

Final Report



Route 6 Hop River Corridor Transportation Study



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Prepared for:

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The Final Plan is the result of a collaborative effort among local officials, local stakeholders, and regional and State planners. This effort was guided by the Regional Economic Development Council (REDC) with representation from each of the four participating towns, including:



Bolton:

- Joyce Stille, Administrative Officer, REDC Chairperson
- John Pagini, Director of Community Development
- Cathy Teller, Economic Development Commission



Coventry:

- John Elsesser, Town Manager
- Eric Trott, Director of Planning and Economic Development



Andover:

- Robert Burbank, First Selectman
- Leigh Ann Hutchinson, Planning & Zoning Commission
- Elaine Buchardt, Selectwoman, Economic Development Commission



Columbia:

- Carmen Vance, First Selectwoman
- Jana Butts, Town Planner
- Vera Englert, Economic Development Commission, Planning & Zoning Commission, Business Owner

CRCOG expresses its appreciation to the members of the REDC and others who contributed their time and knowledge to the development of this Plan.

CRCOG and REDC also express their appreciation for the support and input of the following:

- Tony Guglielmo, State Senator, District 35
- Steve Cassano, State Senator, District 4
- Edith Prague, State Senator, District 19
- Pamela Sawyer, State Representative, District 55
- Timothy Ackert, State Representative, District 8

As a result of the dedication and cooperation of all those involved in the development of the *Route 6 Hop River Corridor Transportation Study*, the recommendations in the Plan have received acceptance/endorsement by the following:

- Andover Board of Selectmen, on August 1, 2012.
- Coventry Town Council, on August 6, 2012.
- Bolton Board of Selectmen, on August 7, 2012.
- Columbia Board of Selectmen, on August 21, 2012.
- CRCOG Transportation Committee, on September 10, 2012.
- CRCOG Policy Board, on October 24, 2012.

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Executive Summary

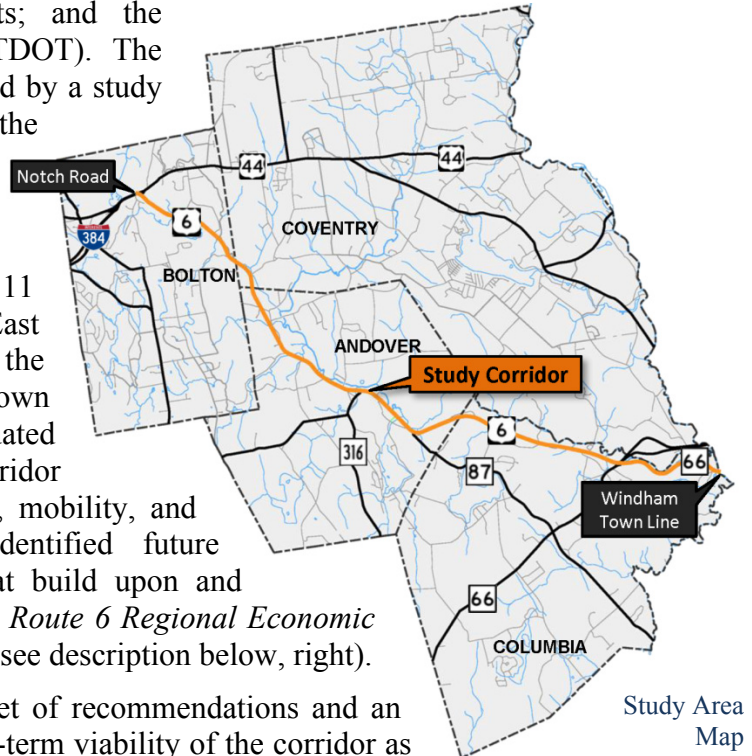
Introduction

The *Route 6 Hop River Corridor Transportation Study* was undertaken by the Capitol Region Council of Governments (CRCOG) in cooperation with the towns of Bolton, Coventry, Andover and Columbia; the Windham Region Council of Governments; and the Connecticut Department of Transportation (CTDOT). The study and its recommendations were developed by a study team composed of CRCOG staff, members of the Regional Economic Development Council (REDC), and CRCOG's technical consultant, CHA.

The study corridor included approximately 11 miles of US Route 6 and 2 miles of Route 66 East located between Notch Road in Bolton and the Willimantic River at the Columbia-Windham town line (see map at right). The study evaluated existing and future conditions in this corridor relative to vehicular and multimodal safety, mobility, and accessibility. In addition, the study identified future development opportunities and strategies that build upon and complement the recommendations of REDC's *Route 6 Regional Economic Development Strategy and Master Plan Study* (see description below, right).

The result of the study is a comprehensive set of recommendations and an implementation plan that will support the long-term viability of the corridor as a regional transportation link and economic growth opportunity.

This summary highlights the key findings of the existing and future conditions assessments of the study and provides a synopsis of the recommendations plan.



Summary of Community & Stakeholder Involvement

The active involvement of the REDC, CTDOT, and a broader group of community stakeholders – including local residents, area business owners, and other town representatives – was a cornerstone of the study process. This involvement provided input and guidance for the study and included:

- Public Meetings in May 2010, December 2011, and June 2012 (6 total).
- Stakeholder Workshops in June/July 2011 (3 total).
- CTDOT Coordination Meetings (3 total).
- REDC Coordination Meetings (18 total).

Route 6 Economic Development Strategy and Master Plan Study

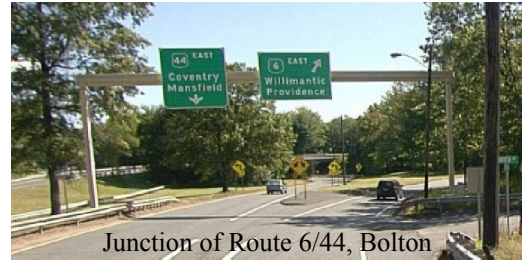
The REDC's study, completed in 2010, provided a unified vision for future development in the Route 6 Hop River corridor that was developed through public involvement and consensus building across the four participating towns. The study also defined targeted areas for future development in the corridor and proposed a new Corridor Zone to promote growth in these areas while preserving the historic, scenic, and environmental resources of the corridor.

Summary of Key Findings

Existing and Future Conditions Assessment

The Route 6 section of the study corridor is a critical regional link between the eastern end of I-384 in Bolton and the western end of the Route 6 expressway in Columbia. As such, it serves a significant level of interstate and regional through-travel, as well as local travel and access. The Route 66 East section of the study corridor parallels the Route 6 expressway in Columbia and links the Route 6 section of the corridor to Willimantic. This route generally serves local travel.

The existing and future conditions assessment included an evaluation of roadway conditions; traffic volumes and operations; travel speeds; pedestrian, bicycle, and transit accommodations; accident history; and safety issues in the corridor. Data analysis and field review of corridor conditions were supplemented by local stakeholder input to identify key issues and areas of concern, including:



- **Travel speeds.** Speeds, particularly in reduced speed areas (45 mph or lower), generally exceed the posted speed limit by 10 mph or more, creating safety concerns for all roadway users.
- **Junction of Route 6/44 and Notch Road intersection.** Limited access between Route 6, Route 44, and Notch Road with safety concerns at Notch Road intersection.
- **Route 6/66 intersection.** Intersection encourages high speeds from the expressway; is a high accident location; and is visually unappealing with excessive pavement.
- **Intersection delays.** Traffic volumes on Route 6 create long delays at unsignalized side road intersections and traffic growth will exacerbate these delays. Eight of the nine unsignalized intersections studied are expected to operate poorly under future traffic conditions. Delays at signalized intersections are generally acceptable and are expected to be acceptable under future conditions; the Route 6/66 intersection, however, will require capacity improvements.
- **South Street.** Configuration of intersection with Route 6 is undesirable and a safety concern. Existing curvature and grades on South Street are also safety concerns.
- **Route 66 East.** Travel speeds, inadequate shoulders for bikes, poor curve delineation, and intersection of Cards Mill Road are safety concerns.
- **Pedestrian and bicycle facilities.** There is no access through the junction of Route 6/44. There is one crosswalk with limited pedestrian accommodations at Long Hill Road in Andover. There are no bicycle warning signs on Route 6 or Route 66 East.
- **Hop River Trail access.** Trail identification and signage are lacking in the corridor, and direct access and trailhead accommodations are limited.
- **Traffic growth.** CROG's traffic forecast for the future condition shows that traffic volumes on Route 6 are expected to increase between 21% and 36% by 2030, with highest growth in the west. Volumes on Route 66 East are expected to increase approximately 14%.

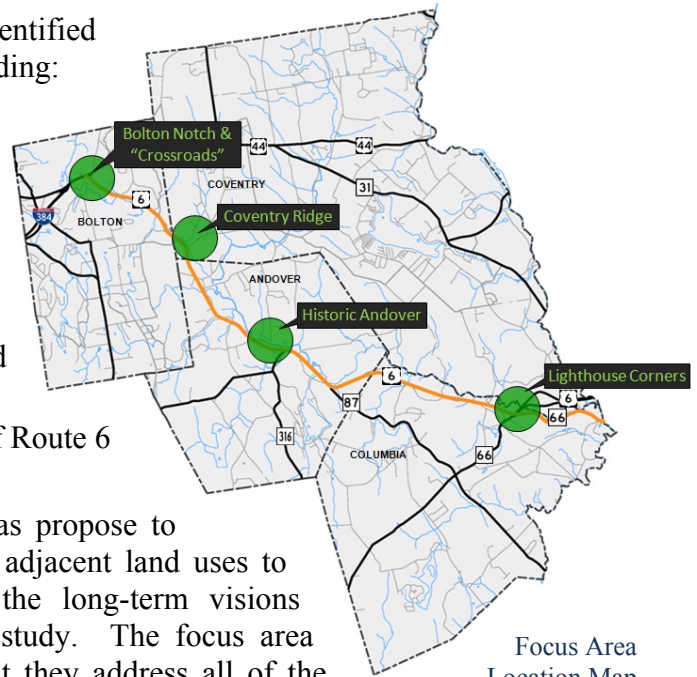
Future Development Potential

The study team worked closely with the REDC to develop a future development model that was used to approximate the development potential of the Route 6 Hop River corridor. The future development model was designed to calculate the area of anticipated development (reported in square feet, sf, of floor area) that could be realized in each location along the Route 6 Hop River corridor by 2030, as well as the total development area that could ultimately be realized at full build-out.

Focus Area Recommendations

Five locations in the corridor (see map at right) were identified by stakeholders as focus areas for in-depth study, including:

- **Bolton Notch**, located at the junction of Route 6 and Route 44 in Bolton.
- **Bolton Crossroads**, located near Bolton Ice Palace and Munson's Chocolates in Bolton.
- **Coventry Ridge**, located west of South Street and north of Route 6 in Coventry.
- **Historic Andover**, located west of Long Hill Road and north of Route 6 in Andover.
- **Lighthouse Corners**, located at the intersection of Route 6 and Route 66 in Columbia.



Focus Area Location Map

The recommendations developed for these focus areas propose to significantly change the character of Route 6 and/or adjacent land uses to address transportation issues, and to complement the long-term visions developed for these areas under the REDC's 2010 study. The focus area recommendations are generally comprehensive in that they address all of the various safety, mobility, and accessibility issues within the focus area.

Creating Village Context at Bolton Crossroads, Historic Andover, and Lighthouse Corners

Recommendations at these focus areas include transportation and land use measures and strategies to create village context. The recommendations also aim to effect changes in driver behavior to encourage slower speeds and provide safer travel conditions on Route 6 while making these areas more attractive and accessible for development.

Village elements in the Bolton Crossroads, Historic Andover, and Lighthouse Corners focus areas include:

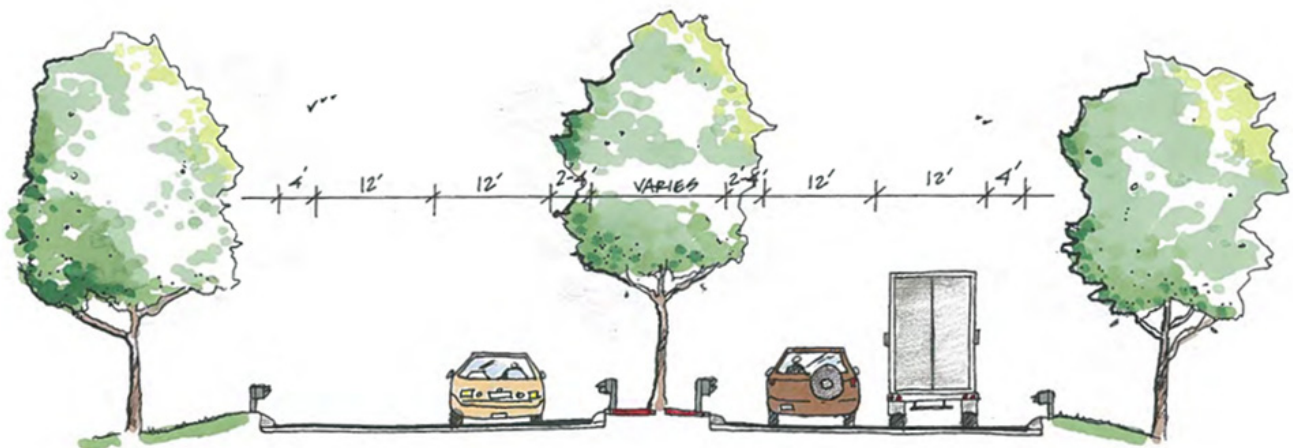
- Village-scale mixed-use development and density.
- Parking provided on side or rear lots.
- Low-speed arterial design for Route 6 with speed mitigation measures.
- Sidewalks and bike-safe shoulder along Route 6.
- Small networks of local streets to provide access between Route 6 and new developments.



Recommended Low-speed Arterial Design for Route 6 in Village Areas

Bolton Notch

The preferred concept modifies the layout of the existing junction of Route 6 and Route 44 to improve connectivity between Bolton Center and Routes 6 and 44 via Notch Road, and to accommodate full access (from both eastbound and westbound directions) between Route 6 and Route 44. The preferred concept also provides opportunities for improved bicycle and pedestrian connectivity within the junction via a shared use path that would connect Route 44, Route 6, Notch Road, and the Hop River Trail.



Low-speed Boulevard - Route 6/Route 44 Overlap
(between Route 6/Route 44 Flyover and Notch Road)

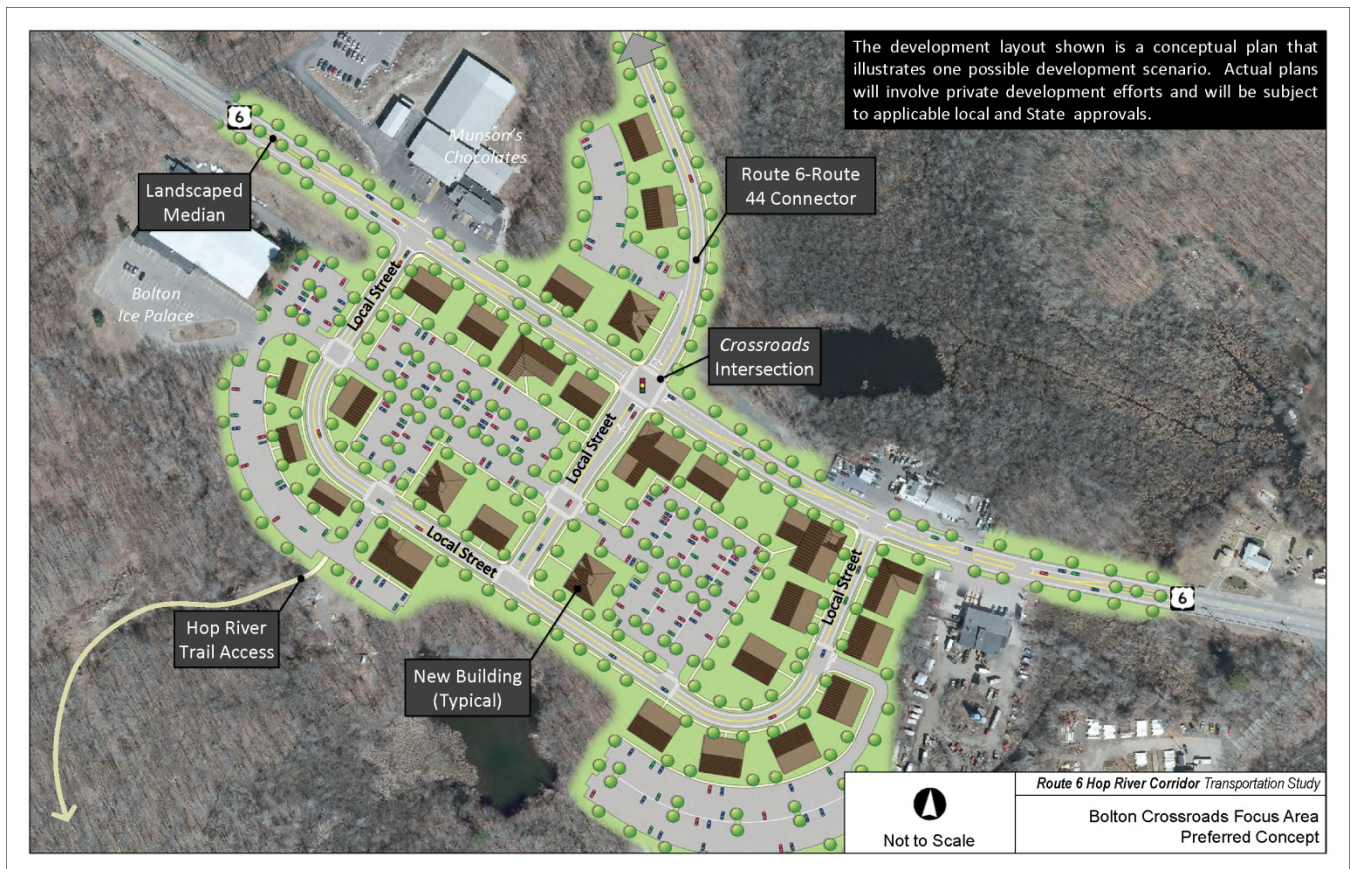
Bolton Crossroads

The preferred concept is derived from the original Bolton Crossroads concept (at right) that was included in the Corridor Master Plan developed under REDC's 2010 Study. Similar to the original concept, the preferred concept illustrates potential development opportunities located near the Bolton Ice Palace that are consistent with the development that would be accommodated within the context of a node as it is defined in the proposed Corridor Zone.

The preferred concept includes provisions for a small network of local streets and physical changes to Route 6 that will accommodate and support the community's long-term vision for a pedestrian and bicycle-friendly mixed-use village in this area. The physical changes to Route 6 include access management measures and speed mitigation measures to promote safety, and streetscape improvements to create a western gateway, or sense of arrival, for travelers as they enter the Route 6 Hop River corridor. The preferred concept also includes a new street connection between Route 6 and Route 44 that will provide access for additional development opportunities. The village layout, as shown, is a conceptual plan that illustrates one possible development scenario. It is anticipated that full build-out of the village would involve private development efforts and could occur in phases over the course of several decades.



Bolton Crossroads Concept from
REDC's 2010 study



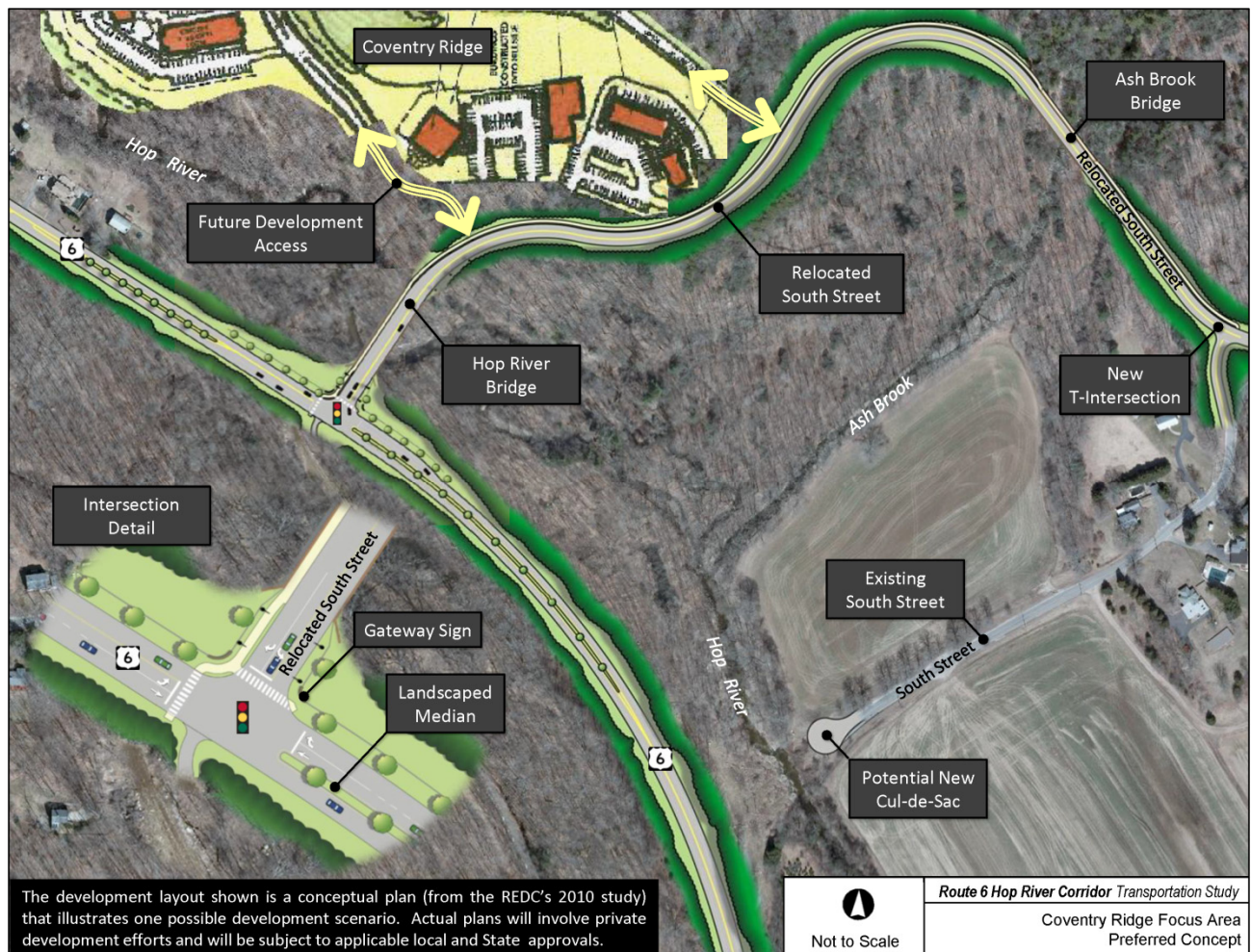
Coventry Ridge

The preferred concept relocates South Street to the west to provide an improved intersection with Route 6 and to accommodate access to developable lands. In support of the community's vision for a future development node in this location, the relocated South Street provides access to a key undeveloped 100-acre Coventry parcel located northwest of the existing Route 6/South Street intersection.



Proposed View – East along Route 6 at Relocated South Street

By relocating South Street, the existing undesirable intersection with Route 6 is eliminated; roadway conditions on South Street are improved for local through traffic, adding increased visibility to the Coventry Ridge development; and the new South Street intersection becomes the “gateway” to Coventry from the Route 6 Hop River corridor.



Historic Andover

The preferred concept for Historic Andover includes provisions for a small network of local streets, physical changes to Route 6, and improved accessibility to the Hop River Trail that will accommodate and support the community's long-term vision for a pedestrian and bicycle-friendly mixed-use village in this area with strong ties to the Hop River Trail. The physical changes to Route 6 include access management measures and speed mitigation measures to promote safety, and streetscape improvements to create a gateway to Historic Andover in the Route 6 Hop River corridor.



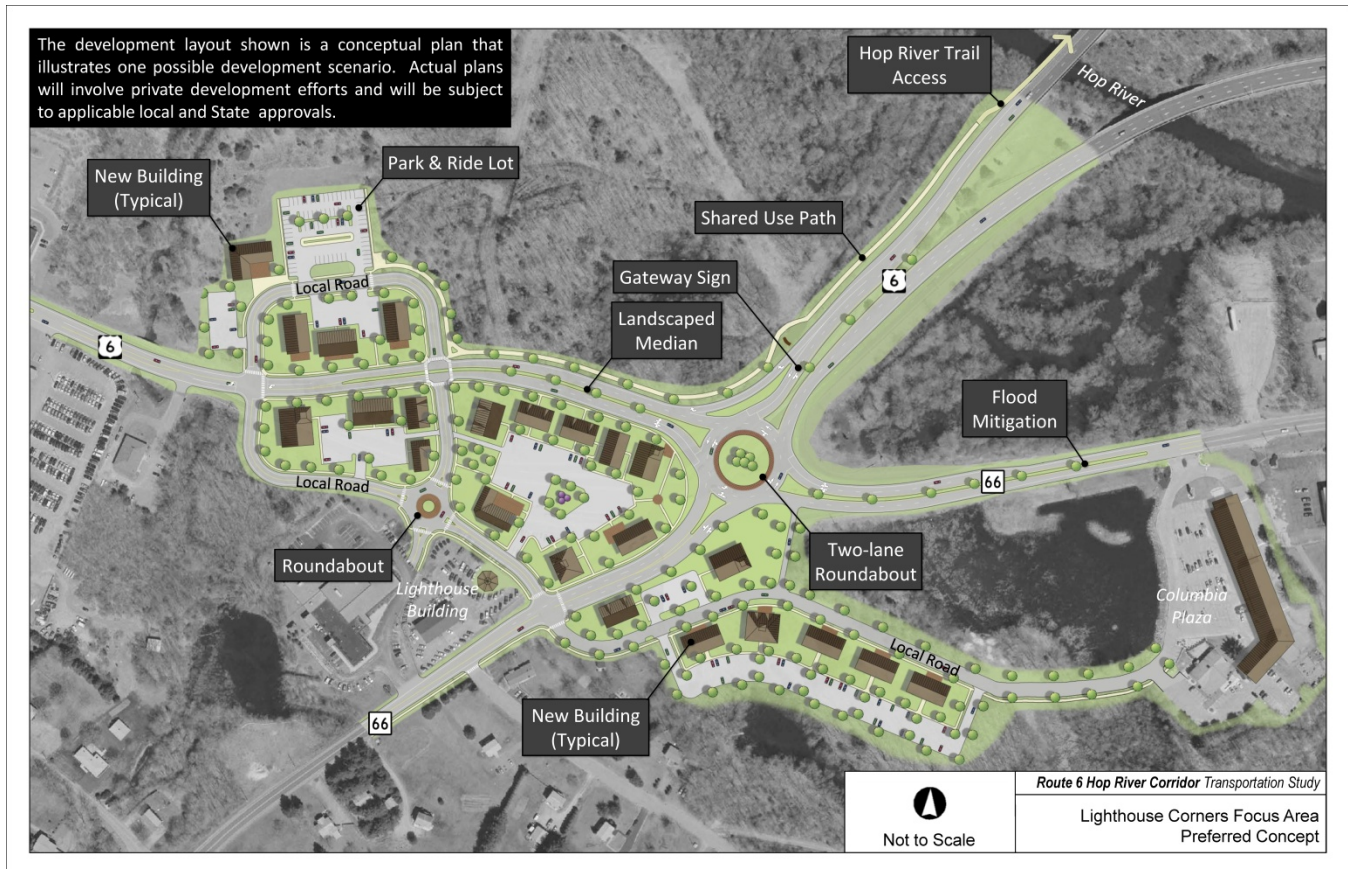
The village layout, as shown, is a conceptual plan that illustrates one possible development scenario. It is anticipated that full build-out of the village would involve private development efforts and could occur in phases over the course of several decades. The relocation of the existing town maintenance garage would be required to accommodate the new local streets and development illustrated in the plan.



Proposed View – West along New Local Street from Long Hill Road

Lighthouse Corners

The preferred concept for Lighthouse Corners (intersection of Route 6 and Route 66 in Columbia) replaces the existing signalized intersection with a two-lane modern roundabout to improve traffic safety and operations while complementing the future village character that is envisioned by the Town for this area. The future village – including new mixed-use development opportunities and improved multimodal accommodations – would be integrated with and designed to complement existing businesses in the area, including the Lighthouse building (from which the name “Lighthouse Corners” was inspired) and Columbia Plaza.



The village layout, as shown, is a conceptual plan that illustrates one possible development scenario. Any development plans or future transportation improvements for this area should be carefully laid out to maintain the prominence of the existing Lighthouse building and to integrate it and other existing businesses into a future village setting. The intent of providing future development opportunities within the context of a village setting is to support the overall economic viability of the area and to complement existing businesses by creating an attractive, accessible, and desirable commercial destination for local and regional patrons, commuters, and residents.



Lighthouse Building, Route 66, Columbia
(Source: flickr)

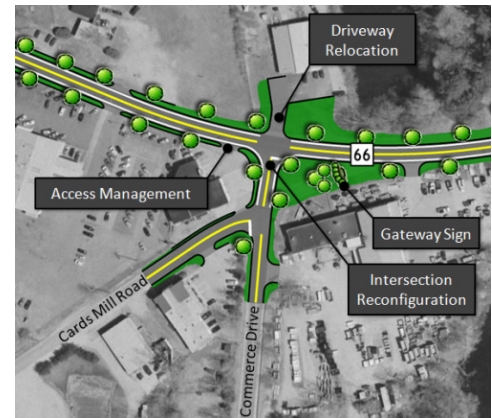
Other Access & Safety Recommendations

The study includes a variety of recommendations to improve vehicular access and safety in other locations outside the limits of the five Focus Areas. These recommendations are categorized into side road intersection improvements, access management improvements and policies, Route 66 East safety measures, and incident management considerations, as described below.

Side Road Intersection Improvements

Recommendations are provided for nine side roads in the corridor to address a number of existing issues including long peak hour delays, limited sight distances, needs for improved warning signage, and accident history. Specific recommendations vary by location, but include:

- Modifying side road approaches to accommodate concurrent left and right turns.
- Providing mitigation for limited sight distances, such as installing dynamic intersection warning signs.
- Installing road name plaques on intersection warning signs.
- Reconfiguring the Cards Mill Road intersection (at right).



Intersection Improvement Concept:
Cards Mill Road at Route 66 East, Columbia

Access Management Improvements and Policies

The goal of the access management components of this study is to encourage CTDOT, the towns, and private property owners to pursue and implement practical and feasible access improvements to the benefit of traffic flow and overall safety in the Route 6 Hop River corridor. The recommendations include:

- Corridor-wide access design guidelines that better define the physical standards for commercial driveways in the corridor.
- Supplemental access management language for the proposed Corridor Zone.
- Site-specific commercial access improvements – such as consolidation and narrowing of existing driveways – for existing commercial establishments.

Route 66 East Safety Measures

Accident data, speed data, and local experience support the need for measures to address vehicular speeds and safety issues on Route 66 East. As such, improvement recommendations include:

- Implementing speed mitigation measures and vehicular access improvements between Flanders Road and Windham town line.
- Striping narrower 11 ft travel lanes to encourage slower speeds and improve lane delineation.
- Implementing curve safety measures such as new warning signs and sight line improvements.
- Installing new guardrail systems to better protect against run-off-the-road accidents.
- Providing safety and access measures for pedestrian and bicycle activity.

Incident Management Considerations

Because Route 6 is a vital link between I-384 and the Route 6 expressway for interstate travel, further consideration could be given to treating Route 6 in the study area like an interstate with respect to incident management. Specifically, it is recommended that diversion route planning for the Route 6 corridor be considered by state, regional, and local stakeholders.

Multimodal Recommendations

A primary goal of this study was to plan for *complete streets* in the Route 6 Hop River corridor by providing multimodal recommendations for safer and more convenient accommodations for pedestrians, bicyclists, and transit users. The recommendations include pedestrian and bicycle improvements, Hop River Trail improvements, and transit access and convenience improvements, as outlined in this section.

Pedestrian and Bicycle Improvements

Various improvements have been integrated into the large-scale and long-term preferred concepts for Bolton Notch, Bolton Crossroads, Coventry Ridge, Historic Andover, and Lighthouse Corners in Columbia that will encourage reduced speeds and increase driver awareness of both pedestrians and bicyclists within these areas. In addition to these, the study includes the following recommendations for smaller-scale improvements to pedestrian and bicycle facilities in the corridor:



Bike Warning Sign

- **Shared use path, Bolton Notch.** Construct a path along the north side of Route 6/44 between Bolton Notch State Park trailhead and Quarry Road, with crossing improvements at Quarry Road.
- **Sidewalk and crossing improvements, Andover.** Upgrade pedestrian crossing at Long Hill Road. Construct sidewalk between Park and Ride lot and Long Hill Road.
- **Bike route designation and warning signage.** Designate Route 6 as a state bike route and provide bike route markers. Provide bike warning signs on Route 66 East.
- **Shoulder improvements.** Delineate 11 ft lanes to maximize available shoulder widths. Widen the overall pavement surface in the future to accommodate 5 ft shoulders and 11 ft lanes throughout.
- **Bike parking.** Provide bike lockers at Park and Ride lots and bike racks at key destinations in future village locations.

Hop River Trail Improvements

A number of Hop River Trail improvements have been integrated into the large-scale and long-term preferred concepts for Bolton Notch, Bolton Crossroads, Historic Andover, and Lighthouse Corners in Columbia. In addition to these, the study includes the following recommendations for smaller-scale improvements to trail accessibility and visibility:



Directional Sign

- **Trail identification and directional signage.** Provide auto-scale and pedestrian-scale signs on Route 6 and Route 66 East to direct users to existing trail access.
- **Trail marker and directional signage.** Provide signs along the trail to guide users along the trail and to nearby points of interest.
- **Safer trail crossings.** Install adequate warning signage and crosswalk markings at trail crossings on side roads.
- **Trail access improvements.** Improve trailhead and parking accommodations in Andover. Provide new trailhead near Flanders Road and trail access improvements near Willimantic River in Columbia.
- **Kings Road gap mitigation.** Provide new trail directional signage and pedestrian warning signs on Kings Road and Flanders Road to direct users around the closed Hop River Bridge.
- **Trail surface improvements.** Provide a uniform trail width and surface throughout the corridor.

Transit Access and Convenience Improvements

Recommendations for Historic Andover and Lighthouse Corners in Columbia include Park and Ride improvements that will enhance multimodal accessibility and connectivity, while providing greater parking capacity in the long-term. In addition to these improvements, the study includes recommendations for other, smaller-scale opportunities to improve the convenience and accessibility of utilizing transit service and ridesharing in the corridor. Specifically, these recommendations include:

- **Park and Ride lighting.** Repair and maintain lighting at the existing Park and Ride lots in Andover and Columbia.
- **Bike parking.** Install bike lockers at the existing Park and Ride lots in Bolton, Andover, and Columbia. Consider providing a canopy shelter and lighting for new bike racks.
- **Bike racks for buses.** Equip CTTransit Express buses that service the corridor with bike racks.
- **Real-time bus tracking.** Provide a real-time bus tracking system for buses that service the Park and Ride lots to accommodate tracking of bus schedules and locations from a smartphone or computer.



Green Infrastructure Recommendations

Green infrastructure – such as green streets and low impact development practices – should be incorporated into the subsequent planning, design, and construction of future improvements in the Route 6 Hop River corridor. Given the proximity of the Hop River, its floodplains, and adjacent wetlands to a



Example porous pavement treatment.
Source: CTDEEP

number of the improvement recommendations of this study, the implementation of innovative and environmentally-sensitive stormwater management practices will help minimize the potential impacts that runoff from new street surfaces, parking lots, and rooftops could have on these resources.

Specific green infrastructure measures that could be utilized in the corridor include open vegetated channels, bioretention areas, porous pavements, rain barrels and cisterns, and green roofs.

Implementation Plan

The Implementation Plan outlines an improvement program that consists of 27 potential projects and initiatives of various sizes and priorities that could be implemented over time to accomplish the improvement recommendations of the study. Projects in the program are defined by location, type, and priority. The location is specific to one of the four participating towns or is considered multi-town. The type is classified as small, medium, or large based on implementation time, complexity, and approximate construction cost of the project. The priority is assigned based on the transportation needs and benefits of the project; top priorities are indicated with three stars (★★★). The improvement program is summarized in Table ES-1.

Table ES-1. Summary of Improvement Program

Project Location and Description	Project Type	Approx. Constr. Cost	Priority
Bolton			
1. Bolton Notch – Interim Safety Improvements at Notch Road Mitigate safety concerns at Notch Road by improving intersection warning signage and sight lines.	Small	\$200,000	★★
2. Bolton Notch – Low-speed Boulevard Improvements Relocate the Route 6/44 expressway terminus westerly and implement low-speed boulevard improvements along Route 6/44 overlap to encourage slower speeds.	Medium	\$3.0 million	★
3. Bolton Notch – Notch Road Ext. and Route 6/44 Improvements Modify the junction of Route 6 and Route 44 to enhance safety and to improve connectivity between Route 6, Route 44, and Notch Road.	Large	\$25 million	★★★
4. Bolton Notch – Pedestrian and Bicycle Improvements Construct a new shared use path along westbound Route 44 to improve pedestrian and bicycle connectivity through Bolton Notch.	Small	\$300,000	★★
5. Bolton Crossroads – Route 6 Speed Mitigation Implement low-speed village arterial improvements along Route 6 between Bolton Notch and eastern limit of the future village to encourage slower speeds.	Medium	\$2 million	★★★
6. Bolton Crossroads – Phase 1: Route 6-Route 44 Connector First phase of a three-phase program to implement the transportation elements of the Bolton Crossroads Focus Area recommendations.	Medium	\$3 million	★
7. Bolton Crossroads – Phase 2: Village Streets West Second phase of a three-phase program to implement the transportation elements of the Bolton Crossroads Focus Area recommendations.	Medium	\$3.5 million	★★
8. Bolton Crossroads – Phase 3: Village Streets East Third phase of a three-phase program to implement the transportation elements of the Bolton Crossroads Focus Area recommendations.	Medium	\$3 million	★★

Table ES-1. Summary of Improvement Program

Project Location and Description	Project Type	Approx. Constr. Cost	Priority
Coventry			
9. Coventry Ridge – Phase 1: Site Access (Future Reloc. South Street) First phase of a two-phase program to implement the transportation elements of the Coventry Ridge Focus Area recommendations.	Large	\$10 million	★
10. Coventry Ridge – Phase 2: Relocated South Street Second phase of a two-phase program to implement transportation elements of the Coventry Ridge Focus Area recommendations.	Large	\$7 million	★★★
Andover			
11. Historic Andover – Pedestrian and Speed Mitigation Improvements Upgrade pedestrian crossings at Long Hill Road and construct new sidewalk to connect Park and Ride lot to Long Hill Road. Implement low-speed village arterial improvements along Route 6.	Small	\$2 million	★★★
12. Andover – Hop River Trail Access Improvements, Route 6 Provide new trail identification and directional signage improvements on Route 6 for trail parking and access in Andover.	Small	\$5,000	★
13. Historic Andover – Phase 1: Village Streets East First phase of a two-phase program to implement the transportation elements of the Historic Andover Focus Area recommendations.	Large	\$6 million	★★
14. Historic Andover – Phase 2: Village Streets West First phase of a two-phase program to implement the transportation elements of the Historic Andover Focus Area recommendations.	Large	\$3 million	★★
Columbia			
15. Lighthouse Corners – Phase 1: Roundabout Phase 1 of a two-phase program to implement transportation elements (two-lane roundabout at Route 6/66) of the Lighthouse Corners recommendations.	Large	\$10 million	★★★
16. Lighthouse Corners – Phase 2: Village Streets Phase 2 of a two-phase program to implement transportation elements (new local streets) of the Lighthouse Corners recommendations.	Medium	\$5 million	★★
17. Lighthouse Corners – Route 66 East Flooding Mitigation Two-phase project to address flooding issues on Route 66 East in Columbia. Specifically, Phase 1 – Investigation; Phase 2 – Mitigation.	Medium	\$750,000	★
18. Columbia – Route 66 East Roadway Improvements Provide speed mitigation, curve safety, and shoulder improvement measures on Route 66 East to improve safety for motorists, bicyclists, and pedestrians.	Medium	\$4.5 million	★★
19. Columbia – Cards Mill Road Intersection Improvements Reconfigure the intersection of Cards Mill Road and Commerce Drive with Route 66 East in Columbia to address existing safety issues.	Small	\$600,000	★★★
20. Columbia – Hop River Trail Access Improvements, Route 66 East Improve trail access from Route 66 East by providing a new trailhead east of Flanders Road, and improving existing access just east of the Willimantic River.	Small	\$30,000	★

Table ES-1. Summary of Improvement Program

Project Location and Description	Project Type	Approx. Constr. Cost	Priority
Multi-town			
21. Gateway Signing (Bolton, Andover, Columbia) Install gateway signing and associated landscaping in key locations in the Route 6 Hop River corridor.	Small	\$40,000	★
22. Route 6 Side Road Intersection Improvements Address safety and corridor access issues at side roads on Route 6 by providing signing, pavement marking, and minor pavement improvements.	Small	\$100,000	★
23. Program of Bicycle Safety Improvements Provide bike route designation and signing on Route 6 and bike warning signage and new edge lines on Route 66 East to improve accessibility and safety for bicyclists.	Small	\$15,000	★★
24. Hop River Trail Surface Improvements Improve trail accessibility by providing a uniform trail surface along its length in the Route 6 Hop River corridor.	Small	\$1 million	★★
25. Program of Hop River Trail Signing Improvements Provide new Hop River Trail signing on Route 6, Route 66 East, and side roads to improve awareness of, and access to, the trail.	Small	\$30,000	★
26. Park and Ride Lot Improvements Provide various maintenance, bike parking, and bus shelter improvements at the three Park and Ride lots in the corridor to improve the convenience and comfort of using bus transit.	Small	\$75,000	★
27. Express Bus Improvements Provide bike racks and bus tracking technology to improve access and convenience of using bus transit in the Route 6 Hop River corridor.	Small	\$50,000	★

1

Introduction

The *Route 6 Hop River Corridor Transportation Study* was undertaken by the Capitol Region Council of Governments (CRCOG) in cooperation with the towns of Bolton, Coventry, Andover and Columbia; the Windham Region Council of Governments; and the Connecticut Department of Transportation (CTDOT). The purpose of the study was to develop a comprehensive transportation plan for the corridor that:

- Addresses the safety, mobility, and access needs of all corridor travelers, residents, business owners, and patrons while preserving the character of the corridor;
- Provides recommendations and strategies for transportation and land use that build upon and complement the recommendations of the Route 6 Regional Economic Development Council's *Route 6 Hop River Corridor Economic Development Strategy and Master Plan Study* (see Section 1.2.2 for details);
- Evaluates and mitigates the potential effects of future development on traffic growth;
- Supports the long-term viability of the corridor as a regional transportation link and economic growth opportunity.

1.1 Study Corridor

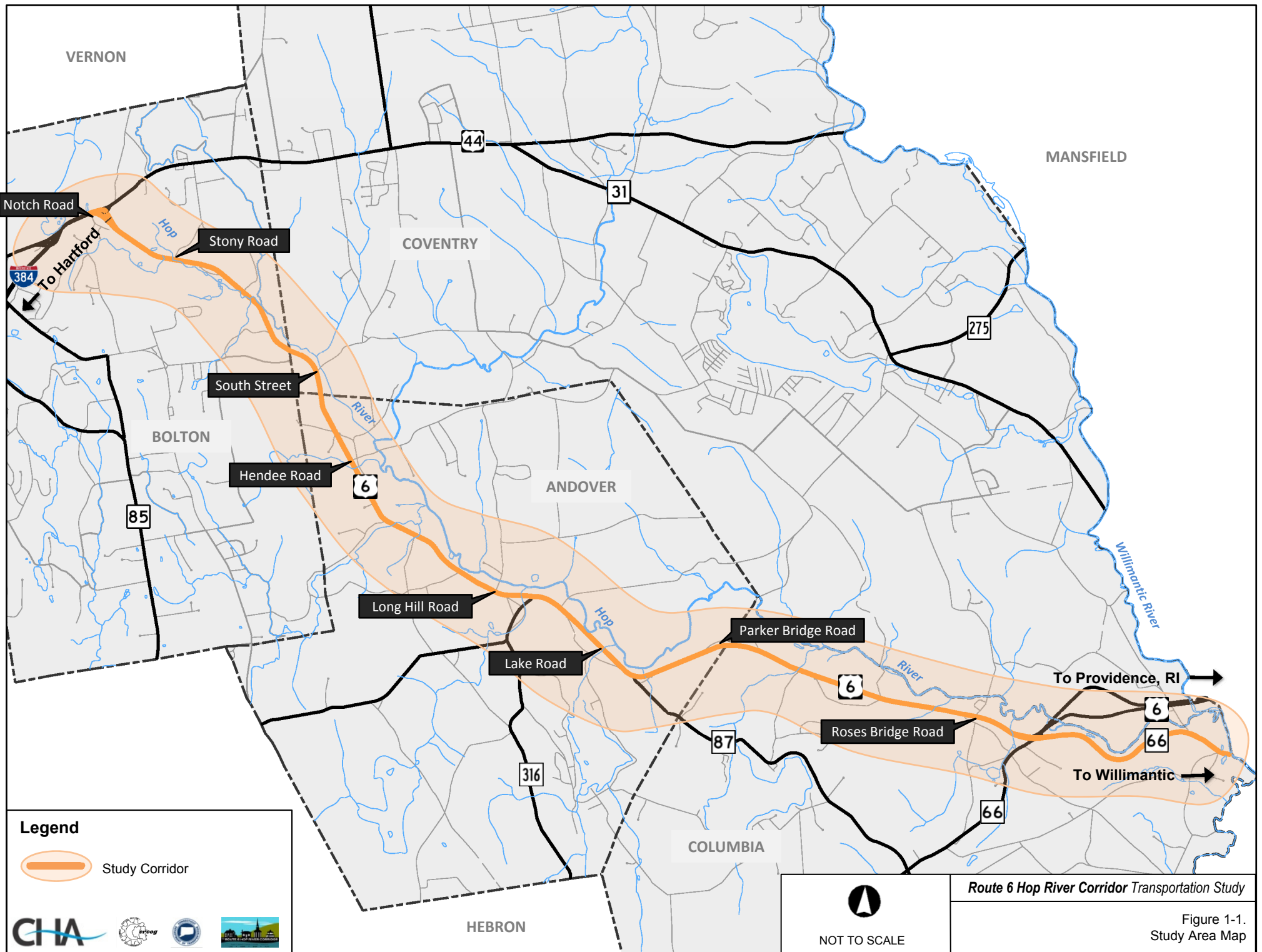
The study corridor included approximately 11 miles of US Route 6 and 2 miles of Route 66 located between Notch Road in Bolton and the Willimantic River at the Columbia-Windham town line (see Figure 1-1). Because this corridor parallels the Hop River valley and includes segments of both US Route 6 and Route 66, it is generally referred to in this document as the *Route 6 Hop River corridor*.



The Route 6 section of the study corridor is part of the National Highway System and is a critical regional roadway link between the eastern end of I-384 in Bolton and the western end of the Route 6 expressway in Columbia. The Route 6 corridor is signed in Connecticut and Rhode Island as the designated route for travel between Hartford, Connecticut and Providence, Rhode Island. As such, the route serves a significant level of interstate and regional through-travel, as well as commuter travel to employment centers in the greater-Hartford area.

The Route 66 section of the study corridor, which is locally known as *Route 66 East* (and is referred to as such throughout this document), parallels the Route 6 expressway in Columbia and links the Route 6 section of the study corridor to Willimantic, generally serving shorter trips between local destinations rather than serving a significant level of interstate travel.

Locally, both Route 6 and Route 66 East provide access to residential, commercial, industrial/manufacturing, and recreational uses in Bolton, Coventry, Andover, and Columbia.



As shown in Figure 1-1, Route 6 is one of two major east-west routes connecting I-384 to points east. US Route 44 is the other major route and continues north of Route 6 from I-384 serving destinations in northern Coventry and Mansfield, including the University of Connecticut in Storrs (via Route 195).

Regional east-west travelers between I-384 and the Route 6 expressway can utilize Route 44 and Route 31 as an alternate route to the Route 6 section of the study corridor. Local interconnectivity is limited between Route 6 and Route 44 in Bolton and Coventry, with only a few local roads and streets providing direct and indirect connections between them.

Other important regional connections from Route 6 include Route 316, which provides access to Hebron and other communities to the south, and Route 87, which connects the corridor to Norwich and other points to the southeast.

1.2 Study Overview

From serving General Jean-Baptiste de Rochambeau and his army's march to Yorktown, Virginia in 1781 to connecting thousands of employees to the workplace in present-day, the Route 6 Hop River corridor has been, throughout its history, a critical piece of the local, regional, and interstate transportation networks. This study effort, in conjunction with previous planning efforts conducted by the Route 6 Regional Economic Development Council (REDC), provides a comprehensive set of recommendations to support the future viability of the corridor relative to the transportation needs it serves and the future viability of the corridor as an economic growth opportunity.

This section discusses key information to provide background context for this study effort, and presents an overview of the REDC, its previous study efforts, and the study process undertaken for this study. The specific goals and objectives of the study are presented in Section 1.3.

1.2.1 Background

Expressway Plans

In 1953, Connecticut's long range transportation plan first introduced the notion of constructing an expressway parallel to Route 6 through eastern Connecticut to serve interstate travel demands and to relieve traffic on existing Route 6. By 1968, the Federal Highway Administration (FHWA) designated the proposed expressway I-84 which would continue 64 miles from East Hartford to Providence, Rhode Island. In 1970 and 1971, nine miles of expressway were constructed from East Hartford to Manchester and five miles were constructed through Willimantic (Willimantic Bypass). In the 1980s, Rhode Island abandoned plans to complete its part of I-84 and CTDOT renamed the East Hartford to Manchester segment to be I-384 and the Willimantic Bypass segment to be part of Route 6.¹

Throughout this time, the construction of an expressway that would connect I-384 and the Route 6 expressway remained part of CTDOT and FHWA plans. By the late-1990s, CTDOT had evaluated more than 130 alignment alternatives for the planned expressway, but each was opposed by the United States Army Corps of Engineers (USACOE), the Environmental Protection Agency, or local representatives. Federal funding for an expressway was ultimately withdrawn in 2002 after an impasse was reached between the USACOE and CTDOT regarding a preferred alignment alternative.²

¹ <http://www.kurumi.com/roads/ct/index.html>

² <http://www.kurumi.com/roads/ct/index.html>

Route 6 Improvements

With the knowledge that the expressway alternative was unlikely to be constructed in the near future, CTDOT invested in the design and implementation of a series of projects to improve safety and operations along existing Route 6 between Route 44 in Bolton and Route 66 East in Columbia. These projects were completed between 1999 and 2005 and provided:



- 12 ft travel lanes and 8 ft shoulders along mainline Route 6;
- Left turn lanes on Route 6 at many side road intersections and right turn lanes at select side road intersections;
- Side road intersection modifications to improve approach alignments and eliminate redundant intersections; and
- Sight line improvements through site-specific clearing, mainline alignment and profile modifications, and wider shoulders.

As part of this study, the accident history along Route 6 within the limits of these improvements was assessed to understand whether they have been effective in reducing accidents in the corridor and to identify locations where safety issues still persist. A comparison of accident trends for the pre-improvement (before 2005) and post-improvement (after 2005) conditions indicates that the average number of annual accidents decreased approximately 26% in the corridor as a result of the improvements. A detailed comparison of these accident trends is provided in Appendix 2.6. A detailed evaluation of the most recent accident history and existing safety concerns is presented in Section 2.1.5.

1.2.2 Route 6 Regional Economic Development Council (REDC)

In 2005, representatives from the towns of Andover, Bolton, Coventry, and Columbia met to discuss a regional approach to economic development along the Route 6 Hop River corridor. Through the subsequent adoption of a Memorandum of Understanding by the participating towns, the REDC was created to pursue the following goals³:

- Create a unified vision for the Route 6 corridor;
- Make recommendations to member towns for appropriate economic development;
- Make recommendations to member towns for coordinated zoning within the corridor;
- Market properties within the corridor through literature, website and other media; and
- Apply for grants where appropriate or recommend grants to member towns.

In 2009, the REDC received a grant from the Connecticut Department of Economic and Community Development to prepare the *Route 6 Hop River Corridor Economic Development Strategy and Master Plan Study*. Published in 2010, the study provided a unified vision for future development in the Route 6 Hop River corridor that was developed through public involvement and consensus building across the four member towns. The study also defined targeted areas for development in each town and proposed a new Corridor Zone to promote growth in these areas while preserving the historic, scenic, and environmental resources of the corridor.

³ http://www.theroute6hoprivercorridor.com/p_description.html

1.2.3 Study Process and Participants

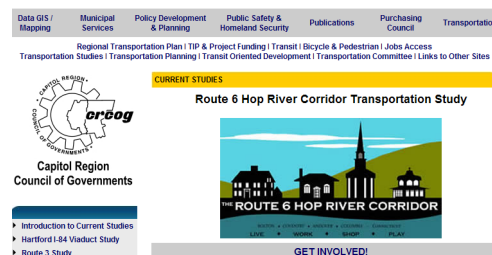
CRCOG developed a study process for the Route 6 Hop River Corridor Transportation Study that maintained consistency with the REDC's previous planning initiative in the Route 6 Hop River corridor and facilitated the active involvement of study team members and other stakeholders in the development of the study and its recommendations. Study team members included members of the REDC and other town representatives; CRCOG; Windham Region Council of Governments (WINCOG); CTDOT, and CRCOG's technical consultant, Clough Harbour & Associates LLP (CHA). Other corridor stakeholders included a broader group of study participants, local residents, area business owners, community groups, and anyone with an interest in the study and its recommendations.



Key aspects of the study process included CRCOG's participation in the public involvement components of the REDC's 2010 study – which consisted of attendance at REDC meetings and joint participation in public meeting presentations – and REDC's continued involvement as members of the advisory committee for this study. Additionally, the study process included numerous mechanisms of public outreach by which stakeholders were kept apprised of the study progress and were provided the opportunity to interface with the study team and provide input to the objectives, direction, and recommendations of the study. These mechanisms included:

- **REDC Coordination Meetings:** REDC members, along with CRCOG and CTDOT staff, served as an Advisory Committee (AC) for this study. The AC was responsible for guiding the study process; reviewing technical documentation; overseeing public involvement activities; and providing input on the development of the corridor plan. More than 15 coordination meetings were conducted during the study concurrently with regular meetings of the REDC in Columbia Town Hall. These meetings were open to the general public.
- **CTDOT Coordination Meetings:** Three meetings were conducted during the study between the study team members and other technical staff from CTDOT. The purpose of these meetings was to maintain CTDOT's involvement in the development of the study and to obtain input on the technical aspects of the improvement recommendations.
- **Stakeholder Workshops:** Three workshops were conducted in Summer 2011 with area residents, business owners, and other stakeholders representing Bolton/Coventry, Andover, and Columbia. The purpose of these workshops was to involve the local communities in the review of preliminary improvement concepts and to obtain input on preferred concepts.
- **Public Information Meetings:** Three sets of public information meetings were conducted during the study, including meetings in May/June 2010 (conducted concurrently with meetings for the REDC's 2010 study), December 2011, and June 2012. The purpose of these meetings was to inform the general public of the study findings and recommendations; and to provide attendees an opportunity to pose questions to the study team and to provide comments and feedback on the study. Summaries of the public information meetings are provided in Appendix 1.1.

- **Project Website:** CRCOG maintained a Route 6 Hop River Corridor Transportation Study webpage⁴ on their website that provided regular study updates including access to reports and other study documents. The webpage also gave visitors an opportunity to join the study mailing list for direct notification of study progress and announcements.
- **Public Access Television Broadcasts:** Study team representatives participated in three interviews on the Community Voice Channel that were hosted by the REDC chairperson. These interviews included presentations and discussion on existing corridor conditions and preliminary corridor recommendations.



By responding to and incorporating constructive input from corridor stakeholders as a fundamental component of the early planning process, the study team developed recommendations that are generally accepted by corridor stakeholders.

1.3 Goals and Objectives

The study goals and objectives outlined below and on page 1-7 were developed with input from the Advisory Committee and reflect the overall desire for a safe and efficient transportation system that will support and promote the economic viability of the Route 6 Hop River corridor. The corridor recommendations, presented in Section 4, were developed to both satisfy these goals and respond to the key issues and areas of concern identified in Sections 2 and 3.

Goal: Improve Corridor Safety for All Users
Objectives: <ul style="list-style-type: none"> • Address safety concerns and deficiencies in high accident locations and other areas of concern. • Provide measures to manage vehicular speeds, particularly in areas of existing and future development nodes. • Manage vehicular access to minimize conflicts on Route 6. • Provide measures to promote safe use of corridor by pedestrians and bicyclists.
Goal: Improve Mobility and Accessibility for All Users
Objectives: <ul style="list-style-type: none"> • Mitigate traffic delays along Route 6. • Improve side road access to and from Route 6. • Provide new and improved pedestrian facilities (where appropriate) to promote walkability within development nodes. • Provide new and improved bicycle facilities (where appropriate) to promote bikeability in the corridor and to improve bike access to the Hop River Trail, Park & Ride lots, and other destinations. • Provide improved multimodal access for Park & Ride lots and public transit services; examine opportunities for other Park & Ride lot and transit service improvements.

⁴ http://www.crcog.org/transportation/current_stud/Route6.html

Goal: Coordinate Land Use and Transportation Strategies and Recommendations

Objectives:

- Build upon the land use and transportation recommendations of the REDC's *Route 6 Hop River Corridor Economic Development Strategy and Master Plan Study*.
- Develop transportation recommendations and promote land use strategies based on *smart growth* principles that provide compact development, incorporate mixed uses, and facilitate transportation choices.
- Support future economic development opportunities and associated transportation needs.

Goal: Preserve Character and Context of Study Corridor

Objectives:

- Develop strategies and recommendations that are consistent with the existing rural, small community characteristics of the corridor.
- Minimize impacts to historic, environmental, and visual resources.

2

Existing Conditions Assessment

The purpose of the existing conditions assessment is to understand and identify issues, deficiencies, and opportunities that will be addressed under subsequent phases of the study. The existing conditions assessment also establishes a baseline to which anticipated future conditions can be measured and various improvement recommendations can be compared.

2.1 Transportation System

The transportation system in the Route 6 Hop River Corridor includes the state and local roadway network, pedestrian and bicycle facilities, and public transit services and amenities that facilitate the mobility of people and goods through and around the corridor. Developing an understanding of the extents, interconnectivity, and conditions of the various components of the transportation system, as well as how efficiently and safely these components function, is an important first step towards identifying how the transportation system can and should be improved over the near term and long term planning horizons.

2.1.1 Roadway Characteristics

This section provides a general description of the physical roadway features (such as travel lanes, shoulders, and alignments) that characterize the Route 6 and Route 66 study corridors. Specific descriptions of pedestrian, bicycle, and transit accommodations that also characterize the study corridors are provided in Section 2.1.3.

Route 6/Route 44 Junction

Route 6 overlaps with Route 44 at the western end of the study corridor in Bolton Notch, just west of Notch Road. This section of roadway is a four-lane divided expressway that serves as an extension of I-384 east of the junction of Route 6 and Route 44 at Route 85. The junction of Route 6 and Route 44 in Bolton Notch – the point where the routes merge/diverge just east of Notch Road – was designed and constructed as an interchange where a system of ramps provide free-flow directional moves between the routes. The interchange-type design is an indication of former CTDOT and FHWA plans to continue I-384 easterly to Providence, Rhode Island. With no state or federal commitment to extend I-384 or to construct a Route 6 expressway easterly from this location in the future, the interchange-type ramp system and its associated expressway-sized guide signs are no longer warranted for this area. Because this area serves as a gateway to the Route 6 corridor for eastbound travelers, an adequate transition in roadway character from I-384 and the expressway section of the Route 6 and Route 44 overlay to the two-lane section of Route 6 is necessary to affect driver behavior and to encourage lower travel speeds for vehicles entering the corridor from the west (see Section 2.1.2 for additional information on travel speeds in the vicinity of the Route 6/44 junction).

In addition to interchange-type character of the Route 6/Route 44 junction, other notable concerns for this location include:

- No direct connection from westbound Route 6 to eastbound Route 44;
- No direct connection from westbound Route 44 to eastbound Route 6;
- Notch Road intersection is located within the diverge area of the ramps to eastbound Route 44 and Route 6. The intersection is also located on the inside of the roadway curve and sight lines to the west are obstructed by rock ledge.

Route 6 between Route 44 and Route 66 East

Route 6 between Route 44 and Route 66 East is a two-lane roadway that generally consists of two 12 ft travel lanes with 8 ft shoulders on both sides of the road. Left turn lanes are provided at many side road intersections to more safely accommodate turning vehicles and to help preserve through traffic flow. Right turn lanes are also provided at several side road intersections. In total, there are 22 unsignalized intersections and five signalized intersections along Route 6 in the study corridor. Signalized intersections include Long Hill Road, Route 316, Lake Road, Route 87, and Route 66. See Table A2-1 in Appendix 2.1 for a detailed summary of the characteristics of each intersection.

The alignment and grade of Route 6 generally follow the natural topography of the area and are characterized by many gradual curves with few, long straight sections of roadway between, and some long gradual grades and other generally flat areas. There are no passing zones along this section.

Route 6/Route 66 Intersection

Route 6 intersects with Route 66 at a four-legged signalized intersection in Columbia. The intersection is skewed with Route 6 turning approximately 70 degrees to the left (north) and Route 66 turning approximately 40 degrees to the right (east). Route 6 continues east as the Route 6 Willimantic Bypass, a four-lane divided expressway. Route 66 East continues east as Willimantic Road, a direct continuation from Route 6 west of the intersection. The overall footprint of the intersection is large and includes wide paved medians on the intersection approaches. Channelized right turn lanes are also provided on the approaches allowing right turning vehicles the ability to maneuver through the intersection with little or no delay. Additionally, the channelized right turn lanes for westbound Route 6 and eastbound Route 66 are conducive to high-speed travel. This is of particular concern for westbound Route 6 where motorists can generally continue expressway speeds into the two-lane corridor where the posted speed is 45 mph. Because this area serves as a gateway to the Route 6 corridor for westbound travelers, an adequate transition in roadway character from the Route 6 expressway to the two-lane section of Route 6 is necessary to help affect driver behavior and encourage lower travel speeds for vehicles entering the corridor from the expressway and Route 66 East.

Route 66 East between Route 6 and Windham Town Line

Route 66 East between Route 6 and the Windham Town-Line is a two-lane roadway that generally consists of 11 ft to 13 ft travel lanes with shoulders that vary in width of 4 ft or less. One section of Route 66 East in this segment has been widened to provide a standard shoulder width. There are three unsignalized intersections along Route 66 East in the study corridor, none

of which provide left or right turn lanes. See Table A2-1 in Appendix 2.1 for a detailed summary of the characteristics of each intersection.

Like Route 6, the alignment and grade of Route 66 East generally follow the natural topography of the area and are characterized by several gradual curves with few, long straight sections of roadway between, and some long gradual grades. There are no passing zones along this section.

The area of Route 66 East located just west of the Willimantic River near Cards Mill Road is considered by the Route 6 Regional Economic Development Council (REDC) to be an area of opportunity for a future gateway to the Route 66 East corridor for westbound travelers. The area is currently characterized by auto-oriented development and has no aesthetic enhancements that serve as a gateway. Potential gateway opportunities are detailed in the REDC's *Route 6 Hop River Corridor Economic Development Strategy and Master Plan Study* (2010).

Roadway Standards

Route 6 in the study area is classified by CTDOT as a principal arterial roadway and is part of the National Highway System (NHS). Principal arterial roadways generally serve a high level of traffic mobility for through travelers, including statewide and interstate travelers, while providing a lesser degree of access to adjacent land development. Route 66 in the study area is classified as a major collector roadway. Collector roadways generally provide a balance between traffic mobility and access.

Roadway classifications serve to define minimum roadway standards for features such as travel and turning lane widths, shoulder widths, horizontal curvature, and sight distances. Table 2-1 summarizes the roadway standards for Route 6 and Route 66 that were obtained from CTDOT's *Highway Design Manual 2003 Edition* (HDM). Standard design values for Route 6 are provided for 55 mph and 60 mph design speeds. The selection of these design speeds was based on the approximate 85th percentile speed data (see Section 2.1.2 for details) recorded in the corridor. From the data, it was assumed that a 55 mph design speed applies to segments of Route 6 that have posted speed limits of 40 and 45 mph; a 60 mph design speed applies to segments that have a posted speed limit of 50 mph. Standard design values for Route 66 are provided for a 55 mph design speed, which applies to a posted speed limit of 45 mph.

Table 2-1. Roadway Standards

Roadway Feature	Route 6		Route 66
	Design Value for 60 mph	Design Value for 55 mph	Design Value for 55 mph
Lane Widths			
• Travel Lane	12'		12'
• Turning Lane	12'		11'-12'
Shoulder Widths	4'-8'		4'-8'
Horizontal Curve Radius	1340'	1065'	1065'
Intersection Sight Distance	665'	610'	610'

Using a combination of aerial photographs, field observations, and field measurements, the study team assessed the geometric characteristics of Route 6 and Route 66 to determine locations where the existing roadways do not meet CTDOT's current standards. A summary of deficiencies is provided in Table 2-2 and illustrated in Figure 2-1.

Table 2-2. Summary of Existing Geometric Deficiencies

Feature/Location	Existing Value (Apprx.)	Standard Design Value	Comments
Shoulder Widths			
Route 66 East, Columbia	Varies <4'	4'-8'	Most areas deficient
Horizontal Curvature			
Near Burnap Brook Rd, Andover	1150'	1340'	-
Near Route 87, Andover	1175'	1340'	-
Intersection Sight Distance			
Notch Rd Looking West, Bolton	325'	530'	Restricted by rock slope, curvature
Johnson Rd Looking West, Bolton	610'	665'	Restricted by roadway crest
Wales Rd Looking West, Andover	600'	665'	Restricted by roadway crest

As shown in Table 2-2, the geometric deficiencies in the study corridor include substandard horizontal curvature in two locations on Route 6 and limited intersection sight distances at three unsignalized intersections with Route 6. Although the horizontal curvature is deficient for the assumed design speed of 60 mph in the two noted locations, the curvature exceeds the minimum standard for 55 mph (1065'). Because these locations both have posted speed limits of 50 mph, the deficiencies will not necessarily warrant roadway alignment modifications to increase the existing curve values, but the need for mitigating measures such as improved warning signage in these areas will be investigated.

Restricted intersection sight distances from unsignalized intersections in the corridor also need careful evaluation relative to corrective or mitigating measures. Given the high volume, high speed nature of traffic on Route 6, motorists entering from side roads need as much sight distance as possible to perceive gaps in on-coming traffic. The sight distance available from a vehicle stopped at Notch Road is of particular concern because the sight distance of 325 ft is sufficient when the speed of on-coming traffic is less than 35 mph. The posted speed limit in this location is 40 mph and the average speed of on-coming traffic was recorded at approximately 55 mph. Consequently, vehicles turning from Notch Road often cause approaching vehicles to unexpectedly decelerate rapidly or maneuver to avoid a potential collision. The location of the Notch Road intersection on a curve within the diverge area of lanes curving to Route 6 and Route 44 compound the safety issues associated with the restricted sight distance. Currently, there is an intersection warning sign with flashing beacons on the Route 6 approach to this intersection to warn motorists of potential conflicts with turning traffic.

Shoulder widths along Route 66 East are generally deficient with an available shoulder width of less than 4 ft in most areas. Available shoulder width was determined by subtracting the standard travel lane width (24 ft total) from the existing paved roadway width and dividing the result by two (to yield the width available for each the left and right shoulders). By this methodology, any two-lane segments narrower than 32 ft (regardless of existing striped lane widths greater than 12 ft) were considered deficient relative to available shoulder width.

Undesirable Roadway Conditions

In addition to the geometric deficiencies identified above, there are other conditions that are not necessarily substandard, but were identified through the study process as being undesirable. For the purposes of this study, several undesirable roadway conditions in the study corridor have been identified as potential concerns relative travel speeds and safety. These are shown Figure 2-1 and include:

- Interchange-type layout of Route 6/44 intersection that accommodates high travel speeds and lacks a direct connection between westbound Route 6 and eastbound Route 44.
- Location of Notch Road intersection within the diverge area to Route 6 and Route 44.
- South Street intersection approach to Route 6 in Coventry. This approach was previously modified by CTDOT to eliminate skew, but the existing acute turn between South Street and Route 6 to the west, combined with a relatively steep grade on South Street approaching the intersection, can create issues for motorists negotiating the intersection.
- Channelized right turn lanes at the intersection of Route 6 and Route 66 that accommodate high-speed turning movements.
- Roadway flooding issues on Route 66 in the vicinity of Columbia Plaza (located just east of the Route 6 intersection) that can result in road closures.
- Layout of Cards Mill Road and Commerce Drive intersection with Route 66 East that provides a heavily skewed approach leg to Route 66 East.

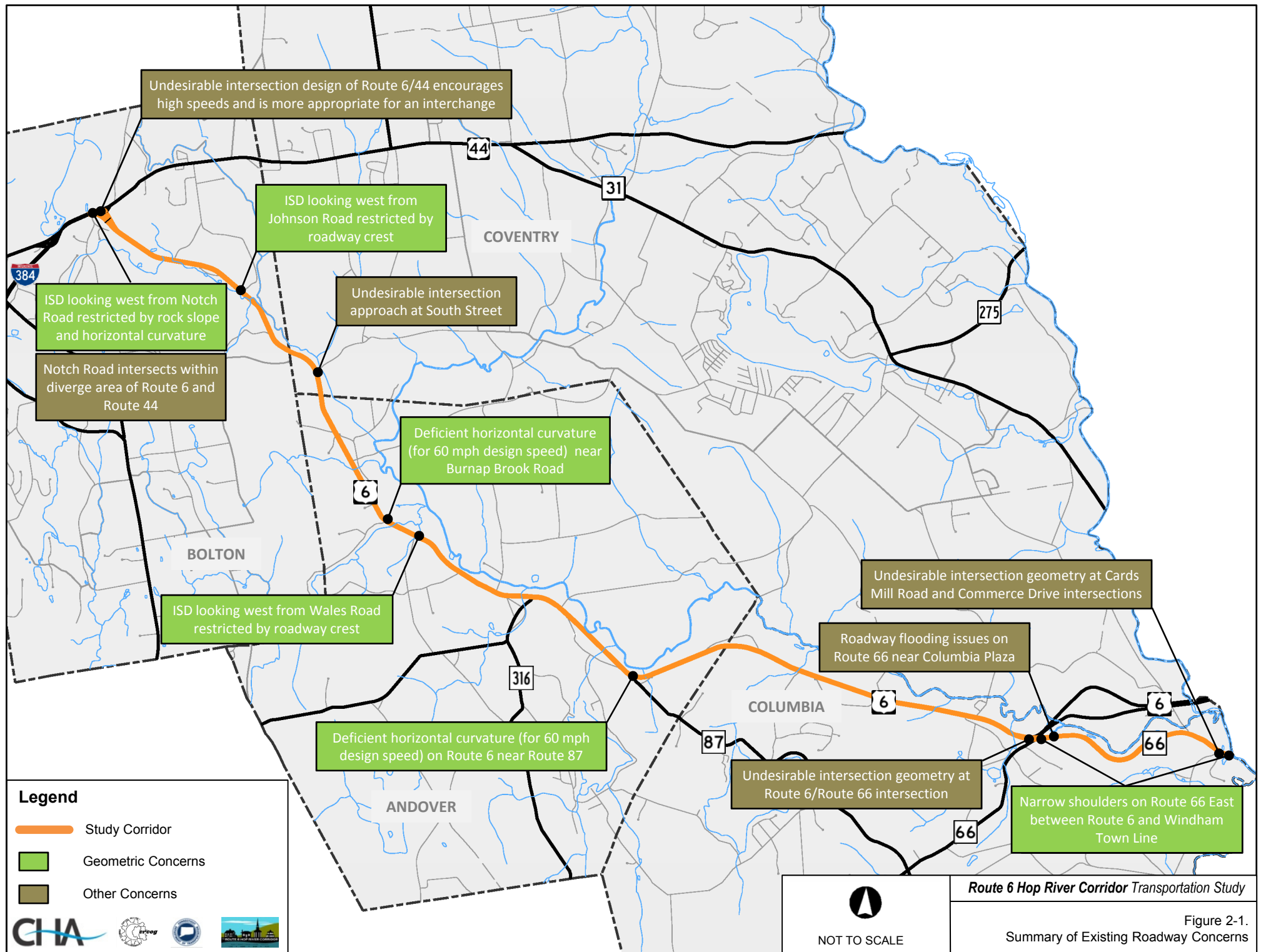


Figure 2-1.
Summary of Existing Roadway Concerns

2.1.2 Traffic Conditions

The existing traffic conditions in the study corridor are assessed to identify deficiencies relative to existing traffic capacity and operations and to establish a baseline condition against which the anticipated future conditions and potential impacts of future traffic growth can be evaluated. The study team compiled and analyzed average daily traffic volumes, peak hour traffic volumes and trends, truck traffic, corridor travel speeds, and peak hour intersection and roadway segment operations.

Daily Volumes

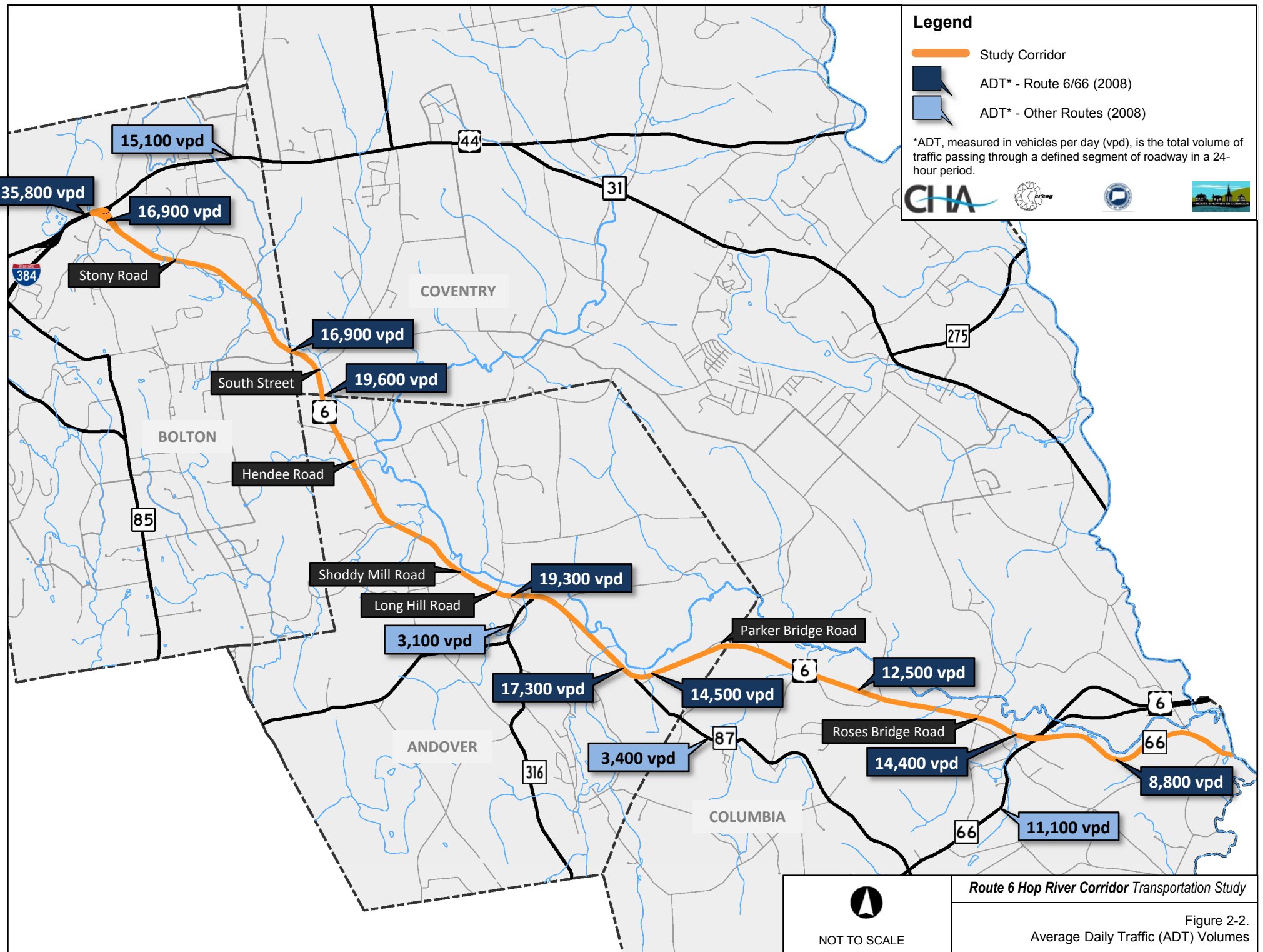
CTDOT maintains a database of average daily traffic (ADT)¹ volumes for all state and some select local roadways that was referenced for this study. The database is updated approximately every three years as new count data is collected. CTDOT most recently collected counts in the study area in 2008. Counts were also collected on four other occasions between 1992 and 2005 in both the Route 6 and Route 66 corridors. The 2008 and historical ADT volumes obtained from CTDOT are summarized in Tables 2-3 and 2-4 for Route 6 and Route 66, respectively. The 2008 ADT volumes for Route 6, Route 66 East, and other roadways proximate to the study corridor are also illustrated in Figure 2-2.

Table 2-3. ADT Volume Summary – Route 6 (1992 – 2008)

Location	ADT Volume [vpd]				
	1992	1995	2002	2005	2008
West of Notch Road (Route 6 and 44 Overlap), Bolton	36,700	37,400	35,900	36,200	35,800
East of Boston Turnpike (Route 44), Bolton	14,900	16,600	17,400	17,100	16,900
Bolton/Coventry Town Line	15,600	17,200	17,200	17,300	16,900
Coventry/Andover Town Line	15,000	16,400	15,900	17,200	19,600
West of Hebron Road (Route 316), Andover	-	16,000	15,400	17,100	19,300
East of Hebron Road (Route 316), Andover	13,600	15,000	15,000	16,100	18,000
West of Route 87, Andover	13,400	14,400	15,100	15,200	17,300
East of Route 87, Andover	10,900	11,800	12,100	12,400	14,500
East of Whitney Road, Columbia	-	-	11,600	14,100	12,500
West of Middletown Road (Route 66), Columbia	-	-	12,800	15,000	14,400

As shown in Table 2-3 and Figure 2-2, traffic volumes on the Route 6/Route 44 overlap are slightly more than double the average daily volume on Route 6 in the study corridor indicating that Route 44 and Route 6 carry approximately the same level of daily traffic. Elsewhere, volumes generally increase traveling east to west through Andover and decrease in Bolton prior to joining with Route 44.

¹ ADT, measured in vehicles per day (vpd), is the total traffic volume passing through a defined segment of roadway in a 24-hour period.



The historical data shows varying trends in different portions of the corridor. Daily volumes along the overlap of Route 6 and Route 44 have historically fluctuated with the 2008 volume being the lowest over the time period. The two other count locations in Bolton show a general trend upward prior to 2008 with slight decreases in volumes most recently. The five count locations in Andover all show a general trend upward through 2008. The two counts locations in Columbia, much like those on Route 6 in Bolton, show a trend upward prior to 2008 with decreases in volumes most recently.

Table 2-4. ADT Volume Summary – Route 66 East (1996 – 2008)

Location	ADT Volume [vpd]				
	1996	1999	2002	2005	2008
Route 66					
East of Middletown Road/US 6 Intersection, Columbia	9,200	8,200	8,400	9,100	8,800
West of Cards Mill Road, Columbia	-	-	8,800	8,900	6,600
Columbia/Windham Town Line	9,100	9,000	8,500	9,600	8,200

As shown in Table 2-4, ADT volumes on Route 66 East in the study area are noticeably less than those on Route 6, indicating that a large portion of trips use the Route 6 Willimantic Bypass for east-west travel rather than continuing into Willimantic via Route 66. The historical data shows that volumes on Route 66 East have fluctuated higher and lower between 1996 and 2008. Overall, 2008 volumes are lower than their respective peaks, and the 1996 volumes (for the two sites which the data is available) are higher than their respective 2008 values, indicating that volumes have not consistently increased over time in the area.

Heavy Vehicle Volumes

Automatic traffic recorder (ATR) data collected by the study team in 2010 shows that heavy vehicles², including trucks and buses, comprise approximately 5% to 8% of the average daily traffic volumes on Route 6. Applying these percentages to the 2008 ADT volumes shows that heavy vehicle volumes range between 800 and 1400 vehicles per day on Route 6. The ATR locations are shown in Figure A2-1 in Appendix 2.2.

Travel Speeds

Two sets of travel speed data were obtained for this study including average and 85th percentile speeds³ collected by ATRs over the course of several days, and speeds collected during the weekday morning (AM) peak period (7 to 9 am) and afternoon (PM) peak period (4 to 6 pm) using the *floating car method* and global positioning systems (GPS) data.

² Heavy vehicles include trucks and buses that have more than four tires, including school buses, dump trucks, and combination tractor trailers. Passenger vehicles or passenger trucks towing trailers, campers, and boats are not considered heavy vehicles.

³ 85th Percentile Speed – Speed at which 85% of vehicles are traveling at or below.

ATR Travel Speed Data

Summaries of the average and 85th percentile speeds that were measured at the ATR locations are presented relative to the posted speed limits in Figure 2-3 and Table 2-5. The posted speed limit in the Route 6 study corridor is generally 50 mph exclusive of several reduced speed zones where the posted speed limits are 40 mph or 45 mph. The approximate locations of these reduced speed zones are shown in Figure 2-3. The posted speed limit in the Route 66 study corridor is 45 mph.

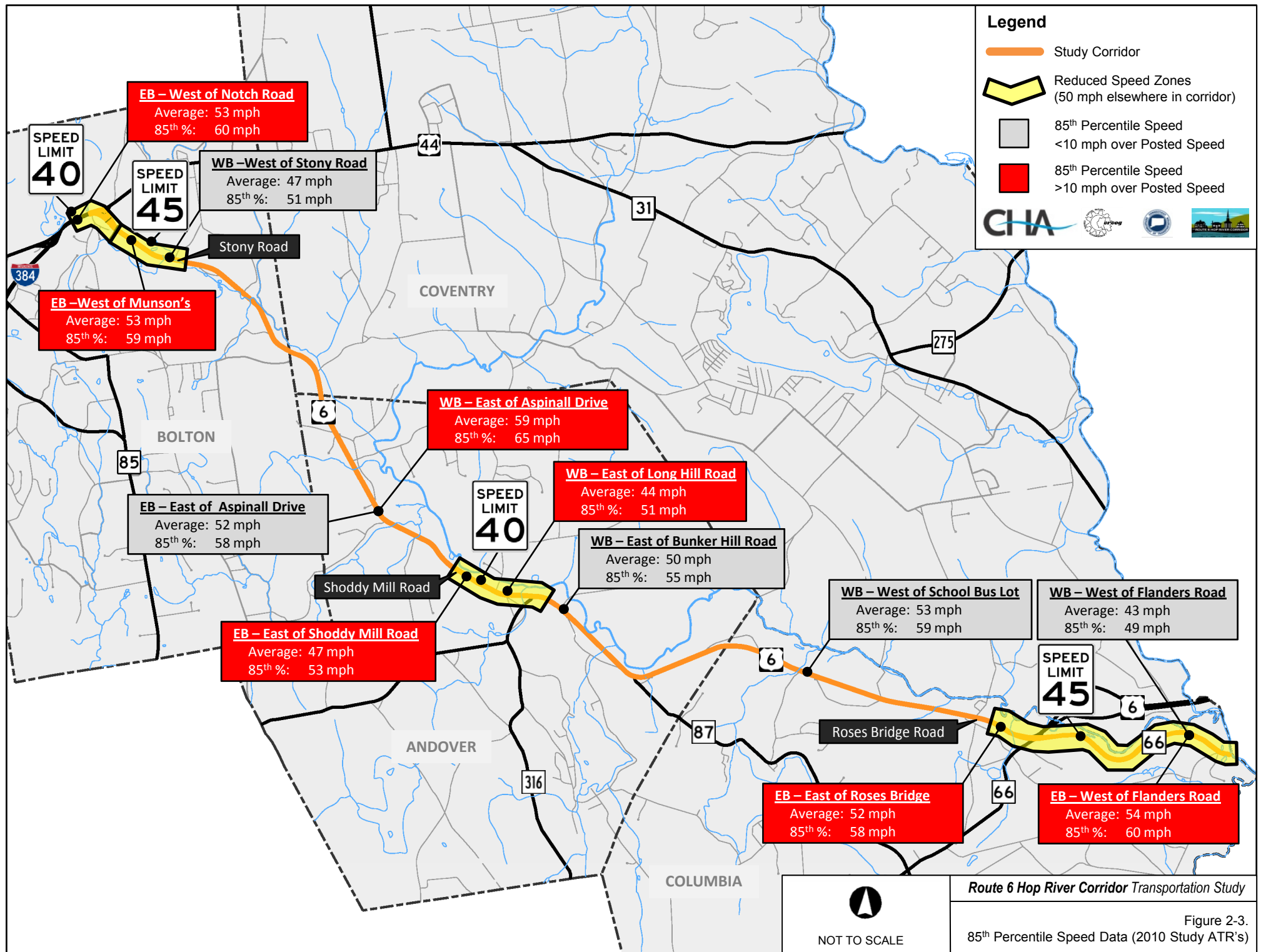
Table 2-5 Travel Speed Summary – Route 6

Direction/Location	Speed [mph]		
	Posted	Average	85 th Percentile
Eastbound			
West of Notch Road (Route 6 and 44 Overlap), Bolton	40	53	60
West of Munson's Driveway, Bolton	45	53	59
East of Aspinall Drive, Andover	50	52	58
East of Shoddy Mill Road, Andover	40	47	53
Westbound			
West of Stony Road, Bolton	45	59	65
East of Aspinall Drive, Andover	50	59	65
East of Long Hill Road, Andover	40	44	51
East of Bunker Hill Road, Andover	50	50	55
West of School Bus Lot Driveway, Columbia	50	53	59

As shown in Figure 2-3 and Table 2-5, the average travel speeds along Route 6, with one exception, exceed the posted speed limits with the average difference between the posted speeds and average speeds being 7 mph. The average difference between posted speeds and average speeds in the three reduced speed zones is 9 mph.

The average difference between 85th percentile speeds and posted speeds along Route 6 is 13 mph. At the five locations within reduced speed zones, the average difference between 85th percentile speeds and posted speeds is 16 mph; none of these locations has an 85th percentile speed within 10 mph of the posted speed limit. In addition to study ATR data, the study team researched historical speed data available through CTDOT. Tables A2-2 and A2-3 in Appendix 2.3 present the historical speed data for both Route 6 and Route 66.

The speed data shows that speeding is a safety concern in the Route 6 Hop River corridor, particularly within the reduced speed zones where development density and commercial activity are more concentrated and there is an increased potential for conflicts with turning vehicles and pedestrians. It is noted that the character of the existing roadway throughout the Route 6 corridor is the same whether the posted speed is 50 mph or reduced to 40 mph. Because the character of the roadway does not change, motorists are less inclined to change their speeds upon entering a reduced speed zone, despite the presence of signage for the lower speed limit.



Peak Period Travel Speed Data

The study team obtained average travel speeds through the corridor during the AM and PM peak hour commuting periods using the *floating car method* and global positioning systems (GPS) data collection equipment. The floating car method consists of driving the corridor under prevailing traffic conditions six times in each direction during the AM and PM peak periods while recording the distance traveled and travel time along major segments of the corridor. Average travel speeds are determined by dividing the distance along each segment by the average travel time for the multiple corridor runs. Tables 2-6 and 2-7 summarize the travel times and average speeds for the eastbound and westbound segments of Route 6 and Route 66 in the study corridor. Figure A2-2, provided in Appendix 2.4, also illustrates the average travel speeds for each segment.

Table 2-6. Travel Time Summary – Eastbound

Eastbound Roadway Segment	Length [mi]	Travel Time [m:s]	Average Speed [mph]
AM Peak Period			
Notch Road to Long Hill Road	5.37	6:10	52.3
Long Hill Road to Route 316	0.32	0:26	44.1
Route 316 to Lake Road	0.84	1:06	45.8
Lake Road to Route 87	0.42	0:43	34.5
Route 87 to Route 6/66	3.89	5:08	45.4
Route 6/66 to Windham Town Line	1.97	2:38	44.8
Total	12.80	16:11	47.5
PM Peak Period			
Notch Road to Long Hill Road	5.37	6:44	47.9
Long Hill Road to Route 316	0.32	0:28	41.0
Route 316 to Lake Road	0.84	1:11	42.3
Lake Road to Route 87	0.42	0:40	37.1
Route 87 to Route 6/66	3.89	5:02	46.3
Route 6/66 to Windham Town Line	1.97	2:46	42.8
Total	12.80	16:51	45.6

Table 2-7. Travel Time Summary – Westbound

Westbound Roadway Segment	Length [mi]	Travel Time [m:s]	Average Speed [mph]
AM Peak Period			
Windham Town Line to Route 6/66	1.97	2:54	40.7
Route 6/66 to Route 87	3.89	4:45	49.1
Route 87 to Lake Road	0.42	0:35	43.2
Lake Road to Route 316	0.84	1:12	42.1
Route 316 to Long Hill Road	0.32	0:33	35.6
Long Hill Road to Notch Road	5.37	6:47	47.5
Total	12.80	16:46	45.9
PM Peak Period			
Windham Town Line to Route 6/66	1.97	3:10	37.3
Route 6/66 to Route 87	3.89	4:44	49.3
Route 87 to Lake Road	0.42	0:32	46.2
Lake Road to Route 316	0.84	1:03	47.9
Route 316 to Long Hill Road	0.32	0:29	39.8
Long Hill Road to Notch Road	5.37	6:53	46.9
Total	12.80	16:51	45.6

As shown in Tables 2-6 and 2-7, the average corridor travel time was approximately 16 minutes and 40 seconds, which equates to an overall average speed of approximately 46 mph. The eastbound AM runs yielded the fastest average run, which is to be expected, given the lighter eastbound volumes during the AM peak period. Conversely, the average westbound travel time during the PM peak period is approximately the same as the travel time during the AM peak period, which is somewhat unexpected given that the predominant direction of travel in the AM is westbound and greater delays would normally be expected. The study team notes that any given run had the opportunity of being delayed at any of the five signalized intersections through the corridor, with the Route 6/66 intersection being the most common place to be delayed. Additionally, local schools operate school bus routes along Route 6 during the AM peak period, leading to additional potential delays.

Peak Hour Volumes

Intersection turning movement counts were obtained for 17 intersections in the study corridor in October 2009 (under REDC's previous study); and in March 2010, April 2010, and September 2011 (under this study). Intersection turning movement counts were performed during the weekday morning (AM) peak period (7 to 9 am) and afternoon (PM) peak period (4 to 6 pm) to capture the influence of the peak daily commuting times. The actual peak hours at these intersections were generally from 7:15 to 8:15 am and from 4:45 to 5:45 pm. A traffic volume diagram representing the AM and PM peak hour traffic volumes is shown in Figure 2-4.

It is noted that two intersections for which counts were obtained were subsequently not analyzed for this study: the westbound Route 44 merge with westbound Route 6 in Bolton, and the Route 6 and CTDOT Park and Ride lot driveway intersection in Andover.

The study team used the volumes shown in Figure 2-4 to characterize peak hour travel trends in the study corridor and to determine existing traffic operations at the 14 study intersections. Peak hour travel trends and existing traffic operations are presented in the following sections.

Peak Hour Travel Trends

Peak hour travel trends in the Route 6 study corridor are primarily influenced by traffic commuting to and from major employers in Hartford and the greater Hartford metro area via Route 6 and I-384. Specifically, the peak hour traffic counts indicate the following travel trends:

AM Peak Hour⁴

- Predominant direction of travel is westbound toward I-384. The percentage of all two-way traffic in the Route 6 study corridor that is traveling westbound varies along the corridor within the range of 59% to 78%.
- Westbound traffic volumes consistently build from approximately 800 vehicles entering the Route 6 study corridor at the Route 6/66 intersection to approximately 1300 vehicles exiting the corridor to Route 44 and I-384. The origins of this traffic are (approximately):
 - 44% from Route 6 expressway
 - 20% from Route 87 in Andover
 - 10% from Route 316 in Andover
 - 8% from Hendee Road in Andover
 - 10% from South Street in Coventry
 - 8% from other locations

PM Peak Hour⁵

- Predominant direction of travel is eastbound toward Willimantic. The percentage of all two-way traffic in the Route 6 study corridor that is traveling eastbound varies along the corridor within the range of 55% to 69%.
- Eastbound traffic volumes consistently diminish from approximately 1200 vehicles entering the Route 6 study corridor at the Route 6/44 intersection to approximately 900 vehicles exiting the corridor to Route 6 expressway and Route 66. The proportions of traffic destined to Route 6 expressway and other intersecting roadways in the study corridor generally reflect a reverse of the AM peak hour commuting trends.

⁴ All percentages represent approximate values as calculated from the traffic volumes shown in Figure 2-4.

⁵ All percentages represent approximate values as calculated from the traffic volumes shown in Figure 2-4

Operations

The study team evaluated existing traffic operations in the Route 6 Hop River corridor by determining levels of service (LOS) at the study intersections. LOS is based on the average delay (in seconds per vehicle, sec/veh) that motorists experience while traveling through the intersection. LOS can be determined for individual movements at signalized and unsignalized intersections, and for each signalized intersection as a whole. For this study, intersection operations of LOS D or better are considered acceptable.

LOS values for intersections and roadway segments can range from A to F with LOS A representing the best operational conditions. LOS F represents generally congested, unacceptable conditions.

The study team determined the LOS for each of the 14 study intersections to provide a measure of the existing traffic operations at these intersections. The LOS for each intersection was determined by completing capacity analyses using the existing AM and PM peak hour turning movement volumes obtained by the study team and SYNCHRO software. The AM and PM peak hour traffic operations are summarized in Table 2-8 and illustrated in Figure 2-5 (AM) and Figure 2-6 (PM).

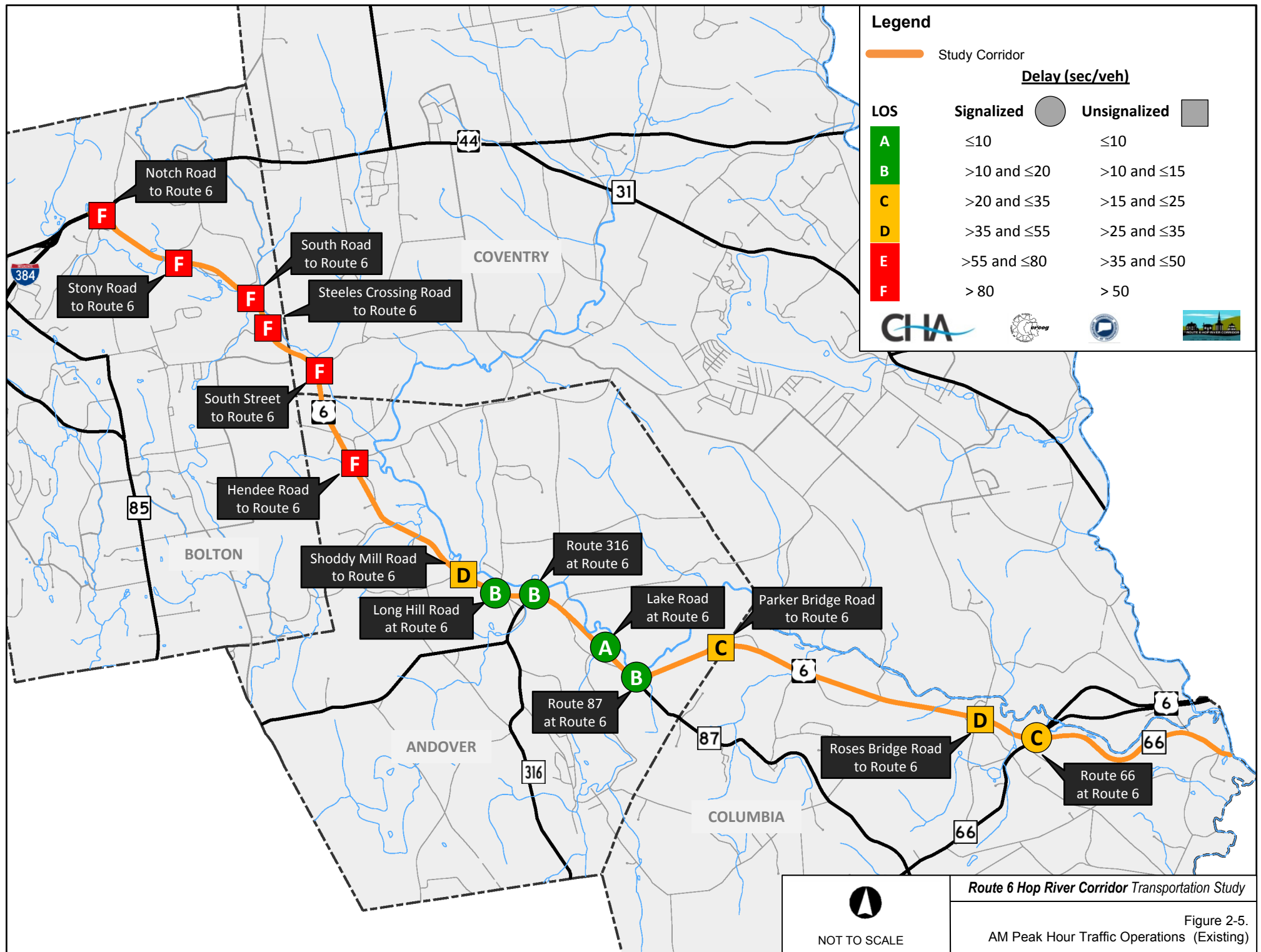
Table 2-8. AM and PM Peak Hour Traffic Operations – Existing Conditions

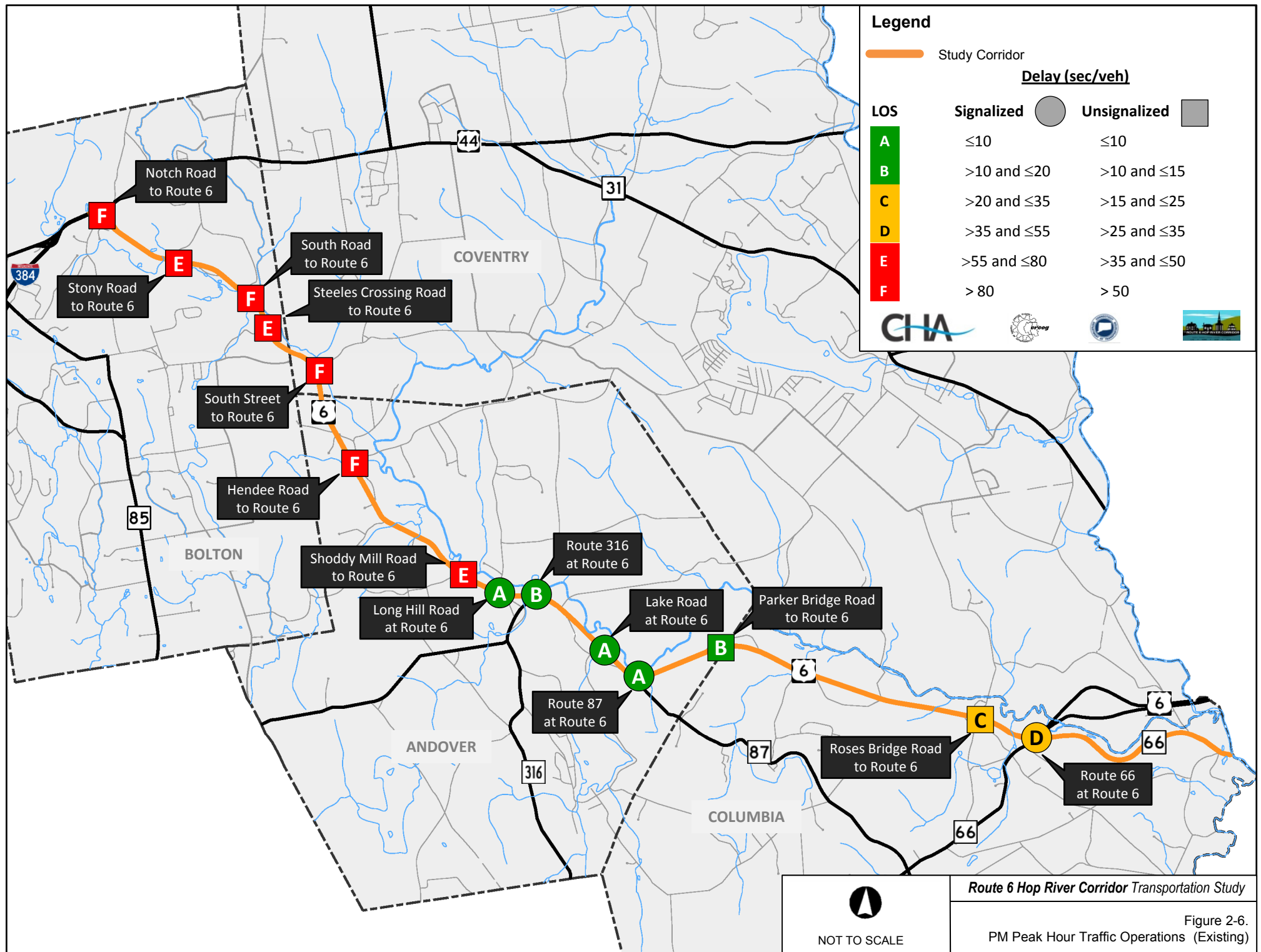
Intersection/Direction	AM Peak Hour		PM Peak Hour	
	LOS	Avg. Delay (sec/veh)	LOS	Avg. Delay (sec/veh)
Route 6/44 at Notch Road, Bolton (unsignalized)				
Northbound Right – Notch Road	F	331.7	F	- ¹
Route 6 at Stony Road, Bolton (unsignalized)				
Eastbound Left – Route 6	C	15.6	A	9.1
Southbound – Stony Road	F	160.6	E	47.3
Route 6 at South Road, Bolton (unsignalized)				
Eastbound Left – Route 6	B	12.9	A	9.2
Southbound – South Road	F	64.1	F	150.0
Route 6 at Steeles Crossing Road, Bolton (unsignalized)				
Westbound Left – Route 6	A	8.8	B	11.1
Northbound – Steeles Crossing Road	F	64.6	E	44.4
Route 6 at South Street, Coventry (unsignalized)				
Eastbound Left – Route 6	B	12.9	B	10.2
Southbound – South Street	F	114.6	F	81.6
Route 6 at Hendee Road, Andover (unsignalized)				
Eastbound Left – Route 6	B	12.0	A	9.6
Southbound – Hendee Road	F	55.0	F	54.0
Route 6 at Shoddy Mill Road, Andover (unsignalized)				
Westbound Left – Route 6	A	8.5	B	11.2
Northbound – Shoddy Mill Road	D	28.3	E	35.7

¹Long Delay, SYNCHRO software outputs error message.

Table 2-8. AM and PM Peak Hour Traffic Operations – Existing Conditions

Intersection/Direction	AM Peak Hour		PM Peak Hour	
	LOS	Avg. Delay (sec/veh)	LOS	Avg. Delay (sec/veh)
Route 6 at Long Hill Road, Andover				
Eastbound – Route 6	A	3.5	A	9.8
Westbound – Route 6	B	15.6	A	7.6
Southbound – Long Hill Road	C	28.1	C	23.8
Overall	B	12.9	A	9.4
Route 6 at Route 316 (Hebron Road), Andover				
Eastbound – Route 6	A	8.5	C	22.6
Westbound – Route 6	B	16.7	A	6.3
Northbound – Route 316	B	18.5	B	17.4
Overall	B	14.6	B	16.6
Route 6 at Lake Road, Andover				
Eastbound – Route 6	A	4.1	A	8.3
Westbound – Route 6	A	6.6	A	2.6
Northbound – Lake Road	C	27.3	C	23.7
Overall	A	6.7	A	6.7
Route 6 at Route 87 (Jonathan Trumbull Highway), Andover				
Eastbound – Route 6	A	7.4	A	6.6
Westbound – Route 6	B	13.7	A	4.4
Northbound – Route 87	C	34.2	C	26.2
Overall	B	15.5	A	7.4
Route 6 at Parker Bridge Road, Andover (unsignalized)				
Eastbound Left – Route 6	B	10.1	A	8.6
Southbound – Parker Bridge Road	C	16.0	B	12.4
Route 6 at Roses Bridge Road, Columbia (unsignalized)				
Eastbound Left – Route 6	A	9.6	A	8.9
Southbound – Roses Bridge Road	D	29.9	C	21.0
Route 6 at Route 66 (Middletown Road), Columbia				
Eastbound – Route 6	C	34.6	E	62.5
Westbound – Route 66	D	47.5	E	62.7
Northbound – Route 66	C	28.5	D	46.7
Southbound Right – Route 6	B	11.4	C	27.4
Overall	C	26.2	D	47.9





As shown in Table 2-8, overall operations are acceptable at each signalized intersection. However, there are signalized intersection approaches where the operations are currently LOS E or F during the AM or PM peak hour. These approaches include:

- Route 6 at Route 66 (Middletown Road), Columbia
 - Eastbound Route 6 – LOS E during the PM peak hour. The eastbound left turn movement from Route 6 to the Route 6 expressway experiences significant delay and long traffic queues (over 800 ft for the 95th percentile queue) which results in the overall eastbound movement being LOS E.
 - Westbound Route 66 East – LOS E during the PM peak hour. Both the westbound left turn and through/right turn movements experience significant delays (though traffic queue lengths are moderated at less than 300 ft).
 - Because of the skew of the intersection, the eastbound Route 6 and westbound Route 66 East movements require their own phase to prevent conflicts between the opposing left turn movements, resulting in longer traffic delays on these approaches.

In addition, there are unsignalized intersection approaches where the operations are currently LOS E or F during the AM or PM peak hour. As shown in Table 2-8, these approaches include:

- Route 6 at Notch Road, Bolton
 - Northbound Notch Road – LOS F during AM and PM peak hours
- Route 6 at Stony Road, Bolton
 - Southbound Stony Road – LOS F during the AM peak hour, LOS E during the PM peak hour
- Route 6 at South Road, Bolton
 - Southbound South Road – LOS F during AM and PM peak hours
- Route 6 at Steeles Crossing Road, Bolton
 - Northbound Steeles Crossing Road– LOS F during the AM peak hour, LOS E during the PM peak hour.
- Route 6 at South Street, Coventry
 - Southbound South Street – LOS F during AM and PM peak hours
- Route 6 at Hendee Road, Andover
 - Southbound Hendee Road – LOS F during AM and PM peak hours
- Route 6 at Shoddy Mill Road, Andover
 - Northbound Shoddy Mill Road – LOS E during the PM peak hour

Based strictly upon the results of the existing traffic operations analyses, traffic capacity improvements to accommodate existing traffic demands are generally not warranted at the study intersections, particularly the signalized intersections which all operate at acceptable levels of service. Additionally, it is important to note that the long delays and unacceptable levels of service at the unsignalized intersection approaches throughout the western part of the corridor are generally a function of the relatively high volumes of through traffic on Route 6 in this area that limit the availability and size of gaps in traffic for vehicles entering Route 6 from side roads. Although entering traffic volumes are relatively low, long delays present safety issues when drivers become impatient and attempt to enter traffic before it is safe to do so.

The potential effects of future traffic demand on intersection operations, and any associated capacity improvement needs to accommodate this future traffic demand, will be evaluated and discussed under the next phase of this study. This effort will include an assessment of signal warrants for unsignalized intersections and an assessment of other mitigating measures for unsignalized intersections that do not meet signal warrant criteria.

2.1.3 Access Management

Access management can be defined as the proactive management of vehicular access points to land parcels adjacent to roadways. Good access management promotes safe and efficient use of the transportation network and encompasses a set of techniques that state and local governments can use to control access to highways, major arterials, and other roadways.⁶

The access management assessment for this study included a field review of existing driveways and an assessment of the access management and driveway-related provisions of the zoning regulations for each of the four participating towns (see Table A2-4 in Appendix 2.5 for a summary of the zoning regulations review). In general, most segments of the Route 6 study corridor are sparsely developed with some clusters of residential driveways and small concentrations of commercial activity interspersed throughout. The Route 66 study corridor generally features more regularly spaced commercial activity interspersed with residential driveways. On average, there are approximately 20 driveways per mile of Route 6 and 30 driveways per mile of Route 66 in the study corridor.

Along both Route 6 and Route 66, the majority of driveways serve single family residential uses and are characteristically low volume. As such, these driveways create a relatively low frequency of turning conflicts with through traffic and have limited effect on the overall flow of traffic in the corridor. Commercial driveways that are relatively high volume create more turning conflicts and consequently create more opportunities for disruptions to the flow of traffic and turning-related collisions. Therefore, a key aspect of the access management review in the Route 6 Hop River corridor was to assess existing commercial access drives and identify potential issues associated with:

- Location of drives relative to existing intersections and other driveways. Driveways should not be located within the functional area of an intersection to minimize conflicts between vehicles queuing and maneuvering through the intersection and vehicles accessing drives. Spacing between adjacent driveways should also be maximized to separate potential turning movements, or driveways should be consolidated and internal connections provided so that adjacent parcels can share access.
- Width of drives (“curb cuts”). Driveway widths at their intersection with the roadway should not be excessively wide so that the point of access is clearly defined and conflicts are minimized.
- Redundant drives. Businesses should not have more driveways than are required to maintain site access and operations. Redundant two-way driveways should be closed or converted to one-way egress and ingress to minimize conflict points.

⁶ FHWA, Office of Operations, http://ops.fhwa.dot.gov/access_mgmt/what_is_accsmgmt.htm

In general, access management issues in the study corridor include a number of businesses with redundant driveways or businesses with driveways that are wider than necessary. These locations are shown in Figure 2-7.

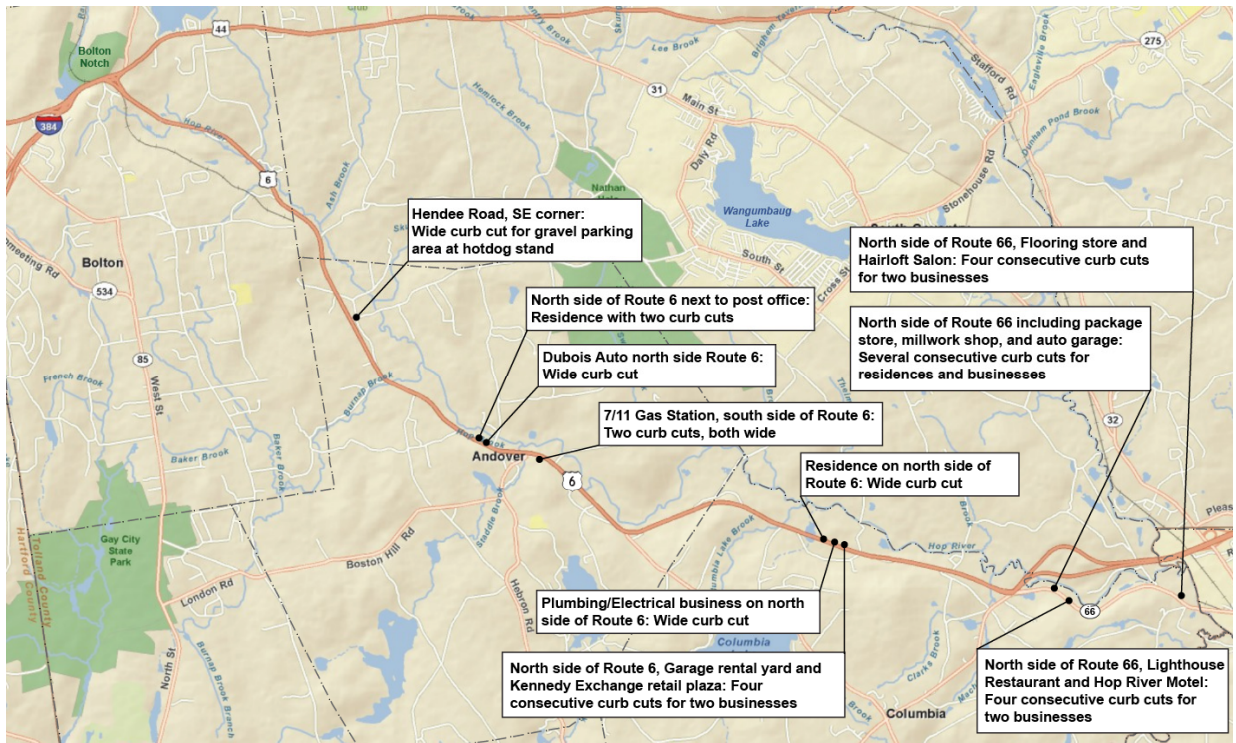


Figure 2-7. Access Management Issues

Opportunities to close redundant driveways, narrow excessively wide driveways, or share driveways between adjacent parcels should be considered in conjunction with the site plan application review and approval process for new development or redevelopment proposals in each town. Strategies to minimize the number of new access points on Route 6 within potential future development nodes will be evaluated as part of this study.

2.1.4 Multimodal Accommodations

The study team reviewed and assessed the availability and extent of the existing facilities and accommodations in the study corridor that support alternative modes of transportation such as walking, bicycling, and transit.

Pedestrian Facilities

Being rural in nature, the study corridor generally has no continuous sidewalks. Other pedestrian facilities are limited to four pedestrian actuated intersection crossings and only one crosswalk across Route 6. The locations of these facilities are noted in Figure 2-8, and include:

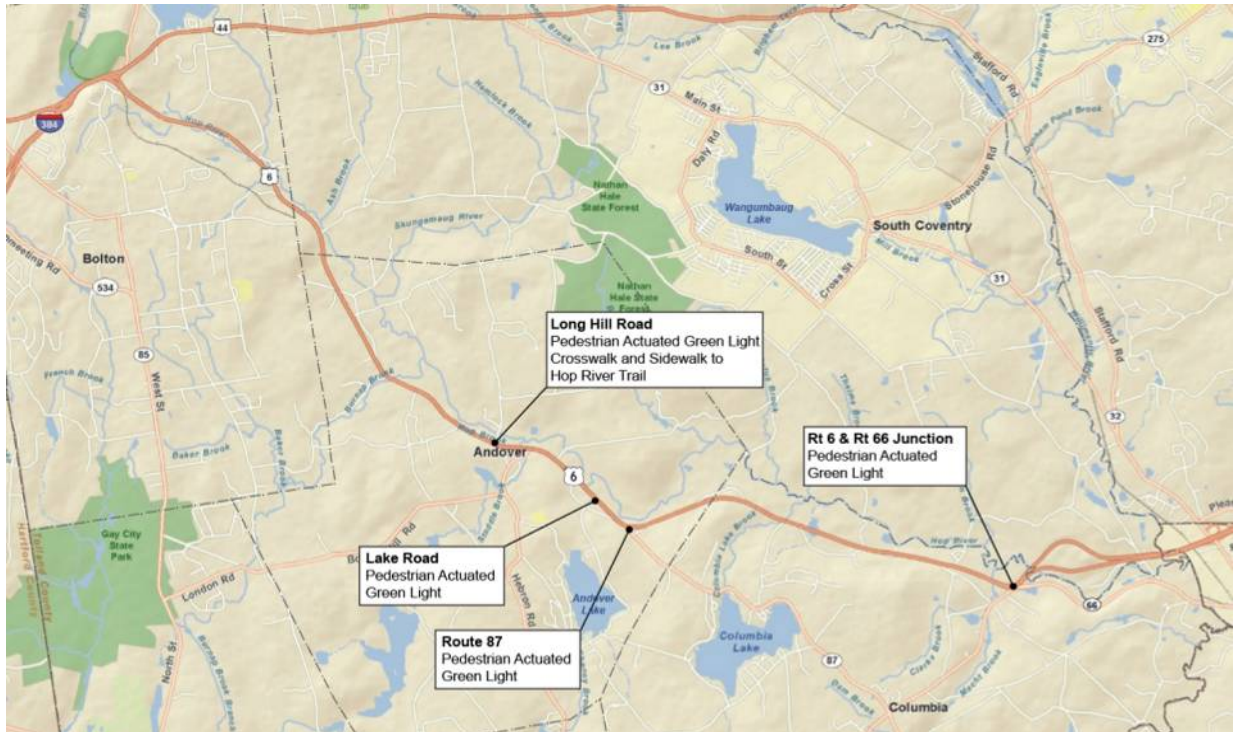


Figure 2-8. Pedestrian Facilities

- **At Route 6 and Long Hill Road (Andover)**, curb ramps, a marked crosswalk on the east side of the intersection, and a pedestrian actuated green light which is concurrent with the green light for traffic on Long Hill Road. The sidewalk on the south side of the crosswalk extends east towards the Hop River Trail (see The Hop River Trail discussion that follows for trail details). There is no sidewalk on the north side of Route 6 nor a crosswalk on the Long Hill Road approach to the intersection that link the trail and other potential pedestrian destinations like the church, library, Park & Ride lot, post office, and ball fields in this area.



- **At Route 6 and Lake Road (Andover),** a pedestrian actuated green light used for crossing Route 6. The pedestrian crossing shares the green light with traffic from Lake Road. There are no sidewalks, curb ramps, or crosswalk markings at this location. The only notable destination near this intersection is a convenience store a few hundred feet west of the intersection.
- **At Route 6 and Route 87 (Andover),** a pedestrian actuated green light used for crossing Route 6. The pedestrian crossing shares the green light with traffic from Route 87. There are no sidewalks, curb ramps, or crosswalk marking at this location. Additionally, there are no retail or business facilities in the proximity of this intersection.
- **At Route 6 and Route 66 (Columbia),** a pedestrian actuated green light used for crossing Route 6. There is no provision for crossing Route 66. The pedestrian crossing shares the green light with traffic from Route 66. There are no sidewalks, curb ramps, or crosswalk markings at this location. Pedestrian push buttons are located in an island on the southwest corner of the intersection and on an island on the northwest corner. They are isolated and difficult to access. The button on the southwest corner does not function.



Bicycle Facilities

While having no marked or signed bicycle lanes or routes, Route 6 has wide (8 ft) shoulders which are suitable for cycling for the purposes of commuting or recreational use. CTDOT's Connecticut Bike Map shows most of the Route 6 study corridor as being "more suitable" on the State Road Suitability Index based on an ADT volume greater than 10,000 vpd and shoulder widths greater than 6 ft.⁷ However, several side road and driveway intersections have dedicated right turn lanes that pose a potential hazard to cyclists using the wide shoulders. This hazard results from a cyclist having to cross the right turn lane and to travel between through traffic and right turning traffic in order to continue through the intersection and reach the shoulder across the intersection.



The Route 66 study corridor has narrow shoulders (typically less than 4 ft) and frequent curb cuts which make this roadway "less suitable" for cycling.

⁷ <http://www.ctbikemap.org/bikemap.html>

The Hop River Trail

The Hop River Trail is a fairly continuous recreational walking and bicycling trail that generally parallels Route 6 and Route 66, extending from Bolton Notch State Park at the western end of the study corridor to the Willimantic River at the eastern end. Trail conditions and quality vary in surface type and width along its length; the western section of the trail is mainly 6 ft wide or more with a gravel or stone dust surface, and the eastern section is 4 ft wide or less with a soil and grassed surface. The trail is commonly used by walkers, hikers, mountain bikers, and cross country skiers.

The placement of the trail varies relative to the road and Hop River. As shown in Figure 2-9, the Hop River Trail is accessible from Bolton Notch State Park via a vehicle-only access drive and trailhead. Just east of the trailhead, the trail passes through a tunnel under Route 6 and continues to be lower in elevation than Route 6 until the grade of Route 6 drops near the Bolton Ice Palace, where the trail becomes higher than adjacent uses. The trail continues through a wooded area to Steeles Crossing Road. There is an informal parking area off Steeles Crossing Road (approximately ¼ mile west of Route 6). There is no signage on Route 6 indicating trail access on Steeles Crossing Road or any of the road crossings to the east. This lack of signage for the trail was noted the length of the corridor.

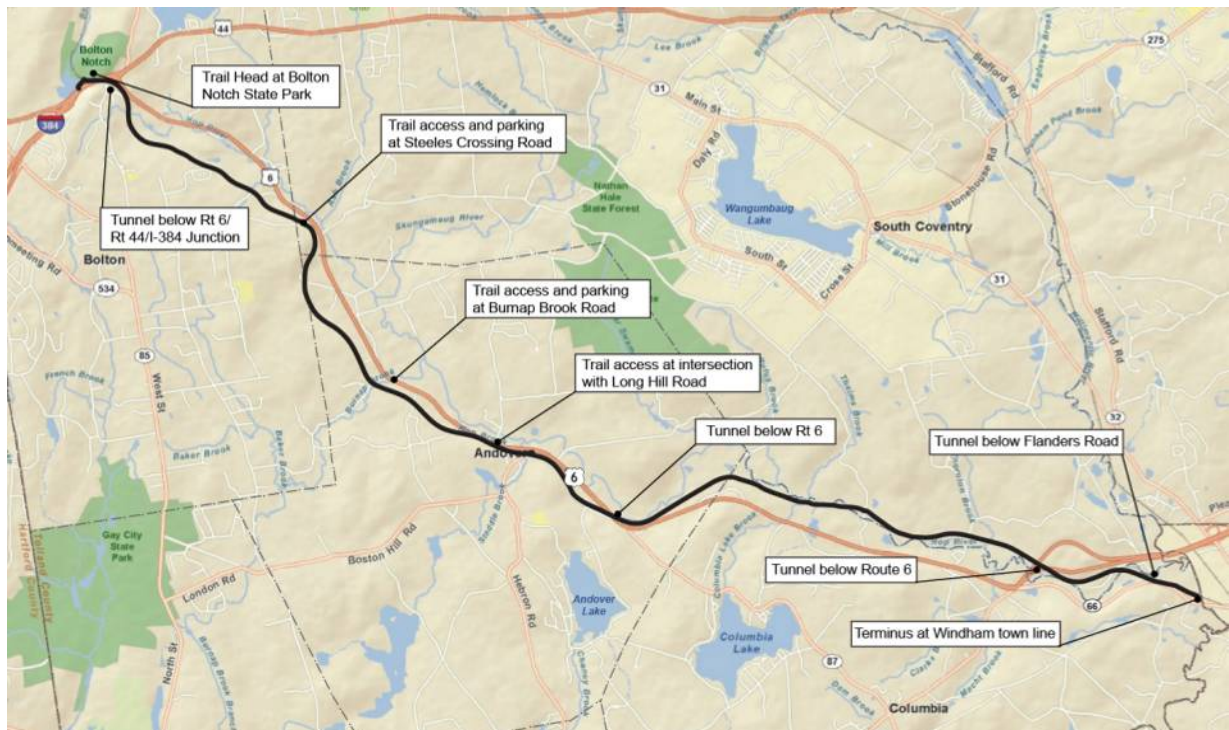


Figure 2-9. Hop River Trail

From Steeles Crossing Road, the trail continues east to Coventry. In this area, the trail is relatively isolated and much higher than Route 6 and thus limited views of the road. The trail continues east into Andover with a road crossing at Bailey Road (approximately ¼ mile southwest of Route 6). It then continues to Burnap Brook Road. The trail in this location is dirt and there is an informal parking area which is well used. The trail continues east to Wales Road and Shoddy Mill Road. At Shoddy Mill Road, the trail is dirt with some stone dust. It runs

along Route 6 in Historic Andover. The trail is elevated above Route 6 and is very heavily used. The trail is closest to Route 6 in Historic Andover at Long Hill Road where a crosswalk allows pedestrian access to the trail from Long Hill Road. From this location east to Route 316 (Hebron Road), the trail is not maintained. At Route 316, a new bridge was installed in April 2012 to provide uninterrupted travel along the trail and over traffic on Route 316.

East of Route 316, the trail continues to the southeast crossing Merritt Valley Road then travelling under Route 6 and assuming a route north of Route 6, closely following the Hop River. The trail continues east, crossing River Road and Pucker Street before going under the limited access highway segment of Route 6. The trail continues east between the Route 6 expressway and Route 66 East to Kings Road in Coventry, where the trail is barricaded due to an impassable bridge over the Hop River just to the east. Trail users must follow Kings Road to Flanders River Road before reconnecting with the trail at the Flanders Road crossing in Columbia. The trail then continues east to its terminus at the Willimantic River in Windham.



Transit Service and Operations

Connecticut Transit (CTTransit), a CTDOT-owned bus service, provides bus service to downtown Hartford on weekdays from the Park & Ride lots (see page 2-27 for locations) located along Route 6 in the study area. The route is designated Route 18 Willimantic/Coventry Express. The duration of the trip to Hartford is approximately 40 minutes from Columbia, 30 minutes from Andover, and 15 minutes from Bolton. Buses provide service from each stop approximately every half-hour between 6:00 a.m. and 7:30 a.m. on weekday mornings. Service is provided from Hartford to the area about every half-hour between 4:30 p.m. and 6:30 p.m. on weekday evenings. In addition, there is one bus providing service from Hartford to the area at around 1:00 p.m. There is no service Saturday or Sunday.

Ridership averages approximately 4,000 trips per month, equating to approximately 200 trips per weekday, or 100 commuters per weekday. While trips originate in Willimantic, most of the ridership is generated from the Columbia Park & Ride lot and points west.

Park & Ride Facilities

There are three commuter parking lots in the general study area. All three of the lots are adequately signed from the corridor, are fully ADA-compliant, and are serviced by CTTransit. The lots and associated amenities include:

- **Bolton Park & Ride Lot:** Located along Route 6/Route 44 at the intersection of Morancey Road just west of the Bolton Notch area. The lot shares a driveway with the Connecticut Department of Transportation Highway Garage. The facility has a total of 87 parking spaces, 4 of which are handicap spaces. Parking usage counts since 2000 have indicated parking utilization that has varied from a low of 54% to a high of 71%. The most recent count occurred in 2009, indicating a utilization rate of 64%. There is no bus shelter or bike rack at this location. Field inspection of the lot in 2011 noted that there are four area lights, all of which were functional.
- **Andover Park & Ride:** Located on Route 6, one-half mile west of Route 316. The lot can only be accessed from Route 6. This facility has a total of 60 parking spaces, 3 of which are handicap spaces. This lot can be accessed via sidewalks and is in the vicinity of the post office and town library. Parking usage counts since 2000 have indicated parking utilization that has varied from a low of 37% to a high of 58%. The most recent count occurred in 2010, indicating a utilization rate of 47%. There is a bus shelter, but no bike rack at this location. Field inspection of the lot in 2011 noted that there are two area lights, one of which was broken (located over the shelter).
- **Columbia Park & Ride Lot:** Located on the southwest corner of the intersection of Route 6 and Route 66. The lot can only be accessed from Route 66. This facility has a total of 53 parking spaces, 3 of which are handicap spaces. This lot can be accessed via sidewalks and is in the vicinity of a few commercial buildings. Parking usage counts since 2000 have indicated parking utilization that has varied from a low of 74% to a high of 108%. The most recent count occurred in 2010, indicating a utilization rate of 74%. In addition to CTTransit, this lot is serviced by EasyStreet ridesharing service consisting of a 15-passenger van that runs one morning and one evening trip between the lot and Hartford each weekday. There is a relatively new bus shelter, but no bike rack at this location. Field inspection of the lot in 2011 noted that there are two area lights, one of which was occupied by a bird's nest.

It is noted that the Express service buses that service the Park & Ride lots are not equipped with bike racks; however bikes are allowed in empty luggage compartments of these buses. The lack of convenient bike storage on these buses; the lack of bike racks at each lot; and the lack of sidewalks to the Andover lot collectively discourage commuters from considering bicycling and walking as part of their regular commuting trip.

2.1.5 Accident History

The study team obtained accident data from CTDOT's *Traffic Accident Viewing System* (TAVS) for the three-year period beginning January 1, 2006 and ending December 31, 2008. Table 2-9 summarizes the accident data relative to the most frequent types of collisions in the corridor and the most common factors that have contributed to these collisions.

As shown in Table 2-9, 253 accidents were recorded in the Route 6 Hop River corridor during the three-year period ending December 31, 2008. Of these accidents, 60% were either rear end collisions or fixed object collisions. Approximately 63% of all accidents were speed-related caused by vehicles following too closely, drivers losing control, or speed too fast for conditions.

The most frequent collision types and the speed-related contributing factors to these collisions are a function of the driving environment in the Route 6 Hop River corridor. That is, Route 6 is a two-lane, high speed roadway that carries a significant amount of through traffic, particularly during peak commuting periods when more aggressive driving behaviors are typically expected. At both the west and east ends of the corridor, vehicles enter the area via an expressway. This condition, combined with a relatively wide roadway surface on Route 6, contribute to high speeds through the corridor and lead to the prevalence of motorists following too closely, losing control, and driving too fast for conditions.

Figure 2-10 and Table 2-10 detail the accident history at each side road intersection.

Table 2-9. Accident Summary (2006-2008)

Collision Type	Number	Percentage
Rear-End	79	31%
Fixed Object	73	29%
Turning – Intersecting Paths	32	13%
Sideswipe – Same Direction	16	6%
Sideswipe—Opposite Direction	15	6%
Other	38	15%
Total	253	100 %
Contributing Factor	Number	Percentage
Following Too Closely	78	31%
Driver Lost Control	45	18%
Failed to Grant ROW	38	15%
Speed Too Fast for Conditions	36	14%
Fell Asleep	13	5%
Improper Passing Maneuver	9	4%
Improper Turning Maneuver	7	3%
Other	27	10
Total	253	100%
Severity	Number	Percentage
Fatal	3	1%
Injury	66	26%
Property Damage Only	184	73%
Total	253	100%

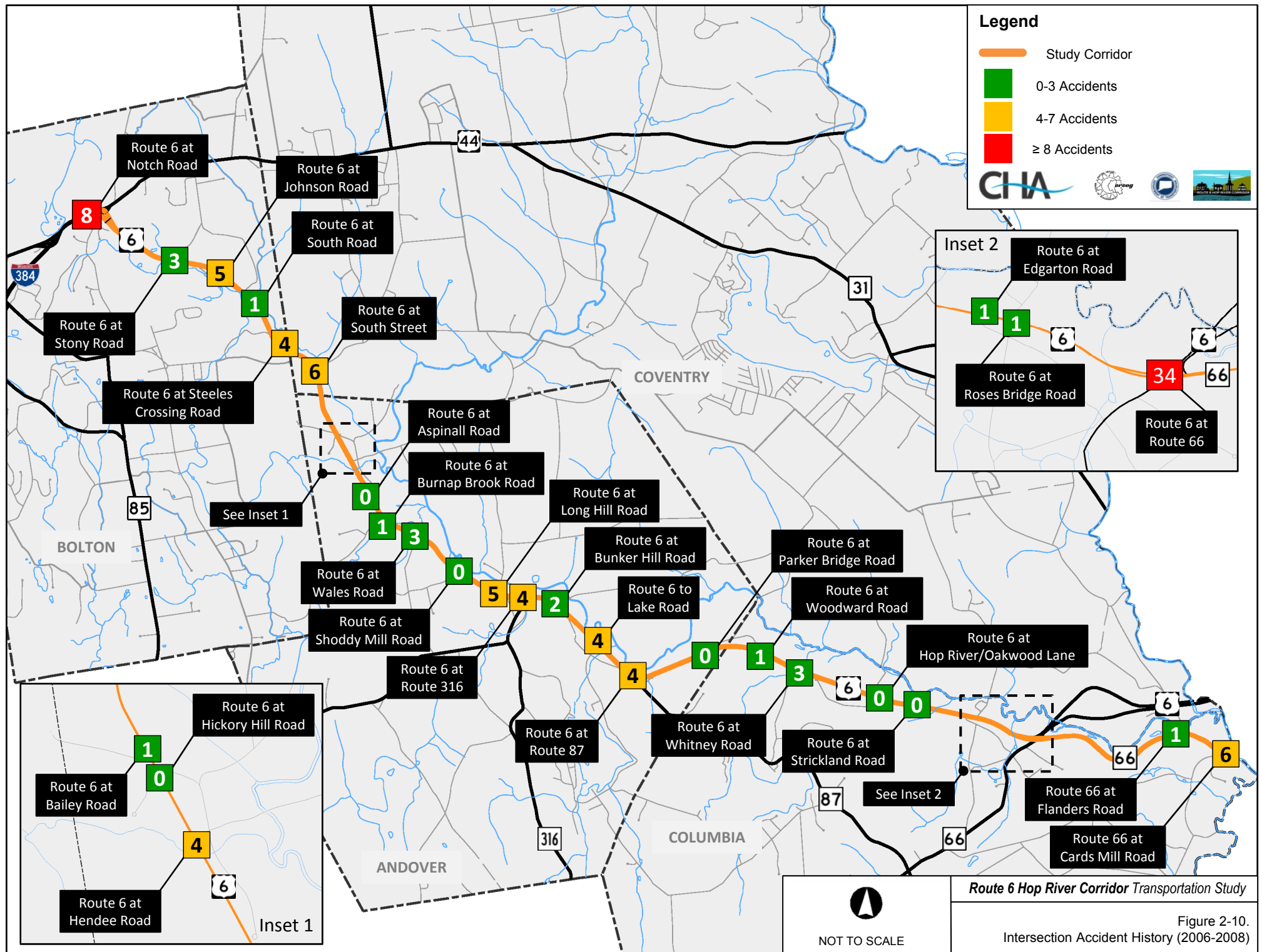


Table 2-10. Accident History (2006-2008) – Side Road Intersections

Intersection	Number of Accidents	Most Common Collision Type	Most Common Contributing Factor(s)
Bolton			
Notch Road	8	Fixed Object	Speed Too Fast for Conditions Failed to Grant ROW Driver Lost Control
Stony Road	3	Turning-Intersecting Paths Backing Fixed Object	Failed to Grant ROW Driver Lost Control Unsafe Backing
Johnson Road	5	Fixed Object	Driver Lost Control
South Road	1	Rear-End	Following Too Closely
Steeles Crossing Road	4	Fixed Object	Speed Too Fast for Conditions Under the Influence Failed to Grant ROW Fell Asleep
Coventry			
South Street	6	Fixed Object	Driver Lost Control Failed to Grant ROW
Andover			
Bailey Road	1	Sideswipe-Opposite Direction	Driver Lost Control
Hendee Road	4	Rear-End	Following Too Closely
Aspinall Road	0	N/A	N/A
Burnap Brook Road	1	Fixed Object	Speed Too Fast For Conditions
Wales Road	3	Rear-End	Following Too Closely
Shoddy Mill Road	0	N/A	N/A
Long Hill Road	5	Rear-End	Following Too Closely
Route 316 (Hebron Road)	4	Rear-End	Following Too Closely
Bunker Hill Road	2	Rear-End Sideswipe-Opposite Direction	Following Too Closely
Lake Road	4	Rear-End	Following Too Closely
Route 87 (Jonathan Trumbull Highway)	4	Rear-End	Following Too Closely
Parker Bridge Road	0	N/A	N/A

Table 2-10. Accident History (2006-2008) – Side Road Intersections

Intersection	Number of Accidents	Most Common Collision Type	Most Common Contributing Factor(s)
Columbia			
Woodward Road	1	Turning-Intersection Paths	Improper Turning Maneuver
Whitney Road	3	Turning-Intersecting Paths Sideswipe-Opposite Directions Fixed Object	Failed to Grant ROW Fell Asleep Improper Turning Maneuver
Hop River Road	0	N/A	
Strickland Road	0	N/A	
Edgerton Road	1	Fixed-Object	Driver Lost Control
Roses Bridge Road	1	Turning-Intersecting Paths	Violated Traffic Control
Route 66 (Middletown Road)	34	Rear-End	Following too Closely
Flanders Road	1	Fixed Object	Animal/Foreign Object
Cards Mill Road	6	Rear-End	Speed Too Fast For Conditions Failed to Grant ROW Following too Closely

As shown in Table 2-10, 102 accidents occurred at side road intersections over the three year period from 2006 to 2008. This number represents approximately 40% of all accidents. A review of statewide accident information indicates that the intersection of Route 6 and Route 66 and the intersection of Route 66 and Cards Mill Road should be evaluated in more detail relative to opportunities to improve safety. The study team assessed these intersections and two other intersections of interest (intersections that were identified as having undesirable geometric characteristics in Section 2.1.1) to understand potential accident patterns and to identify any particular site conditions that might be contributing to these patterns.

- **Notch Road at Route 6.** Eight accidents in three-year period. Notable patterns include:
 - Fixed object collisions (which are accidents defined by vehicles running off the roadway and striking roadside objects such as guardrail, rock ledge, or utility poles) constituted 50% of all accidents (4 of 8) in the three year period at this unsignalized intersection location. These four accidents were attributed to eastbound vehicles running off the left side of the roadway near Notch Road due to excessive speeds or drivers losing control. This accident pattern could be attributed to the diverge to Route 44 and Route 6 that requires driver decision and speed reduction to negotiate the Route 6 ramp that curves to the right immediately downstream of Notch Road.
 - Turning-related collisions constituted the other 50% of accidents (4 of 8) at Notch Road. Two of these accidents involved right-turning vehicles from Route 6 to Notch Road being struck from behind by through vehicles on Route 6 that were following too closely. These accidents could be attributed to high speeds in this

area and the lack of a right turn lane to Notch Road that would allow turning vehicles to decelerate outside the path of through traffic. The other two accidents involved right-turning vehicles from Notch Road to Route 6 that did not grant the right of way to the vehicles on Route 6. These accidents could be attributed to the restricted sightlines from Notch Road to the west that make it difficult for turning vehicles to perceive sufficient gaps in traffic.

- **South Street at Route 6.** Six accidents in three-year period. Notable patterns include:
 - Fixed object collisions constituted 50% of all accidents (3 of 6) in the three year period at this unsignalized intersection location. Two of these accidents were attributed to westbound vehicles running off the right side of the roadway and one was attributed to an eastbound left-turning vehicle running off the roadway and striking guardrail near South Street. All three of these accidents were attributed to excessive speeds or drivers losing control. The curvature of Route 6 near South Street could also be a factor in these accidents.
 - Turning-related collisions constituted 33% of all accidents (2 of 6). Both of these accidents were caused by vehicles turning left from South Street and colliding with through vehicles (one eastbound and one westbound) on Route 6. The relatively steep approach grade of South Street, which requires additional acceleration and time for a vehicle to complete a turn, and the left and right turn lanes on Route 6, which require additional distance and time for a vehicle to complete a turn, could be factors in these turning-related collisions involving left-turning vehicles from South Street.
- **Route 66 at Route 6.** Thirty-four accidents in three-year period. Notable patterns include:
 - Rear-end collisions constituted 59% of all accidents (20 of 34) in the three year period at this signalized intersection. The majority of these accidents (16 of 20) occurred on the Route 6 approaches to the intersection and were attributed to vehicles following too closely. Sight lines to the signal and vehicle queues on these approaches are good, but driver inattention combined with relatively high approach speeds could be factors in these accidents.
 - Turning-related collisions constituted 15% of all accidents (5 of 34). Four of these accidents involved vehicles turning left from northbound Route 66 to westbound Route 6 or from southbound Route 6 to eastbound Route 66. The northbound/southbound movements at this intersection are concurrent and the left turn movements do not occur under a protected green signal phase. The geometry of the northbound and southbound approach legs – which includes medians, two-lane approaches, and offset left turns that occur from the shared through lane on the northbound approach and exclusive left turn lane on the southbound approach – requires left turning vehicles to traverse a greater distance than usual distance to complete a turn and requires motorists to compensate for this condition by selecting larger gaps in traffic. Failure of motorists to recognize the condition could be a factor in these accidents.

- **Cards Mill Road at Route 66 East.** Six accidents in three-year period. Notable patterns include:
 - Rear-end collisions constituted 33% of all accidents (2 of 6) in the three year period at this unsignalized intersection. These accidents occurred on the heavily skewed, stop-controlled Cards Mill Road approach to Route 66 East and were attributed to vehicles following too closely. Skewed approaches like the Cards Mill Road approach are often treated by drivers (who are making the oblique turn) as yield conditions and rolling stops because little reduction in speed is required to complete the turn. Consequently, when two vehicles are approaching the intersection and the driver of the second vehicle anticipates that the driver of the first vehicle will yield rather than stop at the intersection, rear end collisions oftentimes will result.
 - One turning, one sideswipe, one overturning, and one fixed object collision constituted the other four accidents at this intersection. These accidents were attributed to excessive speeds and failure of motorists to grant the right of way. The variety in the types of collisions and these contributing factors do not indicate any other particular site condition at this intersection that should be investigated further.

Figure 2-11 and Table 2-11 detail the accident history along each roadway segment (between intersections) in the study corridor.

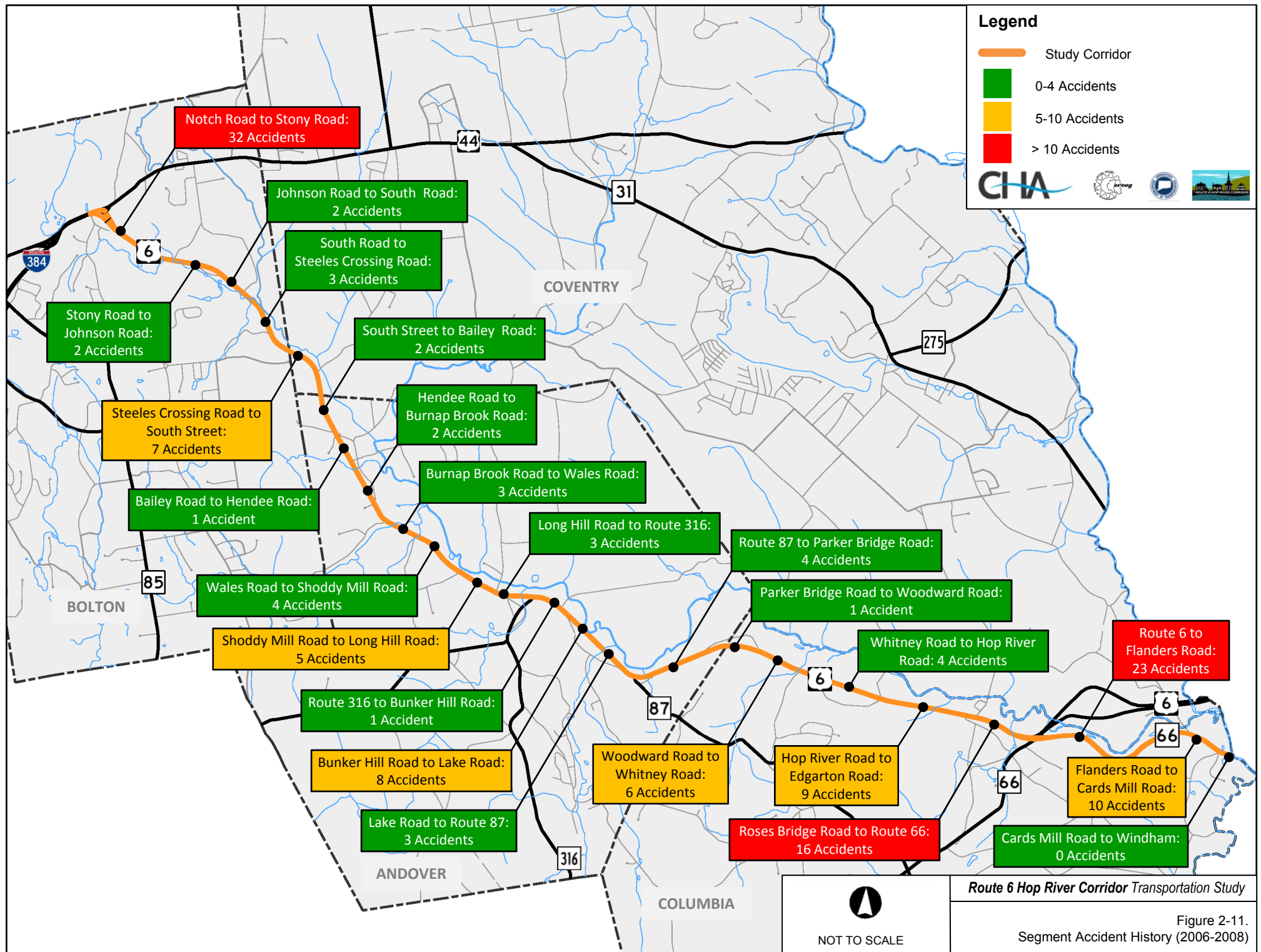


Table 2-11. Accident History (2006-2008) – Roadway Segments

Intersection	Number of Accidents	Most Common Collision Type(s)	Most Common Contributing Factor(s)
Bolton			
Notch Road to Stony Road	32	Fixed Object	Speeds Too Fast For Conditions
Stony Road to Johnson Road	2	Rear-End	Following Too Closely
Johnson Road to South Road	2	Sideswipe-Opposite Direction Rear-End	Driver Lost Control
South Road to Steeles Crossing Road	3	Rear-End	Speed too Fast For Conditions Failed to Grant ROW Following Too Closely
Steeles Crossing Road to South Street	7	Fixed Object	Fell Asleep
Coventry			
South Street to Bailey Road	2	Fixed Object Sideswipe-Opposite Direction	Driver Lost Control
Andover			
Bailey Road to Hendee Road	1	Fixed Object	Fell Asleep
Hendee Road to Aspinall Drive	0	N/A	N/A
Aspinall Drive to Burnap Brook Road	2	Fixed Object Sideswipe-Opposite Direction	Speed Too Fast For Conditions Driver Lost Control
Burnap Brook Road to Wales Road	3	Fixed Object	Speed Too Fast For Conditions Driver Lost Control Fell Asleep
Wales Road to Shoddy Mill Road	4	Fixed Object	Speed Too Fast For Conditions Following Too Closely Fell Asleep Defective Equipment
Shoddy Mill Road to Long Hill Road	5	Rear-End	Following Too Closely
Long Hill Road to Route 316 (Hebron Road)	3	Turning-Intersecting Paths	Failed to Grant ROW
Route 316 (Hebron Road) to Bunker Hill Road	1	Rear-End	Following Too Closely

Table 2-11. Accident History (2006-2008) – Roadway Segments

Intersection	Number of Accidents	Most Common Collision Type(s)	Most Common Contributing Factor(s)
Bunker Hill Road to Lake Road	8	Turning-Opposite Direction Turning-Intersecting Paths Sideswipe Same Direction	Failed to Grant ROW
Lake Road to Route 87 (Jonathan Trumbull Hwy)	3	Rear-End	Following Too Closely
Route 87 (Jonathan Trumbull Hwy) to Parker Bridge Road	4	Sideswipe Same Direction Rear-End Head On Fixed Object	Under the Influence Improper Passing Maneuver Following Too Closely Driver Lost Control
Columbia			
Parker Bridge Road to Woodward Road	1	Sideswipe-Opposite Direction	Driver Lost Control
Woodward Road to Whitney Road	6	Fixed Object	Fell Asleep
Whitney Road to Hop River Road	4	Rear-End	Following Too Closely
Hop River Road to Edgerton Road	9	Rear-End	Following Too Closely
Roses Bridge Road to Route 66	16	Turning-Intersecting Paths	Failed to Grant ROW
Route 6 to Flanders Road	23	Fixed Object	Driver Lost Control
Flanders Road to Cards Mill Road	10	Rear End Fixed Object Turning-Same Direction Turning-Intersecting Paths	Failed to grant ROW Improper Passing Maneuver Following too Closely
Cards Mill Road to Windham	0	N/A	N/A

As shown in Table 2-11, 151 accidents occurred along roadway segments between intersections over the three year period from 2006 to 2008. This number represents approximately 60% of all accidents. The study team further assessed each these segments and identified several notable accident patterns. These include:

- **Route 6 between Notch Road and Stony Road.** Thirty-two accidents occurred in the three-year period, of these:
 - Eleven accidents occurred in the Route 6/Route 44 “interchange” and were predominantly fixed object collisions attributed to excessive speeds.
 - Five accidents occurred at the Bolton Ice Palace/Munson’s driveway intersection with Route 6 and were predominantly turning-related.

- **Route 6 between Roses Bridge Road and Route 66.** Sixteen accidents occurred in the three-year period, of these:
 - Eleven accidents occurred at commercial driveways and included turning, rear-end, and sideswipe collisions.
- **Route 66 between Route 6 and Flanders Road.** Twenty-three accidents occurred in the three-year period, of these:
 - Fourteen (61%) accidents were fixed object collisions predominantly attributed to excessive speeds and drivers losing control. There were no areas where a concentration of accidents would indicate that a specific site condition has contributed to the number of fixed object collisions in this segment. The relatively narrow shoulders throughout the segment and the generally curving alignment could be contributing factors.
 - Two accidents were fatal collisions. One accident occurred at the Columbia Motorsports driveway and involved a motorcycle being struck by a truck exiting the driveway. The other accident occurred near Murphy's Drive-in and involved a head-on collision.

Although one may feel that the number of accidents along any particular segment of the Route 6 Hop River corridor might appear high, analysis of the local accident data does not suggest a deficiency in vehicular safety along any particular segment when compared to statewide accident data.

2.1.6 Incident Management

Severe accidents and other incidents in the Route 6 study corridor that result in the closure of Route 6 and the diversion of traffic from Route 6 to other local and state roadways was an expressed concern of the public and REDC members. Currently, there are no formal plans maintained by CTDOT, the Connecticut State Police, or local traffic authorities in Bolton, Coventry, Andover, or Columbia that outline how traffic is to be managed during these incidents on Route 6.

Formal diversion plans are typically developed for interstates and major expressways by CTDOT working in cooperation with the regional planning agencies and local municipalities to determine viable alternate routes for incident management. Formal diversion plans are not typically developed for other arterial roadways such as Route 6. When necessary, diversion plans for incident management on Route 6 are created and implemented by state and local officials on a case-by-case basis depending on the location of the incident and its proximity to viable alternate routes.

Whether formal diversion plans should be developed for Route 6 in the study corridor would be a point of further discussion among CTDOT, CRCOG, WINCOG, and municipal representatives. Because Route 6 in the study corridor carries a significant proportion of through traffic between the terminus of I-384 and the Route 6 expressway, there is valid reason to suggest that this section of roadway should be treated similarly to I-384 and the Route 6 expressway with respect to incident management.

The development of diversion plans for the Route 6 study corridor, whether as part of a formal planning process or in response to an immediate incident, should consider:

- The identification of viable alternate routes that can most safely and efficiently accommodate large volumes of traffic – a significant percentage of which is through traffic, and a measurable percentage of which is heavy vehicle and truck traffic. Viable alternate routes for through traffic should include other arterial roadways or major, state-maintained collector roadways. In the region, viable alternate routes include:
 - For a closure between Route 44 and Route 316, use Route 85 and Route 316 from I-384 in Bolton to Route 6 in Andover. This route would add approximately 11 miles to a trip between Route 44 and Route 316. It is noted that Route 603 (Boston Hill Road), which connects Route 85 and Route 316, was determined to be too narrow to safely accommodate high volumes of truck traffic and is therefore not considered a viable alternate in this area.
 - For a closure between Route 316 and Route 87, use Route 316 and Route 66 from Route 6 in Andover to Route 6 in Columbia. This route would add approximately 7 miles to a trip between Route 316 and Route 66.
 - For a closure between Route 87 and Route 66, use Route 87 and Route 66 from Route 6 in Columbia to the intersection of Route 6 expressway and Route 66 East, also in Columbia. This route would add approximately 1 mile to a trip between Route 87 and Route 66.
 - For a closure anywhere on Route 6 between Route 44 and Route 66, use Route 44, Route 31, and Route 32 from I-384 in Bolton to Route 6 expressway in Columbia. This route would add approximately 0.1 mile to a trip between Route 44 and Route 6 expressway.
- The need to maintain local access to Route 6. Formal diversion planning for an incident on Route 6 is different from diversion planning for an incident on a limited-access interstate because of the need to provide local access to points beyond the preferred point of diversion (for through traffic) from the main route. When an interstate is closed, all traffic is diverted to the nearest upstream exit and follows a defined detour route that is managed with temporary signs and traffic police. When a portion of Route 6 is closed, access for local traffic must be maintained up to the point of closure, which could be located beyond the preferred point of diversion for through traffic. Through motorists who receive notification in advance of the closure can divert to the most convenient and viable alternate route; through motorists who do not receive notification in advance could proceed into the corridor until the point of closure and bypass the incident along local roadways and detour routes. This latter condition is of particular concern when relatively large volumes of traffic and large trucks are using local roadways that are not designed to safely accommodate this traffic.

- The potential for timely implementation of the diversion plan that includes real-time notification of motorists in the event of an incident. Currently, there are no permanent alert systems (variable message signs or highway emergency radio signs) deployed on eastbound I-384 or westbound Route 6 expressway approaching the Route 6 corridor that could be used to inform motorists of incidents, road closures, or alternate routes. It is noted that CTDOT's current policy regarding variable message signs (VMSs) is that interstate and expressway VMSs are not used to display messages regarding conditions on adjacent or intersecting arterial roadways. Under this policy, signs deployed to the approach roadways would not be used to display Route 6 conditions.

It is noted that the development of a formal diversion plan for the Route 6 study corridor would be contingent upon a decision by state, regional, and local stakeholders regarding the need for a formal plan and further discussion on the applicability of a plan to a non-expressway/non-interstate route; the feasibility of implementing a plan that is targeted to the diversion of through traffic to other major roadways while maintaining local traffic access to Route 6; and the costs associated with developing a plan and deploying new infrastructure (such as permanent VMSs) to ensure its effectiveness.

2.2 Resources

The study team identified and reviewed environmental, historic, cultural, and visual resources in the study corridor. These resources are generally considered constraints that could affect the feasibility of various improvement alternatives in the corridor. Potential impacts to these resources will be avoided where possible. More specific environmental evaluations and documentation will be completed in accordance with CEPA and NEPA requirements under subsequent initiatives as study recommendations are advanced to design and implementation.

2.2.1 Environmental Resources

Environmental resources (shown in Figure A2-4 in Appendix 2.7) in the study corridor include:

- **Hop River and associated tributaries and floodplains.** The Hop River generally runs parallel to, and north of, the study corridor beginning in Bolton north of Route 6 and west of Stony Road and terminating at the Willimantic River. The Hop River crosses to the south side of Route 6 and back between Stony Road and Steeles Crossing Road in Bolton. Several tributaries are also conveyed under Route 6 in the study area. Potential impacts to the Hop River floodplain need to be avoided or minimized. The Hop River's regulatory floodway will also need to be avoided or spanned in order to ensure that any increases in water surface elevations do not occur as a result of the improvement recommendations.
- **Wetland Soils.** Wetland soils are located throughout the study corridor and are generally associated with the floodplains of the Hop River and its tributaries.

- **Natural Diversity Data Base (NDDDB) Areas.** NDDDB Areas represent known locations, of state listed species and significant natural communities. NDDDB Areas are a generalized representation of species and community locations; the exact locations and species names are masked to protect sensitive species from collection and disturbance.⁸ Four sections of the Route 6 study corridor pass through NDDDB Areas, including locations in Bolton (at Route 44), Andover, and Columbia (at Route 66).

2.2.2 Historic and Cultural Resources

Historic and cultural resources in the study corridor were identified and documented under the REDC's *Route 6 Hop River Corridor Economic Development Strategy and Master Plan Study* (shown in Figure A2-5 in Appendix 2.8). These resources include:

- Patriot Farm at Steeles Crossing Road in Bolton
- Former White's Tavern
- Washington Rochambeau Revolution Route and Stone Monument at the Post Farm
- Post Farm and barns
- Two farmhouses located on the north side of Route 6 just east of Wales Road
- Andover Library, First Congregational Church, and Andover Museum in Historic Andover
- "Dog Pound" structure
- Cemetery at the First Church and War Memorial at Route 316
- Baptist Church at Roses Bridge Road
- Lighthouse building in the southwest quadrant of the Route 6 and Route 66 intersection

2.2.3 Visual Resources

Significant views that are known to be important to the communities were identified and documented under the REDC's *Route 6 Hop River Corridor Economic Development Strategy and Master Plan Study*. In addition, the REDC determined several locations where gateways should be established to improve the visual appeal of the corridor. These significant views and gateway locations (shown in Figure A2-6 in Appendix 2.9) include:

- **Significant Views:**
 - Patriot Farm at Steeles Crossing Road in Bolton
 - Historic houses at Post Farm and M. Dion properties in Andover
 - Historic Andover view of First Congregational Church and library
 - Farmland views of Post Farm and Hutchinson Farm in Andover
 - Open meadow wetlands view in Columbia at the Columbia Garage
- **Gateway Locations:**
 - Bolton Notch in Bolton
 - Route 6 and Route 66 intersection in Columbia
 - Route 66 East near Windham Town Line in Columbia

⁸ http://cteco.uconn.edu/guides/Natural_Diversity_Database.htm

3

Future Conditions Assessment

The purpose of the future conditions assessment was to evaluate the potential effects of vehicular traffic growth in the study area over the future (year 2030) planning horizon. By understanding the potential effects of traffic growth on operations and mobility in the Route 6 Hop River corridor, local, regional, and state officials and policy-makers can make informed decisions about the future needs and priorities of the corridor relative to improving transportation systems and enacting land use policies that will help mitigate traffic growth over time.

There are two primary components of growth that will contribute to the overall traffic growth in the study corridor. One component is regional growth, which accounts for new traffic demand throughout the regional roadway network that is associated with projected changes in land use and demographics (such as population, employment, households, and other census-based data) in areas beyond the study corridor. A second component of growth is localized growth, which accounts for new traffic demand generated by planned or potential new developments within the immediate study corridor. Both components of growth were forecasted by the Capitol Region Council of Governments' travel demand model. For this study, the localized growth component of the travel demand model was tailored to reflect the anticipated future development potential of the Route 6 Hop River corridor assuming a proposed Corridor Zone has been implemented.

3.1 Future Development Potential

The study team worked closely with members of the Regional Economic Development Council (REDC) to develop and refine a future development model that was used to approximate the development potential of the Route 6 Hop River corridor. The future development model consisted of a database of existing parcels in the corridor with inputs for future development density, future land use, and percent-developed by 2030. The parcel database included attributes for total land area, existing development area, existing site constraints (such as wetland and steep slope areas), existing land use, existing zoning, and a proposed zoning district assigned to each parcel. The existing parcel data was determined from available GIS data, aerial mapping, and field reconnaissance. The proposed zoning district assigned to each parcel was based on its location within the proposed Corridor Zone developed and defined under the REDC's previous *Route 6 Hop River Corridor Economic Development Strategy and Master Plan Study* (see Section 1.2.2 for details about this study). The proposed zoning districts that comprise the proposed Corridor Zone and the limits of the Corridor Zone are illustrated in Figure A3-1 in Appendix 3.1. The limits of the future development model correspond to the limits of the proposed Corridor Zone. By assuming that future development will generally occur within the proposed Corridor Zone, the outputs of this model reflect the desire of the REDC to encourage future development within the limits of this zone.



The future development model was designed to calculate the area of development (reported in square feet, sf, of floor area) that could be realized in the Route 6 Hop River corridor by 2030, and the total area that could be realized at full build-out. The total area of development was calculated by multiplying the net buildable area¹ of each parcel within the Corridor Zone by an average expected floor area ratio (FAR)² for the parcel. The FAR for each parcel was assigned based on the proposed zoning district within which it will be located. A unique FAR value corresponding to each of the five zoning districts that comprise the proposed Corridor Zone was estimated based on the proposed bulk requirements and input from REDC members.

The future development model was also designed to calculate area of development in terms of the future land uses that could comprise this development. Because land use is a key variable in determining the traffic generation potential of future development, the future development model can readily demonstrate how adjusting the composition of land uses can affect potential traffic generation. Each of the five zoning districts within the proposed Corridor Zone was assigned an assumed composition of future land uses based on input from REDC members.

Table 3-1 summarizes the future development model inputs for FAR and composition of future land uses that were assigned to each of the five zoning districts.

Table 3-1. Future Development Model Inputs for FAR and Composition of Land Uses

Zoning District	FAR	Composition of Land Uses				
		Retail	Warehouse/ Lt. Industry	Gen. Office, Commercial	Corporate Office	Residential
Village Node	0.30	33%	0%	34%	0%	33%
Business/Corporate Park	0.23	0%	15%	35%	50%	0%
Transition Area	0.13	45%	0%	45%	0%	10%
Conservation Area	0.09	0%	0%	34%	33%	33%
Residential	0.08	0%	0%	0%	0%	100%

The total development potential for the Route 6 Hop River corridor that was calculated for the inputs shown in Table 3-1 is approximately 7.1 million sf. This total includes approximately:

- 1.6 million sf in Bolton
- 900,000 sf in Coventry
- 2.6 million sf in Andover
- 2.0 million sf in Columbia

¹ Net Buildable Area: Equal to the total land area of a parcel less areas occupied by wetlands and steep slopes (net usable area), and less areas required for future rights-of-way and open space set-asides (assumed to be 5% and 10% of net usable area, respectively).

² Floor Area Ratio (FAR): The ratio of gross square footage of floor space of a development to the square footage of a lot. For example, a one-story building with a building footprint of 10,000 square feet (sf) situated on a 40,000 sf lot has an FAR value of 0.25. A two-story building with the same footprint has an FAR value of 0.5 (20,000 sf of gross floor space divided by 40,000 sf of lot).

Based on recent and historic development trends in the corridor, the study team and REDC members estimated that approximately 5% of the total development potential of the Corridor Zone will be realized by 2030. The remaining 95% will be realized by some indeterminate future year. Table 3-2 summarizes the total development potential and 2030 development potential for the Route 6 Hop River corridor reported in terms of the potential future land uses in each town.

Table 3-2. Future Development Potential

Town	Development Area (sf)		2030 Development Area by Land Use (sf)				
	Total	By 2030	Retail	Warehouse/ Lt. Industry	Gen. Office, Commercial	Corporate Office	Residential
Bolton	1,600,000	82,000	20,000	3,500	28,000	11,500	19,000
Coventry	900,000	43,000	14,300	0	14,400	0	14,300
Andover	2,600,000	130,000	3,000	10,000	32,500	39,500	45,000
Columbia	2,000,000	99,000	5,000	10,000	33,500	38,500	12,000
Total	7,100,000	354,000	42,300	23,500	108,400	89,500	90,300

As shown in Table 3-2, the overall composition of new development by 2030 in the Route 6 Hop River corridor is expected to be approximately:

- 31% general office and commercial
- 25% corporate office
- 25% residential
- 12% retail
- 7% warehouse and light industry

In terms of future traffic generation potential, general commercial and office uses generate approximately half the number of afternoon peak hour traffic trips that retail uses generate for the same amount of floor space. Warehouse and light industry uses generate approximately half the number of traffic trips that general commercial and office uses generate, though a relatively high proportion of these trips can be heavy vehicle and truck trips. Residential uses also generate significantly fewer traffic trips than both retail and general commercial and office uses for comparable floor space (note – residential trip generation is based on dwelling units, not floor space, so a conversion factor is required to compare trip generation values). Consequently, providing a mix of land uses that favor residential, and general office and commercial uses, while moderating retail and industrial uses, will help mitigate overall traffic generation and will help limit the volume of new truck traffic in the corridor. Additionally, providing a mix of land uses that are within close proximity of each other and that are conveniently accessible via other modes of travel (walking, bicycling, and transit) will help mitigate overall traffic generation by increasing park-once-and-walk opportunities within new development areas; facilitating non-motorized trips to, from, and within developments; and better accommodating transit riders.

3.2 Future Traffic Analysis

The future (2030) traffic analysis for this study used traffic volume forecasts developed by CRCOG to determine how traffic operations at key intersections in the corridor could be affected by future traffic growth. This section of the report provides a summary of the anticipated future traffic growth in the Route 6 Hop River corridor and an analysis of the resultant traffic operations.

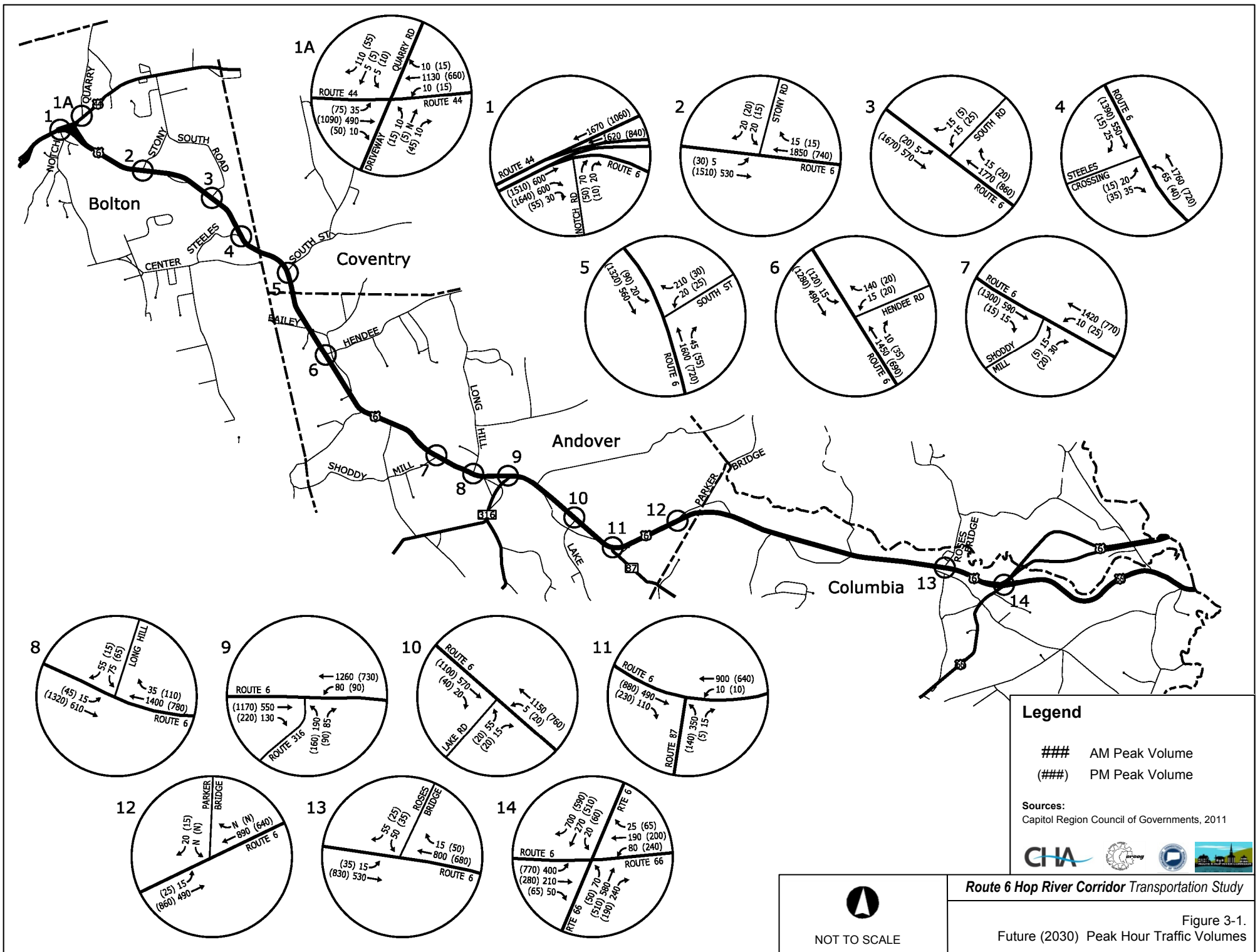
3.2.1 Traffic Volume Forecasts

The Capitol Region Council of Governments (CROG) developed the traffic forecast for the Route 6 Hop River study corridor using their CROG-maintained travel demand model. The travel demand model is a complex planning tool used to understand travel behavior and trips. It consists of a series of mathematical equations that represent travel choices within the regional transportation network. Trips are assigned to the network based on the shortest calculated travel times between trip origins and destinations. As traffic volumes increase and cause decreasing speeds on roadways in the network, the travel demand model reassigns trips to the network according to the shortest travel time for each trip. The number of trips on the network changes as demographic and land use factors (such as population, employment, and number of households) change over time with development in the region.

For this study, CROG forecasted traffic for a future condition that reflects regional growth – associated with projected changes in land use and demographics in the region and state – and localized growth – associated with the potential new development area in the study corridor of 354,000 sf (see Section 3.1, Table 3-2 for details). The morning (AM) and afternoon (PM) peak hour volumes forecasted by CROG’s travel demand model are shown in a traffic volume diagram in Figure 3-1. Tables 3-3 and 3-4 summarize the forecasted traffic growth along key segments of the study corridor for the AM and PM future conditions, respectively. This forecasted traffic growth is also illustrated in Figures 3-2 and 3-3.

As shown in Tables 3-3 and 3-4, both the AM and PM peak hour traffic volumes on Route 6 are expected to grow between 21% and 36% by 2030. In general, growth is highest at the western end of the study corridor and decreases moving easterly. On Route 66 East, growth is expected to be approximately 14% by 2030. The overall traffic growth by 2030 translates to annual traffic increases of approximately:

- 1.5% between Notch Road and South Street
- 1.0% to 1.5% between South Street and Roses Bridge Road
- 0.5% to 1.0% between Roses Bridge Road and Windham Town Line



Route 6 Hop River Corridor Transportation Study

Figure 3-1.
Future (2030) Peak Hour Traffic Volumes

Table 3-3. AM Peak Hour Growth Summary – Future Condition

Location	AM Peak Hour Vol.		Approx. Change	
	Existing	Future	Net Volume	%
Route 6				
Between Notch Road & Stony Road	1690	2410	+ 640	+ 36.2%
Between Stony Road & South Road	1880	2360	+ 625	+ 36.0%
Between South Road & Steeles Crossing Road	1580	2355	+ 610	+ 35.0%
Between Steeles Crossing Road & South Street	1610	2390	+ 605	+ 33.9%
Between South Street & Hendee Road	1620	2085	+ 475	+ 29.5%
Between Hendee Road & Shoddy Mill Road	1640	2040	+ 455	+ 28.7%
Between Shoddy Mill Road & Long Hill Road	1680	2090	+ 525	+ 33.5%
Between Long Hill Road & Route 316	1750	2150	+ 515	+ 31.5%
Between Route 316 & Lake Road	1505	1800	+ 390	+ 27.7%
Between Lake Road & Route 87	1490	1840	+ 380	+ 26.0%
Between Route 87 & Parker Bridge Road	1240	1415	+ 280	+ 24.7%
Between Parker Bridge Road & Roses Bridge Road	1290	1410	+ 265	+ 23.1%
Between Roses Bridge Road & Route 66	1630	1630	+ 280	+ 20.7%
Route 66 East				
Between Route 6 & Windham Town Line	680	775	+ 95	+ 14.0%

Table 3-4. PM Peak Hour Growth Summary – Future Condition

Location	PM Peak Hour Vol.		Approx. Change	
	Existing	Future	Net Volume	%
Route 6				
Between Notch Road & Stony Road	1690	2305	+ 615	+ 36.4%
Between Stony Road & South Road	1880	2560	+ 680	+ 36.2%
Between South Road & Steeles Crossing Road	1580	2140	+ 560	+ 35.4%
Between Steeles Crossing Road & South Street	1610	2150	+ 540	+ 33.5%
Between South Street & Hendee Road	1620	2100	+ 480	+ 29.6%
Between Hendee Road & Shoddy Mill Road	1640	2110	+ 470	+ 28.7%
Between Shoddy Mill Road & Long Hill Road	1680	2160	+ 480	+ 28.6%
Between Long Hill Road & Route 316	1750	2290	+ 540	+ 30.9%
Between Route 316 & Lake Road	1505	1920	+ 415	+ 27.6%
Between Lake Road & Route 87	1490	1880	+ 390	+ 26.2%
Between Route 87 & Parker Bridge Road	1240	1550	+ 310	+ 25.0%
Between Parker Bridge Road & Roses Bridge Road	1290	1580	+ 290	+ 22.5%
Between Roses Bridge Road & Route 66	1630	1975	+ 345	+ 21.2%
Route 66 East				
Between Route 6 & Windham Town Line	925	1055	+ 130	+ 14.1%

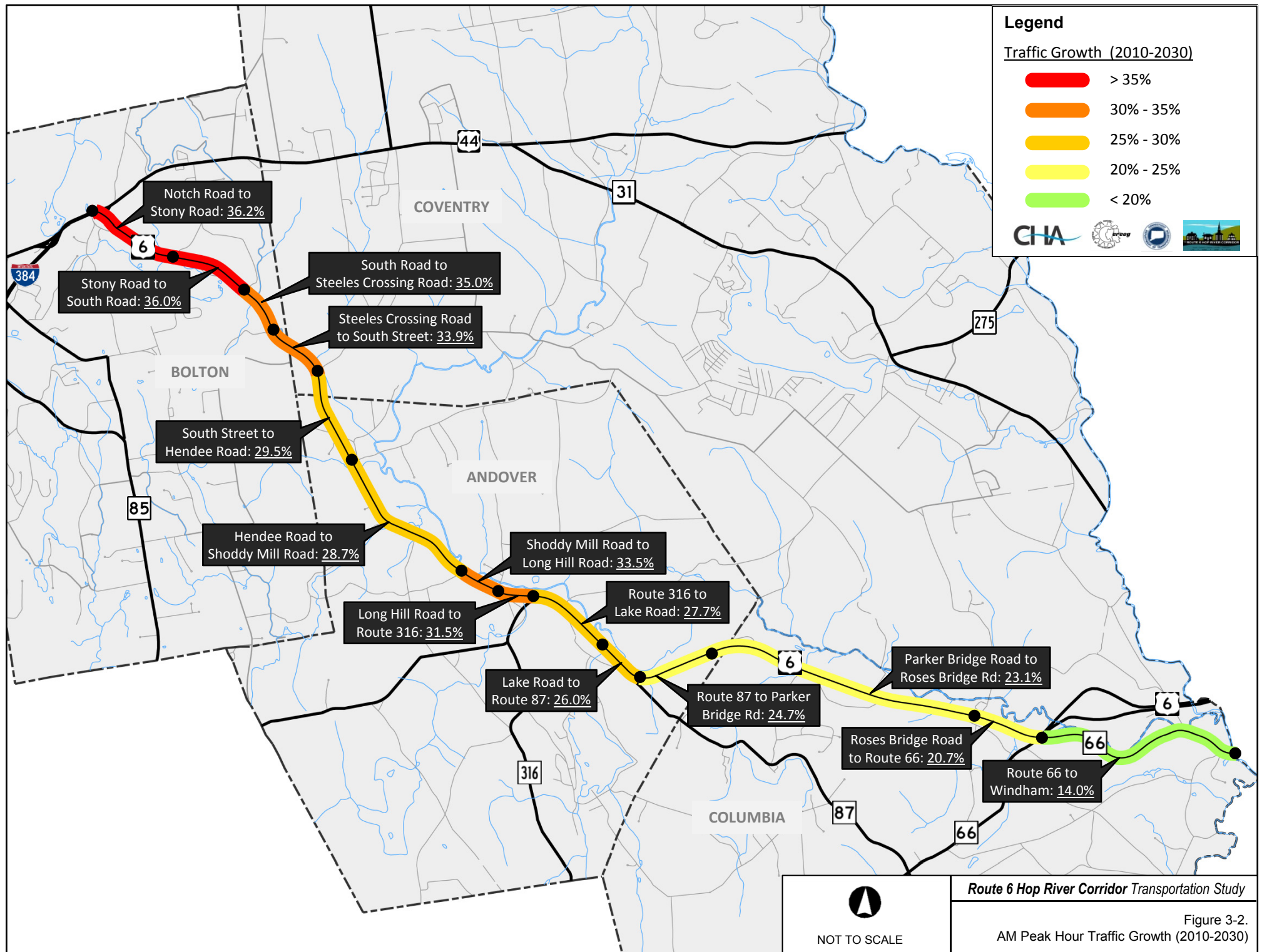


Figure 3-2.
AM Peak Hour Traffic Growth (2010-2030)

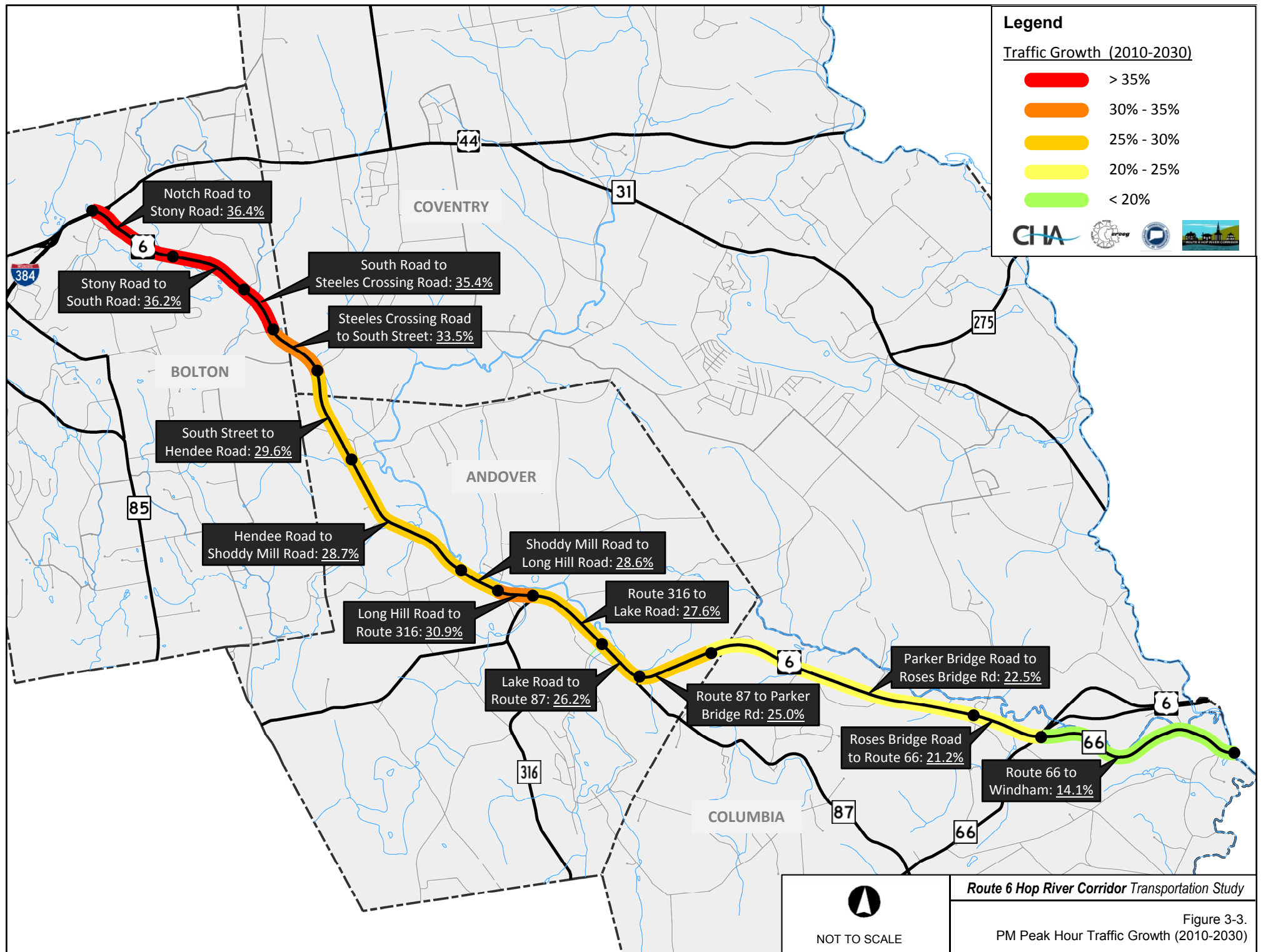


Figure 3-3.
PM Peak Hour Traffic Growth (2010-2030)

3.2.2 Traffic Operations

The study team evaluated future traffic operations in the Route 6 Hop River corridor by determining levels of service (LOS) at the study intersections. LOS is based on the average delay (in seconds per vehicle, sec/veh) that motorists experience while traveling through the intersection. LOS can be determined for individual movements at signalized and unsignalized intersections, and for each signalized intersection as a whole. For this study, intersection operations of LOS D or better are considered acceptable.

LOS values for intersections and roadway segments can range from A to F with LOS A representing the best operational conditions. LOS F represents generally congested, unacceptable conditions.

The study team determined the LOS for each of the 14 study intersections to provide a measure of the future traffic operations at these intersections. The LOS for each intersection was determined by completing capacity analyses using the future AM and PM peak hour turning movement volumes forecasted by CRCOG and SYNCHRO software. The AM and PM peak hour traffic operations are summarized in Table 3-5 and illustrated in Figure 3-4 (AM) and Figure 3-5 (PM).

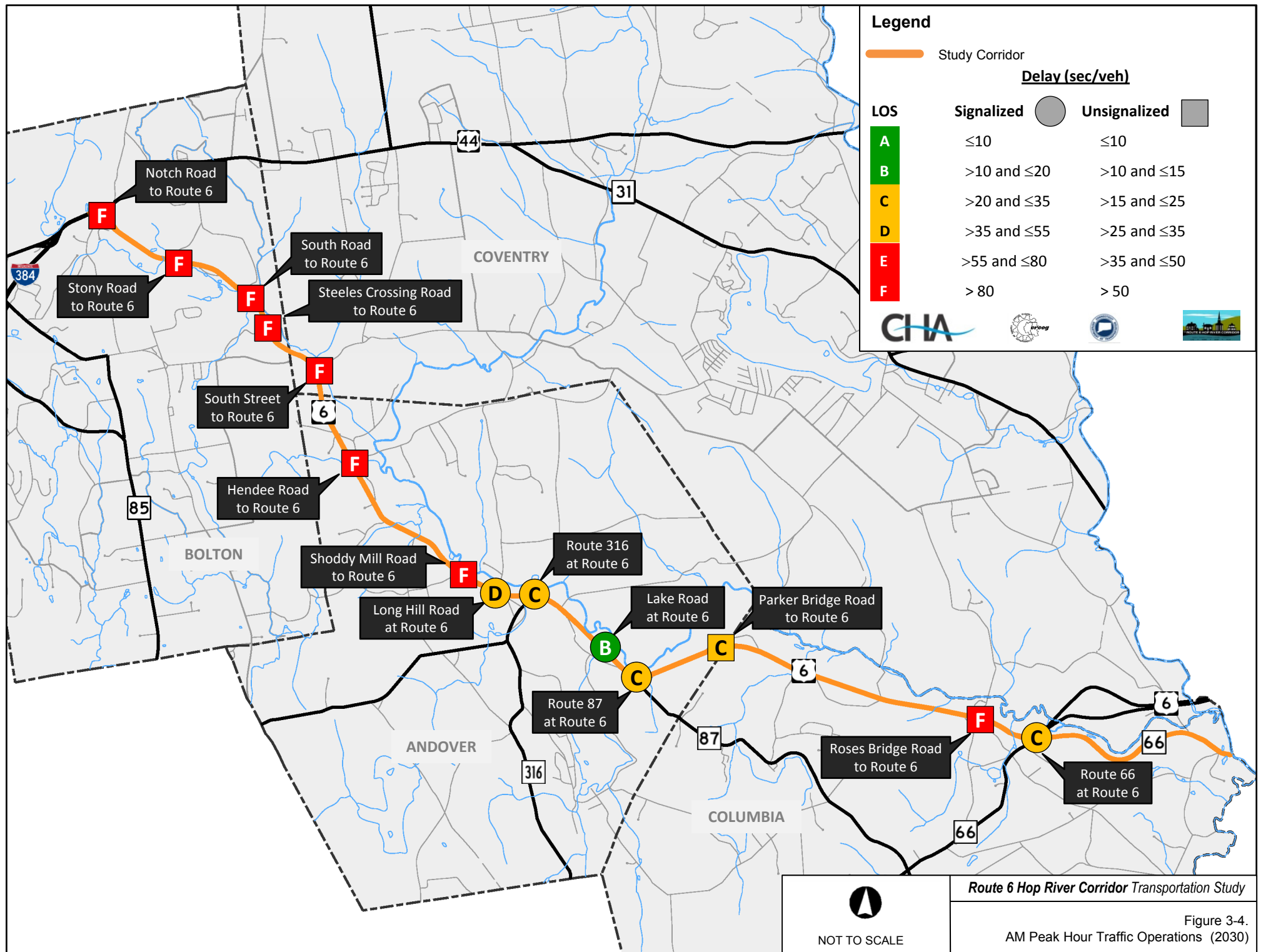
Table 3-5. AM and PM Peak Hour Traffic Operations – Future Condition

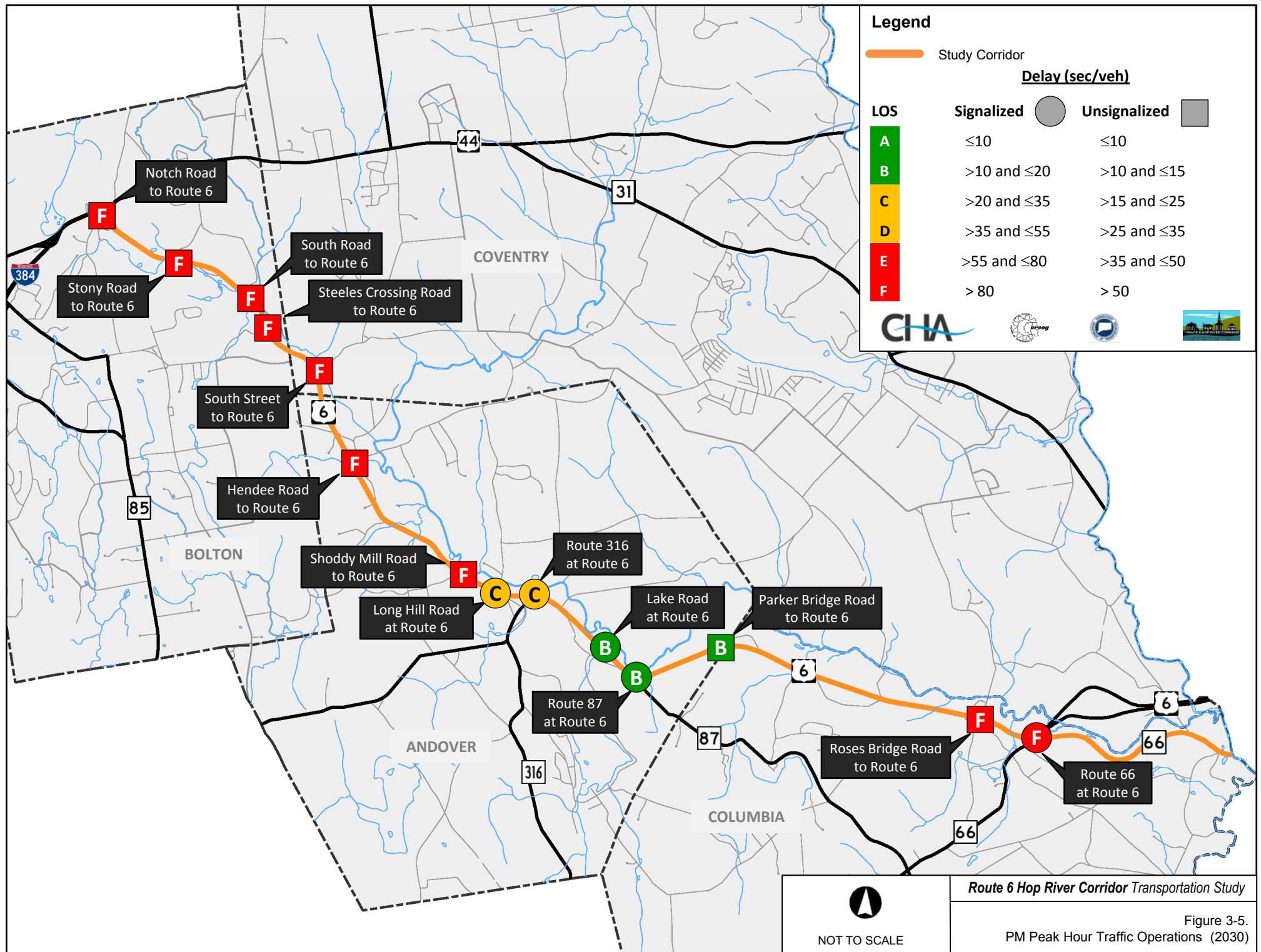
Intersection/Direction	AM Peak Hour		PM Peak Hour	
	LOS	Avg. Delay (sec/veh)	LOS	Avg. Delay (sec/veh)
Route 6/44 at Notch Road, Bolton (unsignalized)				
Northbound Right – Notch Road	F	- ¹	F	- ¹
Route 6 at Stony Road, Bolton (unsignalized)				
Eastbound Left – Route 6	C	24.2	B	10.2
Southbound – Stony Road	F	- ¹	F	377.3
Route 6 at South Road, Bolton (unsignalized)				
Eastbound Left – Route 6	C	18.0	B	10.3
Southbound – South Road	F	527.2	F	1194.9
Route 6 at Steeles Crossing Road, Bolton (unsignalized)				
Westbound Left – Route 6	A	9.6	B	14.3
Northbound – Steeles Crossing Road	F	618.9	F	344.7
Route 6 at South Street, Coventry (unsignalized)				
Eastbound Left – Route 6	C	17.5	B	13.1
Southbound – South Street	F	- ¹	F	- ¹
Route 6 at Hendee Road, Andover (unsignalized)				
Eastbound Left – Route 6	C	15.2	B	10.9
Southbound – Hendee Road	F	352.1	F	283.1
Route 6 at Shoddy Mill Road, Andover (unsignalized)				
Westbound Left – Route 6	A	9.0	B	13.3
Northbound – Shoddy Mill Road	F	112.2	F	79.3

¹Long Delay, SYNCHRO software outputs error message.

Table 3-5. AM and PM Peak Hour Traffic Operations – Future Condition

Intersection/Direction	AM Peak Hour		PM Peak Hour	
	LOS	Avg. Delay (sec/veh)	LOS	Avg. Delay (sec/veh)
Route 6 at Long Hill Road, Andover				
Eastbound – Route 6	A	4.6	C	25.7
Westbound – Route 6	E	70.1	B	12.1
Southbound – Long Hill Road	E	60.8	D	48.4
Overall	D	50.8	C	21.5
Route 6 at Route 316 (Hebron Road), Andover				
Eastbound – Route 6	A	8.0	D	38.6
Westbound – Route 6	D	39.4	B	10.0
Northbound – Route 316	D	38.7	D	37.4
Overall	C	30.3	C	29.2
Route 6 at Lake Road, Andover				
Eastbound – Route 6	A	4.9	B	14.3
Westbound – Route 6	B	15.5	A	3.7
Northbound – Lake Road	D	35.3	C	26.7
Overall	B	13.1	B	10.7
Route 6 at Route 87 (Jonathan Trumbull Highway), Andover				
Eastbound – Route 6	A	9.3	A	9.9
Westbound – Route 6	C	29.2	A	5.8
Northbound – Route 87	D	46.7	C	28.7
Overall	C	26.4	B	10.0
Route 6 at Parker Bridge Road, Andover (unsignalized)				
Eastbound Left – Route 6	B	11.3	A	9.2
Southbound – Parker Bridge Road	C	21.0	B	14.2
Route 6 at Roses Bridge Road, Columbia (unsignalized)				
Eastbound Left – Route 6	B	10.6	A	9.8
Southbound – Roses Bridge Road	F	93.5	F	99.3
Route 6 at Route 66 (Middletown Road), Columbia				
Eastbound – Route 6	D	51.9	F	116.1
Westbound – Route 66 East	E	68.6	F	172.3
Northbound – Route 66	C	21.7	E	60.7
Southbound Right – Route 6	A	9.0	C	24.7
Overall	C	29.3	F	82.3





As shown in Table 3-5, overall operations are generally expected to be acceptable at each of the signalized intersections with the exception of the Route 6 and Route 66 intersection, which is expected to operate at LOS F during the PM peak hour. Operations at the unsignalized intersection approaches to Route 6 are generally expected to be unacceptable, operating at LOS F with significant delays at all but one location.

The following intersections and intersection approaches are expected to operate at LOS E or F during the AM or PM peak hour:

Signalized Intersections

- Route 6 at Long Hill Road, Andover
 - Westbound Route 6 – LOS E during the AM peak hour. The 95th percentile queue length is approximately 1600 ft, which extends to a point immediately west of the intersection of Route 6 and Route 316.
 - Southbound Long Hill road – LOS E during the AM peak hour. The 95th percentile queue length is approximately 135 ft.
- Route 6 at Route 66 (Middletown Road), Columbia
 - Eastbound Route 6 – LOS F during the PM peak hour. The eastbound left turn movement from Route 6 to the Route 6 expressway experiences significant delay and long traffic queues (approximately 1000 ft for the 95th percentile queue) which results in the overall eastbound approach movement being LOS F. The left turn queue extends beyond the beginning of the through lane and right turn lane tapers and can impede the progression of through and right-turning vehicles.
 - Westbound Route 66 East – LOS E during the AM peak hour, LOS F during the PM peak hour. The westbound through/right turn lane experiences significant delay and long queues (approximately 300 ft for the 95th percentile queue) during the AM peak hour. Both the westbound left turn and through/right turn lanes experience significant delays and long queues (approximately 400 ft and 430 ft, respectively) during the PM peak hour. None of the queues that occur during the AM or PM peak period are long enough to block or impede the progression of vehicles in adjacent lanes.
 - Northbound Route 66 – LOS E during the PM peak hour. Both the through/left turn and through/right turn lanes experience significant delays and long queues (approximately 440 ft per lane for the 95th percentile queue). The queues extend past the driveway for the Columbia Park and Ride located in the southwest corner of the intersection and can make egress for left-turning vehicles more difficult during the peak.
 - Because of the skew of the intersection, the eastbound Route 6 and westbound Route 66 movements require their own phase to prevent conflicts between the opposing left turn movements, resulting in longer traffic delays.

Unsignalized Intersections

- Route 6 at Notch Road, Bolton
 - Northbound Notch Road – LOS F during the AM and PM peak hours
- Route 6 at Stony Road, Bolton
 - Southbound Stony Road – LOS F during the AM and PM peak hours
- Route 6 at South Road, Bolton
 - Southbound South Road – LOS F during the AM and PM peak hours
- Route 6 at Steeles Crossing Road, Bolton
 - Northbound Steeles Crossing Road– LOS F during the AM and PM peak hours
- Route 6 at South Street, Coventry
 - Southbound South Street – LOS F during the AM and PM peak hours
- Route 6 at Hendee Road, Andover
 - Southbound Hendee Road – LOS F during the AM and PM peak hours
- Route 6 at Shoddy Mill Road, Andover
 - Northbound Shoddy Mill Road – LOS F during the AM and PM peak hours
- Route 6 at Roses Bridge Road, Columbia
 - Southbound Roses Bridge Road – LOS F during AM and PM peak hours

Based upon the results of the future traffic operations analyses, traffic capacity improvements might be required to accommodate forecasted traffic demands at the Long Hill Road intersection and Route 6 and Route 66 intersection.

Additionally, it is important to note that despite the relatively low volumes of traffic on the unsignalized side road approaches to Route 6, long delays and unacceptable levels of service result from the relatively high volumes of through traffic on Route 6 that limit the availability and size of gaps in traffic for vehicles entering Route 6 from side roads. These long delays present safety issues when drivers become impatient and attempt to enter traffic before it is safe to do so.

4

Recommendations

This section presents detailed recommendations for transportation improvements and land use strategies in the Route 6 Hop River corridor. These recommendations were developed to address identified needs and issues as they relate to vehicular and multimodal safety, mobility, and accessibility in the corridor; and to build upon and complement the recommendations of the Regional Economic Development Council's recently-completed *Route 6 Regional Economic Development Strategy and Master Plan Study* (REDC, 2010; hereafter referred to as *REDC's 2010 Study*).

For the purposes of this plan, the recommendations are organized and presented in four general categories including:

- **'Focus Area' Recommendations** (described in Section 4.1). Five locations in the Route 6 Hop River corridor were identified by stakeholders as focus areas for in-depth study. The improvements and strategies developed for these focus areas propose to significantly change the character of Route 6 and/or adjacent land uses in order to address transportation issues, and to complement long-term visions for these areas that were developed under the REDC's 2010 Study. The focus area recommendations are generally comprehensive in that they address all of the various safety, mobility, and accessibility issues within the focus area.
- **Other Access and Safety Recommendations** (described in Section 4.2). These recommendations address specific vehicular access and safety needs at side roads, along Route 66 East, and other locations outside the limits of the five focus areas. These recommendations also address access management and incident management issues in the corridor.
- **Multimodal Recommendations** (described in Section 4.3). These recommendations address specific needs relative to pedestrian, bicycle, transit, and Hop River Trail facilities in the corridor. Some of the recommendations address multimodal needs within the focus areas, but these recommendations are generally more short term and could be implemented independently of the focus area improvements.
- **Green Infrastructure Recommendations** (described in Section 4.4). These recommendations address the importance of incorporating environmentally-sensitive design elements into the future roadway and development projects that are ultimately constructed in the study corridor.

Taken as a whole, the recommendations of this plan will support the long-term viability of the corridor as a regional transportation link and economic growth opportunity. However, as a whole, the recommendations will require many years and significant capital investment to implement. How these recommendations can be implemented over time as a series of projects is discussed in Section 5, *Implementation Plan*.

4.1 'Focus Area' Recommendations

Five locations in the Route 6 Hop River corridor were identified by stakeholders as focus areas for in-depth study. These focus area locations are shown in Figure 4-1 and include:

- Bolton Notch.** Located at the junction of Route 6 and Route 44 in Bolton. Bolton Notch was identified as a focus area because of its importance as the western gateway to the Route 6 corridor and because of the Town of Bolton's expressed priority of addressing safety at the Notch Road intersection, and providing full directional access between Notch Road, Route 44, and Route 6. A number of improvement concepts were vetted for this location, each of which investigated alternative configurations to the existing Route 6/Route 44 intersection. Ultimately, the preferred concept¹ for Bolton Notch (described in Section 4.1.2) retains the interchange nature of the intersection to maintain traffic capacity and mobility, while modifying the layout to improve safety for Notch Road and to improve overall connectivity between routes and modes in this area.

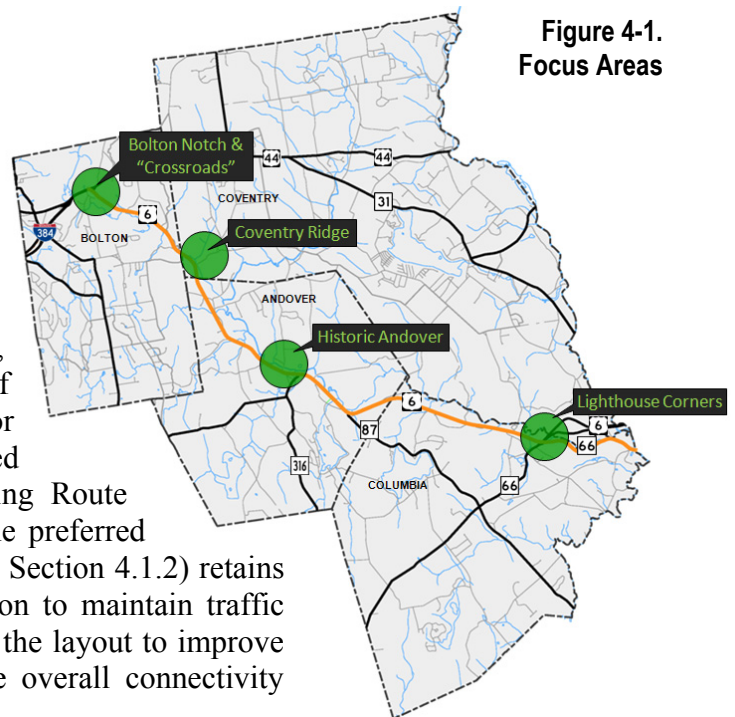


Figure 4-1.
Focus Areas

- Bolton Crossroads.** Located at and around Bolton Ice Palace and Munson's Chocolates in Bolton. The *Crossroads* moniker for this area was a product of REDC's 2010 Study, which included recommendations for a future development node here as part of the study's Corridor Master Plan. Crossroads was identified as a focus area of this study because of a recognized opportunity to significantly change the character of Route 6 in this area to help create a village context for future transportation and development. The preferred concept for Crossroads (described in Section 4.1.3) includes recommendations for new local streets and physical changes to Route 6 that will accommodate and support a future development node in this area.
- Coventry Ridge.** Located west of South Street and north of Route 6 in Coventry. REDC's 2010 Study included recommendations for a future development node on a large, undeveloped parcel located north of Route 6 in Coventry. *Coventry Ridge*, as the node was termed, was identified as a focus area of this study to assess site access opportunities from Route 6. The preferred concept (described in Section 4.1.4) includes recommendations for site access to be provided from a new South Street alignment.

See Section 4.1.1 for details on creating village context in the Route 6 Hop River corridor.

¹ Preferred concepts, as they are referred to in this document, were selected as "preferred" by REDC representatives after a thorough assessment of alternative concepts in each of the focus areas. The development of the concepts was carried out through an iterative planning process involving direct input from the REDC, CRCOG, CTDOT, and local stakeholders. See Appendix 5.1 for a Concept Development Summary, including discussion on other alternatives in Bolton Notch, Historic Andover, and Lighthouse Corners focus areas.

- **Historic Andover.** Located west of Long Hill Road and north of Route 6 in Andover. REDC's 2010 Study included recommendations for a future development node in Historic Andover as part of the study's Corridor Master Plan, though no specific development concepts were proposed. This area was identified as a focus area of this study because of a recognized opportunity to significantly change the character of Route 6 in Historic Andover to help create a village context for future transportation and development opportunities. Several concepts were vetted for this location, including alternatives to realign a short segment of Route 6 in this area. Ultimately, the preferred concept for Historic Andover (described in Section 4.1.5) includes recommendations for several new local streets and changes to existing Route 6 that will accommodate and support a future development node in this area and provide future opportunities to enhance the village and its connectivity to the nearby Hop River Trail.
- **Lighthouse Corners.** Located at the intersection of Route 6 and Route 66 in Columbia. The *Lighthouse Corners* moniker for this area was a product of REDC's 2010 Study, which included recommendations for a future development node here as part of the study's Corridor Master Plan. Lighthouse Corners was identified as a focus area of this study because of safety issues and a high accident history at the existing intersection. Like Historic Andover and Bolton Crossroads, there is a recognized opportunity to significantly change the character of Route 6 to help create a village context for future transportation and development opportunities at Lighthouse Corners, while also creating an aesthetic gateway to the corridor. The preferred concept for Lighthouse Corners (described in Section 4.1.6) includes recommendations for a modern two-lane roundabout to replace the existing signalized intersection, and recommendations for new local streets and changes to Route 6 that will accommodate and support a future development node in this area.

4.1.1 Creating Village Context

The Bolton Crossroads, Historic Andover, and Lighthouse Corners focus areas all include recommendations to create village context for future transportation and development opportunities along Route 6. The purpose of creating village context in these discrete areas is to effect changes in driver behavior that will translate to slower speeds and safer travel conditions on Route 6, making these areas more attractive and accessible for development, and making them more bicycle and pedestrian-friendly. Achieving the village context as it is envisioned in each of these three focus areas will require significant changes to both the adjacent land uses and the supporting roadway network that will occur gradually over time.



The REDC identified the character of New Hartford's village center, located along Route 44 in Connecticut, as a desirable model for the character of future village areas along Route 6.

Land Uses

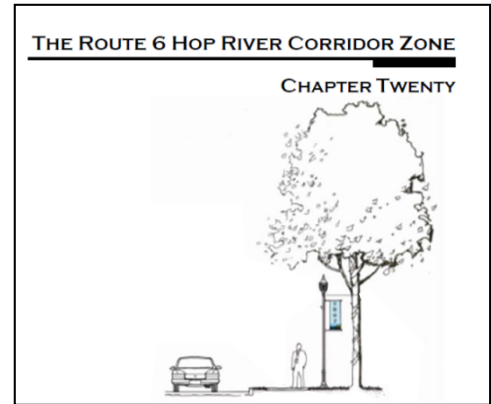
The mechanism to change land uses within these three focus areas is the Corridor Zone, which is a new, unified zoning regulation for the four-town Route 6 Hop River corridor that was developed under REDC's 2010 Study. Once it is adopted by each of the four towns, the Corridor Zone will promote economic growth in eight development nodes throughout the corridor – including Bolton Crossroads, Coventry Ridge, Historic Andover, and Lighthouse Corners.

Characteristics of future development within the nodes would include:

- Village-scale development and density.
- Mixed-use development consisting of office, retail, and residential uses in close proximity.
- New multi-story buildings located closer to Route 6.
- Parking provided on side or rear lots.

Roadway Network

The current design of Route 6, which provides for efficient and relatively high-speed travel between regional destinations, is generally not compatible with the desire to promote economic growth in development nodes, where safe access to local commercial and residential land uses will be required. Where possible, development nodes are located within reduced speed zones on Route 6 (Bolton Crossroads, Historic Andover, and Lighthouse Corners included) such that lower speeds in these areas would otherwise translate to safer access for new development. However, actual speed data shows that motorists generally do not respond effectively to the lower speed limits within reduced speed zones in the corridor. One explanation for this is the character of Route 6 itself, which is consistent throughout the length of the study corridor. Because the character of the roadway does not change between the higher speed sections and the reduced speed zones, there are no physical or psychological cues for motorists that would encourage a change in driving behaviors and a reduction in travel speeds.



Chapter 20 of REDC's 2010 Study includes proposed regulations for a unified Corridor Zone for the Route 6 Hop River Corridor in Bolton, Andover, Coventry, and Columbia.

Addressing Corridor Travel Speeds

- Speed data obtained for this study shows that speeding is a safety concern throughout the corridor.
- Within reduced speed zones (where speed limits are 40 or 45 mph), average speeds exceed posted speeds by 9 mph, on average.
- The recommended design of Route 6 within future villages is intended to encourage slower speeds by changing the character of the roadway and providing cues for motorists to reduce speeds.
- In addition to special design measures, speed monitoring and police enforcement will be a necessary component of speed management in the corridor.

As illustrated in Figure 4-2, Route 6 within and approaching Bolton Crossroads, Historic Andover, and Lighthouse Corners should be modified to provide a low-speed “village arterial” design that would incorporate the following:

- Speed mitigation measures that encourage vehicle travel speeds of 35 mph, consistent with a village context. Specific design elements include narrower travel lanes (11 ft instead of 12 ft); landscaped medians (not to preclude access to existing businesses); street trees; and dynamic speed display signs in key locations². It is noted that the use of alternative median treatments – such as depressed vegetated median strips that serve to handle stormwater runoff – or other green infrastructure elements could be explored and incorporated into the improvement recommendations during future design phases (see Section 4.4 Green Infrastructure Recommendations, p. 4-47, for more details).
- Sidewalks with streetscape elements and bike-safe shoulders (5 ft wide) to encourage walking and bicycling along Route 6.

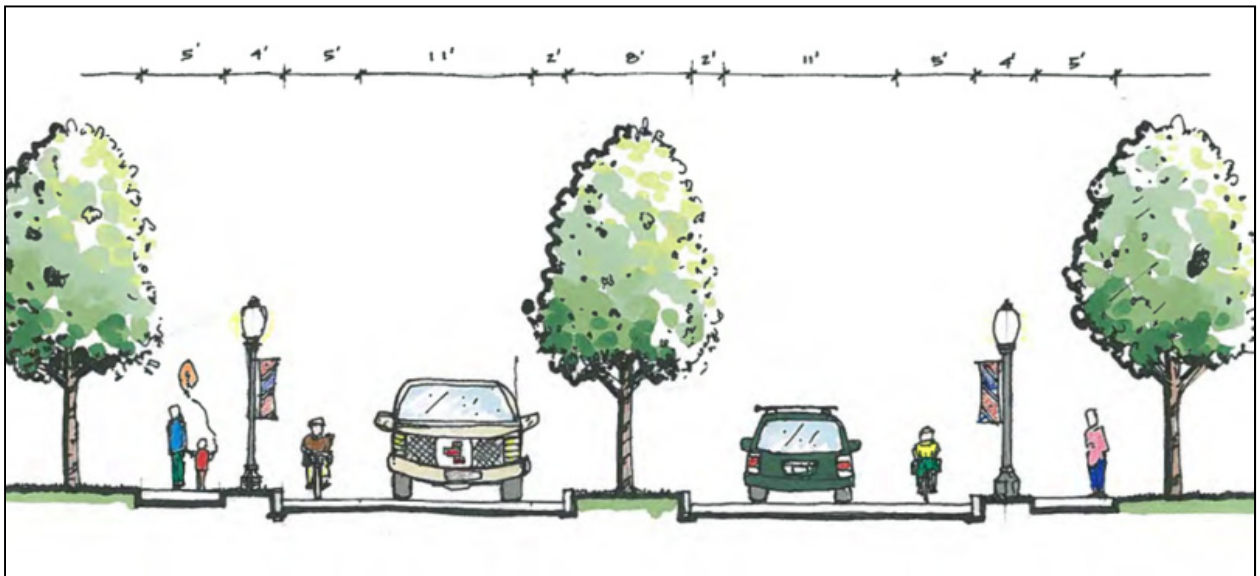


Figure 4-2. Recommended Low-speed Arterial Design for Route 6 in Village Areas

It is also recommended that small networks of new local streets be provided in a traditional grid pattern within the village areas. These streets would create the transportation framework for new development and would be the primary points of access from Route 6 to these developments. It is intended that, by relocating most Route 6 driveways to new local streets within the limits of each village, access to Route 6 would be consolidated to its intersections with the new local streets. These intersections would be appropriately designed with turn lanes on Route 6 and other access management measures (such as restricted left turns from some local roads) to minimize turning conflicts and preserve through traffic mobility.

² Street trees should be of columnar varieties (in the median) that reach no more than 4” in diameter at maturity if located within the median or within the roadside clear zone. Street trees and landscaped medians will have to be maintained by the towns under encroachment permits from CTDOT’s Maintenance and Construction District 1 (for Bolton, Coventry, and Andover) and District 2 (for Columbia).

4.1.2 Bolton Notch

The preferred concept for Bolton Notch, which is illustrated in Figure 4-3 (page 4-7), modifies the layout of the existing junction of Route 6 and Route 44 to improve connectivity between Bolton Center and Routes 6 and 44 via Notch Road, and to accommodate full access (from both eastbound and westbound directions) between Route 6 and Route 44. The preferred concept also provides opportunities for improved bicycle and pedestrian connectivity within the junction via a shared use path that would connect Route 44, Route 6, Notch Road, and the Hop River Trail.



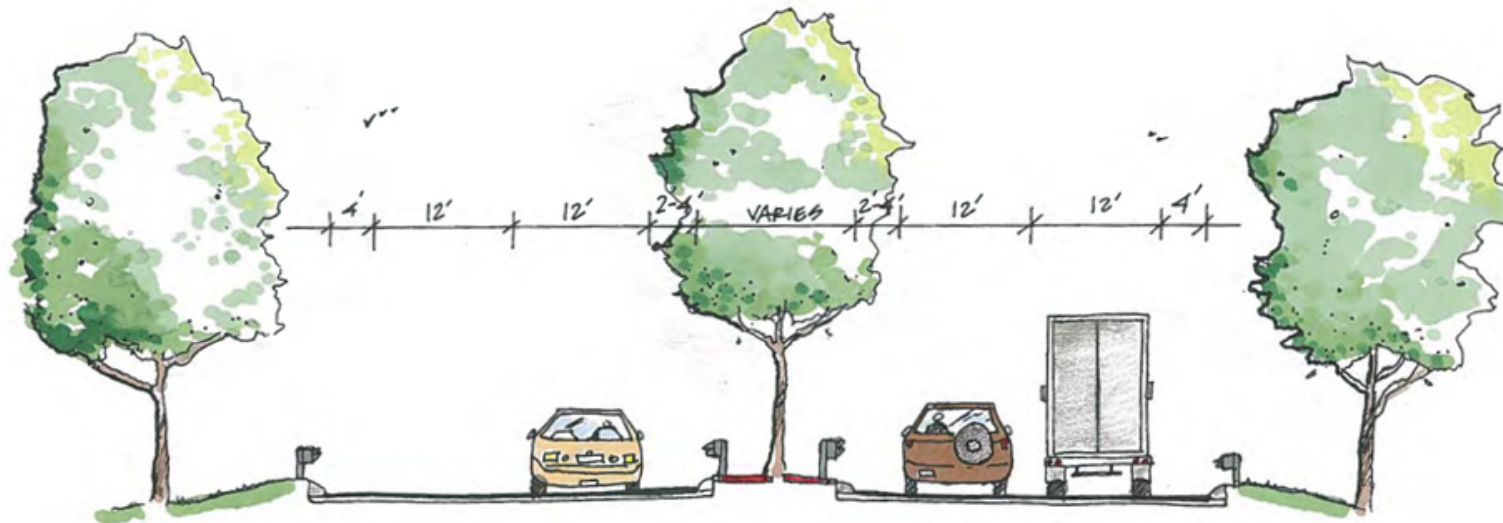
Recommendations:

- Address high eastbound travel speeds into the junction by relocating the expressway terminus approximately a half-mile to the west (near the Route 6/Route 44 eastbound flyover). Reclassify the section of roadway between the Route 6/Route 44 flyover and Notch Road from a principal arterial – expressway, to a principal arterial – other, and change the roadway characteristics accordingly to encourage slower speeds. Provide a landscaped median, narrower shoulders, and smaller-scale signing that is characteristic of a low-speed, arterial boulevard and consistent with the posted speed limit of 40 mph (see Figure 4-4 for low-speed arterial boulevard concept, page 4-8).
- Extend the new, low-speed boulevard through the junction and transition to meet the existing two lane Route 44 located east of Quarry Road. Eliminate the existing eastbound Route 44 ramp and accommodate eastbound traffic along the new boulevard. Provide a new flyover carrying westbound Route 6 over Route 44 to accommodate the extension of the boulevard.
- Realign and extend Notch Road and provide a new Notch Road Extension that terminates at a new signalized intersection with Route 44. Relocate the existing eastbound Route 6 ramp to accommodate the Notch Road modifications. It is noted that the alignment of Notch Road Extension shown in Figure 4-3 represents one possible layout; there are alternative alignments (such as a through-roadway alignment) and alternative ramp intersection configurations that could be explored under subsequent engineering efforts.

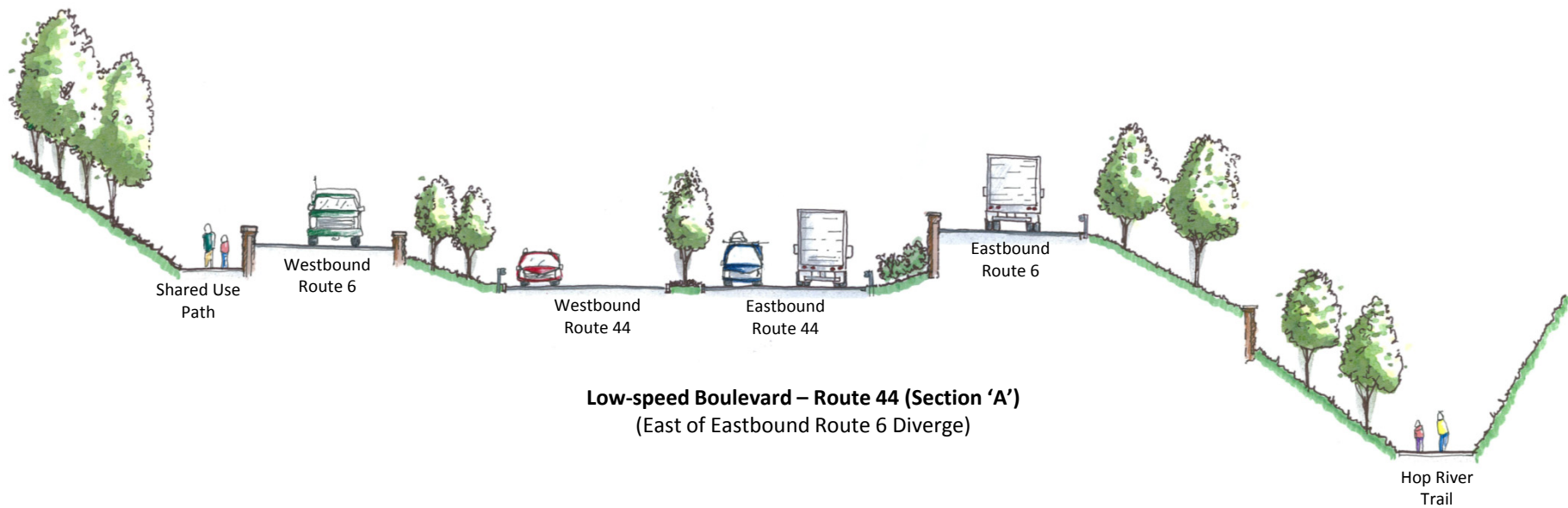
Summary of Issues in Bolton Notch:

- Safety and operational issues at the existing unsignalized intersection of Notch Road with Route 6/44 including inadequate sight distance and long delays.
- Lack of a connection between westbound Route 6 and eastbound Route 44, and between westbound Route 44 and eastbound Route 6.
- Lack of a direct connection from Notch Road to westbound Route 6 and from westbound Route 44 to Notch Road.
- Lack of bicycle and pedestrian access to the Hop River Trail and between roadways within the existing junction.
- High eastbound travel speeds entering the junction.
- Stakeholder concerns about the safety and convenience of emergency vehicle and school bus access to and from Bolton Center via Notch Road.





Low-speed Boulevard - Route 6/Route 44 Overlap
(between Route 6/Route 44 Flyover and Notch Road)



Low-speed Boulevard – Route 44 (Section 'A')
(East of Eastbound Route 6 Diverge)

Note: As shown in this figure, street trees located within a median or within the roadside clear zone should be no more than 4" in diameter at maturity, unless protected from vehicular collisions by guardrail. Street trees and landscaped medians will have to be maintained by the Town of Bolton under an encroachment permit with CTDOT's Maintenance and Construction District 1.

NOT TO SCALE

Route 6 Hop River Corridor Transportation Study

Figure 4-4.
Route 6/Route 44
Low-speed Boulevard Concept

Recommendations (Continued):

- Accommodate full directional access between Route 6, Route 44, and Notch Road by:
 - Providing a new ramp connection from Notch Road Extension (accessible from Route 44) to eastbound Route 6.
 - Providing a new ramp connection from westbound Route 6 to the new Notch Road Extension (accessible to Route 44).
- Coordinate the adjacent signalized intersections of Notch Road Extension and Quarry Road with Route 44 to optimize traffic operations. Resultant intersection operations are (LOS AM(PM)):
 - Notch Road Extension – LOS B(C)
 - Quarry Road – LOS B(B)
- Provide a new shared use path within the reconfigured junction that connects the Hop River Trail, Route 6, Route 44, and Notch Road. It is noted that the route of the path shown in Figure 4-3 represents one possible layout; there are other potential opportunities to enhance bicycle and pedestrian connectivity in the junction, as well as other alternative routes for a shared use path that could be explored under subsequent engineering efforts³.
- Provide a new trailhead with parking located off Route 44 opposite Notch Road Extension. This new trailhead with full directional signalized access to Route 44 and Notch Road Extension would be an alternative to the Hop River Trail access located off the expressway section of westbound Route 6/Route 44.
- Provide pedestrian accommodations (including high-visibility crosswalks, pedestrian signals, and sidewalk ramps) at the signalized Route 44 intersections with Notch Road Extension and Quarry Road. Additionally, provide pedestrian warning signs (with beacons, as deemed necessary), high-visibility crosswalks, sidewalk ramps, and short crossing distances for other shared use path crossings within the junction, particularly for those crossings located at the eastbound and westbound Route 6 ramp intersections with Notch Road Extension.
- Install a gateway sign for the Route 6 Hop River corridor along eastbound Route 6.

Design Considerations:

- Visibility of the traffic signal at the intersection of Route 44 and the new Notch Road Extension from eastbound Route 44 was a noted concern by CTDOT due to the proximity of the intersection to the new bridge carrying westbound Route 6 over Route 44. Subsequent engineering efforts will determine the actual vertical clearance of this structure and whether measures to mitigate sight line obstructions will be required.

³ One potential alternative route for the recommended shared use path has been suggested by CTDOT and includes a connection to the Hop River Trail at a point located between the tunnel under Route 44 and the proposed bridge for Notch Road Extension. The shared use path would continue through the junction between Notch Road Extension and the eastbound Route 6 alignment; continue under Route 6 along the north and west sides of Notch Road Extension; and cross to the east side of Notch Road Extension at the Route 44 intersection. This alternative route would replace the section of the shared use path illustrated in Figure 4-3 and located south of Route 44.

Design Considerations (Continued):

- The location of the merge of the eastbound ramp from Notch Road with eastbound Route 6 should be coordinated with the recommendations for Bolton Crossroads. Specifically, the location of eastbound traffic queues for a potential signal at Bolton Crossroads should not interfere with merge operations. It is noted that alternative locations for the merge, such as downstream of a signal at the future Bolton Crossroads intersection, could be evaluated along with other geometric requirements of the merge area during subsequent engineering efforts.

Potential Impacts and Constraints:

- **Historic Resources.** Squaw Cave is a historic landmark located in Bolton Notch State Park on the rocky hillside immediately north of the existing westbound Route 44 ramp. To avoid potential impacts to this landmark, the realigned westbound Route 6 should be aligned to not encroach beyond the footprint of existing westbound Route 44.
- **Bridge Structures.** The proposed improvements will require modification (lengthening) of the existing tunnel/bridge structure that conveys the Hop River Trail under Route 6/Route 44. The existing bridge structures carrying Notch Road over the Hop River Trail and westbound Route 6 over Route 44 will be demolished and replaced with new structures.
- **Rights-of-way.** Implementation of the preferred concept will impact up to nine properties, five of which are undeveloped, and three of which are currently owned by the State of Connecticut. No private structures are impacted, and no relocations are anticipated.
- **Environment.** No wetland or floodplain impacts are likely in this area.

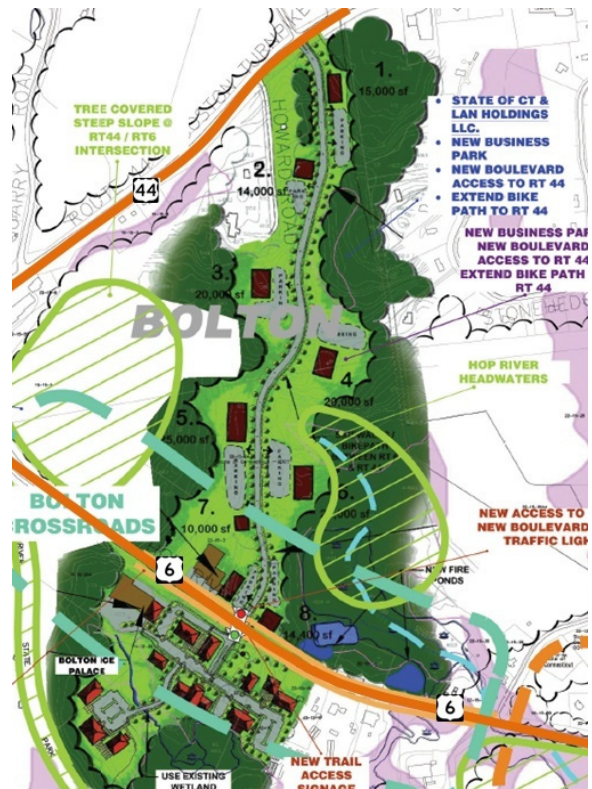
4.1.3 Bolton Crossroads

The preferred concept for Bolton Crossroads, which is illustrated in Figure 4-5 (page 4-12), is derived from the original Bolton Crossroads concept that was included in the Corridor Master Plan developed under REDC's 2010 Study. Similar to the original concept, the preferred concept illustrates potential development opportunities located near the Bolton Ice Palace that are consistent with the development that would be accommodated within the context of a node as it is defined in the proposed Corridor Zone.

The preferred concept includes provisions for a small network of local streets and physical changes to Route 6 that will accommodate and support the community's long-term vision for a pedestrian and bicycle-friendly mixed-use village in this area. The physical changes to Route 6 include access management measures and speed mitigation measures to promote safety, and streetscape improvements to create a western gateway, or sense of arrival, for travelers as they enter the Route 6 Hop River corridor. The preferred concept also includes a new street connection between Route 6 and Route 44 that will provide access for additional development opportunities.

Recommendations:

- Locate the primary *Crossroads* intersection (intersection of Route 6 and the new street connection between Route 6 and Route 44) approximately 500 ft east of the existing Bolton Ice Palace driveway to minimize approach grades on Route 6, maximize distance from the Bolton Notch improvements, and to maximize future development potential adjacent to Munson's Chocolates on the north side of Route 6. It is not practical to locate the intersection any further east due to environmental constraints on the north side of Route 6 in this area.

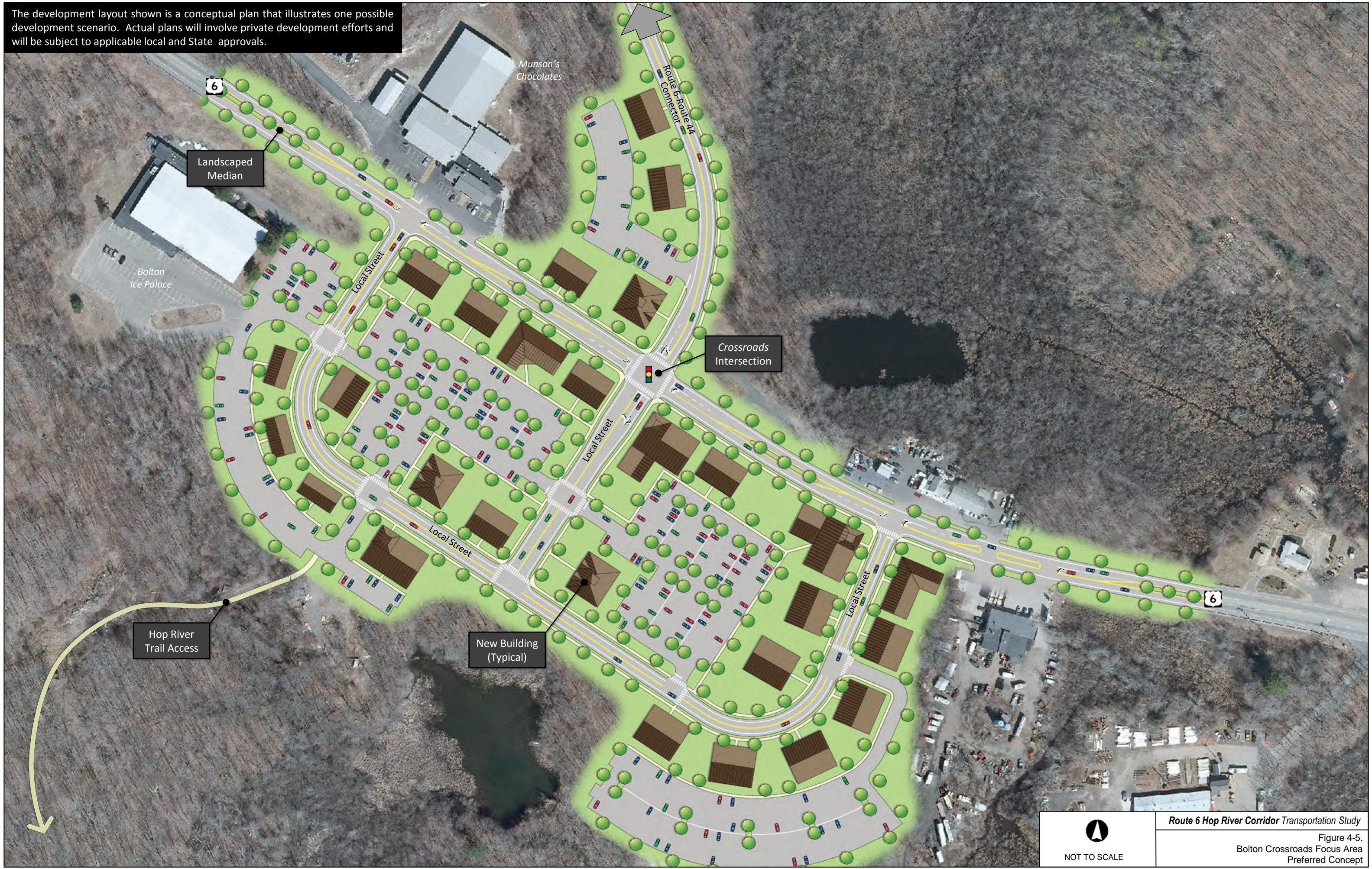


The original Bolton Crossroads concept, shown here from the Corridor Master Plan, included a new business park development located north of Route 6 (to be serviced by a new boulevard connecting Route 6 to Route 44), and a new mixed-use village development located south of Route 6. Access to these developments would be provided via a single new intersection (likely to be signalized) located just east of the Munson's Chocolates retail store. The original concept also included provisions for landscaped medians and streetscape features on Route 6 in this area.

Summary of Issues for Bolton Crossroads:

- Relatively high eastbound travel speeds entering the area.
- Effects of the grade of Route 6 on westbound traffic operations, particularly trucks during inclement winter weather.
- Potential of exacerbating the effects of the grade by introducing a potential new traffic signal.

The development layout shown is a conceptual plan that illustrates one possible development scenario. Actual plans will involve private development efforts and will be subject to applicable local and State approvals.



Recommendations (continued):

- Modify Route 6 within and approaching the village limits to provide: landscaped medians (where possible considering left turn lanes and access needs), 11 ft travel lanes, 5 ft outside shoulders, and street trees. The change in roadway appearance and narrowing of the pavement surface would affect driving behavior and encourage reduced travel speeds, thereby improving safety for motorists, bicyclists, and pedestrians within the village.
- Construct a new two-way local street (or development road) from the *Crossroads* intersection north to Route 44 to provide access to future development opportunities and to provide a relatively direct connection between Route 6 and Route 44. The street would be approximately 3600 ft long and would traverse two properties – one owned by the State of Connecticut and one owned by a private entity. The north end of the street could align with existing Howard Road, which would require some improvement of Howard Road, or could follow an alternative alignment depending on site constraints and other access considerations at Route 44.
- Provide a small network of two-way local streets on the south side of Route 6 to accommodate access to the village development and to accommodate on-site circulation for bicyclists, pedestrians, and motorists.
- Manage commercial access to Route 6 by encouraging shared parking lots with access from a limited number of new local streets or shared driveways.
- Provide sidewalks along portions of Route 6 and on new local streets to promote walking between destinations within the village.
- Provide Hop River Trail access with dedicated trailhead parking from the new village.

Future Development Considerations:

- The preferred vision involves development located along a new north-south connector roadway between Route 6 and Route 44, and build out of a mixed-use village located south of Route 6. Figure 4-5 is a conceptual plan that illustrates one possible development scenario for the area south of Route 6. Actual future development – both in terms of location, intensity, and character – will be dependent upon private developers to propose and implement through the typical site plan review process of both the Bolton Planning and Zoning Commission and the REDC.

As shown in the figure, the potential new floor area is approximately 90,000 sf. There are approximately 315 parking spaces shown for this development area, which equates to approximately 3.5 spaces per 1000 sf. It is assumed that parking demands for the proximate, mixed uses will reflect some shared parking efficiencies.

Design Considerations:

- Provide signalization for the new *Crossroads* intersection when required based on future signal warrants and traffic generation associated with future development in the area. Any future development proposal would likely be subject to the certification requirements of the Office of the State Traffic Administration (OSTA). The certification process would determine whether signalization of the intersection would be required at a cost to the developer.

Design Considerations (continued):

- The improvements for Bolton Crossroads should be coordinated with the recommendations for Bolton Notch. Specifically, traffic demands at the future *Crossroads* intersection may or may not require additional approach lanes on Route 6 (compared to the approach lane configuration shown in Figure 4-5) and the resultant eastbound traffic queues could affect the location of the upstream merge for eastbound Route 6 and the ramp from Notch Road. Subsequent engineering efforts would resolve these coordination issues.

Potential Impacts and Constraints:

- **Rights-of-way.** Implementation of the preferred concept will impact up to 10 properties, two of which are undeveloped, and one of which are currently owned by the State of Connecticut. Five relocations are anticipated.
- **Environment.** Some minor impacts to floodplains and wetlands are possible. The magnitude of the impacts, both permanent and temporary, will depend on the actual layout of streets and buildings within the village.

4.1.4 Coventry Ridge

The preferred concept for Coventry Ridge, which is illustrated in Figures 4-6A and 6B (pages 4-16, 17), relocates South Street to the west to provide an improved intersection with Route 6 and to accommodate access to developable lands. In support of the community's vision for a future development node in this location, the relocated South Street provides access to a key undeveloped 100-acre Coventry parcel located northwest of the existing Route 6/South Street intersection. By relocating South Street, the existing undesirable intersection with Route 6 is eliminated; roadway conditions on South Street are improved for local through traffic, adding increased visibility to the Coventry Ridge development; and the new South Street intersection becomes the "gateway" to Coventry from the Route 6 Hop River corridor.

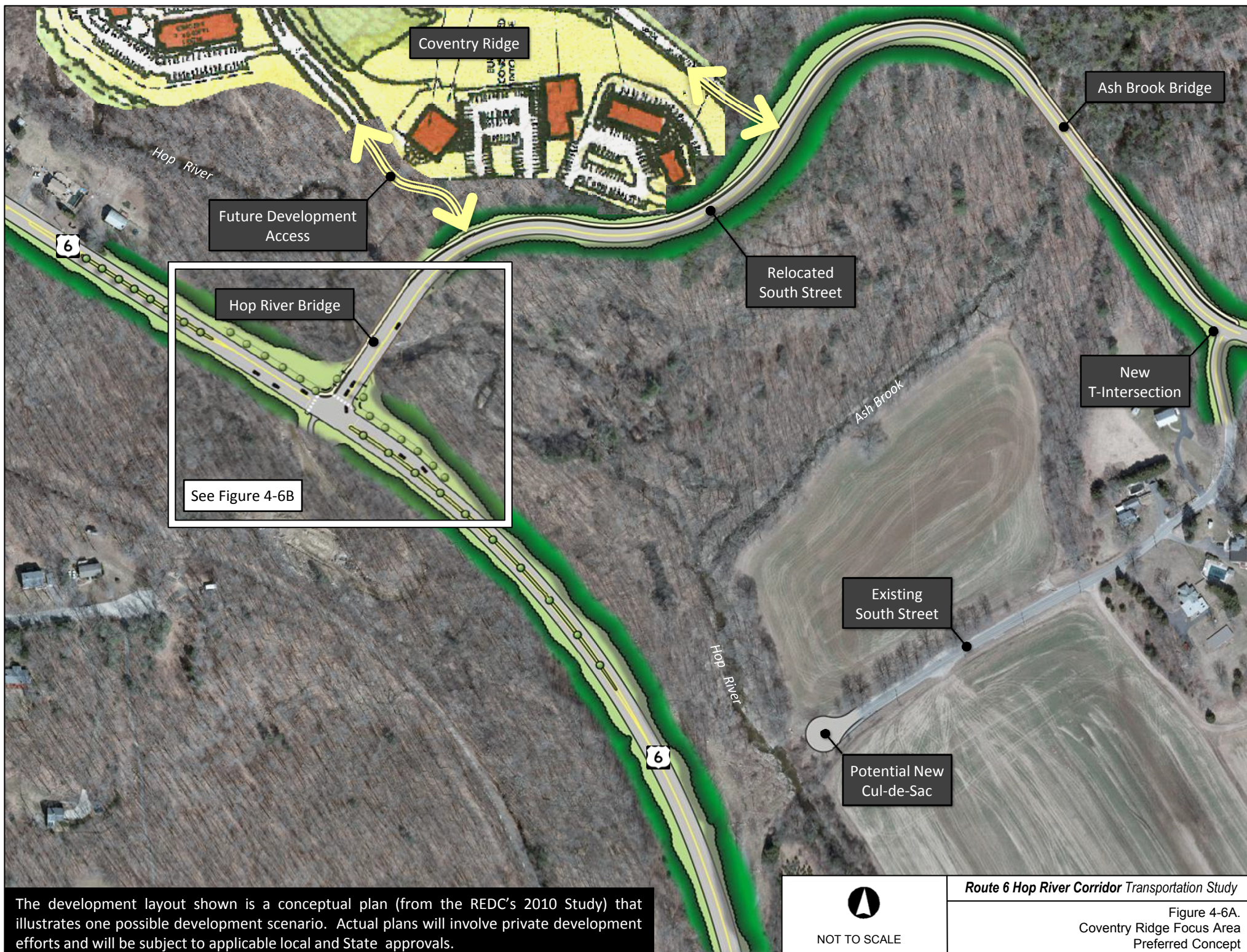


Summary of Issues for Coventry Ridge:

- New access needed from Route 6 to service development opportunities on the Coventry parcel.
- Undesirable South Street approach to Route 6 and awkward intersection geometry.
- Non-standard curvature and grades on existing South Street near the Coventry parcel.

Recommendations:

- Relocate the South Street intersection approximately 1400 ft to the west of its existing location. This involves realigning approximately 2900 ft of South Street and constructing two new bridge structures to span Hop River and Ash Brook and their associated floodways.
- Eliminate the existing South Street intersection and remove the existing bridge over Hop River, or consider other opportunities for existing South Street (see *Design Considerations*, page 4-19, for other opportunities). Realign approximately 300 ft of existing South Street to provide a "T" intersection with the new/relocated South Street.
- Modify Route 6 on the approaches to the new intersection to provide: landscaped medians, 11 ft travel lanes, and 5 ft outside shoulders. The change in roadway appearance and narrowing of the pavement surface in the vicinity of the new intersection would affect driving behavior and encourage reduced travel speeds, thereby improving safety for turning vehicles. The overall required roadway width of 43 ft would be approximately the same width as the existing pavement surface generally requiring no significant widening.
- Provide signalization for the new intersection as required based on future signal warrants and traffic generation associated with future development on the Coventry parcel. Any future development proposal would likely be subject to the certification requirements of the Office of the State Traffic Administration (OSTA). The certification process would determine whether signalization of the intersection would be required at a cost to the developer.



The development layout shown is a conceptual plan (from the REDC's 2010 Study) that illustrates one possible development scenario. Actual plans will involve private development efforts and will be subject to applicable local and State approvals.

NOT TO SCALE





Figure 4-7. View Looking East along Route 6, Coventry
(at Relocated South Street Intersection)

Recommendations (continued):

- Provide a shared use path along the west side of Relocated South Street to facilitate safe pedestrian and bicycle access between Route 6 and future development on the Coventry parcel. If future traffic volumes warrant signalization of the Relocated South Street and Route 6 intersection, a crosswalk should be provided at the intersection to connect the shared use path to the eastbound side of Route 6 (see Figure 4-7). Provide directional signage on Route 6 between Relocated South Street and Steeles Crossing Road to direct trail users to and from the existing trailhead on Steeles Crossing Road and destinations in Coventry, including future Coventry Ridge development. See Section 4.3.3 (pages 4-44 and 45) for details on directional signage for the Hop River Trail.
- Reinforce the “gateway” nature of the intersection with decorative stone walls that could double as gateway signs for Coventry; ornamental light standards with banners along South Street; and aesthetic bridge treatments that could include stone facing, rustic bridge railing, and rustic approach guard railing.

Future Development Considerations:

- The preferred concept for this study did not consider the specific development opportunities for the Coventry parcel. It is anticipated that future development would be consistent with the uses that were identified in the Corridor Master Plan developed under REDC’s 2010 Study. These potential uses include a mix of office, recreational, institutional, retail, restaurant, and residential uses that are provided in a “synergistic neighborhood approach.”

Design Considerations:

- There are various opportunities for the treatment of existing South Street that could be considered by the Town. These include: eliminating the existing South Street intersection, removing the existing bridge over Hop River, and terminating existing South Street in a cul-de-sac located just north of the river; maintaining a gated emergency-access-only connection to Route 6; providing Hop River access from existing South Street; and moving the location of the cul-de-sac to the north end of the large farm property, among others.

Potential Impacts and Constraints:

- **Rights-of-way.** Implementation of the preferred concept will impact up to five properties, two of which are undeveloped. No relocations are anticipated.
- **Environment.** Some permanent impacts to Hop River and Ash Brook floodplains and adjacent wetlands are possible. The magnitude of the impacts, both permanent and temporary, will depend on the type of bridge structures that are ultimately selected for these crossings and the final design of new/relocated South Street. Based on the preferred concept shown in Figure 4-6A, there is less than 0.5 acre of permanent impact to floodplains and wetlands.

4.1.5 Historic Andover

The preferred improvement concept for Historic Andover, which is illustrated in Figure 4-8 (page 4-21), includes provisions for a small network of local streets, physical changes to Route 6, and improved accessibility to the Hop River Trail that will accommodate and support the community's long-term vision for a pedestrian and bicycle-friendly mixed-use village in this area. The physical changes to Route 6 include access management measures and speed mitigation measures to promote safety, and streetscape improvements to create a gateway to Historic Andover in the Route 6 Hop River Corridor.



Summary of Issues in Historic Andover:

- Lack of safe and accessible pedestrian and bicycle connections between residential neighborhoods and important community features in Historic Andover (including the Hop River Trail, library, church, post office, Hop River, and sports fields).
- Lack of a street network and multimodal accommodations to support the Town's vision for a future mixed-use village.
- Lack of speed mitigation measures to reinforce the 40 mph posted speed limit on Route 6.

Recommendations:

- Modify Route 6 within and approaching the village limits to provide: landscaped medians (where possible considering left turn lanes and access needs), 11 ft travel lanes, 5 ft outside shoulders, street trees, and village gateway signage. The change in roadway appearance and narrowing of the pavement surface would affect driving behavior and encourage reduced travel speeds, thereby improving safety for motorists, bicyclists, and pedestrians within the village.
- Construct a small network of two-way local streets on the north side of Route 6 to accommodate access to the village and to accommodate on-site circulation for pedestrians, bicyclists, and motorists.
- Manage commercial access to Route 6 by encouraging shared parking lots with consolidated access and access from local streets.
- Provide sidewalks along Route 6 and local streets with crossings between the Hop River Trail, the village, and a new community green space along the Hop River.
- Upgrade the pedestrian crossings at Long Hill Road to provide new pedestrian signal heads, crosswalks, and accessible ramps; exclusive pedestrian signal phasing; and a new trail spur connecting the elevated Hop River Trail down to the Long Hill Road crossing from the west.
- Provide Hop River access via a new shared use path that connects to the village street network.
- Connect the village to sports fields and senior housing located north of Hop River by incorporating sidewalk on a new Long Hill Road structure over Hop River. This sidewalk would be included as part of a future bridge replacement project.

The development layout shown is a conceptual plan that illustrates one possible development scenario. Actual plans will involve private development efforts and will be subject to applicable local and State approvals.





Figure 4-9. View Looking West along New Local Street, Historic Andover
(Long Hill Road in Foreground)

Future Development Considerations:

- The preferred vision for Historic Andover includes full build out of a mixed-use village located west of Long Hill Road. Figure 4-8 (page 4-21) is a conceptual plan that illustrates one possible development scenario for this area. Actual future development – both in terms of location, intensity, and character – will be dependent upon private developers to propose and implement through the typical site plan review process of both the Andover Planning and Zoning Commission and the REDC. As shown in the figure, the potential new floor area is approximately 75,000 square feet. There are approximately 225 parking spaces shown for this development area, including 40 additional spaces for commuter parking (to replace the existing Park and Ride lot). Exclusive of the commuter parking allocation, the parking rate illustrated in the figure equates to approximately 3 spaces per 1000 sf. It is assumed that parking demands for the proximate, mixed uses will reflect some shared parking efficiencies.

Design Considerations:

- Any future development proposal would be subject to the certification requirements of the Office of the State Traffic Administration (OSTA). The certification process would determine whether additional measures (such as capacity improvements at the Long Hill Road intersection) would be required on Route 6 to mitigate the potential traffic impacts associated with the development.
- The need for additional access management measures (such as restricted left turns to and from one or more new local street intersections with Route 6) to supplement the Route 6 improvements illustrated in Figure 4-8 could be evaluated during subsequent engineering efforts.

Design Considerations (continued):

- All recommendations should be designed to not preclude the potential improvements detailed under *Other Future Transportation Opportunities*, page 4-24. It is noted that provisions for a future westbound Route 6 connection to Long Hill Road will require raising the grade of Long Hill Road in order to accommodate standard grades for the future connection. Raising the grade of Long Hill Road in the area of the future connection will require replacing the Long Hill Road bridge over Hop River. As such, the future replacement of this bridge – whether as part of the implementation of the local roadway improvements of the preferred concept, or to address the natural deterioration and structural deficiencies associated with the age of the structure – should be designed with consideration to the geometric requirements of a future westbound Route 6 connection. For the purposes of estimating the costs associated with the implementation of the preferred concept, it was assumed that the replacement of the Long Hill Road bridge would be implemented independently of the improvements of the preferred concept; as such, the replacement costs are not included in the cost estimates of this study.

Potential Impacts and Constraints:

- **Historic Resources.** The preferred concept is partially located within the limits of the Andover Center Historic District (see Figure 4-10 at right), which is listed on the National Register of Historic Places. Contributing resources within the district that are proximate to the recommendations include: 349 Hebron Road (located immediately west of the library); 355 Hebron Road, Burnap Skinner Memorial Library; and 359 Hebron Road, Andover Congregational Church and New Andover Cemetery. The village development and roadway improvements will have to be sensitive to avoiding impacts to these resources.

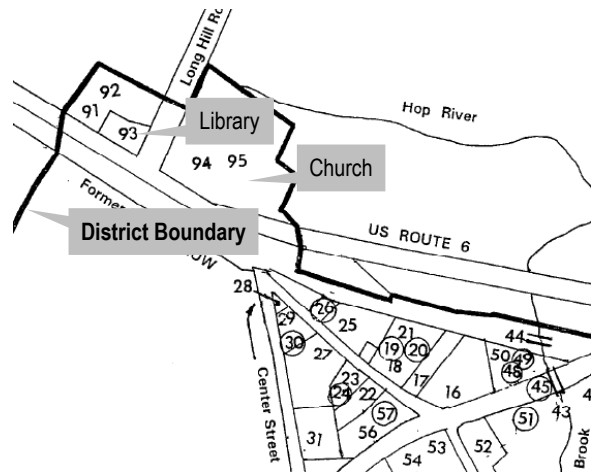


Figure 4-10. Andover Center Historic District
(Source: National Register of Historic Places, 2003)

- **Rights-of-way.** Full build-out as shown in Figure 4-8 (page 4-21) could affect a total of eight properties, one of which is owned by the State of Connecticut. One residential property and the town maintenance garage would have to be relocated to accommodate the new local street connections.
- **Environment:** The proposed recommendations as shown in Figure 4-8 could impact approximately two acres of wetland and floodplain area.

Other Future Transportation Opportunities:

- As shown in Figure 4-8 (page 4-21), there is a potential opportunity under a future improvement initiative to provide a westbound Route 6 connection to Long Hill Road from the east. This connection would facilitate shifting all westbound Route 6 traffic from existing Route 6 to this new northerly connection, following the local street that parallels Route 6, and reconnecting to existing Route 6 west of the village.

As part of this initiative, the local street would be converted to a one-way road in the westbound direction, and existing Route 6 within the village would be converted to a one-way road in the eastbound direction, as shown in Figure 4-11. This context-sensitive street

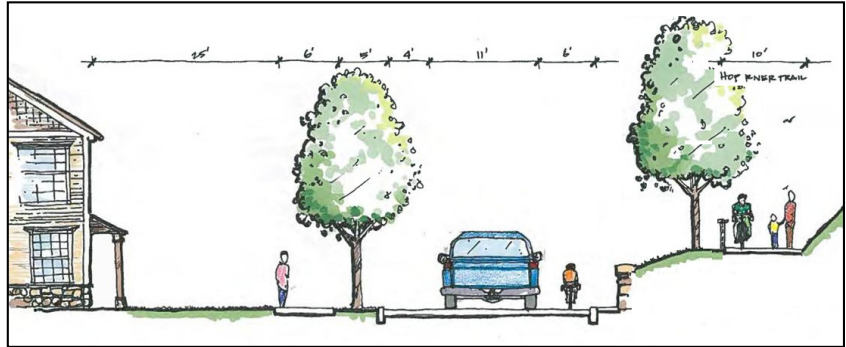


Figure 4-11. Potential Future Eastbound Route 6, Historic Andover

arrangement would better distribute traffic throughout the village while maintaining through traffic mobility, further encouraging reduced travel speeds, improving safety and access between the village and Route 6, and providing some additional development opportunities on the east end of the village. The actual alignment of the future westbound connection would have to consider minimizing or avoiding impacts to environmental and historic resources (see *Potential Impacts and Constraints*, page 4-23).

It is noted that the alignment and configuration of the westernmost local street intersection with Route 6, as it is shown in Figure 4-8, is consistent with the potential future opportunity to shift westbound Route 6 traffic to a new northerly alignment. Alternative intersection configurations are possible and could be explored under subsequent engineering efforts; however, these alternatives should not preclude a future opportunity to shift westbound Route 6.

4.1.6 Lighthouse Corners, Columbia

The preferred concept for Lighthouse Corners (intersection of Route 6 and Route 66 in Columbia), which is illustrated in Figure 4-12 (page 4-26), replaces the existing signalized intersection with a two-lane modern roundabout to improve traffic safety and operations while complementing the future village character that is envisioned by the Town for this area. The future village – including new mixed-use development opportunities and improved multimodal accommodations – would be integrated with existing businesses in the area, including the Lighthouse building (from which the name “Lighthouse Corners” was inspired) and Columbia Plaza.



Recommendations:

- Relocate the intersection slightly north of the existing location to accommodate a two-lane modern roundabout with realigned approach roadways that are less skewed. Resultant intersection operations are LOS C during the afternoon peak hour.
- Provide approach roadways that are designed to encourage reduced travel speeds and enhance aesthetics by incorporating landscaped medians (where possible considering left turn lanes and access needs), 11 ft lanes, 5 ft outside shoulders, and street trees.
- Construct a small network of new two-way local streets (or development roads) to accommodate better access to existing businesses and new businesses, and to accommodate on-site circulation for bicyclists, pedestrians, and motorists.
- Managing commercial access to Route 6 and Route 66 by encouraging shared parking lots with access from a limited number of new local streets or shared driveways.

Summary of Issues at Lighthouse Corners:

- High accident frequency (34 accidents between 2006 and 2008), more than one-third of which involved turning or angle collisions in the intersection, and rear end collisions on turning roadways (slip lanes) between Route 6 and Route 66.
- Future traffic demands that will result in LOS F during the afternoon peak hour (with no capacity improvements).
- Undesirable intersection geometry that includes high-speed slip lanes for right turns from westbound Route 6 and eastbound Route 66.
- Lack of speed mitigation measures to reinforce the reduced speed limit on Route 6 in the area.
- Lack of a street network and multimodal accommodations to support the Town’s vision for a mixed-use village.
- Excessive, visually unappealing pavement areas and lack of attractive gateway features, particularly for travelers from the expressway section of Route 6.
- Periodic roadway flooding on Route 66 just east of the intersection.
- Park & Ride lot demand can exceed capacity.
- Limited access and view of Columbia Plaza from Route 6.

The development layout shown is a conceptual plan that illustrates one possible development scenario. Actual plans will involve private development efforts and will be subject to applicable local and State approvals.



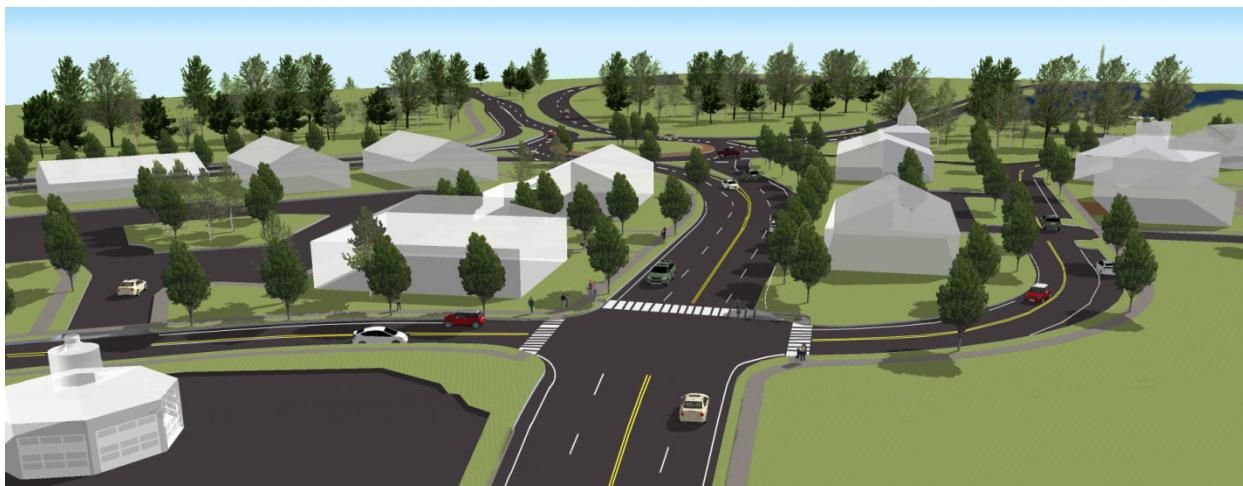


Figure 4-13. View Looking North along Route 66 to Roundabout, Lighthouse Corners
(Lighthouse Building in Left Foreground)

Recommendations (continued):

- Provide expanded Park and Ride opportunities conveniently accessed via transit and bicycle.
- Provide sidewalks along portions of Route 6 and along new local streets to promote walking between destinations within the village.
- Install a gateway sign for the Route 6 Hop River corridor on the expressway Route 6 westbound approach to the Route 6 and Route 66 intersection.
- Include provisions for future Hop River Trail access via a new shared use path that parallels the westbound lanes of expressway Route 6 and connects to the village street network. Connecting the shared use path to the Hop River Trail located on the north side of the Hop River will require a new pedestrian bridge, or widening of the existing westbound Route 6 bridge, to accommodate a shared use path connection over the river.

Design Considerations:

- For this study, a two-lane roundabout is being considered a viable alternative to a signalized intersection at this location. Currently, two-lane roundabouts are not being designed or implemented by CTDOT, pending more experience with single lane roundabouts in Connecticut; however the actual implementation of the roundabout would be a long-term improvement, occurring as far as a decade or two in the future.
- The location and dimensions of the roundabout and approach roadways are variable and can be refined during subsequent engineering efforts to maximize traffic capacity, optimize development area, and minimize environmental impacts.
- Additional pedestrian crossings and alternative routes for bicycle and pedestrian traffic within a future village development, including potential routes along new local street connections and/or routes through the roundabout which are not illustrated in Figure 4-10, could be reevaluated under subsequent engineering efforts.

Design Considerations (Continued):

- Investigate roadway flooding issues on Route 66 East just east of the Route 6 intersection and incorporate flood mitigation measures into the design of the roundabout. Measures such as raising the elevation of Route 66 East and improving stormwater management in the area, could be studied. Measures that are found to address the flooding issues could be provided in conjunction with the reconstruction of Route 66 East for the roundabout, or as an independent improvement initiative.
- Future development opportunities that are illustrated in the southeast quadrant of the intersection would be founded in whole or in part on a former landfill. It was determined under the REDC's 2010 Study that this area is suitable for development given that appropriate building design measures (such as micropile foundations) and landfill remediation (such as capping) are implemented as necessary.
- Any future development proposal would be subject to the certification requirements of the Office of the State Traffic Administration (OSTA). The certification process would determine whether signalization is required for the main point(s) of access to the future development area.
- The local roadway connection illustrated in the southwest quadrant of the intersection could be perceived as a "cut-through" roadway and could encourage some motorists to use this roadway to bypass the roundabout in travelling between Route 6 (to the west) and Route 66 (to the south). It is suggested that appropriate traffic calming measures that discourage the use of this roadway for through-traffic movements (such as the mini roundabout illustrated in Figure 4-12), be incorporated into the final design of any improvements in this area.

Future Development Considerations:

- The Lighthouse building, which is a well-known and historic destination in its own right, should be a prominent feature in any future village development scenario. As such, building arrangements and street configurations should be carefully laid out to create view corridors of the Lighthouse building from Route 6 and the roundabout.
- Special consideration for how existing businesses in the area will be integrated into a future village setting will be required as future transportation improvements and development plans are being designed. The intent of providing future development within the context of a village setting is to support the overall economic viability of the area and to complement existing businesses by creating an attractive, accessible, and desirable commercial destination for local and regional patrons, commuters, and residents.
- The preferred vision for Lighthouse Corners includes full build out of a mixed-use village in this area. Figure 4-12 (page 4-26) is a conceptual plan that illustrates one possible development scenario. Actual future development – both in terms of location, intensity, and character – will be dependent upon private developers to propose and implement through the typical site plan review process of both the Columbia Planning and Zoning Commission



Lighthouse Building, Route 66, Columbia
(Source: flickr)

and the REDC. As shown in the figure, the potential new floor area is approximately 100,000 square feet. There are approximately 350 parking spaces for this development area, including 80 additional spaces for commuter parking (to replace the existing Park and Ride lot). Exclusive of the commuter parking allocation, the parking rate illustrated in the figure equates to approximately 3.5 spaces per 1000 sf. It is assumed that parking demands for the proximate, mixed uses will reflect some shared parking efficiencies.

Potential Impacts and Constraints:

- **Rights-of-way.** Full build-out as shown in Figure 4-12 could affect a total of five properties, one of which is owned by the State of Connecticut. Only one private property would be impacted to accommodate the Route 6 alignment modifications west of the roundabout.
- **Environment.** The preferred concept could impact approximately five acres of wetland and floodplain area.
- **Algonquin Gas Transmission Line.** There are two existing natural gas transmission lines and associated right-of-way easements that run through the existing Route 6 and Route 66 intersection in a northwest-southeast direction. The locations of these gas lines could affect the layout and configuration of new buildings within the future village area as buildings cannot be constructed within the gas line easements. Coordination with the utility owner will be required in subsequent engineering efforts to avoid or mitigate potential conflicts with these lines.

4.2 Other Access & Safety Recommendations

This section presents recommendations for vehicular access and safety improvements and measures in the corridor that were otherwise not addressed by the Focus Area recommendations presented in Section 4.1. Included are recommendations for:

- Side road intersection improvements (Section 4.2.1)
- Access management improvements and policies (Section 4.2.2)
- Route 66 East safety measures (Section 4.2.3)
- Incident management considerations (Section 4.2.4)

4.2.1 Side Road Intersection Improvements

Based on the existing and future conditions assessments of this study (see Sections 2 and 3, respectively), issues related to access and safety were identified at nine side road intersections in the study corridor (exclusive of intersections within the Focus Areas). Noted issues at one or more of these nine intersections include:

- **Peak hour delays.** Long peak hour delays (resulting in LOS E or F) are typical for motorists accessing Route 6 from unsignalized side roads in the study corridor. Although volumes on the side roads are relatively low, long delays present safety issues when drivers become impatient and attempt to enter traffic before it is safe to do so. Delays can be reduced for some drivers by accommodating concurrent left and right turn movements from the side road. Where there is sufficient pavement width, the approach can be striped and signed for separate turn lanes (provided adequate sight lines are provided). Where there is insufficient pavement width to accommodate concurrent movements or bypass of left-turn queues, minor widening could be provided (see Figure 4-14 for a typical widening application). It is noted that future accident data and traffic growth should be monitored at all side road intersections to determine whether alternative safety measures are needed or if signalization becomes warranted.
- **Sight distances.** Intersection sight distances from a couple of unsignalized side roads in the corridor are limited due to crest vertical curves in the roadway. Given the high volume, high speed nature of traffic on Route 6, motorists accessing Route 6 from side roads need as much sight distance as possible to perceive gaps in on-coming traffic. Where it is not practical to modify the roadway to improve sight distances, mitigation measures – such as new dynamic intersection warning signs (see warning signage, page 4-31 for details) – that actively alert vehicles on Route 6 to the presence of vehicles entering from side roads could be considered near these intersections.

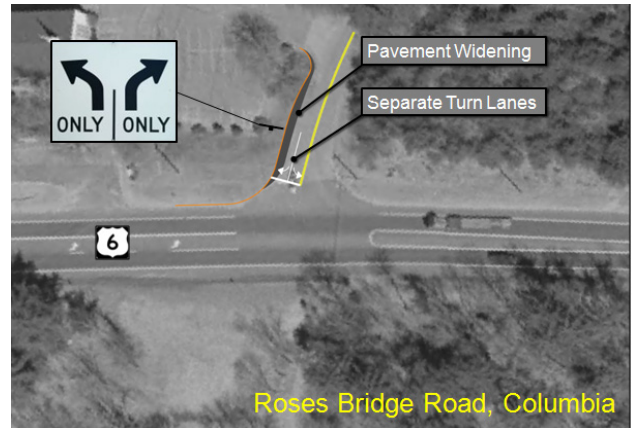


Figure 4-14. Typical Widening of Side Road Approach

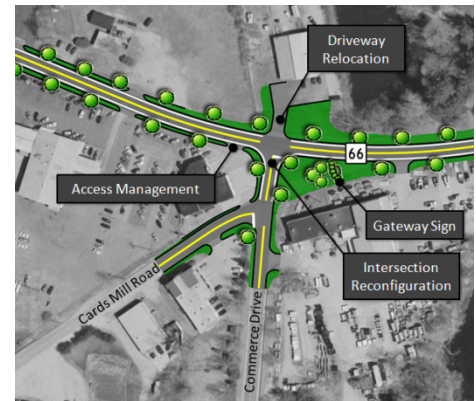
- Warning signage.** Intersection warning signs are generally provided on the Route 6 and Route 66 East approaches to all unsignalized side road intersections in the study corridor. The warning signs for intersections in Andover and Columbia are also provided with supplemental road name plaques that help motorists identify approaching side roads some distance in advance of the intersection. These plaques are especially beneficial in a relatively high speed, high volume corridor like Route 6 where adequate advance notice of an intersection is required for motorists – particularly those who are unfamiliar with the corridor, or those who are traveling at night or in inclement weather – to safely decelerate in traffic and maneuver to a turn lane. Typical street name signs located at intersections are generally not adequately visible from a sufficient distance in advance of these intersections. As such, it is recommended that supplemental name plaques be installed with all existing intersection warning signs in the corridor.



Intersection warning sign with supplemental road name plaque in Route 6 corridor, Columbia.

Additionally, dynamic intersection warning signs could be considered where there are safety concerns associated with limited sight distances to and from side road intersections. Dynamic warning signs incorporate beacons and “traffic entering” plaques into typical intersection warning sign installations; the beacons are only activated to alert approaching drivers when a vehicle is waiting on the side road approach.

- Accident history.** A review of statewide accident information indicates that the intersection of Cards Mill Road at Route 66 East should be evaluated in more detail as it relates to opportunities to improve safety. The accident assessment of this intersection (see *Existing Conditions Assessment*, Section 2.1.5, page 2-33 for details) suggests that the undesirable geometry of the intersection, particularly the heavily skewed approach of Cards Mill Road, could be contributing to the accident history. [Based on statewide accident information, it is noted that the intersection of Route 6 and Route 66 should also be evaluated for safety improvement opportunities. This location is addressed in Section 4.1.6, page 4-25).]



See Figure A4-1 in Appendix 4.1 for details of the Cards Mill Road intersection improvement concept.

Although one may feel the number of accidents in other locations along the Route 6 study corridor are high, analysis of the local accident data does not suggest a safety deficiency when compared to statewide data.

Table 4-1 summarizes the identified issues and recommendations for each of the nine side road intersections.

Table 4-1. Summary of Side Road Intersection Recommendations

Intersection	Identified Issues				Recommendations
	Peak Hour Delays	Sight Distance	Warning Signage	Accident History	
Stony Road, Bolton	X	-	X	-	<ul style="list-style-type: none"> Widen approach to accommodate concurrent left and right turns from Stony Road. Install supplemental road names plaques on intersection warning signs.
Johnson Road, Bolton	N/A	X	X	-	<ul style="list-style-type: none"> Consider installing dynamic intersection warning signs on Route 6 if future accident trends dictate a need. Install supplemental road names plaques on intersection warning signs.
South Road, Bolton	X	-	X	-	<ul style="list-style-type: none"> Widen approach to accommodate concurrent left and right turns from South Road. Install supplemental road names plaques on intersection warning signs.
Steeles Crossing Road, Bolton	X	-	X	-	<ul style="list-style-type: none"> Widen approach to accommodate concurrent left and right turns from Steeles Crossing Road. Install supplemental road names plaques on intersection warning signs.
Hendee Road, Andover	X	-	-	-	<ul style="list-style-type: none"> Stripe existing approach as separate left/right turn lanes. Monitor traffic growth for potential future signal warrants.
Wales Road, Andover	N/A	X	-	-	<ul style="list-style-type: none"> Consider installing dynamic intersection warning signs on Route 6 if future accident trends dictate a need.
Shoddy Mill Road, Andover	X	-	-	-	<ul style="list-style-type: none"> Widen approach to accommodate concurrent left and right turns from Shoddy Mill Road.
Roses Bridge Road, Columbia	X	-	-	-	<ul style="list-style-type: none"> Widen approach to accommodate concurrent left and right turns from Roses Bridge Road.
Cards Mill Road (at Rte 66 East), Columbia	N/A	-	-	X	<ul style="list-style-type: none"> Reconfigure intersection approach to eliminate skewed approach and provide access management at intersection. See Figure A4-2 in Appendix 4.1 for details of the Cards Mill Road intersection improvement concept.

4.2.2 Access Management Improvements and Policies

Access management is the proactive management of vehicular access points to land parcels adjacent to roadways. Good access management promotes safe and efficient use of the transportation network and encompasses a set of techniques that state and local governments can use to control access to highways.⁴

The focus of access management is on safety and minimizing vehicular conflict points which, in turn, helps to maintain traffic flow along a roadway. Maintaining traffic flow has the potential to reduce the need for roadway capacity improvements as fewer conflict points help reduce delays for through traffic. Sound access management also facilitates economic sustainability because it establishes a safe and effective relationship between the local transportation system and adjacent land use. Ease of access is an important factor influencing customer decision-making about which businesses to patronize. Access management can ensure that motorists reach local businesses easily and safely and that access for new developments will not create a safety risk.

The goal of the access management components of this study is to encourage CTDOT, the towns, and private property owners to pursue and implement practical and feasible access improvements to the benefit of traffic flow and overall safety in the Route 6 Hop River corridor. The access management recommendations in this section include:

- Corridor-wide access design guidelines (this page).
- Supplemental access management language for the proposed Corridor Zone (page 4-34).
- Site-specific commercial access improvements (page 4-35).

Corridor-wide Access Design Guidelines

Design guidance from the Transportation Research Board's *Access Management Manual* (TRB, 2005) and CTDOT's *Highway Design Manual* (HDM, 2003) were consulted to develop the following base-line criteria for access design in the Route 6 Hop River corridor. In general, the respective municipal zoning provisions for access management should include these access design criteria.

- Curb cuts and roadway intersections should meet at a 90° angle wherever possible; one-way driveways should intersect public streets at a 60° angle or greater; two-way driveways should intersect public streets at a 75° angle or greater.
- Access drives should not be located within 125 feet of an intersection.
- Where a driveway distance of 125 feet from an intersection cannot be achieved, driveways should be located as far from the intersection of the street lines as is practical; regardless, access drives should not be, to the extent feasible, located within the functional area of an intersection (maneuvering area and area of vehicle queuing at an intersection).
- Access drives on the same side of the street should be separated as far apart as is practical, with a target minimum separation of 60 feet for residential drives and 125 for commercial drives.

⁴ FHWA, Office of Operations, http://ops.fhwa.dot.gov/access_mgmt/what_is_accsmgmt.htm

Corridor-wide Access Design Guidelines (continued)

- Sight distances from major commercial access drives should meet intersection sight distance (ISD) requirements of the HDM. For a 50 mph design speed, the minimum ISD is 555 ft.
- All curb cuts and/or roadway intersections on opposite sides of the street should be aligned directly opposite one another.
- Internal circulation among adjoining properties should be provided where possible; driveway consolidation among adjoining properties and shared driveways should be provided where possible.
- Access drives should be provided to lower classification streets whenever possible. That is, access should be provided to collector roads or local streets that intersect with Route 6 rather than directly to it, where that option exists.
- Properties with 150 feet or less frontage should have no more than one curb-cut.
- Where a property has more than 150 feet of frontage, two entrances/curb-cuts are acceptable, provided there is a minimum of 1/3 of the frontage area separating the two curb-cuts.
- Where a property has multiple curb-cuts, redundant access drives should be eliminated.
- Entrance drives should not be excessively wide (more than 30 feet per HDM requirements).
- Curb edges should be clearly defined with islands and/or landscaping.

To effectively include these criteria specifically in the REDC's proposed *Route 6 Hop River Corridor Zone*, it is recommended that a separate section be organized on site design which gathers all the required and/or encouraged site design standards (such as parking, signage, landscaping, and architectural review) in one place for ease of use. This site design section should include the access design criteria under its own sub-heading for *Driveways and Access*.

Supplemental Access Management Language for Corridor Zone

In addition to the corridor-wide access design guidelines, other general recommendations for supplementing and refining the draft access management language in the REDC's proposed Corridor Zone include:

- Each municipality should adopt a driveway ordinance or add detail to its existing roadway ordinance to require any proposed new driveway or modification of an existing driveway be referred to the Town Engineer for comment on its location and design.
- In addition, the ordinance should state that any new driveway serving a single-family to three-family residential parcel should include a turn-around such that no vehicle has to back out onto Route 6 (such driveways are typically not subject to zoning review).
- Language should be included in both the ordinance and the Corridor Zone that refers the applicant to the general design standards for accessways and driveways, and states that those standards must be used as guidance in driveway design.

Supplemental Access Management Language for Corridor Zone (continued)

- The draft Corridor Zone language recommends “access to (a) site be located along (the) side of a building”. This should be clarified. It is intended that parking be located behind the building and driveways should not disrupt the visual character of the building setting or the network of pedestrian ways to the building, particularly along the street, to the extent practical.
- The draft Corridor Zone language states that “separate curb-cuts for drive-thru (sic) are discouraged”. This beneficial language should be expanded to describe or provide a graphic of a desirable drive-through circulation pattern. It is recommended that drive-thrus only be permitted in the Transition Areas of the Corridor Zone.
- The draft Corridor Zone language discusses gas stations and recommends “limit curb-cuts” and “use internal roads for circulation through and out of the site”. This language could be clarified to acknowledge that gas stations must have two access points per Connecticut State regulations. It is recommended that gas stations:
 - Be limited to no more than two curb-cuts with a maximum driveway width of 30 ft.
 - Have landscaping along the street frontage.
 - When feasible, have one of the two access points be a shared driveway, or access to an adjacent planned commercial development (such as a plaza), or access to an internal circulation accessway for multiple parcels.
 - Not occur within the functional area of any intersection.
- Include language to describe when the Planning and Zoning Commission has the option of waiving any of the access standards where it can be demonstrated that the proposed access design is safe and efficient and meets the intents and purposes of the zone where it occurs.
- Include language to describe when the Planning and Zoning Commission has the option of requiring a traffic analysis specifically to assess the functionality and safety of a new road or driveway serving a planned development where it intersects with Route 6. A traffic analysis may have variable levels of detail from a full traffic impact report to a less detailed engineering analysis of specific access features. It is recommended that the regulations provide the Planning and Zoning Commission with the option of requiring an analysis at a level of detail adequate to the access concerns raised in a site development plan.
- Although access management focuses on vehicle conflicts and movements, it is recommended that the site design provisions in each municipality’s zoning code also include discussion of pedestrian and bicycle access and the interface of driveways with sidewalks and greenways. In general, driveways should be designed to avoid crossing a greenway, when possible, and to minimize interruptions to sidewalk continuity. Facilities for pedestrian and bicycle passage, and wayfinding should be made part of site design in a manner to avoid pedestrian and bicyclist conflicts with vehicles accessing the development.

Site-specific Commercial Access Improvements

Based on the assessment of existing commercial driveways and corridor accident data under the existing conditions assessment of this study (see Sections 2.1.3 and 2.1.5, respectively), several locations were identified where there are opportunities to improve commercial access to address access management and safety issues. Improvement recommendations were developed for these locations to highlight access management opportunities, not to serve as a mandate for private

property owners to modify their existing access. These improvements would be implemented over time as a contingency of the site plan review and approval process, if and when individual property owners seek approval for a change in use or change in development intensity on their respective properties. Where applicable, these improvements could also be implemented in conjunction with the other roadway recommendations of this study, or other roadway improvement projects undertaken by CTDOT in the corridor. In any case, the commercial access improvements will require additional planning and coordination with CTDOT, the respective towns, and the private property owners prior to implementation.

The commercial access improvement recommendations are summarized in Table 4-2.

Table 4-2. Summary of Commercial Access Improvement Recommendations






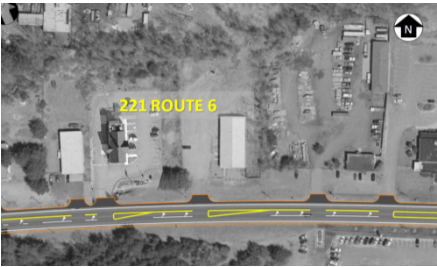



Location	Identified Issues	Recommendations
<p>Hendee Road, Northeast Corner, Andover</p> 	<ul style="list-style-type: none"> Excessively wide (50 ft) driveway on Route 6 with two 30 ft driveways located on Hendee Road. 	<ul style="list-style-type: none"> Narrow the Route 6 driveway to 30 ft maximum or eliminate driveway and provide primary access from existing driveways on Hendee Road.
<p>343 Route 6, Andover</p> 	<ul style="list-style-type: none"> Two, two-way driveways located in close proximity serving the site. Excessively wide (70 ft) eastern driveway. 	<ul style="list-style-type: none"> Narrow the eastern driveway to 30 ft maximum. Close one of the two driveways, or convert one or both of them to one-way entrance and exit.
<p>380 Route 6, Andover (Gas Station)</p> 	<ul style="list-style-type: none"> Two excessively wide (50 ft) driveways. 	<ul style="list-style-type: none"> Narrow both driveways to 30 ft maximum. Increase the separation distance between the driveways in the process of narrowing.
<p>59 Route 6, Columbia</p> 	<ul style="list-style-type: none"> One excessively wide (80 ft) driveway. 	<ul style="list-style-type: none"> Narrow driveway to 30 ft maximum, or provide two separate one-way entrance and exit driveways separated by an island.

Table 4-2. Summary of Commercial Access Improvement Recommendations

Location	Identified Issues	Recommendations
<p>65 Route 6, Columbia</p> 	<ul style="list-style-type: none"> Four consecutive, closely spaced driveways. 	<ul style="list-style-type: none"> Consolidate one or more driveways and provide shared access to reduce the number of driveways. Minimize widths of remaining driveways to maximize separation distance.
<p>221 Route 6 & Adjacent, Columbia</p> 	<ul style="list-style-type: none"> 11 accidents (turning, rear-end, and sideswipe) within a 3-year period at commercial driveways in vicinity of 221 Route 6 (Dunkin' Donuts) Seven driveways located along north side of Route 6 within 900 ft in this area. 	<ul style="list-style-type: none"> Provide left turn lanes to the driveways in this area to separate left turning vehicles from through traffic. Requires minor widening of Route 6 by approximately 2 ft. See Figure A4-1 in Appendix 4.1 for details.
<p>152-156 Route 66 East, Columbia</p> 	<ul style="list-style-type: none"> Four consecutive, closely spaced driveways for two establishments. Westernmost and easternmost driveways are excessively wide (45 ft and 50 ft, respectively). 	<ul style="list-style-type: none"> Consolidate one or more driveways and provide shared access to reduce the number of driveways. Minimize widths of remaining driveways to maximize separation distance.
<p>164-170 Route 66 East, Columbia</p> 	<ul style="list-style-type: none"> Seven consecutive commercial and residential driveways located along north side of Route 66 East. 	<ul style="list-style-type: none"> Consolidate one or more driveways and provide shared access to reduce the number of driveways. Consider providing lot interconnections between commercial properties and eliminating some driveways.
<p>15-35 Route 66 East, Columbia</p> 	<ul style="list-style-type: none"> Ten commercial driveways/curb cuts for three businesses located along north side of between 16 and 22 Route 66 East. Few commercial driveways located along south side align with driveways on north side. 6 accidents within 3-year period at these driveways. 	<ul style="list-style-type: none"> Consolidate one or more driveways and provide shared access or lot interconnections to reduce the number of driveways. Minimize widths of remaining driveways. See Figure A4-2 in Appendix 4.1 for details of possible access management improvements.

4.2.3 Route 66 East Safety Measures

The accident data for Route 66 East shows that 33 accidents occurred between Route 6 and the Windham town line over the latest three-year period for which data was available for this study (see Section 2.1.5 for additional details on accident history). Approximately half of these accidents involved fixed object collisions where motorists ran off the road due to loss of driver control or excessive speeds. More than half of the accidents between Flanders Road and Cards Mill Road involved vehicular movements to or from commercial driveways. The speed data for Route 66 East shows that excessive speeds, particularly in the eastbound direction near Flanders Road, are also a concern in this section of the corridor (see Section 2.1.2 for additional details on travel speeds). Additionally, input from business owners and other local stakeholders supports the need for measures to address vehicular speeds and safety issues on Route 66 East. As such, the improvement recommendations for Route 66 East include:

See Section 4.3 for multimodal improvement recommendations on Route 66 East.

- Implementing speed mitigation measures between Flanders Road and Windham town line to encourage slower speeds in this area where there is a higher density of commercial driveways with turning movements, and proposed Hop River Trail access improvements with a potential increase in pedestrian and bicycle activity along Route 66 East. Specific measures include:
 - A landscaped median located just east of Flanders Road to create a “gateway” feature for eastbound traffic entering the area^{5,6}.
 - A dynamic speed display sign located adjacent to the landscaped median to visually advise motorists of the need to reduce their speeds.
 - Street trees planted along both sides of the roadway to provide a sense of roadway enclosure^{5,6}.
 - Gateway signing just east of Cards Mill Road consistent with the recommendations of the Corridor Master Plan from REDC’s 2010 Study. This signing could be provided in conjunction with the Cards Mill Road intersection improvements (see Table 4-1 for additional details on the Cards Mill Road recommendations).

The improvement recommendations for Route 66 East between Flanders Road and Windham town line are illustrated in Figure A4-2 in Appendix 4.1.

- Delineating narrower, 11 ft travel lanes. Narrower lanes will help encourage slower speeds and new retroreflective edge lines will help motorists perceive the limits of the travelway.
- Implementing curve safety measures including:
 - New retroreflective warning signs (chevrons or directional arrows) placed on the outside of curves to better advise motorists of changes in roadway alignment.
 - Clearing of roadside vegetation and grading of earthen slopes to improve sight lines along the inside of curves.
- Installing new guardrail systems (with reflectorized delineators), where warranted, to better protect against run-off-the-road accidents.

⁵ Landscaped medians and street trees on Route 66 East will have to be maintained by the Town of Columbia under an encroachment permit from CTDOT’s Maintenance and Construction District 2.

⁶ Street trees located within the roadside clear zone or within a landscaped median should be no more than 4” in diameter at maturity.

4.2.4 Incident Management Considerations

There are no formal diversion plans maintained by CTDOT, State Police, or local traffic authorities for the Route 6 study corridor that prescribe how traffic will be safely managed when a segment of the Route 6 corridor is closed due to a major traffic incident. When necessary, diversion plans for incident management on Route 6 are created and implemented by state and local officials on a case-by-case basis depending on the location of the incident and its proximity to viable alternate routes.

Although formal diversion plans are typically developed for interstates and major expressways in Connecticut, further consideration could be given to treating Route 6 in the study area like an interstate with respect to incident management because Route 6 is a vital interstate link between I-384 and Route 6 expressway. Given the expressed concern of the REDC regarding incident management in the corridor, it is recommended that further diversion planning be considered by state, regional, and local stakeholders. If pursued, the planning process would include:

- Assessment of the feasibility of implementing a diversion plan including how real-time notification will be provided to motorists in the event of an incident.
- Identification of viable alternate routes that can most safely and efficiently accommodate large volumes of traffic.
- Development of criteria for when the diversion plans are implemented, such as under a single lane closure or full closure of Route 6.
- The cost-benefit relationship of developing a plan and deploying new infrastructure – such as Highway Advisory Radio stations – to ensure the effectiveness of the plan.



Connecticut maintains a Highway Advisory Radio (HAR) system that is used to alert motorists to incidents on some major highways. Deployment of new HAR stations and associated advisory signs, like the one pictured, could be considered for the Route 6 study corridor as part of a formal diversion planning process.

4.3 Multimodal Recommendations

Planning for the future of transportation in the Route 6 Hop River corridor includes recognizing and responding to the need for safer and more convenient accommodations for pedestrians, bicyclists, and transit users. The idea of planning for *complete streets* – or streets that are designed to enable safe and reasonable access for all users – is consistent with CRCOG policy⁷ and Connecticut State law⁸, and is a primary goal of this study. The potential benefits of safer and more accessible multimodal accommodations in the Route 6 Hop River corridor include:

- Less dependence on single-occupancy motor vehicle use for daily commuting and other trips in the corridor. This helps mitigate traffic growth, preserves capacity of the existing roadway, and improves air quality by reducing vehicular emissions.
- Greater ability to walk between destinations, particularly within more dense, future mixed-use village developments. This facilitates park-once-and-walk behavior, thereby reducing traffic demand in the corridor and creating shared parking opportunities.
- Healthier lifestyles and better quality-of-life for corridor residents and patrons, particularly when better pedestrian and bicycle facilities are provided within the context of attractive and unique recreational and commercial destinations in the corridor.
- Economic benefits of bicycle tourism that could be derived from the Hop River Trail. Bicycle tourism is a potential economic driver in the Route 6 corridor, though reaping the economic benefits will be contingent upon providing safe access from the trail to existing and future businesses in communities along the trail.

This section describes recommendations that will improve the safety, accessibility, and convenience of pedestrian, bicycle, transit, and Hop River Trail accommodations in the Route 6 Hop River corridor.

4.3.1 Pedestrian Improvements

In general, the study corridor is rural in nature and pedestrian destinations are limited. As such, the corridor has no continuous sidewalks and existing pedestrian facilities (exclusive of the Hop River Trail) consist of four pedestrian-actuated intersection crossings, including one crosswalk on Route 6 at Long Hill Road in Andover.

As discussed in Section 4.1, various pedestrian improvements have been integrated into the large-scale and long-term preferred concepts for Bolton Notch, Bolton Crossroads, Coventry Ridge, Historic Andover, and Lighthouse Corners in Columbia. Generally, these improvements include new sidewalks and shared use paths along discrete sections of Route 6 and new local streets; improved pedestrian crossings, including pedestrian refuge in some median locations; street trees; and pedestrian-level lighting, particularly where new village developments are envisioned in Bolton, Andover, and Columbia.



Pedestrian crossing at Long Hill Road, Andover

⁷ *Regional Pedestrian and Bicycle Plan: The CROG Commitment to a Walkable Bikable Region*, CROG, 2008.

⁸ Connecticut Public Act No. 09-154 (effective July 1, 2009)

Some of the pedestrian improvements associated with the large-scale preferred concepts can be implemented as standalone, small-scale projects that could be implemented in a much shorter timeframe. These include:

- Constructing a shared use path along the north side of Route 6/Route 44 between the existing Bolton Notch State Park trailhead and Quarry Road, and providing pedestrian crossing improvements at Quarry Road. This shared use path would accommodate new pedestrian access through the existing Route 6/Route 44 junction where pedestrian and bicycle access is currently prohibited.
- Upgrading the pedestrian crossings at Long Hill Road in Andover to provide pedestrian signal heads and crosswalks on both the Long Hill Road and Route 6 approaches; exclusive pedestrian phasing that eliminates potential conflicts with vehicular movements; and accessible ramps. Although exclusive pedestrian phasing can increase delays for motorists, relatively low pedestrian volumes at this location and a general lack of motorist awareness of pedestrians in the roadway would better protect pedestrians while not creating excessive traffic delays. The exclusive pedestrian phase should only be initiated when the pedestrian crossing push button has been activated.
- Constructing a sidewalk from the Long Hill Road intersection to the Andover Park and Ride lot. The sidewalk would provide direct access from the Park and Ride lot to the trail and other locations such as the library. Pedestrian level lighting and street trees could be provided to create a buffer from traffic on Route 6 and to promote walkability in the area.

Additionally, improvement strategies that mitigate vehicular travel speeds – such as landscaped medians, narrower (11 ft) travel lanes, street trees, and new roadside development activity in future village locations – will also serve to improve the pedestrian environment in the corridor.

4.3.2 Bicycle Improvements

The Route 6 section of the study corridor has shoulders that are generally 8 ft wide or more, which are adequate for bicycling. However, relatively high traffic volumes and speeds in the corridor are concerns for cyclists.

Although volumes and speeds on the Route 66 East section of the study corridor are lower, this section has shoulders that are typically less than the minimum desirable width of 4 ft for bicycling.



Bicyclist in Route 6 corridor

As discussed in Section 4.1, various improvements have been integrated into the large-scale and long-term preferred concepts for Bolton Notch, Bolton Crossroads, Coventry Ridge, Historic Andover, and Lighthouse Corners in Columbia that will encourage reduced speeds and increase driver awareness of both bicyclists and pedestrians within these areas. In addition to these improvements, there are opportunities for other standalone, small-scale improvements in the study corridor that can improve bicycle facilities and thereby improve safety and accessibility for cyclists.

Recommendations for bicycle improvements in the corridor include:

- **Bike Route Designation.** Designate Route 6 as a state bike route and provide bike route marker signage on Route 6. Bike route marker signs (D11-1 signs) would inform motorists of the multi-use nature of the route and would help raise motorists' awareness of bicyclists on the roadway shoulders. These signs would also inform bicyclists that the route is deemed suitable for riding, consistent with CTDOT's Connecticut Bike Map and the suitability index of "more suitable" that has been assigned to most of the Route 6 study corridor.



D11-1 Bike Route Marker

It is noted that CTDOT has been reluctant to allow designation of Route 6 as a bike route due to CTDOT's desire to steer users towards the parallel Hop River Trail. It is also noted that CTDOT does not have a formal process for designation of bike routes. Future guidance is anticipated to be forthcoming from the CT Bicycle and Pedestrian Advisory Board.

In consideration of designating Route 6 as a formal bike route, it is noted that the typical bicyclist on Route 6 is an experienced distance rider traversing the region, or a local resident travelling between home and a local destination. Route 6 has several benefits over the Hop River Trail for daily commuting or regional through-riding. These benefits include a paved surface that is maintained; a direct and unobstructed route; and access to nearby businesses and municipal buildings. As such, the demand for bicycling will remain on Route 6 despite the proximity of the Hop River Trail, which by contrast is more recreational in nature, is less suitable for high performance road bikes, and requires circuitous routing for some destinations.

- **Shoulder Improvements on Route 66 East.** The shoulder width of Route 66 East should be improved, as feasible, with widening to at least 4 ft, and desirably 5 ft where space allows. Wider shoulders may be achieved on the existing roadway by delineating travel lanes that are limited to 11 ft wide (instead of 12 ft wide). The 11 ft lane width is supported by CTDOT policy which allows for the striping of 11 ft travel lanes on state roads when roads are resurfaced or reconstructed. However, to achieve the full 5 ft wide shoulder that is desirable for bicyclists, widening of the overall pavement surface will be required and this should be considered when Route 66 East is reconstructed in the future.
- **Bike Warning Signs.** Provide bike warning signage on Route 66 East. Bike warning signs (W11-1 signs) are effective in alerting drivers to the potential presence of bicyclists on the roadway shoulders or in the travel lanes. The signs are recommended for use at intervals throughout the corridor, but particularly in areas where sight lines are limited and where narrow shoulders require bicyclists to share travel lanes with vehicles. Auxiliary "Share the Road" plaques can be mounted in conjunction with bike warning signs where narrow shoulders require bicyclists to occupy part of the travel lane.

W11-1 Bike Warning Sign



- **Bike Parking.** Provide appropriate bike parking at key destinations. Bike parking is an important component of a bicycle transportation system. It is as necessary to bikes as a parking space is to a car. Racks should be placed throughout future village locations, particularly at destinations for recreational users coming from the Hop River Trail. Additionally, bike lockers should be placed at Park and Ride facilities in the study corridor. These locations include, but are not limited to:
 - Bolton Park and Ride (Route 6 at I-384)
 - Andover Park and Ride
 - Andover Center at library and/or post office
 - Columbia Park and Ride (Route 6 at Route 66)

The placement of bike lockers at Park and Ride locations gives commuters the option of riding to these facilities from their home and securely parking their bicycle during the day while at work, thereby eliminating the use of a single occupant vehicle for commuting.



Example Bike Rack

4.3.3 Hop River Trail Improvements

The Hop River Trail is a fairly continuous recreational bicycling and walking trail that extends from Bolton Notch at the western end of the study corridor to the Willimantic River at the eastern end. It is part of the East Coast Greenway, a network of trails and bike routes that will run from Maine to Florida. Existing trail conditions vary from 6 ft or more of gravel on the western end to 4 ft or less of soil and grass on the eastern end. There is currently a gap in the trail at Kings Road in Coventry where a bridge across the Hop River is closed. Direct access to the trail from Route 6 and Route 66 East is limited: there is vehicle-only trailhead access from the westbound Route 6/44 expressway in Bolton; a narrow bituminous path up to the trail from Route 6 at Long Hill Road in Andover; and unmarked access from Route 66 East in two locations in Columbia (north side of Route 66 East approximately 700 ft east of Flanders Road, and 100 ft west of Willimantic River). Off of Route 6 and Route 66 East, access to the trail is provided via several side roads where the trail crosses at-grade. Some of these access points are formal trailheads with gravel parking areas; others are simply crossing points with varying degrees of trail crossing warning signage and markings to alert motorists to the crossing. While the trail generally parallels and is proximate to the Route 6 and Route 66 East corridors, there is no signage on either roadway indicating the location of the trail, trail access, or trailheads. Additionally, there is generally no signage along the trail directing trail users to local destinations or points of interest.

As discussed in Section 4.1, various improvements have been integrated into the large-scale and long-term preferred concepts for Bolton Notch, Bolton Crossroads, Historic Andover, and Lighthouse Corners in Columbia that will improve accessibility and visibility of the trail via new shared use path connections between the trail and future roadway improvements in these locations. In addition to these improvements, there are several opportunities for other standalone, small-scale improvements in the study corridor that can improve trail accessibility and visibility for motorists, bicyclists, and pedestrians.

Recommendations for Hop River Trail improvements include:

- **Trail identification and directional signage in Hop River Corridor for bicyclists and pedestrians.** These signs are pedestrian-scale – smaller than typical roadway signs and intended primarily for bicyclist and pedestrian viewing. The signs would be located at strategic locations on Route 6 and Route 66 East to direct users to existing trail crossing locations and trail access where parking is not available (or limited), but where access is available to bicyclists and pedestrians. Signs should be placed in the east and westbound directions within 100 ft of the following locations:

- Wales Road and Route 6 intersection
- Shoddy Mill Road and Route 6 intersection
- Hebron Road (Route 316) and Route 6 intersection
- Lake Road and Route 6 intersection
- Parker Bridge Road and Route 6 intersection
- Roses Bridge Road (Pucker Street) and Route 6 intersection
- Flanders Road and Route 66 East intersection
- Willimantic River pull-off area on Route 66 East



Pedestrian-scale Signs

- **Trail identification and directional signage in Hop River Corridor for motorists.** These signs are auto-scale – typical of other roadway sign sizes and legible to motorists traveling at higher speeds. The signs would be located at strategic locations on Route 6 and Route 66 East to direct motorists to existing trailhead/trail access locations with parking. These signs should be placed in both the east and westbound directions (where applicable) within 200 ft of the following locations:

- Bolton Notch State Park access road off of I-384 (westbound only)
- Steeles Crossing Road and Route 6
- Burnap Brook Road and Route 6
- Hop River Road and Route 6
- Trail access pull-off area on Route 66, east of Flanders Road



Auto-scale Signs

- **Trail marker and trail directional signage.** These signs are provided along the trail to guide users along the trail path and assure users that they are on the correct path. Trail marker signs should be accompanied by mile marker placards below the sign that aid in locating oneself along the trail. Signs should be placed at half-mile intervals and at trailhead and trail crossing locations. There is currently East Coast Greenway and Connecticut Greenways marker signage at several of the trailheads. The Connecticut Greenways marker is a remnant of a 2001 designation by the Department of Environmental Protection. Because the Connecticut Greenways marker refers to a program and not a route, this signage should be supplemented with or replaced by the more specific Hop River Trail marker. Additionally, there is a planned initiative by others to sign the East Coast Greenway in 2012. The installation of those signs should be coordinated with the trail marker and directional signage recommendations of this study.



Example Trail Marker

Other trail directional signs could be provided to help guide users to nearby points of interest such as state parks and town centers. These directional signs should be used at trail crossings and trailhead locations where there is a point of interest within close proximity (1-2 miles) of the sign location.

- **Safer trail crossings.** Improve crossing safety by providing adequate warning signage and crosswalks. Warning signage should consist of a standard yellow-green retro-reflective pedestrian crossing sign, as this symbol is well recognized and sufficiently applies to bicyclists as well as pedestrians. The crossing should be marked with a traditional “piano key” style crosswalk.



Example Directional Sign

Trail crossings that are currently signed and/or marked include:

- Steeles Crossing Road
- Parker Bridge Road (northbound sign missing from post)
- Hop River Road (crosswalk but no signage)

Trail crossings in need of both signage and crosswalk markings:

- Burnap Brook Road
- Wales Road
- Shoddy Mill Road
- Lake Road
- Pucker Street



Pedestrian Crossing Sign

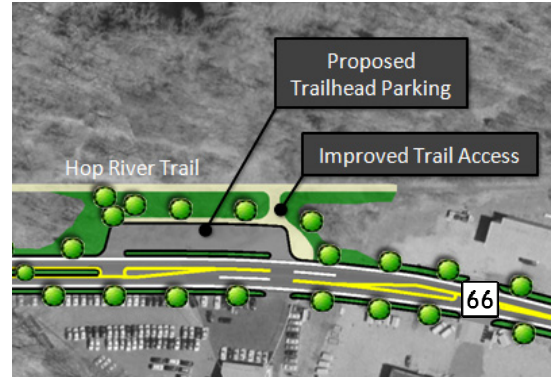
- **Trail Access Improvements on Route 6 in Andover.** The installation of the new Hop River Trail bridge over Route 316 in Andover in April 2012 created a new demand for better local access to the trail. As of May 2012, CTDEEP was working with the Town of Andover and CTDOT to advance development of a new trailhead and parking area located on Route 6 just east of the Museum of Andover History building. The proposed parking area would accommodate approximately 22 cars with additional spaces allocated for horse trailers. New auto-scale trail identification and directional signage should be placed in both the eastbound and westbound directions of Route 6 in advance of the new trailhead. Pending implementation of the new trailhead and parking area, the existing Park and Ride lot in Andover could be adapted to accommodate trail parking by providing Hop River Trail directional signage at the Park and Ride lot. The greatest demand for trail parking is during weekends when the lot is unutilized by commuters. Additionally, a new trail spur connecting the elevated Hop River Trail down to the Long Hill Road crossing from the west could be provided to facilitate better trail access in this area.



Hop River Trail bridge over Route 316, Andover

- **Trail Access Improvements on Route 66 East in Columbia.** There are two locations on Route 66 East where space is available within state-owned rights-of-way to improve Hop River trail access and to provide trailhead amenities. These locations and associated improvement recommendations include:

- North side of Route 66 East, approximately 700 ft east of Flanders Road. This location currently has sufficient area to accommodate parking for approximately eight vehicles, but could be expanded to accommodate up to 18 vehicles on a new gravel parking surface. This location also has direct access to the trail, but the access requires some maintenance and new auto-scale trail identification and directional signage on Route 66 East. Trailhead amenities should also be provided at this location in conjunction with the parking and signage improvements.



Potential trail access improvements on Route 66 East, 700 ft east of Flanders Road, Columbia. See Figure A4-2 in Appendix 4.1.

- North side of Route 66 East, approximately 100 ft west of the Willimantic River crossing and Windham town line. This location is currently not maintained or signed and consists of a small dirt parking area that could accommodate approximately six vehicles if improved with a new gravel parking surface. Poor sight lines from the existing access drive to the east make this location less desirable for better parking and increased vehicular activity; however, its proximity to the proposed Air Line State Park Trail improvements in Windham – which will connect to the Hop River trail in Columbia – and its proximity to the Willimantic River make this a desirable location for better pedestrian and bicycle access. Consequently, it is recommended that trail access improvements at this location focus on better pedestrian and bicycle access and include new pedestrian-scale trail identification and directional signage on Route 66 East; site improvements with new trailhead signage, benches, and trash receptacles; and secure bike parking.

- **Kings Road Trail Gap Mitigation.** Provide new trail directional signs and pedestrian warning signs on Kings Road and Flanders Road in Coventry and Columbia that more effectively direct users from the end of the Hop River Trail at Kings Road to the resumption of the trail at Flanders Road (and vice versa). Currently, the trail terminates at Kings Road due to the closure of a deteriorated rail bridge over the Hop River straddling the Coventry/Columbia town line. Trail users, without the aid of directional signage, must leave the trail and follow Kings Road to Flanders Road where the trail resumes on the south side of the Hop River and on the east side of Flanders Road.



Existing Bridge over Hop River near Kings Road.

- **Trail Surface Improvements.** Provide a uniform, 10 foot minimum wide trail width throughout the corridor. The trail should be surfaced with stone dust similar to what is provided in Bolton.

4.3.4 Transit Access and Convenience Improvements

There are three Park and Ride facilities within the study corridor that are served by Connecticut Transit (CTTransit) Route 18. These facilities include:

- **Bolton** – Located off of I-384 west, approximately ¼ mile west of the junction with Route 6
- **Andover** – Located on Route 6, approximately 600 ft west of Long Hill Road
- **Columbia** – Located at the junction of Route 6 and Route 66

All three Park and Ride locations offer similar amenities, with the notable absence of a shelter at the Bolton location. Additionally, these locations were found to be adequately signed from the corridor, and fully ADAAG-compliant; the buses serving these locations are also handicap accessible.

Identified deficiencies at the three Park and Ride facilities in the corridor include:

- Bolton: Lack of bus shelter; lack of bike parking.
- Andover: Broken light at shelter; lack of bike parking.
- Columbia: Light maintenance issues; lack of bike parking; inadequate parking for utilization rate.

Recommendations for the large-scale and long-term preferred concepts in Historic Andover and Lighthouse Corners in Columbia include Park and Ride improvements that will enhance multimodal accessibility and connectivity, while providing greater parking capacity. In addition to these improvements, there are several opportunities for other standalone, small-scale improvements that will improve the convenience and accessibility of utilizing transit service and ridesharing from the existing Park and Ride facilities. Recommendations for Park and Ride and transit service improvements include:

- **Park and Ride Lighting.** Repair and maintain lighting at the Andover and Columbia Park and Ride facilities.
- **Bike Parking.** Install bike lockers at all three Park and Ride facilities to encourage bicycle access and use, particularly by commuters who live in residential areas that are proximate to these facilities. Consider providing a canopy shelter and lighting for new bike racks to protect parked bicycles.
- **Bike Racks for Express Buses.** Equip the buses that provide CTTransit Express service to and from the Park and Ride facilities with bike racks to accommodate users who choose to begin and end their trip on bicycle. These buses are currently not equipped with racks, so an agreement between CTTransit and the bus owners should be pursued to accommodate the racks. [Note: All CTTransit buses are equipped with racks, but service on these routes is contracted to Peter Pan and Arrow, which do not equip their buses with racks.]

- **Real-time Bus Tracking.** Provide a real-time bus tracking system for buses that service these Park and Ride lots. This type of system would allow transit users to track the schedule and location of a bus from a smartphone or computer. Buses would have to be equipped with GPS units and applications would have to be developed to accommodate smartphone and computer access to the schedule and location information. [Note: CTTransit is planning to install an automatic vehicle location (AVL) system in the near future.]

A similar real-time system was implemented by the Massachusetts Bay Transit Authority (MBTA) in 2010 and is currently in use in the Boston area. Volunteer programmers developed a number of free applications that can be downloaded from MBTA's website. This type of system would be beneficial to transit users in the Route 6 corridor, where bus headways are 20 minutes or greater and the consequences of missing a bus can significantly impact commuting times. Bus location information would be particularly valuable on days of inclement weather when bus schedules and travel times to Park and Ride facilities can be more variable for commuters.



Example Bus App
for Smartphones

4.4 Green Infrastructure Recommendations

Green infrastructure refers to innovative stormwater management practices and technologies that capture, infiltrate, filter, evaporate, and reuse stormwater to maintain or restore natural hydrology⁹. This is achieved by managing the quantity and quality of stormwater runoff from streets (*green streets*) and development sites (*low impact developments*) at points that are as close as possible to the sources of the runoff. Given the proximity of the Hop River, its floodplains, and adjacent wetlands to a number of the improvement recommendations of this study, green infrastructure practices should be incorporated into the subsequent planning, design, and construction of future improvements to Route 6 and Route 66 East, new local streets, and new private development sites, particularly within the future development nodes where the surface area of new and potentially impervious rooftops, parking, and street surfaces will be greatest. The implementation of green streets and low impact development practices is consistent with current CRCOG policies and initiatives¹⁰, and with the REDC's 2010 Study which, as part of the proposed Corridor Zone for the Route 6 Hop River Corridor, would require the implementation of low impact development techniques wherever practical¹¹.

⁹ *Incorporating Low Impact Development into Stormwater Programs*, United States Environmental Protection Agency, April 2009.

¹⁰ *Capitol Region Transportation Plan, A Guide for Transportation Investments through the Year 2040*, Capitol Region Council of Governments, May 2011.

¹¹ *The Route 6 Hop River Corridor Economic Development Strategy and Master Plan Study*, REDC, 2010.

There is a variety of green infrastructure stormwater management practices that should be considered as part of future improvements in the Route 6 Hop River Corridor. These include^{12,13}:

- **Open Vegetated Channels.** Grass channels and enhanced dry swales can be used in place of curbing and closed drainage systems to convey and treat stormwater runoff. Vegetated channels could be used within medians (with proper design) and alongside street edges.
- **Bioretention Areas.** Vegetated structural stormwater areas can be integrated into landscaping and traffic islands to provide an aesthetically pleasing alternative to traditional stormwater detention facilities for roadways and parking lots. Bioretention areas resemble landscaped depressions and can contain grasses, wildflowers, or trees.
- **Porous Pavements.** Porous concrete, asphalt, or interlocking pavers can be used to allow runoff to infiltrate into the ground instead of being directed to closed drainage systems.
- **Infiltration.** Measures such as infiltration trenches, basins, dry wells, leaching chambers, and porous paving surfaces can be used to capture runoff from parking lots, roadways, and rooftops, store the runoff, and slowly percolate the runoff back into subsoils (where soil conditions are adequate).
- **Water Collection.** Rain barrels and cisterns can be used to collect and store rooftop runoff for reuse. Rain barrels are typically small volume and can provide water for landscaping. Cisterns are larger volume and can store water for gray water applications such as toilet flushing and landscape irrigation.
- **Green Roofs.** Layers of soil and plants can be installed on roof surfaces to retain stormwater and promote evaporation and transpiration.



Example bioretention area¹².



Example porous pavement treatment.
Source: CTDEEP

¹² *Better Site Design*, Center for Watershed Protection

¹³ *Incorporating Low Impact Development into Stormwater Programs*, United States Environmental Protection Agency, April 2009.

5

Implementation Plan

Section 4 presented detailed recommendations for transportation improvements and land use strategies in the Route 6 Hop River corridor. This section outlines how the transportation improvements can be implemented over time through a series of projects and provides guidance on the implementation process.

5.1 Improvement Program

The overall transportation improvement program consists of 27 potential projects and initiatives that, once implemented, will accomplish the recommendations presented in Section 4. The details of these potential projects are presented in the following sections.

5.1.1 Project Definitions

Projects in the improvement program are defined by project location, type, and priority.

Project Location

The project location is either specific to one of the four corridor towns (Bolton, Coventry, Andover, or Columbia), or applies to more than one town, in which case the location is considered “multi-town.”

Project Type

The project type is classified as small, medium, or large based on three criteria – implementation time, complexity, and approximate construction cost. The project types and their associated criteria are summarized in Table 5-1.

Table 5-1. Project Type Summary

Project Type	Implementation Time	Complexity	Approximate Construction Cost
Small Project	Less than 5 years	Low – Moderate	Low: Less than \$2 million
Medium Project	6 – 10 years	Moderate	Moderate: \$2 million - \$5 million
Large Project	More than 10 years	Moderate – High	High: Greater than \$5 million

Implementation time refers to the approximate length of time that is required to complete a project; it is measured from when the project is initiated (see Section 5.2.1, page 5-23, for discussion on project initiation) to when construction is completed.

Project complexity is a qualitative measure that reflects the level of engineering required to implement the project and the level to which the project will impact rights-of-way (ROW), environmental resources, or utilities. As the complexity of the project increases, the timeframe required to implement the project increases. For the purposes of this implementation plan, the various levels of project complexity are defined as follows:

- **Low Complexity.** Little or no additional planning required. Limited design effort. Typically limited or no utility, environmental, or ROW impacts.
- **Moderate Complexity.** Some additional planning required. Detailed design effort. Typically some utility, environmental, or ROW impacts.
- **High Complexity.** Significant planning and design efforts could be required. Typically significant utility, environmental, or ROW impacts.

The provided approximate construction costs are planning-level approximations of the cost of building the project, exclusive of allowances for utility relocations, ROW acquisition, site remediation, and engineering. Costs are reported in 2012-dollars and were estimated using a methodology consistent with CTDOT's latest *Preliminary Cost Estimating Guidelines*¹.

Project Priority

The project priority is reported in terms of transportation priority and community priority. There are three grades of transportation priority which are generally defined based on the relative need and urgency for the safety, accessibility, and/or mobility improvements provided by each project. More specifically, transportation and community priorities are defined as:

Transportation Priorities:

- ★★★ There is an urgency to initiate the project due to a critical safety need and significant safety benefits. There are some moderate to significant accessibility or mobility benefits of the project.
- ★★ There is a moderate level of safety benefit from the project, but there is no urgency to initiate the project based on safety need. There are some accessibility or mobility benefits of the project.
- ★ There may be some safety benefit from the project, but there is no safety need. There may be some accessibility or mobility benefits of the project.

Community Priorities:

- Community priority will generally be defined based on the REDC's preference for which projects should be initiated first, and in addition to transportation elements, takes into account non-transportation elements including potential for economic development, aesthetic value, and community vision.

¹ The methodology outlined in CTDOT's *Preliminary Cost Estimating Guidelines* consists of estimating quantities and prices for major construction items (such as excavation, pavement, curbing, sidewalk, drainage, traffic signals) and applying factors (as a percentage of the sum of major items) to account for minor items (25%), lump sum items (14.5%, including mobilization and traffic control), incidental items (25%-30%), and contingencies (10%).

All transportation priorities referenced in this plan were assigned based on input from the REDC and CRCOG. In general, these priorities, as well as community priorities, are subjective and should be reviewed on an as-needed basis in the future as the implementation of the projects in this plan evolves. This review should be conducted with input from the individual towns, REDC, CRCOG, WINCOG, and CTDOT.

5.1.2 Bolton Projects

The overall improvement program includes eight potential projects that are located in Bolton. Of these projects, two are considered small; five are medium; and one is large. Two projects are considered top (★★★) transportation priorities.

This section describes each of the Bolton projects and provides a summary of the project type, project priority, and approximate construction cost for each.

1. Bolton Notch – Interim Safety Improvements at Notch Road

Bolton

Summary: Mitigate safety concerns at Notch Road by improving intersection warning signage and sight lines.

Project Type: Small
Cost: \$200,000
Priority: ★★

This project includes:

- Installing a new dynamic intersection warning sign on the eastbound approach to replace the existing warning sign for Notch Road. Flashing beacons for the new sign would only be activated by vehicles waiting on the Notch Road approach to Route 6/Route 44.
- Improving sight lines from Notch Road by removing rock ledge and vegetation.



See Section 4.1.2 for other recommendations in the Bolton Notch Focus Area.

2. Bolton Notch – Low-speed Boulevard Improvements

Bolton

Summary: Relocate the Route 6/44 expressway terminus to the west and implement low-speed boulevard improvements along Route 6/44 overlap to encourage slower speeds into the corridor.

Project Type: Medium
Cost: \$3.0 mill.
Priority: ★

This project requires the reclassification of the section of Route 6/44 between the existing eastbound Route 6 flyover and Notch Road from a principal arterial – expressway to principal arterial – other.

Physical improvements include providing a tree-lined median, narrower shoulders, and smaller-scale signing that are consistent with a 40 mph roadway.

Note: The approximate construction cost for this project includes boulevard improvements between the existing eastbound Route 6 flyover and Notch Road. Boulevard improvements east of Notch Road are included under Project 3 (below, this page).



See Section 4.1.2 for more details about the recommendations in the Bolton Notch Focus Area.

3. Bolton Notch – Notch Road Ext. and Route 6/44 Improvements

Bolton

Summary: Modify the junction of Route 6 and Route 44 to enhance safety and to improve connectivity between Route 6, Route 44, and Notch Road.

Project Type: Large
Cost: \$25 mill.
Priority: ★★★

This project would implement the recommendations of the preferred concept for the Bolton Notch Focus Area (see Section 4.1.2 for details) and would include:

- Extending Route 44 as a low-speed boulevard through the junction
- Providing Notch Road Extension to connect to Route 44 just west of Quarry Road
- Providing new ramp connections between Notch Road Extension and Route 6
- Providing new multimodal connections and accommodations within the junction.

Note: Project 2 (above, this page) should be implemented prior to or in conjunction with the improvements of this project. Modifications to the Route 6/44 overlap to encourage reduced speeds approaching the junction is a key component of the overall improvements for Bolton Notch.



See Section 4.1.2 for more details about the recommendations in the Bolton Notch Focus Area.

4. Bolton Notch – Pedestrian and Bicycle Improvements

Bolton

Summary: Construct a new shared use path along westbound Route 44 to improve pedestrian and bicycle connectivity through Bolton Notch.

Project Type: Small
Cost: \$300,000
Priority: ★★

This project includes construction of a 10 ft wide shared use path along the north side of westbound Route 44 between the Hop River Trail trailhead at Bolton Notch State Park and Quarry Road. The path will improve bicycle and pedestrian access from Route 44 east through the Route 6/44 junction where non-motorized access is prohibited on the roadway.

The alignment of the path should minimize potential impacts to rights-of-way and existing utilities. Where feasible, the alignment should also be consistent with the other recommendations in the Bolton Notch Focus Area.



See Section 4.1.2 for other recommendations in the Bolton Notch Focus Area.

5. Bolton Crossroads – Route 6 Speed Mitigation

Bolton

Summary: Implement low-speed village arterial improvements along Route 6 between Bolton Notch and the eastern limit of the future village to encourage slower speeds.

Project Type: Medium
Cost: \$2 mill.
Priority: ★★★

This project includes providing landscaped medians (where possible considering left turn lanes and access needs); 11 ft travel lanes, 5 ft outside shoulders, and street trees along Route 6 within the limits of the future Bolton Crossroads village.



See Section 4.1.3 for more details about the recommendations in the Bolton Crossroads Focus Area.

6. Bolton Crossroads – Phase 1: Route 6-Route 44 Connector

Bolton

Summary: First phase of a three-phase program to implement the transportation elements of the Bolton Crossroads Focus Area recommendations.

Project Type: Medium

Cost: \$3 mill.

Priority: ★

The Phase 1 project provides a new Route 6-Route 44 connector roadway that would serve to both provide a direct connection between Route 6 and Route 44 and provide access to new development opportunities north of Route 6.

It is possible to implement Phase 1 as two separate initiatives with the first initiative restricted to constructing the southern half of the new connector that is located exclusively on State-owned property, ending in a temporary cul-de-sac. The second initiative would construct the northern half of the connector across privately-owned lands to make the full connection between Route 6 and Route 44.



See Section 4.1.3 for more details about the recommendations in the Bolton Crossroads Focus Area.

7. Bolton Crossroads – Phase 2: Village Streets West

Bolton

Summary: Second phase of a three-phase program to implement the transportation elements of the Bolton Crossroads Focus Area recommendations.

Project Type: Medium

Cost: \$3.5 mill.

Priority: ★★

The Phase 2 project provides a portion of the new local street network south of Route 6 and west of the Route 6-Route 44 Connector intersection that would create the framework for the western half of the future village development opportunity. Approximately 1200 ft of new local streets are included in this work.

This project could be undertaken independently of, or concurrently with, new development in this area.

Three properties would be affected by the implementation of Phase 2 project elements.



See Section 4.1.3 for more details about the recommendations in the Bolton Crossroads Focus Area.

8. Bolton Crossroads – Phase 3: Village Streets East

Bolton

Summary: Third phase of a three-phase program to implement the transportation elements of the Bolton Crossroads Focus Area recommendations.

Project Type: Medium

Cost: \$3 mill.

Priority: ★★

The Phase 3 project provides the remaining portion of the new local street network south of Route 6 and east of the Route 6-Route 44 Connector intersection that would create the framework for the eastern half of the future village development opportunity. Approximately 1000 ft of new local streets are included in this work.

This project could be undertaken independently of, or concurrently with, new development in this area.

Four properties would be affected by the implementation of Phase 3 project elements.



See Section 4.1.3 for more details about the recommendations in the Bolton Crossroads Focus Area.

5.1.3 Coventry Projects

The overall improvement program includes two potential projects that are located in Coventry. Both of these projects are considered large projects. One project is considered a top (★★★) transportation priority.

This section describes the two Coventry projects and provides a summary of the project type, project priority, and approximate construction cost for each.

9. Coventry Ridge – Phase 1: Site Access (Future Reloc. South Street)

Coventry

Summary: First phase of a two-phase program to implement the transportation elements of the Coventry Ridge Focus Area recommendations.

Project Type: Large
Cost: \$10 mill.
Priority: ★

The Phase 1 project provides site access to the Coventry parcel by constructing approximately 1200 ft of the future Relocated South Street alignment from the new intersection with Route 6, over Hop River.

The project includes modifying the Route 6 approaches to the new intersection to provide landscaped medians, 11 ft travel lanes, and 5 ft outside shoulders.

It is assumed that this project could be undertaken by a private developer in conjunction with a future site development project.

One property would be affected by the implementation of Phase 1 project elements.



See Section 4.1.4 for more details about the recommendations in the Coventry Ridge Focus Area.

10. Coventry Ridge – Phase 2: Relocated South Street

Coventry

Summary: Second phase of a two-phase program to implement the transportation elements of the Coventry Ridge Focus Area recommendations.

Project Type: Large
Cost: \$7 mill.
Priority: ★★★

The Phase 2 project completes the relocation of South Street by constructing approximately 1800 ft of new roadway that extends from the Coventry parcel site access (see project 9, page 5-8) over Ash Brook to meet existing South Street.

The project includes eliminating the existing South Street intersection, or otherwise modifying access to prohibit local vehicular traffic.

Four properties would be affected by the implementation of Phase 2 project elements.



See Section 4.1.4 for more details about the recommendations in the Coventry Ridge Focus Area.

5.1.4 Andover Projects

The overall improvement program includes four potential projects that are located in Andover. Of these projects, two are considered small, and two are large projects. One project is considered a top (★★★) transportation priority.

This section describes each of the Andover projects and provides a summary of the project type, project priority, and approximate construction cost for each.

11. Historic Andover – Pedestrian and Speed Mitigation Improvements

Andover

Summary: Upgrade the pedestrian crossings at Long Hill Road and construct new sidewalk to connect the Park and Ride to Long Hill Road. Implement low-speed village arterial improvements along Route 6.

Project Type: Small
Cost: \$2 mill.
Priority: ★★★

This project includes:

- Upgrading the pedestrian crossings at Long Hill Road to provide: new pedestrian signal heads and crosswalks; exclusive pedestrian signal phasing; a new connection from the Hop River Trail down to the Long Hill Road crossing from the west; and ADAAG-compliant ramps.
- Constructing a sidewalk from the Long Hill Road intersection to the existing Park and Ride lot. The sidewalk would provide direct access from the Park and Ride lot to the Hop River Trail and other community destinations such as the library and post office.
- Providing pedestrian-level lighting and street trees along the sidewalk to create a buffer from traffic on Route 6 and to promote walkability in the area.
- Constructing landscaped medians (where possible) and providing 11 ft travel lanes and 5 ft outside shoulders along Route 6 within the limits of the future Historic Andover village.



See Section 4.1.5 for other recommendations in the Historic Andover Focus Area.

12. Andover Hop River Trail Access Improvements, Route 6

Andover

Summary: Provide new trail identification and directional signage improvements on Route 6 for trail parking and access in Andover.

Project Type: Small
Cost: \$5,000
Priority: ★

This project includes providing new auto-scale and pedestrian-scale trail identification and directional signage on Route 6 to direct Hop River Trail users to trail parking and trail access locations in Andover. Pending construction of the planned new trailhead and parking area (by CTDEEP) on Route 6 just east of Route 316, signage should be provided for trail parking at the existing Park and Ride lot. Once the new trailhead is completed, signage should be revised to direct access to this location.

See Section 4.3.3 for other recommendations for Hop River Trail improvements.

13. Historic Andover – Phase 1: Village Streets East

Andover

Summary: First phase of a two-phase program to implement the transportation elements of the Historic Andover Focus Area recommendations.

Project Type: Large
Cost: \$6 mill.
Priority: ★★

The Phase 1 project provides a portion of the new local street network adjacent to Long Hill Road that would create the framework for the eastern half of the future village development opportunity. Approximately 900 ft of new local streets are included in this work.

It is assumed that this project could be undertaken by a private developer in conjunction with a future site development project.

Five properties would be affected by the Phase 1 project elements. The work requires relocation of the existing town maintenance garage and on-site relocation of the existing Park and Ride lot.

The planning-level cost estimate does not include any remediation of the existing town maintenance garage site.



See Section 4.1.5 for more details about the recommendations in the Historic Focus Area.

14. Historic Andover – Phase 2: Village Streets West

Andover

Summary: Second phase of a two-phase program to implement the transportation elements of the Historic Andover Focus Area recommendations.

Project Type: Large
Cost: \$3 mill.
Priority: ★★

The Phase 2 project provides the remaining new local street network that would create the framework for the western half of the future village development opportunity. Approximately 900 ft of new local streets are included in this work.

It is assumed that this project could be undertaken by a private developer in conjunction with a future site development project.

Three properties would be affected by the Phase 2 project elements, including one residential property requiring relocation.



See Section 4.1.5 for more details about the recommendations in the Historic Focus Area.

5.1.5 Columbia Projects

The overall improvement program includes six potential projects that are located in Columbia. Of these projects, one is considered small; four are medium; and one is large. Two projects are considered top (★★★) transportation priorities.

This section describes each of the Columbia projects and provides a summary of the project type, project priority, and approximate construction cost for each.

15. Lighthouse Corners – Phase 1: Roundabout

Columbia

Summary: Phase 1 of a two-phase program to implement the transportation elements of the Lighthouse Corners Focus Area recommendations. Specifically, construct a two-lane roundabout at Route 6 and Route 66 in Columbia to address safety and traffic capacity needs.

Project Type: Large
Cost: \$10 mill.
Priority: ★★★

The Phase 1 project includes:

- Relocating the Route 6 and Route 66 intersection and constructing a two-lane roundabout with realigned approach roadways.
- Providing landscaped medians; 11 ft travel lanes, 5 ft outside shoulders, and street trees along the approach roadways (excluding the Route 6 expressway approach).

Relocation of the intersection also provides an opportunity to expand the existing Park and Ride within State right-of-way.

One property would be affected by the implementation of the Phase 1 project elements.



See Section 4.1.6 for more details about the recommendations in the Lighthouse Corners Focus Area.

16. Lighthouse Corners – Phase 2: Village Streets

Columbia

Summary: Phase 2 of a two-phase program to implement the transportation elements of the Lighthouse Corners Focus Area recommendations. Specifically, construct new local streets.

Project Type: Medium
Cost: \$5 mill.
Priority: ★★

The Phase 2 project includes:

- Constructing approximately 700 ft of new local streets and a new Park and Ride lot located north of Route 6.
- Constructing approximately 1000 ft of new local streets located south of Route 6 and west of the roundabout.

These new streets would create the framework for new village development opportunities.

It is assumed that this project could be undertaken by a private developer in conjunction with a future site development project.

Four properties would be affected by implementation of the Phase 2 project elements.



See Section 4.1.6 for more details about the recommendations in the Lighthouse Corners Focus Area.

17. Lighthouse Corners – Route 66 East Flooding Mitigation

Columbia

Summary: Two-phase project to address flooding issues on Route 66 East in Columbia.

Project Type: Medium
Cost: \$750,000
Priority: ★

This project includes two phases:

Phase 1 – Investigation. Investigate the causes and necessary mitigation measures to address flooding issues on Route 66 East between Route 6 and Columbia Plaza.

Phase 2 – Mitigation. Implement appropriate mitigation measures. It is anticipated that mitigation could be implemented as an independent project initiative, or together with future pavement reconstruction on Route 66 East.

Depending on the urgency of the issue, the mitigation could be implemented as part of the roundabout improvements at Lighthouse Corners (see project Co-5, page 5-15).



See Section 4.1.6 for more details about the recommendations in the Lighthouse Corners Focus Area.

18. Columbia – Route 66 East Roadway Improvements

Columbia

Summary: Provide a variety of measures on Route 66 East to improve safety for motorists, bicyclists, and pedestrians.

Project Type: Medium
Cost (Total): \$4.5 mill.
Priority: ★ ★

This program is divided into three initiatives that could be implemented as one project, or as separate projects based on priority.

Initiative 1: Speed Mitigation Measures. Cost: \$1.5 million.
 Initiative 1 includes installation of:

- Landscaped median on the east side of Flanders Road intersection to shadow a left turn lane at Flanders Road.
- Dynamic speed display sign for eastbound traffic located adjacent to the proposed landscaped median.
- Street trees along both sides of the roadway from east of Flanders Road to Cards Mill Road to provide a sense of roadway enclosure.



See Section 4.2.3 for more details about safety improvements on Route 66 East.

Initiative 2: Curve Safety Measures. Cost: \$75,000.
 Initiative 2 includes:

- Installation of new warning signs (chevrons or directional arrows) to improve curve delineation along Route 66 East.
- Clearing of roadside vegetation and grading of earthen slopes to improve sight lines along the inside of horizontal curves.

Initiative 3: Shoulder Improvements. Cost: \$2.9 million.
 Initiative 3 includes:

- Widening the existing pavement to provide consistent travel lane and shoulder widths of 11 ft and 5 ft, respectively. Resulting overall width of 32 ft provides narrow lanes to help mitigate speeds and wider shoulders for bicyclists.
- Providing new guardrail systems, where warranted, with reflectorized delineators.

Initiative 3 could involve some impacts to existing roadside utilities and stormwater drainage systems, and some minor grading impacts that could result in construction easements or property strip takings.

19. Columbia – Cards Mill Road Intersection Improvements

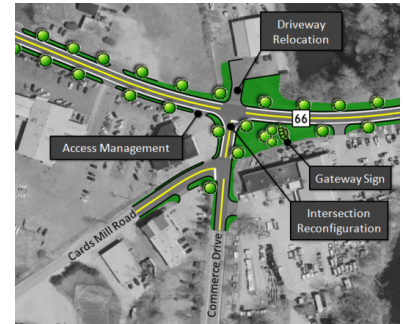
Columbia

Summary: Reconfigure the intersection of Cards Mill Road and Commerce Drive with Route 66 East in Columbia to address existing safety issues.

Project Type: Small
Cost: \$600,000
Priority: ★★ ★

This project includes reconfiguring the intersection to eliminate the skewed Cards Mill Road approach to Route 66 East and to provide access management at the intersection.

The project could include new gateway signing in this location that is consistent with the recommendations of the Corridor Master Plan from REDC's 2010 Study.



See Section 4.2.1 for other side road intersection improvements.

20. Columbia – Hop River Trail Access Improvements, Route 66 East

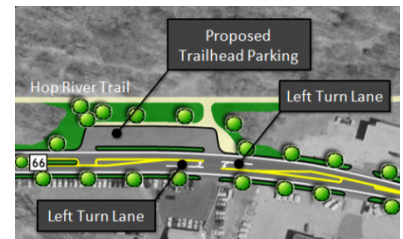
Columbia

Summary: Improve Hop River Trail access from Route 66 East in Columbia by providing a new trailhead with parking and amenities east of Flanders Road, and improving existing access just east of the Willimantic River.

Project Type: Small
Cost: \$30,000
Priority: ★

This project includes improvements in two locations:

- North side of Route 66 East, approximately 700 ft east of Flanders Road within State-owned rights-of-way: Providing a new gravel parking area for up to 18 vehicles with direct trail access and trailhead amenities; and providing trail identification and directional signage on Route 66 East for bicyclists, pedestrians, and motorists.
- North side of Route 66 East, approximately 100 ft west of the Willimantic River crossing and Windham town line within State-owned rights-of-way: Providing better pedestrian and bicycle access including new pedestrian-scale trail identification and directional signage on Route 66 East; site improvements with new trailhead signage, benches, and trash receptacles; and secure bike parking.



Shown: Route 66 East, 700 ft east of Flanders Road

See Section 4.3.3 for other Hop River Trail improvements.

5.1.6 Multi-town Projects

The overall improvement program includes seven potential projects that are multi-town projects. All of these are considered small projects. None of the projects is considered a top (★★★) transportation priority.

This section describes each of the multi-town projects and provides a summary of the project type, project priority, and approximate construction cost for each.

21. Gateway Signing (Bolton, Andover, Columbia)

Multi-town

Summary: Install gateway signing in key locations in the Route 6 Hop River Corridor.

Project Type: Small
Cost: \$40,000
Priority: ★

This project includes the installation of gateway signs and associated landscaping in the following locations:

- East of Notch Road along eastbound Route 6 in Bolton.
- North of Route 6 and Route 66 intersection along the expressway Route 6 westbound approach to the intersection in Columbia.
- East of Cards Mill Road along westbound Route 66 East in Columbia.
- Along eastbound and westbound Route 6 on the approaches to the Historic Andover area.



See Section 4.1 for other recommendations in the Bolton Notch, Historic Andover, and Lighthouse Corners Focus Areas.

It is anticipated that each of these signs would be located within State-owned rights-of-way and would require maintenance agreements and Highway Encroachment Permits from CTDOT prior to installation.

22. Route 6 Side Road Intersection Improvements

Multi-town

Summary: Address safety and corridor access issues at side roads on Route 6 by providing signing, pavement marking, and minor pavement improvements.

Project Type: Small
Cost: \$100,000
Priority: ★

This project includes improvements in:

- **Bolton** – Stony Road, Johnson Road, South Road, and Steeles Crossing Road.
- **Andover** – Hendee Road, Wales Road, and Shoddy Mill Road.
- **Columbia** – Roses Bridge Road.

It is anticipated that these improvements could be implemented together as an independent corridor improvement initiative, or as part of the next planned pavement rehabilitation project(s) in the corridor.



See Section 4.2.1 and Table 4-1 for location-specific recommendations.

23. Program of Bicycle Safety Improvements

Multi-town

Summary: Provide measures on Route 6 and Route 66 East to improve accessibility and safety for bicyclists in the corridor.

Project Types: Small
Cost (Total): \$15,000
Priority: ★★

This program is divided into two initiatives that could be implemented as one project, or as separate projects based on priority.

Initiative 1: Route 6 Bike Route Designation & Signing. Cost: \$5,000. This initiative includes:

- Installation of bike route marker signs along Route 6 subsequent to designation of Route 6 as a bike route.

Initiative 2: Route 66 East Bike Warning Signage & Shoulders. Cost: \$10,000. This initiative includes:

- Installation of bike warning signs on Route 66 East.
- Installation of new edge line markings on Route 66 East to delineate 11 ft travel lanes and maximize shoulder widths within existing pavement.



See Section 4.3.2 for details about bicycle improvements.

24. Hop River Trail Surface Improvements

Multi-town

Summary: Improve Hop River Trail accessibility by providing a uniform trail surface along its length in the Route 6 Hop River corridor.

Project Type: Small
Cost: \$1 mill.
Priority: ★★

This project includes widening narrow sections, grading, and resurfacing the trail with stone dust to provide a 10 ft wide, uniform surface that can accommodate shared use of the trail throughout the corridor.

In conjunction with this project, trail access from side roads should be improved to replace existing large boulders and gates that serve as vehicular barriers with measures, such as bollards, that are less hazardous to users.



See Section 4.3.3 for other Hop River Trail improvement recommendations.

25. Program of Hop River Trail Signing Improvements

Multi-town

Summary: Provide new Hop River Trail signing on Route 6, Route 66 East, and side roads to improve awareness of, and access to, the trail.

Project Types: Small
Cost (Total): \$30,000
Priority: ★

This program is divided into three initiatives that could be implemented as one project, or as separate projects based on priority.

Initiative 1: Trail Signage on Route 6 & Route 66 East.

Cost: \$10,000. Initiative 1 includes installation of:

- Pedestrian-scale trail identification and directional signage on Routes 6 and 66 East for bicyclists and pedestrians.
- Auto-scale trail identification and directional signage on Route 6 for motorists.

Initiative 2: Trail Markers and Directional Signage.

Cost: \$10,000. Initiative 2 includes installation of:

- Trail markers along the Hop River Trail in the corridor.
- Trail directional signs at select trail crossing and trailhead locations for nearby points of interest.

Initiative 3: Trail Crossing Signage & Markings.

Cost: \$10,000. Initiative 3 includes installation of:

- Pedestrian crossing signs on all local roadway approaches to trail crossings.
- Crosswalk markings at trail crossings on local roadways.



See Section 4.3.3, pages 4-43 and 4-44 for specific signing and marking needs.

See Section 4.3.3 for other recommendations for Hop River Trail improvements.

Implementation Consideration:

Coordinate trail marker and directional sign installation with the planned East Coast Greenway signing initiative (by others).

26. Park and Ride Lot Improvements

Multi-town

Summary: Provide various maintenance, bike parking, and bus shelter improvements at the three Park and Ride lots in the corridor to improve the convenience and comfort of using bus transit.

Project Type: Small
Cost: \$75,000
Priority: ★

This project includes:

- Repairing and maintaining appropriate lighting at the Andover and Columbia facilities.
- Installing bike lockers and/or bike racks at all three facilities.
- Installing a bus shelter at the Bolton facility.



See Section 4.3.4 for additional details on transit recommendations.

27. Express Bus Improvements

Multi-town

Summary: Provide measures to improve access and convenience of using bus transit in the Route 6 Hop River corridor.

Project Type: Small
Cost: \$50,000
Priority: ★

This project involves modifications to privately-owned buses that are contracted by CTTransit to provide Express service in the corridor. It is assumed that an agreement will be required between CTTransit and the bus owners to accommodate the following improvements:

- Installation of bike racks on buses to improve convenience of bike-bus commuter trips.
- Installation of bus tracking technology on buses and development of a smartphone application to provide real-time bus tracking capabilities for commuters.



See Section 4.3.4 for additional details on transit recommendations.

5.1.7 Improvement Program Summary

Table 5-2 provides a summary of the Bolton, Coventry, Andover, Columbia, and multi-town projects described in this plan. As shown in the table, there are six top priority (★★★) transportation projects that should be considered for immediate project initiation.

Table 5-2. Summary of Improvement Program

Project Location and Description	Reference	Coordinating Agencies ¹	Project Type	Approx. Constr. Cost	Transportation Priority ²
Bolton					
1. Bolton Notch – Interim Safety Improvements at Notch Road	p. 5-3	DOT	Small	\$200,000	★★
2. Bolton Notch – Low-speed Boulevard Improvements	p. 5-4	DOT	Medium	\$3.0 million	★
3. Bolton Notch – Notch Road Ext. and Route 6/44 Improvements	p. 5-4	DOT	Large	\$25 million	★★★
4. Bolton Notch – Pedestrian and Bicycle Improvements	p. 5-5	DOT	Small	\$300,000	★★
5. Bolton Crossroads – Route 6 Speed Mitigation	p. 5-5	DOT	Medium	\$2 million	★★★
6. Bolton Crossroads – Phase 1: Route 6-Route 44 Connector	p. 5-6	DOT	Medium	\$3 million	★
7. Bolton Crossroads – Phase 2: Village Streets West	p. 5-6	DOT	Medium	\$3.5 million	★★
8. Bolton Crossroads – Phase 3: Village Streets East	p. 5-7	DOT	Medium	\$3 million	★★
Coventry					
9. Coventry Ridge – Phase 1: Site Access (Future Reloc. South Street)	p. 5-8	DOT	Large	\$10 million	★
10. Coventry Ridge – Phase 2: Relocated South Street	p. 5-8	DOT	Large	\$7 million	★★★

Project Type	Implementation Time	Complexity	Planning-level Cost
Small Project	Less than 5 yrs	Low – Moderate	Low: Less than \$2 million
Medium Project	6 – 10 years	Moderate	Moderate: \$2 million - \$5 million
Large Project	More than 10 yrs	Moderate – High	High: Greater than \$5 million

¹**Coordinating Agencies:** In addition to the town or towns in which a project is located, the coordinating agencies for a project are those that will be involved in the implementation process. For clarity, the towns are not listed in the table.

²**Transportation Priorities:**

★★★. Urgency to initiate due to critical safety need and significant safety benefits. Some moderate to significant accessibility or mobility benefits.

★★. Moderate level of safety benefit, but no urgency to initiate based on safety need. Some accessibility or mobility benefits.

★. May be some safety benefit, but no safety need. May be some accessibility or mobility benefits.

Table 5-2. Summary of Improvement Program

Project Location and Description	Reference	Coordinating Agencies ¹	Project Type	Approx. Constr. Cost	Transportation Priority ²
Andover					
11. Historic Andover – Pedestrian and Speed Mitigation Improve.	p. 5-9	DOT	Small	\$2 million	★★★
12. Andover Hop River Trail Access Improvements, Route 6	p. 5-10	DOT/DEEP	Small	\$5,000	★
13. Historic Andover – Phase 1: Village Streets East	p. 5-10	DOT	Large	\$6 million	★★
14. Historic Andover – Phase 2: Village Streets West	p. 5-11	DOT	Large	\$3 million	★★
Columbia					
15. Lighthouse Corners – Phase 1: Roundabout	p. 5-12	DOT	Large	\$10 million	★★★
16. Lighthouse Corners – Phase 2: Village Streets	p. 5-13	DOT	Medium	\$5 million	★★
17. Lighthouse Corners – Route 66 East Flooding Mitigation	p. 5-13	DOT	Medium	\$750,000	★
18. Columbia – Route 66 East Roadway Improvements <ul style="list-style-type: none"> Initiative 1 – Speed Mitigation Measures Initiative 2 – Curve Safety Measures Initiative 3 – Shoulder Improvements 	p. 5-14	DOT	Medium	\$4.5 million	★★
		DOT	Small	\$1.5 million	★★
		DOT	Small	\$75,000	★★
		DOT	Medium	\$2.9 million	★★
19. Columbia – Cards Mill Road Intersection Improvements	p. 5-15	DOT	Small	\$600,000	★★★
20. Columbia – Hop River Trail Access Improvements, Route 66 East	p. 5-15	DOT/DEEP	Small	\$30,000	★

Project Type	Implementation Time	Complexity	Planning-level Cost
Small Project	Less than 5 yrs	Low – Moderate	Low: Less than \$2 million
Medium Project	6 – 10 years	Moderate	Moderate: \$2 million - \$5 million
Large Project	More than 10 yrs	Moderate – High	High: Greater than \$5 million

¹**Coordinating Agencies:** In addition to the town or towns in which a project is located, the coordinating agencies for a project are those that will be involved in the implementation process. For clarity, the towns are not listed in the table.

²**Transportation Priorities:**

★★★. Urgency to initiate due to critical safety need and significant safety benefits. Some moderate to significant accessibility or mobility benefits.

★★. Moderate level of safety benefit, but no urgency to initiate based on safety need. Some accessibility or mobility benefits.

★. May be some safety benefit, but no safety need. May be some accessibility or mobility benefits.

Table 5-2. Summary of Improvement Program

Project Location and Description	Reference	Coordinating Agencies ¹	Project Type	Approx. Constr. Cost	Transportation Priority ²
Multi-town					
21. Gateway Signing (Bolton, Andover, Columbia)	p. 5-16	DOT	Small	\$40,000	★
22. Route 6 Side Road Intersection Improvements	p. 5-17	DOT	Small	\$100,000	★
23. Program of Bicycle Safety Improvements	p. 5-17		Small	\$15,000	★★
• Initiative 1 – Route 6 Bike Route Designation & Signing		DOT	Small	\$5,000	★★
• Initiative 2 – Route 66 East Bike Warning Signage & Shoulders		DOT	Small	\$10,000	★★
24. Hop River Trail Surface Improvements	p. 5-18	DEEP	Small	\$1 million	★★
25. Program of Hop River Trail Signing Improvements	p. 5-18		Small	\$30,000	★
• Initiative 1 – Trail Signing on Route 6 & Route 66 East		DOT/DEEP	Small	\$10,000	★
• Initiative 2 – Trail Directional Signage		DEEP	Small	\$10,000	★
• Initiative 3 – Trail Crossing Signage & Markings		DEEP	Small	\$10,000	★
26. Park and Ride Lot Improvements	p. 5-19	DOT	Small	\$75,000	★
27. Express Bus Improvements	p. 5-19	CTTransit	Small	\$50,000	★

Project Type	Implementation Time	Complexity	Planning-level Cost
Small Project	Less than 5 yrs	Low – Moderate	Low: Less than \$2 million
Medium Project	6 – 10 years	Moderate	Moderate: \$2 million - \$5 million
Large Project	More than 10 yrs	Moderate – High	High: Greater than \$5 million

¹**Coordinating Agencies:** In addition to the town or towns in which a project is located, the coordinating agencies for a project are those that will be involved in the implementation process. For clarity, the towns are not listed in the table.

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★★. Moderate level of safety benefit, but no urgency to initiate based on safety need. Some accessibility or mobility benefits.

★. May be some safety benefit, but no safety need. May be some accessibility or mobility benefits.

5.2 Project Implementation

Many of the projects outlined in Section 5.1 could follow a traditional implementation process that is initiated and led by a public entity (such as a participating municipality or CTDOT) and carried through implementation by traditional funding mechanisms and a design-bid-build process. Some projects – or elements of some projects – could be initiated and implemented by private entities or private developers through a variety of other implementation mechanisms. Details of both the traditional implementation process and other implementation mechanisms are discussed in this section.

5.2.1 Traditional Implementation Process

For the purposes of discussion in this plan, the traditional project implementation process is generally led by a public entity and includes the following components: project identification; project initiation; design; construction; and on-going inter-agency coordination and community involvement. Each of these components is described in detail in this section.

Project Identification

The first part of the implementation process requires the identification of discrete projects or initiatives that can be advanced independently to address the specific needs of the study area. In general, project identification includes the following activities:

- Defining the scope, limits, purpose, and need for the project.
- Estimating the construction cost of the project to help determine what the funding requirements and funding mechanisms could be.
- Determining the lead agency and participating agencies or responsible parties who will be involved in the implementation process. For most projects, one or more of the participating towns, working with CRCOG, WINCOG, and/or CTDOT, will be responsible for identifying and promoting the projects that will move to *project initiation*. Whether the project is locally funded or State/Federally funded will determine which agency maintains the lead through implementation.

The improvement program outlined in Section 5.1, with the associated construction costs and prioritization ratings for each respective project, was developed as a guide to identifying projects for implementation. This guide should be used by the REDC, participating towns, CRCOG, WINCOG, and CTDOT as a starting point for the implementation process.

Project Initiation

The next part of the implementation process requires the participating towns, working with CRCOG, WINCOG, and/or CTDOT, to initiate the process of moving the project forward to design and construction. In general, project initiation includes the following activities:

- Prioritizing the project within the context of other competing initiatives in the towns, regions, and State.
- Pursuing and securing funding for the engineering and construction of the project. Depending on the overall complexity and cost of the project, it might be necessary to secure funding in two phases: first for engineering, second for construction. If a phased approach is pursued and Federal monies are secured for engineering, it is likely that funding for construction will need to be identified early in the process.

The participating towns can begin initiating projects immediately by working with their respective town boards, state representatives, CRCOG, WINCOG, and CTDOT, as required, to identify potential Federal, State, and local funding opportunities. These funding opportunities could include one or more of the following:

- **Federal and State Funding.** It is anticipated that many of the projects that follow the traditional implementation process will be publically funded in part using State and/or Federal funding sources. To receive State or Federal funding, a project will have to meet the eligibility requirements of one or more funding programs and be approved to receive those funds through a competitive application process.

Potential Federal funding programs for which projects in the plan could be eligible include:

- Surface Transportation Program (STP).
- Highway Safety Improvement Program (HSIP).
- Transportation Alternatives (TA) Program.
- Congestion Mitigation and Air Quality (CMAQ) Program.

Potential State funding programs and resources could include:

- Local Capital Improvement Program (LoCIP).
- Small Town Economic Assistance Program (STEAP).
- Special Tax Obligation (STO) Bonds.

- **Local Funding.** It is possible that some projects in the plan could be funded in whole or in part using local capital improvement funds from one or more of the participating municipalities. Additionally, many of the Federal funding programs require local participation, which typically equates to 10% to 20% of the construction cost of the project.

Private Funding Opportunities

Private participation in project implementation is discussed in Section 5.2.2, Other Implementation Mechanisms.

Design

Design can be initiated once funding has been appropriated to a project. This part of the implementation process is described here in two key phases:

- **Preliminary Engineering,** including additional planning (as required), preliminary design efforts, and environmental documentation to satisfy CEPA/NEPA requirements, if applicable. The Preliminary Engineering phase for most large-scale projects would include the selection of a preferred alternative to be advanced to the Final Design phase.
- **Final Design,** including the acquisition of rights-of-way, utility coordination, and the preparation of final design plans and specifications.

Most low-complexity projects in this plan will take less than one year to design (if required); moderate-complexity projects less than three years; and high-complexity projects three years or more.

Construction

The last part of the project implementation process is construction. Construction activities include bidding and awarding the project; relocating public and private utility infrastructure; and physical implementation of the improvements.

Most low-complexity projects in this plan will take less than one year to construct; moderate-complexity projects less than two years; and high-complexity projects two years or more.

On-going Coordination

Coordination and cooperation among the participating towns, REDC, CRCOG, WINCOG, and CTDOT should be on-going throughout the project implementation process to ensure that priority projects, once identified, are progressed in a timely manner through the process. Successful implementation of the projects outlined in this implementation plan – particularly the more complex medium and large projects – will be contingent upon the early coordination efforts required to secure funding through State and Federal funding programs. This part of the process, which includes addition of the project into the regional TIP and STIP, can be a lengthy process as individual projects must compete for limited funding resources against other priority projects in the region and State.

The involvement of local residents, business owners, town officials, and other stakeholders in the project implementation process should also be on-going. The community's collective desire to champion and facilitate the initiation of various projects is one of the most critical elements to successfully implementing the projects outlined in this plan. Without strong community support, many of the projects in this plan may never be initiated.

5.2.2 Other Implementation Mechanisms

It is possible that some projects or elements of projects in this plan could be implemented or funded by private developers, companies, organizations, or individuals using primarily private resources. Mechanisms by which these projects or project elements could be implemented or funded will generally vary by the type of project (small, medium, or large) and could include:

- **Development Exactions.** A development exaction is generally any requirement placed on a developer as a condition of receiving municipal approval for a project. Various forms of development exactions can include dedication of public rights-of-way or lands; construction of public infrastructure; or payment of impact fees to fund necessary public improvements for a project². This implementation mechanism could apply to the medium and large projects in the plan that are closely tied to future development opportunities.
- **Joint Development Agreements.** Joint development agreements involve a public-private partnership to develop certain assets, such as infrastructure, land, or facilities³. Where local regulations permit such agreements, municipalities can partner with private developers to jointly undertake the funding and implementation of mutually-beneficial projects. This implementation mechanism could apply to the medium and large projects in the plan that are closely tied to future development opportunities.

² AASHTO Center for Excellence in Project Finance Website, <http://www.transportation-finance.org/>, 2013.

³ Ibid.

- **Donations.** For relatively small-scale infrastructure improvements or enhancement projects, private organizations, companies, or individuals can contribute funds, materials, professional services, or volunteer time towards the implementation or maintenance of these improvements. Various donations could include community service projects by local high school groups or Boy Scouts of America troops; volunteer and non-profit group undertakings (such as the Shoreline Greenway Trail organization in Connecticut); and free professional services provided by local construction companies, legal professionals, engineers, tradesmen, among others. This implementation mechanism could apply to various Hop River Trail surface, access, and signing improvements; gateway signing improvements; landscaped median maintenance; and streetscape improvements.
- **Sponsorship Programs.** Formal sponsorship programs could be established by the municipalities or local organizations to provide a mechanism by which small-scale amenities – such as benches, bike racks, trailhead signs, among other elements – are paid for and donated in the name of local businesses and organizations.

Appendix 1.1

Summary of May/June 2010 Public Information Meetings

Summary of December 2011 Public Information Meetings

Summary of June 2012 Public Information Meetings

Summary of May/June 2010 Public Information Meetings

May 13, 2010 and June 29, 2010

Meeting Date and Location:

Thursday, May 13, 2010 at 7 p.m.

Andover Community Room, 17 School Road

Andover, CT

- Representing Capitol Region Council of Governments (CRCOG) – Jennifer Carrier.
- Representing CHA (CRCOG’s consultant) – Jeff Parker, Casey Hardin.
- Meeting Format: The meeting was a combined public meeting for the Route 6 Hop River Corridor *Planning Project* (administered by REDC) and *Transportation Study* (administered by CRCOG). This meeting was the first of two public meetings that compose the first of three rounds of public meetings for the Transportation Study and the last round of meetings for the Planning Project.

The primary purpose of the meeting was to present and obtain public input on draft recommendations developed by LADA, P.C. for the Planning Project. The secondary purpose of the meeting was to introduce the public to the Transportation Study; present preliminary findings relative to safety, traffic operations, and traffic speeds in the corridor; and obtain input on public concerns relative to existing problem areas and safety issues.

A formal PowerPoint® presentation by LADA and CRCOG/CHA was preceded and followed by an open house review of large-scale meeting exhibits that were designed to obtain specific public input.

- Summary of exhibits and presentation content for the Transportation Study:
 - Exhibits: *Aerial Mapping of Corridor – Where is safety an issue?*; *Route 6 Study Corridor Improvement History*; *Comparison of Accident Trends in Route 6 Study Corridor; 2006 – 2008 Accident History*; *Traffic Speeds*; *AM and PM Intersection Operations*.
- Presentation Content: *Transportation Study Overview*; *Study Findings to Date*, which included: summary of corridor improvement history and resulting reduction in average annual accidents post-improvements; summary of pre and post-improvement accident trends; preliminary areas of concern based on 2006 – 2008 accident data; summary of existing traffic speed data; summary of AM weekday traffic operations. Next Steps.

- Summary of public comments and questions received by Transportation Study team members during open house and formal presentation:
 - An attendee noted dangerous conditions at Route 6 intersections with Notch Road/Route 44 and with Route 66.
 - An attendee noted that the area of Bolton between Route 44, Route 6 and South Road/Stony Road is isolated from Bolton Center (site of Bolton's town hall/downtown/schools) due to poor road network circulation, mainly caused by the incomplete interchange of Route 6 and Route 44.
 - An attendee questioned what caused the changes in the most common accident types pre and post-improvement. Mr. Parker explained that widened shoulders and improved roadway design likely factored into the reduction of fixed object collisions. The fact that rear end collisions are more frequent than fixed object collisions post-improvement does not indicate that the number of rear end collisions has increased; the number of rear end collisions just has not decreased as much as the number of fixed object collisions.
 - An attendee questioned whether the accident data presented factors in changes in traffic volumes over the years. Mr. Parker responded that the percent changes in accidents are based on the average numbers of annual collisions pre and post-improvement, not rates of collisions (which would account for changes in traffic volumes). Mr. Parker also stated that the study team has verified that traffic volumes have increased over time as accident occurrences have decreased, so the actual accident rates would reflect a post-improvement decrease as well.
- Summary of public comments and questions received by Planning Project team members during the formal presentation relative to transportation issues and concerns:
 - Upon hearing of the recommendation of installing sidewalk through the Historic Andover Center area, an attendee stated that despite the vehicular safety improvements recently done to Route 6, she still felt pedestrians would not feel safe walking along Route 6. In response, LADA said that sidewalk was not being recommended throughout the corridor, only at selected development nodes where it would be most appropriate.
 - Attendees appeared to provide a mixed response on recommendations that incorporated the installation of a roundabout at the Route 6/66 intersection.
 - An attendee asked who would be responsible for paying to power any ornamental street lights installed in the corridor, indicating they felt it would potentially be money better spent elsewhere.

Meeting Date and Location:

Tuesday, June 29, 2010 at 7 p.m.

Beckish Senior Center, 188 Route 66

Columbia, CT

- Representing Capitol Region Council of Governments (CRCOG) – Basilia Huang.
- Representing CHA (CRCOG’s consultant) – Jeff Parker.
- Meeting Format: The meeting was a combined public meeting for the Route 6 Hop River Corridor *Planning Project* (administered by REDC) and *Transportation Study* (administered by CRCOG). This meeting was the second of two public meetings that compose the first of three rounds of public meetings for the Transportation Study and the last round of meetings for the Planning Project.

The primary purpose of the meeting was to present and obtain public input on draft recommendations developed by LADA, P.C. for the Planning Project. The secondary purpose of the meeting was to introduce the public to the Transportation Study; present preliminary findings relative to safety, traffic operations, and traffic speeds in the corridor; and obtain input on public concerns relative to existing problem areas and safety issues.

A formal PowerPoint® presentation by LADA and CRCOG/CHA was preceded and followed by an open house review of large-scale meeting exhibits that were designed to obtain specific public input.

- Summary of exhibits and presentation content for the Transportation Study:
 - Exhibits: *Aerial Mapping of Corridor – Where is safety an issue?*; *Route 6 Study Corridor Improvement History*; *Comparison of Accident Trends in Route 6 Study Corridor; 2006 – 2008 Accident History*; *Traffic Speeds*; *AM and PM Intersection Operations*.
 - Presentation Content: *Transportation Study Overview*; *Study Findings to Date*, which included: summary of corridor improvement history and resulting reduction in average annual accidents post-improvements; summary of pre and post-improvement accident trends; preliminary areas of concern based on 2006 – 2008 accident data; summary of existing traffic speed data; summary of AM weekday traffic operations. *Next Steps*.
- Summary of public comments and questions received by Transportation Study team members during open house and formal presentation:
 - An attendee noted that the Route 6 corridor is “better” since major improvements were completed.
 - The above attendee also noted that high traffic volumes are a concern and make turning to or from Route 6 difficult in both directions.
- Summary of public comments and questions received by Transportation Study team members during open house and formal presentation (continued):

- An attendee/corridor resident commented that the suggested roundabout at the Route 6/66 intersection is a concern because people generally do not know how to drive them.
- The above attendee also questioned what the difference in accident experience has been in converting an unsignalized intersection to a signalized intersection. It was noted that Long Hill Road was recently signalized and could be researched.
- The above attendee also noted that he could count on his fingers how many times Route 6 has been closed due to accidents in the last few years. Mr. Parker noted that a component of the Transportation Study involves assessing incident management plans for the corridor.
- Summary of public comments and questions received by Planning Project team members during the formal presentation relative to transportation issues and concerns:
 - An attendee expressed concern about sidewalk suggested for Andover Center and the affect that narrowing the roadway to provide it would have on safety in an area that is already a concern. The attendee suggested that wider shoulders provide some area for motorists approaching an intersection to decelerate if they are traveling too fast approaching a traffic queue at the signal.
 - The above attendee questioned whether the sidewalk suggested for Andover Center could be moved closer to the existing buildings to minimize impacts on Route 6 widths. Terri-Ann Hahn (LADA) noted that the sidewalks are not shown closer to the buildings due to topographical constraints in that area.
 - The above attendee questioned whether pedestrians should use the Hop River Trail on the south side of Route 6 to walk through Andover Center rather than new sidewalks. Ms. Hahn noted that she has observed pedestrians using the north side of Route 6 in the area where sidewalk is suggested.
 - An attendee stated her feeling that sidewalks shown in the plans are not consistent with the heritage of New England and further noted that proposed sidewalks along Route 87 were recently defeated by the public and that, by her observations, new sidewalks in Brooklyn, CT are not used by pedestrians or bicyclists.
 - John Pagini (REDC member) stated that alternative sidewalk surfaces, colors, and materials are available to provide more context-sensitive pedestrian accommodations.
 - Ms. Hahn noted that sidewalks are only being suggested in select areas where pedestrian use is most likely to occur, such as between Long Hill Road and the post office on Route 6 in Andover.
 - An attendee questioned whether alternative crosswalk treatments, such as cobbles or other texture, have been explored.
 - An attendee noted that more needs to be done in Andover Center to encourage slower speeds.

- Summary of public comments and questions received by Planning Project team members during the formal presentation relative to transportation issues and concerns (continued):
 - An attendee suggested that sidewalks are very important. It was noted that the Senior Home in Andover center should be considered in proposing sidewalk connections.
 - An attendee noted that speeding is a big issue and that better patrolling is needed.
 - An attendee expressed desire to see more/better defined rail trail connections to Route 6 in the plan.
 - When questioned whether there was anything shown during the presentation that attendees liked, responses included underground utilities, gateway signage/landmarks, median treatments, landscaping, and façade improvements.
 - An attendee expressed concerns about the suggested roundabout at the intersection of Route 6/66, specifically: what are approaching speeds; can fire trucks turn through the roundabout; can a roundabout handle the traffic volumes.
 - An attendee suggested that the study needs to reflect more than accommodating future traffic demands.
 - An attendee questioned whether bike lanes could be added along Route 6.

Summary of December 2011 Public Information Meetings

December 14, 2011 and December 15, 2011

Meeting Date and Location:

Wednesday, December 14, 2011 at 7 p.m.
Beckish Senior Center, 188 Route 66
Columbia, CT

- Number of Public Attendees (excluding Regional Economic Development Council (REDC) and study team members): 7
- Representing Capitol Region Council of Governments (CRCOG) – Basilia Huang, Rob Aloise.
- Representing CHA (CRCOG's consultant) – Jeff Parker, Casey Hardin.
- Meeting Overview and Format: This meeting was the first of two public meetings that compose the second of three rounds of public meetings for the Route 6 Hop River Corridor Transportation Study.

The primary purpose of the meeting was to present and obtain public input on preliminary recommendations that have been developed with input from the REDC and participating stakeholders.

A formal PowerPoint® presentation by CHA was preceded by a brief open house for public review of large-scale exhibits and informational boards. A public question and comment period followed the presentation.

- Summary of public questions and comments:
 - An attendee questioned why the concept for Lighthouse Corners (roundabout with village) retains a slip lane despite the noted issue of the existing high speed slip lanes. CHA replied that the slip lane from westbound Route 6 expressway to westbound Route 6 is required to maintain acceptable operation of the roundabout due to the high traffic volume. CHA noted that this slip lane will be designed with a smaller radius to encourage slower speeds.
 - An attendee questioned whether transverse rumble strips had been considered on the Route 6 expressway approach to the Route 6/66 intersection to encourage slower speeds. CHA replied that rumble strips had not been evaluated and noted that noise generated by the rumble strips could be an issue considering the desire to create a village node in this area.
 - An attendee suggested that there should be a slip lane for traffic turning right from Route 66 to Route 66 East since this is a high volume movement. CHA replied that the traffic volumes do not require a slip lane for the roundabout to operate acceptably and noted that the right turning movement would be fairly free-flowing through the roundabout at most times.

- Summary of public questions and comments, Columbia Meeting (continued):
 - An attendee suggested that high traffic volumes in the afternoon from approximately 3 p.m. to 6 p.m. will cause excessive delays at the roundabout. CHA replied that the two-lane roundabout operates comparably to a signalized intersection in terms of average delay and levels of service.
 - An attendee inquired where there is a two-lane roundabout in operation similar to the one presented. CHA replied that there is a similar two-lane roundabout in Keene, NH and noted that there are no two-lane roundabouts in Connecticut.
 - An attendee questioned who has the right-of-way at a roundabout. CHA replied that circulating traffic has the right-of-way and entering traffic is required to yield to circulating traffic.
 - Attendees questioned whether a roundabout can accommodate the passage of large vehicles. CHA replied that roundabouts can be designed to accommodate large vehicles and noted that the two-lane roundabout, as shown in the concept, can accommodate a large truck side-by-side with a passenger vehicle within the roundabout.
 - An attendee noted that the realignment of Route 6 on the eastbound approach to the intersection and the development opportunities shown north of Route 6 in that area are within the floodplain of the Hop River and will be difficult to develop due to existing flooding issues. CHA replied that the concept was developed to minimize floodplain impacts and noted that floodplain impacts would have to be mitigated. Potential floodplain impacts are being evaluated and documented as part of this study.
 - An attendee noted that there is currently no left turn arrow for vehicles turning left from eastbound Route 6 to Route 6 expressway. CHA replied that a near-term need for signal modifications will be evaluated.
 - An attendee noted concern about the occasional traveler not knowing how to drive through a roundabout, particularly a two-lane roundabout at this location. CHA replied that the concept with the two-lane roundabout is understood to be a long-term project and noted that driver experience, in general, will be much greater in the future as more roundabouts are implemented in the state and region.
 - An attendee questioned what the general feedback from the public is regarding roundabouts. CHA replied that public opinion is generally favorable once a new roundabout is in operation, though initial opposition or apprehension to the proposition of a roundabout is typical.
 - An attendee suggested that the Route 6/66 intersection be improved with a flyover from eastbound Route 6 to Route 6 expressway to benefit through traffic. CHA replied that a flyover had not been considered. A flyover is not warranted to provide acceptable operations and is not consistent with the desired context for this area.

- Summary of public questions and comments, Columbia Meeting (continued):
 - An attendee questioned whether a traffic analysis has been performed for the roundabout and a traffic signal. CHA replied that a traffic analysis of the afternoon peak hour traffic conditions for the future study year (2030) shows that a two-lane roundabout will operate at level of service (LOS) C; a comparable signalized intersection with some capacity improvements will operate at LOS D or better (Note – LOS values range from A to F with A reflecting the best operations with lowest delay).
 - An attendee suggested that the study leaves out recommendations for access improvements to the Hop River. CHA replied that access improvements to the river are part of the concept in Historic Andover and that opportunities exist for improved river access from Route 66 in Columbia near the Windham town line.
 - An attendee noted concern about the realignment of Route 6 reducing the visibility of existing businesses near the intersection of Route 6/66. CHA indicated that there are opportunities that can be explored to maximize or enhance the visibility of businesses in the area. It was also noted that the village development desired for this area is intended to benefit both existing and future businesses by creating a destination that will overall attract more patrons to the area.
 - An attendee suggested that the Hop River Trail trailhead parking area in Columbia be constructed of gravel or other environmentally-sensitive material, not bituminous pavement.

Meeting Date and Location:

Thursday, December 15, 2011 at 7 p.m.
Andover Community Room, 17 School Road
Andover, CT

- Number of Public Attendees (excluding Regional Economic Development Council (REDC) and study team members): 25 (approximately)
- Representing Capitol Region Council of Governments (CRCOG) – Basilia Huang, Rob Aloise, Jennifer Carrier.
- Representing CHA (CRCOG's consultant) – Jeff Parker, Casey Hardin.
- Meeting Overview and Format: This meeting was the second of two public meetings that compose the second of three rounds of public meetings for the Route 6 Hop River Corridor Transportation Study.

The primary purpose of the meeting was to present and obtain public input on preliminary recommendations that have been developed with input from the REDC and participating stakeholders.

A formal PowerPoint® presentation by CHA was preceded by a brief open house for public review of large-scale exhibits and informational boards. A public question and comment period followed the presentation.

- Summary of public questions and comments:
 - An attendee questioned how the recommendations would be funded. CHA replied that anticipated costs, potential funding opportunities, and other implementation considerations will be evaluated as the next step in this study.
 - An attendee expressed concern about the installation of raised medians throughout the corridor and potentially blocking driveway access. CHA replied that the intent is to provide landscaped medians in select locations where they will provide aesthetic and speed mitigation benefits without limiting access to existing businesses and driveways. It is also the intent to utilize medians to manage access to new local streets in the future, as necessary to promote safety and maintain through traffic operations.
 - An attendee noted that streetscape improvements that were recommended under the REDC's previous Land Use Study appear to be absent. CHA replied that streetscape improvements consistent with those proposed in the Land Use Study are incorporated into the concepts though they are not fully detailed on the preliminary graphics at this time.
 - An attendee expressed concerns over environmental impacts associated with the concept presented for Historic Andover, particularly floodplain impacts. CHA replied that floodplain and wetland impacts would have to be mitigated. Potential floodplain and wetland impacts are being evaluated and documented as part of this study.
 - An attendee noted that the Historic Andover concept will include a large amount of new impervious area which could require a new closed drainage system and noted that the system should be designed to be environmentally friendly and not discharge directly to the Hop River. CHA replied that drainage system design is not part of the study, but potential drainage issues and concerns for the area will be identified and documented. John Pagini of the REDC added that low impact development strategies will be utilized in sensitive areas.
 - An attendee suggested that lowering the elevation of the Hop River Trail along Route 6 in Historic Andover may not be possible due to site constraints. CHA replied that a relatively short distance would be required at each end to transition to and from a lower trail elevation.
 - An attendee suggested that it would be preferred to maintain the elevation of the existing trail, which is further from traffic and avoids conflicts between vehicle and bicyclist headlights.
 - An attendee noted that CTDEEP and CTDOT might need to approve changes to the elevation and grades of the trail because it is a state park and there might be future opportunity to restore rail service along the line. CHA noted that coordination with CTDOT is on-going and coordination with CTDEEP is likely.
 - An attendee suggested that the trail could be split to bring one section down to the elevation of Route 6 for a crossing at Long Hill Road, leaving a continuous section of the path at its existing elevation.

- Summary of public questions and comments, Andover Meeting (continued):
 - An attendee suggested that there should be a truck climbing lane for westbound Route 6 approaching the junction with Route 44 in Bolton Notch. CHA replied that the need and feasibility of a climbing lane is would be investigated.
 - An attendee suggested that there should be near term improvements for access to the Hop River Trail trailhead in Bolton, off the Route 6/44 overlap. The existing driveway requires motorists to slow in traffic and turn approximately 180 degrees from the high speed expressway. CHA replied that opportunities to improve access to the trailhead would be investigated.
 - An attendee noted that speeds on the Route 6/44 overlap are an issue and that measures should be included in the study to address speeding on the eastbound approach to the Route 6 and Route 44 split in Bolton Notch. CHA replied that opportunities to provide speed mitigation on this approach are being considered as part of this study.

Summary of June 2012 Public Information Meetings

June 7 and June 12, 2012

Meeting Date and Location:

Thursday, June 7, 2012 at 7 p.m.

Beckish Senior Center, 188 Route 66

Columbia, CT

- Number of Public Attendees (excluding Regional Economic Development Council (REDC) and study team members): 13 (approximately)
- Representing Capitol Region Council of Governments (CRCOG) – Basilia Huang, Rob Aloise, Jennifer Carrier
- Representing CHA (CRCOG’s consultant) – Jeff Parker, Casey Hardin.
- Meeting Overview and Format: This meeting was the first of two public meetings that compose the third of three rounds of public meetings for the Route 6 Hop River Corridor Transportation Study.

The primary purpose of the meeting was to present and obtain public input on the final recommendations and implementation plan that have been developed with input from the REDC and participating stakeholders.

A formal PowerPoint® presentation by CRCOG and CHA was preceded by a brief open house for public review of large-scale exhibits and informational boards. A public question and comment period followed the presentation.

- Summary of public questions and comments:
 - An attendee suggested that vehicles traveling “110 mph” off the Route 6 expressway may have trouble slowing to enter the roundabout.
 - An attendee questioned how the proposed node at Lighthouse Corners would be developed, and who owns the existing property. CHA replied that a large portion of the land located south of the proposed Route 6 alignment is owned by CTDOT (the existing Route 6 right-of-way (ROW)); a private entity owns the parcel located north of the Route 6 alignment. CTDOT would have to acquire the necessary land from the private entity to realign the roadway. CTDOT could sell the existing ROW or relinquish it to the Town. The development itself would be undertaken by a private developer, potentially with assistance from the Town.
 - An attendee suggested that there are impacts shown to the existing parcel occupied by the Lighthouse building. CHA responded that it is not the intent of the plan to impact this parcel and that the property line and ROW information being used for the study is approximate. CHA noted that with establishment of the actual property bounds and detailed design of the planned roadway and intersection, it is anticipated that direct impacts to the Lighthouse parcel could be avoided.

- Summary of public questions and comments, Columbia Meeting (continued):
 - An attendee suggested that backups and congestion may occur on Route 6 from slowing traffic speeds at the roundabout. CHA replied that traffic analysis of the proposed roundabout shows it operates acceptably during peak hour conditions.
 - An attendee asked if the desired 35 mph speeds in the corridor would negatively affect traffic. CHA replied that measures to mitigate speeds for the purpose of improving safety are proposed within existing reduced speed areas (where speed limits are 40 or 45 mph) and within the proposed discrete village areas; speed limits throughout the rest of the corridor would not be changed. It is anticipated that measures to mitigate speeds will not reduce traffic capacity.
 - An attendee asked if the proposed medians were raised or depressed, and questioned the risk of curbs to vehicles approaching at high speed from the Route 6 expressway. CHA replied that the medians in the vicinity of the roundabout would be raised and the roundabout approaches would be designed to encourage slower speeds. Slower speeds reduce the risks posed by vehicles striking curbs. It was noted that the right turn bypass lane to westbound Route 6 would be designed to accommodate slower vehicle speeds than the existing slip lane.
 - An attendee noted that the footprint of the proposed development may create environmental impacts with wetland areas.
 - An attendee noted that the Lighthouse building would no longer be at the corner and questioned whether the name “Lighthouse Corners” would remain an appropriate description of the area. CHA replied that the development concept shown is just one of many possibilities.
 - An attendee requested an explanation for how the roundabout at the intersection of Route 6 and 66 became the preferred recommendation. CHA explained that a number of alternatives, including a signalized intersection, had been evaluated and reviewed with the public (including workshops in June and July 2011) and the REDC. The REDC selected the roundabout as the preferred alternative on the basis of safety benefits – in terms of reduced accident severity and frequency; traffic operations; gateway opportunities created by the roundabout; and consistency of the roundabout with the future village character that has been envisioned for this area.
 - An attendee noted that people who do not have experience driving through roundabouts often perceive them as dangerous. CHA replied that safety data shows roundabouts can reduce accident severity and frequency at intersections. CHA noted that educational materials and resources for roundabouts have been compiled as part of this study and that this information is available on CRCOG’s website (www.crcog.org). CHA also noted that modern roundabouts are becoming more common in Connecticut, New York, Massachusetts, New Hampshire, among other places, and that motorists’ experience with roundabouts will increase over time.
 - An attendee asked if the roundabout would pose a restriction to commercial truck traffic. CHA replied that the roundabout would be designed to accommodate large trucks and there would be no restriction to commercial traffic.

- Summary of public questions and comments, Columbia Meeting (continued):
 - An attendee questioned whether the existing topography of the Route 6/66 area had been taken into account during the preparation of the Lighthouse Corners concept, specifically whether the downgrade from Route 6 expressway to the proposed roundabout presented issues. CHA indicated that existing and proposed grades were evaluated and that grades within acceptable limits for an approach to a roundabout (approximately 3% maximum) could be provided. Further evaluation could be done during subsequent design phases to minimize the grades to the greatest extent practical to minimize the effect of the grade on approach speeds.
 - An attendee asked how new vehicular movements were accommodated in the recommendation for the Bolton Notch focus area. CHA described the subject movements.
 - Several attendees drew attention to unsafe conditions on Route 66 East. They reported that high vehicular speeds and left turns to several of the commercial driveways on Route 66 East are safety issues. Additionally, they reported that this area is heavily used by cyclists. The attendees suggested that slowing traffic in this area would create a safer environment and an additional benefit is a positive impact for area businesses.
 - An attendee suggested that Willimantic residents should have been involved in the study outreach given their proximity to the corridor.
 - An attendee asked what the projected traffic growth for the corridor over 20 years was. CHA replied that growth varies along the corridor, but generally growth is forecasted to be approximately 30%.
 - An attendee stated that he thought the study had done a good job.
 - An attendee asked how bicyclists and pedestrians would navigate the proposed two lane roundabout. CHA replied that bicyclists would be relocated to a shared use path outside of the vehicular travel lanes in the roundabout and that pedestrian crossings could be provided. CHA noted that more specific pedestrian and bicycle accommodations would be detailed during subsequent design phases.
 - An attendee mentioned long delays while making left turns from Hendee Road and questioned what could be done to alleviate these delays. CHA replied that the study had evaluated providing indirect left turn/u-turn areas, where vehicles could turn right out of a side road on to Route 6, then make a u-turn somewhere on Route 6 to head in the opposite direction. CHA noted that provisions for these u-turns were determined to be impractical given the lack of space on Route 6 to provide u-turns without significant impacts to properties, and given the potential distance between possible u-turn locations and the locations of the existing side roads that they could serve. CHA noted that the study contains recommendations for accommodating concurrent left and right turns at some locations to reduce delays; improving sightlines; and providing intersection warning sign improvements to increase the safety for motorists accessing Route 6 from side roads.

- Summary of public questions and comments, Columbia Meeting (continued):
 - An attendee questioned whether side road access could be improved by providing traffic signals at additional intersections that could be coordinated to create gaps in through traffic. CHA noted that although signal systems can be designed for this purpose, the spacing of the signals in the Route 6 corridor makes it difficult to maintain platoons of vehicles and large gaps over distances. Additionally, none of the unsignalized intersections are expected to meet warrants for signalization in the future and providing unnecessary signals would have an adverse affect on through traffic operations.

Meeting Date and Location:

Tuesday, June 12, 2012 at 7 p.m.

Andover Community Room, 17 School Road

Andover, CT

- Number of Public Attendees (excluding Regional Economic Development Council (REDC) and study team members): 6 (approximately)
- Representing Capitol Region Council of Governments (CRCOG) – Basilia Huang, Rob Aloise.
- Representing CHA (CRCOG’s consultant) – Jeff Parker, Casey Hardin.
- Meeting Overview and Format: This meeting was the second of two public meetings that compose the third of three rounds of public meetings for the Route 6 Hop River Corridor Transportation Study.

The primary purpose of the meeting was to present and obtain public input on the final recommendations and implementation plan that have been developed with input from the REDC and participating stakeholders.

A formal PowerPoint® presentation by CRCOG and CHA was preceded by a brief open house for public review of large-scale exhibits and informational boards. A public question and comment period followed the presentation.




- Summary of public questions and comments:
 - An attendee questioned whether the study had any specific recommendations for maintaining open space. CHA replied that the 2010 Land Use Study completed previously by the REDC, includes recommendations for a new “corridor zone” that is intended to maintain conservation areas and preserve open space by way of allowing for more concentrated development with defined nodes in the corridor.
 - An attendee noted that she liked the retention of some of the existing buildings in Andover while creating the development node.
 - An attendee asked what comments were discussed at the Columbia meeting. CHA noted there was a good dialogue about the proposed roundabout at Route 6/66 and new input regarding potential safety issues on Route 66 East.

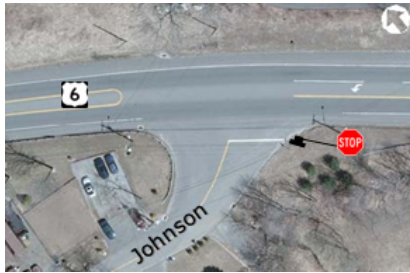


- Summary of public questions and comments, Andover Meeting (continued):
 - An attendee stated that this was an award winning project and hoped that monies would become available to fund the recommendations.
 - An attendee asked how funding could be obtained for the recommendations in Bolton including changing the end point of I-384. CHA replied that many of the projects in the corridor could be eligible for funding through various state and federal programs. It was noted that funding opportunities are outlined in the Implementation Plan.
 - An attendee stated that this is a very nice plan, but questioned how it will be implemented. CRCOG replied that a key to implementing projects is to have local officials and state representatives champion the projects that their communities identify as priority projects in an effort to secure public funding.




Appendix 2.1




Summary of Intersection Characteristics

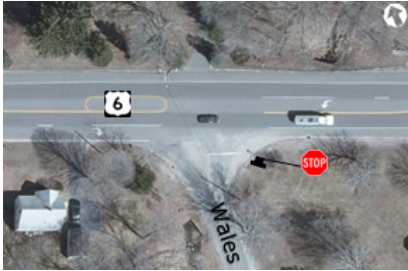


Table A2-1. Summary of Intersection Characteristics




Intersecting Road	Intersections Characteristics/Features	Other Considerations
Route 44 (Boston Turnpike)		
	<ul style="list-style-type: none"> • Unsignalized, two-way merge/diverge • EB Approach (Route 6/44): Two lanes • WB Approach (Route 6): One Lane • WB Approach (Route 44): One Lane 	<ul style="list-style-type: none"> • Warning signs identifying raised median separating Routes 6 & 44, chevrons attached below sign to increase visibility • Horizontal curve warning sides provided in both directions on Route 6 for sub-standard horizontal curvature. • Signing throughout the intersection is more representative of interstate signing than arterial signing.
Notch Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6/Route 44): Two lanes – One thru lane (Route 44) to left; one thru lane (Route 6) to right • NB Approach (Notch Road) Stop controlled; One lane – right turn lane 	<ul style="list-style-type: none"> • Intersection Warning Signs with flashing beacon, and road plaque provided on eastbound Route 6/44 • Limited sight distance looking west from Notch Road (325' provided, 530' standard) • 8 accidents during most recently available 3-year period (2006-2008)
Stony Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • WB Approach (Route 6): One lane – shared thru/right lane • SB Approach (Stony Road) Stop controlled; One lane – shared left /right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, no road name plaques provided • Standard ISD available looking both east and west from Stony Road • 3 accidents during most recently available 3-year period (2006-2008)


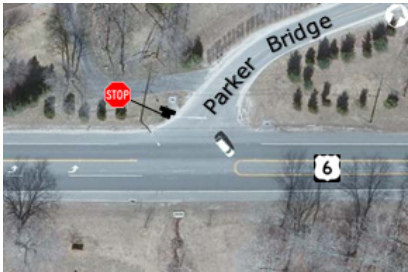

Intersecting Road	Intersections Characteristics/Features	Other Considerations
Johnson Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): One lane – shared thru/right lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Johnson Road) Stop controlled; One lane – shared left/ right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, no road name plaques provided • Limited sight distance looking west from Johnson Road (610' provided, 660' standard) • 5 accidents during most recently available 3-year period (2006-2008) • Johnson Road approach grade greater than 3%
South Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • WB Approach (Route 6): One lane – shared thru/right lane • SB Approach (South Road) Stop controlled; One lane – shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, no road name plaques provided • Standard ISD available looking both east and west from South Road • 1 accident during most recently available 3-year period (2006-2008)
Steeles Crossing Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive right turn lane, one thru lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Steeles Crossing Road) Stop controlled; One lane – shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, no road name plaques provided • Standard ISD available looking both east and west from Steeles Crossing Road • 4 accidents during most recently available 3-year period (2006-2008)


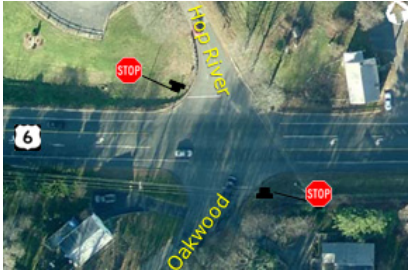
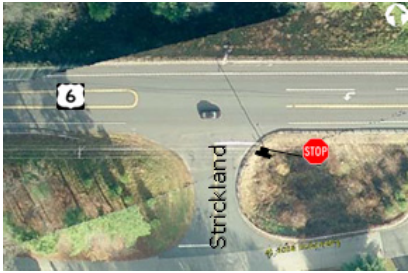
Intersecting Road	Intersections Characteristics/Features	Other Considerations
South Street		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • WB Approach (Route 6): Two lanes - One exclusive right turn lane, one thru lane • SB Approach (South Street) Stop controlled; One lane – shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, no road name plaques provided • Standard ISD available looking both east and west from Steeles Crossing Road • 4 accidents during most recently available 3-year period (2006-2008)
Bailey Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): One lane – shared thru/right lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Bailey Road) Stop controlled; One lane – shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Bailey Road • Standard ISD available looking both east and west from Bailey Road • 1 accident during most recently available 3-year period (2006-2008)
Hickory Hill Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): One lane – shared thru/right lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Hickory Hill Road) Stop controlled; One lane – shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Hickory Road • Standard ISD available looking both east and west from Hickory Hill Road



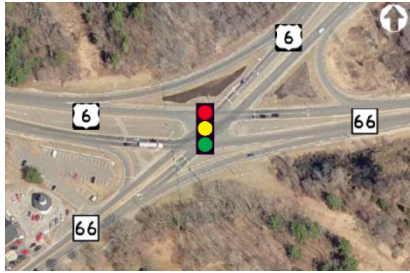
Intersecting Road	Intersections Characteristics/Features	Other Considerations
Hendee Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • WB Approach (Route 6): Two lanes - One exclusive right turn lane, one thru lane • SB Approach (Hendee Road) Stop controlled; One lane – shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Hendee Road • Standard ISD available looking both east and west from Hendee Road • 4 accidents during most recently available 3-year period (2006-2008)
Aspinall Drive		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): One lane – shared thru/right lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Aspinall Drive) Stop controlled; One lane – shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Aspinall Road • Standard ISD available looking both east and west from Aspinall Road
Burnap Brook Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): One lane – shared thru/right lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Burnap Brook Road) Stop controlled; One lane – shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, no road name plaques provided • Standard ISD available looking both east and west from Burnap Brook Road • 1 accident during most recently available 3-year period (2006-2008)



Intersecting Road	Intersections Characteristics/Features	Other Considerations
Wales Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive right turn lane, one thru lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Wales Road) Stop controlled; One lane – shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Wales Road • Limited sight distance looking west from Wales Road (600' provided, 665' standard) • 3 accidents during most recently available 3-year period (2006-2008) • Wales Road approach grade greater than 3%
Shoddy Mill Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): One lane – shared thru/right lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Shoddy Mill Road) Stop controlled; One lane – shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Shoddy Mill Road • Standard ISD available looking both east and west from Shoddy Mill Road • 0 accidents during most recently available 3-year period (2006-2008)
Long Hill Road		
	<ul style="list-style-type: none"> • Signalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • WB Approach (Route 6): One lane – shared thru/right lane • SB Approach (Long Hill Road) One lane – shared left/right lane 	<ul style="list-style-type: none"> • Standard ISD available looking both east and west from Long Hill Road • 5 accidents during most recently available 3-year period (2006-2008)

Intersecting Road	Intersections Characteristics/Features	Other Considerations
Route 316 (Hebron Road)		
	<ul style="list-style-type: none"> • Signalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive right turn lane, one thru lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Route 316) Two lanes – One exclusive right turn lane, one exclusive left turn lane 	<ul style="list-style-type: none"> • Standard ISD available looking both east and west from Route 316 • 4 accidents during most recently available 3-year period (2006-2008)
Bunker Hill Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • WB Approach (Route 6): Two lanes - One exclusive right turn lane, one thru lane • SB Approach (Bunker Hill Road) Stop controlled; One lane – shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Bunker Hill Road • Standard ISD available looking both east and west from Bunker Hill Road • 2 accidents during most recently available 3-year period (2006-2008)
Lake Road		
	<ul style="list-style-type: none"> • Signalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive right turn lane, one thru lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Lake Road) One lane— shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Lake Road • Standard ISD available looking both east and west from Lake Road • 4 accidents during most recently available 3-year period (2006-2008)

Intersecting Road	Intersections Characteristics/Features	Other Considerations
Route 87 (Jonathan Trumbull Highway)		
	<ul style="list-style-type: none"> • Signalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive right turn lane, one thru lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Route 87) Two lanes – One exclusive right turn lane, one exclusive left turn lane 	<ul style="list-style-type: none"> • Standard ISD available looking both east and west from Route 87 • 4 accidents during most recently available 3-year period (2006-2008)
Parker Bridge Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • WB Approach (Route 6): One lane – shared thru/right lane • SB Approach (Parker Bridge Road) Stop controlled; One lane – shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Parker Bridge Road • Standard ISD available looking both east and west from Parker Bridge Road • 0 accidents during most recently available 3-year period (2006-2008)
Woodward Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • WB Approach (Route 6): One lane – shared thru/right lane • SB Approach (Woodward Road) Stop controlled; One lane – shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, no road name plaques provided • Standard ISD available looking both east and west from Woodward Road • 1 accident during most recently available 3-year period (2006-2008)

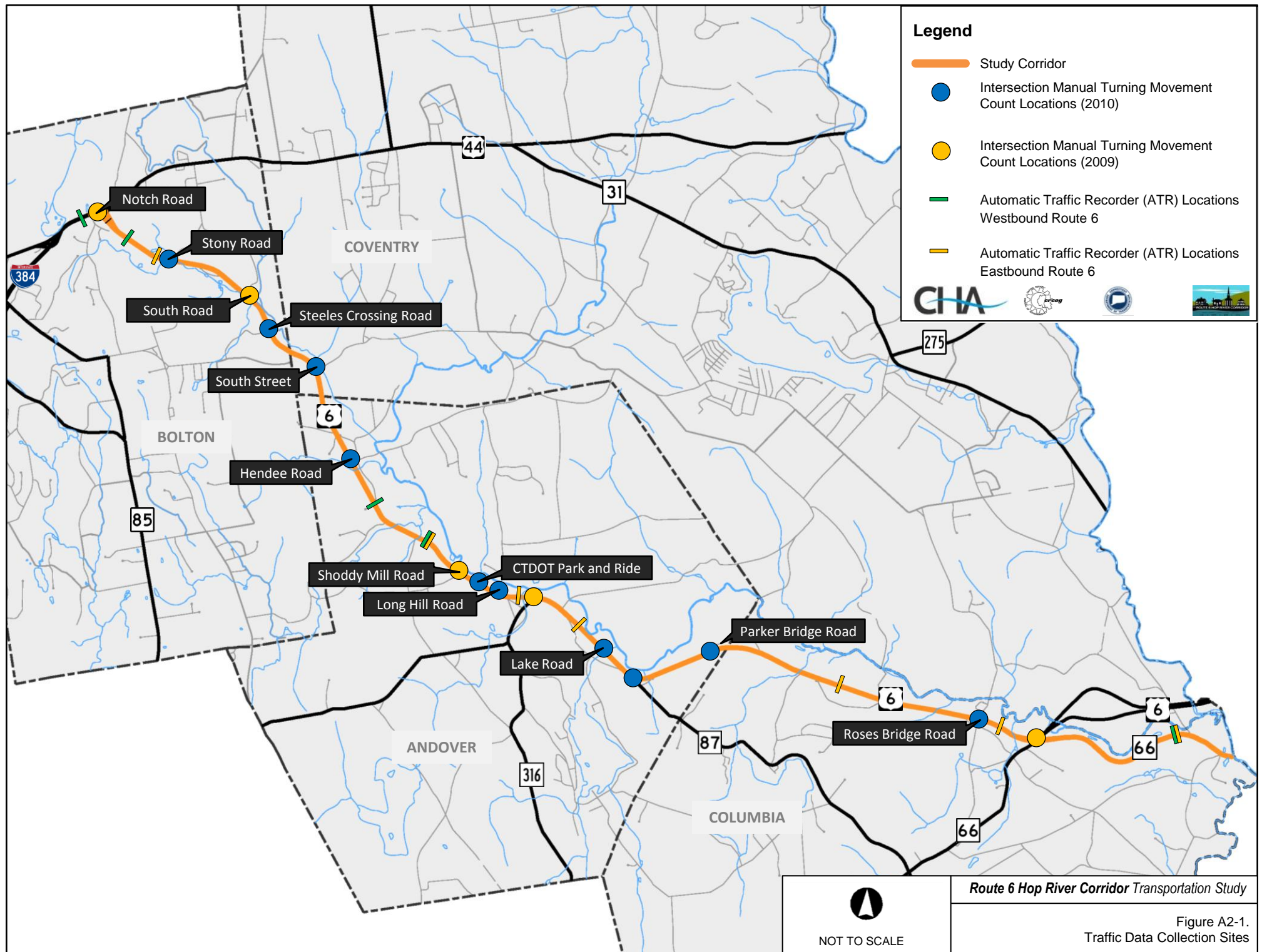
Intersecting Road	Intersections Characteristics/Features	Other Considerations
Whitney Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): One lane – shared thru/right lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Whitney Road) One lane— shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Whitney Road • Standard ISD available looking both east and west from Whitney Road • 3 accidents during most recently available 3-year period (2006-2008)
Hop River Road and Oakwood Lane		
	<ul style="list-style-type: none"> • Unsignalized, four-legged intersection • EB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru /right lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru /right lane • NB Approach (Oakwood Lane) One lane— shared left/thru/right lane • SB Approach (Hop River Road) One lane— shared left/thru/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, two name plaques provided indicating Hop River Road and Oakwood Lane with arrows • Standard ISD available looking both east and west from Hop River Road as well as Oakwood Lane • 0 accidents during most recently available 3-year period (2006-2008) on Hop River Road
Strickland Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): One lane – shared thru/right lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Strickland Road) One lane— shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Strickland Road • Standard ISD available looking both east and west from Strickland Road

Intersecting Road	Intersections Characteristics/Features	Other Considerations
Edgarton Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): One lane – shared thru/right lane • WB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • NB Approach (Edgarton Road) One lane— shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Edgarton Road • Standard ISD available looking both east and west from Edgarton Road • 2 accidents during most recently available 3-year period (2006-2008)
Roses Bridge Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 6): Two lanes – One exclusive left turn lane, one thru lane • WB Approach (Route 6): One lane – shared thru/right lane • SB Approach (Roses Bridge Road) One lane— shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Roses Bridge Road • Standard ISD available looking both east and west from Roses Bridge Road • 2 accidents during most recently available 3-year period (2006-2008)
Route 66 (Middletown Road)		
	<ul style="list-style-type: none"> • Signalized, four-legged intersection • EB Approach (Route 6): Three lanes – One exclusive left turn lane, one through lane, one exclusive and channelized right turn lane • WB Approach (Route 66): Three lanes – One exclusive left turn lane, one through lane, one exclusive and channelized right turn lane • NB Approach (Route 66): Three lanes – One shared thru/left lane, one through lane, one exclusive and channelized right turn lane • SB Approach (Route 6): Three lanes – One exclusive left turn lane, one through lane, one exclusive and channelized right turn lane 	<ul style="list-style-type: none"> • 34 accidents during most recently available 3-year period (2006-2008) • High speed channelized right turn lanes on all approaches encourage high speeds. • Intersection lacks crosswalks and sidewalks.

Intersecting Road	Intersections Characteristics/Features	Other Considerations
Flanders Road		
	<ul style="list-style-type: none"> • Unsignalized, three-legged T-intersection • EB Approach (Route 66): One lane – shared thru/left lane • WB Approach (Route 66): One lane – shared thru/right lane • SB Approach (Flanders Road) One lane— shared left/right lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 66 approaches, name plaques provided indicating Flanders Road • Standard ISD available looking both east and west from Flanders Road • 1 accident during most recently available 3-year period (2006-2008)
Cards Mill Road/Commerce Drive		
	<ul style="list-style-type: none"> • Commerce Drive: Unsignalized, three-legged T-intersection • Cards Mill Road: Unsignalized, three-legged T-intersection with skewed northbound approach • EB Approach (Route 66): One lane – shared thru/right lane • WB Approach (Route 66): One lane – shared thru/right lane • NB Approach (Cards Mill Road) One lane— shared right/left lane 	<ul style="list-style-type: none"> • Intersection Warning Signs provided for both Route 6 approaches, name plaques provided indicating Cards Mill Road • Standard ISD available looking both east and west from Commerce Drive and Cards Mill Road • 6 accidents during most recently available 3-year period (2006-2008)

Appendix 2.2

Traffic Data Collection Sites



Appendix 2.3

Historical Speed Data

Table A2-2. Historical Speed Data, Route 6

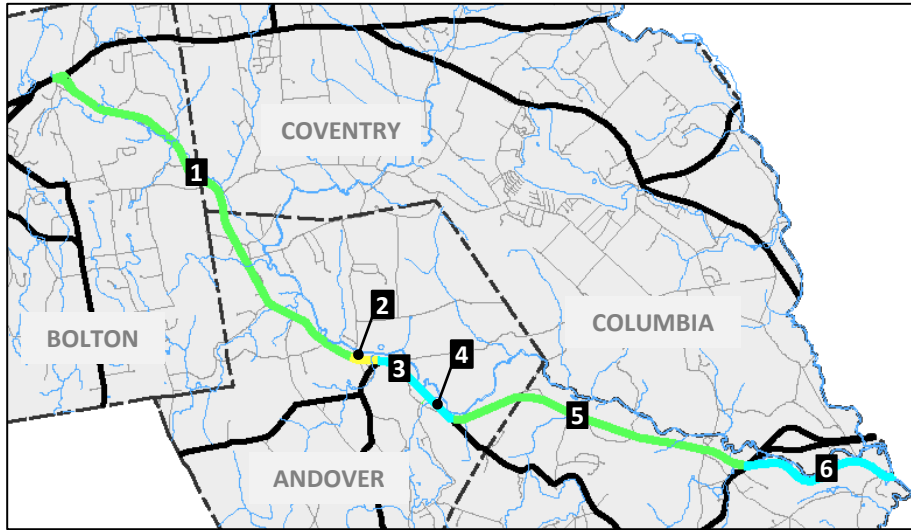
Location	Year	Speed [mph]					
		EB			WB		
		Posted	Average	85th	Posted	Average	85th
Stony Road, Bolton	1997	50	51.7	55.9	45	51.6	54.5
	2001		51.9	55.8		50.2	52.7
	2007		50.5	52.6		50.9	53.3
South Road, Bolton	1997	50	54.3	57.6	50	51.9	55.2
	2001		53.4	56.9		50.8	54.1
	2007		52.3	55.6		49.9	52.9
South Street, Coventry	1997	50	51.3	55.0	50	50.4	54.2
	2001		51.1	54.8		49.4	52.1
	2007		54.2	57.5		50.6	53.6
Hendee Road, Andover	1997	50	51.3	54.9	50	53.1	56.5
	2001		50.1	53.6		49.1	53.6
	2007		50.1	54.1		50.8	52.9
Wales Road, Andover	1997	50	52.5	55.0	50	53.3	56.7
	2001		51.3	54.5		53.3	58.0
	2007		51.5	53.8		50.4	53.8
Long Hill Road, Andover	1997	40	46.1	50.3	40	45.4	49.8
	2001		45.2	47.9		45.0	48.5
	2007		46.9	49.6		45.3	47.3
Route 87 (Jonathan Trumbull Highway), Andover	1997	45	49.3	53.5	45	49.3	53.5
	2001	50	47.0	49.5	50	47.3	51.5
	2007		50.3	54.0		50.6	53.3
Andover-Columbia Town Line	1997	50	50.7	55.2	50	52.5	56.3
	2001		44.4	47.4		44.8	47.3
	2007		49.5	52.3		51.0	54.2
Oakwood Lane, Columbia	1997	50	52.5	57.1	50	50.4	54.2
	2001		47.1	50.8		47.7	51.3
	2007		50.5	54.3		51.5	54.6
Strickland Road, Columbia	1997	50	50.4	54.4	50	55.9	61.3
	2001		45.9	48.5		47.0	50.0
	2007		50.4	53.6		53.6	57.5

Table A2-3. Historical Speed Data, Route 66

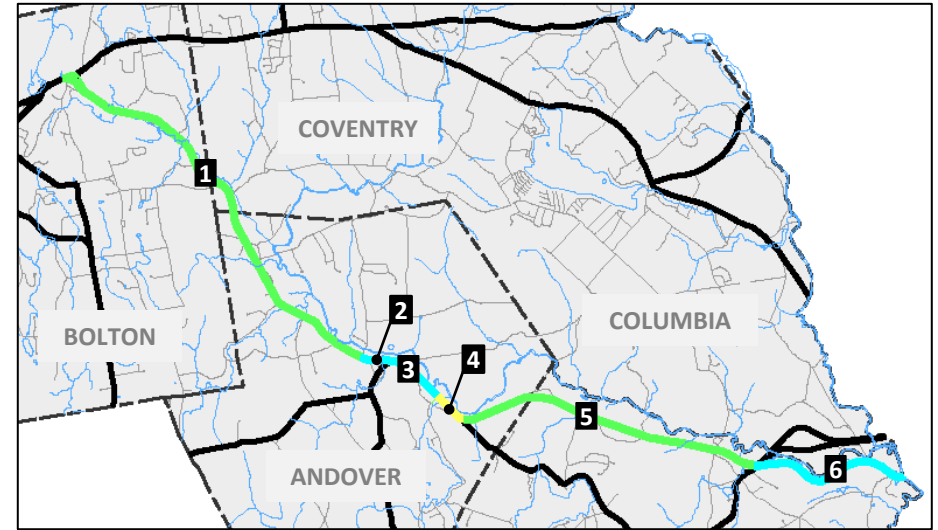
Location	Year	Speed [mph]					
		EB			WB		
		Posted	Average	85th	Posted	Average	85th
West of Flanders Road, Columbia	1998	45	49.7	54.4	45	51.0	55.8
	2002		48.4	51.2		49.9	54.5
	2008		48.8	52.4		50.6	55.4
East of Flanders Road, Columbia	1998	45	45.1	48.5	45	44.1	48.5
	2002		53.4	46.9		50.8	54.1
	2008		45.3	52.4		44.6	47.9

Appendix 2.4

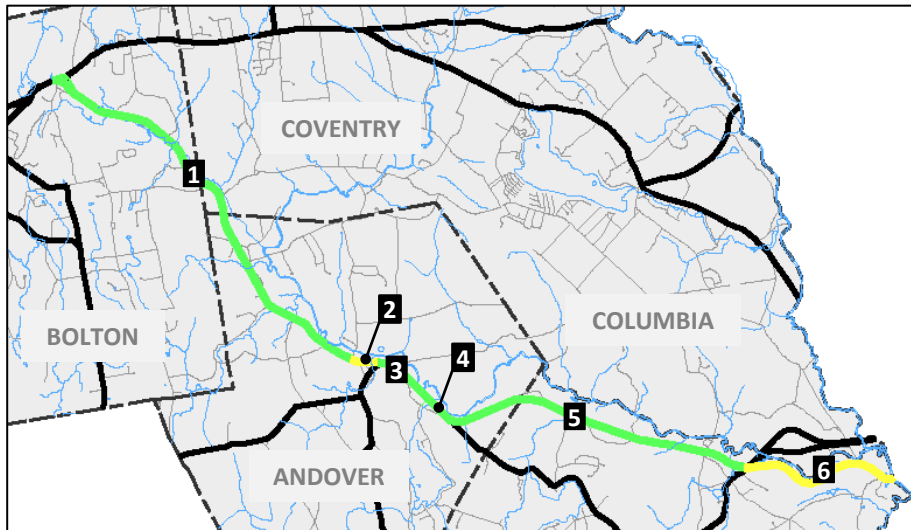
Average Travel Speeds Based on Peak Period Travel Speed Data



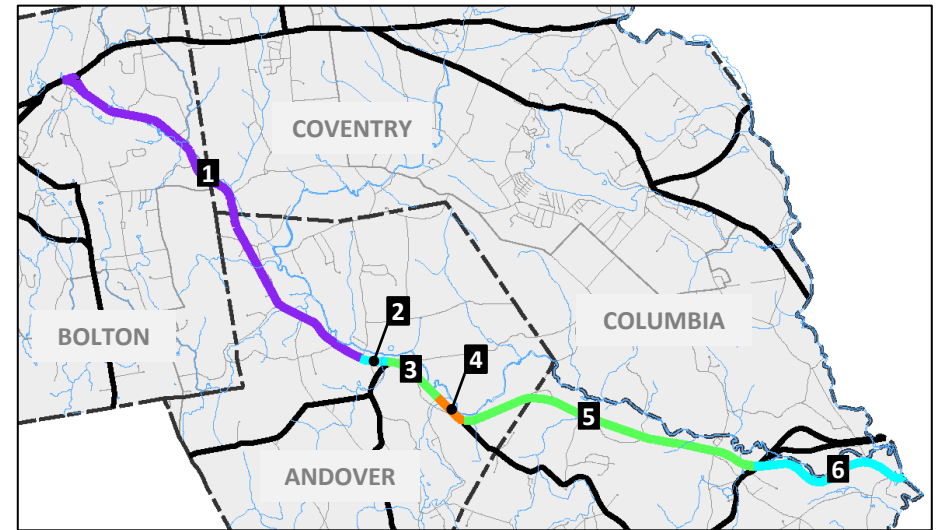
Westbound – AM (Peak Travel Direction)



Eastbound – PM (Peak Travel Direction)



Westbound - PM



Eastbound – AM

Legend:

Observed Average Travel Speeds:

> 50 MPH

45 MPH – 50 MPH

40 MPH – 45 MPH

35 MPH – 40 MPH

< 35 MPH

1 Notch Road to Long Hill Road

2 Long Hill Road to Route 316

3 Route 316 to Lake Road

4 Lake Road to Route 87

5 Route 87 to Route 66

6 Route 66 to Windham TL



Route 6 Hop River Corridor Transportation Study

Figure A2-2.
Average Travel Speeds

Appendix 2.5

Summary of Existing Zoning Regulations for Access Management

Table A2-4. Summary of Existing Zoning Regulations for Access Management

DOCUMENT/ZONING SECTION	RELEVANT TEXT (<i>paraphrased</i>)	COMMENTS
<i>Town of Bolton Zoning Regulations (May 2005)</i>		
2. Definitions	Definition of Access-way: A paved or unpaved surface intended for a small amount of vehicle usage; a driveway	Definition would benefit from noting that an access-way or driveway provides ingress/egress from a property to a public street – as it stands – it is somewhat unclear.
2. Definitions	Street: an avenue, boulevard, lane, road, highway or other thoroughfare	Consider defining streets also by their functional classification: arterial, minor arterial, and local road; this can facilitate applying a range of driveway spacing and location standards relative to the traffic speeds and volumes on the street being accessed.
3A3.c Non-conformity	No non-conformity of any kind shall be expanded or intensified	This would cover any non-conforming access features. Language would benefit from also noting any non-conforming site feature, such as a nonconforming driveway, must be brought in to conformance at such time there is any change in use, intensity of use, or configuration of a site.
3A12 Common or Shared Driveways	Driveways serving more than one lot are generally not allowed	This language appears to be intended for residential properties. Similar text is included in reference to a conservation subdivision and limits an access-way to serving no more than three lots. Shared driveways can serve many beneficial access management purposes for non-residential properties; particularly minimizing the number of driveways and associated conflict points on an arterial road with high traffic speeds and/or volumes

DOCUMENT/ZONING SECTION	RELEVANT TEXT (<i>paraphrased</i>)	COMMENTS
3B4.e Fast Food Restaurants; 10D. Golf Courses;	The applicant shall provide a traffic study	Beneficial requirement. Could specify that the traffic impact analysis shall include information on the functionality of all driveways and in relation to other nearby driveways onto the same street
11.J Frontage in Business Zones	Minimum lot frontage shall be 200 feet except a) where driveways and curb-cuts in the General Business Zone on a property or adjacent property are no less than 200 feet apart; b) the Neighborhood Business Zone, on a property or adjacent property where driveways or curb-cuts are no more than 150 feet apart or c) where there are consolidated parcels with combined frontage of 200 feet or more and a shared driveway	This language alludes to the benefits of driveway separation. It could be more direct in stating why the driveway separation is relevant and should cross-reference with Section 16 for specifics on driveway design standards
14. 2 Site Plans	Lists what site plan information is required	This section does not specify requirements for information on a site plan regarding access and travel patterns on the surrounding street system or other circumstances under which a traffic assessment related to site operations might be required. This section would benefit from this addition.
15M Access to a Street	States that all parking areas shall be designed to provide safe access to and from a public street	This section would benefit from a complete set of access design guidelines or standards for driveway spacing, location, and design.
16A.3.f Access and Circulation	Access and Circulation – Requirements for Site design	Includes a beneficial list of requirements for provision of safe access to and from a property. The language is general in that it calls for safe design – the section would benefit from the addition of some specifics regarding design, location, and safe separation distances.

DOCUMENT/ZONING SECTION	RELEVANT TEXT (<i>paraphrased</i>)	COMMENTS
16B.4.h Traffic Access – Special Permits	Discusses need for internal connections on a site, minimal curb-cuts, and specifies driveway spacing	Suggest all language for driveway design be consolidated in one section of the regulations for ease of use – and requirements for driveway spacing, location, and design be made consistent throughout the regulations relative to the functions of the streets being accessed as opposed to being linked to the site uses or application type.
Zoning, Town of Coventry (November 2006)		
2.02 Definitions	Accessway: Any portion of a lot that provides access to and from a street but that has a width (measured in the direction of lot width) of fifty (50) feet or less. [There is a separate definition of driveway]	Sound definition – could be clarified as to how this is different from a driveway.
2.02 Definitions	Street: Any thoroughfare intended for public travel, including any street, avenue, boulevard, road, lane, or highway, and any land dedicated as a public right of way	Consider also defining streets by their functional classification: arterial, minor arterial, and local road; this can facilitate applying a range of driveway spacing and location standards relative to the traffic speeds and volumes on the street being accessed
4.03.03 Rear Lot Standards and Criteria	No accessway may be used for vehicular access to more than three lots.	This section may benefit from language that distinguishes access for three interior single family residential lots as distinct from non-residential developments where a shared driveway for numerous contiguous or consolidated parcels may be desirable.
4.10 Traffic Sightlines	For minimum vision clearance, no structure or other object shall be created, established, or erected to a height exceeding three (3) feet above the street grade within a radius of fifty (50) feet from the point of intersection of any two street lines. A greater distance may be required upon higher volume roads.	Beneficial language; this language could be strengthened with a complementary requirement for adequate sight distance from any corner appropriate to the functional class of the road being accessed

DOCUMENT/ZONING SECTION	RELEVANT TEXT (<i>paraphrased</i>)	COMMENTS
4.14 Driveways	Establishes standards for driveway construction and a permit process for driveway design approval relative to grading, materials, sideline setback, sight lines, and width	Recommend this section be supplemented with language regarding access management; driveway location, spacing and design standards in terms of interface with the surrounding roadway system and circulation on a site. In addition, consider language to encourage the use of shared driveways for non-residential properties fronting on a major arterial road as a technique to minimize the number of curb-cuts. Alternately – provide cross reference to town commercial design guidelines – adopt those guidelines for access as requirements for any non-residential property and/or property with primary access to an arterial road. Add specifics to those design guidelines with separation distances and access design criteria.
5.07 Nonconforming Uses, Buildings, and Structures	Establishes standards for changes to any non-conforming use or structure	This section would benefit from additional language relating to non-conforming site features such as non-conforming driveways
5.13 Designed Apartment/Condominium Developments	All access drives shall, where feasible, be a minimum of 50 feet from side property lines and, except as noted below, shall be built to conform to standards for Town roads.	This is the single location in the regulations that specifically refers to separation distance for driveways. The regulations would benefit from establishing acceptable and safe separation distances among all non-residential driveways and/or property with primary access to an arterial road. In general, 50 feet is insufficient for safe spacing of driveways or driveways to street intersections.

DOCUMENT/ZONING SECTION	RELEVANT TEXT (<i>paraphrased</i>)	COMMENTS
7.02.02 Site Plans and site plan review standards	Requires site plans show the location of all existing and proposed driveways. Includes review by the Commission for Circulation; With respect to vehicular and pedestrian circulation, special attention shall be given to location and number of access points to the public streets, width of interior drives and access points, general interior circulation, separation of pedestrian and vehicular traffic, accessibility of emergency vehicles, access to community or public facilities, and arrangement of parking areas that are safe and convenient and do not detract from the use and enjoyment of proposed buildings and structures and the neighboring properties.	<p>Good general language highlighting the need for attention to site access design. This language would benefit from mention of driveway spacing and a cross-reference to the section on driveways, particularly at such time added access management design standards are added to the regulations.</p> <p>This section would also benefit from language specifying conditions under which the Commission may require a traffic impact analysis or site access study.</p>
Zoning, Town of Andover		
4.1 Non-conforming Lots, Uses of Land, and uses of Structures and Premises	No non-conformity shall not be enlarged or increased	This would not cover any non-conforming access features. Language would benefit from noting non-conforming features such as non-conforming driveways must be brought in to conformance at such time there is any change in use, intensity of use, or configuration of a site.
4.4 Visibility at Intersections	States that on a corner lot no structure or natural feature (such as a tree) shall obstruct views, causing a danger to pedestrians or traffic.	This section would benefit from a cross-reference to Section 4.16 on driveways with complementary language in that section of specific sight distances that should be maintained at all intersections.
4.9.4 Driveways – Rear Lot	This section details requirements for driveways serving an interior or rear lot. It states all driveways require a permit from the First Selectman's Office; a common driveway to two rear lots may be permitted as a Special Exception	This is beneficial language. Note that shared driveways can serve many beneficial access management purposes for non-residential properties; particularly minimizing the number of driveways and associated conflict points on an arterial road with high traffic speeds and/or volumes. Recommend that language encouraging shared driveways under those circumstances along with design standards for such shared driveways be added to this section and/or Section 4.16 on Driveways

DOCUMENT/ZONING SECTION	RELEVANT TEXT (<i>paraphrased</i>)	COMMENTS
4.16 Driveways	Establishes standards for driveway construction relative to grading, materials, sideline setback, sight lines, and width	<p>Recommend this section be supplemented with language regarding access management; driveway location, spacing and design standards in terms of interface with the surrounding roadway system and circulation on a site. In addition, consider language to encourage the use of shared driveways for non-residential properties fronting on a major arterial road as a technique to minimize the number of curb-cuts. Include caveat on the need for a permit from the First Selectman's office for any new or reconfigured driveway.</p> <p>Alternately – provide cross reference to Section 23.4 with traffic access design criteria for decision-making on Special Permit/Exception applications.</p>
11.3 Consolidation of Lots and Reduction in Setbacks	Section 11.3.4 states that the Commission may approve a reduction in dimensional requirements when one or more adjoining lots are consolidated as a single site and features including driveways are combined and permanent cross-easements across the lots is provided.	This is a beneficial incentive for developers of planned commercial developments to combine driveways and reduce the number of curb-cuts. Recommend other or similar incentives be offered for driveway consolidation, reduction in the number of curb-cuts and cross-easements in any business zone.
23.2 Required Information for Special Permit/Exception	Lists what site plan information is required	This section does not specify requirements for information on a site plan regarding access and travel patterns on the surrounding street system or other circumstances under which a traffic assessment related to existing and proposed driveways and related site operations might be required. This section would benefit from this addition.

DOCUMENT/ZONING SECTION	RELEVANT TEXT (<i>paraphrased</i>)	COMMENTS
23.4 Criteria for Decision	Section 23.4.D addresses traffic access and driveway location, spacing and design as a criteria for Commission decision making on a Special Permit/Exception – shared driveways and interconnections among parcels are required where possible	Recommend this beneficial language for access management be cross-referenced in the earlier sections of the regulations dealing with driveway design. This section includes driveway spacing requirements along with requirements to minimize the number of curb-cuts per site that may be more effectively located in the earlier section on driveway design. These criteria would be beneficial if applied to driveways for any non-residential development onto any arterial road in Andover.
24.3 Definitions	No definitions related to driveways or access are included	Recommend that definitions of accessways and driveways be included in the regulations
<i>Zoning Regulations of the Town of Columbia (November 2009)</i>		
8. Additional Standards: Minimum Access	No dwelling shall be constructed, and no building shall be changed in use for occupancy as a dwelling, unless located on a lot which has a minimum access of not less than 20 feet on a street	The intent of this language is unclear relative to requirements for street frontage. Suggest that some clarifications be added to indicate, if intended, that this refers to a driveway to any residential interior lot or to the width of any driveway serving any lot.
8. Additional Standards; Corner Visibility	On any corner lot there shall be no building, structure, fence, wall or planting, located within a triangular space on the lot bounded by the two intersecting street lines and a straight line connecting a point on one street line 25 feet from the intersection with a point on the other street line 25 feet from the intersection, so as to obstruct a clear line of sight anywhere across such triangle between an observer's eye at an elevation of 3.5 feet above one street line and an object one (1) foot above the other street line	Beneficial language; this language could be strengthened with a complementary requirement for adequate sight distance from any corner appropriate to the functional class of the road being accessed and a cross reference to the CTDOT sight distance requirements for visual sight distance at any intersection of a driveway or side road with a street.

DOCUMENT/ZONING SECTION	RELEVANT TEXT (<i>paraphrased</i>)	COMMENTS
8.12 Driveways	This sections addresses driveway drainage, construction, grading, width, vertical clearance, sight line, angle at an intersection, turnarounds, and passing areas	Recommend this section be supplemented with language regarding access management; driveway location, spacing and design standards in terms of interface with the surrounding roadway system and circulation on a site. In addition, consider language to encourage the use of shared driveways for non-residential properties fronting on a major arterial road as a technique to minimize the number of curb-cuts.
8.12.2 Common and Loop Driveways	The intent of this section is to: reduce the impact to native habitat, including wetlands and watercourses; to protect natural features; The Commission may require that a common driveway be utilized: 1) to minimize curb cuts where traffic conditions are hazardous due to high speeds and heavy volume, or 2) to enhance scenic vistas and rural character and to protect natural and historic features of special interest	Suggest that limiting the number of driveways and curb cuts is advantageous on any arterial road or other local road with high traffic volumes or hazardous conditions. Shared driveways can be beneficial under many circumstances in addition to protecting natural features. Recommend the section on driveways be made more comprehensive with language regarding access management; driveway location, spacing and design standards in terms of interface with the surrounding roadway system and circulation on a site. In addition, consider language to encourage the use of shared driveways for any non-residential properties fronting on a major arterial road.
9. Definitions	No definitions related to driveways or access are included with the exception of definitions for a street	Recommend that definitions of accessways and driveways as opposed to rear-lot driveways, cul-de-sacs, and shared driveways be included in the regulations.

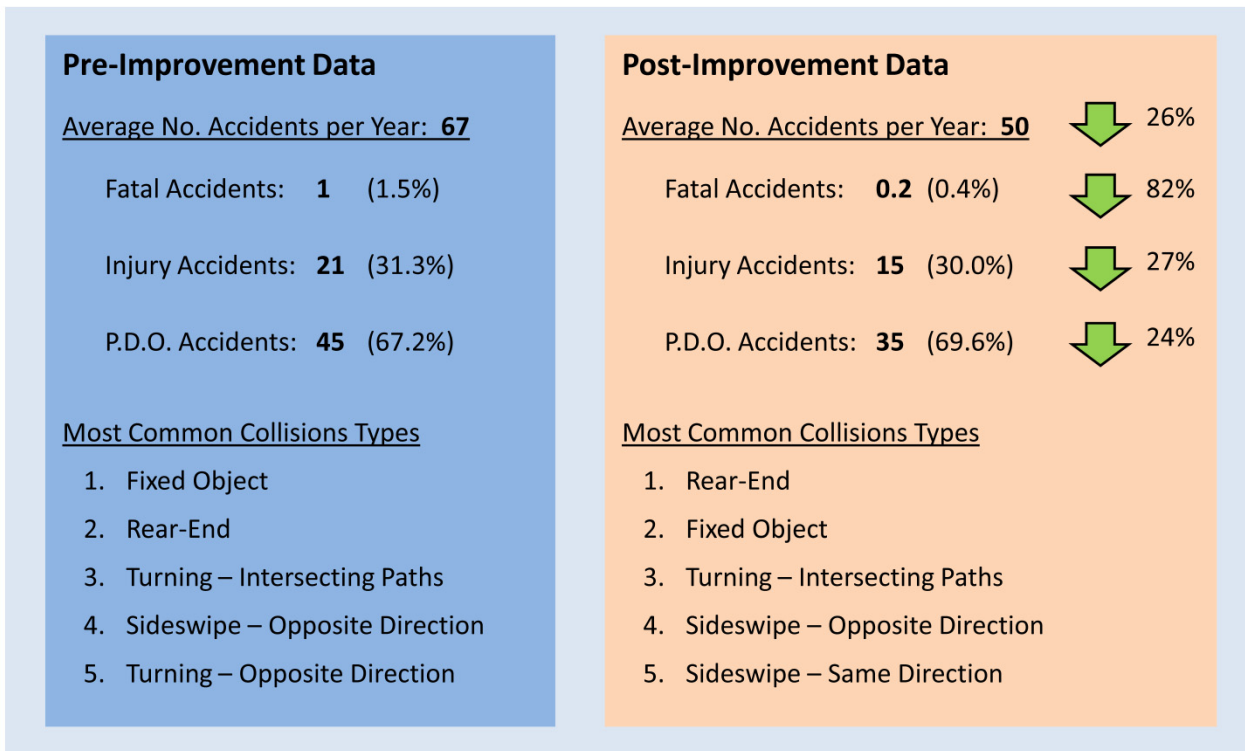
DOCUMENT/ZONING SECTION	RELEVANT TEXT (<i>paraphrased</i>)	COMMENTS
10.3.2 Expansions, Enlargements, or Replacements - Nonconforming Lots	Buildings or structures that are associated with a conforming use on a nonconforming lot the date of application may be expanded, altered in dimension, or replaced provided that the expansion, enlargement, or replacement does not expand or enlarge a nonconformity and conforms to these Regulations in all other respects. Expansions, enlargements, or replacements that create or increase the kind, degree or amount of an otherwise nonconformity may be permitted only after a Special Exception is received from the Zoning Board of Appeals.	This section would benefit from additional language relating to non-conforming site features such as non-conforming driveways; in general it is recommended that the policy on non-confirming access features is that they be brought into conformance at any time a site has a change in use, an increase in intensity of use, or a reconfiguration of the site layout.
51.4 Site Plans – Duties of the Commission	The Commission shall consider the following; traffic circulation within the site; traffic load or possible circulation problems on existing streets; and the amount, location and access to parking.	This is beneficial language – but could be strengthened with a more specific list of what the site plan should show including location, spacing and any special design features of all existing and proposed accessways including nearby access points and intersections within 500 feet of the subject property
52.6 Special Exceptions Site Plans	The proposed use and the proposed buildings and structures shall conform to the following General Standards; Access: provision shall be made for vehicular access to the lot in such a manner as to avoid undue hazards to traffic or pedestrians and undue traffic congestion on any street.	<p>This is beneficial language – but, as above, could be strengthened with a more specific list of what the site plan should show including location, spacing and any special design features of all existing and proposed accessways including nearby access points and intersections within 500 feet of the subject property.</p> <p>This section would also benefit from language specifying conditions under which the Commission may require a traffic impact analysis or site access study.</p>

DOCUMENT/ZONING SECTION	RELEVANT TEXT (<i>paraphrased</i>)	COMMENTS
52.7.8 Motels	The Commission will study each motel location and site plan relative to.... Traffic safety and ease of access at street or highway entrances and exits of motel driveways, taking account of grades, sight distance between such driveway entrances or exits and the nearest street or highway intersections; Safety and adequacy on site of motel driveway layout	This is beneficial language that is of value for any non-residential development in addition to motels. Suggest all language for driveway design be consolidated in one section of the regulations for ease of use – and requirements for driving spacing, location, and design be made consistent throughout the regulations relative to the functions of the streets being accessed as opposed to be linked to the site uses or application type.
61 Parking and Loading	Points of entrances and exit for driveways onto the street shall be located so as to minimize hazards to pedestrian and vehicular traffic in the street.	Suggest all language for driveway design be consolidated in one section of the regulations for ease of use – and requirements for driving spacing, location, and design be made consistent throughout the regulations relative to the functions of the streets being accessed as opposed to be linked to the site uses or application type.

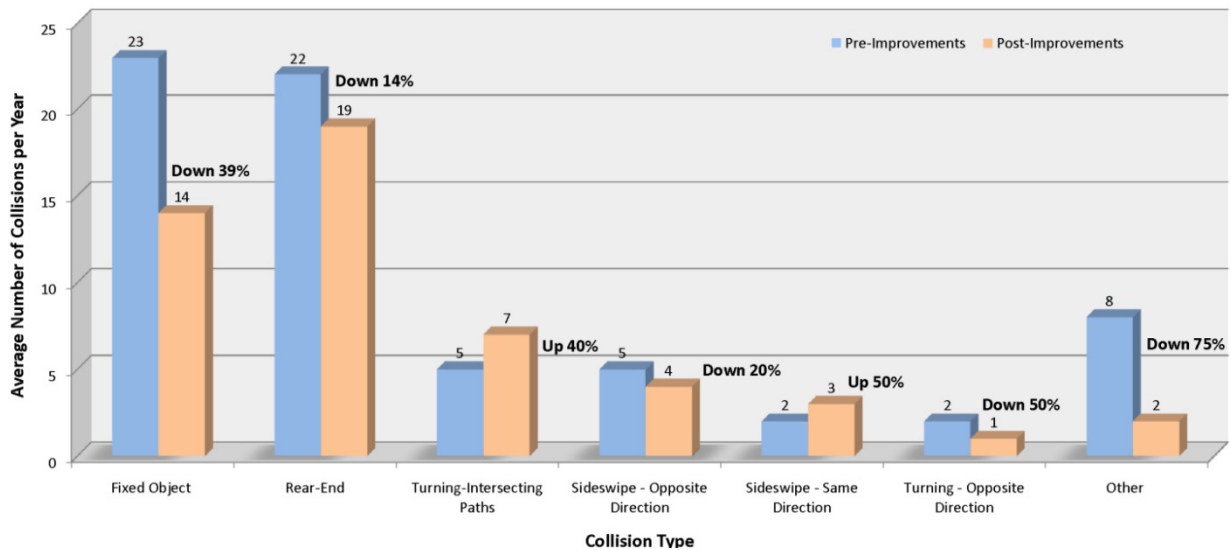
Appendix 2.6

Comparison of Pre-Improvement and Post-Improvement Accident Trends in Route 6 Study Corridor

Figure A2-3. Comparison of Accident Trends

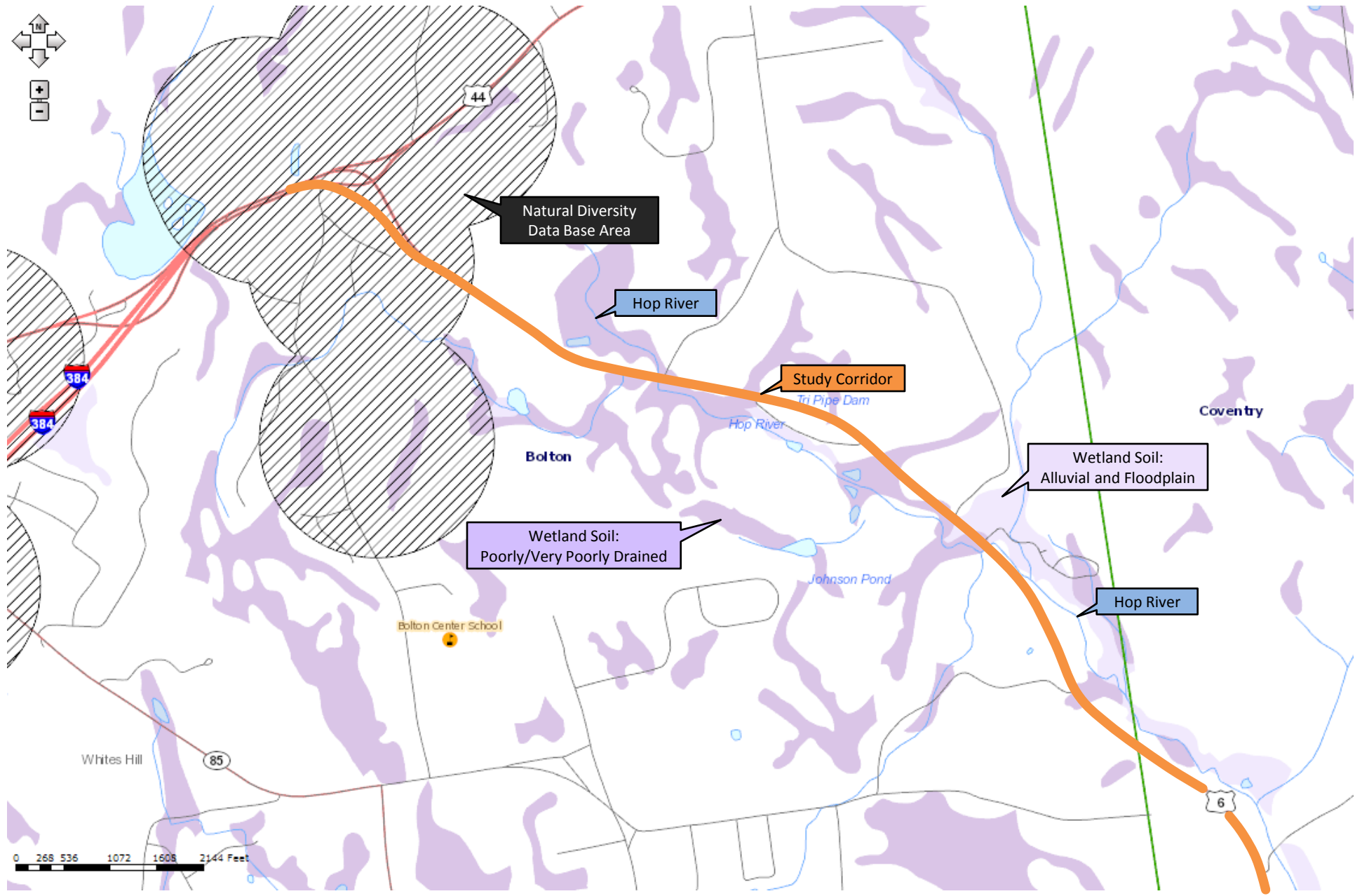


Average Number of Accidents per Year by Collision Type



Appendix 2.7

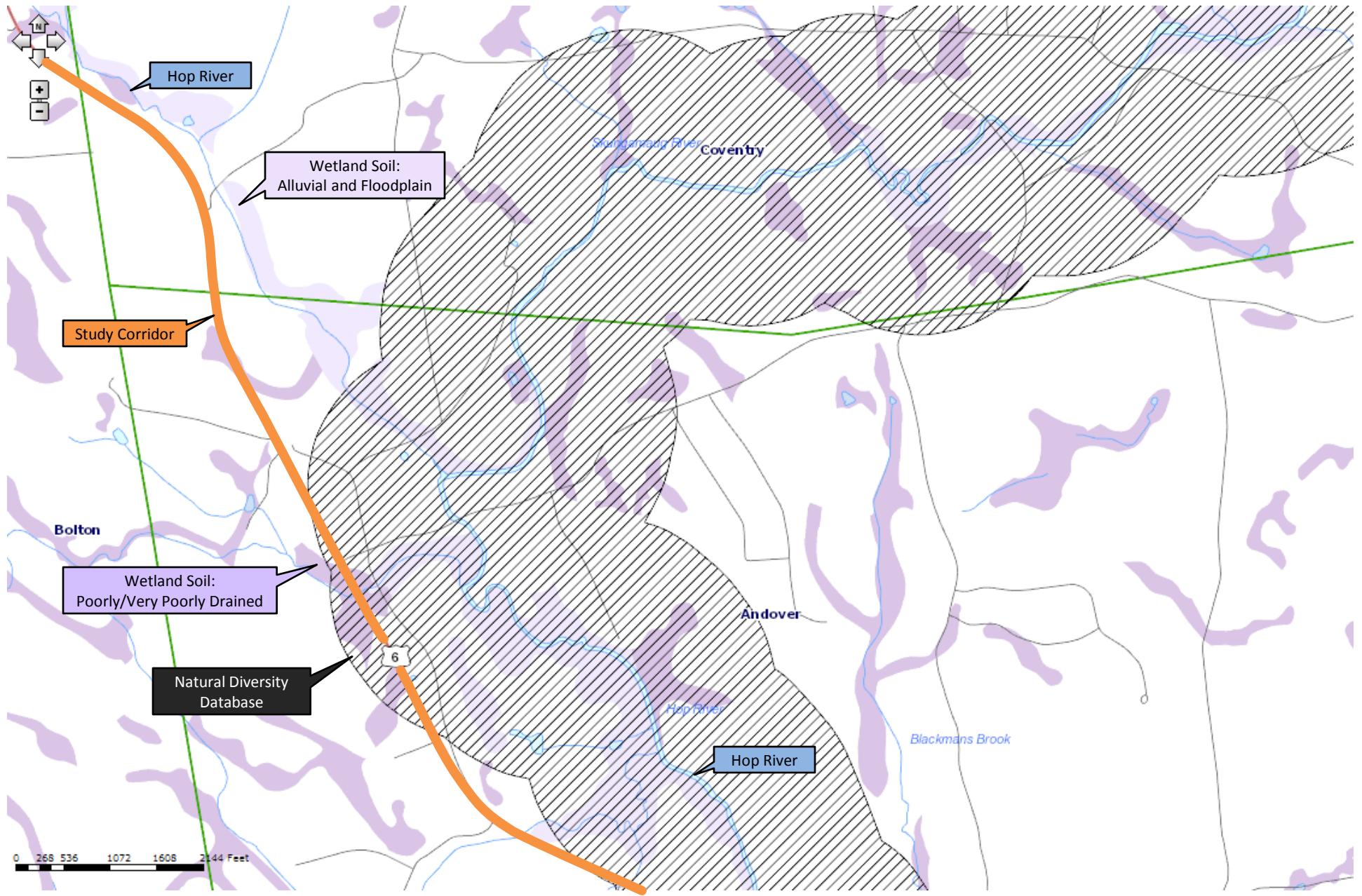
Environmental Resources Map



NOT TO SCALE

Route 6 Hop River Corridor Transportation Study

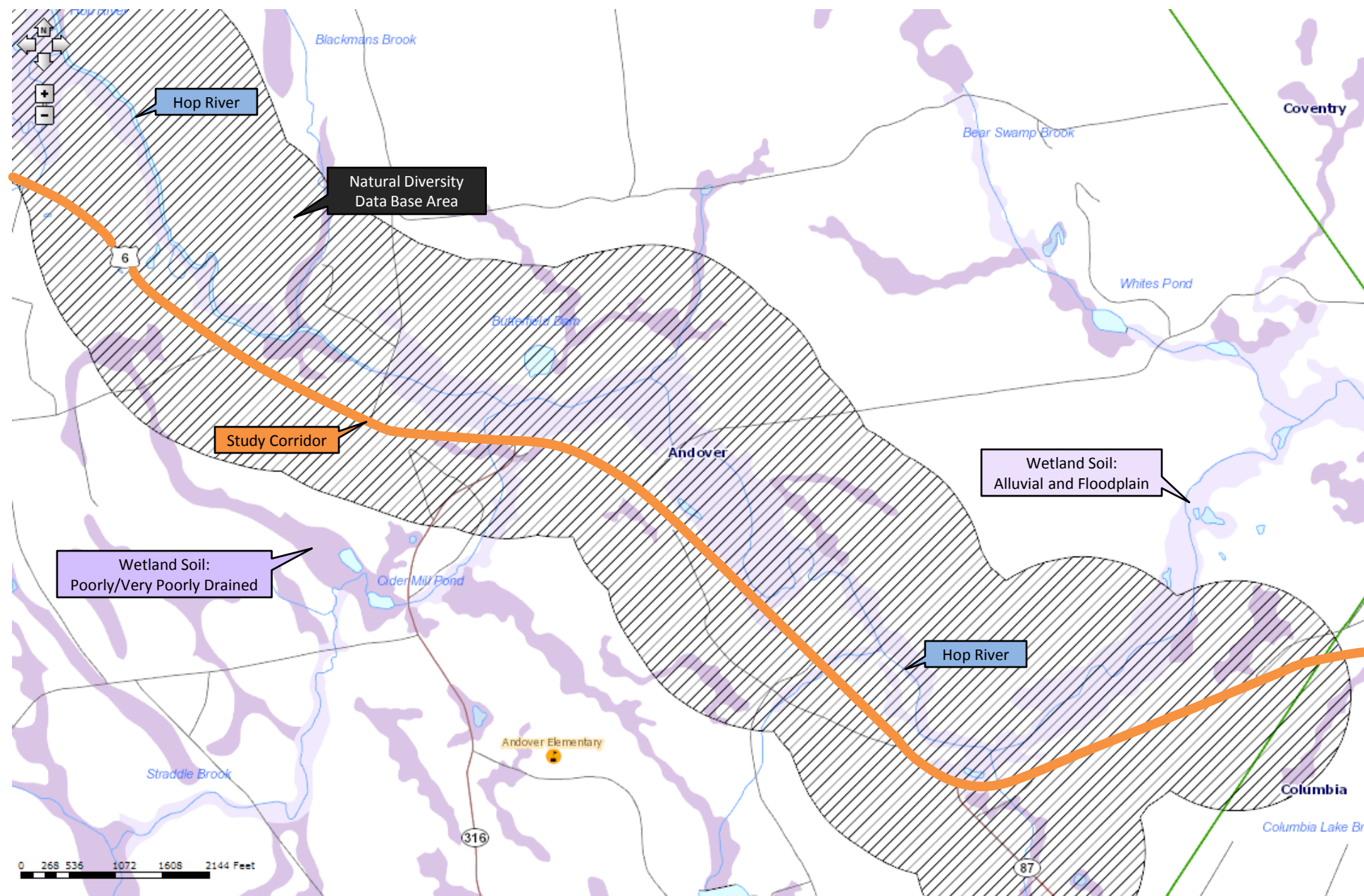
Figure A2-4.
Environmental Resources (1 of 5)



NOT TO SCALE

Route 6 Hop River Corridor Transportation Study

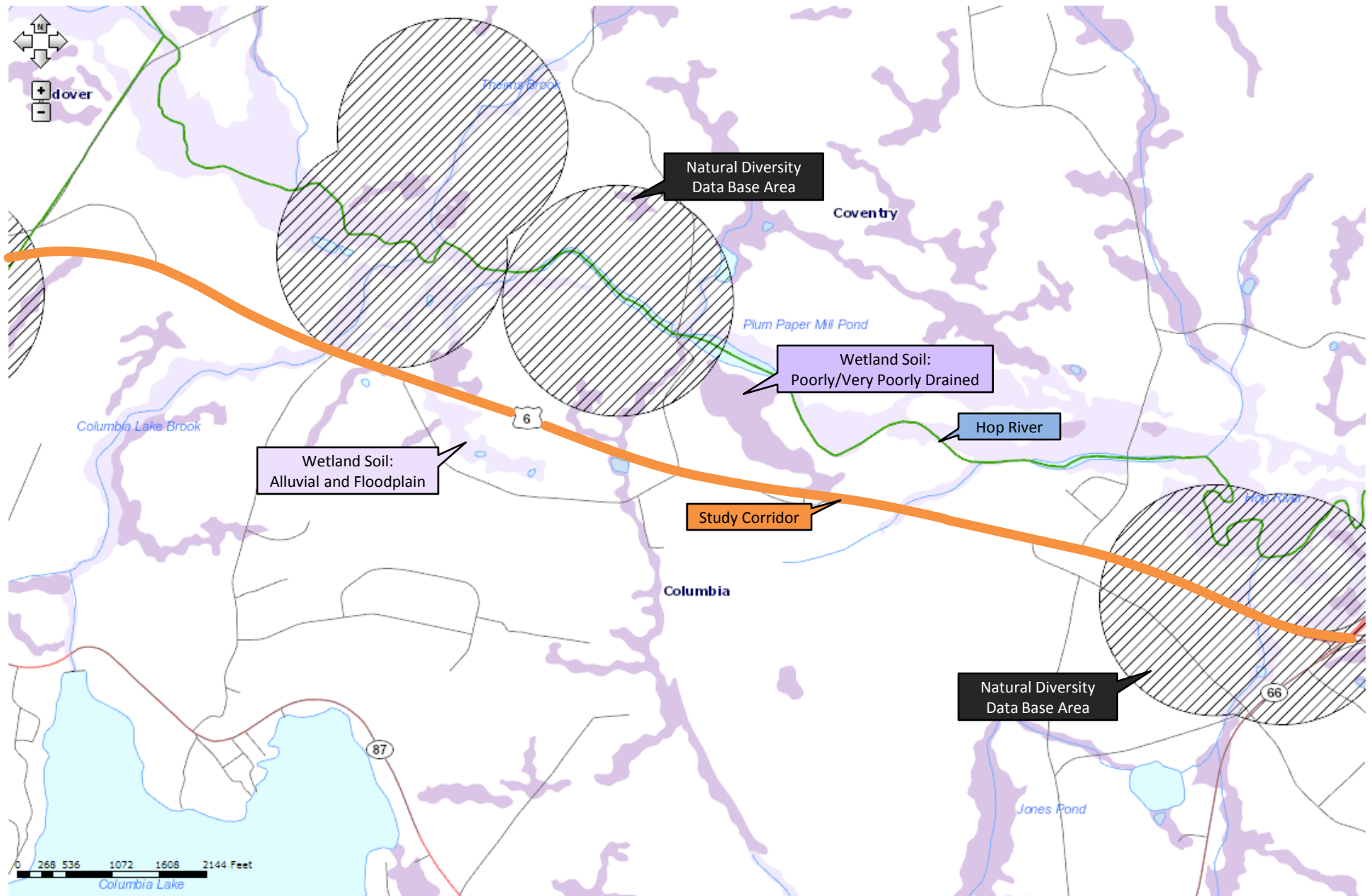
Figure A2-4.
Environmental Resources (2 of 5)



NOT TO SCALE

Route 6 Hop River Corridor Transportation Study

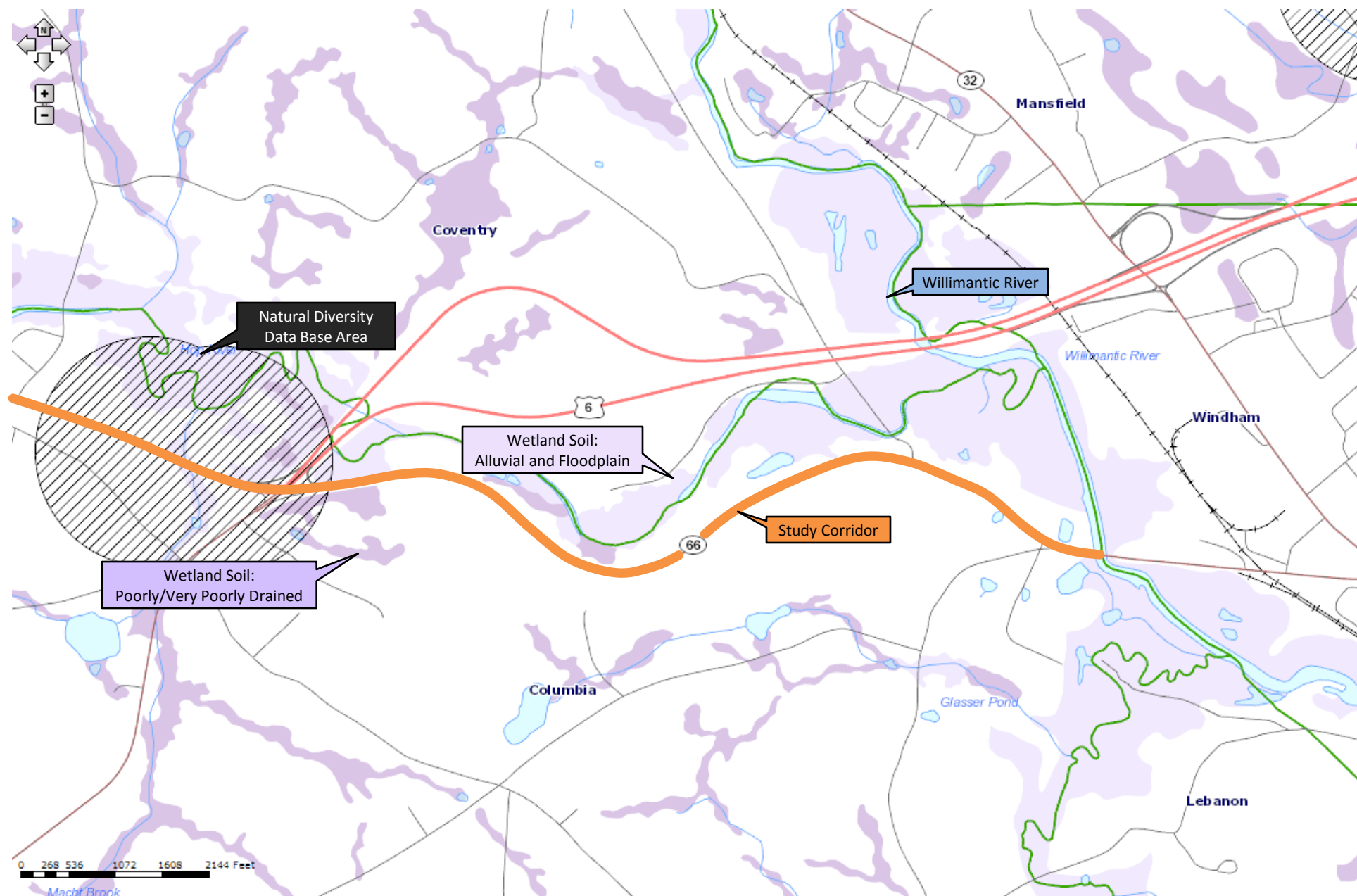
Figure A2-4.
Environmental Resources (3 of 5)



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Route 6 Hop River Corridor Transportation Study

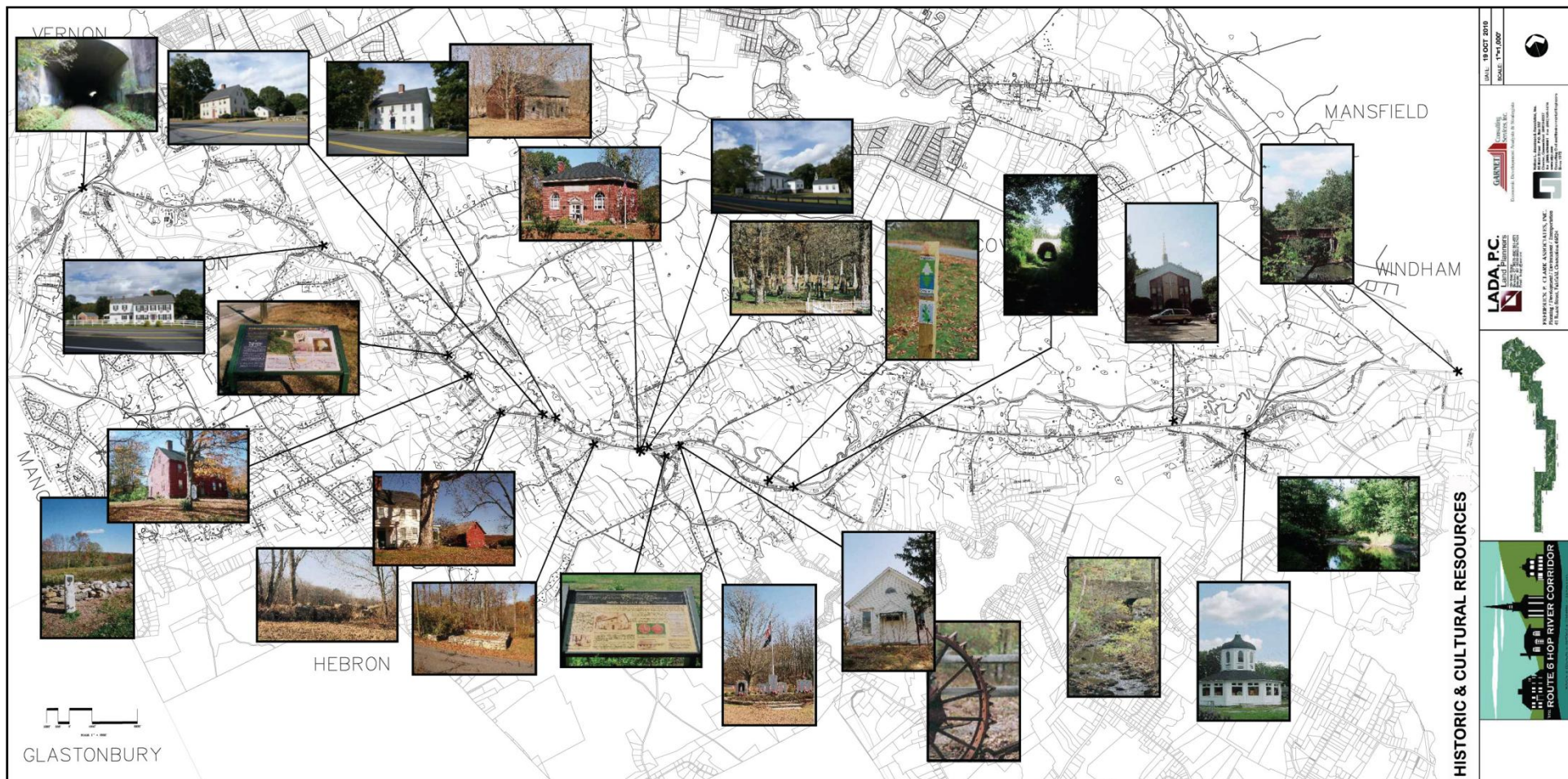
Figure A2-4.
Environmental Resources (4 of 5)



NOT TO SCALE	Route 6 Hop River Corridor Transportation Study
	Figure A2-4. Environmental Resources (5 of 5)

Appendix 2.8

Historic and Cultural Resources Map



NOT TO SCALE

Route 6 Hop River Corridor Transportation Study

Figure A2-5.
Historic and Cultural Resources

Appendix 2.9

Significant Views and Gateway Locations



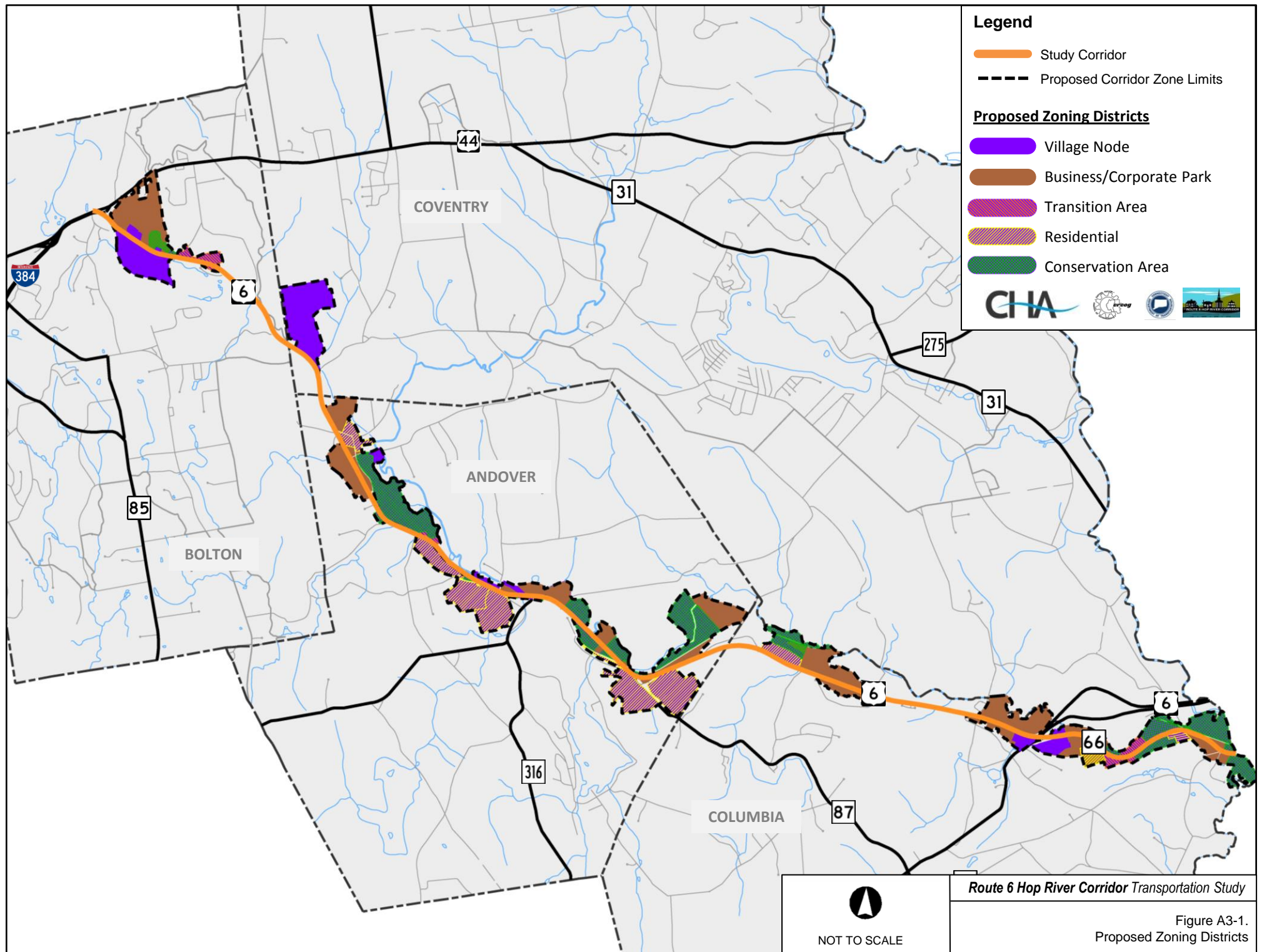
NOT TO SCALE

Route 6 Hop River Corridor Transportation Study

Figure A2-6.
Significant Views and Gateway Locations

Appendix 3.1

Proposed Zoning Districts



Appendix 4.1

Access and Safety Recommendations:

Route 6 West of Route 66, Columbia

Route 66 East, Columbia



The potential access management improvements shown are conceptual and illustrate one possible set of opportunities for this area. Actual access management improvements will occur over time and changes to commercial access will require additional planning and coordination with CTDOT, the Town of Columbia, and private property owners prior to implementation.



Appendix 5.1

Concept Development Summary

Concept Development Summary

Alternative concepts for Focus Areas in Bolton Notch, Historic Andover, and Lighthouse Corners were developed during this study to address the variety of transportation and development issues and goals that were identified in each area. Each of these alternative concepts was considered and evaluated through the public involvement efforts of the study – which included input from the Regional Economic Development Council (REDC), Connecticut Department of Transportation (CTDOT), Capitol Region Council of Governments (CRCOG), and local business owners, residents, town representatives, and other stakeholders.

Only the details of the preferred concept (as determined by the REDC) for each of the Focus Areas are presented in Section 4.1. This section presents the other viable alternative concepts for each of the Focus Areas and provides a summary of the reason(s) why each was eliminated by the REDC from further consideration.

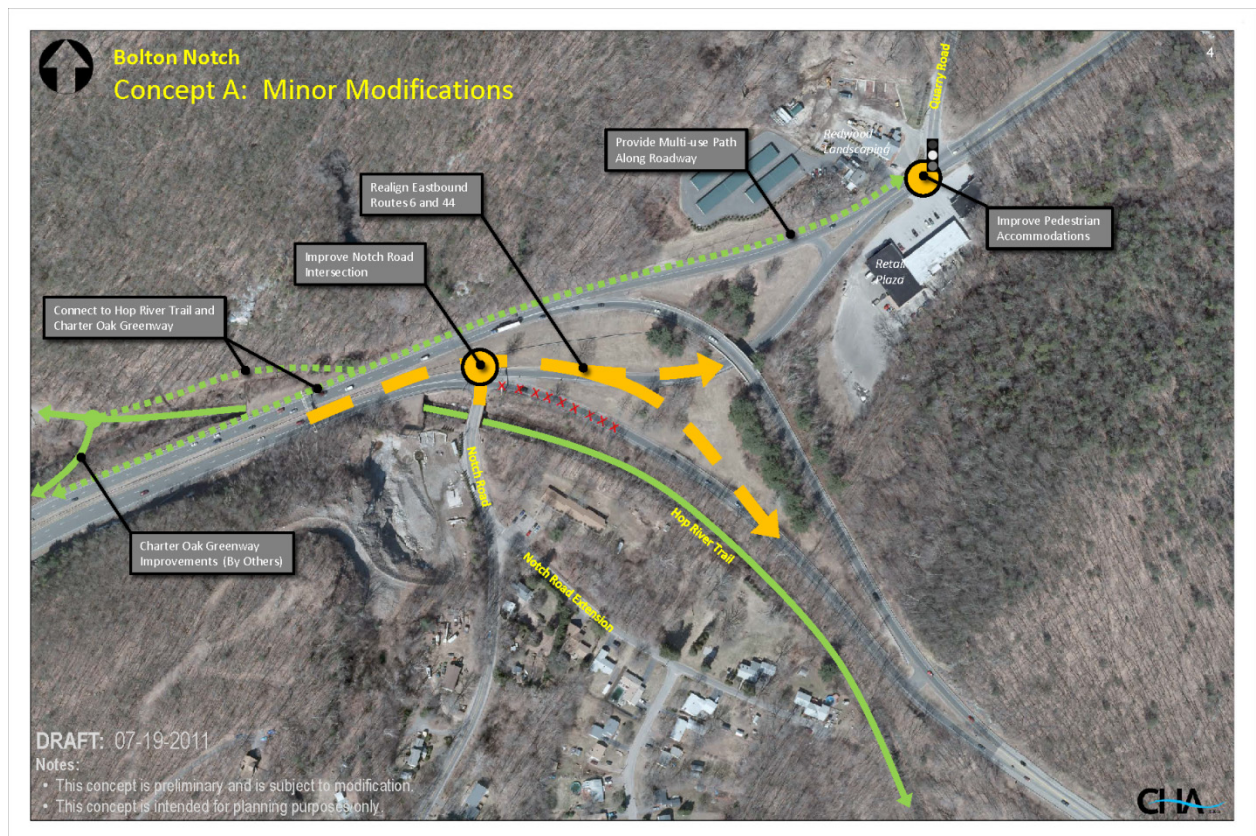
Bolton Notch

Four other alternative concepts were considered for the junction of Route 6 and Route 44 in Bolton Notch. These concepts are described below and on the following pages and include:

- Concept A: Minor Modifications
- Concept B: New Two-way Connection
- Concept C: Traditional Intersection
- Concept D: Two-lane Roundabout

The former “Concept E: Notch Road Connector with Route 6 Flyover” was developed into the preferred concept for Bolton Notch (see Section 4.1.2 for details).

Concept A: Minor Modifications

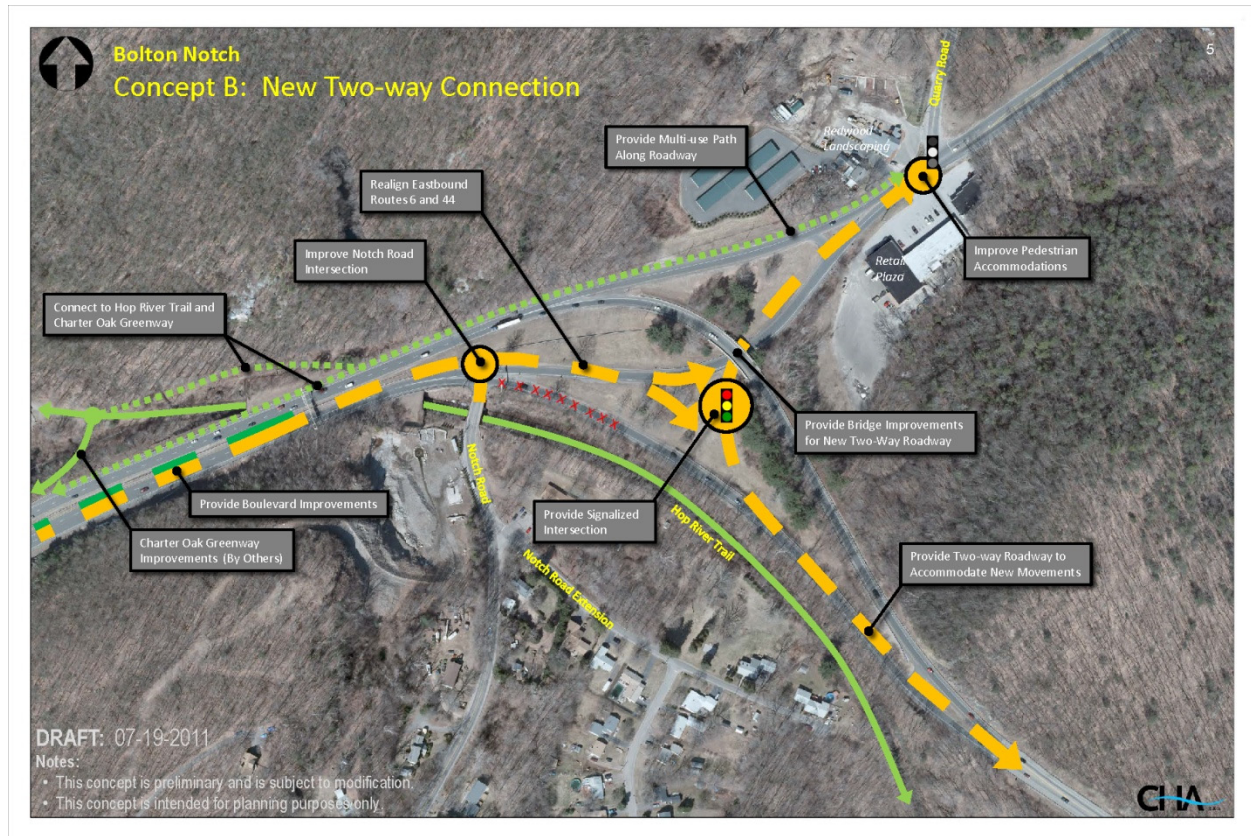


Description: Concept A provides modest realignment of the eastbound Route 6 and Route 44 “ramp” to improve sight lines from Notch Road and to provide greater separation between the Notch Road intersection and the diverge point of eastbound Route 6 and Route 44. These improvements would be supplemented with the recommended low-speed boulevard improvements on the Route 6/44 overlap to the west.

Eliminated: This concept was eliminated by the REDC from further consideration because it does not address the lack of connectivity between westbound Route 6 and eastbound Route 44 and between westbound Route 44 and eastbound Route 6; nor does it adequately address the lack of full connectivity between Notch Road and Routes 6 and 44.

Bolton Notch (continued)

Concept B: New Two-way Connection

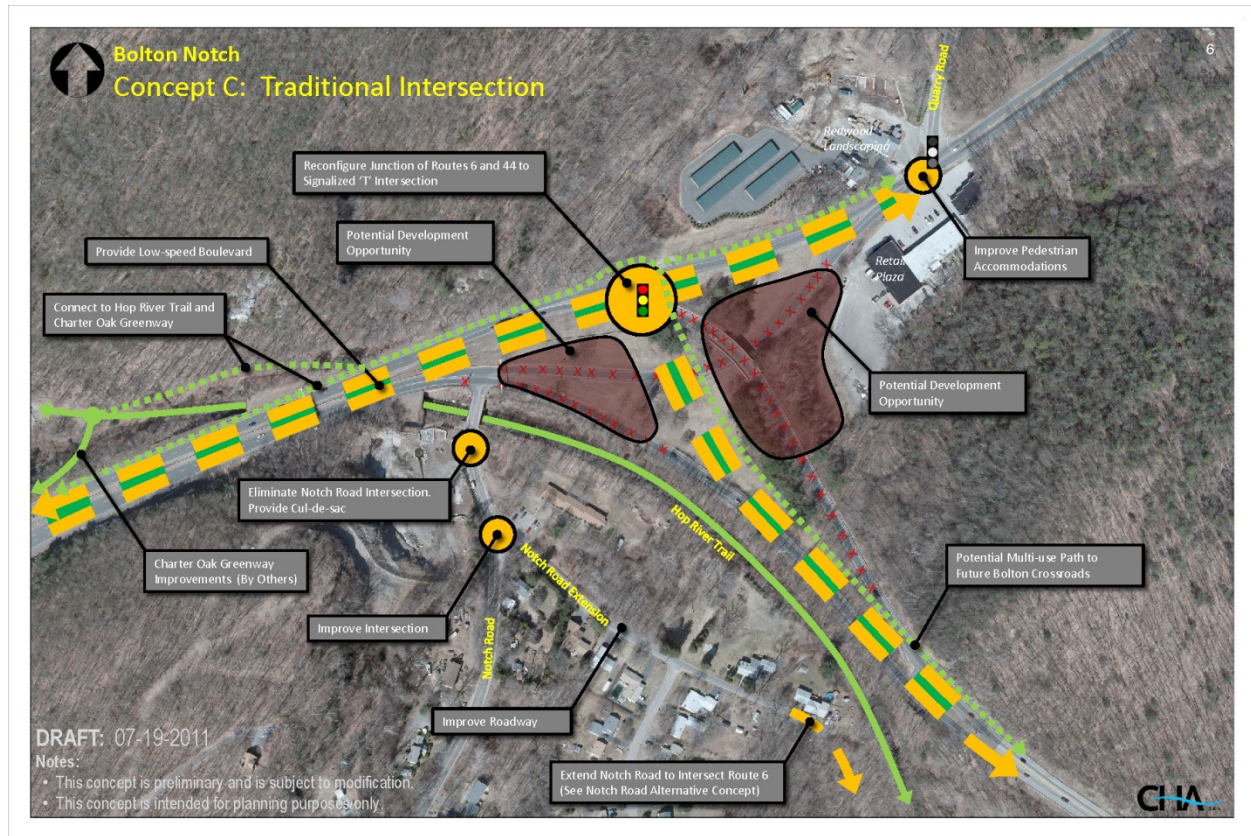


Description: Concept B provides the modest realignment of the eastbound Route 6 and Route 44 “ramp” from Concept A and incorporates a new bi-directional roadway connecting westbound Route 6 to eastbound Route 44 and westbound Route 44 to eastbound Route 6. The intersection of the Route 6 and Route 44 “ramp” and the new roadway would be signalized. As with Concept A, these improvements would be supplemented with the recommended low-speed boulevard improvements on the Route 6/44 overlap to the west.

Eliminated: This concept was eliminated by the REDC from further consideration because it does not adequately address the lack of full connectivity between Notch Road and Routes 6 and 44.

Bolton Notch (continued)

Concept C: Traditional Intersection

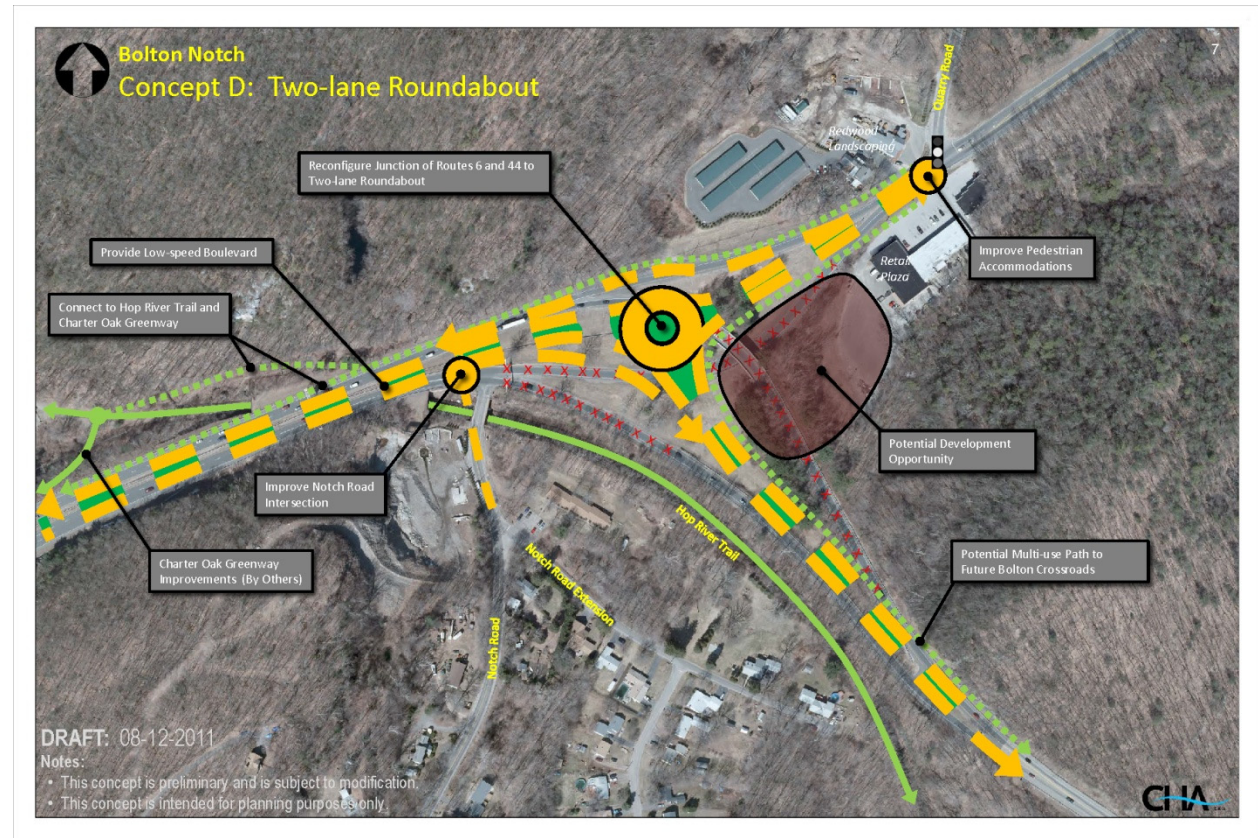


Description: Concept C reconfigures the junction of Route 6 and Route 44 to a signalized T-intersection and considers relocation of the Notch Road intersection via Notch Road Extension to a point on Route 6 located east of the new T-intersection. As with Concepts A and B, the concept includes low-speed boulevard improvements on the Route 6/44 overlap to the west.

Eliminated: This concept was eliminated by the REDC from further consideration because a large T-intersection with sufficient capacity to accommodate the combined traffic volumes from Route 6 and Route 44 (similar in size to the major intersections in the commercial Manchester Buckland Hills area) was decided to be undesirable for this area. Additionally, relocation of the Notch Road intersection to the east via Notch Road Extension was generally opposed by local residents and stakeholders.

Bolton Notch (continued)

Concept D: Two-lane Roundabout



Description: Concept D reconfigures the junction of Route 6 and Route 44 to a two-lane modern roundabout and maintains the Notch Road intersection near its existing location on the Route 6/44 overlap. To provide acceptable operations through the roundabout, the concept includes bypass lanes for eastbound Route 6 and westbound Route 44. The concept also includes low-speed boulevard improvements on the Route 6/44 overlap to the west.

Eliminated: This concept was eliminated by the REDC from further consideration because of potential operational concerns with the roundabout (particularly the long westbound queues that would require trucks to stop on the upgrade to the roundabout). Additionally, the location of the Notch Road intersection does not adequately address the lack of full connectivity between Notch Road and Routes 6 and 44.

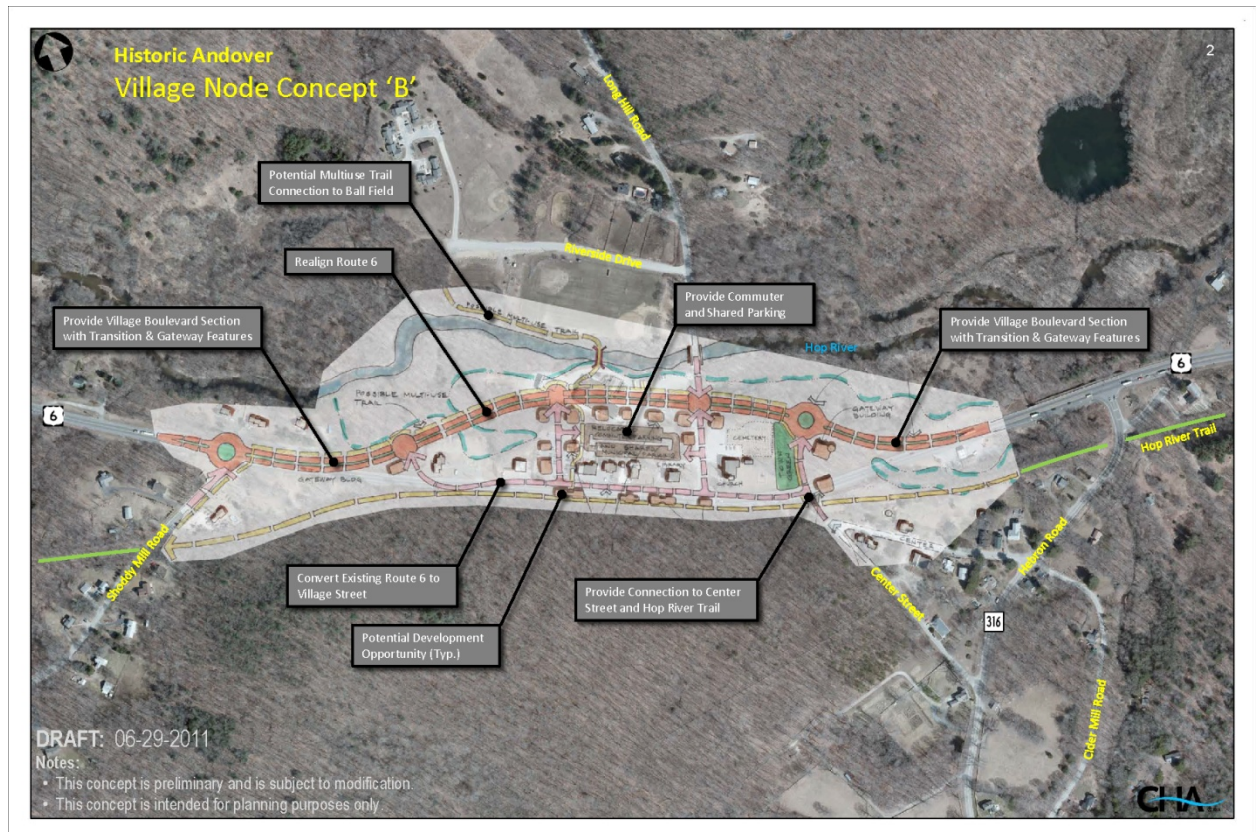
Historic Andover

Two other alternative concepts were considered for the Historic Andover village area in Andover. These concepts are described below and on the following page and include:

- Concept B: Village with Relocated Route 6
- Concept C: Village with Split Route 6

The former “Concept A: Village with Route 6 Improvements” was developed into the preferred concept for Historic Andover (see Section 4.1.5 for details).

Concept B: Village with Relocated Route 6

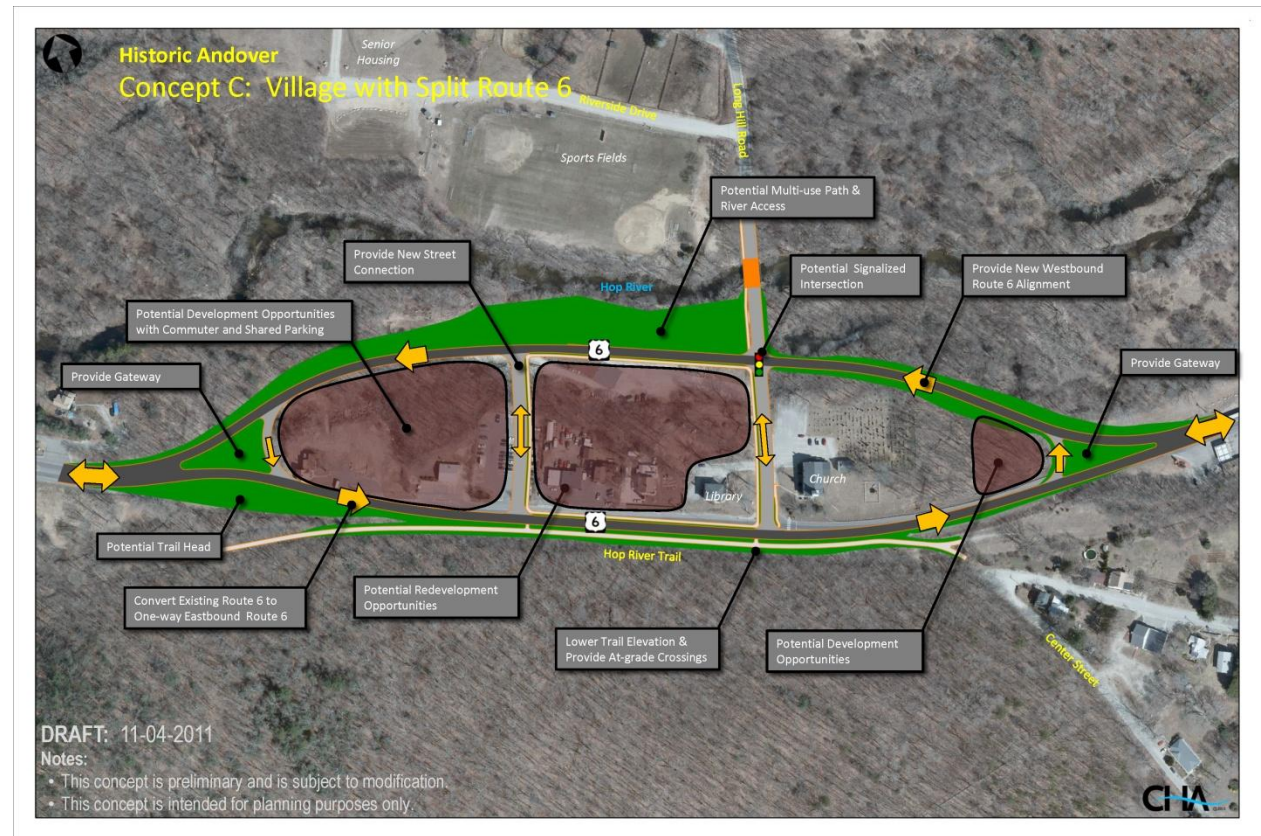


Description: Concept B relocates Route 6 to the north of existing Route 6 within the Historic Andover area to create a future village development opportunity that is relatively continuous with existing residential development and the Hop River Trail located immediately south of Route 6. Existing Route 6 within the village area is converted to a local street and other local street network connections are provided for multimodal access and circulation.

Eliminated: This concept was eliminated by the REDC from further consideration because of the relatively large scope and impacts associated with a complete relocation of Route 6 in the area. More specifically, noted concerns included potentially significant environmental impacts (wetlands, floodplains, historic), high construction costs, and limited accessibility of the Hop River created by the proximity of the relocated section of Route 6.

Historic Andover (continued)

Concept C: Village with Split Route 6



Description: Concept C includes splitting the eastbound and westbound directions of Route 6 to create a one-way pair of roadways connected by new local streets with future village development opportunities provided between the split roadways. The concept compromises between Concept C (village with Route 6 relocated to the north) and Concept A (village with Route 6 improvements) and improves traffic distribution, speed mitigation, multimodal access, and mobility within a future village development area.

Deferred: This concept was eliminated by the REDC from consideration as the preferred concept because of preference for a smaller-scale alternative (village with Route 6 improvements) with greater potential for implementation. However, the notion of a split Route 6 has essentially been deferred to future consideration with a complete westbound alignment shown in the preferred concept (Figure 4-8, page 4-21) as a future opportunity. It is noted that the layout of the local street network and the overall recommendations contained in the preferred concept were adapted to accommodate a potential future split of Route 6.

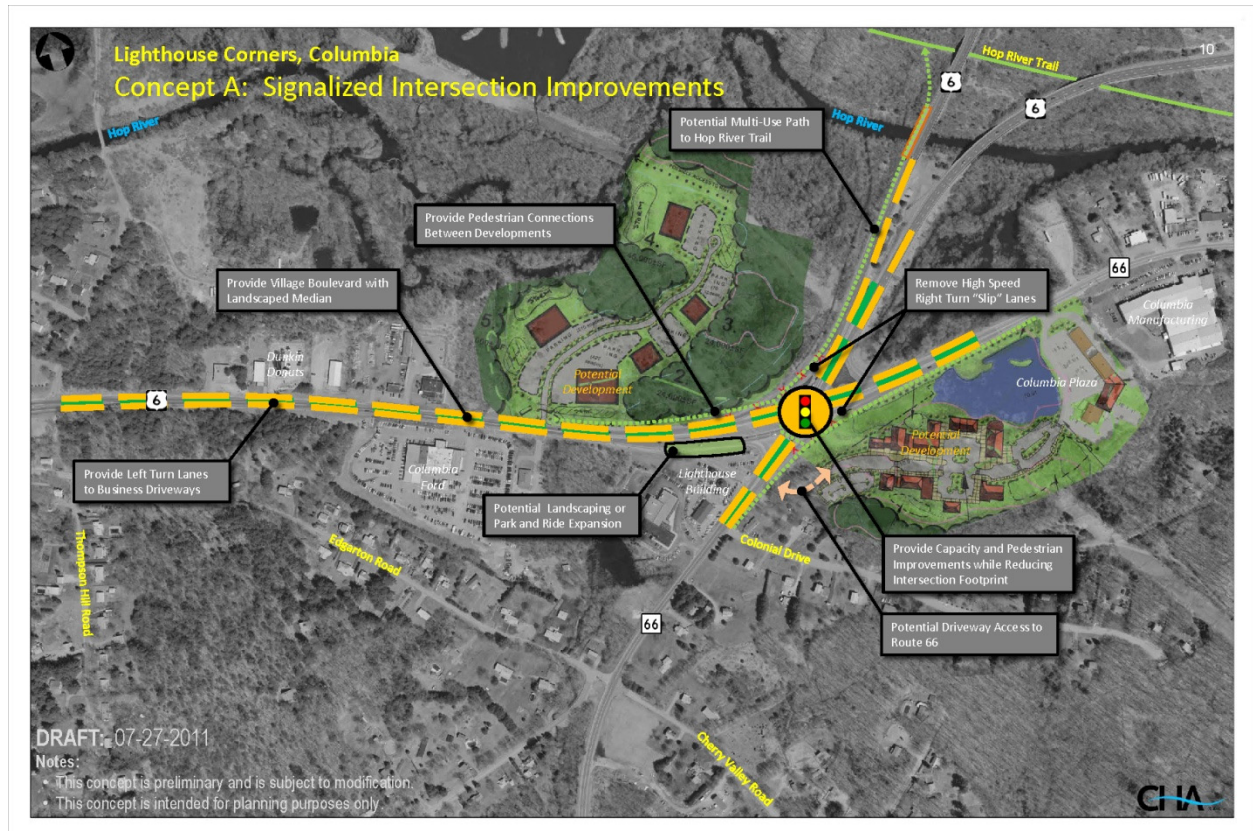
Lighthouse Corners

Three other alternative concepts were considered for Lighthouse Corners in Columbia. These concepts are described below and on the following pages and include:

- Concept A: Signalized Intersection Improvements
- Concept B: Roundabout with Minor Realignment
- Concept C: Route 6 Realignment with Village

The former “Modified Concept C: Small Village with Roundabout” was developed into the preferred concept for Lighthouse Corners (see Section 4.1.6 for details).

Concept A: Signalized Intersection Improvements

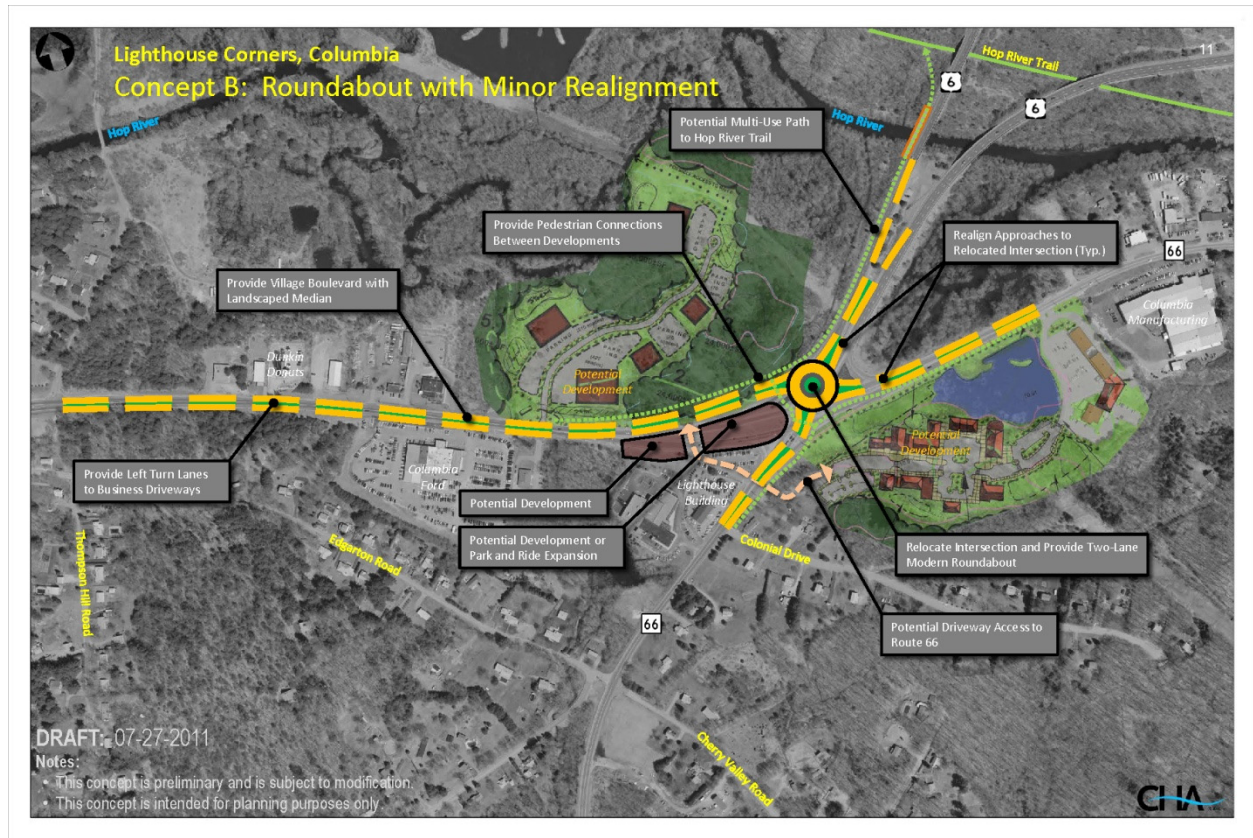


Description: Concept A improves the existing signalized intersection by removing the high-speed slip lanes, providing capacity improvements, and enhancing pedestrian accommodations. The concept also improves the aesthetics of the intersection by reducing the overall pavement footprint and providing new landscaping. The concept maintains the development opportunities recommended by the REDC’s 2010 Study.

Eliminated: This concept was eliminated by the REDC from further consideration because it does not adequately fulfill the community’s vision for gateway improvements and a future mixed-use village development in this location.

Lighthouse Corners (continued)

Concept B: Roundabout with Minor Realignment

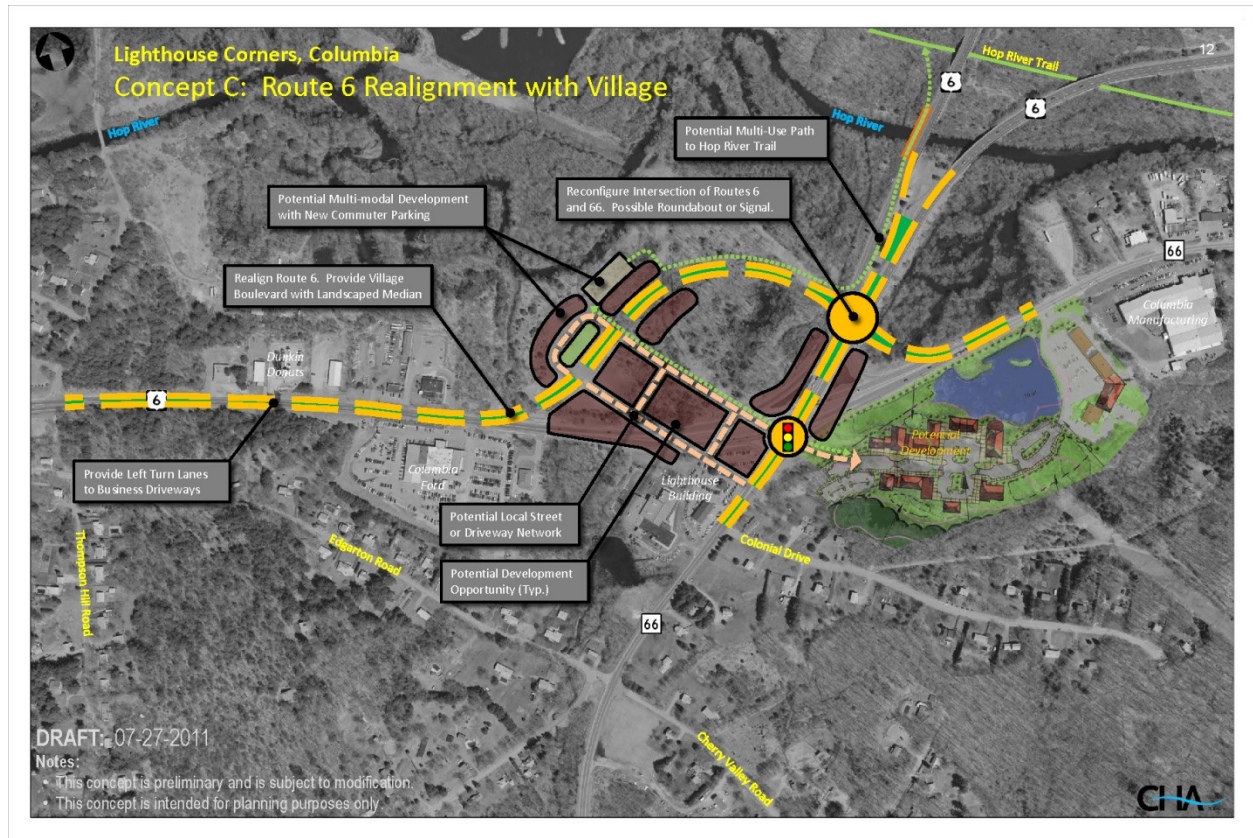


Description: Concept B replaces the existing Route 6 and Route 66 intersection with a two-lane modern roundabout and provides modest realignment of the Route 6 approach to accommodate the geometric requirements of the roundabout. The concept maintains the development opportunities recommended by the REDC's 2010 Study. Additionally, the realignment creates some development area within the footprint of the existing Route 6 roadway located just west of the intersection.

Eliminated: This concept was eliminated by the REDC from further consideration because it does not adequately fulfill the community's vision for a future mixed-use village development in this location.

Lighthouse Corners (continued)

Concept C: Route 6 Realignment with Village



Description: Concept C realigns a section of Route 6 to the north of the existing alignment to create a significant area for future village development opportunities and complementary local street network improvements. The intersection of Route 6 and Route 66 is reconfigured to the north as a roundabout or new signalized intersection.

Eliminated: This concept was eliminated by the REDC from further consideration because the realignment would have extensive and generally unacceptable environmental impacts (including wetlands and floodplains) north of the existing Route 6 alignment.

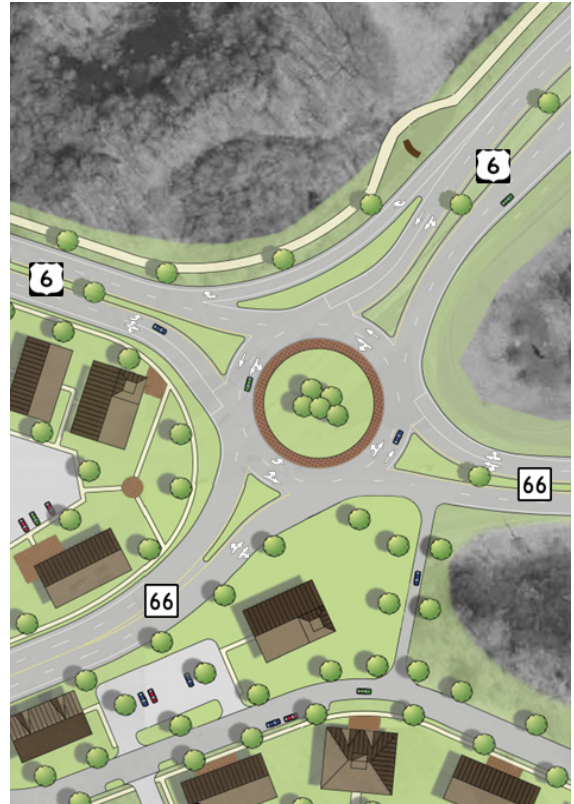
Appendix 5.2

Modern Roundabout Supplement

Modern Roundabout Supplement

The preferred concept for Lighthouse Corners, Columbia (discussed in Section 4.1.6) recommends replacing the existing signalized intersection of Routes 6 and 66 with a two-lane modern roundabout to improve traffic safety and operations while complementing the future village character that is envisioned by the Town for this area. The community response to the notion of a roundabout in this location was mixed, with a number of public meeting attendees and other study stakeholders expressing concerns about the potential function of the roundabout relative to safety, truck operations, and motorist unfamiliarity with roundabout operations.

In response to these concerns, several pieces of information were developed from new and existing sources to better explain the key advantages and characteristics of modern roundabouts (particularly in contrast to more commonly understood traffic circles or rotaries) and to better illustrate the intent of the modern roundabout concept at Lighthouse Corners through regional examples of roundabouts and computer simulation.



This supplement contains the following information:

- *All About Modern Roundabouts* Summary
- A list of Roundabout Resources & References
- Example Multi-lane Roundabouts
- Lighthouse Corners Roundabout: Traffic Analysis

All About Modern Roundabouts

What is a Modern Roundabout?

- A modern roundabout is a compact circular intersection in which traffic flows counter-clockwise around a center island.
- A roundabout can be single lane, or multi-lane with two or more lanes of entering and circulating traffic.
- Entering traffic yields to circulating traffic.
- The relatively small diameter of a roundabout and the curved entry paths promote speeds of 20 mph or less.



What a Roundabout is Not...

A modern roundabout is not a rotary or traffic circle. Modern roundabouts differ from rotaries and traffic circles in several key respects:

- Roundabouts are substantially smaller in diameter than typical traffic circles. The diameter of a typical roundabout can be 3 to 5 times smaller than that of a traffic circle or rotary.
- Because of their small size, roundabouts are designed for low speeds of entering and circulating traffic. Traffic circles and rotaries are much larger and promote high-speed merging and weaving of traffic.
- Roundabouts require yield-at-entry such that entering traffic must yield to circulating traffic. Traffic circles require circulating vehicles to grant the right of way to entering vehicles.



Features of a Modern Roundabout...



1. Pedestrian Refuge
 2. Pedestrian Crossing
 3. Splitter Island
 4. Lane Use Marking
 5. Yield Line
 6. Edge Line
 7. Landscaping Buffer
 8. Circulatory Roadway
 9. Center Island
 10. Truck Apron
- A. Lighting
B. Sidewalk
C. Regulatory Chevron
D. Exit Guide Sign
E. Yield Sign

The features of a modern roundabout communicate to drivers, pedestrians, and bicyclists how the roundabout operates and direct users how to safely navigate through the roundabout.

[Source: *Planning-Level Guidelines for Modern Roundabouts*, Center for Transportation Research and Education, November 2008]

Signs & Pavement Markings are Key...

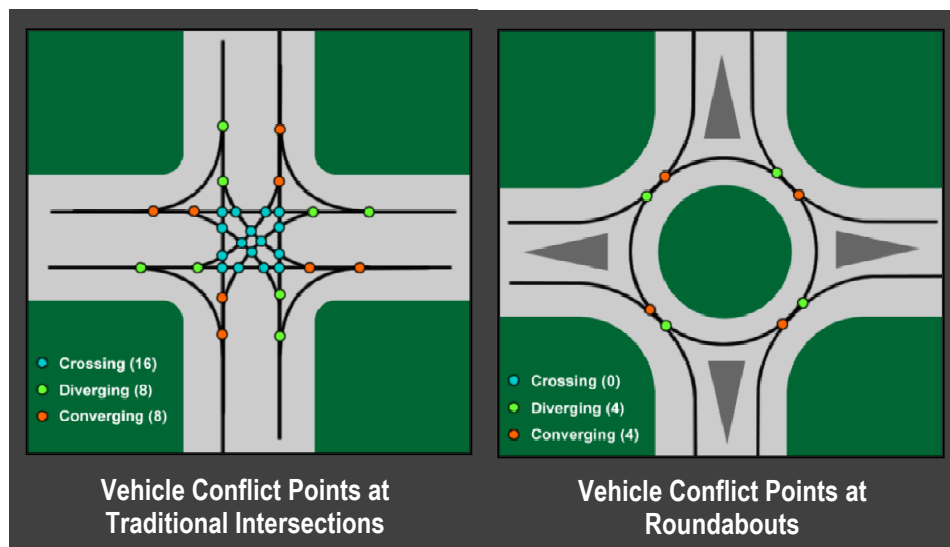
Key features of modern roundabouts are signs and pavement markings, particularly those on the approaches to roundabouts. Clear and effective signing and pavement markings are essential to helping users safely navigate roundabouts.



Safety Benefits of a Roundabout...

Studies have shown that modern roundabouts, when replacing traditional intersections, can reduce all accidents by 48% and fatal accidents by 78%. Also consider:

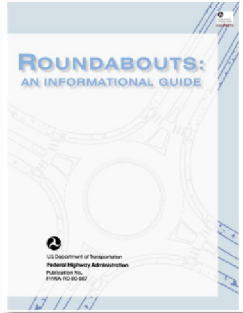
- At traditional intersections, common collision types often include right-angle, left-turn, and head-on collisions. These types of collisions can be severe as they can occur at high speeds.
- With roundabouts, these types of collisions are essentially eliminated. Installing roundabouts in place of traffic signals can also reduce the likelihood of rear-end crashes and their severity by removing the incentive for drivers to speed up as they approach green lights and by reducing abrupt stops at red lights.
- As shown in the graphic below, the vehicle-to-vehicle conflicts that occur at roundabouts generally involve a vehicle merging into the circular roadway, with both vehicles traveling at low speeds — generally less than 20 mph.



[Additional Sources: *What is a Roundabout?*, CTDOT; *Benefits and Operational Information, Five Corners, Ellington*, CTDOT; *Safety Aspects of Roundabouts*, FHWA.

Roundabout Resources and References

Federal Highway Administration (FHWA)



Roundabouts: An Informational Guide

<http://www.fhwa.dot.gov/publications/research/safety/00068/>

Includes chapters on:

- Planning
- Operations
- Safety
- Geometric Design



Technical Summary: Roundabouts

<http://safety.fhwa.dot.gov/intersection/roundabouts/fhwasa10006/>

Includes chapters on:

- Characteristics of Roundabouts
- Benefits of Roundabouts
- User Considerations
- Design Considerations



Roundabouts Webpage

<http://safety.fhwa.dot.gov/intersection/roundabouts/>

Webpage provides links to:

- Video – *Modern Roundabouts: A Safer Choice*
- Presentations
- Publications
- Related Website Links

Transportation Research Board (TRB)



Roundabouts: An Informational Guide – Second Edition

http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_672.pdf

Includes chapters on:

- Roundabout Considerations
- Planning
- Operational Analysis
- Safety

State Agencies



Connecticut Department of Transportation (CTDOT)

CTDOT Roundabout Information Webpage

<http://www.ct.gov/dot/cwp/view.asp?a=4109&q=467780&PM=1>

Webpage Includes:

- General Information
- Project News
- Roundabout Simulation (under News)



New York State Department of Transportation (NYSDOT)

NYSDOT Roundabout Information Webpage

<https://www.dot.ny.gov/main/roundabouts>

Webpage Includes:

- Guidance for Users (with Animations)
- Video Gallery
- Photo Gallery



Washington State Department of Transportation (WSDOT)

WSDOT Roundabout Information Webpage

<http://www.wsdot.wa.gov/safety/roundabouts/>

Webpage Includes:

- General Information
- Driving Multi-lane Roundabouts Information
- Roundabout Video Series

Other Resources

Roundabouts USA Website

<http://www.roundaboutsusa.com/>

Includes:

- Roundabout Information
- Photo Gallery
- Article Library
- Resource Links



Example Multi-lane Roundabouts

Keene, New Hampshire

Routes 10/12/101 and Winchester Street Intersection [Source: Bing Maps]



Keene, New Hampshire

Main Street, Marlborough Street, Winchester Street Intersection [Source: Google Maps]



Lighthouse Corners Roundabout: Traffic Analysis

To better understand the operational feasibility of a two-lane roundabout at the intersection of Route 6 and Route 66 in Columbia (Lighthouse Corners), a VISSIM traffic model was developed as part of this study to simulate the performance of the conceptual roundabout design under future traffic conditions (year 2030). The simulation was developed for the weekday afternoon peak traffic hour, which represents the highest traffic volumes that are experienced at this intersection during a typical weekday. During the afternoon peak hour, the highest volumes are experienced on the eastbound Route 6 approach to the intersection. A large percentage of this traffic then continues “north” on expressway Route 6.



Screenshot image of the VISSIM traffic model that was developed for the preferred roundabout concept at the intersection of Route 6 and Route 66 in Columbia (Lighthouse Corners).

The outputs from the VISSIM model showed that the overall average delay for all vehicles traveling through the roundabout is comparable to a level-of-service (LOS) C for a signalized intersection (that is, approximately 30 sec. of delay per vehicle). The LOS for each approach (using comparable signalized intersection criteria) was shown to be:

Two-lane Roundabout Concept

- Eastbound Route 6: LOS D
- Westbound Route 66: LOS E
- Northbound Route 66: LOS B
- Southbound Route 6: LOS A
- All Approaches (overall): LOS C

By comparison, the afternoon peak hour traffic analysis for the existing signalized intersection at Routes 6 and 66 under future traffic conditions with no improvements to the intersection was shown to be:

Signalized Intersection (with No Improvements)

- Eastbound Route 6: LOS F
- Westbound Route 66: LOS F
- Northbound Route 66: LOS E
- Southbound Route 6: LOS C
- All Approaches (overall): LOS F