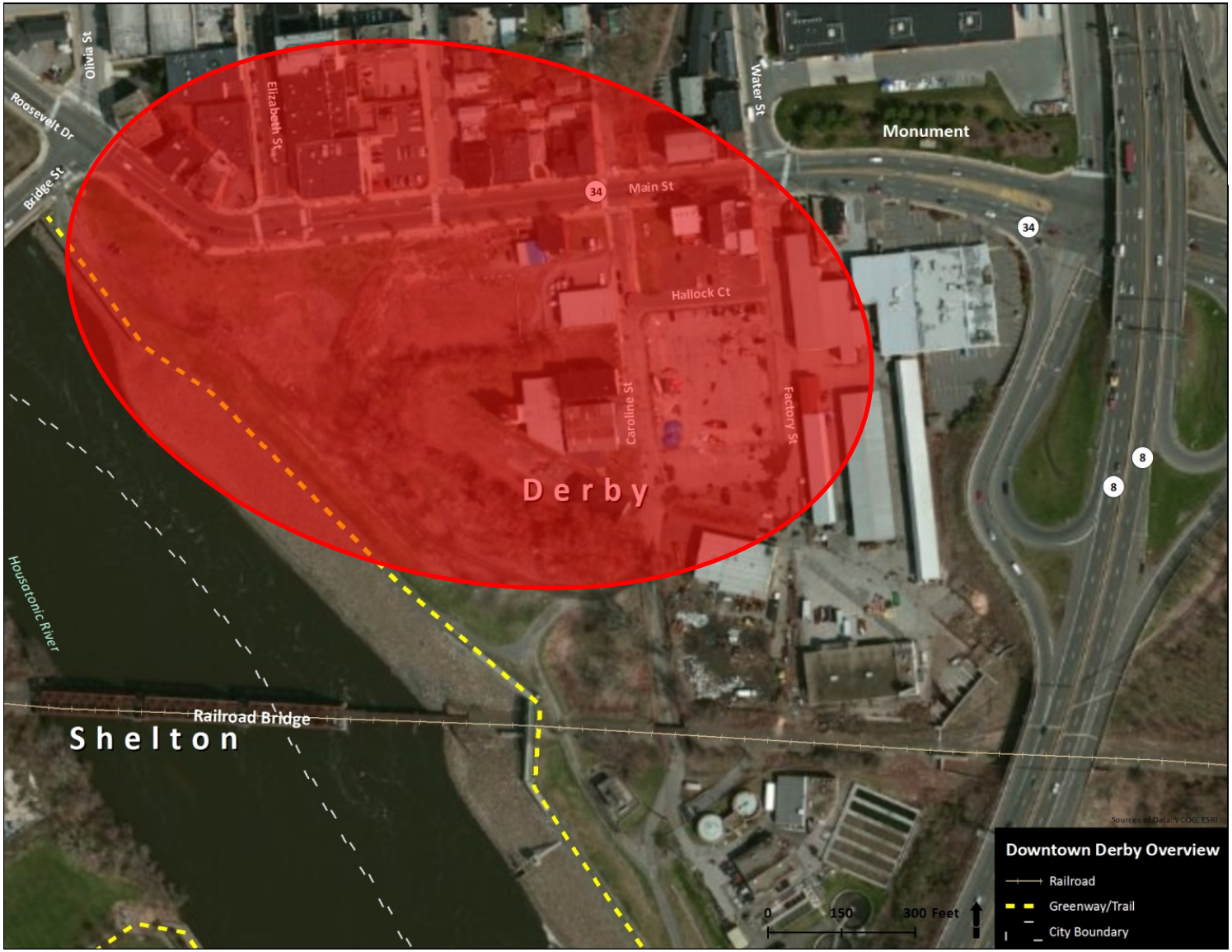


Figure 34:

Downtown Derby Segment Overview

Photo Perspectives of Main Street between Caroline Street & Bridge Street

Figure 35:

Looking North along Caroline Street

Figure 36:

Looking North along Minerva Street

Figure 37:

Looking North along Olivia Street

Figure 38:

Looking North along Main Street toward Elizabeth Street

Figure 39:

Downtown Derby Segment, Option 1 Aerial and Plan View

The area south of Main Street is under-utilized and features several vacant parcels. The City of Derby has obtained ownership of various parcels with the intent of consolidating land for redevelopment. The existing roads provide access to the remaining businesses as well as serving to connect Main Street with the city's waste water treatment plant and a boat launch for the Housatonic River. A large parking area that can accommodate about 50 vehicles, is located at the boat launch and can be used by trail users. Because of the number of vacant parcels and limited land uses, there are numerous opportunities for aligning a bike way through the area. As the area is redeveloped, the accommodation of bicycle and pedestrian facilities needs to be required in all new site plans. The intent is to properly plan and design bicycle and pedestrian features as integrated and integral elements of the future streetscape and built environment.

Option 2:

The purpose and needs of the TOD Pilot Program is to enhance the pedestrian and bicycle connections between Downtown Shelton and the Derby-Shelton rail station. The option, described above as Option 1, merely directs bicyclists along existing streets from the greenway to the Derby-Shelton rail station. It would not provide a separate or enhanced facility, nor provide access to downtown businesses.

A current and on-going project will reconstruct and widen Main Street (Route 34). The project (Project No. 0036-0184) will widen

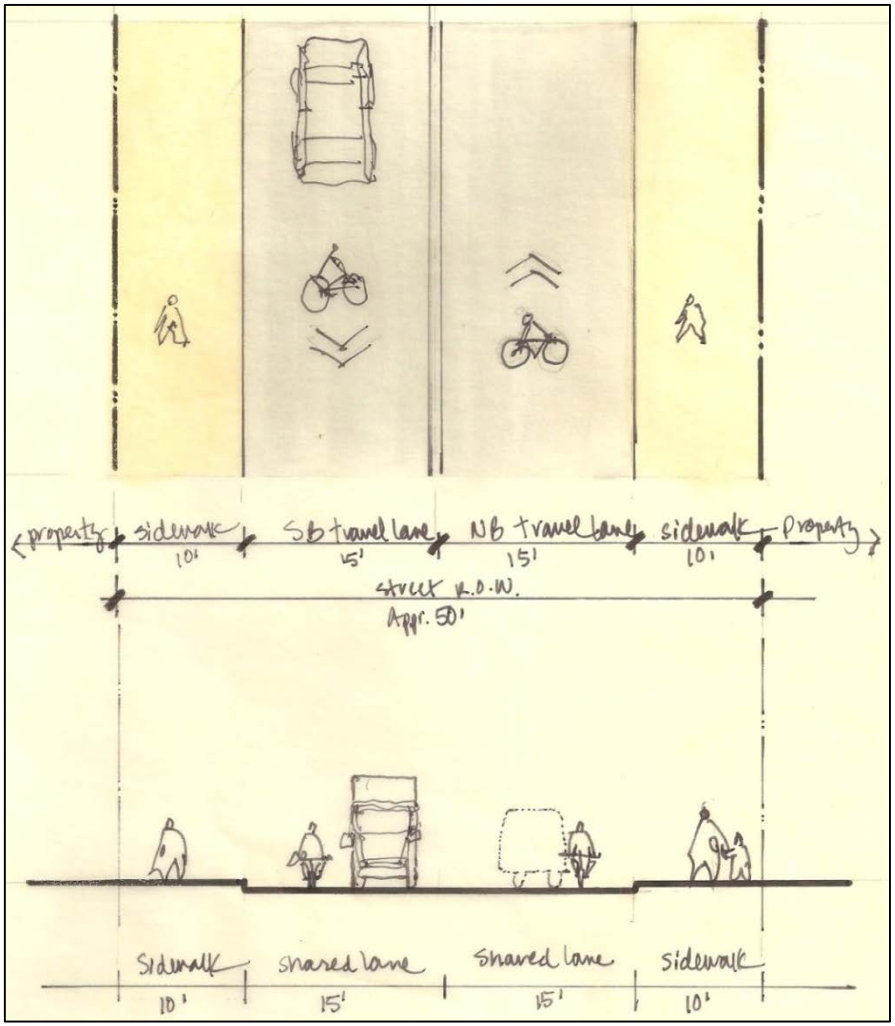


Figure 40: Downtown Derby Option 1 Cross Section

the road from two travel lanes to four, designate on-street parking spaces, reconstruct the sidewalks and install various complete streets elements. This project offers opportunities to integrate bicycle and pedestrian enhancements along the corridor.

The actions included in Option 2 propose widening the sidewalk area on the south side of Main Street from the currently planned ten feet to twenty feet over the entire project length from Water to Bridge Street. The added width would be used to install bi-direction bike lanes between the on-street parking lane and new sidewalk.

Landscaped buffers would be installed along both sides of the bike lanes to separate bicyclists and walkers and minimize conflicts. The new bike lanes would be built either at-grade with Main Street or at the sidewalk level.

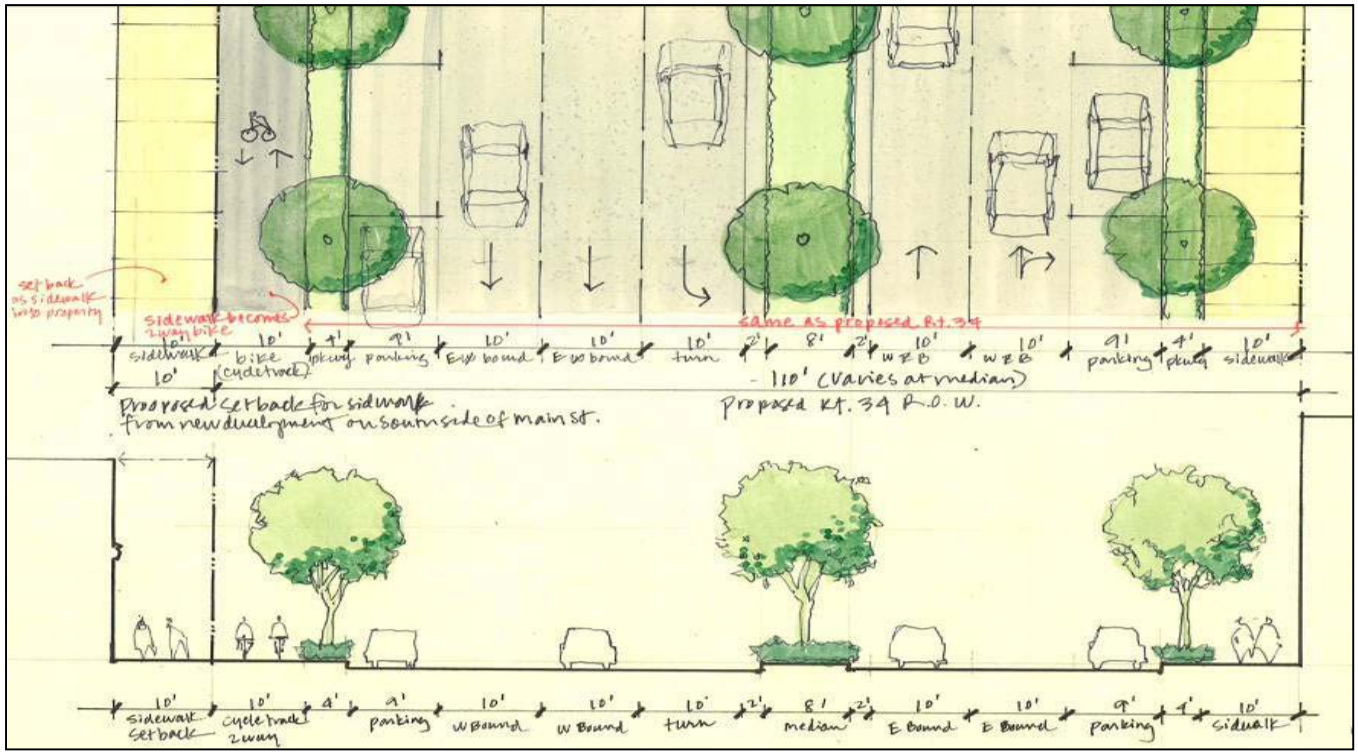


Figure 41:

Downtown Derby Option 2 Cross Section

Photo Perspectives of the Option 1 Alignment with the Derby Greenway

Figure 42:

Looking West near the Greenway Overpass of the Railroad Tracks

Figure 43:

Looking South East along Access Road to Boat Launch

Figure 44:

Looking East toward Area South of Main Street

Figure 45:

Looking East from Derby Greenway toward Area South of Main Street

Figure 46:

Downtown Derby Segment, Option 2 Aerial and Plan View

This option maintains the proposed cross section of the Route 34 reconstruction project, except it would require approximately fourteen feet of additional right-of-way on the south side of Main Street for the bicycle lanes and buffers. Pedestrians would use the north and south sidewalks, as envisioned under the road reconstruction project. Bicyclists would be aligned only on the south side of the road.

Option 3:

The Route 34 reconstruction project will require the acquisition of the remaining properties located along the south side of Main Street and result in a wide publicly owned right-of-way. The availability of this right-of-way provides an opportunity to create a signature and significant road frontage for new development along this side of the road.

The Option 3 concept involves the construction of a new frontage road and bicycle boulevard along the south side of Main Street. While it will require minor modification of the preliminary design plans for the Route 34 reconstruction project, this option essentially maintains the cross section planned for Route 34.

The proposed actions recommend using a portion of the right-of-way that will be available to construct a frontage road and bicycle boulevard consisting of the following elements:

- Construct a bicycle boulevard along the south edge of Main Street consisting of bi-directional bicycle lanes, ten feet wide with four-foot landscaped buffers on either side of the bike lanes;
- Construct a one-way frontage road, 16 feet wide, in the eastbound direction. The frontage road would be accessed from Main Street, about 100 feet east of Bridge Street. It would exit onto Factory Street to avoid creating a new curb cut on Main Street;
- Install a head-in angled parking bay, 18 feet deep along the frontage road. The new parking bay would provide store-front parking for new business development along the south side of the street and allow the elimination of the line of on-street parking spaces within the proposed new cross section for Main Street which would improve traffic operations by eliminating friction and impedance between free flow traffic and vehicles moving into and out of the parking spaces. In addition, the number of parking spaces provided would increase significantly;
- Create a ten-foot sidewalk/pedestrian zone. Various amenities would be installed within the zone, including furniture, plantings, and period/decorative lighting; and
- Buffers, four feet wide, would be installed along the south side of Main Street to separate the road from the bike lanes and between the bike lanes and the frontage road.

The frontage road and pedestrian zone would create a curb line for redevelopment of the south side of Main Street. However, at this time the concept is illustrative and the alignment and layout needs to be designed based on topography and land use concepts to be determined in more detail as the project advances.

Figure 47:

Downtown Derby Segment, Option 3 Aerial and Plan View

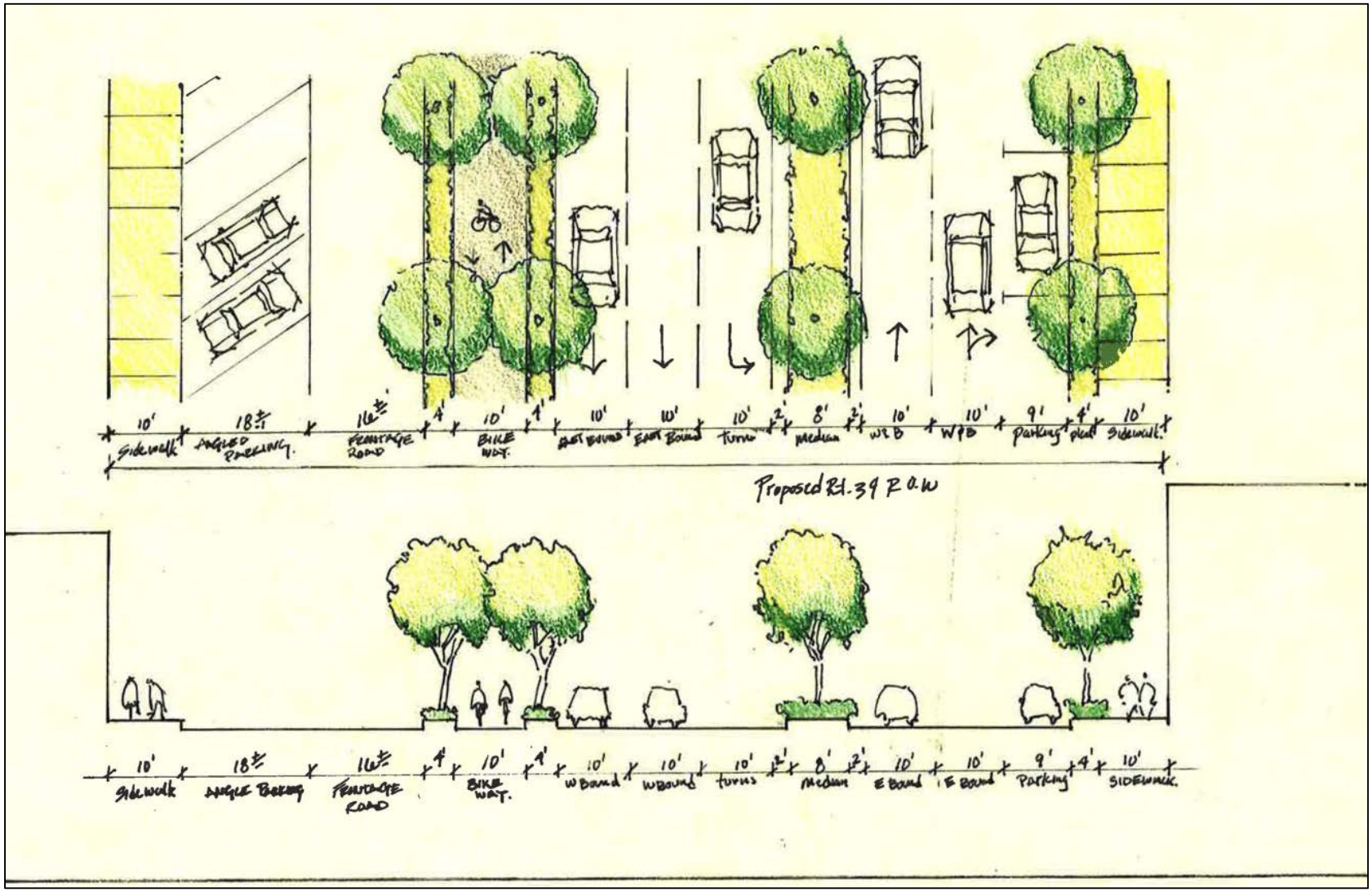


Figure 48: Downtown Derby Segment Option 3 Cross Section

The bi-directional bicycle lanes and pedestrian area would be extended to Factory Street. Bicyclists would be routed along Factory Street and across Main Street to connect to the proposed bike way behind the Home Depot (East Side Segment, Option 1).

On the west end, the bike boulevard would be seamlessly connected to the Derby Greenway. This may require a crossing of the frontage road. Proper signage and pavement markings would be installed to safely carry bicyclists across the frontage road.

New sidewalks would be installed along Factory Street to provide a continuous walkway to Main Street. ADA-compliant curb ramps would be installed along the entire length of the frontage road and bike boulevard, as needed and appropriate. In addition, to provide a pedestrian path from the south side of Main Street to the downtown area north of Main Street, connections will be installed across the frontage road and bi-directional bike lanes, and cuts would be made across the buffers.

As part of this option, a gateway plaza or park would be constructed on the southwest corner of Main Street and Bridge Street. A plaza on this site is included in the preliminary design plans for the Route 34 reconstruction project.

Preferred Alternative:

The three options considered for the Downtown Derby Segment represent a range of possible concepts from essentially a *"No Build"* option (Option 1) to an extensive reconstruction that would dramatically alter how pedestrians and bicyclists would be accommodated and travel along Main Street. Option 1 does not meet the purpose and needs of the TOD Pilot Program and merely directs bicyclists along existing streets from the greenway to the Derby-Shelton rail station. A separate bicycle facility would not be provided, except between Caroline Street and the Derby Greenway. The route would not provide a convenient nor aesthetically pleasing experience. Consideration of Option 1 would be made only as an interim action.

Both Option 2 and Option 3 would create a new, safe and high quality bicycle facility that meets the purpose and needs of the study. A direct, convenient and safe connection between downtown Shelton and the DSMMC would be provided. However, given the planned reconstruction of Route 34, there is a tremendous opportunity to fundamentally change how the businesses, residences and other land uses are tied together within downtown Derby and how the area is perceived. Option 3 will construct transformative improvements that will be the catalyst for economic revitalization, livable communities and sustainable transportation choices. Option 3 will foster a visual and physical connection to the existing transit center.

Photo Perspectives of the Main Street Corridor

Figure 49:

Looking East – Properties to be Acquired under Project No. 0036-0184

Figure 50:

Looking North – Redevelopment Zone South of Main Street from the Derby Greenway

Figure 51:

Looking East along Minerva Street

Segment 3: Derby-Shelton Bridge

The Derby-Shelton Bridge Segment is essentially comprised of the historic bridge that carries Bridge Street over the Housatonic River. The east end of the segment is at the intersection between Main Street and Bridge Street. The Derby Greenway also starts near this intersection and an informal driveway runs from Bridge Street along the greenway to a small, undesignated parking area.

At the west end of the bridge, directional ramps connect the bridge to Canal Street, which is grade-separated from Bridge Street. Bridge Street continues from the ramps on an elevated structure over Canal Street and freight railroad tracks to Howe Avenue in downtown Shelton (West Side Segment).

The Derby-Shelton Bridge was built in 1918. It is 466 feet long and has 43-foot curb-to-curb width. Ten-foot wide sidewalks are provided along each side of the bridge, increasing the total width of the structure to 63 feet. Although the bridge is rated in satisfactory condition based on the most recent bridge inspection report, it is in need of aesthetic and cosmetic improvements.

The area is depicted in the following figure and in the subsequent photographic perspective.

Option 1:

The curb-to-curb width on the Derby-Shelton Bridge is sufficiently wide for bicyclists to ride within the existing roadway. And, sidewalks are installed on both sides for pedestrians. Therefore, both walkers and bicyclists are accommodated on the bridge. However, the current layout only offers the most basic experience and does not provide a high quality environment that would encourage or promote walking or riding over the bridge.

While the bridge structure is in satisfactory condition and structurally sound, there are visible signs of wear on the deck and along the parapets as evidenced by cracking in the bituminous overlay, spalls with exposed rebar, random concrete patches and cracking and delaminated areas along the parapets. Renovation of the bridge is needed to create an attractive gateway entry to the downtown areas of Derby and Shelton. Recommended actions include the following:

- Resurface the bridge deck and travel lanes;
- Repair and rehabilitate the bridge parapet walls and pilasters beyond simply crack sealing and patching. The concrete parapets will be fully reconditioned and a new veneer added to match historic design and finish;
- Install decorative and period railings on top of the parapet to provide a standard height; and
- Replace the existing “Cobra” style lighting with decorative, period light fixtures that meet “Dark Sky” standards. New lights would be installed on top of the parapet.

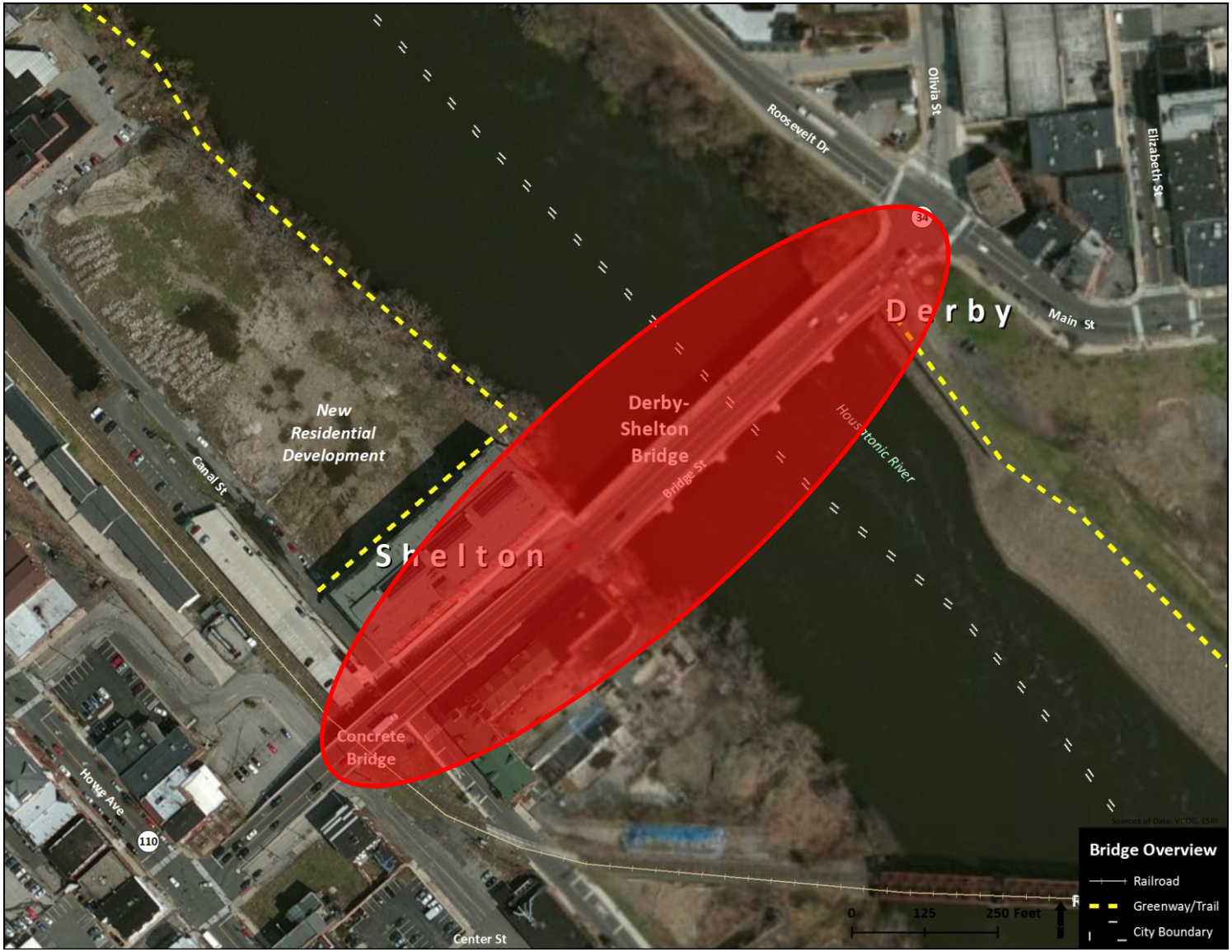


Figure 52:

Derby-Shelton Bridge Segment Overview

In addition to the repairs and renovations described above, Option 1 proposes minimal changes to the existing bridge layout to construct and install cycle tracks, on both sides, on the existing sidewalks. The sidewalks are currently ten feet wide and the cycle tracks would be placed along the curb lane and consume five feet of the available width. The cycle tracks would provide separation from the travel lanes, but, other than the existing curb and shoulder area, there would be no barrier separating travel lanes from the bike facility. The cycle tracks also would allow bikes to travel in the same direction as the traffic.

Pedestrians would be accommodated on the existing, but narrower, sidewalks on both sides of the bridge.

Under this concept, crossing treatments, consisting of bike lane pavement markings, would be installed across Bridge Street at Route 34 and Bridge Street for westbound bicyclists to access the cycle lane on the north side of the bridge from the Derby Greenway.

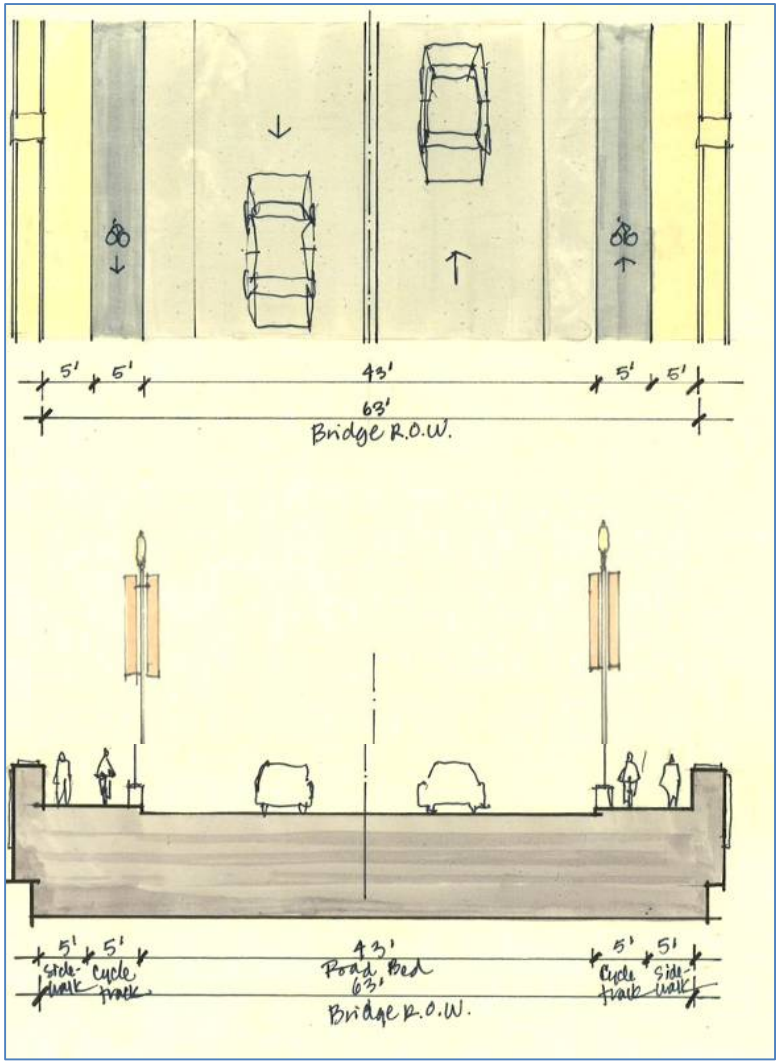


Figure 53: Derby-Shelton Bridge Segment Option 1 Cross Section

Photo Perspectives of the Derby-Shelton Bridge

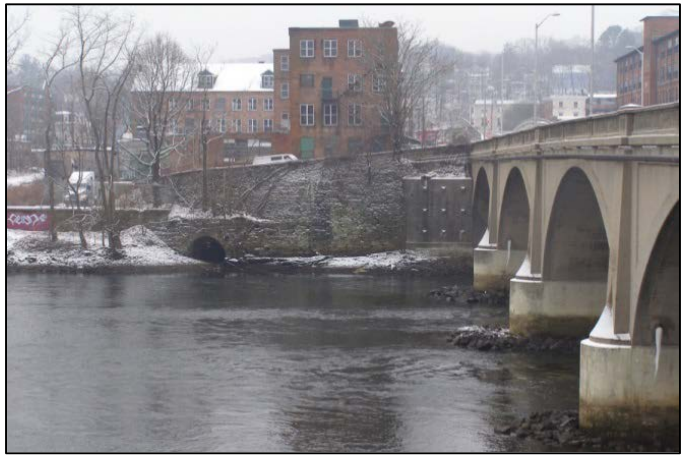


Figure 54:

Looking Across the Housatonic River Towards Shelton

Figure 55:

Historic Plaque on the Derby-Shelton Bridge

Figure 56:

Looking North Up the Housatonic River

Figure 57:

Project Study Team Inspecting the Bridge

Photo Perspectives of the Condition of the Derby-Shelton Bridge

Figure 58:

Looking West along Bridge Deck

Figure 59:

Cracking and Deteriorated Concrete

Figure 60:

Cracking of the Parapet and Deteriorated Concrete

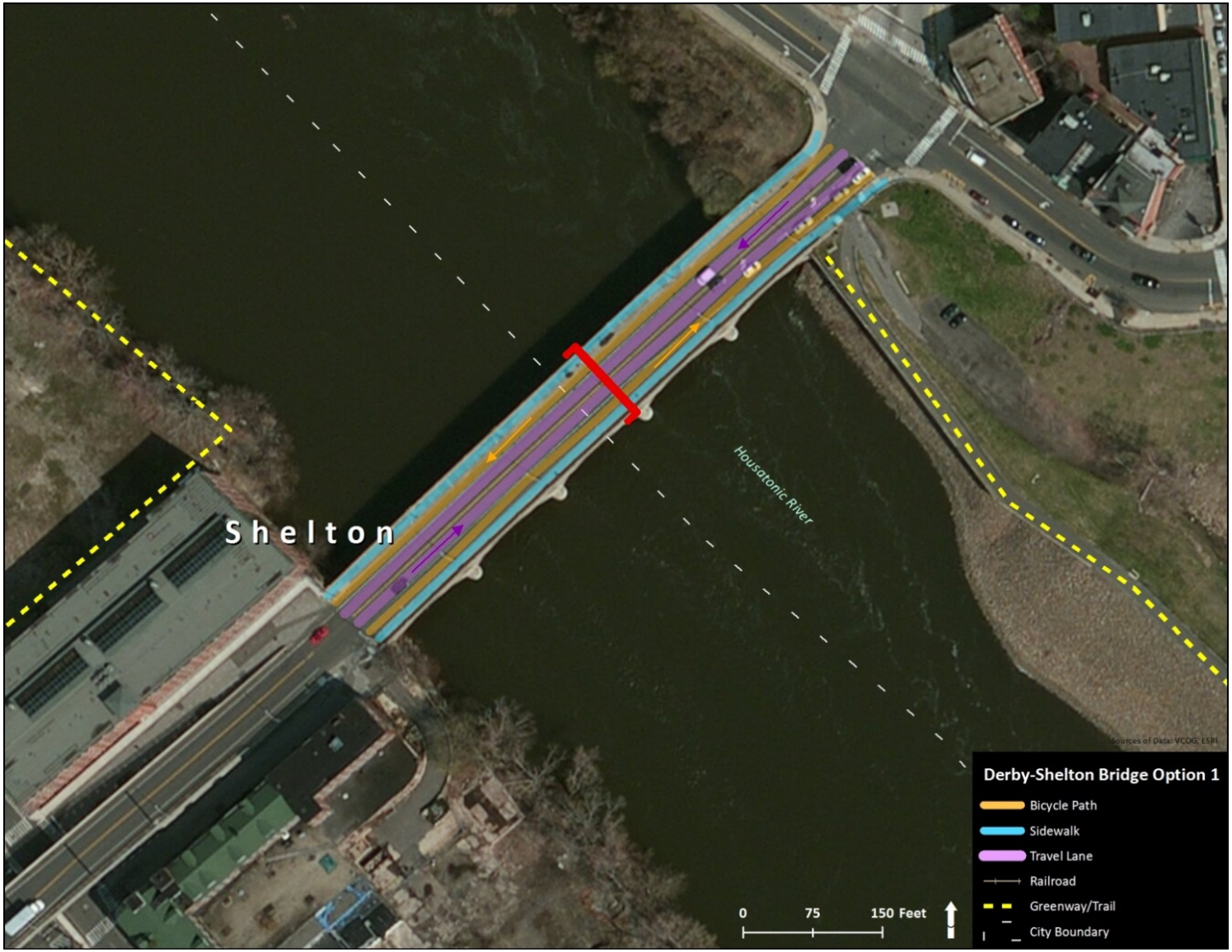


Figure 61:

Derby-Shelton Bridge Segment, Option 1 Aerial and Plan View

Option 2:

This option would include and implement the bridge repairs and renovations described in Option 1. Given the deteriorated condition of the parapets, roadway surface and lighting, all options for this segment include the rehabilitation of the bridge.

Under this option, the bridge deck would be reconfigured and, how it is used, modified. Currently, the sidewalks are ten feet wide and the roadway surface is 43 feet. The proposed action would replace the existing sidewalk along the north side with a new, narrower (five feet wide). A raised shelf would be constructed along the south side of the bridge at an average width of 25 feet. This would be achieved by using the width of the existing sidewalk, shifting the travel lanes to the north, and using a portion of the wide shoulder area. The raised area would accommodate a fifteen foot wide sidewalk/pedestrian plaza and a ten-foot bicycle facility with bi-directional bike lanes. A two-foot barrier would be installed between the bicycle lanes and the motorized vehicle travel lanes.

At Main Street, a direct, two-way bicycle connection will be made to the Derby Greenway and no crossing of Bridge Street would be required. The west end of the bridge poses an issue of how to continue the bike lanes. There is not sufficient width on the Bridge Street structure over Canal Street and the railroad tracks to extend the bicycle lanes to Howe Avenue. Therefore, bicyclists traveling west would have to cross at the west end of the bridge.

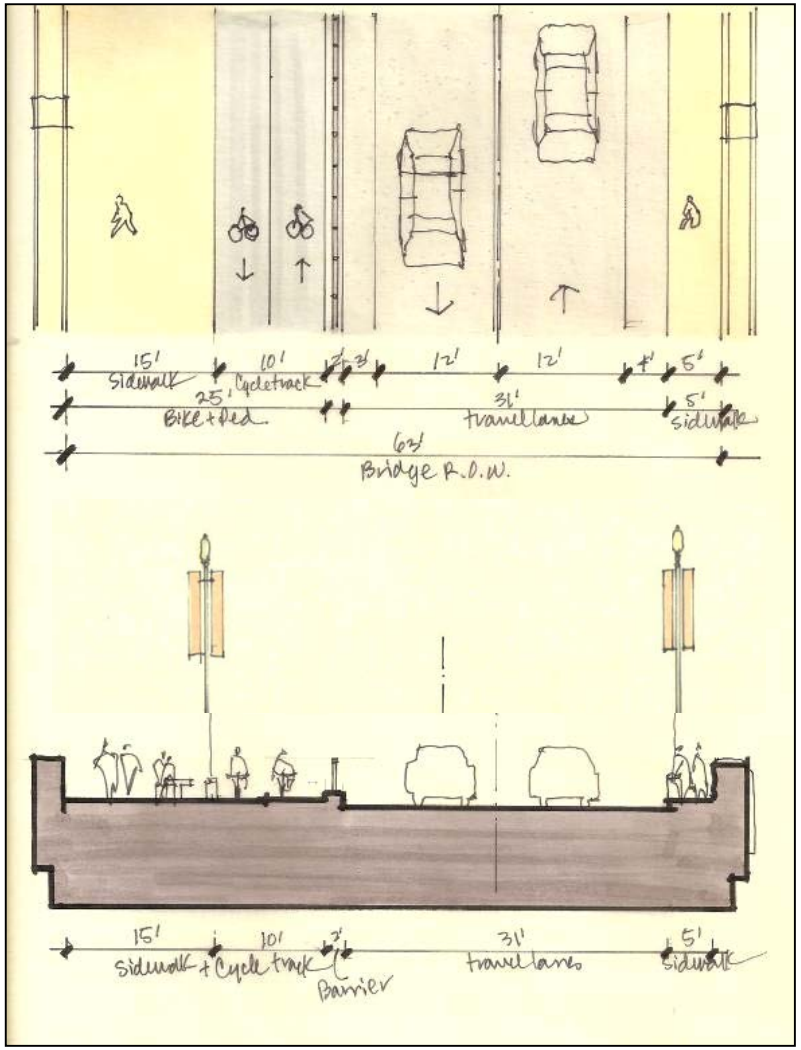


Figure 62: Derby-Shelton Bridge Segment Option 2 Cross Section

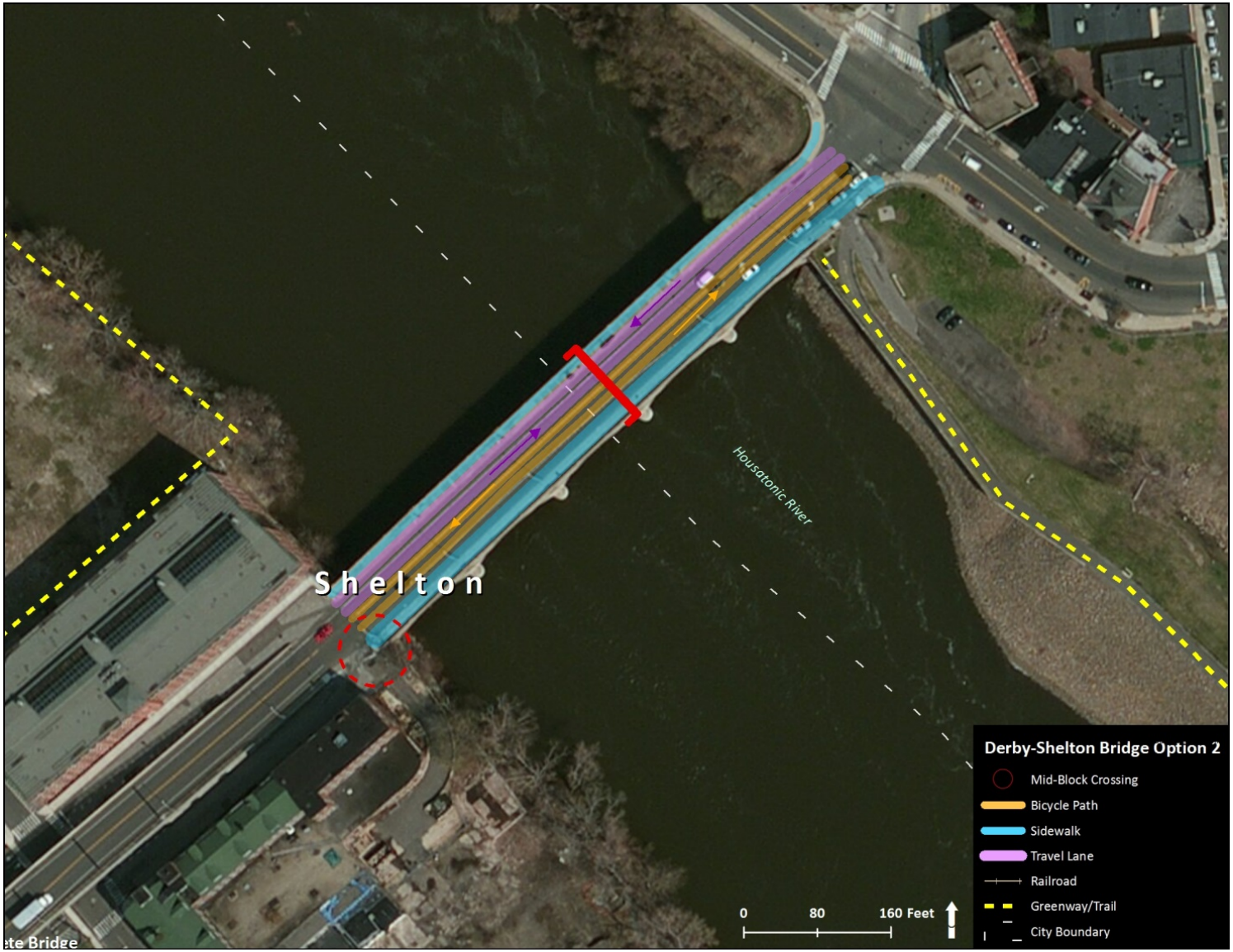


Figure 63:

Derby-Shelton Bridge Segment, Option 2 Aerial and Plan View

Option 3:

Because of the issue described above regarding bicyclists crossing Bridge Street at the west end of the bridge, the concept of designating bicycle lanes along the travel lanes within the existing shoulder areas was developed. The bike lanes would be flush with the road surface and a two-foot barrier, also flush with the road surface, would be installed to separate the bike lanes from travel lanes. The barrier could be comprised of a different surface material to clearly mark the separation between the bike and travel lanes.

This option would allow bicyclists to travel in the same direction as traffic. The bike lanes would align with the ramps that connect Bridge Street to Canal Street and eliminate the need for a crossing treatment at the west end of the bridge. However, crossing treatments would need to be installed on Bridge Street at the Main Street intersection for westbound bicyclists to access the bike lane on the north side of the bridge from the Derby Greenway. The crossing at a signalized intersection will be easier to install than at a mid-block location.

As with Option 2, bridge repairs and renovations described in Option 1 would be included and implemented in this option.

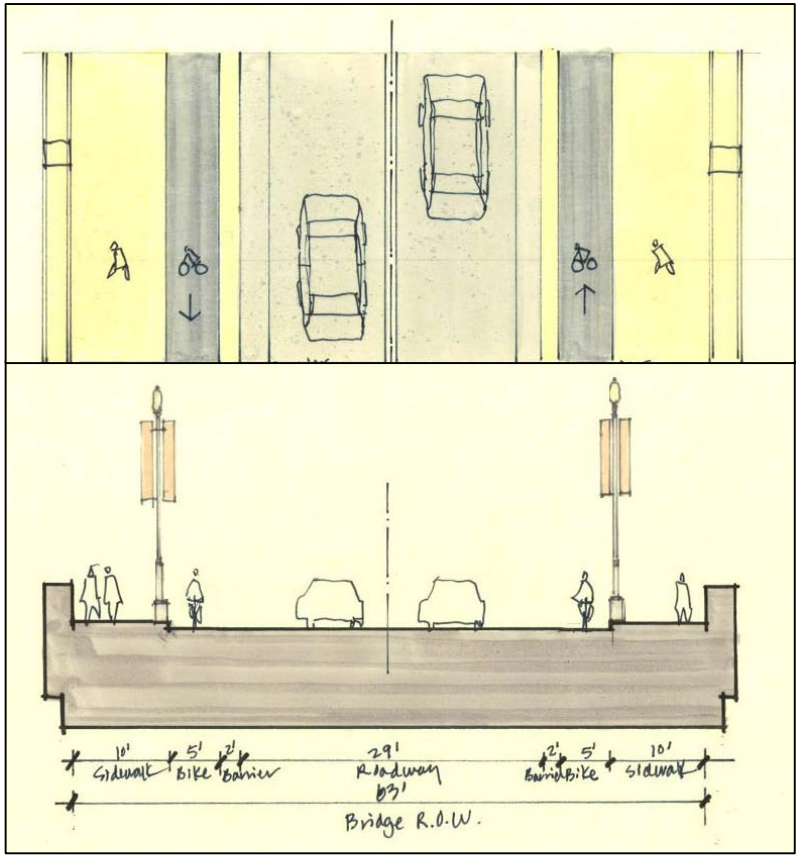


Figure 64: Derby-Shelton Bridge Segment Option 3 Cross Section

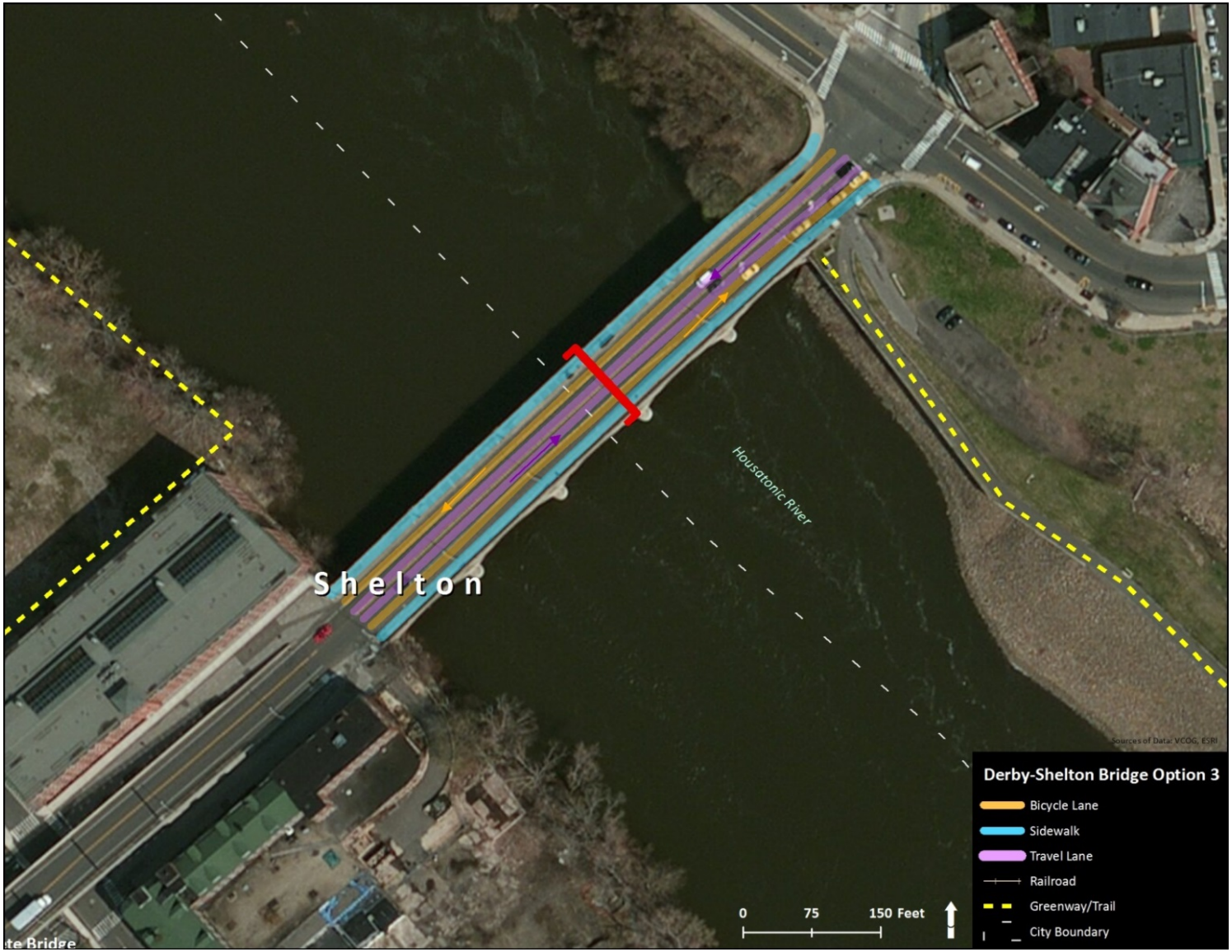


Figure 65:

Derby-Shelton Bridge Segment, Option 3 Aerial and Plan View

Option 4:

Option 4 is similar to the proposed actions listed under Option 3, except the existing sidewalks would be modified to create a fifteen foot pedestrian/public plaza on the south side of the bridge. To provide this width, the sidewalk on the north side would be narrowed to five feet and would be rehabilitated as needed.

Bicycle lanes would be designated along the curb lines, at the same level as the travel lanes, and use the available width within the roadway. Pavement markings or decorative surface treatments would be used to separate the bike lanes from the travel lanes.

As is the case with the other options that designate directional bike lanes, crossing treatments at the Main Street and Bridge Street intersection for westbound bicyclists to access the bike lanes on the north side of the bridge from the Derby Greenway would be needed.

Bridge repairs and renovations described in Option 1 would be included and implemented in this option.

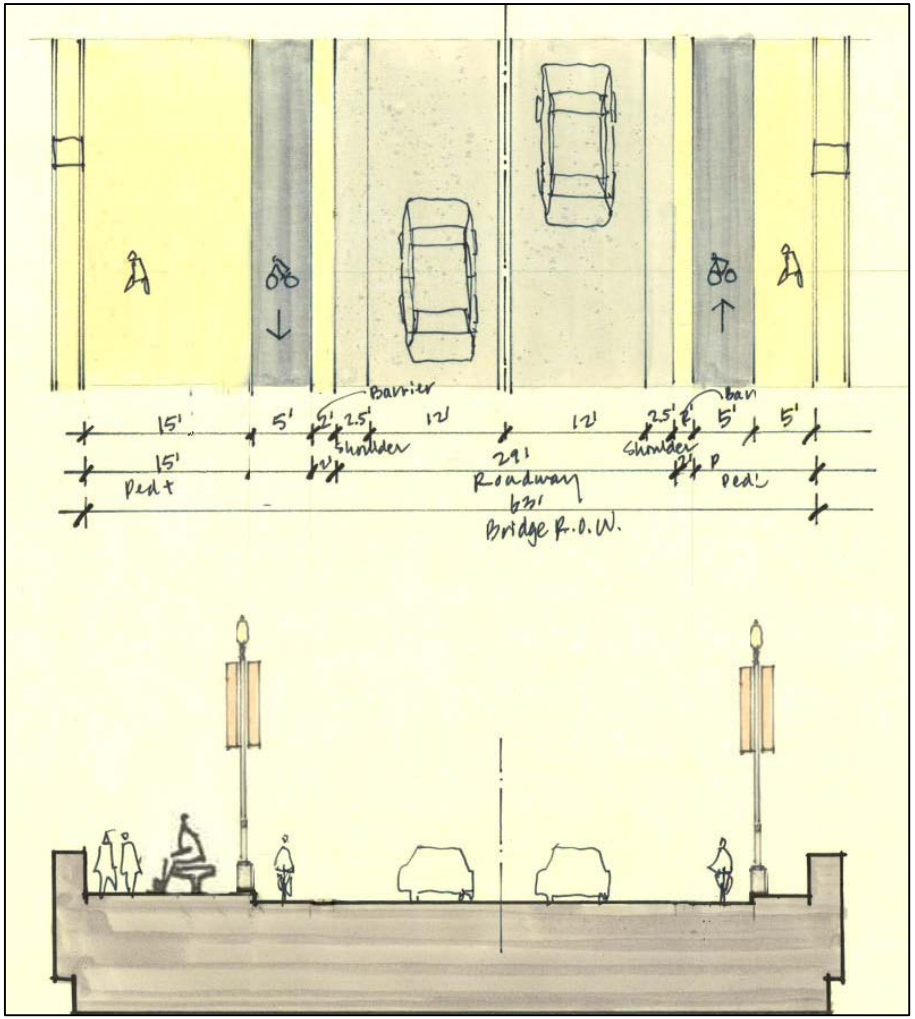


Figure 66: Derby-Shelton Bridge Segment Option 4 Cross Section

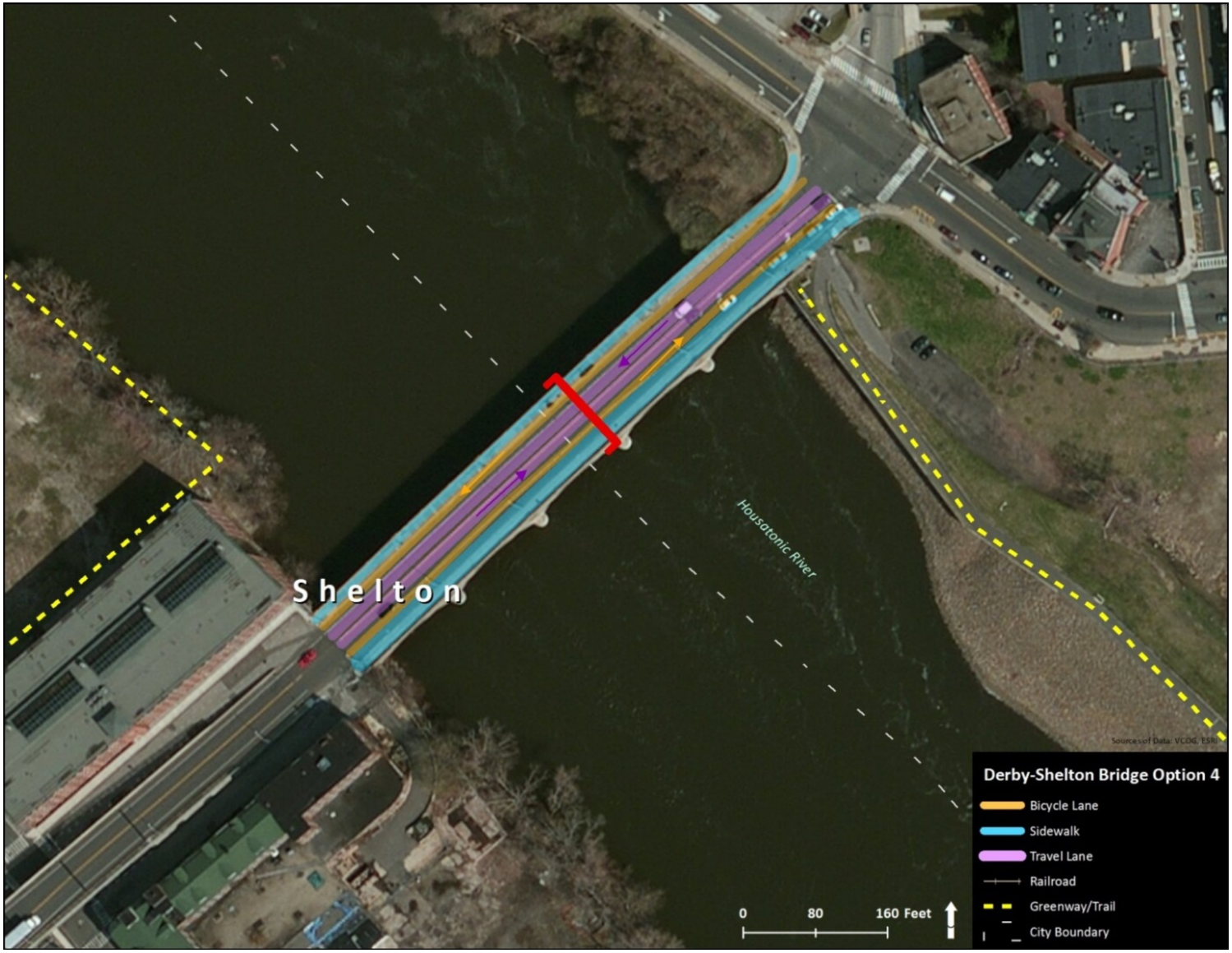


Figure 67:

Derby-Shelton Bridge Segment, Option 4 Aerial and Plan View

Preferred Alternative:

Comments and recommendations expressed by the stakeholder committee members emphasized the need to renovate the Derby-Shelton Bridge and create an aesthetically attractive public space that would visually link the downtown areas of Derby and Shelton. The option that best meets the purpose of the TOD Pilot Program and direction of community stakeholders is Option 2. This option includes the complete renovation and repair of the structure, including replacement of the lighting, reconstruction of the parapets, and installation of decorative railing, and the reconfiguration of the bridge deck to create a wide pedestrian plaza and a separate, bi-directional bike way. New period style lighting would be installed on the parapet walls.

The one remaining question is how to continue the bike way to Howe Avenue. The narrower width of the elevated structure limits options to a shared, on-road facility beginning at the west end of the bridge. The bike way could also use the ramps to Canal Street. In either case, a transition between a bi-directional bike facility, located along the south side of the bridge and the on-road facility would be required, creating an awkward mid-block crossing at the west end of the bridge.

If it is necessary to provide bike lanes on both sides of the bridge to avoid a mid-block crossing, a bicycle crossing of Bridge Street would be needed at the east end of the bridge. Bicyclists can cross safely and be easily accommodated by installing intersection crossing markings to indicate the intended path of bicyclists. The

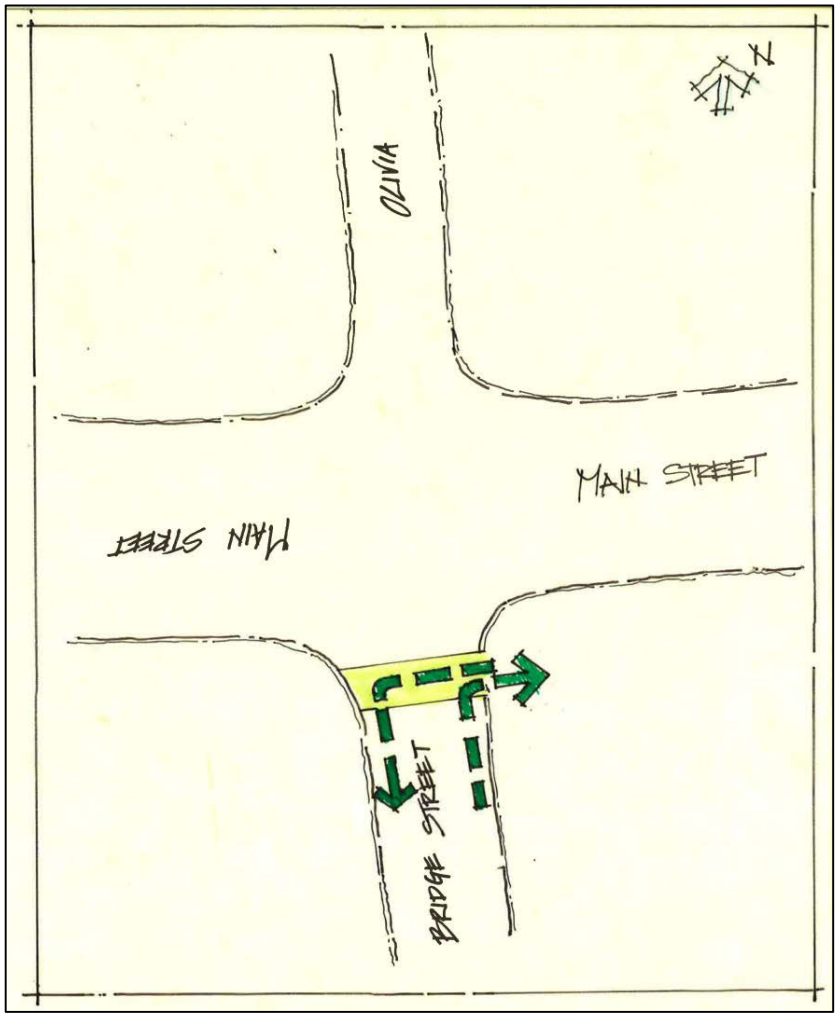


Figure 68: Intersection Treatment for Main Street and Bridge Street

markings provide a boundary between the path of bicyclists and crossing motor vehicles. They also raise awareness for both bicyclists and motorists of potential conflict areas and reinforces that bicyclists have priority over turning vehicles.

In this case, intersection crossing markings would be installed across Bridge Street for westbound bicyclists to follow to access the bike lane on the north side of the bridge from the Derby Greenway. Since eastbound bicyclists would have a direct connection to the greenway, the intersection crossing markings would provide one-way operation.

Bicyclists would cross on the concurrent green phase for Main Street traffic; that is, Bridge Street traffic would be stopped by a red indication.

Figure 69: Intersection Crossing Markings
Source: National Association of City Transportation Officials, *"Urban Bikeway Design Guide"*

Bridge Lighting:

The current lighting on the Derby-Shelton Bridge consists of a series of outdated, cobra-style lights. These lights illuminate the structure at night but do not enhance its presence. The recommended action includes the removal of these lights and the installation of period-style lights that comply with dark sky guidelines. New light poles would be installed on the new parapet walls. Additional lighting would be installed within the pedestrian plaza as needed.

Figure 70:

Historic Lighting Options

Figure 71: Illustration of Period Lighting on New Parapet Walls

Source: Derby/Shelton Bridge Visual Design Study, November 2008, Tate & Associates, LLC

Figure 72: Illustration of Archway Lighting

In addition, gateway lighting can be a great way to bring transformative effects to a historic bridge. Artful archway lighting can make every trip over the bridge a special experience. Lighting effects can also be tailored for special events and holidays to be celebratory.

Figure 73: Illustration of Archway Lighting

Bridge Railing and Amenities:

The bridge parapet walls need to be replaced. The existing walls have deteriorated and the past removal of the railing has made the parapet lower than required. The new parapet can be either a solid concrete wall and/or include decorative railings.

The selection of the railing treatment and its placement along the parapet can provide safety, as well as aesthetically attractive sightlines. The intent of the TOD Pilot Project is to create a public space along the Derby-Shelton Bridge. As part of the preferred option, benches would be placed on the bridge to be the catalyst for creating a gathering or resting place, and encouraging walkers to linger to enjoy the views of the river. The benches could be placed within the space available for the pedestrian plaza or incorporated into the new parapet walls. The height of the railing and placement of benches would be set to provide protection from falling and safety for those walking along the bridge.

Figure 74: Illustration of Pedestrian Plaza with Decorative Railing and Benches as part of the New Parapet Walls

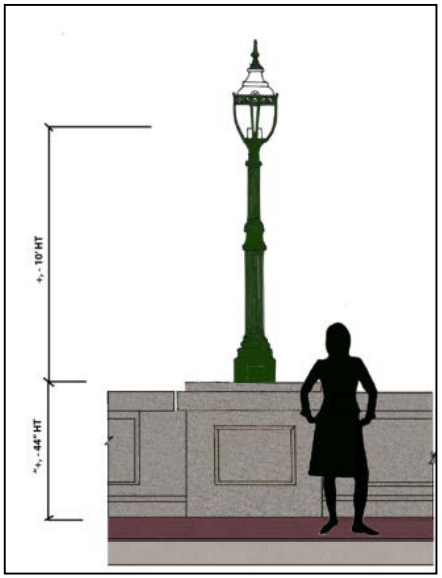


Figure 75:

Illustration of Period Lighting on New Parapet Walls

Source: Derby/Shelton Bridge Visual Design Study, November 2008, Tate & Associates, LLC

Figure 76: Examples of Decorative Railings

Segment 4: West Side Segment

The West Side Segment includes the connections from the west end of the Derby-Shelton Bridge to Howe Avenue in downtown Shelton. From the Derby-Shelton Bridge, pedestrians and bicyclists can continue along Bridge Street and its overpass of Canal Street and the railroad tracks to Howe Avenue or follow the directional ramps that connect the bridge to Canal Street. From Canal Street, users would need to follow several local streets to Howe Avenue. This latter path also connects directly with the Shelton River Walk and the new residential developments in the area.

Option 1:

While a connection to the downtown area of Shelton is a key goal of the TOD Pilot Project, the priority is linking the DSMMC to the new residential developments that are located along Canal Street. Option 1, therefore, proposes installing a shared bicycle lane on the ramps from the west end of the Derby-Shelton Bridge to Canal Street. Shared lane markings or *"sharrows"* would be laid on the road surface denoting lanes for shared use by motor vehicles and bicycles and making motorists aware of the possible presence of bicyclists. This option would create the connections from Bridge Street to Canal Street and the new residential development north and south of the bridge. The bike way would also provide a connection to Veterans Memorial Park, located to the south, and the Shelton River Walk, with completed trail sections extending to the north and to the south along the Housatonic River. Access to Howe Avenue and the main commercial strip of downtown Shelton would be designated as an on-road facility, most likely along Cornell Street.

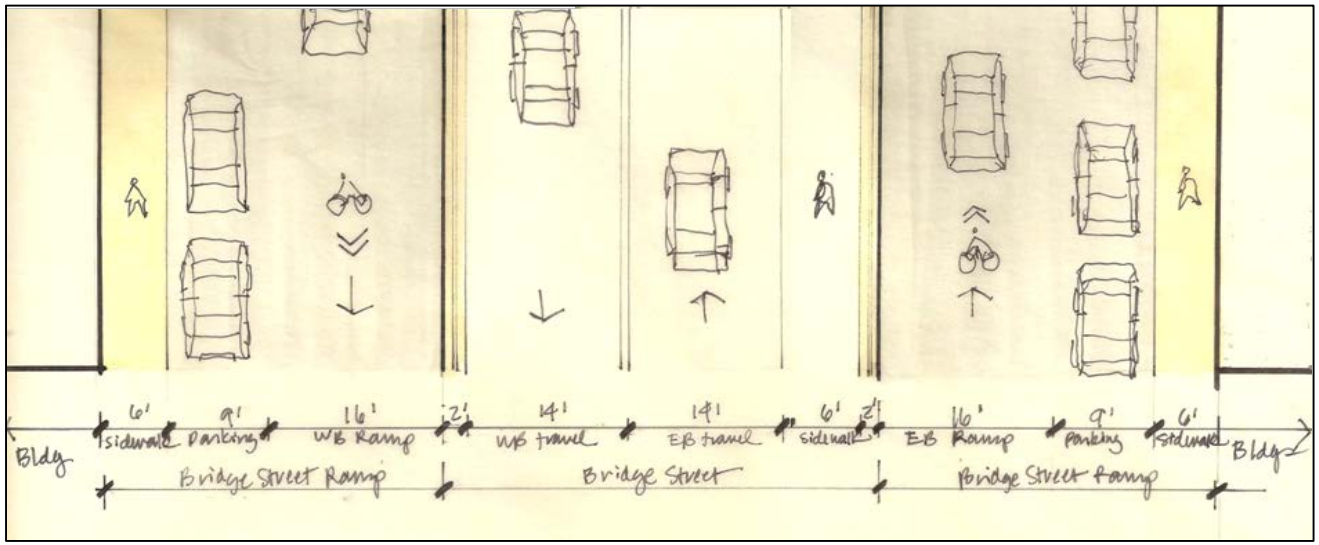


Figure 77:

West Side Segment
Option 1 Cross Section

Figure 78:

West Side Segment Overview

Photo Perspectives of the Bridge Street Overpass

Figure 79:

Looking West near the Railroad Bridge Overpass

Figure 80:

Eastbound Ramp from Canal Street at the Bridge Street overpass

Figure 81:

Looking East from Howe Avenue

Figure 82:

Bridge Street overpass Looking East from Howe Avenue

Figure 83:

West Side Segment, Option 1
Aerial and Plan View

Option 2:

This option would align the bicycle facility through a parcel located south of Bridge Street and east of Canal Street. An existing building, currently unused, is located on the site and an access road runs behind the west and south sides of the building, through the site to Canal Street. The concept would upgrade the access road to accommodate bicycle travel. In the existing condition, the access road intersects Canal Street near the at-grade crossing of the freight rail tracks. This location is between the existing crossing gates and would create an unacceptable safety hazard, as vehicles exiting the access road would not be controlled by the crossing gates. This option would only become viable if an agreement is made with the developer for sharing the right-of-way.

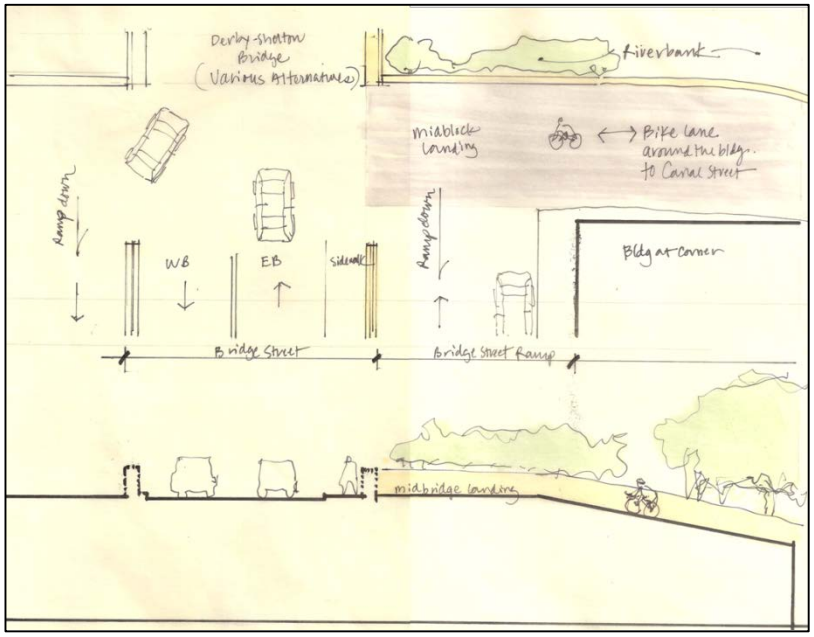


Figure 84: West Side Segment Option 2 Cross Section

A site plan for redeveloping the property has been submitted to the City of Shelton. As an alternative to upgrading the existing access road, a bike facility would be incorporated as part of the redevelopment plans. The site plan shows that the westbound ramp to Bridge Street would be closed to traffic, landscaped and a walkway installed. The area is sufficiently wide to accommodate a separate bike way.

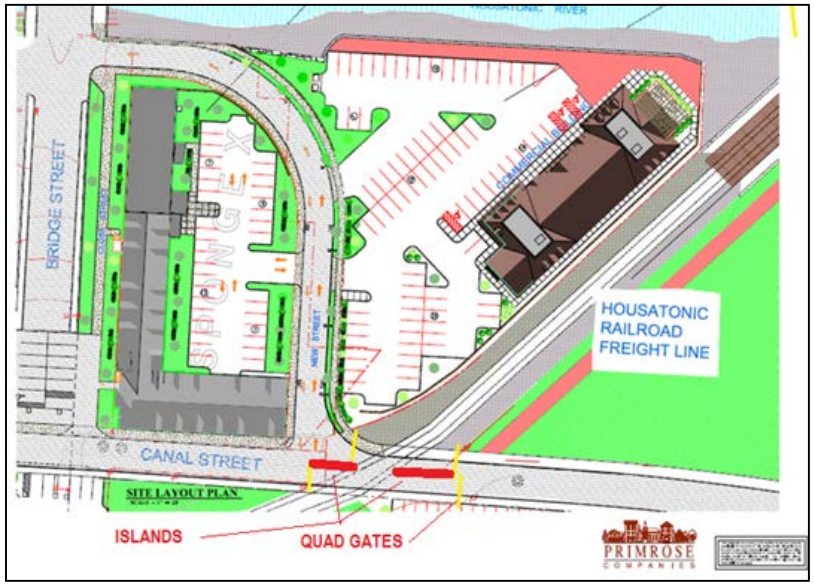


Figure 85: Site Plan for Redeveloping Parcel South of Bridge Street

Figure 86:

West Side Segment, Option 2
Aerial and Plan View

Preferred Alternative:

Opportunities to enhance the bicycle and pedestrian connections along this segment are somewhat limited by the physical constraints of the Bridge Street structure, the proximity of the freight line and land use patterns. The existing cross sections of Bridge Street and Canal Street will not be widened; therefore the preferred option is to work with the City and the owner of the unused parcel to incorporate a separate bike way into the site plans for redeveloping the site.

Under this option, the bicycle facility would seamlessly connect with the pedestrian plaza and bi-directional bike lanes proposed under Option 2 for the Derby-Shelton Bridge Segment. The bike way on the bridge will continue and be extended along the closed, eastbound ramp from Canal Street. This option would eliminate the need to provide a mid-block bicycle crossing at the west end of the Derby-Shelton Bridge.

Bicycle Signage and Pavement Markings

In addition to the physical improvements and enhancements described above, wayfinding, information and guide signage needs to be installed. Regulatory and warning signs also are required to inform users of any traffic laws or regulations that apply to the greenway. Currently, wayfinding signage is lacking and regulatory and warning signs are inconsistently applied.

Guidelines and regulations relating to the type, style, size, placement and wording of all signs that regulate, warn and guide all forms of traffic, including pedestrians and bicyclists, are based primarily on two sources:

- The *Manual on Uniform Traffic Control Devices (MUTCD*), Federal Highway Administration, U.S. Department of Transportation, 2009; and
- *Guide for the Development of Bicycle Facilities,* American Association of State Highway and Transportation Officials (AASHTO), 2012, Fourth Edition.

It is expected that the proposed project bicycle and pedestrian facilities will serve a variety of users from adults to children with different trip purposes, including commuting, shopping, dining and recreation. To create a clear identity, encourage walking and bicycling and direct users to various destinations, a comprehensive signage plan needs to be implemented. Developing a unique logo or “brand” for the pedestrian way and bicycle facility will provide a consistent sign type and graphic that identifies the facilities and is recognizable to users along the entire route. A logo can be developed that contains an image or depiction of the pedestrian and bicycle facilities and may contain important local geographic features, such as a bridge or river. The proper application of signs and pavement markings will ensure the corridor is safe, user friendly and intuitive to use for pedestrians, bicyclists and motorists.

Information and guide signs need to be installed at key decision points. Primary destinations include, but are not limited to:

- Downtown Derby;
- Downtown Shelton and Howe Avenue;
- Derby Shelton Multi-Modal Center; and
- Veterans Memorial Park and Shelton River Walk.

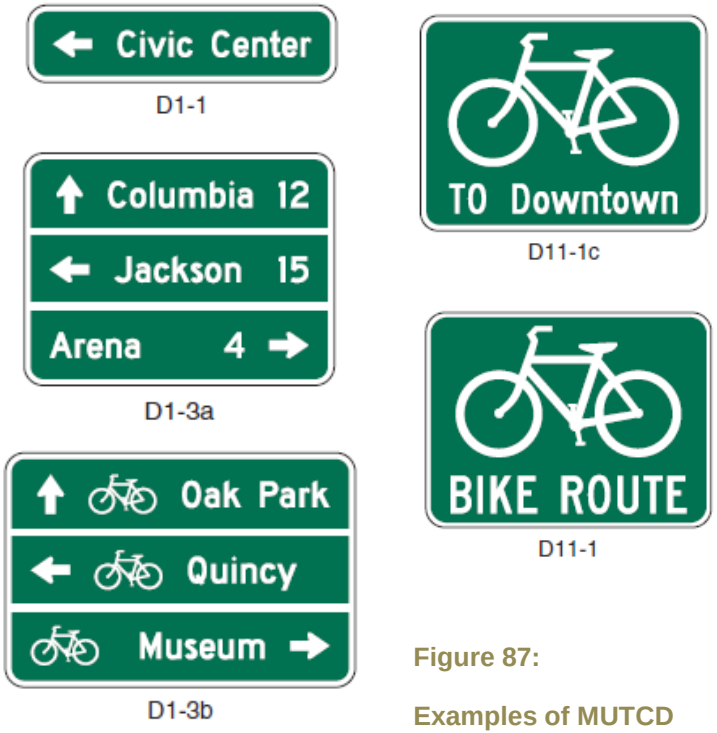


Figure 87: Examples of MUTCD Bicycle Guide Signs

In addition to the wayfinding signs, it will be necessary to install regulatory signs to inform users of any traffic laws or regulations that apply to the greenway. These may include:

- Stop signs (R1-1)
- Yield signs (R1-2)
- Bike Lane signs (R3-17)
- Bikes May Use Full Lane (R4-11)
- No Motor Vehicles signs (R5-3)
- Pedestrian Crossing signs (R1-6a or R1-9a)
- Ride with Traffic plaque (R9-3cP)
- No Bikes signs (R5-6)
- No Parking Bike Lane signs (R7-9)
- No Pedestrians signs (R9-3)
- Bikes use Pedestrian Signal signs (R9-5) and Bike Push Button for Green Light (R10-24) – if the crossing of a street is controlled by pedestrian signal indications
- Bikes Yield to Pedestrians signs (R9-6)
- Bikes Keep Left Pedestrians Keep Right (R9-7)

Figure 88: Examples of MUTCD Bicycle Regulatory Signs

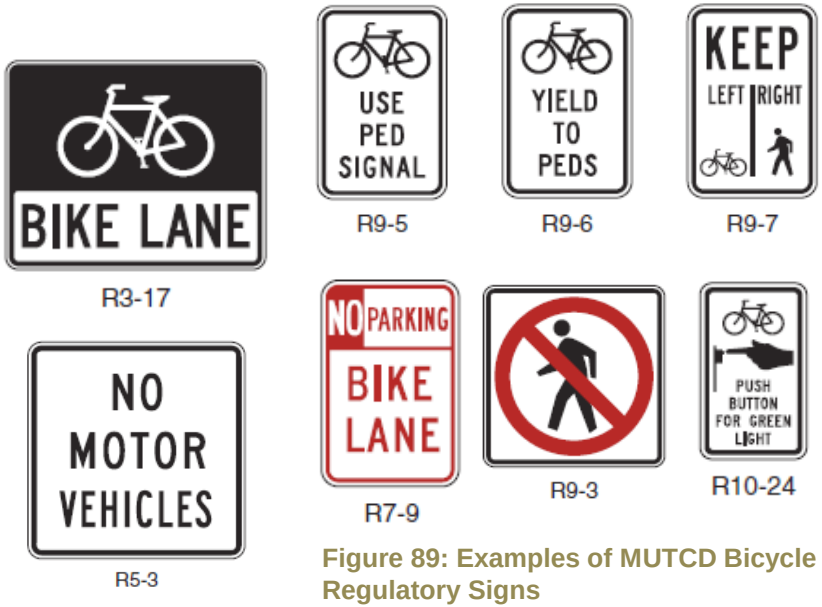


Figure 89: Examples of MUTCD Bicycle Regulatory Signs

Similarly, warning signs need to be installed, where appropriate, to inform users of changing conditions along the greenway and alert motorists that bicyclists may be present or allowed to use the full lane where no dedicated bike lane has been designated. Standard warning signs may also be used to indicate the presence of an intersection and the possibility of turning or entering traffic. The use of the these signs must also adhere to MUTCD guidelines.

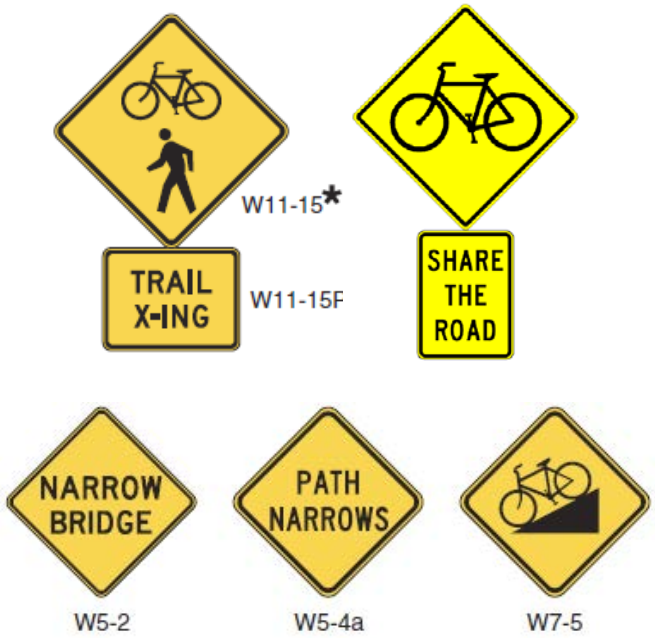


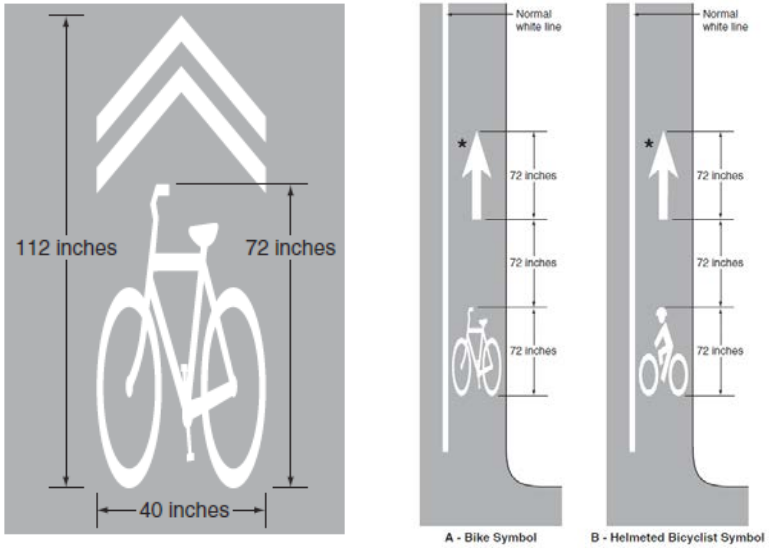
Figure 90: Examples of MUTCD Bicycle Warning Signs

Any sign installed along the designated path needs to conform with the MUTCD guidelines. Despite this, there are opportunities to develop distinct plates to supplement the MUTCD style signs. Also, for other treatments not provided in either the MUTCD or the AASHTO guide, best practices from national and international applications can be used. A complimentary source for bicycle facilities and treatments is the *Urban Bikeway Design Guide*, developed by the National Association of City Transportation Officials (NACTO).

The MUTCD also provides guidance and regulations for the placement of pavement markings for bicycle and pedestrian facilities. Markings are used to designate lane separation for road users, assist bicyclists by indicating assigned travel paths, indicate correct or preferred positioning of bicyclists within the travel lanes, and provide advance information for turning maneuvers. The MUTCD also provides requirements for the colors, symbols, dimensions, patterns, and arrows for pavement markings.

Typical bicycle and pedestrian pavement markings include:

- Bicycle Lane – comprised of longitudinal markings, symbols, word legends and arrows;
- Shared-use Path – where appropriate center line markings can be used to designate and separate directional lanes. Center lines are required for all shared-use paths;
- Shared Lane Marking – a symbol placed in the travel lane to assist bicyclists with lateral positioning, alert motorists where bicyclists are likely to be positioned and encourage safe passing. The symbol is also referred to as a *"sharrow;"*
- Edge line striping or longitudinal markings – placed along the travel lane to denote the shoulder area of the road;
- Stop Line – indicates the position where bicyclists need to stop at either a traffic signal or stop sign; and
- Crosswalks – provide guidance for pedestrians crossing a roadway by defining where they should cross and alert motorists to expect pedestrians. Other treatments should be installed with a marked crosswalk. Bicyclists should not ride within a marked crosswalk.



Shared lane marking or *sharrow*

Bicycle lane markings

Figure 91: Examples of MUTCD Bicycle Pavement Markings

Additional pavement markings will be required where bicycle facilities cross intersections. In recent years, cities have installed bike boxes at intersections controlled by a traffic signal to designate an area at the head of a traffic lane, between a crosswalk (if present) and the stop bar, where bicyclists should wait during the red phase. The bike box provides a safe and visible place for bicyclists and better facilitates left turning bicyclists by allowing them to position themselves on the left side of the bike box and in front of traffic. Typical applications are at higher volume locations and where there are frequent bicyclist left turns. Solid green pavement markings are typically used to denote bike boxes. Bicycle symbols are also generally included.

The application of bike boxes has not been officially included in the MUTCD; however, the National Committee on Uniform Traffic Control Devices (NCUTCD) has studied the effectiveness of bike boxes and received experimental data from various communities. The NCUTCD has recommended adoption of bike box guidelines into the MUTCD.

Figure 92: Example of Bike Box Application

Figure 93: Cycle Track Design Illustrations

A cycle track is a special bicycle facility that provides some level of separation and physical protection from passing vehicles. A one-way cycle track is basically the same as an on-road bike path that carries the bicyclist in one direction and in the same direction as motor vehicles. These facilities can be at street level or raised to provide vertical separation, usually at the same height as the adjacent sidewalk. Two-way cycle tracks allow bicycle movement in both directions on one side of the road, and are physically separated from traffic by a median or other device. Bicycle symbols should be placed along the cycle track and a different material or pavement color can be used to highlight the cycle track and make it more visible.

Figure 94: Example of a One-Way Cycle Track

Refinement of Options

After developing the long list of options, a meeting between VCOG, CTDOT and the Consultant Team, headed by AECOM, was held to review and begin to refine the options. The meeting was held on April 9, 2014. The purpose of the meeting was to present the initial findings of the study and solicit input from CTDOT on various options being considered. The focus was on the actions for enhancing the Derby-Shelton Bridge and improving bicycle and pedestrian connections between downtown Shelton and the Derby-Shelton Multi-Modal Center (DSMMC) in Derby, along Bridge Street and Main Street (Route 34). Various CTDOT offices and divisions participated and were represented at the meeting. The options presented to CTDOT and VCOG were developed with consideration of the issues and concerns expressed at the February 26, 2014 stakeholder's meeting. The meeting was very productive and elicited a good, interactive conversation regarding how best to meet the purpose and needs of the TOD Pilot Program. CTDOT staff provided comments and suggestions at the meeting as well as written comments subsequent to the meeting.

The project study team responded to the comments, concerns and issues raised by CTDOT. A primary concern was the potential delay in the design of the reconstruction of Route 34 through Derby. If actions from this study were integrated into the Route 34 reconstruction project, the preliminary design plans may need to be revised. An internal meeting was held between VCOG and AECOM to finalize the short list of options to assess in more detail and to include in the alternative assessment report. The selected short list of options are consistent with CTDOT's comments, concerns and issues, as well as with the VCOG's goals and objectives for enhancing mode choice through downtown Derby.

The following is an overview of the comments, concerns, and issues expressed by CTDOT regarding proposed alternatives and study team's responses. A complete listing and discussion of the comments and responses are found in Appendix I.

General Comments:

Comments:

1. Facility consistency and continuity throughout the entire corridor is an important element and it is not desirable to switch between differing types of bicycle facility. The preferred alternative should provide a consistent bicycle treatment and/or facility between Howe Avenue and the Derby-Shelton Multi-Modal Center.
2. The preferred alternative needs to consider maintenance of facility in its design. The use of flush buffers, such as texture pavement or pavement markings, instead of a raised or physical barrier to separate travel lanes from the bicycle facility will greatly facilitate maintenance.
3. There is need to understand the communities' preferences regarding constructing a new bicycle facility within the corridor and renovations of the Derby-Shelton Bridge.

4. How do the proposed options fit in with each of the town's overall land use and economic development plans.
5. The proposed lane arrangements for the Route 34 reconstruction project (State Project No. 0036-0184) were fully analyzed as part of the preliminary design phase. Any additional considerations for bicycle facilities in this corridor should not have an impact on the travel lanes proposed in the project.
6. The lack of sufficient parking for users of multi-use trails has been identified as a problem at other trails throughout Connecticut, and planning for trail parking needs to be included in the project.

Responses:

1. The intent of the project is to develop a safe and convenient connection between downtown Shelton and the Derby-Shelton Multi-Modal Center. An important aspect of any alternative is to ensure facility continuity and consistency. Preferred alternatives will be developed in a way to minimize "switching" between differing bicycle facility types.
2. Both cities maintained the existing bicycle and pedestrian facilities and are committed to maintaining the new facilities. The preferred alternatives will consider maintenance needs and address concerns regarding maintenance and snow removal. Facilities within the Derby Greenway or on sidewalk shelves will be maintained by the local forces as part of their normal maintenance responsibilities. The project will not impact the State's ability to maintain the roads under its jurisdiction nor its ability to inspect the Derby-Shelton Bridge. The preferred option for the Derby-Shelton Bridge will adjust the lane configuration and adjacent sidewalk areas only and will not alter the bridge structure.
3. The VCOG has been active in coordinating the project with the mayors of both Derby and Shelton and has convened a stakeholders advisory committee, comprised of the mayors of both communities, the economic development agencies, planning and zoning officials, municipal planners, and other interested parties. In addition, the committee includes representatives of the Derby Shelton Rotary who participated in a visioning study on renovations of the Derby-Shelton Bridge.

   Both mayors consider the key element of the project to be the rehabilitation and enhancement of the Derby-Shelton Bridge and view the renovation of the structure as critical to their efforts at revitalizing their respective city's downtowns.
4. Both Shelton and Derby have included the opportunity of TODs in their plans of conservation and development (POCD) and have embraced the concept of mixed-use developments within the downtown areas. Model regulations to accommodate TODs will be prepared as part of Task 2 of the TOD Pilot Program. In addition, the Shelton Economic Development Corporation sponsored the preparation of the concept plan for rehabilitating the Derby-Shelton Bridge and improving bicycle and

pedestrian connections to the rail station; therefore, these concepts are elements in the economic development plans.

5. The proposed options will have minimal impact on the Route 34 reconstruction project and its design schedule. The final design phase will be based on a new public comment process and will include complete streets elements, including curb extensions at intersections, new crosswalks, updated pedestrian signals and other complete streets elements as appropriate. Concepts developed as part of the TOD Pilot Project will provide some direction in identifying possible elements to include in the final design of the Route 34 reconstruction project, but they will not alter the base layout of the roadway as illustrated in the preliminary design plans.
6. There are currently several parking areas available to users of the Derby Greenway, including an informal parking lot at Bridge Street, a parking lot at the boat launch on O'Sullivan's Island and a formal trail lot at the north terminus of the greenway at Division Street. Additional vehicle parking is available at the Derby-Shelton Multi-Modal Center as well as in the BJs Wholesale Club parking lot (the city has an agreement with BJs that allows trail users to park in the lot). Proposed and existing parking along Route 34 will not be impacted by any of the proposed options. The intent of this project is to enhance the non-motorized connections between downtown Shelton and DSMMC; therefore, the demand for vehicle parking should not be increased above current levels.

East Side Segment:

Comments:

1. Have discussions with The Home Depot to gauge their interest in accommodating the bike path within the landscaped buffer.
2. Greater development of actions to accommodate bicyclist at the Main Street and Water Street intersection.
3. Consider demand for bicycling from the east side of Derby.

Responses:

1. The buffer was a requirement for approval of the development and the City has control of its use and deed restrictions. Coordination with the Home Depot will be undertaken as the project advances.
2. Because of the low traffic volumes on Water Street, the initial concept for accommodating bicyclists crossing Main Street at this intersection is to allow bikes to move concurrently with vehicles; no special treatments would be needed on Water Street.
3. The study area does not include the Route 34 corridor east of Route 8 and access from the east side of the Naugatuck River is not included in the scope of the project. However, because of the road geometry (four travel lanes, median divided, 90 degree turn at Route 115), high volumes (44,200 to 46,300 vpd), narrow sidewalks, ramp connections with Route 8 and safety concerns, accommodating bicycle travel from the east is

problematic. The current project to rehabilitate the Route 34 bridge over the Naugatuck River should have included bicycle accommodations.

Downtown Derby Segment:

Comments:

1. The installation of bicycle lanes on the north side of Main Street is not suggested because of the multiple roadway crossings, limited sight distances, extant historic buildings, lack of continuity, the topography, on-street parking, and numerous street appurtenances which would require modifications.
2. New bicycle facilities adjacent to Main Street would provide incomparable benefit of greater access to businesses and efficiency for transportation of bicyclists.
3. Option 1 for the Derby Downtown Segment would be preferred. Although Option 2 and 3 may provide more access to business along the segment, there is concern on how to address bicycle movements at either end of the segment.
4. The alignment and connection of proposed bicycle facilities at the Main Street and Bridge Street intersection need to be developed in more detail so that the planned turn radii and lane arrangements under the Route 34 reconstruction project are consistent.

Responses:

1. The consideration of bicycle lanes on the north side of Main Street was deemed unsafe with regard to the limited sightlines and impractical. This option was eliminated from further consideration.
2. The utilization of the south side of Main Street was determined to be the more feasible location for enhanced bicycle facilities because of the continuity, minimal roadway crossings, the ability to control future development to be consistent with selected options, (most of the area has been demolished or will be as part of the Route 34 reconstruction project), and because the planned cross section under the Route 34 reconstruction project can be maintained with minimal revisions.
3. The preferred alternative is to construct a new bicycle facility adjacent to Main Street. The on-road option is viewed as a *"No Build"* scenario and one that would be considered as an intermediate action. While the off-Main Street alignment would be longer, it does not mean that it would *"reflect a prioritized recreation over transportation and access"* project. It would also provide a more direct connection between Shelton and the Derby-Shelton Multi-Modal Center. The on-road bicycle enhancements along streets south of Main Street relate to the existing surface transportation network, its proximity to Route 34 and an established bicycle corridor, that is, the Derby Greenway. In addition, the on-road alignment would improve safety for bicyclists.

4. The preferred option for a bicycle facility will be designed as an overlay of the planned realignment and reconstruction of the Main Street and Bridge Street intersection and the geometry required to move traffic will be maintained. The alternatives would maintain the same number of operating and turning lanes as proposed under the Route 34 reconstruction project and bicycle crossing will be coincidental with proposed vehicle signal timing. Minimal or no impact on roadway level of service would occur under any option.

Derby-Shelton Bridge Segment:

Comments:

1. The Derby-Shelton Bridge Segment has significant roadway and sidewalk width to work with, but there is need to understand the communities' preferred use of this space.
2. There are significant barriers to cantilevering additional width on a historic structure.
3. The bridge is eligible for the National Register of Historic Places and any option must retain key historical features and faithfully restore as appropriate.

Responses:

1. The mayors of both Derby and Shelton support renovation of the bridge and installation of an enhanced public space. The initial preference by the Stakeholders, as expressed at the first Stakeholder meeting, is to provide a pedestrian plaza on the south side of the bridge. This side is visually more attractive and provides better connection with downtown Shelton and the south side of Main Street, where the plaza would provide a better connection to the Derby Greenway.
2. Because of the cost of cantilevering additional width on the bridge and the potential negative impacts on the historic structure, this option has been deemed infeasible and was eliminated from further study.
3. The preferred alternative will be consistent with the historic qualities of the bridge and will replace, repair and renovate existing features that mirror their original design and function. New features will replicate historical elements.

West Side Segment:

Comments:

1. The design of the West Side Segment will be challenging along the ramps connecting Bridge Street to Canal Street. Any mid-block crossing on Bridge Street and the ramps to Canal Street will create safety and operational concerns.
2. If bi-directional bicycle lanes are considered on one side of the bridge, on-street parking on the respective adjacent ramp will likely need to be eliminated.
3. The narrowness of Bridge Street between the Canal Street

ramps and Howe Avenue presents limited options for bicycle lane continuity from the Derby-Shelton Bridge.

4. Crossing the existing freight rail tracks will necessitate coordination with CTDOT and require State approval.
5. Is the closed road from Bridge Street through a vacant and unused parcel privately owned?

Responses:

1. The preferred option will focus on facility continuity and will not include a mid-block crossing at the west end of the Derby-Shelton Bridge
2. Parking designated along the westbound ramp to Canal Street will not be eliminated and any proposed facility will be designed to maintain existing parking.
3. There may be an opportunity to construct a new road at the west end of the Derby-Shelton Bridge and the top of the eastbound ramp from Canal Street as part of a redevelopment project planned in that quadrant. The preferred option may include simply accommodating bicycles along a new road through the site to Canal Street. The preliminary site plan shows closing the existing ramp. If that option were built, bicycle lanes could be built within the old ramp right-of-way.
4. Any new railroad grade crossing will be challenging. At this time, a new crossing of the freight line is not being considered. Any crossing of bicyclists will be made at the existing at-grade, gate-controlled crossing.
5. The closed road from Bridge Street is private and not a city-owned street.

Design Criteria:

The long list of possible options was evaluated versus standard design criteria contained in the AASHTO *Guide for the Development of Bicycle Facilities.* It is assumed that all new bicycle facilities will be designed in accordance with the AASHTO guide.

The following is a summary of the design guidelines that will be addressed during the design phase of the project:

- All catch basin grates within the limits of the Route 34 reconstruction project shall be the "CTDOT Standard Catch Basin Grate Type A." This grate is designed to allow bicycles to traverse the catch basin. Catch basins located outside the Route 34 project limits but that will be crossed by new bicycle facilities, shall be evaluated to ensure that the existing grates are traversable by a bicycle. If not, the grates need to be upgraded or replaced accordingly;
- With respect to geometry, all the options presented in this report meet sight distance, turning radius, and pavement cross slope requirements;
- All proposed bike lanes meet the minimum design width

of five feet for each lane;

- All options meet maximum profile grade requirements, except for Options 2 and 3 within the Downtown Derby Segment. Both exceed the recommended maximum profile grade of five percent;
- The three critical intersections within the Downtown Derby Segment – Ausonio Drive, Water Street/Factory Street and Bridge Street – have been provided with acceptable schemes for intersection crossing. Other crossings are low volume intersections and do not require special crossings treatment; bicyclists can operate within existing travel lanes and concurrently with motor vehicles;
- Even though the posted speed limit on Main Street is 25 miles per hour, it is recommended that bike lanes installed on Main Street be separated by a physical barrier from the vehicle travel lanes. Because the profile grade exceeds the design criterion of five percent and there is limited vehicle sight distance, a barrier is warranted. The high traffic volumes and the amount of truck traffic also contribute to the need for physical separation between bicyclists and motorists;
- For Canal Street, the ramps between Bridge Street, Canal Street, and other local streets south of Main Street in Derby and between Canal Street and Howe Avenue in Shelton, shared lane markings are acceptable because the traffic volumes are substantially lower than 1,000 vpd;
- All pavement markings, symbols and signage designating new bicycle facilities shall comply with standards specified in the latest version of the Manual on Uniform Traffic Control Devices (MUTCD);
- The bridge railings and parapets shall be provided in accordance with CTDOT Bridge Standards;
- Roadway lighting along Main Street will be addressed and upgraded, as necessary, under the Route 34 reconstruction project; however, the lighting assessment must accommodate proposed bicycle and pedestrian enhancements included in the TOD Pilot Project, especially at intersections and where a widened roadway cross section may be required;
- Along Bridge Street, the ramps from Bridge Street to Canal Street, Canal Street, and any roadway used to connect Canal Street to Howe Avenue, the roadway lighting will need to be checked and/or replaced per current standards. In addition, the lighting under overpasses, such as Canal Street under the Bridge Street overpass and the entrance to the DSMMC, needs to be evaluated to ensure there are no areas with shadows or blind spots and lighting meets required standard;
- The preferred alternatives will not reduce the number of travel lanes proposed under the Route 34 reconstruction project or along Bridge Street; and
- Bicycle crossings at intersections will run concurrent with vehicle signal phases and no deterioration of intersection levels of service are anticipated.

Evaluation of the Proposed Options

The selection of the preferred alternatives and actions is based on an evaluation of how well the options meet the purpose and needs of the TOD Pilot Program. While the cost to construct and implement an action will factor into its feasibility, this evaluation relates to the pluses (Pros) and minuses (Cons) of the action. The following is a brief description of the reasoning for selecting a preferred alternative for each respective segment, as well as, the associated issues. Appendix L lists all options that were reviewed, but were not considered feasible, because they did not substantially address the concerns of the stakeholders, CTDOT, and/or VCOG.

East Side Segment

The East Side Segment extends from the Derby-Shelton Multi-Modal Center to Water Street and is the segment that provides the direct access to the rail station.

Option 1

This option proposes to construct a bike path within the landscaped buffer between Ausonio Drive and Water Street and upgrade the existing sidewalks.

- **Pros**: Provides a bike path separated from Main Street traffic and creates a safe environment for bicyclists. It has sufficient area to enhance the facility with amenities such as benches, lighting and trees. In addition, it has no operational impact on the adjacent Route 34 roadway.
- **Cons:** Requires negotiations with The Home Depot to reconfigure and reuse the buffer area for a new bike path. Any new use of the buffer needs to be sensitive to the existing World War II monument located in the area. The street grade crossings at Ausonio Drive on the east end and Water Street on the west will require careful design to minimize conflicts.

Option 2

This option proposes to place a bicycle shelter just off the Derby Greenway near the Route 8 northbound entrance ramp and create a pedestrian connection to DSMMC along Route 34 and down the bank adjacent to the parking lot. Bicyclists would be able to store their bikes at a secure shelter and walk to the rail station.

- **Pros:** Is a supplementary action to Option 1 and creates a direct connection with the Derby Greenway. The option enhances the pedestrian connection from the greenway to the rail station by installing pedestrian friendly features and traffic controls.
- **Cons:** It would continue to be an indirect and longer route from downtown Shelton to the DSMMC and bicyclists would have to park their bikes away from the rail station and walk the final portion to the DSMMC.

Downtown Derby Segment

The Downtown Derby Segment is along a hilly section that makes bicycle travel more challenging. The segment is consistent with respect to development and proposed roadway alignment. Most of the buildings on the south side have been demolished and the remaining structures on the south side will be removed during the widening of Main Street. The vertical drop from the roadway to the redevelopment zone south of Main Street is substantial and any widening to accommodate a bicycle path or facility on Main Street would required additional retaining walls and substantial fill.

Three options are being considered for this segment.

Option 1

This option creates an on-road by-pass of Main Street from the Derby Greenway to Factory Street via Hallock Court and Caroline Street.

- **Pros:** Does not impact Main Street or the Route 34 reconstruction project; and eliminates the need to reposition the retaining walls planned for the Route 34 reconstruction projects and substantially increase the amount of fill needed. This option is a low cost alternative that utilizes the existing street network and greenway.
- **Cons:** No direct bike access to businesses within the segment and a path for bikes needs to be addressed between the greenway and Caroline Street.

Option 2

This option would provide a grade separate cycle track and sidewalk on the south side of Route 34 with a flush barrier between pedestrians and bicyclists and a landscaped buffer between the roadway and the bike path.

- **Pros:** Provides access to the businesses along the segment with a grade separated path and a landscaped buffer.
- **Con:** Additional right of way is required along the south side of Main Street. The retaining wall currently planned as part of the Route 34 reconstruction project will need to be repositioned and additional fill placed to allow the cycle track to be located at the same height as the road. Bicyclists would travel along hilly terrain of Main Street. All bike travel would occur on the south side, requiring bicyclists to cross Main Street to access the downtown Derby area.

Option 3

This option would create a frontage road and bicycle boulevard on the south side of Main Street from the vicinity of Bridge Street to Caroline Street. The facility would access Factory Street to provide a crossing of Main Street. The on-street parking spaces on the south side of Main Street would be relocated to the frontage road.

- **Pros:** Provides access to the businesses along the segment with a grade separate path and a landscape buffer. It also increases the amount of parking available along Main Street, while eliminating the conflicts between parking

and the eastbound travel lanes on Main Street.

- **Cons:** Substantial additional right of way will be required to accommodate the frontage road, angled parking, bi-directional bike lanes and pedestrian walkway. Additional fill will be needed to raise the area to same grade as Main Street.

Derby-Shelton Bridge Segment

The Derby-Shelton Bridge Segment encompasses the span over the Housatonic River from Main Street to the ramps that provide connections to Canal Street. The bridge was built in 1918 and is eligible for the National Register of Historic Places. However, it has deteriorated over the years and is in need of repair and renovation. Cracking in the concrete parapets is extensive and the walls are too low and require pedestrian railing. The existing lighting is inconsistent with the bridge's historic character and the light poles are located off of the parapets and too close to the road. Despite these aesthetic deficiencies, the bridge is structurally sound and offers excellent views of the Housatonic River, especially to the south.

Option 1

This option would utilize the existing sidewalks on both sides of the bridge for pedestrian travel and installation of directional cycle tracks.

- **Pros:** Minimal work would need to be performed to accommodate bike and pedestrian travel. By using the existing sidewalks, the cycle tracks would be grade-separated from the road surface, providing greater protection from vehicle traffic. Cycle tracks would be provided on both sides of the bridge, eliminating the need for a mid-block crossing at the west end of the bridge.
- **Cons:** Westbound bicyclists will have to cross Bridge Street at Main Street, requiring special pavement markings. The existing light standards would restrict the available width for combined sidewalk and cycle track and would impede bicycle and pedestrian travel.

Option 2

This option proposes reconfiguring the existing layout on the bridge by widening the sidewalk area on the south side to 25 feet and narrowing the north sidewalk to five feet. Bi-directional bicycle lanes would be installed within the widened sidewalk area on the south side.

- **Pros:** The 25-foot area on the south side would provide sufficient space for a public plaza and viewing area along with a separated bike path. The bike path would also provide continuity with the Downtown Derby Segment and the Derby Greenway.
- **Cons:** The ramp to Canal Street on the south side does not have sufficient clear width to accommodate bi-directional bike lanes and pedestrian access, requiring transitioning to on-road, shared lane bicycle routes on the Canal Street connector ramps. This will create discontinuity in the

bicycle facility type, as well as, the need for a mid-block crossing of Bridge Street. In addition, the public plaza will need to be narrowed as it approaches Main Street to maintain the existing and planned two-lane approach.

Option 3

This option would maintain the existing sidewalk areas and install at-grade, directional bike lanes on both sides of the roadway adjacent to the curb line. The bicycle lanes would be separated from the traffic lanes by a flush treatment or pavement markings.

- **Pros:** Minimal work would need to be performed to accommodate bicycle and pedestrian travel and viewing areas could be provided on both sides of the bridge. In addition, this option would directly connect into the ramps to Canal Street, providing facility continuity.
- **Cons**: Westbound bicyclists will have to cross Bridge Street at Main Street, requiring special pavement markings. The bicycle lanes would not be physically separated from the travel lanes.

Option 4

This option includes widening the sidewalk area on the south side to 15 feet and narrowing the north sidewalk to five feet. At grade bicycle lanes would be installed on both sides of the roadway adjacent to the curb line and separated from the traffic lanes by a flush treatment or pavement markings.

- **Pros:** Minimal work would need to be performed to accommodate bicycle and pedestrian travel areas and a viewing area would be provided on the south side of the bridge. In addition, this option would directly connect into the ramps to Canal Street, providing facility continuity.
- **Cons:** Westbound bicyclists will have to cross Bridge Street at Main Street, requiring special pavement markings. The bicycle lanes would not be physically separated from the travel lanes.

West Side Segment

The West Side Segment includes the area from the west end of the Derby-Shelton Bridge at the connector ramps to and from Canal Street to Howe Avenue. While Bridge Street provides a direct connection to Howe Avenue, the road has no sidewalk on the north side and only a 5½-foot wide sidewalk on the south side. The 35-foot roadway width is insufficient to accommodate bicycle lanes and sidewalks on both sides of the road. Also, for bicycle travel, the Bridge Street and Howe Avenue intersection has too many conflict points to safely function as a part of a designated bicycle facility.

Option 1

This option uses the connector ramps from Bridge Street to Canal Street as shared-lane bicycle facilities. The shared-lanes would connect with the Shelton Riverwalk and bicyclists continuing to Howe Avenue would be directed along Canal Street and Cornell Street, also via shared bicycle lanes.

- **Pros:** Minimal improvements to the existing roadways would be required to accommodate bicycle travel and there would be no loss of on-street parking. The actions would provide continuity with actions over the Derby-Shelton bridge and create a connection to the Shelton Riverwalk.
- **Cons**: A direct connection to Howe Avenue is not provided and the alignment along various local streets is circuitous.

Option 2

This option uses an existing road through private property that connects Bridge Street to Canal Street. Bicyclists would then proceed to Howe Avenue via Canal Street and Cornell Street via shared bicycle lanes. A planned redevelopment project for the site would allow the re-use of the eastbound ramp, which would be closed to traffic, for a separate bicycle path.

- **Pros:** The use of the road or the closed ramp would provide a better connection if bi-directional bike lanes were installed on the south side of the Derby-Shelton Bridge and would provide a more direct connection to Canal Street and the Shelton Riverwalk.
- **Cons:** If the proposed bike lanes were built within the redevelopment site, negotiation with the owner would be required. Also, if the location of the road's intersection at Canal Street remains, it is in the middle of a railroad-crossing gate, which will require modifications and approvals to adequately and safely protect bicyclists and pedestrians crossing the freight rail line.

Preferred Alternative and Recommended Actions

The TOD Pilot Program assessed the existing bicycle and pedestrian connections between downtown Shelton and the Derby-Shelton commuter rail station. Based on this assessment, alternatives were developed to enhance these connections and encourage greater walking and bicycling within and along the corridor. As described throughout this report, the study area was divided into four segment, each with logical termini. This approach allows the selection of the options and combining elements that best meet the purpose and needs of the project.

The recommended and preferred actions are as follows:

East Side Segment:

- Install a secure bicycle shelter and parking area in the vicinity of the Derby Greenway and the northbound entrance to Route 8.
- Install a rectangular rapid flash LED beacon (RRFB) at the northbound entrance ramp to Route 8.
- Construct a walkway and/staircase from Main Street to the parking lot of the DSMMC.
- Enhance amenities at the DSMMC, including additional bike racks, information kiosks, heat waiting shelter and wayfinding

signage.

- Enhance the existing sidewalk along Main Street from the northbound entrance to Route 8 to Ausonio Drive.
- Create a walkway through the parking lot for the DSMMC from Ausonio Drive to the station.
- Construct bi-directional bike path through the buffer behind the Home Depot.
- Enhance the existing sidewalk between Ausonio Drive and Water Street.

Downtown Derby Segment:

- Widen the right-of-way to the south of Main Street and add fill to raise the area to the same height and grade as Main Street.
- Construct a one-way eastbound frontage road from the vicinity of Bridge Street to Factory Street.
- Construct a bi-directional cycle track between Main Street and the new frontage road.
- Install an angled parking bay.
- Create a pedestrian plaza along the parking bay; and
- Install landscaped buffers.

Derby-Shelton Bridge Segment:

- Repair and renovate the bridge parapet walls, repave the road surface, and install period pedestrian railing.
- Remove existing cobra-style lighting and replace with historic lighting installed on the parapet walls.
- Widen the sidewalk area on the south side of the bridge and create a pedestrian plaza and public space.
- Narrow the sidewalk on the north side of the bridge.
- Install a bi-directional cycle track within the pedestrian plaza on the south side of the bridge.
- Install amenities within the pedestrian plaza, including benches and planter boxes.

West Side Segment:

- Work with the developer of the parcel located at the southwest of Bridge Street and the Housatonic River to include bicycle and pedestrian facilities as part of the site plan.
- Construct a multi-use path on the eastbound connector ramp to be closed as part of the redevelopment of the adjacent parcel.
- Connect the multi-use path to the Shelton Riverwalk.

Estimated Cost to Construct Options

The recommended improvements and actions will improve the bicycle and pedestrian connections between downtown Shelton and the Derby-Shelton Multi-Modal Center and serve as a catalyst for redeveloping the area south of Main Street in the City of Derby. These actions will significantly enhance the streetscape environment and create an area that is more attractive, inviting and livable.

The cost to implement and construct the various concepts was calculated based on the procedures established by the Connecticut Department of Transportation and sound engineering principles. At the level of planning undertaken for this study, the costs are illustrative and represent an order of magnitude. More refined costs will be determined as project elements are refined, designed in detail, and unanticipated factors identified.

Segment costs range from less than $100,000 to over $2.6 million. However, the key is the combination of options into a seamless set of actions to create a high quality, safe and convenient bicycle and pedestrian facility.

The preferred alternatives are described above. In summary, the alternatives for each segment are as follows:

- East Side Segment: Combination of Option 1 and Option 2;
- Downtown Derby Segment: Option 3;
- Derby-Shelton Bridge Segment: Option 2; and
- West Side Segment: Option 2.

The overall, combined cost to implement and construct the preferred alternatives over the entire corridor is estimated at about $5.7 million.

Estimated Construction Costs by Segment and Preferred Option

Segment and Preferred Option	Cost Estimate
East Side Segment Option 1 & 2	$735,900
Downtown Derby Segment Option 3	$2,119,800
Derby-Shelton Bridge Segment Option 2	$2,634,900
West Side Segment Option 2	$176,500
Total:	$5,667,100