Connecticut Metropolitan Council of Governments

Engineering Planning Study for
Route 25 and Route 111
Monroe & Trumbull, CT

Final Report

Connecticut Metropolitan Council of Governments and the Towns of Monroe & Trumbull

July 2019

Section 3 Assessment of Future Conditions

Section 4 Recommendations

Section 5 Implementation Plan

Figures

Appendices

Technical Appendices (Available Upon Request)

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Section 1
Introduction

The Engineering Planning Study for Route 25 and Route 111 (Study) was conducted by the Connecticut Metropolitan Council of Governments (METROCOG) on behalf of the Towns of Monroe and Trumbull (Towns). METROCOG was awarded funding to conduct this Study for the Towns under the State of Connecticut's Local Transportation Capital Improvement Program (LOTCIP) which is administered by the Connecticut Department of Transportation (CTDOT).

The purpose of the Study was to develop a comprehensive transportation improvement plan for Routes 25 and 111 within the study area and provide a planning document for the Towns, Region, and State to guide the implementation of transportation system improvements to meet expected future development, local and regional transportation needs, and economic development goals.

The goals and objectives of the plan were identified by the project Technical Advisory Committee (TAC). The TAC included members from the following agencies and organizations:

- **Towns of Monroe and Trumbull Staff from Various Departments**
- **First Selectman of Monroe**
- **First Selectman of Trumbull**
- **Connecticut Metropolitan Council of Governments Planning Staff**
- **Connecticut Department of Transportation Policy and Planning Staff**

In addition to the TAC, a Community Advisory Committee (CAC) also advised the Study Team. The CAC included representatives from area businesses and stakeholder groups as well as the members of the TAC.

The Study goals and objectives were identified at the onset of the study through meetings and public input. The goals and objectives include the following:

- Develop cost effective physical transportation system solutions that improve operations to mitigate congestion, address identified safety concerns, and provide guidance on access control issues while accommodating future land use expansion opportunities

- Improve transportation system opportunities and mobility for alternative travel modes including sidewalk and bicycle infrastructure, improve pedestrian accommodations at intersections, enhance access and connectivity to the Pequonnock River Trail system, and improve transit amenities to provide a complete transportation system for all travelers

- Develop a comprehensive transportation improvement plan that facilitates the prioritization and implementation time frames to enable the programming and funding of improvements to meet both current and future corridor needs

The study process included five primary work tasks that are included in the overall scope of the project.

Task 1 - Data Collection

Task 2 - Analysis of Existing Conditions

Task 3 - Analysis of Future Conditions

Task 4 - Identification and Analysis of Improvement Alternatives

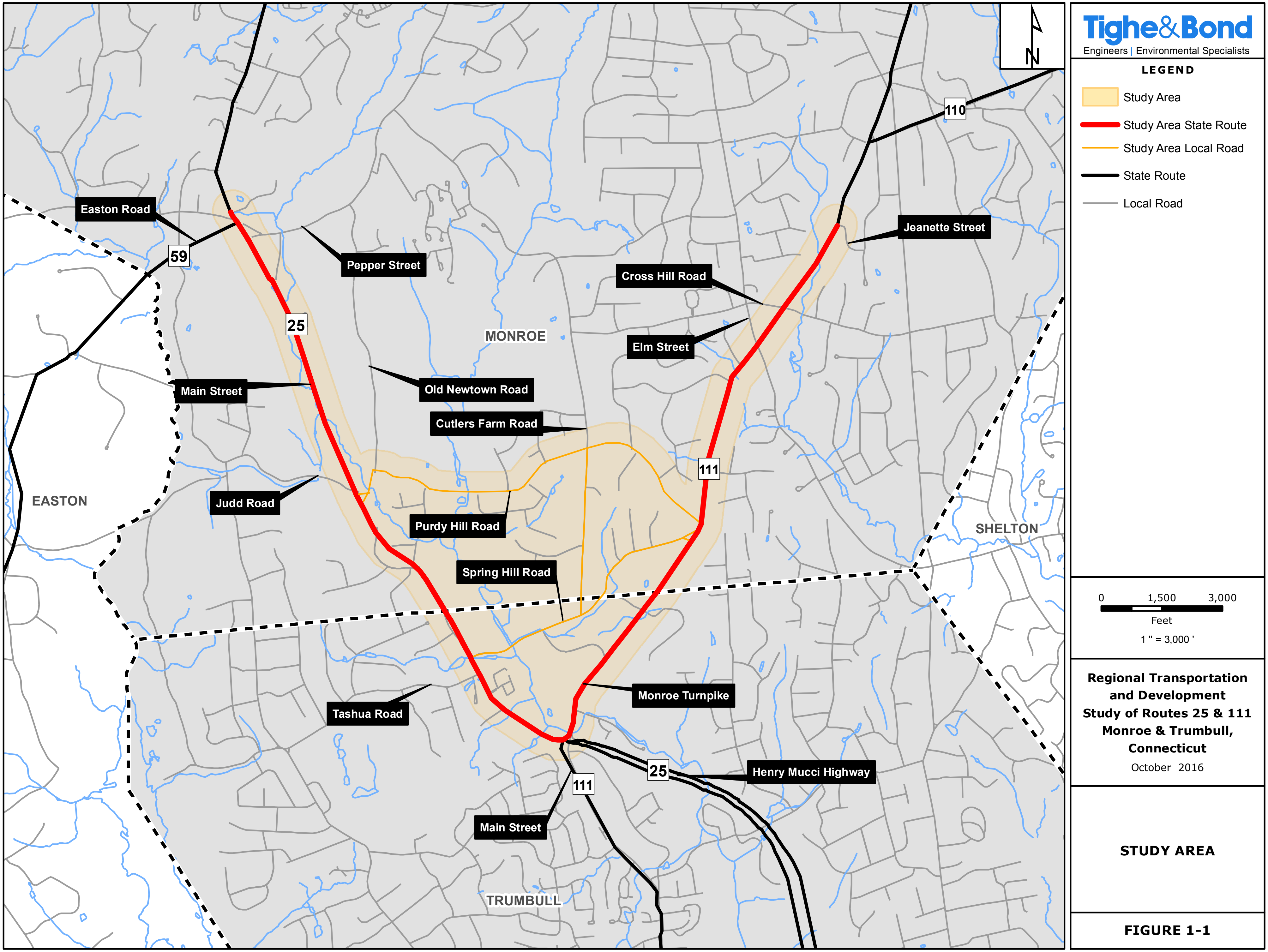
Task 5 - Final Improvement Plan

In addition to these work tasks, a comprehensive Public Outreach program was conducted throughout the study process to involve and obtain input from the public. The public involvement program included meetings with the Technical Advisory Committee, the Community Advisory Committee, and Public Information Meetings conducted during key points in the study process. The Public Outreach program is described in more detail in Section 1.4.

1.1 Study Area

The study area includes approximately 3.2 miles of Route 25 and approximately 2.9 miles of Route 111 in the Towns of Monroe and Trumbull as well as the commercial area bound by the corridors to the south and Purdy Hill Road to the north. The study area begins at the south end at the intersection of Route 25 (Main Street) and Route 111 (Monroe Turnpike) and extends north on Route 25 to the intersection with Route 59 (Easton Road) and north on Route 111 to the intersection with Jeanette Street. The study area includes several signalized and unsignalized intersections described in Section 2.2. The study area is illustrated in Figure 1-1 on the following page.

In addition to reviewing the transportation system, the Study also conducted an analysis of existing and future land use. Overall, the study area includes a diverse mix of land uses currently developed and/or zoned for development. Current land uses include residential, retail, commercial, office parks, and light industrial. The assessment of current land use and forecasted development growth trends are provided in subsequent sections of this report.



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Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut

October 2016

STUDY AREA

FIGURE 1-1

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1.2 Study Team

The study team included representatives from the Towns of Monroe and Trumbull, METROCOG, and CTDOT in addition to the consultant team. The consulting team included Tighe & Bond, the prime consultant, and Fitzgerald & Halliday, a subconsultant. Tighe & Bond provided overall project management, traffic and transportation engineering, and lead the public involvement process. Fitzgerald & Halliday was responsible for assessing the existing natural resources and reviewing current transportation infrastructure relative to accommodations for bicycles and pedestrians to provide recommendations for future enhancements to better accommodate all modes of travel in the study area. They also assisted in the public involvement process.

The Towns of Monroe and Trumbull were represented by staff from the following entities:

- **Engineering Department**
- **Planning & Zoning Department**
- **Public Works Department**
- **Police Department**
- **Emergency Medical Services (EMS)**

CTDOT staff from the Bureau of Policy and Planning were actively involved in the study through their participation on the Technical Advisory and Community Advisory Committees. Additionally, CTDOT staff from various other design and review units were involved in the review of the study findings and recommendations to ensure that the Department's policies and vision was reflected in the final results.

METROCOG is the Council of Governments for the Towns of Monroe and Trumbull and was the overall project manager for the Study. METROCOG staff actively participated in the public outreach initiatives in cooperation with the Towns. METROCOG staff were also members on the Technical Advisory and Community Advisory Committees. Additionally, METROCOG hosted the project website.

In total, the Study Team was comprised of parties at the State, Regional, and Local levels to ensure that the planning activities conducted under this Study fit within the overall planning goals at all levels of government.

1.3 Study Process

The Study followed a process developed by METROCOG. The key elements of the Study included:

- Conducting technical analyses and observations of the study corridors to assess existing conditions and identify deficiencies and needs
- Forecasting future travel demand, analyzing future traffic conditions, and identifying potential future areas of concern within the 20-year Study horizon
- Identifying economic development opportunities within the study corridors and assessing their effect on the transportation system
- Identifying feasible improvement alternatives to mitigate the effects of future traffic on the corridors
- Seeking opportunities to enhance the overall transportation system to better accommodate all modes of travel
- Conducting stakeholder meetings to obtain input on the study results at key milestones throughout the study process
- Conducting a comprehensive public outreach program involving meetings and a project website to obtain public comments

This Final Study Report summarizes the comprehensive analysis of existing and future conditions and describes the transportation system improvement recommendations needed to mitigate the forecasted growth in traffic and development locally and in the region.

The Study included both an assessment of existing conditions detailing the current study area needs, deficiencies, and opportunities as well as a future conditions analysis conducted to assess the impact of local and regional growth on the Route 25 and 111 corridors during the 20-year study horizon. An Existing and Future Conditions Technical Memorandum was prepared that provided a detailed summary of the following tasks:

- Assessing the existing transportation system and identifying needs and deficiencies
- Observing traffic volumes, vehicle classifications, and travel speeds within the study area and developing 2016 Existing traffic volumes
- Analyzing traffic safety for all travel modes
- Analyzing traffic operations during the periods of peak travel demand on the roadways for the weekday morning, weekday afternoon, and Saturday mid-day peak periods
- Reviewing current multi-modal transportation services and facilities
- Screening the natural and environmental resources to identify existing resources that may limit the scope and extent of physical improvements

- Forecasting 2040 background traffic volumes that include both regional travel demand growth plus approved local development generated traffic

- Reviewing potential development/redevelopment within the 20-year study horizon along the corridors and assessing the impacts of the developments on the existing transportation infrastructure

- Conducting an analysis of traffic conditions under the 2040 traffic conditions

- Identifying future areas of concern which formed the basis for the development of physical improvements to mitigate the deficiencies

The assessment of existing and future conditions provided the basis for the development of a series of improvement alternatives for the study area transportation system. The improvements were developed to provide acceptable intersection operations, mitigate the effects of projected traffic growth, address identified safety concerns, enhance bicycle and pedestrian accommodations, improve connectivity of the Pequonnock River Trail system, and increase multi-modal access in the study area. The recommended improvement plans are presented in Section 4 of this report with the complete engineering concept plans presented in Appendix C. Finally, Section 5 of the report presents an implementation plan prioritizing recommended improvements by need and complexity to help guide future decision making.

1.4 Public Involvement and Outreach Initiatives

Community involvement and public outreach were important initiatives of this study scope. A variety of techniques and methods were used to inform the public of study findings and to obtain feedback from project stakeholders throughout the study process. Residents and businesses in the study area had ample opportunities to monitor the progress of the study and offer input to the Study Team to help inform the decisions and recommendations of the Study. Throughout the Study, a comprehensive public Outreach Program was conducted by the Study Team in cooperation with the State and Local agencies. The goals of the community involvement and public outreach program included:

- Obtaining input from the public and project stakeholders on study area issues and concerns to help identify and frame the study goals and objectives

- Advising the public on the study findings

- Educating the Study Team with local knowledge

- Involving stakeholders and the public in the development and refinement of recommendations that fit the character and future vision of the Towns

- Facilitating reviews by the Town Councils, Boards, and Commissions as well as Businesses and Residents leading to a Final Improvement Plan that is endorsed by the Towns and Region to help guide future transportation system improvements and enhancements

In order to meet these public Involvement and Outreach goals, the project committees outlined in the following section were formed.

1.4.1 Project Committees

The study effort was guided through oversight provided by the Towns of Monroe and Trumbull, METROCOG, and CTDOT. The public outreach initiatives were facilitated through a Technical Advisory Committee and a Community Advisory Committee. The following section describes the groups responsible for providing oversight and guidance throughout the development of the Study.

1.4.1.1 Technical Advisory Committee (TAC)

This committee provided consistent input and oversight throughout the study process. The committee was comprised of:

- **Town Representatives**: Staff from the engineering, planning and zoning, public works, and police departments were included on the Committee
- **METROCOG Representatives:** Staff from METROCOG participated in the TAC to ensure that the planning activities taking place along the Study corridors also met regional goals and objectives
- **CTDOT Representatives:** CTDOT Staff from the Division of Policy and Planning represented the Department on this project and served as a liaison between the Study and other Department units

TAC meetings were conducted at key milestones during the study process to provide an update on the Study and obtain guidance on the results, findings, and recommendations.

1.4.1.2 Community Advisory Committee (CAC)

This committee was comprised of key members of the Technical Advisory Committee from the Towns of Monroe and Trumbull as well as METROCOG in order to facilitate a cohesive public outreach process. In addition, the CAC included project stakeholders that were directly impacted by operations in the study area. The CAC included members from area businesses and other key stakeholders that lived and/or operated businesses in the study area. The CAC meetings provided a forum for the CAC members to provide their perspectives on the study goals and objectives and help vet study findings and recommendations.

1.4.2 Public Information Meetings

In addition to the guidance provided by the TAC and CAC, general public information meetings were conducted to meet the public Involvement and Outreach goals. The public information meetings were held at key junctures in the planning study process: one in the initial project investigation and existing analysis phase, one following the identification and analysis of improvement alternatives, and one to review the improvement plan before it was finalized.

1.4.3 Summary of Outreach Activities

The Public Outreach initiatives were fundamental to the progression of the Study from initiation through the meetings with the TAC, CAC, the Towns, and CTDOT as well as with key stakeholders and the public. The following meetings took place during the progression of the Study:

Project Kickoff Meeting:	February 22, 2016
Public Info Meeting #1:	April 6, 2016
TAC Meeting #1:	August 9, 2016
Economic Development Meeting with Towns #1:	October 26, 2016
Economic Development Meeting with Towns #2:	December 19, 2016
TAC Meeting #2:	April 17, 2017
CTDOT Review Meeting:	April 18, 2017
CAC Meeting #1:	April 25, 2017
Public Info Meeting #2:	April 27, 2017
First Selectman Review Meetings:	January 8 & 10, 2018
CTDOT Concepts Review Meeting:	February 27, 2018
Trumbull Stakeholder Meeting:	April 30, 2018
Monroe Stakeholder Meeting:	May 1, 2018
CAC Meeting #2:	May 23, 2018
Public Info Meeting #3:	June 13, 2018

These meetings were a key component of acquiring information and feedback on the various work tasks conducted throughout the Study.

1.4.4 Project Website

METROCOG developed a project website that provides information on the Route 25 and 111 Engineering Planning Study. The website can be found at the following link:

http://www.ctmetro.org/projects/transportation/roads-highways/routes-25-111/#.V88S52f2aUk

The website provides Study information, meeting information and dates, and access to Study Publications as they become available.

Section 2
Assessment of Existing Conditions

The assessment of existing conditions included an extensive data collection process to establish the current condition of the transportation system in the study area. The purpose of the existing condition assessment was to discover existing needs and deficiencies and begin the process of identifying opportunities for improvements to the transportation system. This section describes the assessment of the study area transportation system as it existed in 2016.

2.1 Roadway Network

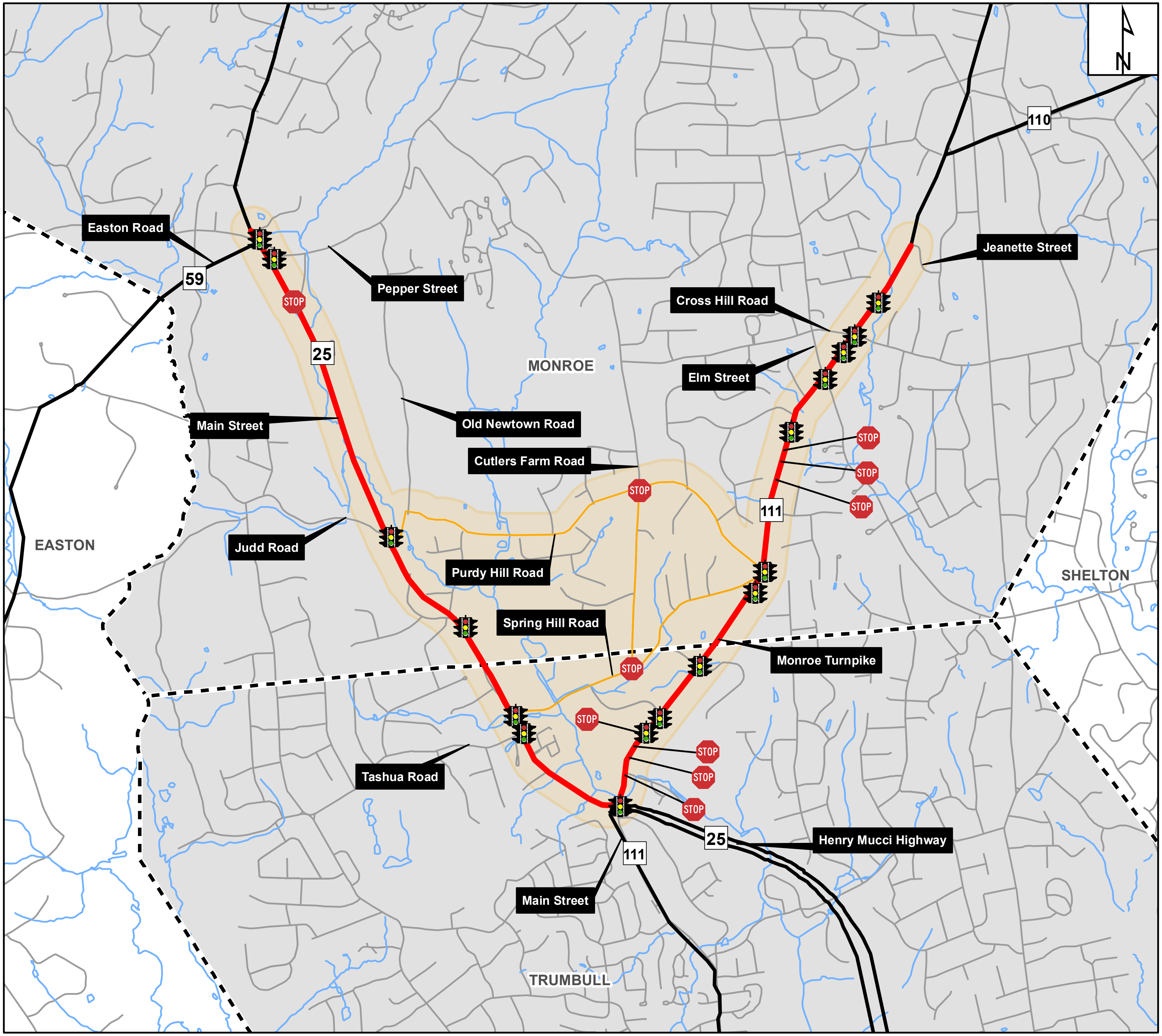
The primary roadways in the study area, shown in Figure 2-1 on the following page, were reviewed in the field by the study team to observe the condition of the roadway network and identify any deficiencies. These roadways are classified as either Urban Expressways, Urban Principal/Minor Arterials, Urban Collectors, or Urban Local Roadways by the Connecticut Department of Transportation (CTDOT) in its functional classification system. Based on the classifications of the study area roadways, a review of roadway characteristics was conducted to determine if deficiencies exist. The following sections summarize the results of the observations for each of the roadways that were reviewed as part of the study scope.

2.1.1 State Route 25 (Main Street)

Main Street, designated as Connecticut State Route 25, is classified by CTDOT as an urban principal arterial north of Route 111. South of Route 111, it is classified as an Urban Expressway and becomes Henry Mucci Highway. Route 25 runs south-north through the center of Trumbull and along the west side of Monroe within the study area. Route 25 begins in Bridgeport at the interchange with Interstate 95 and terminates in Brookfield at the intersection with Route 202 near Route 7.

Route 25 Looking North Towards Green Street

Route 25 provides regional, commercial, and local access within the study area. Northbound, it is utilized by many drivers to access Interstate 84 at exits 10 and 11 in Newtown. Southbound, Route 25 becomes an expressway that terminates in Bridgeport at the interchange with Interstate 95. As it passes through Trumbull, it also intersects with the Merritt Parkway (Route 15) and Route 8. All three of these highways, as well as the Route 25 expressway itself, provide significant regional access to the towns surrounding the study area. Additionally, numerous commercial properties front Route 25 in the study area and northward into Newtown. The intersection of Route 25 and Route 111, as well as the adjoining local roads, are also used by drivers to



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LEGEND

- Traffic Signal Control
- Stop Sign Control
- Study Area
- Study Area State Route
- Study Area Local Road
- State Route
- Local Road

0 1,500 3,000
Feet
1 " = 3,000 '

Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut

October 2016

STUDY AREA INTERSECTIONS AND TRAFFIC CONTROL

FIGURE 2-1

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travel between the commercial properties along both roadways. Many local roads and collectors, which are summarized in subsequent sections, intersect Route 25 and provide access to residences.

The section of Route 25 within the study area is approximately 3 miles long. The roadway cross-section typically consists of two lanes, one in each direction, and widens to three or four lanes at intersections to provide exclusive left and/or right turn lanes. At the intersection with Route 111 where the expressway begins, Route 25 widens to six total lanes with a raised concrete median on both approaches. All other medians between the northbound and southbound traffic are painted. Within the study area, Route 25 contains seven signalized intersections which are further described in Section 2.2. The posted speed limit on Route 25 within the study area is 40 miles per hour north of the intersection with Route 111. The expressway portion of Route 25 south of the intersection has a posted speed limit of 55 miles per hour.

2.1.2 State Route 111 (Main Street/Monroe Turnpike)

Main Street/Monroe Turnpike, designated as Connecticut State Route 111, is classified as an urban minor arterial by CTDOT. Route 111 runs south-north through Trumbull and along the east side of Monroe within the study area. The roadway begins at the Exit 48 interchange with the Merritt Parkway (Route 15) in Trumbull south of the study area and terminates at the intersection with Route 34 in Monroe to the north of the study area.

Similar to Route 25, Route 111 provides regional, commercial, and residential access within the study area. Route 111 intersects Route 25 to the south at the busiest intersection in the Study area. The Route 111 connections to Merritt Parkway, Route 25, and Route 34 result in the roadway being utilized by a significant number of drivers for regional access.

Within the study area, Route 111 is fronted by a large number of retail, general office, medical office, and industrial properties. As such, the roadway attracts significant local commercial traffic which mixes with the regional through traffic. As mentioned in the previous section, several collector and local roadways connect the Route 25 and Route 111 corridors and include access to many residential neighborhoods to the north and industrial and commercial centers to the south.

Route 111 Looking North Towards Route 25 Intersection

The study area contains approximately 2.8 miles of Route 111 starting just south of Route 25 and ending at the intersection with Jeanette Street to the north. The roadway cross-section varies within the study area. From the Route 25 intersection to just north of the intersection with Purdy Hill Road, Route 111 is four lanes wide with two 11-foot travel lanes in each direction and narrow shoulders of 2-5 feet. North of Purdy Hill Road, Route 111 narrows to one travel lane in each direction with narrow shoulders of 2-5 feet. Along both sections of Route 111, the roadway widens at key intersections for additional, exclusive left and right turn lanes.

Within the study area, Route 111 contains 11 signalized intersections which are further described in Section 2.2. The posted speed limit on Route 111 varies between 35 and 40 miles per hour. South of the intersection with Route 25, the speed limit is 40 miles per hour. Between Route 25 and Trefoil Drive, the speed limit is reduced to 35 miles per hour. The speed limit is 40 miles per hour from Trefoil Drive to Ryegate Terrace where it is again reduced to 35 miles per hour through the intersection with Cross Hill Road. North of Cross Hill Road through the remainder of the study area, Route 111 has a speed limit of 40 miles per hour.

2.1.3 Tashua Road

Tashua Road is classified by CTDOT as an urban collector road. It runs from the west and terminates at Route 25 at a signalized intersection. It is typically 22 feet wide with two 11-foot travel lanes. At the intersection with Route 25, it provides designated left and right turn lanes as well as a 10-foot wide painted median with an interior vegetated strip. The speed limit on Tashua Road is 25 miles per hour. Tashua Road provides mostly residential access to adjoining local roads and also connects to Madison Avenue; another collector roadway to the west.

Route 25 at Tashua Road Looking North

2.1.4 Spring Hill Road

Spring Hill Road, classified as a local road by CTDOT, connects Route 25 on its west end to Route 111 on its east end. The roadway is approximately 23 feet wide with 11 to 12-foot travel lanes. The only shoulders are 2 feet wide and are located on the approach to Route 25. The intersection with Route 25 is signalized and Spring Hill Road widens to provide an exclusive left turn and an exclusive right turn lane. The intersection with Route 111 is also signalized and Spring Hill Road remains one lane. Eastbound, the speed limit is 30 miles per hour until it drops to 25 just north of the Trumbull town line. Westbound, the speed limit is 25 miles per hour until it increases to 30 after Cutler's Farm Road.

Spring Hill Road services mainly residential properties to the northeast and commercial and industrial uses to the southwest. The industrial uses include the Trumbull transfer station and the Trumbull school bus depot. The Pequonnock River Trail also crosses Spring Hill Road in the area of the bus depot on the southwest end of the roadway.

Spring Hill Road acts as an important cut-through roadway between Route 25 and Route 111. Cutler's Farm Road intersects Spring Hill Road at the approximate midpoint of the roadway connecting to Purdy Hill Road to the north and facilitating additional access for cut-through traffic bypassing the more congested state routes.

2.1.5 Victoria Drive

Victoria Drive is a private roadway that provides access to commercial and manufacturing properties east of Route 25. Current development on the site includes Victorinox Swiss Army Inc. and new construction on manufacturing space. The road intersects Route 25 at a signalized intersection located approximately 0.5 miles north of Spring Hill Road. Victoria Drive contains a crossing for the Pequonnock River Trail on the east end.

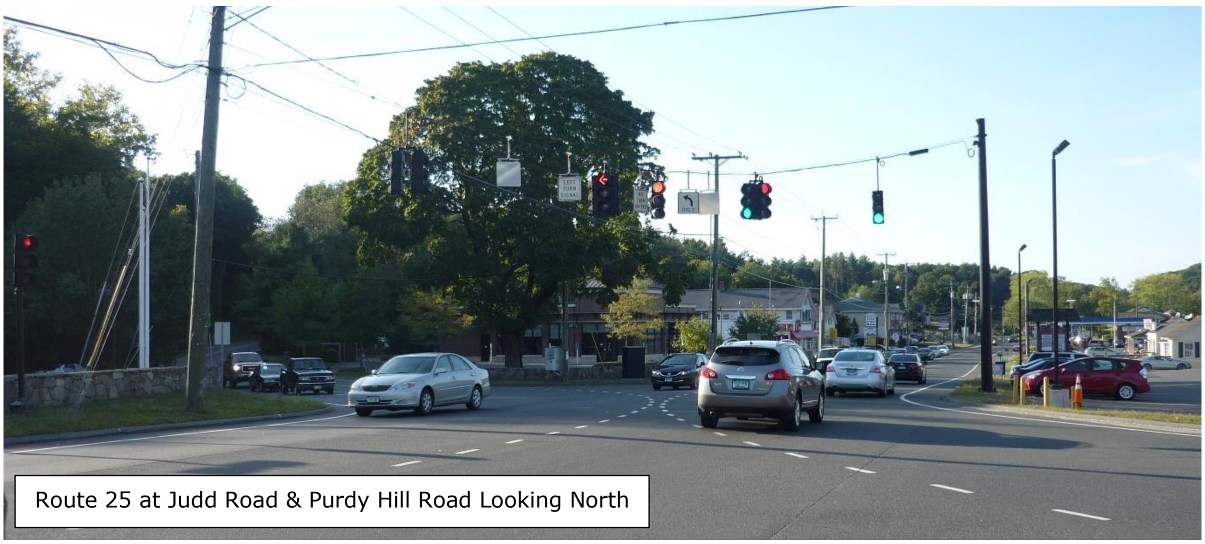
The posted speed limit is 15 miles per hour and the roadway is approximately 36 feet wide with a single travel lane in each direction and no painted shoulders. At the intersection with Route 25, the roadway widens westbound to provide exclusive left and right turn lanes as well as an 8' planted median.

Route 25 at Victoria Drive Looking North

2.1.6 Judd Road

Judd Road, classified as an urban collector roadway by CTDOT, intersects Route 25 opposite Purdy Hill Road at a signalized intersection. Judd Road begins at the intersection with Hattertown Road to the northwest of the study area and runs south to the intersection with Route 59 where it turns east towards its termination at the intersection with Route 25. Judd Road serves as a collector for several residential neighborhoods along its length and funnels traffic to the Route 25 and 59 corridors.

Judd Road is generally 24 feet wide with a travel lane in each direction and no shoulders. At the intersection with Route 25, Judd Road widens to provide an exclusive left turn lane and a shared through-right lane. The posted speed limit on Judd Road is 25 miles per hour.



Route 25 at Judd Road & Purdy Hill Road Looking North

2.1.7 Purdy Hill Road

Purdy Hill Road is classified as an urban collector by CTDOT. The roadway runs east to west in the study area intersecting Route 25 to the west and Route 111 to the east. To the west, Purdy Hill overlaps with Old Newtown Road and shares a signalized intersection with Route 25 with Judd Road on the western side of the intersection. To the east, Purdy Hill Road continues past the Route 111 corridor to the intersection with Elm Street.

Purdy Hill Road serves as a collector for mainly residential properties between the Route 25 and Route 111 corridors. Some commercial development exists on either end proximate to the Route 25 and 111 corridors. Of note are the Monroe Public Works Department, Benedicts Home & Garden, 500 Purdy Hill Road center, and Chucks Corner on the west end and Walgreens, the U.S. Post Office, and Goodwill on the east end. Purdy Hill Road also provides access to Great Hollow Lake at Wolfe Park where Purdy Hill overlaps with the Pequonnock River Trail for a short distance from Maple Drive to the Wolfe Park driveway.

Purdy Hill Road is approximately 26 feet wide with a travel lane in each direction and narrow shoulders. At the intersections with Route 25 and Route 111, the road widens to provide an exclusive left turn lane along with a through-right lane for the westbound approach to Route 25 and both the eastbound and westbound approaches to Route 111.

At Route 25, the stop bar is set back from the intersection to provide room for an exit driveway from Chuck's Corner Plaza. About 0.05 miles south of the intersection, Route 25 intersects Old Newtown Road which is one-way northbound along the Tuscany Pizza Deli and Duchess Restaurant parking lots. Purdy Hill and Old Newtown overlap for a tenth of a mile as they head north to a three-way stop controlled intersection where Old Newtown continues north to Pepper Street and Purdy Hill turns east towards Route 111.

The speed limit on Purdy Hill Road is 25 miles per hour from the intersection with Route 25 to Maple Drive where it raises to 30 miles per hour to the Route 111 intersection. East of Route 111, the speed limit is 25 miles per hour. The roadway is abutted by numerous residential roads through this segment. Near the middle, it comes to a four-way stop controlled intersection with Cutler's Farm Road. At this point, Cutler's Farm transitions from a Local Road to the south into an Urban Collector to the north. East of Route 111, the speed limit on Purdy Hill Road drops back down to 25 miles per hour. It accesses several more residential roads before coming to a stop where the road terminates at the Minor Arterial Elm Street.

Similar to Spring Hill Road, Purdy Hill Road is another important roadway acting as a cut-through route between the Route 25 and 111 corridors. Purdy Hill Road is also intersected by Cutler's Farm Road providing access to Spring Hill Road to the south and Cross Hill Road and Pepper Street to the north.

2.1.8 Brook Street

Brook Street is a 0.25-mile roadway classified by CTDOT as an urban local roadway connecting Route 25 to the south to Pepper Street to the north. The roadway serves as a short bypass route for traffic traveling between Route 25 south of Green Street and Pepper Street. Brook Street is approximately 18 feet wide along the majority of its length, but widens at either end to provide a double yellow centerline and stop bar at the intersections with Route 25 and Pepper Street. The intersections to Route 25 and Pepper Street are unsignalized with stop control on the Brook Street approach. Brook Street was formerly one-way northbound, but was revised to the current two-way traffic pattern by a recent State construction project. The posted speed limit on Brook Street is 25 miles per hour.

Route 25 at Brook Street Looking North

Brook Street provides access to the rear driveway of a small, two business building to the south and a single-family residence to the north.

2.1.9 Green Street/Pepper Street

Green Street is a short 0.05-mile segment that runs east from the signalized intersection with Route 25 to the junction with Pepper Street to the east. Within the study area, both Green Street and Pepper Street are classified as Minor Arterials by CTDOT. Green Street is approximately 37 feet wide with three 11-foot lanes: one entering lane eastbound and an exclusive left turn and shared through-right turn westbound with 2-foot shoulders. Green Street provides access to the Country Plaza on the southeast corner of the Route 25 intersection.

At the junction with Green Street, Pepper Street splits off and runs north and intersects Route 25 just before the intersection with Route 59. The Pepper Street segment is two-way, but does not have an entrance from Route 25 at the north end. Pepper Street continues northeast from the intersection with Green Street intersecting Old Newtown Road and Cutler's Farm before connecting back to Route 25 north of the study area. Along its length, Pepper Street is approximately 24 feet wide with a travel lane in each direction and narrow shoulders. The posted speed limit is 25 miles per hour.

Green Street at Pepper Street Looking West

Pepper Street provides access to mainly residential neighborhoods to the south and industrial and commercial uses to the north outside of the study area. Similar to Spring Hill Road and Purdy Hill Road, the Pequonnock River Trail intersects Pepper Street just north of Cutler's Farm Road and travels along the roadway before crossing to the west side just north of Northbrook Drive and traveling parallel to Pepper Street before crossing the roadway once again near Cambridge Drive.

Due to the fact that Pepper Street connects to Route 25 in the north and south, it is commonly used as a cut-through route to bypass the Route 25 corridor.

2.1.10 Route 59 (Easton Road)

Easton Road, designated as Connecticut Route 59, is classified by CTDOT as an urban collector roadway in the vicinity of the study area. Easton Road runs east-west beginning at the intersection with Route 25 and runs 0.5 miles west to the Easton Town Line where it becomes Stepney Road and continues southwest through Easton to the intersection with Route 136 (Westport Road) and Sport Hill Road. Easton Road is approximately 30 to 33 feet wide providing a single travel lane in each direction and moderate shoulders. Approaching the Route 25 intersection, the roadway widens to provide an exclusive left, a shared through-left, and an exclusive right turn lane along with a single westbound lane. The posted speed limit is 40 miles per hour.

Easton Road, and Stepney Road to the west, provide access to mainly residential neighborhoods. The Lakewood-Stepney YMCA facility is located approximately 0.25 miles west of Route 25 along Easton Road.

Immediately west of the intersection with Route 25, Hattertown Road, an urban collector road, splits off of Easton Road and heads northwest into Newtown. Hattertown Road accommodates one-way traffic westbound until the intersection with Stanley Road where traffic operations transition to two-way traffic. The posted speed limit is 25 miles per hour along Hattertown Road within the study area. Hattertown Road mainly provides access to residential neighborhoods around the study area.

Route 25 at Route 59 Looking North

2.1.11 Old Mine Road

Old Mine Road is a local road that intersects Route 111 from the east. The roadway has no outlet and only provides access to one small residential neighborhood and Old Mine Park. Old Mine Road is approximately 28 feet wide with a single travel lane in each direction. The Old Mine Road corridor also carries the Pequonnock River Trail on the south side along its length. Old Mine Road intersects Route 111 at an unsignalized intersection with stop control on the Old Mine Road approach only. The Pequonnock River Trail crosses Route 111 on the south leg of this intersection via a painted crosswalk, median island, and pedestrian activated flashing beacons present at the intersection. The posted speed limit on Old Mine Road is 20 miles per hour.

Route 111 at Old Mine Road Looking North

2.1.12 Trefoil Plaza/Woodland Hills/Tennis Club Driveways

Route 111 at Woodland Hills Drive Looking South

Trefoil Plaza, the Woodland Hills Condominium complex, and the Tennis Club of Trumbull driveways intersect Route 111 at unsignalized intersections from the west. The intersections are stop controlled on the driveway approaches only and free flow on Route 111. The Trefoil Plaza driveway curb cut is wide with an exclusive left turn lane and an exclusive right turn lane exiting and a single lane entering. This plaza contains approximately 80,000 square feet of commercial space including two restaurants, a gym, and a pet supply store. The Woodland Hills driveway, located approximately 250 feet north of the Trefoil Plaza driveway, provides a single lane in each direction and is restricted to right in entering and right out exiting traffic only. The posted speed limit along the driveway is 10 mph. The Tennis Club of Trumbull driveway, located 300 feet north of the Woodland Hills driveway, is a single lane in each direction.

2.1.13 United Healthcare Driveway

The driveway to the United Healthcare property intersects Route 111 at a signalized driveway located approximately 150 feet north of the Tennis Club of Trumbull driveway. The driveway provides an exclusive left turn and exclusive right turn lane exiting the site and one entering lane. Route 111 widens at the driveway to provide a southbound left turn lane into the site. The approximately 240,000 square foot development is currently vacant.

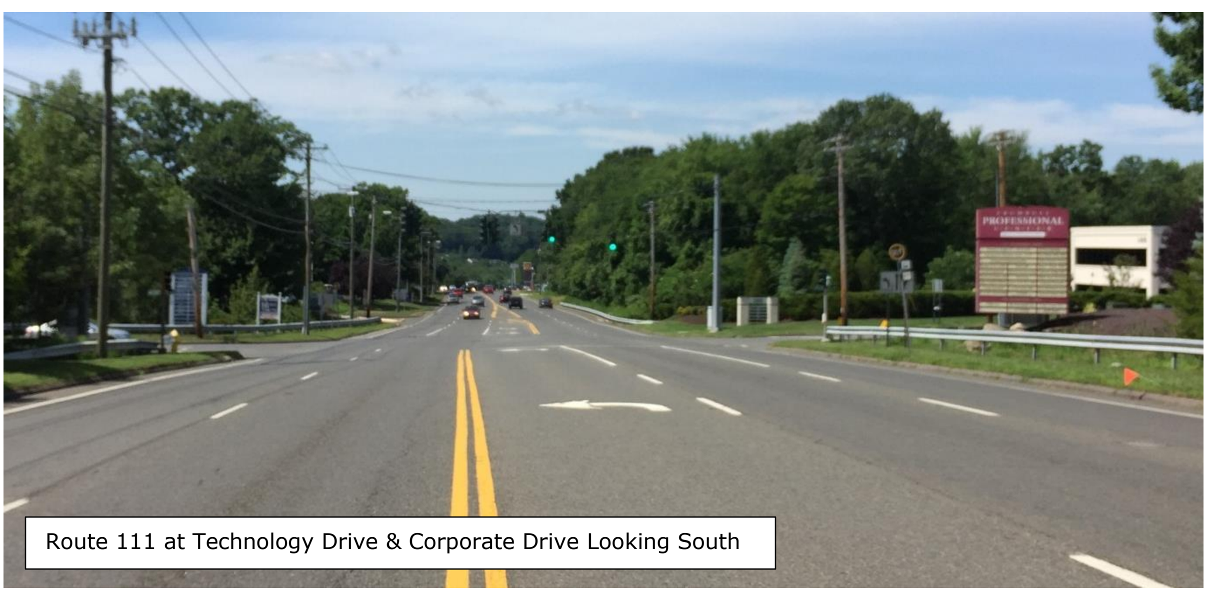
2.1.14 Trefoil Drive/Home Depot Driveway

Trefoil Drive and the driveway to Home Depot intersect Route 111 at a fully signalized intersection. Trefoil Drive is classified as a local road by CTDOT and connects to Spring Hill Road to the west. Trefoil Drive is approximately 36 feet wide with a travel lane in each direction and moderate shoulders. At the intersection with Route 111, Trefoil Drive widens to provide an exclusive left turn lane and shared through-right lane along with a single westbound lane. The speed limit is 25 miles per hour. Trefoil Drive provides access to Trefoil Industrial Park and the industrial properties on Spring Hill Road to the west.

The Home Depot Driveway provides an exclusive left turn and shared through-right lane exiting along with a single entering travel lane. The driveway serves an approximately 150,000 square foot plaza anchored by Home Depot.

2.1.15 Technology Drive/Corporate Drive

Technology Drive and Corporate Drive are local roadways intersecting Route 111 opposite one another approximately 0.3 miles north of the intersection with Trefoil Drive. The intersection is signalized with left turn lanes on both approaches on Route 111 and an exclusive left turn and shared left-through-right lane on the Technology Drive and Corporate Drive approaches. Technology Drive is a single lane in each direction providing access to the approximately 120,000 square foot Trumbull Professional Center development comprised of office and medical office space. Corporate Drive provides a single lane in each direction providing access to the Trefoil Corporate Center including 625,000 square feet of development including office, medical office, warehouse, and manufacturing space.



Route 111 at Technology Drive & Corporate Drive Looking South

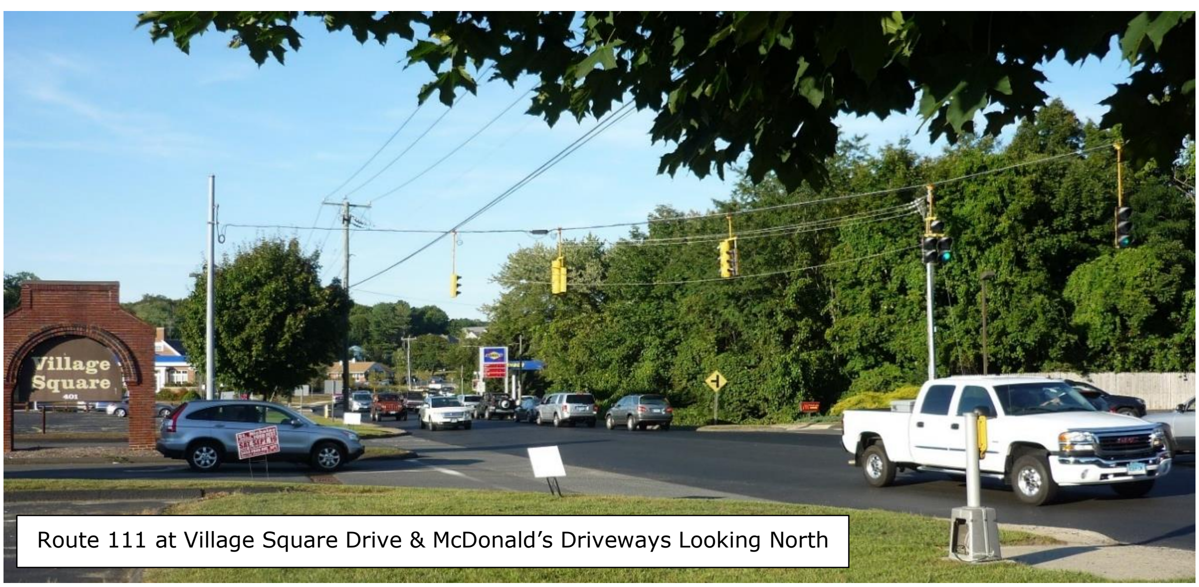
2.1.16 Monroe Elementary School Driveways

Monroe Elementary School is located on the west side of Route 111 approximately 0.5 miles north of the Purdy Hill Road intersection. The school has three driveways along Route 111 at the southern, central, and northern part of the site that are unsignalized with stop control on the school driveway approaches. The southern driveway is a single lane in each direction leading to the rear parking area and allows full access in and out. The center driveway accesses the small parking area in the front of the building on the south end. It allows full access out and restricts northbound left turn traffic to only allow southbound right turns in. The northern driveway is enter-only and also accesses a small parking area in the front of the school and is a one-way access driveway to the parking area in front of the south end of the building. Across and slightly offset from the northern driveway is the driveway for Center One Eleven, a commercial shopping plaza, which provides an exclusive left turn, an exclusive right turn, and single entering lane.

Route 111 at Monroe Elementary School Driveways Looking North

2.1.17 Village Square/McDonald’s Driveways

The Village Square and McDonald’s driveways intersect Route 111 at a signalized intersection approximately 0.25 miles south of the intersection with Elm Street. The Village Square driveway provides a shared through-left and an exclusive right turn lane and two entering lanes and provides access to the approximately 50,000 square foot development. Across from Village Square is the driveway to McDonald’s. The McDonald’s driveway provides a shared through-left lane and an exclusive right turn lane with a single entering lane and only serves the McDonald’s restaurant.



Route 111 at Village Square Drive & McDonald’s Driveways Looking North

2.1.18 Elm Street

Elm Street is classified by CTDOT as an urban minor arterial. The roadway begins to the north of the study area at the intersection with Fan Hill Road and continues south traversing Cross Hill Road and the Route 111 corridor towards the Shelton town line where it becomes Mohegan Road. The roadway is a single lane in each direction with shoulders of varying width for the majority of its length. At the intersection with Route 111, Elm Street widens to provide exclusive right turn lanes along with a shared through-left lane on both the eastbound and westbound approaches. The roadway serves residential neighborhoods almost exclusively with the exception of the area near Route 111 and Good Shepard Church just south of Lovers Lane north of the study area. The posted speed limit is 30 miles per hour.

Route 111 at Elm Street Looking East

2.1.19 Monroe/Comaro Plaza Driveways

The Monroe Plaza and Comaro Plaza driveways intersect Route 111 at a signalized intersection approximately 0.1 miles south of the intersection with Cross Hill Road. The Monroe Plaza driveway is the main driveway to the approximately 80,000 square foot shopping center and provides a shared through-left lane and an exclusive right turn lane exiting and a single entering lane. Opposite the Monroe Plaza Driveway is Comaro Plaza: a smaller shopping center of approximately 33,000 square feet. The Comaro Plaza driveway provides an exclusive left and right turn lane exiting and a single lane entering.

2.1.20 Cross Hill Road

Cross Hill Road is classified as an urban collector by CTDOT. The roadway begins at the intersection with Cutler's Farm Road to the west, crossing Elm Street and Route 111, and continuing east to the intersection with Wheeler Road. The roadway is a single lane in each direction with narrow shoulders of varying width for the majority of its length. At the intersection with Route 111, Cross Hill Road widens to provide exclusive left turn lanes along with a shared through-right lane on both the eastbound and westbound approaches. The roadway serves residential neighborhoods almost exclusively with the exception of the retail and commercial developments along Route 111 and Beardsley Field east of Moose Hill Road east of the study area. The posted speed limit is 30 miles per hour on Cross Hill Road with the exception of the section between Elm Street and Route 111 where it is reduced to 25 miles per hour.

Route 111 at Cross Hill Road Looking North

2.1.21 Century Plaza Driveway

The Century Plaza driveway intersects Route 111 approximately 0.2 miles north of the intersection with Cross Hill Road. The intersection is signalized with the Century Plaza driveway providing exclusive left and right turn lanes, a median, and a single entering lane. Route 111 widens approaching the driveway to provide a northbound left turn lane into the plaza. The plaza contains approximately 85,000 square feet of retail space.

2.1.22 Cutler's Farm Road

Cutler's Farm Road is a north-south roadway located in the study area between the Route 25 and Route 111 corridors. The roadway is classified by CTDOT as an urban local road south of Purdy Hill Road and as an urban collector to the north. Cutler's Farm Road is an important roadway in the network as it connects with several of the cut-through routes between the corridors including where it begins at Pepper Street to the north, Cross Hill Road, Purdy Hill Road, and Spring Hill Road where it ends in the south. Cutler's Farm Road is a single lane in each direction with narrow shoulders along its entire length. The roadway provides access to mainly residential traffic with the exception of some commercial development to the south near the intersection with Spring Hill Road and to the north near Monroe Senior Center and Wolfe Park. The Pequonnock River Trail intersects Cutler's Farm Road at an unsignalized mid-block crossing 150 feet south of the intersection with Pepper Street. The posted speed limit on Cutler's Farm Road is 25 miles per hour.

2.2 Intersection Traffic Control

Within the study area, Route 25 and 111 intersection traffic control is generally signalized at major intersecting roadways and large plaza driveways. Minor roadways and smaller commercial driveways are typically unsignalized with stop control on the minor side-street approaches. The study area features 17 signalized intersections and 10 key unsignalized intersections which are illustrated in Figure 2-1 following page 2-1 and in Table 2-1 in Appendix B.

The majority of the traffic control signals along Routes 25 and 111 operate in one of three time based coordination systems owned and operated by CTDOT. Each system functions to provide coordination between several intersections to promote efficient traffic operations along the corridors. One system includes the intersections of Route 25 with Green Street and Route 59 (Easton Road). Another coordinates the Route 111 intersections with the United Healthcare Driveway, Trefoil Drive/Home Depot, Technology/Corporate Drive, Spring Hill Road, and Purdy Hill Road. The third system controls the intersections of Route 111 with Village Square/McDonald’s, Elm Street, Monroe/Comaro Plazas, Cross Hill Road, and Century Plaza.

The Route 25 intersections with Route 111, Tashua Road, Spring Hill Road, Victoria Drive, and Judd/Purdy Hill Road operate with uncoordinated traffic signals. However, the Tashua and Spring Hill Road signals operate with one traffic signal controller in a cluster intersection configuration. The cluster intersection operation allows for coordination of side street and main line movements for closely spaced intersections that would not allow efficient progression under separate coordinated operation.

Traffic signal control settings including coordination system signal settings related to cycle lengths, time of day signal patterns, and traffic control signal phasing information was obtained from CTDOT. These settings were utilized in the traffic model to analyze existing traffic control signal operations. The results of the analysis are summarized in Section 2.7 – Existing Traffic Operations. Copies of the traffic signal plans for each of the 17 signalized intersections are provided in Appendix D.

Currently, no intersections within the Route 25 and 111 corridors provide a pedestrian push button actuated exclusive pedestrian phase. Instead, all of the signals are equipped with pedestrian push buttons to actuate the minor street (side street) pedestrian clearance time to allow pedestrians to cross concurrently with side street vehicular traffic. Opportunities to improve access and accommodations for pedestrians along the corridors were identified as part of this study. Further detail on the existing pedestrian accommodations within the study area is provided in Section 2.9 – Alternative Travel Modes.

The unsignalized intersections along Route 25 and Route 111 within the study area and the Spring Hill Road intersection with Cutler’s Farm Road are two-way stop controlled. Two-way stop controlled intersections have stop control on the side street or minor approaches while the main line remains uncontrolled. The Purdy Hill Road at Cutler’s Farm Road is all-way stop where vehicles on all approaches are required to stop before proceeding through the intersection.

2.3 Traffic Sign Inventory

A traffic sign inventory was collected along Route 25 and Route 111 to record the traffic control signage along the corridors and conduct an assessment of the condition of the signs including a qualitative assessment of the effectiveness of the signage with respect to visibility for motorists. A comprehensive signage inventory was compiled and delivered in geographic information system (GIS) format. Signs located along the expressway portion of Route 25 were not included in the inventory as there was an ongoing project (#0144-0193) to update the signing in that area. Additionally, signage on Route 111 in the vicinity of Ryegate Terrace was not inventoried due to an ongoing bridge replacement project (State Project No. 0084-0106) which replaced existing signage.

The majority of the signage was observed to be in satisfactory condition with good retroreflectivity. This was based on visual observations only. The signs that were observed to be in poor condition or those with obscured views were noted in the GIS database. The following provides a brief summary on some of the deficiencies:

- Regulatory and directional signage including intersection warning, speed limit, passing zone, lane merge, and Route 25/111 directional signage in areas that have not be recently reconstructed

- Lane use signs approaching several intersections focused on areas that have not been recently improved

- Driveway do not enter, stop, and turn restriction signage at select driveway locations (particularly for older developments)

- Street name signs along both corridors have text height below standards and are in poor condition

Due to the fact that Routes 25 and 111 are State Routes, signage along these roadways, as well as on Route 59, is owned and maintained by CTDOT. Signage on the local roadways is owned and maintained by the towns in which they are located. Key roadways such as Old Mine Road, Trefoil Drive, Technology Drive, Corporate Drive, and the western portion of Spring Hill Road are overseen by the Town of Trumbull. The Town of Monroe maintains signage on Victoria Drive, Judd Road, Purdy Hill Road, Brook Street, Green Street, Cross Hill Road, Elm Street, and the eastern portion of Spring Hill Road. Signage on the private driveways, including Trefoil Plaza, Woodland Hills Drive, Tennis Club of Trumbull, United Healthcare, Home Depot, Monroe Elementary School, Village Square, McDonald's, Monroe Plaza, Comaro Plaza, and Century Plaza is owned and maintained by the property owners.

2.4 Traffic Volumes

2.4.1 Historic and Current Traffic Volumes

Available historic traffic volume data was obtained from CTDOT. In addition, an extensive traffic counting program was conducted to supplement the available data. Data sources included:

- CTDOT triennial 24-hour continuous automatic traffic recorder (ATR) data between 1998 and 2013. The most recent count year for the Towns was 2013 with most stations utilized to collect data. CTDOT did not conduct these regularly scheduled counts in Monroe and Trumbull in 2016.
- Manual turning movement counts at the 27 study area intersections in April and May 2016 as part of the Study data collection effort. Raw data is included in Appendix E.
- ATR counts at 4 locations along Route 25, 3 locations along Route 111, and 5 locations on the connecting side streets in April 2016 as part of the Study data collection effort. Raw data is included in Appendix E.

A review of the historic average daily traffic (ADT) volume data collected indicates daily traffic volumes along Routes 25 and 111 peaked around 2008 before the economic recession and began to decline. In some cases, this decline was significant. Route 111 started to recover in 2010 while Route 25 traffic volumes began to increase again in 2013. Volumes have since returned to their approximate levels prior to the recession. The ADT information is summarized in Figures 2-2 through 2-5 can be found in Appendix A. Figures 2-2 and 2-3 show the change in average daily traffic at multiple count locations in the study area. Figure 2-4 illustrates the daily traffic volume recorded along various side street study area roadways during the 2016 study data collection phase. Figure 2-5 illustrates the 2016 Average Daily Traffic Volumes at count locations throughout the study area.

Table 2-2 in Appendix B summarizes the weekday and Saturday ADT data at select locations along the Route 25 and 111 corridors and the connecting side roads. The previously referenced Figure 2-5 depicts much of this ADT data on a diagram of the overall study area. The table provides the average daily traffic at each location. Additionally, it shows peak hour traffic with directional distributions and the peak hour "K" factor for the morning, afternoon, and Saturday midday peaks. The "K" factor is calculated by determining the percentage of the total ADT that occurs during the peak hour period and is used to indicate the relative intensity of the peak hour volume with respect to the balance of the average daily traffic.

A review of Table 2-2 indicates that Route 25 typically has more weekday ADT than Route 111. The largest ADT in the study area, over 37,000 vehicles per day, occurs on the Route 25 expressway just south of the intersection with Route 111. North of the Route 111 intersection, the Route 25 the ADT drops to approximately 26,500 vehicles per day and continuously decreases to about 19,000 vehicles per day total southeast of Green Street. Past the Route 59 intersection, volumes on Route 25 rise to just above 20,000 vehicles per day. The "K" factors of 7-9% suggest that commuter traffic volume is consistent with regional travel routes. The directional distribution along the Route 25 corridor is typically 0-6% higher southbound in the morning and northbound in the afternoon. Saturday volumes are similar to the weekday volumes north of Route 111 with more even directional distributions.

The largest ADT on Route 111 occurs just north of the intersection with Route 25. The volume of 25,700 vehicles per day is over 12,000 higher than that south of the Route 25 intersection as the Route 25 expressway draws a significant portion of the traffic volume. ADT steadily declines traveling north through the corridor to approximately 14,500 vehicles north of the study area. Similar to Route 25, "K" factors for the corridor are between 7-9% during all three peaks showing an amount of commuter traffic consistent for regional routes. Directional distribution is skewed 5-10% along the corridor with more southbound traffic in the morning and northbound traffic in the afternoon representing the commuter trips during the peaks.

In addition to the Route 25/111 corridors, ADT data was also collected for Spring Hill Road, Purdy Hill Road, and Cutler's Farm Road. Stations were placed near the outlets onto Routes 25 and 111 for Spring and Purdy Hill Road and on the northern part of Cutler's Farm Road north of its intersection with Purdy Hill road. ADT volumes for the roadways were around 4,000-5,000 at all locations with the exception of Spring Hill Road west of Route 111 where it was approximately 1,300. "K" factors were 8-11% suggesting a consistent amount of commuter traffic for local roadways. Directional distribution shows volumes mainly focused on accessing the Route 25/11 corridors in the morning and departing them in the afternoon. The exception is Spring Hill Road where the distribution is closer to even with commuters traveling to the industrial/commercial uses along the roadway. Saturday volumes are similar to the weekday values with more balanced directional distributions suggesting more retail/commercial trips.

2.4.2 2016 Existing Traffic Volumes

In order to establish the 2016 Existing Traffic Volumes, the intersection turning movement data was analyzed and balanced between the study area intersections utilizing the ATR data for each of the three peak periods. The balanced peak hour traffic volumes are illustrated on Figures 2-6 through 2-10 in Appendix A for the weekday morning, weekday afternoon, and Saturday peak periods.

2.4.3 Regional Traffic Patterns

A detailed review of the existing travel patterns along the Route 25/111 corridors provided in the previous sections reveals that in addition to the heavy regional traffic flow, the corridors also receive significant traffic volume from the intersecting roadways accessing points to the west. Spring Hill Road, Trefoil Drive, Purdy Hill Road, Elm Street, Cross Hill Road, Pepper Street, and the other roadways that connect them provide significant opportunity to bypass the main line Route 25 and 111 corridors during congested periods.

In order to quantify the volume of cut-through traffic currently using the side streets to travel between the Route 25 and 111 corridors, an origin and destination (O&D) survey was conducted. The O&D survey recorded vehicle license plates and tracked them between the two corridors at key points to determine the volume of traffic using these streets as a cut-through route. The O&D survey was conducted during the weekday morning peak from 7:00 to 9:00 AM and the afternoon peak from 4:00 PM to 6:00 PM. Figures 2-11 to 2-14 in Appendix A highlight the key cut-through traffic paths and volumes observed in the O&D study by peak hour and direction. The full O&D data set, including volumes between all observation points, is included in Appendix E.

As shown in Figures 2-11 to 2-14, a significant amount of traffic travels between the Route 25 and 111 corridors during the peak periods. In the morning peak hour, vehicles traveling eastbound from Route 25 to Route 111 account for 56%, 60%, and 72% of the total traffic on Purdy Hill Road, Spring Hill Road, and Pepper Street, respectively. In the afternoon peak hour, the percentages for Spring Hill Road and Purdy Hill Road increase to approximately 75% and the percentage entering Pepper Street is reduced to approximately 43%. Reviewing vehicles entering the Route 111 corridor shows that 25-44% of the total volume of the side streets in the morning peak hour and 35-60% in the afternoon peak hour originate from Route 111 depending on the route.

Reviewing the westbound vehicles traveling from Route 111 to Route 25 via the side streets reveals similar patterns to the eastbound routes. In the morning peak hour, 48%, 69%, and 61% of the traffic on Spring Hill, Purdy Hill and Cross Hill are destined for Route 25, respectively. In the afternoon peak hour, 52%, 58%, and 42% of the traffic on these routes departing from Route 111 are destined for Route 25. Reviewing vehicles entering the Route 25 corridor shows that 56-74% of the total volume on the side streets in the morning peak hour and 29-58% in the afternoon peak hour originate from Route 111 depending on the route.

The trends from the O&D study show that a significant portion of traffic within the study area utilizes the side streets to bypass the state highways. Vehicles traveling between the corridors utilize the side streets for faster travel times, shorter travel distances, and to avoid congestion along the main lines. This information was considered in later phases of the project when discussing the potential for improvements to the main lines to reduce traffic congestion and become more attractive to travelers or when considering improvements to specific side streets to facilitate safer and more efficient travel between the corridors and focusing traffic away from sensitive areas and neighborhoods.

2.5 Vehicle Travel Time

A vehicle travel time study was conducted along Routes 25 and 111 in order to measure the average travel time to traverse the study corridors during the weekday morning peak (7:00 – 9:00 AM), weekday afternoon peak (4:00 – 6:00 PM), and Saturday midday peak (11:00 AM – 1:00 PM). Travel time data was recorded three times per travel direction during each of the three peak periods in June 2016. The average travel time between intersections, traffic signal related delay at each intersection, and average travel speed per segment are presented graphically in Figures 2-15 through 2-18 in Appendix A and summarized in tabular format in Appendix F.

The travel time study revealed that the greatest delays occurred for Route 25 northbound traffic during the morning peak and southbound traffic during the afternoon peak. Northbound traffic in the morning peak hour experienced travel times of nearly 13 minutes to traverse the study area with average speeds of 17 miles per hour. The most significant delay occurred between the intersection of Purdy Hill Road/Judd Road and Green Street due to a significant queue resulting from the Green Street signal. In the afternoon peak hour, travel time for southbound traffic was approximately 10 minutes with average speeds of 19 miles per hour. The most significant delay occurred entering the study area from the north at the Route 59 intersection. Saturday peak travel times were significantly shorter at approximately 8 minutes with speeds of 27 and 29 mph for the northbound and southbound traffic, respectively.

A review of the Route 25 time-space diagram indicates good progression for the majority of the corridor with the exception of the segment from Purdy Hill Road/Judd Road through the end of the study area at Route 59. Good progression is illustrated by the plotted line having a steep vertical orientation representing a higher travel speed.

The Route 111 travel time study showed the largest delays for northbound traffic occurred in the afternoon peak and for southbound traffic during the Saturday peak. Travel time for Route 111 northbound traffic was consistent across the peak hours with travel times of 9-10 minutes and average travel speeds of 18-19 miles per hour. The most significant delays occurred at the Route 111 and Elm Street intersection. For southbound traffic, travel times in the morning and afternoon peak hours were 10 minutes and 11 minutes with average speeds of 17.5 and 15 miles per hour, respectively. During the Saturday peak hour, significant delays were present for southbound traffic approaching the Route 25 intersection caused by long queues for the single shared through-right lane.

Similar to Route 25, a review of the Route 111 time-space diagrams indicates good progression for the majority of the corridor with the exception of the delay to traverse the Route 25 intersection.

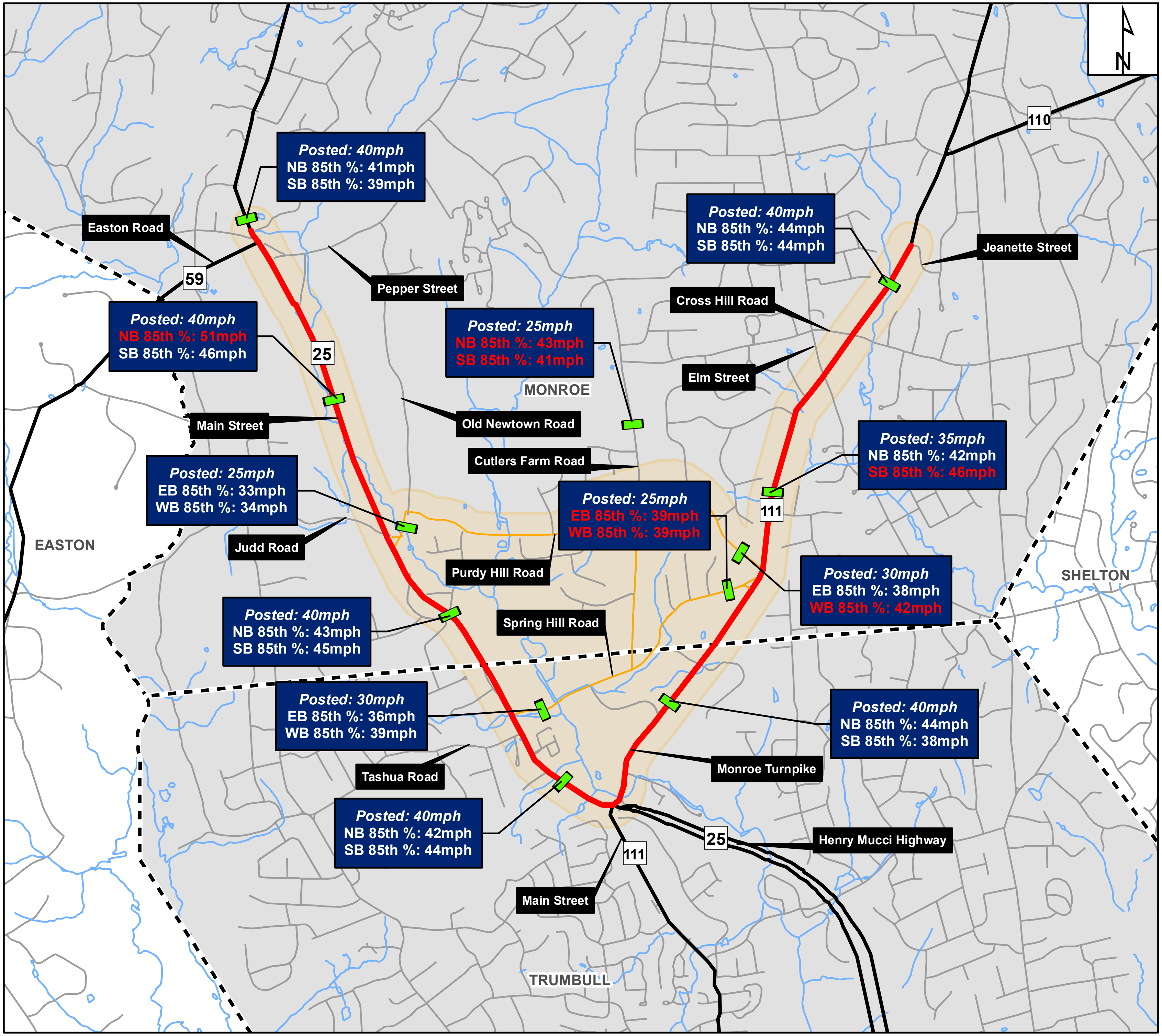
2.6 Travel Speed

Travel speed data was collected along Routes 25 and 111 in the study area using Automatic Traffic Recorders (ATRs). The data was recorded during April and May 2016. Figure 2-19 on the following page and Table 2-3 in Appendix B summarize the results of the speed observations within the study area with operating speeds and/or 85th percentile speeds that exceed the posted speed limit by 10 miles per hour or more highlighted in red. Raw speed data is provided with the ATR data included in Appendix E.

Along Route 25, average travel speeds were less than the posted speed limit of 40 miles per hour by up to 6 mph with the exception of the segment between Stepney Plaza and Brook Street. Along this segment, higher average speeds occur due to the fact that there is limited development and no traffic signals allowing for higher operating speeds without congestion or friction from driveways. The 85th percentile speed, also known as the operating speed and the speed at which 85% of all traffic is travelling at or below, was within 6 miles per hour of the posted speed with the exception of the same Stepney Plaza and Brook Street segment where the northbound 85th speed is 51 miles per hour.

Average speeds along Route 111 were generally at or below the posted speed limit of 35 or 40 miles per hour. The average speed was a maximum of 6 miles per hour over the speed limit of 35 miles per hour for southbound traffic just south of Monroe Elementary School due to the straight geometry of the roadway and limited development in the area. Similarly, the 85th speed along Route 111 was within 4 miles per hour of the speed limit with the exception of the school area with speeds of 42 and 46 miles per hour northbound and southbound, respectively, in the 35 mile per hour zone.

Speed data was also collected for Spring Hill Road, Purdy Hill Road, and Cutler's Farm Road. Along Spring Hill Road, average and 85th percentile speeds on the west end were 2-4 miles per hour and 6-9 miles per hour over the speed limit of 30 miles per hour, respectively. Speeds were significantly higher on the east end where average travel speeds were 10 miles per hour over and 85th speeds were 14 over the speed limit of 25 miles per hour in both directions. The discrepancy is due to the roadway geometry which is straighter on the east end and the intensity of commercial development which is focused on the west end. On Purdy Hill Road, average and 85th speeds were within 8 miles per hour of the 25-30 mile per hour speed limit with the exception of westbound traffic on the east end which was 12 miles per hour over the 30 mile per hour limit. Speeds on Cutler's Farm Road were significantly higher than the posted speed limit of 25 miles per hour with



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LEGEND

- Observation Location
- Study Area
- Study Area State Route
- Study Area Local Road
- State Route
- Local Road

Red Text indicates 85th Percentile Speed exceeds Posted Speed Limit by ≥ 10mph

Source:
Speed Data by Tighe & Bond, April-May 2016

0 1,500 3,000
Feet
1 " = 3,000 '

Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut

October 2016

TRAVEL SPEED OBERVATIONS

FIGURE 2-19

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C-1106

average travel speeds of 39 and 37 miles per hour and 85th speeds of 43 and 41 miles per hour for northbound and southbound traffic, respectively. The speed discrepancy is due to the straight geometry, mainly residential developments, and low speed limit of 25 miles per hour.

2.7 Existing Traffic Operations

Traffic operations were evaluated for the study area intersections during the weekday morning, weekday afternoon, and Saturday midday peak hours. Capacity and queue analyses were conducted using Trafficware's *Synchro plus SimTraffic 9 – Traffic Signal Coordination Software,* based on the *2010 Highway Capacity Manual (HCM)* methodology.

An intersection's qualitative operational condition is described by the HCM in terms of average control delay per vehicle and volume to capacity (v/c) ratio. Average control delay is measured in seconds of delay that occurs at an intersection per vehicle due to the traffic control. The v/c ratio is a measurement of the volume of particular traffic movement or approach in comparison with the capacity of the movement/approach. A v/c ratio closer to zero represents that the approach has significant capacity remaining while approaches with v/c values approaching or exceeding 1.0 indicate that the approach is near or at capacity and not able to accommodate the traffic flow.

Together, the average control delay and v/c ratio are combined to assign a Level of Service (LOS) to a particular intersection or intersection approach movement. LOS is defined by HCM using average control delay and v/c to assign letter grades A through F to indicate the efficiency of the traffic control at an intersection. The definitions of the letter grades in terms of average control delay and v/c are provided in the table below.

Level of Service	**Signalized Intersection Criteria** Average Control Delay (Seconds per Vehicle)	**Unsignalized Intersection Criteria** Average Control Delay (Seconds per Vehicle)	**V/C Ratio >1.00[a]**
A	≤10	≤10	F
B	>10 and ≤20	>10 and ≤15	F
C	>20 and ≤35	>15 and ≤25	F
D	>35 and ≤55	>25 and ≤35	F
E	>55 and ≤80	>35 and ≤50	F
F	>80	>50	F

Note: [a]For approach-based and intersection-wide assessments, LOS is defined solely by control delay.

Source: *HCM2010: Highway Capacity Manual.* Washington, D.C.: Transportation Research Board, 2010. Pages 18-6 and 19-2.

In general, intersections that exhibit LOS A or B are considered to have excellent to good operating conditions with little congestion or delay. LOS C indicates an intersection with acceptable operations. LOS D indicates an intersection that has tolerable operations with average delays approaching one minute. Intersections with Levels of Service E and F are operating with poor or failing conditions and typically warrant a more thorough review and possible improvement to mitigate the capacity issues. Improvements can include geometric, lane use, timing modifications, or a different form of traffic control to mitigate the operational issues and reduce average delay. In the context of this planning process, during the analyses of both existing and future conditions, intersections exhibiting LOS E and F were identified for further analysis and potential improvements to mitigate poor or failing operations.

In addition to LOS, the HCM methodology also allows for the calculation of queues. Queues are the expected length of vehicles waiting at an intersection due to the delay incurred by the traffic control. The 50th percentile queues, or average queues, are the average length of vehicle queues expected on an approach at any given time. The 95th percentile, or design queues, are the maximum expected queues on a given approach.

Figure 2-20 on the following page presents a visual representation of the overall signalized intersection LOS and unsignalized approach LOS results on a study area map with the LOS color coded by letter while Tables 2-4 to 2-7 in Appendix B summarize the intersection operations in terms of LOS, v/c ratio, and queues at the study area intersections for the 2016 Existing Conditions. Within the tables, intersections, approaches, and/or movements operating at LOS E and LOS F have been highlighted yellow and red, respectively. Existing Conditions capacity analysis worksheets are included in Appendix G.

2.7.1 2016 Weekday Morning Peak Hour Operations

During the morning peak hour, the study area intersections operate at overall LOS D or better with the exception of the Route 25 at Route 59 intersection which operates at LOS E. As observed in the field and observed in the travel time study, the most significant delays are focused on the Route 25 intersections with Route 111, Judd Road/Purdy Hill Road, and Route 59. Throughout the corridors, longer delays occur on the side streets as vehicles are trying to access the corridors for regional travel.

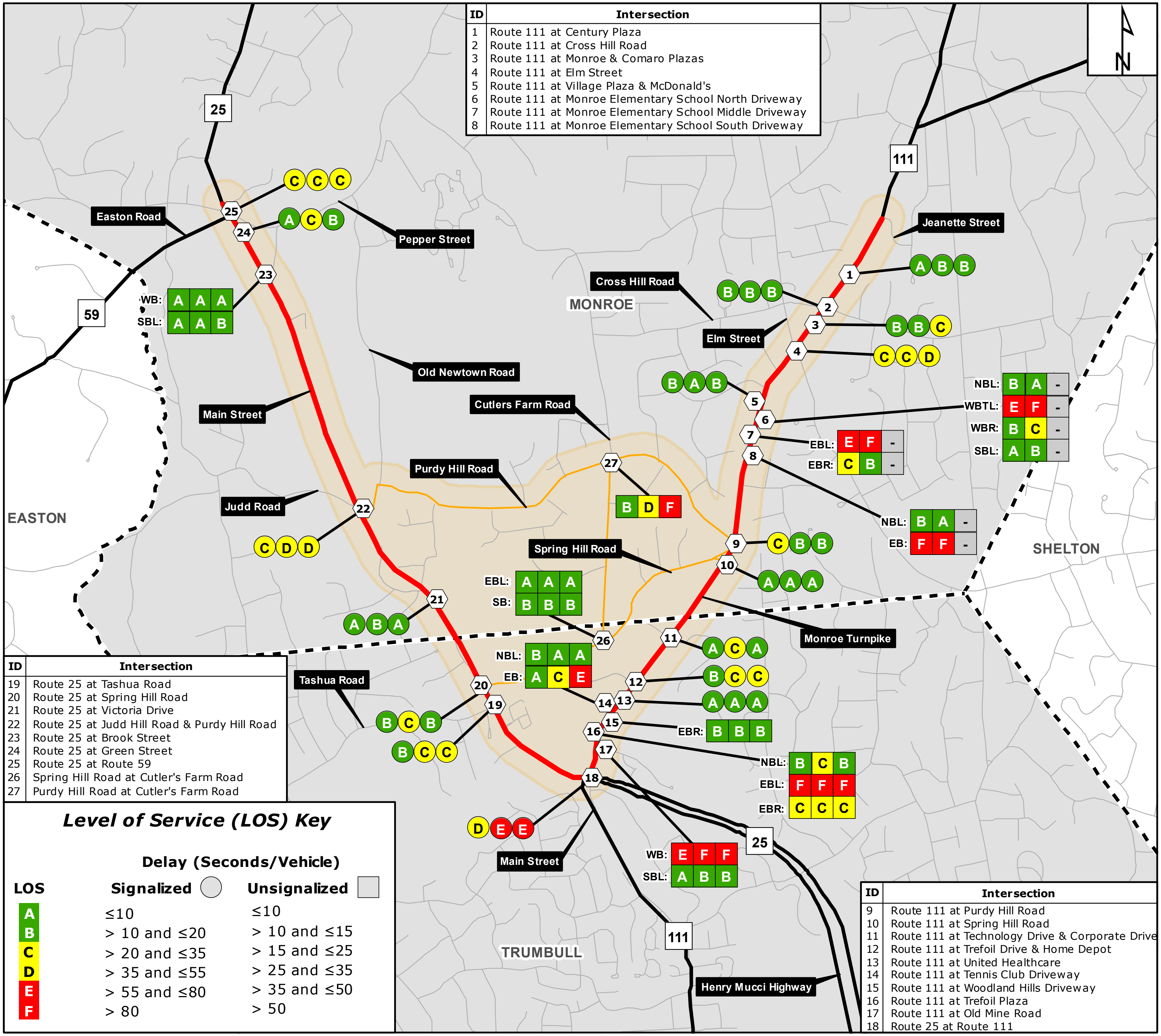
2.7.2 2016 Weekday Afternoon Peak Hour Operations

Similar to the weekday morning peak hour, the afternoon peak hour's most significant delays are focused along Route 25 at the intersections with Route 111, Judd Road/Purdy Hill Road, and Route 59. Route 111 operations have select approaches which operate over capacity that are mainly focused on the side street movements accessing the corridor for regional travel.

2.7.3 2016 Saturday Midday Peak Hour Operations

During the Saturday midday peak hour, the study area intersections operate at LOS D or better with the exception of the LOS F operation at the Route 25 and Route 111 intersection. The most significant delays occur at the Route 25/111 intersection as well as at shopping centers along the corridor which attract Saturday retail traffic.

During the peak periods, the overall LOS computed by the analysis software is slightly better than the actual field-observed conditions as delays from the over-capacity intersections propagate through the network. The congestion created by vehicle queues extended beyond available storage and blocking main line through movements results in additional delay higher than that reported by the capacity analysis.



ID	Intersection
1	Route 111 at Century Plaza
2	Route 111 at Cross Hill Road
3	Route 111 at Monroe & Comaro Plazas
4	Route 111 at Elm Street
5	Route 111 at Village Plaza & McDonald's
6	Route 111 at Monroe Elementary School North Driveway
7	Route 111 at Monroe Elementary School Middle Driveway
8	Route 111 at Monroe Elementary School South Driveway

ID	Intersection
9	Route 111 at Purdy Hill Road
10	Route 111 at Spring Hill Road
11	Route 111 at Technology Drive & Corporate Drive
12	Route 111 at Trefoil Drive & Home Depot
13	Route 111 at United Healthcare
14	Route 111 at Tennis Club Driveway
15	Route 111 at Woodland Hills Driveway
16	Route 111 at Trefoil Plaza
17	Route 111 at Old Mine Road
18	Route 25 at Route 111

ID	Intersection
19	Route 25 at Tashua Road
20	Route 25 at Spring Hill Road
21	Route 25 at Victoria Drive
22	Route 25 at Judd Hill Road & Purdy Hill Road
23	Route 25 at Brook Street
24	Route 25 at Green Street
25	Route 25 at Route 59
26	Spring Hill Road at Cutler's Farm Road
27	Purdy Hill Road at Cutler's Farm Road

Level of Service (LOS) Key

LOS	Delay (Seconds/Vehicle) Signalized	Unsignalized
A	≤10	≤10
B	> 10 and ≤20	> 10 and ≤15
C	> 20 and ≤35	> 15 and ≤25
D	> 35 and ≤55	> 25 and ≤35
E	> 55 and ≤80	> 35 and ≤50
F	> 80	> 50

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LEGEND

- Study Area
- Study Area State Route
- Study Area Local Road
- State Route
- Local Road
- 1 Intersection ID Number
- AM PM SAT Signalized LOS
- AM PM SAT Unsignalized LOS

0 1,500 3,000
Feet
1 " = 3,000 '

Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut

August 2017

2016 EXISTING TRAFFIC OPERATIONS

FIGURE 2-20

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2.8 Traffic Safety

Motor vehicle collision history data for the Route 25 and 111 corridors was collected from CTDOT and the Monroe and Trumbull Police Departments for the latest six-year period of available data between January 1, 2009 and December 31, 2014. Figure 2-21 on the following page shows a graphical summary of the collisions along the corridors and at the study area intersections. Further details for each corridor and select intersections with high collision rates are provided in the following sections. Tables 2-8 through 2-15 referenced in this section can be found in Appendix B. Summaries and detailed collision history at each individual intersection are included in Appendix H.

2.8.1 Route 25

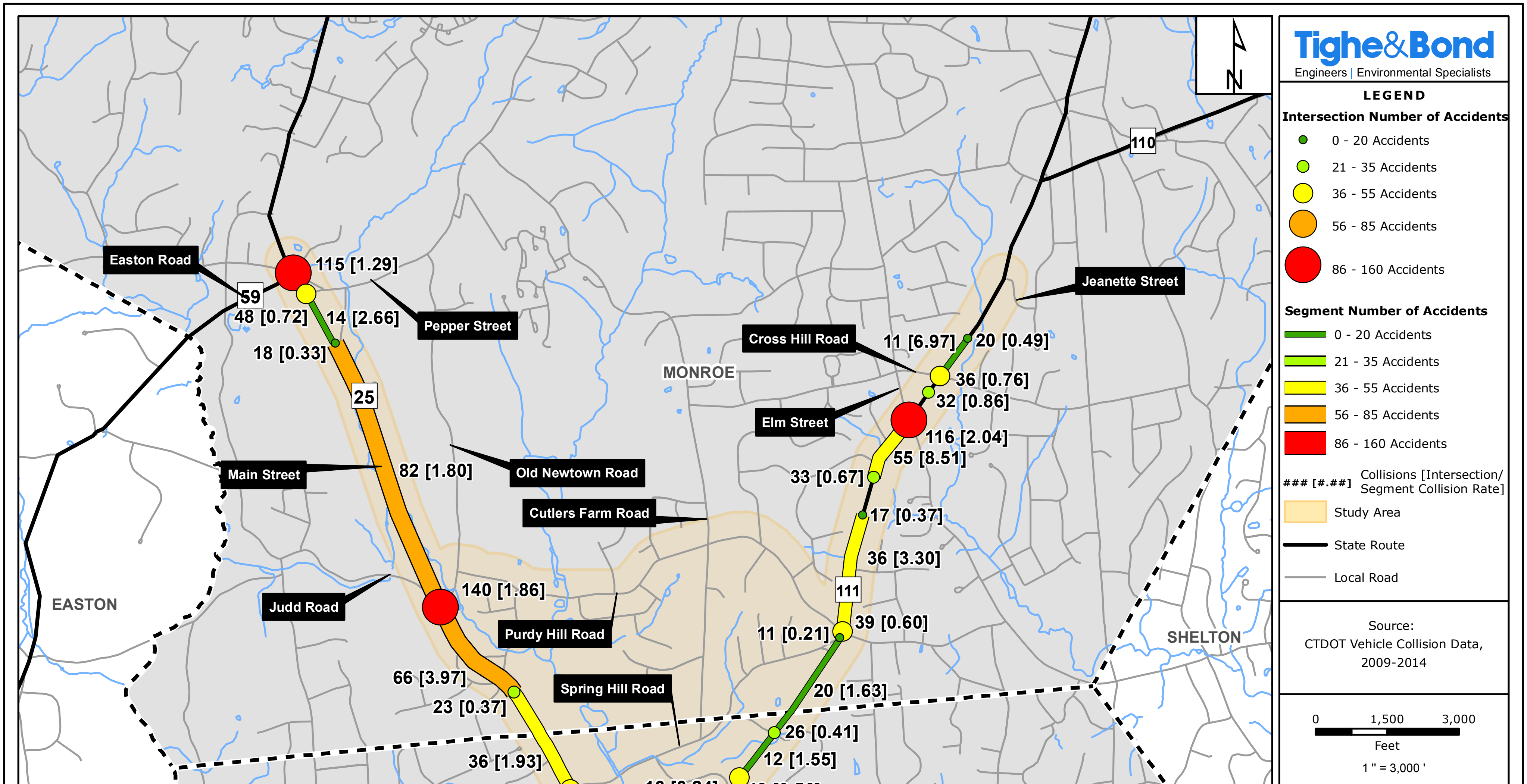
Table 2-8 summarizes the number and type of collisions recorded along Route 25 within the study area from 2009 through 2014. During this six-year period, 854 crashes were reported. Rear-end type collisions were the most common type of collision with 554 crashes accounting for almost two-thirds of the total (65%) recorded. The second most common type of collision was turning - intersecting paths with 62 crashes (7%). Following that was turning – opposite directions with 52 crashes (6%) and fixed object with 48 crashes (6%). The remaining collision types accounted for 5% or less of the total number of crashes.

The most common contributing factor was drivers following too closely accounting for well over half of collisions with 524 crashes (61%) recorded over the six-year period. The second most common contributing factor was drivers failing to grant right of way (ROW) with 96 crashes (11%). The remaining contributing factors accounted for 6% or less of the total collisions. Table 2-9 summarizes the contributing factors for the Route 25 collisions.

One fatality occurred resulting from a vehicle colliding with the median divider caused by a sideswipe collision at the Route 25 intersection with Route 111. A total of 227 crashes (27%) reported injuries while the remaining 626 collisions (73%) were categorized as Property Damage Only. Table 2-10 summarizes the collision severity data along Route 25.

Table 2-11 summarizes the Route 25 collisions by intersection. As shown, the intersections with Route 111, Judd Road/Purdy Hill Road, and Route 59 experienced the most collisions with 156 crashes (approx. 26 per year), 140 crashes (approx. 23 per year), and 115 crashes (approx. 19 per year), respectively. The remaining study area intersections experienced rates of less than 8 collisions per year. Crashes occurring at the Route 111, Judd/Purdy Hill Road, and Route 59 intersections are depicted graphically on collision diagrams in Appendix A shown in Figures 2-22 to 2-24, respectively. The collision diagrams facilitate the identification of collision patterns that are occurring at a given location.

As shown in Figure 2-22, the Route 25 and Route 111 intersection experienced a significant amount of rear-end collisions. A total of 109 rear-end collisions, 70% of the total, were reported with the majority occurring on the Route 25 expressway approach. High rear-end collision rates are common at signalized intersections with significant traffic congestion such as the Route 25 and 111 intersection and the transition from expressway to secondary roadway further exacerbates the likelihood of rear-end collisions. Sideswipe collisions were the second most common type at the intersection and were again focused on the Route 25 expressway approach totaling 15 crashes (10%) at the intersection. These sideswipes were likely caused by vehicles changing lanes as Route 25 widens to provide



Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut

March 2017

VEHICLE COLLISION HISTORY (2009 - 2014)

FIGURE 2-21

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C-1106

exclusive left and right turn lanes. Additionally, some sideswipes are noted on the west leg of the intersection for westbound vehicles where the two travel lanes merge into one. Turning movement collisions, including those with intersecting paths, same direction turns, and opposite direction turns, accounted for 18 crashes (12%). Among the 156 crashes, there was one fatality and 35 injuries (22%) with the remainder being property damage only.

The Route 25 intersection with Judd Road and Purdy Hill Road also experienced a high rate of rear-end collisions at 93 of the 138 collisions (67%) as shown in Figure 2-23. The vast majority of these were along Route 25 and likely occurred due to congestion. The second most common type of collision involved turning vehicles: namely vehicles with intersecting paths and opposite direction turns. Turning collisions totaled 27 crashes (19% of the total crashes at the intersection). As shown in the collision diagram, these turning movement collisions can be attributed to the commercial driveway proximate to the intersection and the skewed geometry of the Judd Road and Purdy Hill Road approaches. Sideswipes were the third most common type of collision accounting for 10 (7%) of crashes. No fatalities occurred at this intersection, but there were 30 injuries (22%).

Figure 2-24 illustrates the 115 collisions that occurred at the Route 25 and Route 59 intersection. In total, 65 of 115 crashes (57%) were classified as rear-ends and occurred on all major intersection approaches focused on Route 25 northbound and southbound. High turning volumes at this intersection resulted in 30 turning type collisions (26% of total intersection crashes). Sideswipes were the third most common collision with 8 crashes (7%). Most occurred between northbound vehicles traveling the same direction where Route 25 widens into three lanes before the intersection. The majority of the collisions at the intersection were property damage only with 29 collisions involving injuries (25%) and no fatalities.

2.8.2 Route 111

Table 2-12 summarizes the number and type of collisions recorded within the study area along the Route 111 corridor. During this six-year period from 2009 to 2014, 726 collisions were reported. It is important to note that incidents that occurred at the Route 25 and 111 intersection were included in the results for each corridor.

The most common type of collision along the Route 111 corridor was rear-end type accounting for over half of the total with 421 crashes (58%) recorded. The second most common type of collision was turning - intersecting paths with 79 crashes (11%). Following that was sideswipe – same direction with 55 crashes (8%) and turning – opposite direction with 45 crashes (6%). All other types of collisions accounted for less than 5% of the total number of crashes each.

Following too closely was the most common contributing factor to collisions. It contributed to over half of collisions at 398 crashes (55%) recorded over the six-year period. The second most common contributing factor was drivers failing to grant ROW with 87 crashes (12%). Each of the remaining contributing factors did not exceed 7% of the total collisions. Table 2-13 summarizes the contributing factors.

Two fatal crashes were recorded amongst the collisions on the Route 111 corridor. As stated in the Route 25 section, one of the fatalities occurred at the Route 25 at Route 111 intersection due to a sideswipe collision. The second fatality occurred in the area of the Route 111 at Northwood Road intersection due to a head-on collision between a northbound and southbound vehicle caused by one of the drivers losing control. A total of 183 crashes (25%) reported injuries while the remaining 540 collisions (75%) were categorized as property damage only. Table 2-14 summarizes the collision severity data along Route 111.

Table 2-15 summarizes the Route 111 collisions by intersection. As previously stated, the Route 25 intersection experienced the highest collision rate with 156 crashes (approx. 26 per year). The second highest amount of collisions occurred at the Elm Street intersection with 116 crashes (approx. 19 per year). Crashes occurring at the Route 111 and Elm Street intersection were depicted graphically on collision diagrams shown in Figure 2-25 in Appendix A to identify collision patterns. The Route 25 at Route 111 intersection collision diagram was summarized in the previous section.

As shown in Figure 2-25, all approaches of the Route 111 intersection with Elm Street experienced a large number of rear-end collisions at 74 of the 109 total intersection crashes (68%). Turning type collisions, particularly those involving intersecting paths and opposite direction turns, accounted for the second most common collision with 22 crashes (20%). Sideswipes and angle type collisions occurred 5 times each (5%) and were the third most common collision type. The majority of the collisions at the intersection were property damage only with 23 collisions involving injuries (21%) and no fatalities reported.

In summary, the collision data for both corridors indicates that the Route 25 intersections with Route 111, Judd Road/Purdy Hill Road, and Route 59 and the Route 111 intersection with Elm Street should be evaluated with respect to identifying opportunities to improve traffic safety.

2.8.3 Local Roadway Intersections

In addition to a review of the traffic collision data along Route 25 and Route 111, similar data was reviewed for the two local roadway intersections included within the study area. As shown in Table 2-16 in Appendix B, the Cutler's Farm Road intersections with Purdy Hill Road and Spring Hill Road experienced limited crash history with 1 crash and 3 crashes in the six-year period, respectively. No fatalities or significant injuries were reported as a result of these crashes.

2.8.4 Bicycle and Pedestrian Crash History

The crash data from the study area was reviewed for crashes caused by or involving bicyclists and/or pedestrians. The data, summarized in Tables 2-17 and 2-18 in Appendix B, revealed that 4 direct collisions with pedestrians and 5 crashes between vehicles waiting for pedestrians/cyclists occurred within the study area. There were no direct collisions reported involving bicyclists during the reporting period.

Due to the limited number of incidents, no significant pattern exists that would suggest a safety deficiency with respect to bicyclists and pedestrians at a particular location within the study area. The most common location for incidents was at the Pequonnock River Trail crossing on Route 111 by Old Mine Road. This area sees the most pedestrian traffic and a large amount of vehicular traffic as well. Further investigation to improve bicycle and pedestrian facilities at the crossing as well as along both study corridors was a focus of the corridor improvement plan.

2.8.5 Community Safety Concern Areas

In addition to reviewing collision data to identify areas exhibiting safety issues, discussions with the Technical Advisory Committee and the public during the Public Information Meetings identified two additional areas where safety was a concern. The areas included the unsignalized driveway intersection for Regency Meadows with Route 25 and the Trefoil Plaza/Woodland Hills driveway intersections with Route 111. Collision data and existing roadway conditions for these locations were reviewed in further detail to investigate potential traffic safety issues.

Members of the community stated that traffic operations at the Regency Meadows driveway on Route 25 presented safety concerns due to high travel speeds along Route 25 combined with poor intersection sight distance. A review of the traffic speed data shows that the operating speed of the roadway was within 5 mph of the posted 40 miles per hour speed limit. A review of roadway geometry confirmed that the intersection sight distance looking south (left) from the site driveway was obstructed by the horizontal curvature of Route 25, a stone wall within the driveway median island, as well as landscaping and other vegetation along the roadside to the south. Conducting a more detailed review of the crash data at this location revealed that a total of nine collisions were reported at the intersection during the 6 years of data. Of the collisions, 7 were rear-ends due to vehicles following too closely or traveling too fast for conditions and 2 were turning movement collisions caused by the exiting vehicle failing to grant the right of way.

At the Trefoil Plaza and Woodland Hills driveways on Route 111, the community stated that there were excessively long delays at the driveways for vehicles attempting to exit due to high traffic volumes on Route 111 and high travel speeds in this area. Additionally, although left turns into and out of the Woodland Hills driveway are prohibited, vehicles were observed making those maneuvers causing potential safety concerns. To review recent traffic collision data, additional data was collected from the Town of Trumbull Police Department as Trefoil Plaza opened in early 2013; largely outside of the available data reviewed in the previous section of the study. The data was collected for the three most recent years of available data from early 2013 through the most currently available data from July 2016. The data showed a total of 4 collisions reported in the vicinity of the driveways: 3 involving vehicles turning from the Trefoil Plaza driveway and 1 involving a vehicle turning from Woodland Hills Drive. These crashes all involved southbound traffic on Route 111. One collision occurred between two vehicles immediately after exiting the plaza driveway southbound.

2.9 Alternative Travel Modes

The study area is typical of a low to mid density suburban setting. The study corridors lack sidewalks with pedestrians walking in the shoulder of the roadway or on lawns. Cyclists ride on the shoulder of the roadway as on-street bicycle facilities are not available for their use.

The lack of bicycle and pedestrian facilities within the study area acts to discourage, rather than encourage, non-motorized travel. Additionally, both the Route 25 and Route 111 corridors are generally hostile to pedestrians whether they are walking along or attempting to cross the corridor due to the lack of sidewalks, ramps, and exclusive pedestrian phases in the traffic signal programs.

The primary bicycle or pedestrian facility within the study area is the Pequonnock River Trail, formerly known as the Housatonic Railroad Trail, "Rails to Trails." The built-out bicycle and pedestrian section of the pathway within the study area is 1.5 miles long. It extends from the Route 111 at Old Mine Road intersection in Trumbull to Maple Drive in Monroe with a spur that connects to the Regency Meadows development in Trumbull. The existing pathway extends south beyond the study area to the intersection of State Routes 127 and 734 in Trumbull Center and is planned to extend south into Bridgeport and north to the Newtown town line. Various segments of this pathway are already complete or are routed on local streets.

2.9.1 Pedestrian & Sidewalk Infrastructure

Given the suburban setting and low to mid density land uses, few pedestrians were observed in the study area during site visits. A contributing factor to these observations is the lack of sidewalks along a majority of the study area's roadways.

Typical section of Route 25. No pedestrian facilities are present.

Approximately 16% of the roadside along Route 25 and Route 111 has public sidewalks (2.1 miles of sidewalk out of 12.9 miles of roadside within the study area). Most of these facilities are located on Route 111 in vicinity of the Elm Street and Cross Hill Road intersections.

Pedestrian movements across Routes 25 and 111 are accommodated at the signalized study area intersections with pedestrian pushbuttons activating the side street green phase. Marked crosswalks across Routes 25 and 111 are limited. Route 25 has no marked crosswalks and Route 111 has four marked crosswalks either across the roadway or across intersecting roadways (not including driveways) at the following locations:

- Route 111 at Old Mine Road: This crosswalk serves the Pequonnock River Trail. There are pedestrian actuated flashing yellow lights and a pedestrian refuge island at this location.
- Route 111 at Village Square Shopping Center and McDonald's: This crosswalk extends across Route 111 and has curb ramps on both sides. There is a green light push button on both sides of the road that allows pedestrians to cross with the green light.

Crosswalk across Route 111 at Old Mine Road

- Route 111 at Gay Bower Road: Crosswalk extends across Gay Bower Road and is flanked by curb ramps with tactile warning strips on both sides of the road. Gay Bower Road is stop controlled and pedestrians cross in the absence of turning traffic.

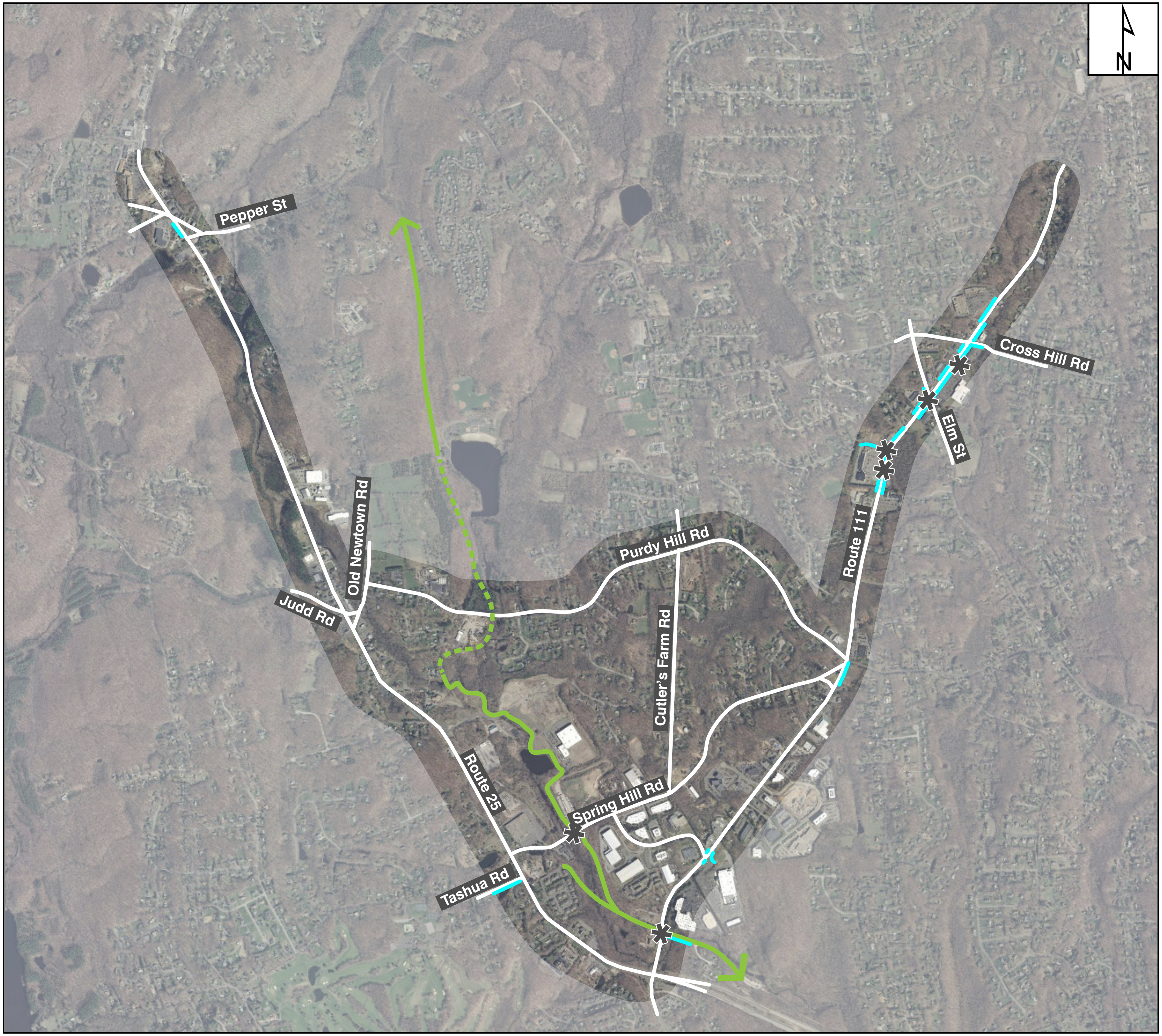
- Route 111 at Elm Street: The crosswalk extends across Elm Street on the east side of the intersection. The crosswalk has curb ramps with tactile warning strips on both sides. There is a green light push button on both sides of the road that allows pedestrians to cross with the green light.

2.9.2 Bicycle Facilities

There are no on-street bicycle facilities within the study area. The Pequonnock River Trail, a shared-use pathway, is the only bicycle facility within the study area. As previously noted, the greenway extends south to Bridgeport and North to the Newtown town line. Approximately 1.5 miles of the greenway within the study area is built-out. Other sections of the greenway are routed on local streets.

The 2015-2040 Regional Transportation Plan (Greater Bridgeport Regional Council/ METROCOG) identifies only Purdy Hill Road as a proposed on-road bicycle route in the study area. Routes 25 and 111 are not identified as proposed bicycle routes. Existing bicycle and pedestrian accommodations are shown graphically in Figure 2-26 on the following page.

Pequonnock River Trail Crossing Route 111 at Old Mine Road



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LEGEND

- Crosswalk
- Public Sidewalk
- Existing Pequonnock River Trail
- Planned Pequonnock River Trail

0 0.25 0.5
Miles
1 " = 0.5 miles

Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut

October 2016

BICYCLE AND PEDESTRIAN ACCOMMODATIONS

FIGURE 2-26

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2.9.3 Pequonnock River Trail Usage

Ridership counts on the trail were conducted by METROCOG for a seven-day period from June 12th to 19th, 2013 west of Route 111. A total of 526 users, both bicyclists and pedestrians, were counted during that period. The weekend daily counts were significantly higher than weekday counts with an average of 159 users per weekend day and 42 users per weekday. Weekday usage was spread throughout the day whereas peak weekend usage was concentrated in the late morning and early afternoon.

Ridership counts conducted during the same period of time at the Route 111 crossing were relatively consistent with counts west of Route 111. A total of 547 users were counted at the crossing during this same seven-day period. The higher count total at this location is likely attributable to the use of the trail crossing as a crosswalk for local pedestrian traffic.

Trail usage was evenly split between bicyclists and pedestrians. Of the 526 users, 274 (52%) were pedestrians and 252 (48%) were bicyclists. Counts were conducted by METROCOG in June 2013 and are shown graphically in Figure 2-27 in Appendix A.

2.9.4 Transit Facilities

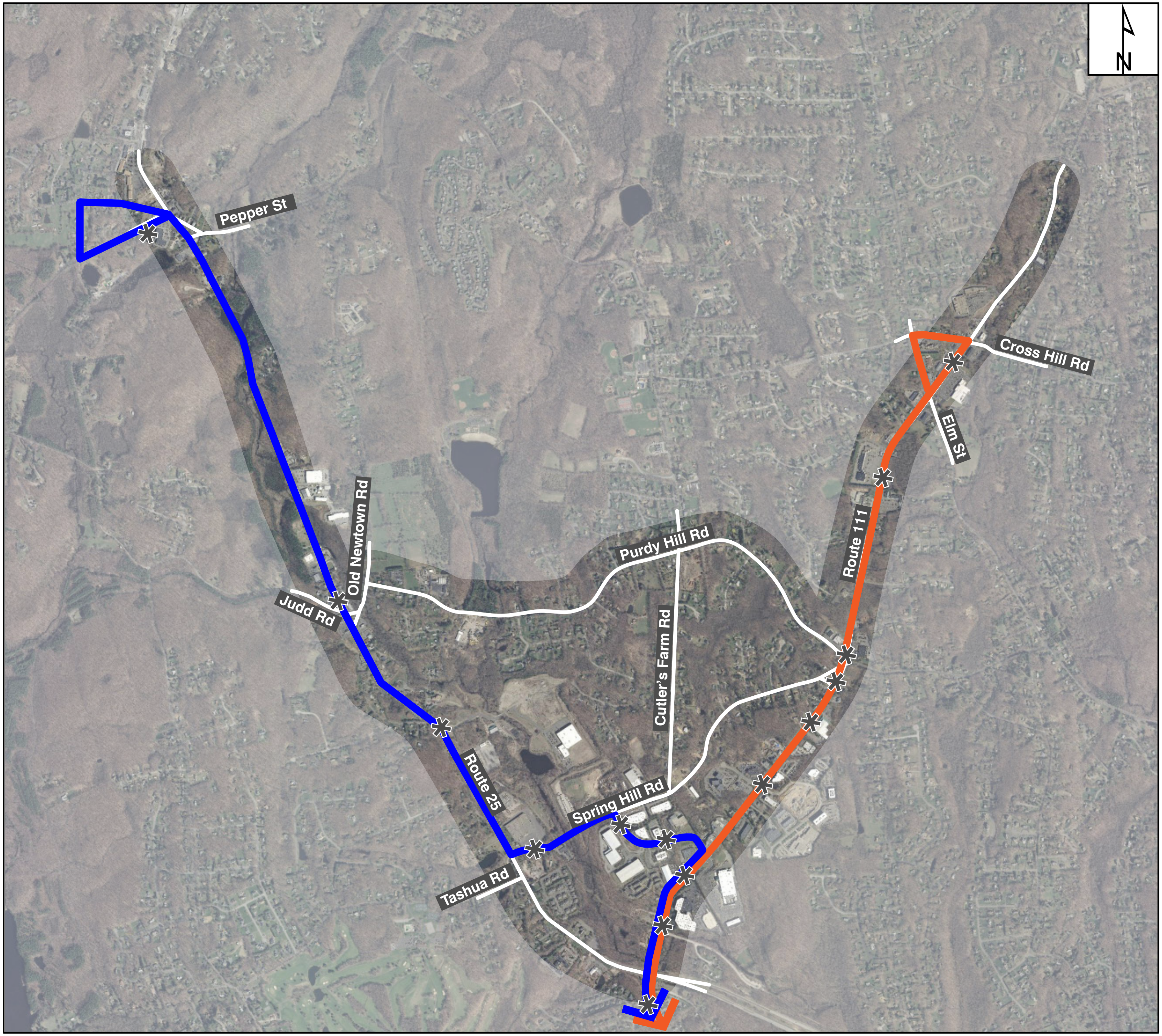
Greater Bridgeport Transit (GBT) Routes 14, 19x, and 20 serve the study area, however, service on Routes 14 and 20 have been suspended as of November 5, 2017 due to funding constraints and lack of ridership. Routes 14 and 19x share the same routing in both Trumbull and Monroe travelling north and south on Route 111 and returning via a loop at Cross Hill Road and Elm Street. At their southern end, Route 14 provides service to the Westfield Mall in Trumbull and Route 19x provides service to Downtown Bridgeport. Route 20 travels on Route 111, Trefoil Drive, Spring Hill Road, and Route 25. Route 20 bus service provides connections between the Westfield Mall in Trumbull and Stepney Village in Monroe.

GBT Route 20 Bus Stop

Trip frequency and hours of operation are as follows:

- Route 14: 4 trips per weekday operating between 8:59 am and 3:32 pm
- Route 19x: 4 trips per weekday operating between 6:30 am and 6:42 pm
- Route 20: 4 trips per weekday operating between 7:09 am and 5:22 pm

Multiple bus stops, denoted with GBT signs, are located along each route with the distance between each stop averaging within a range of 0.25 miles to 0.5 miles apart. Amenities are noticeably lacking at bus stops with no shelters or benches observed in the study area. Most stops also lack sidewalks and paved waiting areas. The existing transit accommodations are shown in Figure 2-28 on the following page.



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LEGEND

- Bus Stop
- GBT Route 20*
- GBT Route 14* & 19x

***Routes 14 and 20 have been suspended as of November 5, 2017.**

0 0.25 0.5
Miles
1 " = 0.5 miles

Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut
October 2016

TRANSIT ACCOMMODATIONS

FIGURE 2-28

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2.9.5 Transit Ridership

Transit ridership on the three routes that serve the study area is light. Ridership data was obtained from Greater Bridgeport Transit for two typical weekdays: Thursday April 2, 2015 and Monday April 27, 2015. The total combined boardings on these two days were 32 and the combined alightings (passengers dropped off by bus) were 25 within the study area. This equates to an average of 16 boardings and almost 13 alightings per weekday within the study area.

The most popular locations for boardings include Route 25 at Route 59 and Route 111 at the Monroe McDonald's. The most popular locations for alightings include Route 25 at Judd Road/Purdy Hill Road and Route 111 at the Monroe McDonald's. Multiple locations had no boardings nor alightings including:

- Route 25 at Victoria Drive
- Route 25 at Spring Hill Road
- Trefoil Drive at 4 Trefoil Drive
- Route 111 at Purdy Hill Road
- Route 111 at Spring Hill Road

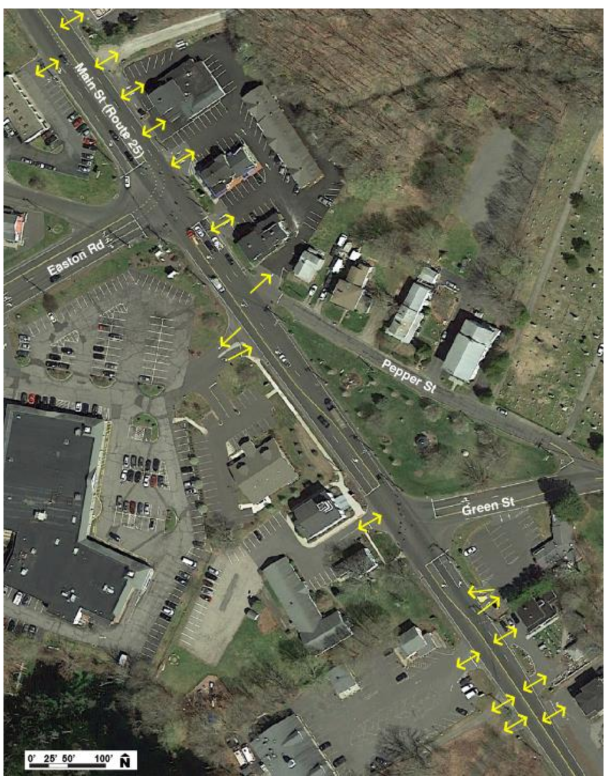
Table 2-19 in Appendix B summarizes the transit usage within the study area. Day to day ridership and bus stop usage could vary. This analysis was limited to two days and only provides a "snap shot" of typical usage based on GBT's surveying techniques.

2.10 Access Management

Access management is the process of overseeing access to land development while simultaneously preserving the flow of traffic on the surrounding roadway system in terms of safety and capacity. Access management focuses on safety of travel and minimizing conflict points (locations where vehicles can cross paths) to maintain the smooth flow of traffic along a roadway. Maintaining smooth traffic flow can in turn reduce the need for roadway widening induced by growing congestion. Access design characteristics of a roadway that directly impact traffic flow and safety include the location, spacing, and design of access drives entering the roadway as well as the location of signals, medians, and turn lanes.

Both Route 25 and Route 111 have numerous areas where there are multiple access points located within close proximity. Figure 2-29 on the following page shows an access point summary for the corridors. The disadvantages of multiple, uncoordinated, closely spaced access points include:

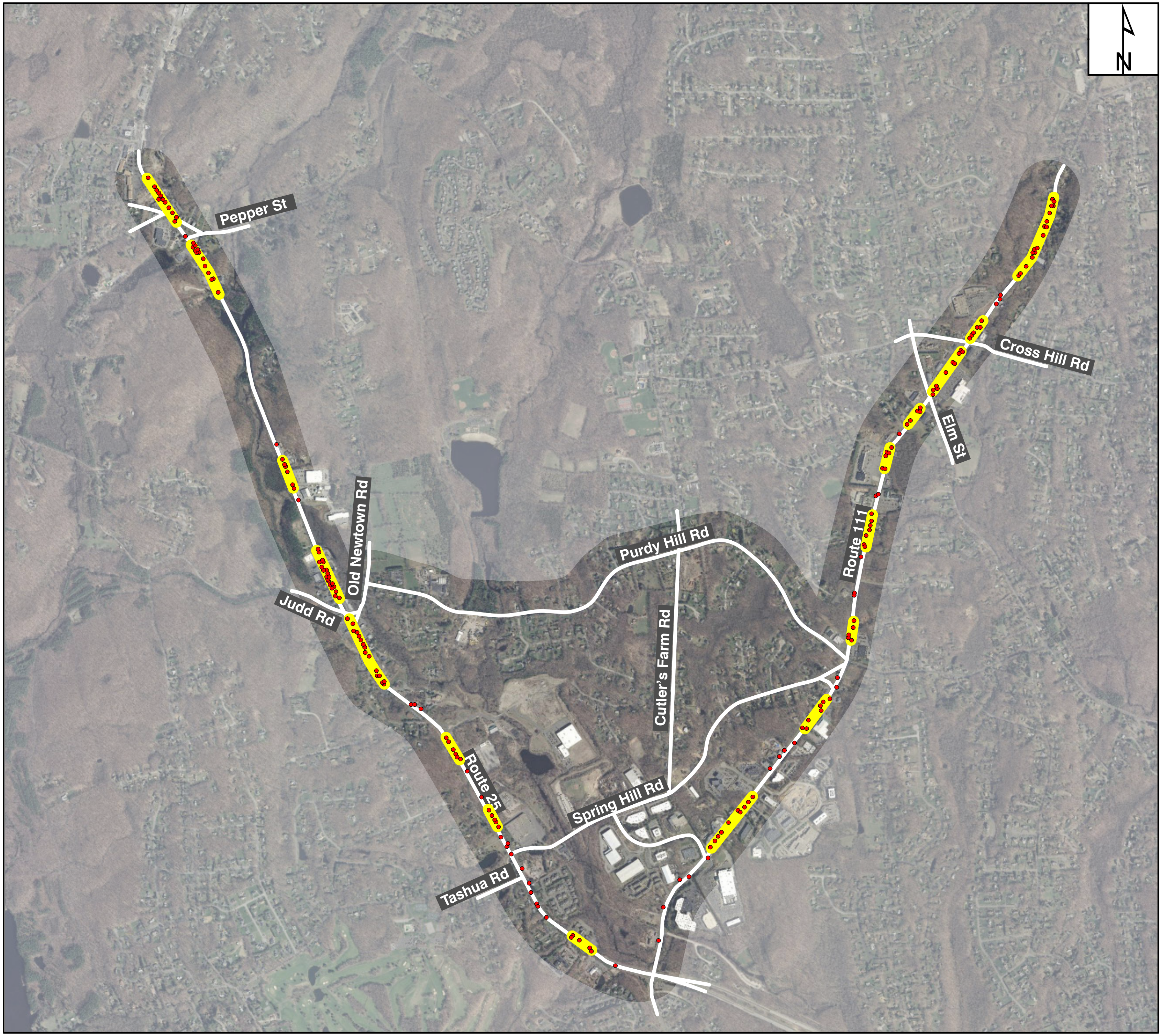
- Multiple points of conflict and increased potential for collisions
- Disruption to traffic flow and increased congestion
- Conflicts with existing or potential sidewalk network and/or bicycle lanes



View north on Main Street (Route 25) showing multiple access points.

Main Street (Route 25) in Monroe at Green Street and Easton Road.

Multiple access points are located in proximity of signalized intersections.



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Driveway or Parking Access

High Access Areas (five or more curb cuts per 500')

0 0.25 0.5
Miles
1 " = 0.5 miles

Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut

October 2016

ACCESS MANAGEMENT SUMMARY

FIGURE 2-29

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The study area is characterized by a mixture of land uses including residential, institutional, office, retail, restaurant, service, and industrial. Most of the uses have direct access from Route 25 and Route 111 by way of an exclusive or shared driveway or parking areas that directly abut either roadway. In total, there are 195 access points along the two corridors with 102 of those located on Route 25 and 93 located on Route 111. On average, there are 30 access points per mile of roadway. Many of these access points are clustered in groups. Figure 2-29 highlights areas where there are five or more access points per 500 feet of roadway. Within the study area, approximately 45% of Route 25 and 43% of Route 111 travel through an area that has a high density of access points (five or more per 500 feet).

2.10.1 Existing Access Regulations

Both Monroe and Trumbull regulate the construction of new driveways and access points through provisions of their respective zoning regulations. Excerpts of this regulatory language is provided below:

Town of Trumbull Zoning Regulations

Article XV Special Permits, Section 4.4

"No driveway onto a public street shall exceed thirty (30') feet in width, excluding the radius fillets at the point of intersection with the street, and no proposed driveway shall be closer than one hundred (100') feet to any other existing or proposed driveway, unless the site is of such width that compliance with this requirement would preclude access, in which case the separating distance between driveways shall be the maximum feasible for the site. In the interests of public safety, the number of driveways onto public streets shall be minimized, and, in non-residential zones, access to adjacent sites shall be by common driveways wherever feasible. The Commission may require that any driveway be designed, and easements to adjacent properties be conveyed, in order to facilitate present or future sharing of such driveways."

Town of Monroe Zoning Regulations

§5.1.7 Design Standards, Section G

Site design in the LOR district must address the following access management provisions:

1. No driveways/curb cuts may be located closer than one-hundred (100) feet from any intersection of public streets.
2. Driveways/curb cuts within a single property must be separated at least one-hundred – twenty (120) feet from one another.
3. Shared access between adjacent parking lots should be provided when possible and wherever practicable. The Commission may require a paved driveway to the property line to allow for potential future shared access between adjacent properties.

These zoning regulations are applicable to new developments as well as redevelopment of existing properties. Existing properties are otherwise not subject to these regulations as driveways that are non-conforming to these standards are "grandfathered" in and allowed to continue to function in the current configuration. The establishment of an access management program that identifies non-conforming driveways and develops a clear strategy for improving, limiting, controlling, and restricting access is further described in Section 4.1.8.

2.11 Transportation System Condition

During data collection, the Study Team conducted observations of the existing roadway network seeking to identify deficiencies or areas of concern that warranted a more detailed review during future phases of the project. The major observations are described below with additional information presented graphically in Figure 2-30 on the following page.

- Arterial capacity issues occur due to spot widening at intersections creating an inconsistent and varying roadway cross-section. Roadway width and lane geometry variations cause significant congestion and queueing along the Route 25 corridor and along Route 111 focused mainly on retail areas between Village Square and Century Plaza.

- Congested operations occur due to normal peak traffic flows at the following locations:
    - Route 111 at Monroe Elementary school during pickup and drop off operations
    - Route 25 at St. Stephen's Church during Sunday services which are currently controlled by police officers
    - Route 25 at Spring Hill Road due to transfer station operations during peak Saturday periods

- High travel speeds exist along Route 25 and Route 111 corridors as well as on the side streets.

- High collision rates occur at the following intersections:
    - Route 25 at Route 111
    - Route 25 at Judd Road/Purdy Hill Road
    - Route 25 at Route 59
    - Route 111 at Elm Street

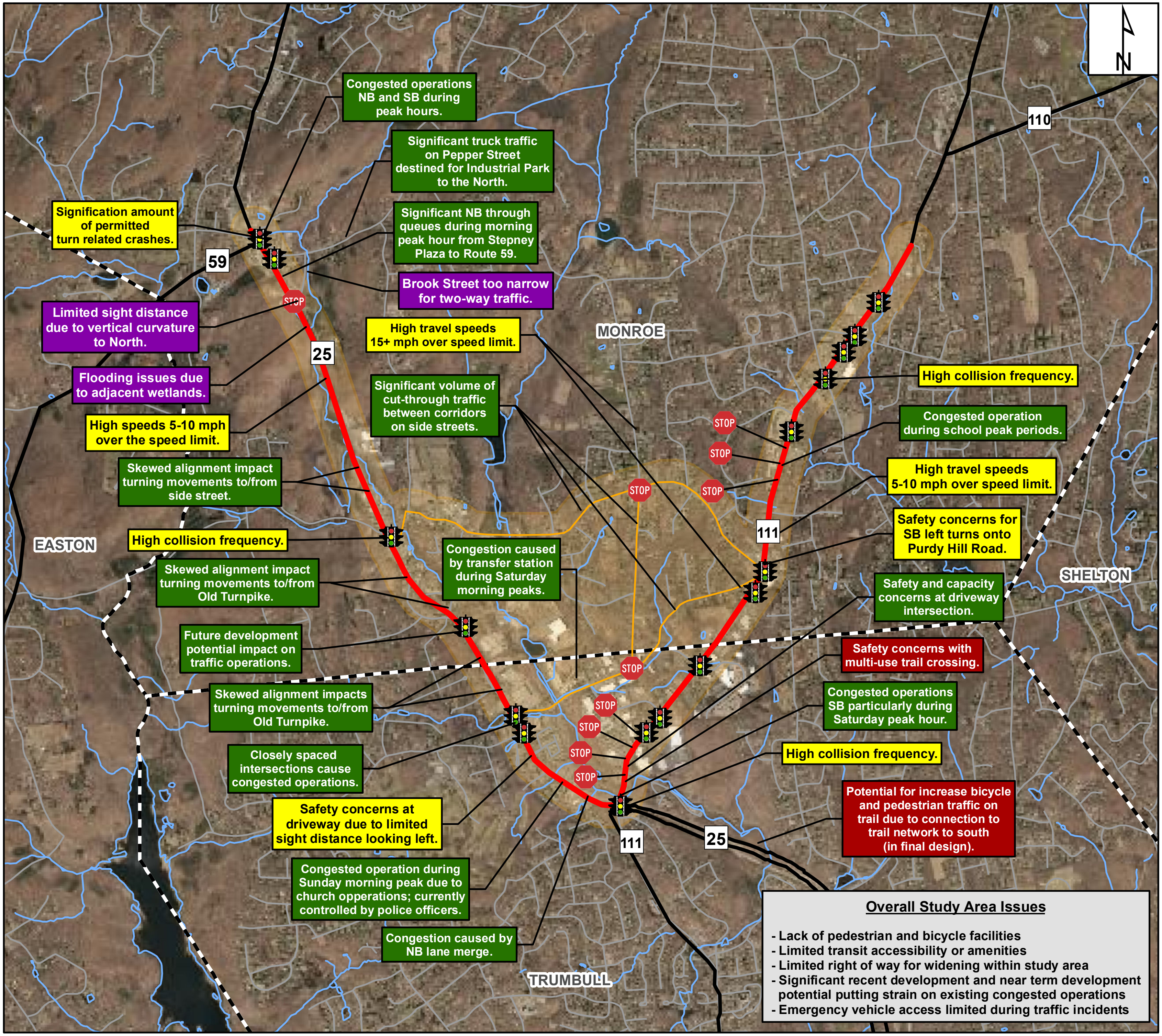
- Safety concerns at the Pequonnock River Trail Crossing on Route 111 due to high travel speeds and congestion; particularly with the potential for increased pedestrian and bicycle traffic as the Pequonnock River Trail expands to the north and south.

- Emergency vehicle access is limited during traffic incidents as vehicles cannot bypass the incidents due to the existing narrow roadway width and lack of wider roadway shoulders.

- Skewed alignments of Crescent Place and Old Turnpike Road impact turning movements to and from Route 25 causing safety concerns.

- Flooding issues present on Route 25 north of Stepney Plaza due adjacent wetlands.

- Significant recent and anticipated near-term development which will generate additional traffic volume within the study area and put strain on existing congested operations.



Overall Study Area Issues

- Lack of pedestrian and bicycle facilities
- Limited transit accessibility or amenities
- Limited right of way for widening within study area
- Significant recent development and near term development potential putting strain on existing congested operations
- Emergency vehicle access limited during traffic incidents

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- Geometric Concerns
- Alternative Mode Concerns
- Operational Concerns
- Safety Concerns
- Traffic Signal Control
- Stop Sign Control
- Study
- Study Area State
- Study Area Local
- State Route
- Local Road

0 1,500 3,000
Feet
1 " = 3,000 '

Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut

March 2017

TRANSPORTATION SYSTEM CONDITIONS SUMMARY

FIGURE 2-30

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C-1106

- Limited right of way available for widening and/or improvements on Route 25 and Route 111 within the study area, including closely located parking areas for many developments, would result in impacts to private property.

- Significant cut-through traffic utilizing east-west local roadway network to avoid congestion on the Route 25 and Route 111 main lines and to shorten overall travel distances between the two major corridors.

- Limited transit usage, accessibility, and amenities exist within the study area. Transit service is only available on weekdays with limited service of 4 trips per day per GBT route.

- Lack of pedestrian and bicycle accommodations throughout the study area. Sidewalks are sparse, and narrow shoulders discourage bicycling and walking.

2.12 Environmental and Natural Resources

The study area was screened for the following natural and cultural resources and physical environment features:

- **Surface Water Resources**
- **Ground Water Resources**
- **Floodplains**
- **Wetlands**
- **Threatened and Endangered Species and Critical Habitats**
- **Historic Register Properties**
- **Section 4(f) and 6(f) Properties**
- **Sensitive Noise Receivers**
- **Hazardous Risk Sites**

In addition to reviewing aerial images of the study area, current Geographic Information Systems (GIS) data from the Connecticut Department of Energy and Environmental Protection (CTDEEP), METROCOG, and the Towns of Monroe and Trumbull were obtained and reviewed during this screening analysis.

2.12.1 Surface Water Resources

Surface water resources within the study area include the Pequonnock River, West Branch Pequonnock River, North Farrars Brook, and various ponds and lakes associated with the Pequonnock River including Great Hollow Lake in Monroe. The study area rests entirely within the Pequonnock River Watershed.

The water quality of the Pequonnock River and West Branch of Pequonnock River is classified by CTDEEP as Class A, which is a default classification for water bodies that are not specifically classified. The 2011 Pequonnock River Watershed Based Plan finds that the water quality of the Pequonnock River and West Branch of the Pequonnock River within the study area is fully supportive of recreation and fish consumption, but no assessment was made for aquatic life.

It is important to note that the water quality of the Pequonnock River outside of the study area both upstream and downstream is impaired. North of the study area, the water quality of the Pequonnock River does not support recreation, south of the study area, the water quality supports recreation but does not support aquatic life.

According to the 2011 Pequonnock River Watershed Based Plan, the study area falls within an area identified as having "Highest Restoration Potential." Multiple restoration recommendations for the study area are identified in the watershed plan including stream and stream buffer restoration and stormwater retrofits.

2.12.2 Groundwater Resources

Most of the groundwater in the study area is classified by CTDEEP as Class GA or GAA.

Class GAA designated uses are existing or potential public supplies of water suitable for drinking without treatment and baseflow for hydraulically-connected surface water bodies. Class GA designated uses are existing private and potential public or private supplies of water suitable for drinking without treatment and baseflow for hydraulically-connected surface water bodies. All groundwaters not specifically classified are considered Class GA.

2.12.3 Wetlands

According to the U.S. Army Corps of Engineers (ACOE) 1987 Wetlands Delineation Manual, federal wetlands can generally be defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil. The State of Connecticut defines wetlands as land, including submerged land, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the Natural Resources Conservation Services (NRCS).

Based on a review of CTDEEP GIS mapping shown in Figure 2-31 in Appendix A, poorly drained and very poorly drained soils are located throughout the study area. Additionally, alluvial and floodplain soils are located within the study area. These areas indicate potential for the presence of wetlands, but do not represent delineated wetland areas.

2.12.4 Floodplains

Floodplains are low-lying areas adjacent to rivers or streams that are inundated periodically by floodwaters. A 100-year floodplain is an area that has a one percent chance of being inundated by floodwaters in a given year whereas a 500-year floodplain is an area that has a one-five hundredth chance (0.2%) of being inundated by floodwaters in a given year. Floodways are located within floodplains and consist of the river or stream channel plus any portion of the 100-year floodplain which carries stream flows during flood events. Floodplains and floodways are important for storing floodwaters so that adjacent properties and downstream areas are not damaged during flood events.

There are 100-year floodplains (Zones A and AE) and 500-year floodplains (Zone X) within the study area. They are primarily associated with the Pequonnock River and North Farrars Brook. These can be seen in Figure 2-32 in Appendix A.

2.12.5 Threatened and Endangered Species and Critical Habitats

Rare, threatened, and endangered species are protected by federal and state legislation. Information on species designated (listed) as threatened and endangered at the state and federal levels is compiled and made available through CTDEEP's Natural Diversity Data Base (NDDB).

The CTDEEP NDDB GIS data layer was consulted to determine if there were any records in the study area. Due to the sensitivity of the information, the GIS data layer only depicts approximate locations of protected species, their habitats, and/or significant natural communities. The GIS data review revealed an NDDB listed "Significant Natural Community Area" in proximity of the Route 25 and 111 intersection.

2.12.6 Historic Properties

There are two properties listed on the National Register of Historic Places within the project study area. This includes the Thomas Hawley House, which is located at 514 Purdy Hill Road in Monroe, and Old Mine Park in Trumbull, which is located in proximity of the Route 25 and 111 intersection. Additional historic resources are identified below as potential 4(f) properties.

Thomas Hawley House

2.12.7 Section 4(f) and Section 6(f) Properties

Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966 prohibits USDOT agencies from using land from publicly owned parks, recreation areas (including recreational trails), wildlife and water fowl refuges, or public and private historic properties listed or eligible for listing on the National Register of Historic Places for transportation projects (unless there is no feasible and prudent alternative to that use and the action includes all possible planning to minimize harm to the property resulting from such a use). There are six potential 4(f) properties within or in proximity to the Route 25 and 111 study area. These include:

- The National Register-listed Thomas Hawley House at 514 Purdy Hill Road in Monroe
- Old Mine Park at 121 Old Mine Road in Trumbull.
- Recreational facilities at the Monroe Elementary School at 375 Monroe Turnpike.
- Ruins of the Barnum Curtis Mills site are located at 14 Maple Drive in Monroe. This site is potentially archeologically significant.
- Gregory's Four Corners Burial Grounds on the north side of Spring Hill Road, 600 feet east of Route 25 in Trumbull.
- Birdsey's Plain/Stepney Cemetery on the north side of Pepper Street at Green Street in Monroe.

Section 6(f) of the Land and Water Conservation Fund Act (LWCF) of 1965 requires that all properties acquired or developed, either partially or wholly, with LWCF funds must be maintained as such in perpetuity. There are no Section 6(f) properties in the within the Route 25 and 111 project area.

2.12.8 Sensitive Noise Receivers

The Federal Highway Administration's Noise Abatement Criteria (NAC) documented in 23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise, is based on Land Use Activity Categories. Land uses considered most sensitive to highway/roadway noise are designated as either Land Use Activity Category A or B. Land Use Activity Category A includes lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such uses include outdoor amphitheaters, outdoor concert pavilions, and National Historic Landmarks with significant outdoor use. The only potential Category A use in the study area is Old Mine Park given its historic significance and passive recreational use.

Land Use Activity Category B includes picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals. The study area possesses multiple properties that qualify as Category B sensitive noise receivers.

2.12.9 Hazardous Risk Sites

Data sources that were reviewed to identify potential hazardous materials and environmental risk sites within the study area include the Environmental Protection Agency's (EPA) Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) GIS database, CTDEEP's List of Contaminated or Potentially Contaminated Sites, CT DEEP's Brownfields Inventory, and CTDEEP's Landfill Leachate and Wastewater Discharges GIS data.

CTDEEP's List of Contaminated or Potentially Contaminated Sites (Dated 7/27/16) identified 29 sites within the study area. The sites within Monroe include:

- 10 Main Street
- 40-44 Main Street
- 133 Main Street
- 172 Main Street
- 178 Main Street
- 256 Main Street
- 450 Main Street
- 455 Main Street
- 456 Main Street
- 270 Monroe Turnpike
- 396 Monroe Turnpike
- 405 Monroe Turnpike
- 447 Monroe Turnpike
- 470 Monroe Turnpike
- 483 Monroe Turnpike
- 505 Monroe Turnpike
- 508/509 Monroe Turnpike/ 220 Cross Hill Road
- 515 Monroe Turnpike
- 528 Monroe Turnpike
- 536 Monroe Turnpike
- 574 Monroe Turnpike
- 445/447 Purdy Hill Road

CT DEEP's List of Contaminated or Potentially Contaminated Sites within Trumbull include:

- 1 Trefoil Drive
- 6 Trefoil Drive
- 20 Trefoil Drive
- 30 Trefoil Drive
- 101 Monroe Turnpike
- 111 Monroe Turnpike
- 205 Spring Hill Road

The EPA CERCLIS database revealed only one site within or proximate to the study area. This site is located at 786 Main Street (Route 25) in Monroe and is the site of the former Nite Brite Sign Company. The site was classified as a superfund site.

There are no sites within the study area identified in CTDEEP's Brownfields Inventory. Additionally, there are no listed CTDEEP Landfill Leachate and Wastewater Discharges in the study area.

2.13 Land Use and Economic Development

In addition to the transportation and environmental analysis, land use, zoning, and development planning impacts on the study area were evaluated. A review of planning documents will help develop a clear understanding of existing land use and economic conditions in the study area in order to facilitate an understanding of how future development will occur in the study area. This section documents demographics, Plans of Conservation and Development for the Towns and the Region including land use and zoning, as well as existing major traffic generators within the study area.

2.13.1 Demographics

Basic demographic data including population, age, median household income, median home price, and household size is shown in Table 2-20 in Appendix B for Monroe, Trumbull, Fairfield County, and the State of Connecticut. Data is presented for both the 2010 Census and current estimates from 2013 or 2014.

The data shows that Monroe is growing at a faster rate than Fairfield County which is growing faster than the State of Connecticut as a whole. The current population is estimated to be 19,744 which is a 2.2% increase over the 2010 Census. Monroe residents are, on average, older than those in the County and State with a mean age of 43.0 years compared to 39.7 and 40.2, respectively. Average age in Monroe increased by 2.8% since 2010 which again exceeds County and State trends of 1.5% and 0.5%.

Monroe residents' current median household income is estimated at $108,688 while the County and State medians are $82,283 and $69,461, respectively. The household income in Monroe has decreased by 0.9% since 2010; a time period over which both the County and State have grown by 1.2% and 2.5%, respectively.

Median housing prices have dropped significantly by 9.5% and 5.9% in both Fairfield County and the State of Connecticut since 2010. The value of Monroe housing, at $390,700, lies below the County median of $432,100, but above that of the State at $278,900. However, the median housing value in Monroe has decreased more significantly than the County and the State at a rate of 11% since 2010.

Median household size in Monroe is currently 2.99 people and has grown by 0.3% since 2010. This is greater than the median household size in the County and the State at 2.82 and 2.68, respectively.

Similar to Monroe, Trumbull is growing at a faster rate than Fairfield County and the State of Connecticut as well. The current population is estimated at 36,444 with an increase of 1.2% since 2010. Median age of residents in Trumbull has remained steady since 2010 at an average of 43.4 years; older than residents in the County and the State.

Trumbull residents have a similar median household income to those of Monroe at $108,554; higher than both the County and State values. Since 2010, the median household income in Trumbull has grown by 6.4%. This is noticeably larger than the trends in the County and State.

The largest drop in median housing price for the regions in question occurred in Trumbull with a substantial decrease of 14.6% since 2010. The current value is estimated at $399,700 which is less than Fairfield County, but more than the State median.

Trumbull's median household size of 3.02 people is slightly larger than the County and State levels. However, its growth rate of 1.3% since 2010 falls closely in line with County and State trends.

2.13.2 Plans of Conservation and Development

The Plan of Conservation and Development (POCD) for most towns and regions within Connecticut outlines goals and objectives for future land use and development. The Towns of Monroe and Trumbull POCD's and the METROCOG Regional POCD were reviewed with a focus on development goals affecting the Route 25 and 111 corridors. The plans recognize that the growth in the region requires goals and policies aimed at sustaining and managing development over the next several years. Key goals and policies from both of the plans specifically related to the objectives of this Study are briefly summarized with excerpts from the POCD's.

Monroe POCD:

- Coordinate Roadway, Infrastructure, and Village District Improvements with CTDOT in Conjunction with Proposed Plans for Routes 25 and 111

- Manage future growth along Routes 25, 111, and 34 to promote measured and attractive economic development

- Alleviate traffic congestion and mitigate the impact of future development through Transportation Demand Management (TDM) and Access Management

- Expand the multi-modal transportation system by promoting sidewalk and bicycle lane construction, conducting sidewalk and bicycle network studies, and increasing the trail networks to improve mobility

- Improve the public transportation network by expanding existing services and studying the feasibility of additional transit services by focusing on the denser Village Districts

Trumbull POCD:

- Expand the range of transportation choices in Trumbull while continuing to provide a safe and efficient road network

- Make more provision for bicyclists and pedestrians as part of the overall transportation network by promoting and encouraging sidewalk improvements/extensions, connections between developments/community nodes/trail facilities, bicycle and pedestrian infrastructure, and facilities for bicycle parking

- Require access management for all new developments to improve safety and access in business areas

- Enhance bus service within Trumbull and the region in order to make transportation and mobility available

- Ensure that roadway upgrades and improvements achieve goals for Town character, water quality, and provide for bicyclists and pedestrians

METROCOG POCD:

The METROCOG POCD, titled "Reconnect 1 Region" core/guiding principles are reconnect, revitalize, and resilient. The overall goal for the METROCOG POCD related to transportation and mobility is "maintain and modernize the Region's established regional transportation network while improving access to all modes of transportation including transit users, bicyclists, and pedestrians.

To achieve the transportation and mobility goal and follow the core principles, the following objective areas were identified:

- Congestion Mitigation – work to reduce roadway congestion, especially along I-95, Route 15, Route 8, and Route 25, and other important regional roadways

- Transit Usage – balance public transit ridership and coverage goals and increase transit usage by making it a safe, reliable, and efficient method of transportation of any need

- Economic Competitiveness – recognize the connection between safe and efficient transportation infrastructure and economic growth and support major investments that can strengthen the economic competitiveness of the Region

- Transit-Oriented Development – leverage key transit nodes in existing downtowns and town centers to create walkable, high density, mixed-use districts that can serve as "transit hubs” for different transportation networks

- Equity - ensure that transportation infrastructure provides access to essential services and is accessible to all, including low income communities and those with disabilities

- Walkability & Bikeability – leverage key transit nodes in existing downtowns and town centers to create walkable, high-density, mixed-use districts that can serve as “transit hubs” for different transportation networks

Full versions of the POCD’s summarized are available on the Town of Monroe, Town of Trumbull, and METROCOG websites.

2.13.3 Zoning Regulations and Land Use

Town zoning regulations dictate where specific land uses can occur and how developments are built. These regulations are generally developed with the focus of achieving the goals and objectives of the POCD. The zoning regulations for Monroe and Trumbull were reviewed to identify existing zoning and land uses within the study area. This information will inform future growth forecasts in subsequent study phases and help identify the potential build-out locations in the corridor that are likely to occur within the next 20 years.

Figures 2-33 and 2-34 in Appendix A display the current zoning and land use for the study area. As shown on the zoning map, there are 10 specific zones that encompass the study area in Monroe and 8 district zones in Trumbull. Table 2-21, included in Appendix B, summarizes the specific zoning designations, the size of each designation within the study area, and major developments located within the designations in the study area.

The land use is simplified into residential, industrial, and commercial categories per the METROCOG GIS data. Table 2-22, included in Appendix B, summarizes the land use within these categories by Town and total within the study area. As shown in the table, 65.3%, 18.5%, and 16.2% of the study area falls within the residential, industrial, and commercial categories, respectively.

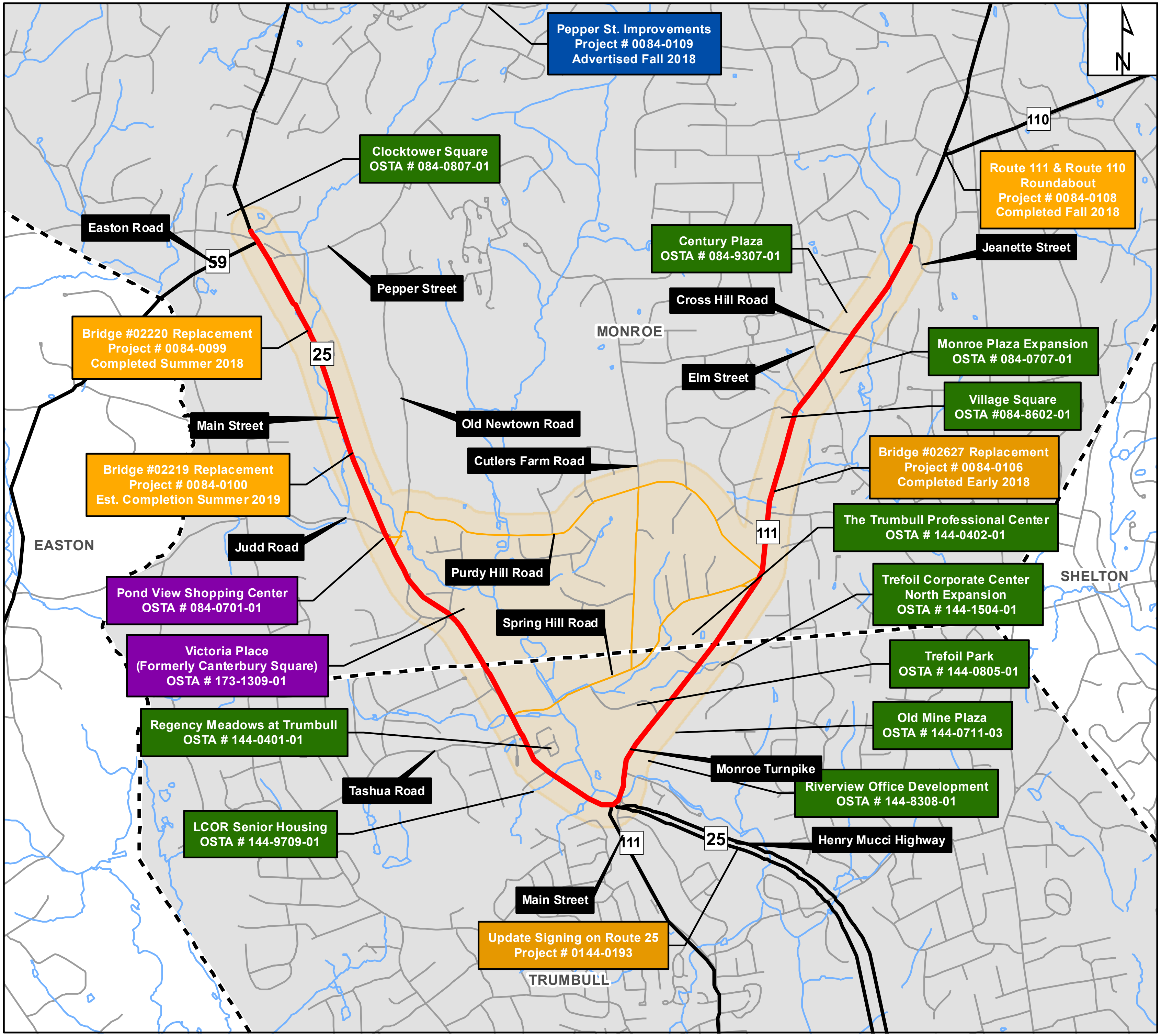
The future land use plans for Monroe and Trumbull from the POCD’s are provided in Figures 2-35 and 2-36 in Appendix A. As stated in the POCD’s, the future land use plan is intended to guide future development, provide the planning framework for future zoning changes and the plan only delineates broad categories of land use, but not site-specific zoning districts.

2.13.4 Major Traffic Generators & Roadway Improvements

According to Connecticut State Statutes, a Major Traffic Generator (MTG) is defined as any development of 100,000 square feet or more of gross floor area or 200 or more parking spaces. MTG’s are regulated by the CTDOT Office of State Traffic Administration (OSTA) to ensure that their traffic impact on the state highway system is appropriately mitigated.

Within or adjacent to the study area are 13 major traffic generators certified by OSTA which are illustrated in Figure 2-37 on the following page and summarized in Table 2-23 in Appendix B. The developments within the study area include assisted living, senior housing, retail/shopping centers, general office, medical office, and warehousing/manufacturing uses. The OSTA certificates for these MTG's area are included in Appendix I.

Also shown in Figure 2-37 are State improvement projects that are currently planned, under construction, or recently completed. There are two recently completed bridge replacement projects: one on Route 25 where construction was completed in Summer 2018 and one on Route 111 where construction was completed in early 2018. There is a third bridge project located on Route 25 with an estimated completion date of Summer 2019. Proximate to the study area, two roadway improvements are being advanced: one project including improvements to Pepper Street north of the study area that was advertised in Fall 2018 and one for the construction of a modern roundabout at the intersection of Route 111 and Route 110 north of the study area in Monroe which was completed in the Fall of 2018.



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LEGEND

- Major Traffic Generator
- Planned Improvement
- Planned Development
- Under Construction/ Recently Completed
- Study Area
- Study Area State
- Study Area Local
- State Route
- Local Road

Source:
CTDOT OSTA Records

0 1,500 3,000
Feet
1 " = 3,000 '

Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut

January 2019

MAJOR TRAFFIC GENERATORS, PLANNED INFRASTRUCTURE IMPROVEMENTS & DEVELOPMENTS

FIGURE 2-37

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C-1106

Section 3
Assessment of Future Conditions

The assessment of future conditions conducts an analysis of the Route 25 and 111 study area under existing geometric and operational conditions utilizing 2040 Background and 2040 Future Traffic volumes. Planned intersection and roadway improvements that will be complete by the 2040 study year were incorporated into the traffic model. Plans for these improvements can be found in Appendix J. This process identifies deterioration of operational efficiency from existing conditions and helps identify areas of concern that develop in the future under a scenario where no improvements are made to the transportation system.

The future conditions analysis includes traffic projections based on the methodology described below to expand the 2016 Existing traffic volumes to the 2040 Background traffic volumes. The Route 25 and 111 study area intersections were analyzed under two scenarios: a Background and a Background-Optimized condition. The 2040 Background analysis utilizes existing geometry and existing traffic signal settings to facilitate a direct comparison between existing and future conditions. The 2040 Background-Optimized analysis utilizes existing geometry, but modifies intersection signal timings and settings to provide the most efficient operations for future conditions. This optimization analysis determines if future needs can be mitigated through low-cost adjustments to signal operations or if additional physical improvement are needed to provide measurable improvements. These Background analyses provide the basis for generating roadway improvement plans to accommodate anticipated traffic growth for each of the corridors.

In addition to the background traffic growth, this section identifies the projected travel demand generated by the potential future development into the traffic volume projections. This additional travel demand was added to the 2040 Background traffic volumes to estimate 2040 Future traffic volumes. These volumes were then analyzed under the existing geometric and operational conditions. The Future traffic volume projections and analyses are provided for the Towns and METROCOG to illustrate the impact of additional future development above the significant traffic volume increases already projected under the Background projections. The Future traffic volume analysis will allow the Towns to guide the planning of future improvement projects directly related to development traffic in addition to the recommended roadway improvement plan generated by the Route 25 and 111 Study when these longer-term developments come closer to fruition.

This section concludes with future areas of concern based on the results of the traffic analyses. These areas are the focus of planning and traffic analyses with the goal of generating a set of physical improvements to accommodate projected travel demand in addition to addressing the other safety, multi-modal, and operational goals on the Route 25 and 111 corridors.

3.1 Background Traffic Forecasts

Background traffic forecasts for the study area were generated by the Connecticut Department of Transportation (CTDOT) transportation model for the region. The model utilizes historical traffic volume trends, pending/approved and yet to be constructed developments, and expected near-term future development based on information provided from local municipalities to forecast future traffic volumes for the region. Based on this methodology, the 2016 Existing Traffic Volumes shown in Figures 2-6 through 2-10 were projected to 2040 Background Traffic Volumes shown in Figures 3-1 through 3-5. All figures can be found in Appendix A.

Comparing the 2016 Existing Traffic Volumes to the 2040 Background volumes reveals that there is significant anticipated development along the Route 25 and 111 corridors within the 20-year study horizon. Table 3-1 in Appendix B shows that total traffic growth along Route 25 ranges from 35 to 75% and equates to approximately 1.5 to 2.9% average annual growth. The most significant traffic volume increases along Route 25 are focused around the Victoria Drive intersection as significant development is expected in this area. Route 111 is expected to experience slightly lower growth than Route 25 with highest overall growth south of Trefoil Drive ranging from 35 to 40% and representing average annual growth rates of 1.5 to 1.75%. To the north, growth along Route 111 is relatively consistent at 20 to 30% or average annual growth rates of 0.9 to 1.3%.

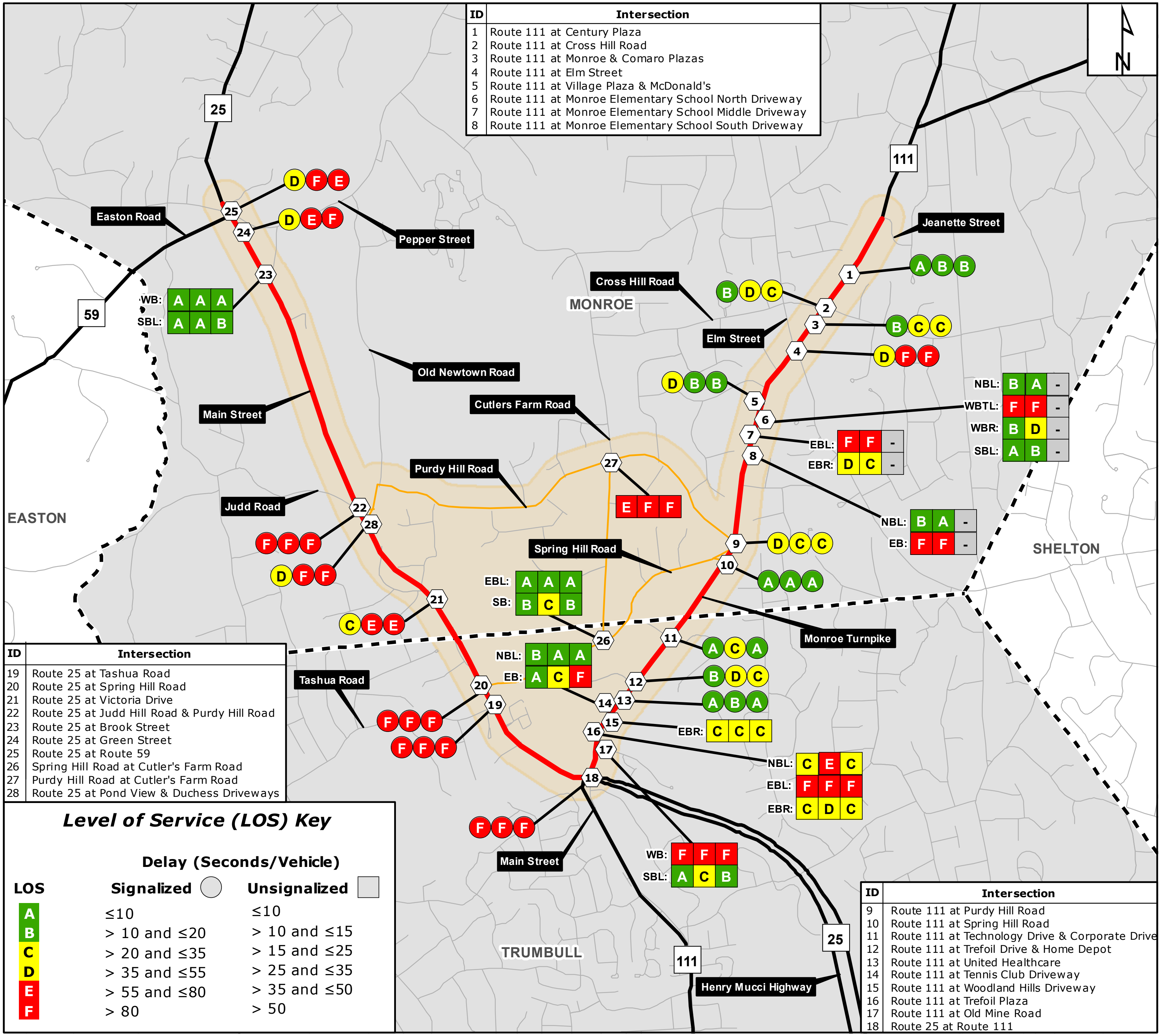
3.2 Background Traffic Operations

Utilizing the existing geometry and traffic signal settings established under the 2016 Existing Traffic analyses, traffic operations for the 2040 Background Traffic Volumes were evaluated for the study area intersections using Trafficware's *Synchro plus SimTraffic 9 – Traffic Signal Coordination Software,* based on the *2010 Highway Capacity Manual (HCM)* methodology.

Figure 3-6 on the following page and Tables 3-2 through 3-5 in Appendix B summarize the expected traffic operations of the corridor in each of the peak periods. Figure 3-6 presents a visual representation of the overall signalized intersection LOS and unsignalized approach LOS results on a study area map with the LOS color coded by letter. Within Tables 3-2 through 3-5, intersections, approaches, and/or movements with significant delays (LOS E) and failing operations (LOS F) have been highlighted yellow and red, respectively. Capacity analysis worksheets for the 2040 Background traffic operations are included in Appendix K.

The background traffic growth further exacerbates existing capacity issues along the Route 25/111 corridors at the study area intersections during the peak hours. Select approaches experience significant delays and reduction in LOS due to the increased traffic volumes. Queueing along many of the approaches within the study area is significantly increased and extends beyond available storage and through adjacent intersections which causes residual delays in excess of those shown by the LOS results.

Traffic operations along Route 25 are significantly impacted with overall intersection LOS E and F operation during the peak hours due to the significant amount of traffic growth expected along the corridor as described in Section 3.1. Traffic operations along Route 111 realize some deterioration, albeit to a lesser extent than on Route 25, with select approaches and overall intersection LOS dropping to LOS E and F.



ID	Intersection
1	Route 111 at Century Plaza
2	Route 111 at Cross Hill Road
3	Route 111 at Monroe & Comaro Plazas
4	Route 111 at Elm Street
5	Route 111 at Village Plaza & McDonald's
6	Route 111 at Monroe Elementary School North Driveway
7	Route 111 at Monroe Elementary School Middle Driveway
8	Route 111 at Monroe Elementary School South Driveway

ID	Intersection
9	Route 111 at Purdy Hill Road
10	Route 111 at Spring Hill Road
11	Route 111 at Technology Drive & Corporate Drive
12	Route 111 at Trefoil Drive & Home Depot
13	Route 111 at United Healthcare
14	Route 111 at Tennis Club Driveway
15	Route 111 at Woodland Hills Driveway
16	Route 111 at Trefoil Plaza
17	Route 111 at Old Mine Road
18	Route 25 at Route 111

ID	Intersection
19	Route 25 at Tashua Road
20	Route 25 at Spring Hill Road
21	Route 25 at Victoria Drive
22	Route 25 at Judd Hill Road & Purdy Hill Road
23	Route 25 at Brook Street
24	Route 25 at Green Street
25	Route 25 at Route 59
26	Spring Hill Road at Cutler's Farm Road
27	Purdy Hill Road at Cutler's Farm Road
28	Route 25 at Pond View & Duchess Driveways

Level of Service (LOS) Key

LOS	Delay (Seconds/Vehicle) Signalized	Unsignalized
A	≤10	≤10
B	> 10 and ≤20	> 10 and ≤15
C	> 20 and ≤35	> 15 and ≤25
D	> 35 and ≤55	> 25 and ≤35
E	> 55 and ≤80	> 35 and ≤50
F	> 80	> 50

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LEGEND

- Study Area
- Study Area State Route
- Study Area Local Road
- State Route
- Local Road
- 1 Intersection ID Number
- AM PM SAT Signalized LOS
- AM PM SAT Unsignalized LOS

0 1,500 3,000
Feet
1 " = 3,000 '

Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut

August 2017

2040 BACKGROUND TRAFFIC OPERATIONS

FIGURE 3-6

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3.3 Background-Optimized Traffic Operations

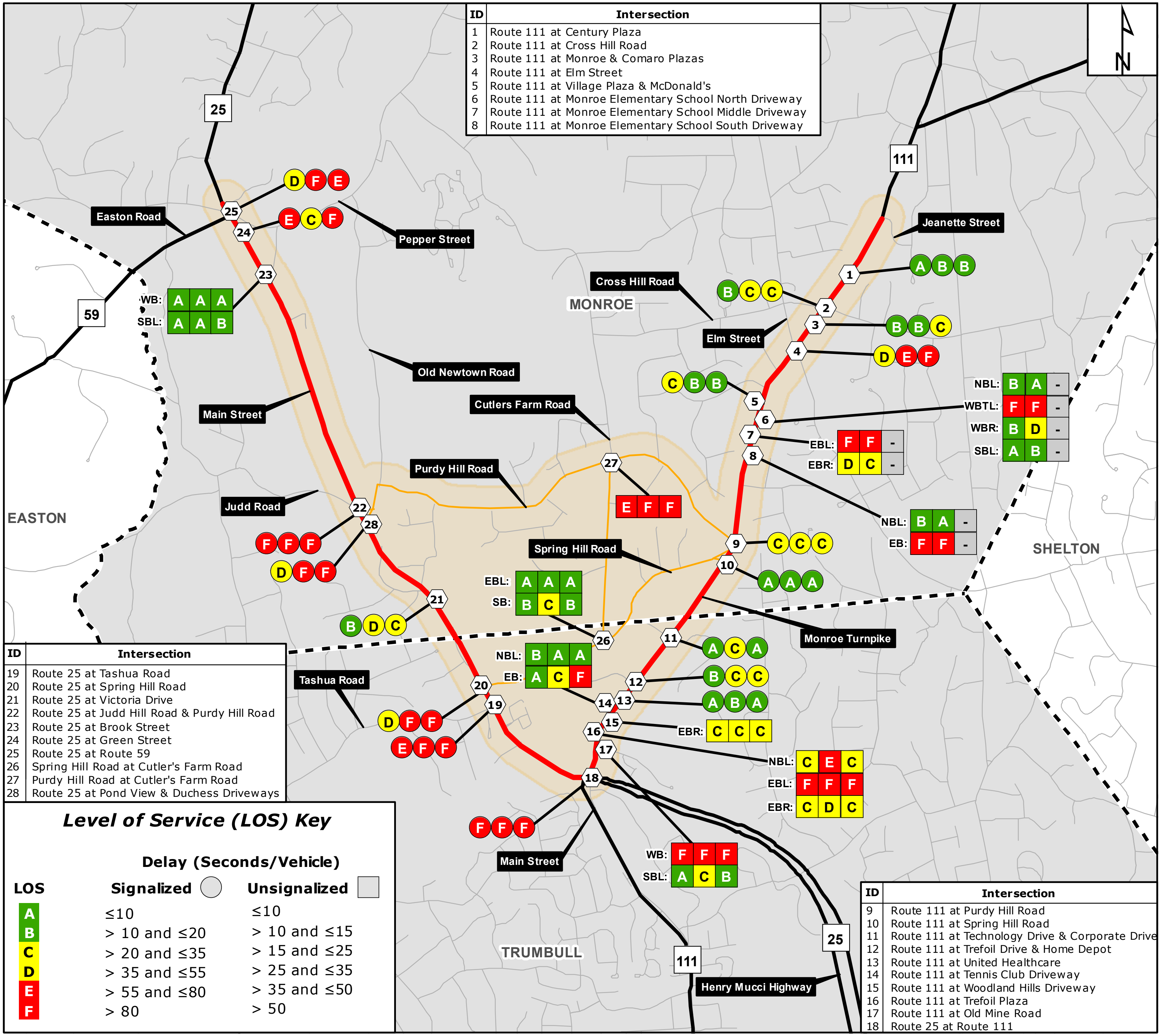
The 2040 Background Traffic Volumes were also analyzed with an optimized traffic network where the lane geometry remained unchanged, but traffic signal timings were optimized and additional coordination was added along the corridors. The purpose of the 2040 Background-Optimized traffic analysis is to determine how the existing signalization along the corridor would process expected traffic without any significant physical improvements.

The optimization process included a review of the coordinated systems on the corridors, the coordinated system cycle lengths, and signal phase timing splits to balance delays on the intersection approaches to increase the efficiency of traffic operations. It also included modifications to the closed loop signal timing offsets that impact the progression of vehicles through the corridor. The optimization process was similar to those employed by CTDOT that monitor state-maintained closed loop systems and periodically modifies the signal timing based on current volumes to maintain operational efficiency. The optimization of the traffic signal operation included the following:

- Expansion of the existing closed loop coordination system on Route 25 to include all intersections from Spring Hill Road to Route 59 (Easton Road)
- Combination of the two existing closed loop coordination systems along Route 111 into one system
- Optimization of the study area intersection splits within existing minimums
- Optimization of the network offsets

A summary of the expected traffic operations with the signal optimization is provided in Figure 3-7 on the following page and Tables 3-6 through 3-9 in Appendix B. Figure 3-7 summarizes the overall signalized intersection LOS and unsignalized intersection approach LOS on the study area map with the LOS color coded by letter. Within Tables 3-6 through 3-9, intersections, approaches, and/or movements with significant delays (LOS E) and failing operations (LOS F) have been highlighted yellow and red, respectively. Capacity analysis worksheets for the 2040 Background-Optimized traffic network are included in Appendix L.

The traffic signal optimization mitigates some of the delay caused by the additional background traffic growth. Overall intersection LOS at select intersections during certain peak periods is improved to acceptable levels. However, many remain at failing LOS E and F conditions. Several intersection approaches continue to operate at failing levels with queues well beyond available storage and extending up to and beyond adjacent intersections.



ID	Intersection
1	Route 111 at Century Plaza
2	Route 111 at Cross Hill Road
3	Route 111 at Monroe & Comaro Plazas
4	Route 111 at Elm Street
5	Route 111 at Village Plaza & McDonald's
6	Route 111 at Monroe Elementary School North Driveway
7	Route 111 at Monroe Elementary School Middle Driveway
8	Route 111 at Monroe Elementary School South Driveway

ID	Intersection
9	Route 111 at Purdy Hill Road
10	Route 111 at Spring Hill Road
11	Route 111 at Technology Drive & Corporate Drive
12	Route 111 at Trefoil Drive & Home Depot
13	Route 111 at United Healthcare
14	Route 111 at Tennis Club Driveway
15	Route 111 at Woodland Hills Driveway
16	Route 111 at Trefoil Plaza
17	Route 111 at Old Mine Road
18	Route 25 at Route 111

ID	Intersection
19	Route 25 at Tashua Road
20	Route 25 at Spring Hill Road
21	Route 25 at Victoria Drive
22	Route 25 at Judd Hill Road & Purdy Hill Road
23	Route 25 at Brook Street
24	Route 25 at Green Street
25	Route 25 at Route 59
26	Spring Hill Road at Cutler's Farm Road
27	Purdy Hill Road at Cutler's Farm Road
28	Route 25 at Pond View & Duchess Driveways

ID	Approach	AM	PM	SAT
1		A	B	B
2		B	C	C
3		B	B	C
4		D	E	F
5		C	B	B
6	NBL	B	A	-
6	WBTL	F	F	-
6	WBR	B	D	-
6	SBL	A	B	-
7	EBL	F	F	-
7	EBR	D	C	-
8	NBL	B	A	-
8	EB	F	F	-
9		C	C	C
10		A	A	A
11		A	C	A
12		B	C	C
13		A	B	A
15	EBR	C	C	C
16	NBL	C	E	C
16	EBL	F	F	F
16	EBR	C	D	C
17	WB	F	F	F
17	SBL	A	C	B
18		F	F	F
19		E	F	F
20		D	F	F
20	NBL	B	A	A
20	EB	A	C	F
21		B	D	C
22		F	F	F
23	WB	A	A	A
23	SBL	A	A	B
24		E	C	F
25		D	F	E
26	EBL	A	A	A
26	SB	B	C	B
27		E	F	F
28		D	F	F

Level of Service (LOS) Key

Delay (Seconds/Vehicle)

LOS	Signalized	Unsignalized
A	≤10	≤10
B	> 10 and ≤20	> 10 and ≤15
C	> 20 and ≤35	> 15 and ≤25
D	> 35 and ≤55	> 25 and ≤35
E	> 55 and ≤80	> 35 and ≤50
F	> 80	> 50

Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut

August 2017

2040 BACKGROUND-OPTIMIZED TRAFFIC OPERATIONS

FIGURE 3-7

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C-1106

3.4 Future Traffic Forecast

In order to forecast additional traffic associated with the additional potential development and redevelopment that may occur along the corridor within the study time horizon, the study team conducted an analysis of the existing parcels available for development and parcels subject to redevelopment. This review identified available parcels and underutilized parcels, existing adjacent land uses, and potential for zoning changes based on discussions with the Towns and METROCOG staff.

Following the identification of potential development locations, a screening process was conducted to identify the areas most likely to develop and that would generate a material increase to future traffic volumes on the study area roadways. Approved developments and other locations that were determined to be included in the CTDOT model projections (Background Traffic Volumes), parcels unlikely to develop, small sites, or sites that would generate negligible additional future traffic based on the type of development were screened out of the future development projections. The development review resulted in the identification the following five major potential development areas along with the potential development land uses:

Area 1 Route 25 South: Large scale shopping center - mixed-use and light industrial development

Area 2 Route 25 Middle: Small scale standalone retail and shopping center development

Area 3 Route 25 North: Small scale standalone retail and commercial development

Area 4 Route 111 South: Medium to large scale shopping center - medical office and light industrial development

Area 5 Route 111 North: Small to medium scale standalone retail and shopping center development

These potential development areas are shown in Figure 3-8 in Appendix A. Area 1 has the highest potential for future development with significant available, developable land capable of supporting large shopping center, mixed-use, and light industrial developments. Areas 3 and 5 on the north ends of the Route 25 and 111 corridors, respectively, are expected to see less significant additional development within the study horizon.

Based on the potential development plan outlined above, potential site generated traffic was estimated for each development area based on the future development potential and uses. This potential development site generated traffic was assigned to the roadway system at the likely point of connection and distributed to the roadway network based on the regional traffic distribution shown in Figure 3-9 and added to the 2040 Background Traffic Volumes to generate the 2040 Future Traffic Volumes shown in Figures 3-10 through 3-14. Figures 3-9 through 3-14 can all be found in Appendix A.

3.5 2040 Future Traffic Operations

Similar to the Background-Optimized Conditions, the Future Condition analyses were conducted utilizing an optimized traffic network where the lane geometry remained unchanged, but traffic signal timings, including the coordination along the corridors, were optimized. Figure 3-15 on the following page and Tables 3-10 through 3-13 in Appendix B summarize the expected traffic operations of the corridor in each of the peak periods. Figure 3-15 summarizes the overall signalized intersection LOS and unsignalized intersection approach LOS on the study area map with LOS color coded by letter. Within Tables 3-10 through 3-13, intersections, approaches, and/or movements with significant delays (LOS E) and failing operations (LOS F) have been highlighted yellow and red, respectively. Capacity analysis worksheets for the 2040 Future traffic operations are included in Appendix M.

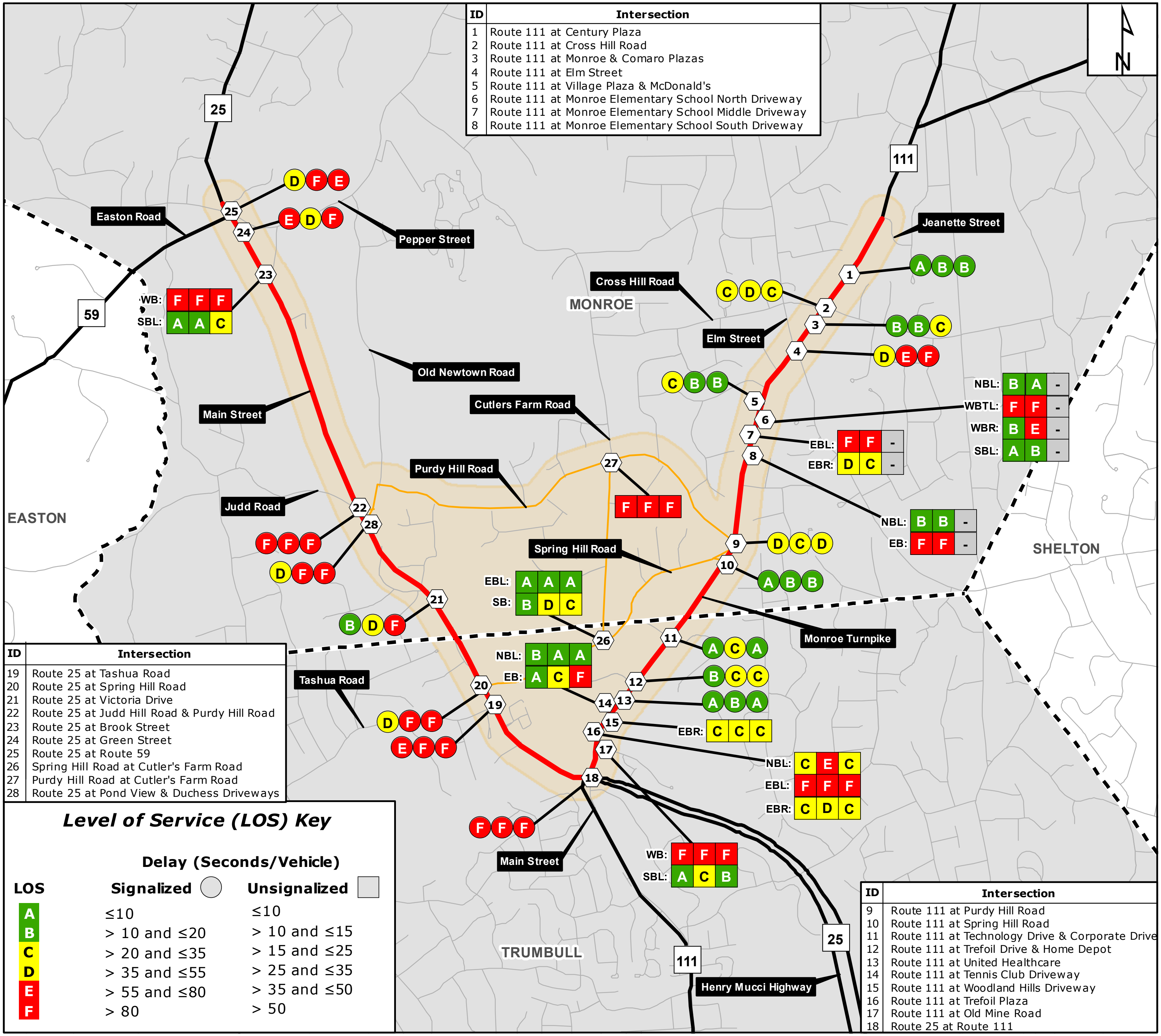
The additional traffic volume from the future potential development and redevelopment results in further degradation of traffic operations from the 2040 Background conditions. Additional intersection approaches deteriorate to failing operations and approaches with failing operations in the Background Condition experience significant increases in delays and queues as a result of the additional traffic. Similar to the 2040 Background and 2040 Background-Optimized conditions, delays on Route 25 are extensive and areas of Route 111 experience overall failing operations at several intersections and on several intersection approaches during select peak hours.

3.6 Future Areas of Concern

As identified in the traffic analyses, the poor traffic operations that were identified under the assessment of existing conditions become significantly worse under future travel demand. The study roadways exhibit extensive poor traffic operations along both the Route 25 and 111 corridors due to the amount of background traffic growth projected within the 20-year study horizon. The areas outlined below will be the focus of efforts to plan roadway improvements to accommodate projected travel demand on both corridors.

Route 25 Corridor

- **Route 25 at Route 111 -** Overall LOS F operation and LOS E/F operation on all approaches during all peak hours
- **Route 25 at Tashua Road and Spring Hill Road –** Overall LOS F operation in all peak hours with significant delays for Route 25 through vehicles and LOS E operation on Spring Hill Road during the weekday afternoon and Saturday peaks
- **Route 25 at Victoria Drive –** Overall LOS F operation in all peak hours with significant delays for Route 25 northbound and southbound vehicles and LOS E/F operation for Victoria drive in the weekday afternoon and Saturday peaks
- **Route 25 at Judd Road/Purdy Hill Road –** Overall LOS F operation in all peak hours and LOS E/F operation on all approaches
- **Route 25 at Green Street –** Overall LOS E/F operation in all peak hours with significant delays for Route 25 northbound and southbound vehicles
- **Route 25 at Route 59 -** Overall LOS F operation and LOS E/F operation on all approaches during all peak hours



ID	Intersection
1	Route 111 at Century Plaza
2	Route 111 at Cross Hill Road
3	Route 111 at Monroe & Comaro Plazas
4	Route 111 at Elm Street
5	Route 111 at Village Plaza & McDonald's
6	Route 111 at Monroe Elementary School North Driveway
7	Route 111 at Monroe Elementary School Middle Driveway
8	Route 111 at Monroe Elementary School South Driveway

ID	Intersection
9	Route 111 at Purdy Hill Road
10	Route 111 at Spring Hill Road
11	Route 111 at Technology Drive & Corporate Drive
12	Route 111 at Trefoil Drive & Home Depot
13	Route 111 at United Healthcare
14	Route 111 at Tennis Club Driveway
15	Route 111 at Woodland Hills Driveway
16	Route 111 at Trefoil Plaza
17	Route 111 at Old Mine Road
18	Route 25 at Route 111

ID	Intersection
19	Route 25 at Tashua Road
20	Route 25 at Spring Hill Road
21	Route 25 at Victoria Drive
22	Route 25 at Judd Hill Road & Purdy Hill Road
23	Route 25 at Brook Street
24	Route 25 at Green Street
25	Route 25 at Route 59
26	Spring Hill Road at Cutler's Farm Road
27	Purdy Hill Road at Cutler's Farm Road
28	Route 25 at Pond View & Duchess Driveways

Level of Service (LOS) Key

LOS	Signalized Delay (Seconds/Vehicle)	Unsignalized Delay (Seconds/Vehicle)
A	≤10	≤10
B	> 10 and ≤20	> 10 and ≤15
C	> 20 and ≤35	> 15 and ≤25
D	> 35 and ≤55	> 25 and ≤35
E	> 55 and ≤80	> 35 and ≤50
F	> 80	> 50

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LEGEND

- Study Area
- Study Area State Route
- Study Area Local Road
- State Route
- Local Road
- 1 Intersection ID Number
- AM PM SAT Signalized LOS
- AM PM SAT Unsignalized LOS

0 1,500 3,000
Feet
1 " = 3,000 '

Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut

August 2017

2040 FUTURE TRAFFIC OPERATIONS

FIGURE 3-15

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C-1106

Route 111 Corridor

- **Route 25 at Route 111 -** Overall LOS F operation and LOS E/F operation on all approaches during all peak hours
- **Route 111 at Trefoil Drive/Home Depot Driveway –** LOS E/F operation on the Route 111 northbound and southbound left turn approaches and the Home Depot approach during select peak hours
- **Route 111 at Technology Drive/Corporate Drive –** LOS F operation on the Corporate Drive approach during the afternoon peak hour
- **Route 111 at Purdy Hill Road –** Overall LOS E operation in the morning peak hour and LOS F operation for Purdy Hill left turning traffic during all peak hours
- **Route 111 at Village Square/McDonald's Driveway –** LOS E operation for through and left turning vehicles from Village Plaza during the weekday afternoon and Saturday peak hours
- **Route 111 at Elm Street –** Overall LOS E and F operation in the weekday afternoon and Saturday peak hours, respectively, with LOS E/F on the Elm Street approaches during all peak hours
- **Route 111 at Monroe/Comaro Plaza Driveways -** LOS E operation for through and left turning vehicles from Comaro Plaza during the weekday afternoon and Saturday peak hours
- **Route 111 at Cross Hill Road –** LOS E operation for Cross Hill Road eastbound left turning vehicles in the weekday afternoon and Saturday peak hours and LOS F operation for Route 111 southbound left turning traffic in the weekday afternoon peak hour
- **Unsignalized Intersections along Route 111**
  - LOS F operation for vehicles exiting Old Mine Road and Trefoil Plaza during all peak hours and for vehicles exiting the Tennis Club of Trumbull driveway during the Saturday peak hour
  - LOS F operation for vehicles exiting the Monroe Elementary School south driveway and the Center One Eleven driveway during the weekday morning and afternoon peak hours

Cut-Through Routes

- **Purdy Hill Road at Cutler's Farm Road –** Overall LOS E/F operation in all peak hours with LOS F operations on select approaches during select peak hours

In addition to the impact from the significant traffic volume projected in background conditions, additional future potential development and redevelopment will exacerbate background capacity issues. As mentioned, the Future traffic volume projections and analyses are provided to allow the Towns to understand the impact of significant, additional future development above the traffic volume increases already included in the Background projections. These future analyses will allow the Towns to guide the planning of future improvement projects in addition to the recommended roadway improvement plan generated by the Route 25/111 study when these potential longer-term developments come closer to fruition.

Section 4 Recommendations

This section details the study recommendations for transportation system improvements and enhancements. The recommendations address both existing issues and those resulting from the forecasted travel demand and potential development growth that is expected to occur in the Towns of Monroe and Trumbull as well as the surrounding region by the year 2040. The recommendations were developed cooperatively with the Technical and Community Advisory Committees, CTDOT, and METROCOG and were refined through a public engagement process to address the goals and objectives outlined in the Study Mission Statement.

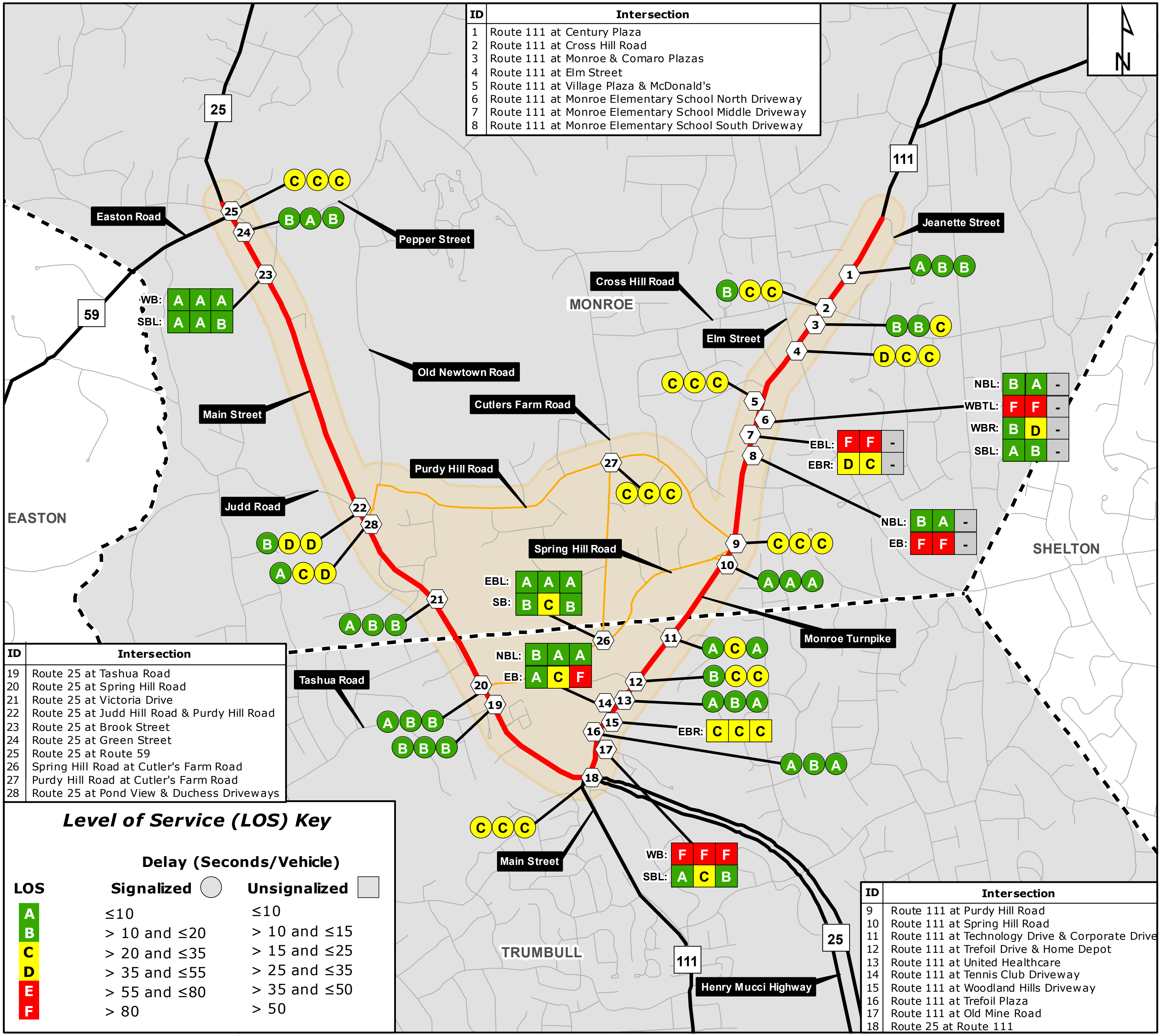
The proposed improvements on Route 25 are predominately corridor wide operational improvements that can be implemented through a phased approach whereas those on Route 111 and the local roadways are generally spot improvements. Additionally, comprehensive multimodal and access management concepts for the network were developed to address existing deficiencies and future transportation needs. All improvements are intended to provide mitigation for current and future areas of concern identified in Section 3.6 and address future traffic growth, improve safety, increase accessibility, and promote alternative modes of travel. The recommendations are presented by location from south to north along the Route 25 and 111 corridors. Although many of the recommendations address transportation issues related to motor vehicles, a series of alternative mode enhancement recommendations were developed to address pedestrian, transit, cyclist, and recreational usage of the transportation system.

The development and refinement of the preferred improvements was guided by the Towns of Monroe and Trumbull as well as METROCOG's desire to identify implementable solutions that adequately meet study goals by addressing both the existing deficiencies and potential future operational issues identified and described in the previous sections of this report.

4.1 Summary of Recommendations

The following sections present the recommended improvements for the areas of concern. The sections include a description of the improvement, illustrations of the concepts, renderings and roadway cross-sections, as well as a summary of the expected traffic operations following implementation of the improvements when compared to the no-build 2040 background-optimized condition. Concept drawings for each of the recommendations are included in Appendix C.

Figure 4-1 on the following page and Tables 4-1 through 4-4 in Appendix B summarize traffic operations following implementation of the recommendations. Tables 4-5 and 4-6 in Appendix B provide a full summary of the traffic operations for each of the scenarios analyzed for comparison purposes. Capacity analysis worksheets for the 2040 Improved traffic operations are included in Appendix N.



ID	Intersection
1	Route 111 at Century Plaza
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6	Route 111 at Monroe Elementary School North Driveway
7	Route 111 at Monroe Elementary School Middle Driveway
8	Route 111 at Monroe Elementary School South Driveway

ID	Intersection
9	Route 111 at Purdy Hill Road
10	Route 111 at Spring Hill Road
11	Route 111 at Technology Drive & Corporate Drive
12	Route 111 at Trefoil Drive & Home Depot
13	Route 111 at United Healthcare
14	Route 111 at Tennis Club Driveway
15	Route 111 at Woodland Hills Driveway
16	Route 111 at Trefoil Plaza
17	Route 111 at Old Mine Road
18	Route 25 at Route 111

ID	Intersection
19	Route 25 at Tashua Road
20	Route 25 at Spring Hill Road
21	Route 25 at Victoria Drive
22	Route 25 at Judd Hill Road & Purdy Hill Road
23	Route 25 at Brook Street
24	Route 25 at Green Street
25	Route 25 at Route 59
26	Spring Hill Road at Cutler's Farm Road
27	Purdy Hill Road at Cutler's Farm Road
28	Route 25 at Pond View & Duchess Driveways

Level of Service (LOS) Key

Delay (Seconds/Vehicle)

LOS	Signalized	Unsignalized
A	≤10	≤10
B	> 10 and ≤20	> 10 and ≤15
C	> 20 and ≤35	> 15 and ≤25
D	> 35 and ≤55	> 25 and ≤35
E	> 55 and ≤80	> 35 and ≤50
F	> 80	> 50

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LEGEND

- Study Area
- Study Area State Route
- Study Area Local Road
- State Route
- Local Road
- 1 Intersection ID Number
- AM PM SAT Signalized LOS
- AM PM SAT Unsignalized LOS

0 1,500 3,000
Feet
1 " = 3,000 '

Regional Transportation and Development Study of Routes 25 & 111 Monroe & Trumbull, Connecticut

May 2018

2040 IMPROVED TRAFFIC OPERATIONS

FIGURE 4-1

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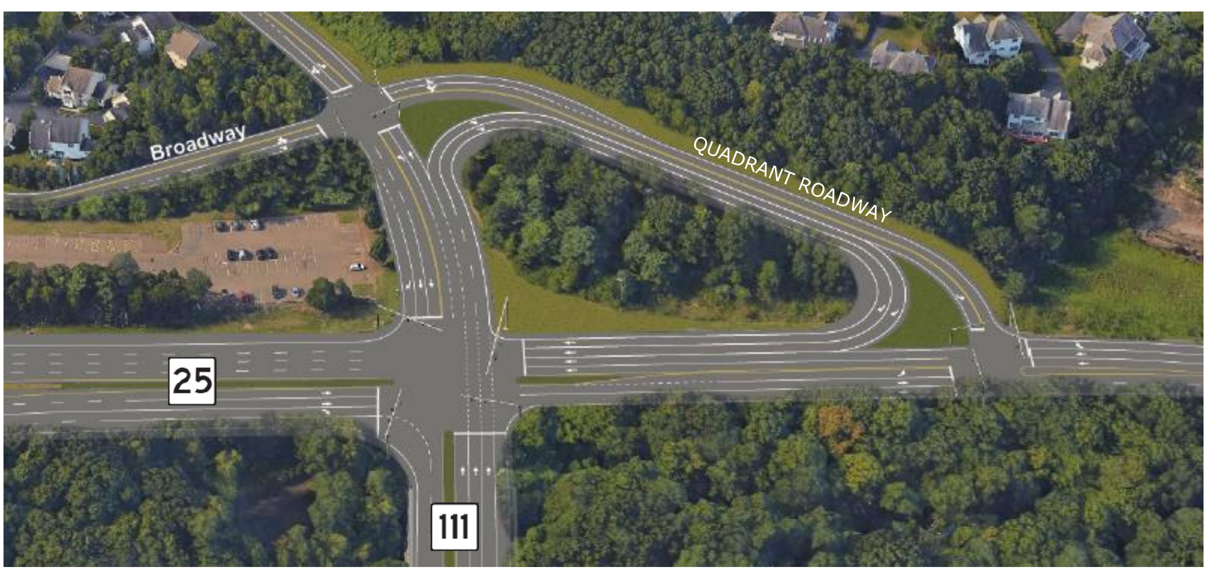
C-1106

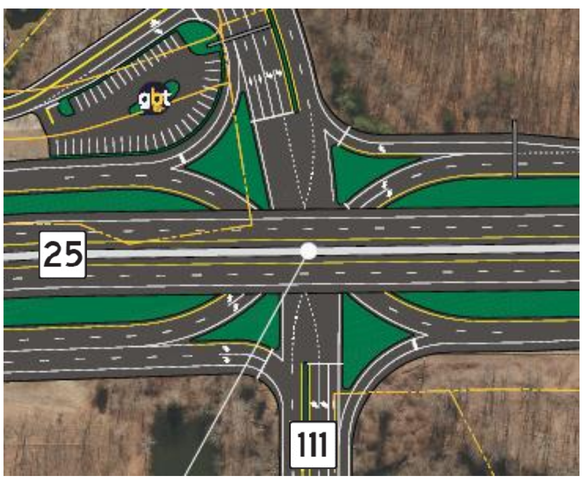
4.1.1 Route 25 at Route 111: Plans 1 and 2

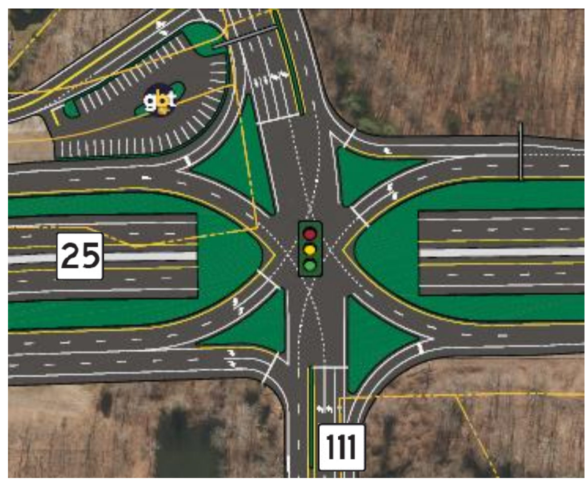
Plans 1 & 2 present improvements alternative for the Route 25 at Route 111 intersection to address congestion and traffic safety concerns. The intersection experienced the highest number of collisions within the study area, 156 in a 6-year period, and the heavy existing traffic volume and future traffic projections are expected to exacerbate both existing traffic congestion and safety issues. Numerous traditional and non-traditional improvements were assessed and two are presented as potential options to mitigate existing and future deficiencies. Plans 1 and 2 are not traditional solutions, although both have been constructed in the northeast and provide sufficient capacity to accommodate future traffic projections. The following sections discuss the concepts in more detail.

Quadrant Roadway – Plan 1: This concept presents a new quadrant roadway southwest of the intersection connecting to Route 25 and Route 111 approximately 500 feet from the physical Route 25 and Route 111 intersection. Under a Quadrant Roadway, left turn movements are prohibited at the physical Route 25 and Route 111 intersection as these connections are accommodated by the quadrant roadway. The removal of the left turns from the Route 25 and 111 intersection and the additional capacity provided by the adjacent coordinated intersections with the quadrant roadway provide improved operations when compared to standard widening or a grade separated diamond interchange. The quadrant roadway concept either replaces left turn movements with free-flowing right turns that do not incur any delay or relocates left turns to the adjacent intersections that have more capacity as there are fewer conflicting movements. The concept also improves safety with safer right turns replacing existing left turns. The quadrant roadway is more pedestrian friendly given the smaller physical intersection area needed to accommodate the traffic movements. Due to the fact that a quadrant intersection concept is an uncommon operational configuration in the northeast, there are concerns with driver expectancy as all left turn movements must use the quadrant roadway with a longer travel distance and multiple turns as opposed to the single left turn at the main intersection. As shown on the concept, significant directional signage will be required to direct vehicles into the appropriate lanes and movements in advance of the physical intersection. The concept plan contains a link to a video showing the proposed operations of a quadrant roadway concept courtesy of the Virginia Department of Transportation.



Single Point Urban Interchange – Plan 2: This concept presents a single point urban interchange (SPUI): an interchange configuration that provides significant capacity for intersections between major roadways with high volumes of turns. As shown on the concept, Route 25 will be grade-separated and travel over Route 111. The ramps between the two routes will be controlled by a single intersection, or single point, located under the overpass. The SPUI increases capacity by allowing left turn movements between the routes to be completed in a single movement as opposed to passing through two signalized intersections as is typically found in a conventional interchange configuration. The concept plan provides a link to a video showing the proposed operations of a SPUI courtesy of HNTB. The analyses show that the SPUI accommodates traffic projections as well as provides excess capacity to accommodate additional traffic growth in the future. The concept also improves safety at the intersection by significantly reducing the number of conflict points between vehicles. Finally, drivers in the area are familiar with SPUI operations as one is in operation on Route 111 approximately 4 miles south of the study area at the intersection with the Merritt Parkway. Should a SPUI be constructed, the existing commuter lot southeast of the current intersection will have to be reconfigured with reduced capacity. The new configuration should be based on the lot's usage as well as the ability of surrounding commuter lots to absorb additional vehicles. Historic commuter lot count data provided by METROCOG from 2006 to 2015 is shown on Figure 4-2 in Appendix A and in Table 4-7 in Appendix B.





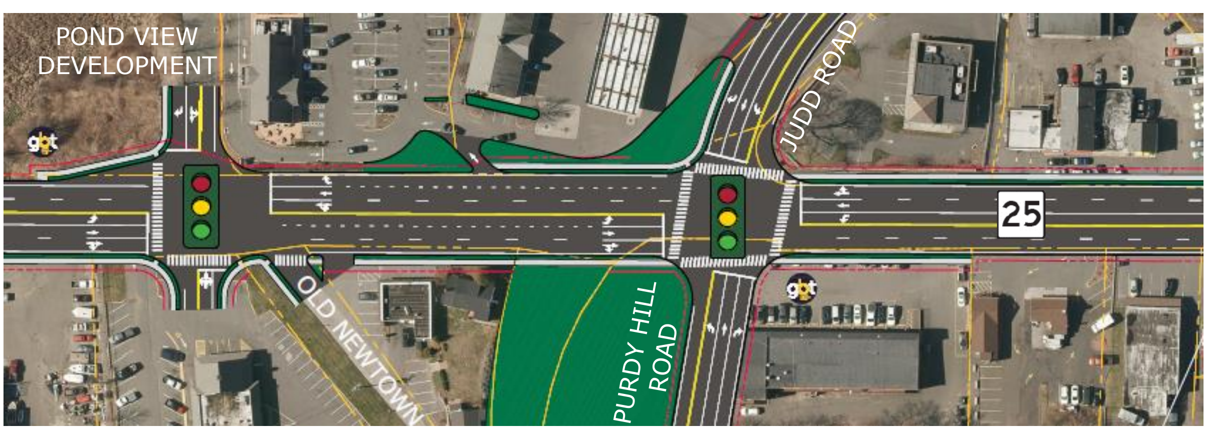
4.1.2 Route 25 Corridor: Plans 3 through 13

The Route 25 corridor serves as a major commuter route for regional traffic as well as a commercial destination for area residents. It carries high traffic volumes and experiences moderate congestion under existing conditions. The potential for significant development along the corridor exacerbates these issues and leads to significant congestion in the future. Due to the high travel demand, the recommended improvement proposes to widen Route 25 to a four-lane cross-section with supplemental turn lanes at major intersections to accommodate the expected traffic growth. The widening starts to the south (Plan 3), connecting to the Route 25 and Route 111 intersection alternatives, and continues north providing the four-lane cross-section to just south of Stepney Plaza (Plan 9) where the adjacent wetlands limit the ability to widen the roadway. Between Stepney Plaza and Brook Street (Plans 10 and 11), the corridor remains as existing with a single travel lane in each direction with wide shoulders. North of Brook Street (Plan 12), the roadway is widened to the four-lane cross section through the end of the study area, past the Route 59 intersection (Plan 13). The concepts also present the bicycle, pedestrian, and transit accommodation improvements envisioned along the corridor. The Route 25 corridor includes the following four key areas where significant improvements are required to accommodate the forecast travel demand and economic development:

Tashua Road and Spring Hill Road Area – Plan 4: This concept widens Route 25 to four-lanes while maintaining the Route 25 exclusive left turn lanes at both intersections and the two-lane approaches on Tashua Road and Spring Hill Road. The concept relocates the existing commercial driveway 125 feet to the south opposite Tashua Road to consolidate turning movements and provide signalization for the driveway approach. The concept accommodates projected traffic volumes, although the close spacing of the intersections does limit the efficiency of Route 25 through movements. However, this is mitigated by the additional through capacity. Options to realign the closely spaced roadways to a single intersection were evaluated, but not pursued due to the significant property impacts.

Victoria Drive - Plan 6: Victoria Drive provides access to a significant development area that is expected to be constructed within the study time horizon. If retail development of the area occurs, an additional Route 25 northbound through lane at minimum is anticipated to be necessary Plan 6 presents this widening with to a four-lane cross-section of Route 25 along with widening Victoria Drive to provide two exclusive left turn lanes and a right turn lane.

Judd Road and Purdy Hill Road – Plan 8: Judd Road and Purdy Hill Road serve as major collector and cut-through routes between the Route 25 and 111 corridors and other regional routes. The high travel demand accessing Route 25 at this location, combined with heavy commuter traffic on Route 25 and the skew of the intersection, causes congestion and safety issues. In addition, this area includes the Pond View development which is expected to be constructed within the study time horizon. If retail development of the area occurs, an additional Route 25 northbound through lane at minimum is anticipated to be necessary along with a potential signalized intersection controlling access to Pond View across from a relocated Duchess driveway approximately 400 feet south of the Judd and Purdy Hill intersection. Plan 8 accommodates the additional traffic demand by providing the four-lane cross-section on Route 25 with exclusive left turn lanes to Judd Road and Purdy Hill Road and three lanes exiting Judd Road and Purdy Hill Road for exclusive left, through, and right turn lanes. The concept also proposes realigning Judd Road and Purdy Hill Road to a more perpendicular alignment allowing for safer turning movements, more efficient turning operations, and provides additional storage space between the intersection and the potential signalized intersection for the Pond View and relocated Duchess driveways. Potential improvements at this location will result in significant commercial property impacts along the east side of Route 25 in addition to smaller property impacts along the side streets and west side of Route 25 to accommodate the required roadway width and pedestrian facilities.

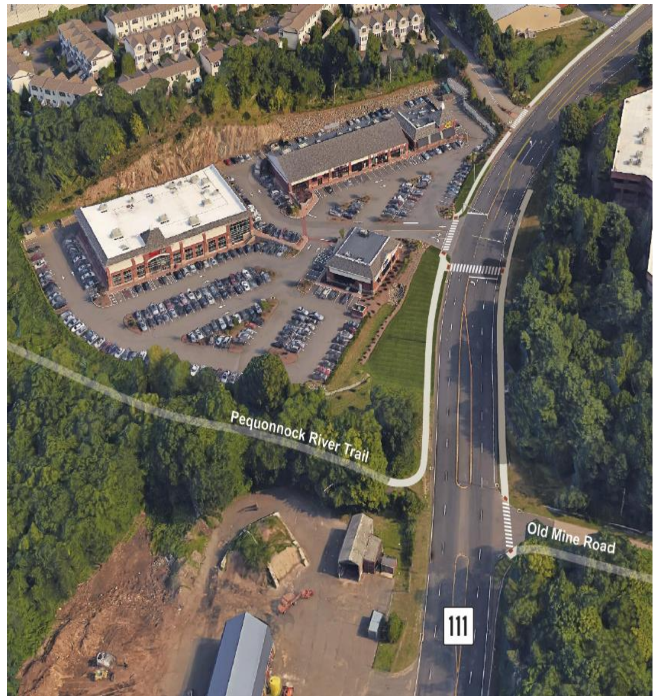


Green Street and Route 59 – Plan 13: Similar to Judd Road and Purdy Hill Road, Green Street and Route 59 are major collector roadways that carry significant commuter and retail traffic. The concept improvements in this area (Plan 13) accommodate the projected traffic with the widening of Route 25 to the four-lane cross-section, adding a double left turn lane from Route 25 northbound to Route 59, and maintaining the existing turn lanes to and from the side streets aside from the right turn lane from Route 25 northbound to Green Street. The concept also incorporates recently constructed improvements on Route 111 north of Route 59 for the Cumberland Farms and Cross Road Center developments and aligns with the lane arrangements at the adjacent Clock Tower Plaza intersection which will enable signal and lane use modifications at this intersection to address southbound capacity issues experienced north of the study area. See Section 4.1.9 for details on the anticipated scope of improvements required to mitigate congestion at Clock Tower Plaza as well as for other locations not included in the study area.

4.1.3 Route 111 at Old Mine Road, Pequonnock River Trail Crossing, Trefoil Plaza, & Woodland Hills: Plans 14 and 15

The southern portion of Route 111, approaching Route 25, is characterized by high travel speeds and associated traffic operation and safety concerns with the Pequonnock River Trail crossing and unsignalized intersections with side street and development driveways.

Pequonnock River Trail Crossing – Plan 14: This plan presents improvements to mitigate the safety concerns at the existing trail crossing at Old Mine Road. The concept fully mitigates the trail crossing concern by relocating the trail off-road to a tunnel under the Route 111 bridge over the Pequonnock River and removing the Route 111 crossing. It is envisioned that the trail can be relocated concurrently with the implementation of improvements associated with the Route 25 and Route 111 intersection (Plan 1 or 2) that will require modifications to the bridge. However, the bridge modifications to provide the additional tunnel bay for the trail by adding a fourth box culvert to convey the trail under Route 111 can be considered separately as funding allows.



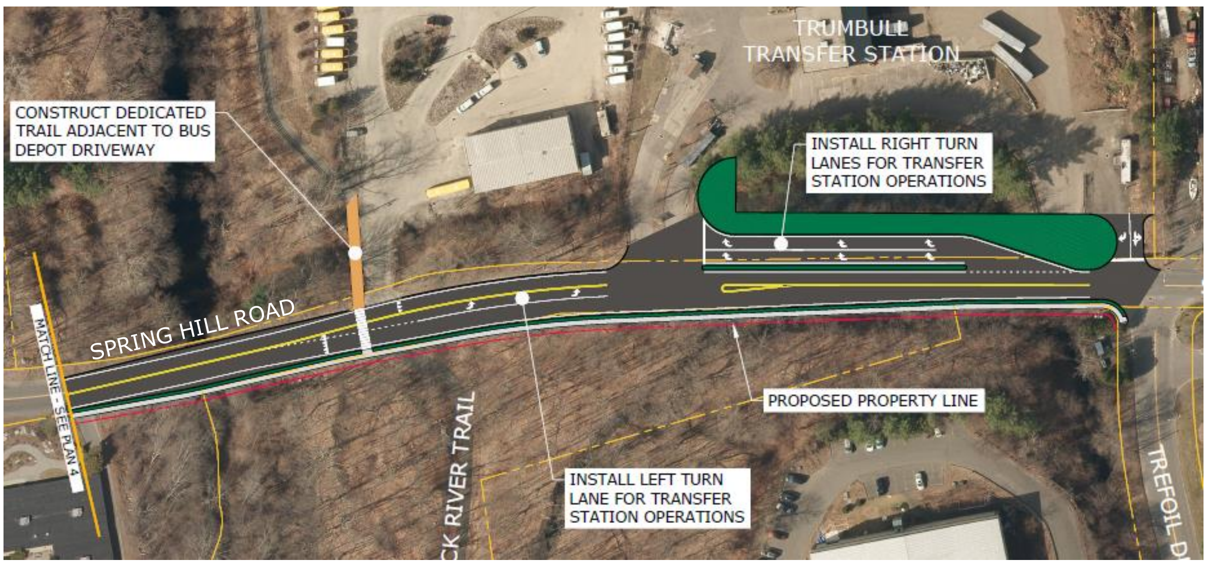
Trefoil Plaza & Woodland Hills – Plan 15: This plan presents improvements to the Trefoil Plaza and Woodland Hills driveways which currently intersect Route 111 at unsignalized intersections. As shown on the concept, the Trefoil Plaza driveway would be signalized to accommodate safer turning movements in and out of the busy development. In addition, if the Pequonnock River Trail crossing illustrated in Plan 14 is not yet constructed, this concept shows the ability to relocate the trail north to the new signalized intersection providing trail users with a signalized crossing of Route 111. The concept also includes a Route 111 northbound left turn lane into Woodland Hills and removes the left turn prohibitions to address the illegal and unsafe turning movements observed at the intersection. The Town of Trumbull and METROCOG are currently pursuing a grant under the CTDOT Local Transportation Capital Improvement Program to fund this project.

4.1.4 Route 111 Corridor: Plans 16 through 18

The plans 16 through 18 concepts illustrate “spot improvements” along the Route 111 corridor to address capacity and/or safety issues at key intersections. Each of the concepts increase road capacity by providing additional turn lanes at the intersections through restriping the pavement markings and/or minor roadway widening. The concepts also incorporate the bicycle, pedestrian, and transit enhancements at these key intersections along the Route 111 corridor. Further details are shown on the concept plans.

4.1.5 Local Roadway Network Improvements: Plans 19 through 25

Plans 19 through 25 present improvements to address operational and safety concerns on local roadways located within the study area between the Route 25 and Route 111 corridors. Plan 19 includes traffic signalization (when determined to be warranted through an engineering study) of the existing 4-way stop control at the intersection of Cutler's Farm Road and Purdy Hill Road to address expected future traffic operation concerns. Plans 20, 22/23, 24, and 25 modify traffic controls and/or traffic flow to address safety concerns due to sight line issues and skewed geometry or reduce access points to the Route 25 corridor. Finally, Plan 21 focuses on improving operations along Spring Hill Road at the Trumbull Transfer station that cause traffic congestion and safety concerns during the Saturday morning period in particular. Further details are shown on the concept plans.



4.1.6 Bicycle and Pedestrian Accommodations: Plan B&P

While the study area is rural/suburban in character, there is a significant population within walking distance of both Route 25 and Route 111. Additionally, there are multiple businesses, jobs, goods and services, and other destinations such as parks and schools along and adjacent to both corridors. These complimentary uses create demand for alternative modes of transportation such as bicycling and walking. In response, bicycle and pedestrian enhancements are recommended within, and extending beyond, the study area. These following sections summarize the following recommended enhancements, shown on Plan B&P in Appendix C:

- Sidewalk Installation and Extensions
- Crosswalks, Refuge Islands, & Actuated Pedestrian Crossing Signals
- Pequonnock River Trail Improvements
  - Network In-fill & Trailhead/Sidewalk Connections
  - Trail Surface & Drainage
  - Crossing Safety
- Bicycle Safety Enhancements

Sidewalk Installation & Extensions

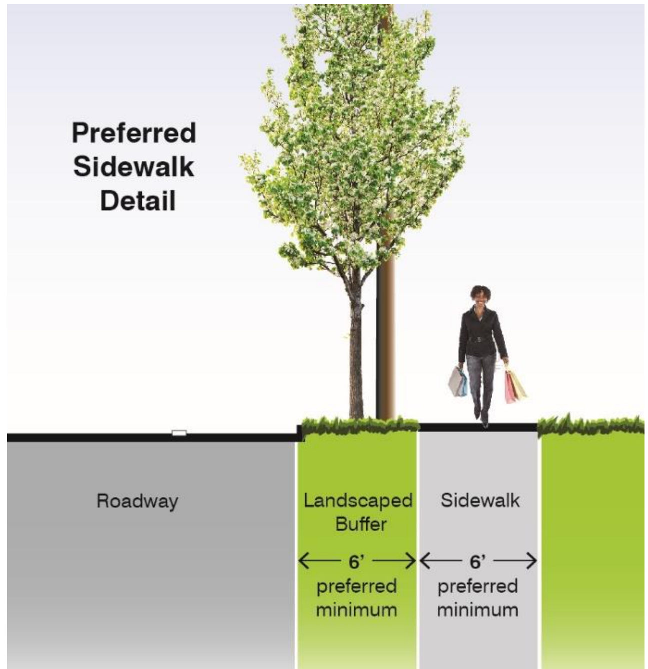
Sidewalks are limited within the study area with most located on Route 111 in Monroe. General trends within transportation planning favor a "complete streets" approach to roadways by providing facilities for all user types. Local residents participating in the project workshops expressed strong support for expanding sidewalk infrastructure in the study area with very few attendees opposing that concept. Looking beyond Trumbull and Monroe, research indicates that sidewalks are generally preferred by residents of communities throughout the U.S. A survey conducted by the Urban Land Institute (ULI) in 2015 supports this statement even though sidewalks are absent from many communities. According to ULI's "American in 2015" report:

> *Despite the desire to be close to amenities, and the fact that walkability is desired by half the country, walking is not a realistic option for many people where they live. More than half of Americans (54 percent) say it is too far to walk to shopping and entertainment in their communities, particularly those in rural areas, where this is true for 80 percent of people...Half of all people believe that their communities need more bike lanes.*
>
> *Just over half of Americans (52 percent) agree that they would like to live in a place where they do not need to use a car very often. Less reliance on a car appeals especially to millennials and renters, almost two-thirds of whom (63 percent and 64 percent, respectively) would prefer to live in this kind of "car-optional" place.*

According to a 2012 study by the Metropolitan Policy Program at Brookings, more walkable places perform better economically. From the study, "Walk this Way: The Economic Promise of Walkable Places in Metropolitan Washington, D.C.:"

> *Based on our sample of places within metropolitan Washington, a neighborhood's walkability score relates positively to several key economic indicators. Higher walkability, as measured by a place's IMI score, is related to higher economic performance, controlling for a place's household income. Specifically, considering the magnitude of influence that walkability has on economic performance, a one-level (or approximately 20 pt) increase in walkability (out of a range of 94 points) translates into a $8.88 value premium in office rents, a $6.92 premium in retail rents, an 80 percent increase in retail sales, a $301.76/square foot premium in residential rents, and a $81.54/square foot premium in residential housing values.*
>
> *While the relationship between walkability and economic performance is continuous (increases in the former relate to increases in the latter), the economic value of walkability is perhaps best illustrated by the impact of moving from one level of walkability, holding housing values constant. For example:*
>
> *Places with higher walkability perform better commercially. A place with good walkability, on*
>
> *average, commands $8.88/sq. ft. per year more in office rents and $6.92/sq. ft. per year higher retail rents, and generates 80 percent more in retail sales as compared to the place with fair walkability, holding household income levels constant.*
>
> *Places with higher walkability have higher housing values. For example, a place with good walkability, on average, commands $301.76 per month more in residential rents and has for-sale residential property values of $81.54/sq. ft. more relative to the place with fair walkability, holding household income levels constant.*

A total of approximately six (6) miles of sidewalks are recommended for the study area. Sidewalks are recommended for at least one side of the roadway for the entire length of Route 111 between Old Mine Road and north of Cross Hill Road. Recommended sidewalks along Route 25 extend from St. Stephen Church to the Judd and Old Newtown Road area. Additional sidewalks are recommended along Route 25 in proximity of the Route 59 and Pepper Street intersection. Sidewalks are also recommended on Spring Hill Road and Trefoil Drive.



Typical Elevation View: Preferred Sidewalk Detail

Sidewalks should be a minimum of 5-feet wide, with a preferred width of 6-feet where space allows. Given the traffic speed and traffic volume on Routes 25 and 111, sidewalks should be offset from the edge of the roadway to the greatest extent possible, preferably 6 feet or more where space allows. This separation removes pedestrians from exposure to large vehicle wind gusts, roadway noise, and water spray from wet payment. The separation area also provides space for snow storage and landscaping when appropriate.

Crosswalks, Refuge Islands, & Actuated Pedestrian Crossing Signals

Crosswalks (that cross a public roadway) within the study area are present at six locations, most of those are located on Route 111 in Monroe. Crosswalk facilities should be expanded as pedestrian infrastructure is expanded in the study area. The recommended locations for new crosswalks, based upon the proposed sidewalk network, include the following locations shown in Plan B&P in Appendix C:

- Route 25 at Tashua Road
- Route 25 at Spring Hill Road
- Route 25 at Victoria Drive
- Route 25 at Maple Drive
- Route 25 at Old Newtown Road
- Route 25 at Judd Road
- Route 25 at Green Street
- Route 25 at Route 59
- Green Street at Pepper Street
- Spring Hill Road
- Route 111 at Trefoil Drive
- Route 111 at Spring Hill Road
- Route 111 at Purdy Hill Road
- Route 111 at Elm Street

These locations would require the installation of crosswalk pavement markings, ADA accessible curb ramps, and pedestrian actuated buttons and signal heads. Additionally, existing crosswalks should be upgraded via construction of curb ramps leading to signal buttons and installation of pedestrian signal heads.

Crosswalk markings and pedestrian crossing signalization may precede longitudinal sidewalk construction in areas where intersections are improved. The potential impact of crosswalk installation is minimal, with pedestrian crossing times at signalized intersection causing a slight delay to traffic and only when signal heads are actuated by pedestrians.

Due to the current traffic volumes and speeds in much of the study area, the location and treatment options of additional crosswalks should be evaluated for durability, visibility and their consistency with the streetscape of the surrounding area. Longitudinal (continental style) crosswalk markings are recommended for use at sidewalk and trail crosswalk locations that have high auto traffic volumes in the study area. These crosswalks provide the best visibility for drivers and pedestrians. This crosswalk marking type is preferred over decorative treatments due to superior visibility and lower maintenance cost on high volume roadways.

The use of decorative pavement markings in lieu of retro-reflective pavement markings should be reserved for low speed areas and are generally most appropriate in a downtown or village center district when combined with complementary streetscape amenities or enhancements. Decorative pavement materials are susceptible to deterioration when exposed to high traffic volumes and high turning movements.

Trail Crosswalk with Longitudinal Markings, Cady Way Trail, Orange County, FL.
Photo Credit: americantrails.org

Pequonnock River Trail Improvements

The Pequonnock River Trail provides an alternative route through the study area for bicyclists and pedestrians. The trail parallels Route 25 and currently extends from Old Mine Park to Maple Drive. The condition of the pathway varies along the route with areas that are unpaved and drainage issues in some locations. Multiple improvements are recommended to make this facility more useable for recreation and a more viable alternative to Route 25 for bicycle and pedestrian transportation trips. These recommendations include:

- Network Completion & Trailhead/Sidewalk Connections – Completion of the Trail Network Previously Planned & New Trailhead/Sidewalk Connections to Local Developments
- Trail Surface & Drainage Improvements – Pavement of unpaved areas, pavement restoration, and drainage modifications
- Crossing Safety Improvements at Route 111 – Options include a tunnel below Route 111 or relocation of the crossing to a signalized intersection.

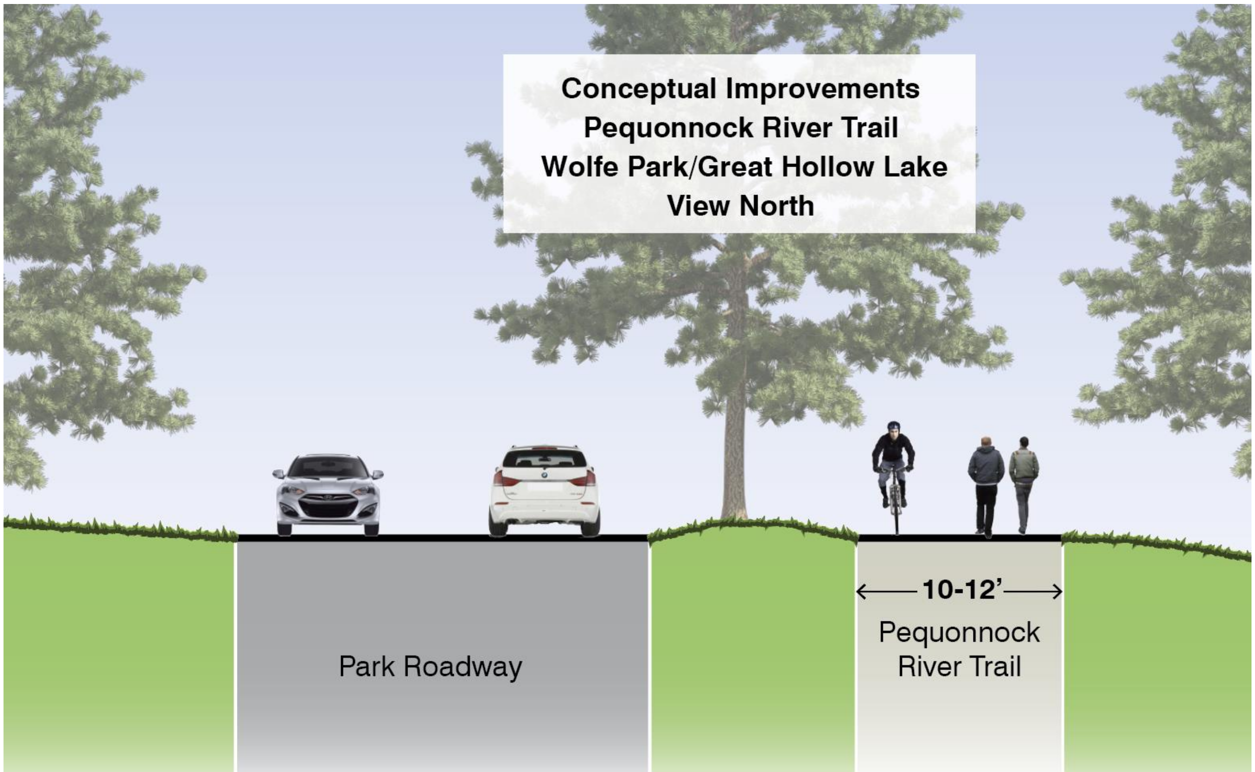
Network Completion & Trailhead/Sidewalk Connections

A major improvement to complete the Pequonnock River Trail system network is the construction of the previously planned, off-roadway trail extension between Maple Drive through Wolfe Park. The connection would provide a continuous off-roadway trail network from the Pequonnock River Valley State Park in southern Trumbull to Wolfe Park and the Housatonic Valley Rail Trail and Great Hollow Lake Pathway to the north into Newtown.

In addition to this extension, trail connections to local developments and Route 25 sidewalks once constructed should be considered wherever feasible by development of existing vacant property and redevelopment of property. As shown in Plan B&P, trailhead connections are recommended to the proposed Route 25 sidewalk in the area of Tashua Road and Victoria Drive along with providing sidewalks along Spring Hill Road to connect the trail to Route 25 at Spring Hill and to Trefoil Corporate Park to the east.

Trail Surface & Drainage Improvements

A bituminous paved trail is recommended for the entire length of the Pequonnock River Trail. The trail should be a minimum of 10 feet to 12 feet wide, although 8 feet is an acceptable width for limited distances in constrained locations. When located adjacent to a roadway, a separation of 6 feet or more between the roadway and trail is preferred. This separation provides a buffer from large vehicle wind gusts, roadway noise, and water spray from wet payment. The buffer area also provides space for snow storage. Drainage improvements including the installation of additional drainage facilities and overland drainage swales should also be considered to ensure that the trail is not adversely affected by storm events. More details are provided in the Green Infrastructure and Landscaping Plan provided in Section 5.2.2.2.



Typical Elevation: Proposed Pequonnock Trail at Wolfe Park

Crossing Safety Improvements at Route 111

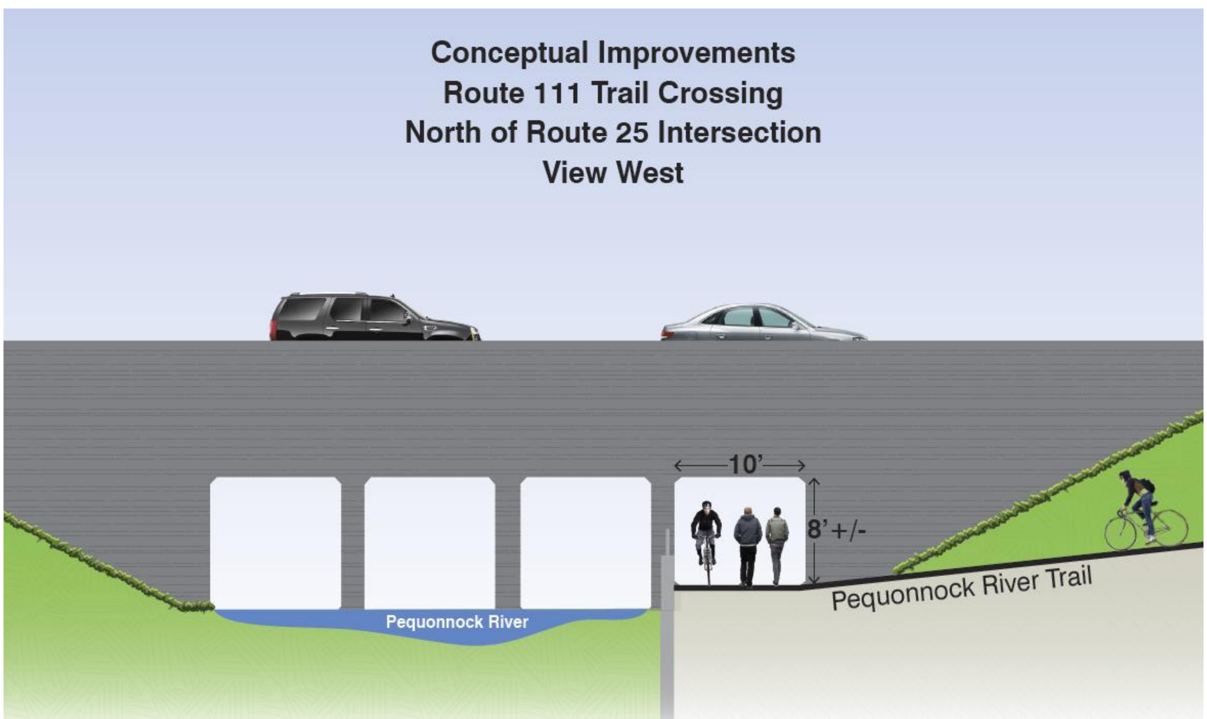
As detailed in Existing Conditions Section 2.9, the Pequonnock River Trail crosses Route 111 via an unsignalized crossing at Old Mine Road within a high volume/high speed segment of Route 111 and there have been several public safety complaints. Two options are included within the project recommendations to eliminate/relocate this crossing to improve the safety for trail users. Plan 14 in Appendix C recommends the relocation of the trail from the unsignalized Old Mine Road intersection to the north as a new signalized intersection at Trefoil Plaza. The traffic signal, proposed for capacity and safety concerns at the Trefoil Plaza driveway (See Section 4.1.3 for more details), would include an exclusive pedestrian phase to facilitate bike/pedestrian movements across Route 111 for trail users. The Town of Trumbull and METROCOG are currently pursuing a grant under the CTDOT Local Transportation Capital Improvement Program to fund this project.

The second option, shown on Plan 15 and referenced in Plan B&P in Appendix C, includes a relocation of the trail to a grade separated tunnel under Route 111. The crossing would require the construction of a tunnel below the existing Route 111 bridge near Old Mine Road. The bridge is currently comprised of three box culvert structures for the passage of water; a fourth box structure could be constructed on the north side of the Pequonnock River to convey the trail under Route 111.

The tunnel will require that the trail be constructed to ADA accessible ramp guidelines on the approaches from either side. Adequate lighting and good visibility will also be critical to ensure security and perceptions of safety. This will require the installation of lighting within and approaching the tunnel and thinning of vegetation so as to open up views of the pathway from Route 111.

According to the American National Standards Institute (ANSI), underpasses require adequate lighting for security purposes. Facial recognition below bridge structures is a primary concern because of the limited options for retreat from a hostile individual. These spaces are often challenged by luminaire mounting restrictions that could create problems by causing obstructions/hazards to pedestrians as well making glare control from the luminaires more difficult. Underpasses or pedestrian tunnels may also have daytime lighting needs. The illuminance recommendations for the pedestrian areas of the underpass are provided in the table below.

The recommended illuminance values vary between 5 and 10 footcandles during the day, and 2 and 4 footcandles during the night (a footcandle is defined by the amount of light received by 1 square foot of a surface that is 1 foot from a point source of light.). Typical light levels range from 1,000 footcandles in full daylight to 0.1 footcandles under a full moon.



Elevation View: Proposed Tunnel Crossing at Route 111

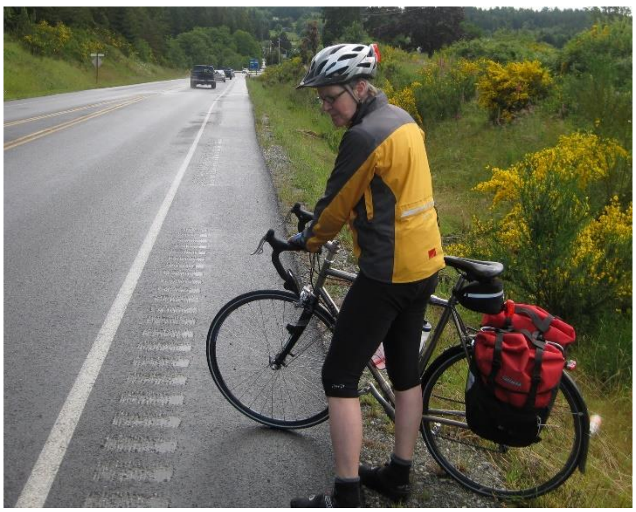
Bicycle and Pedestrian Pathway Tunnel, Dublin, Ohio
Photo credit: American Structure Point Inc.

Bicycle Safety Enhancements

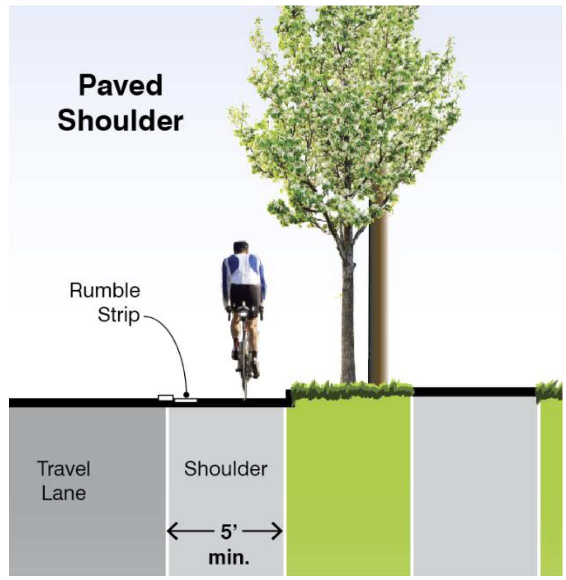
Both Route 25 and Route 111 have traffic conditions that are generally unfavorable to bicyclists. High traffic volume and vehicular travel speed makes the roadway an unsuitable environment for most bicyclists. Improvements to the Pequonnock River Trail are intended to provide an alternative north/south route for bicyclists. The inclusion of five-foot wide paved shoulders on all proposed roadway enhancements should also be considered as a means of providing operating space for bicyclists. This type of accommodation will likely only be used by more advanced riders, whether daily commuters or longer distance recreational riders.

A five-foot wide paved shoulder has limitations which will deter other riders such as: proximity to traffic, wind gusts from large vehicles, lack of physical protection such as curbing, and lack of intersection treatments such as bike pockets and bike boxes. Shoulders could also be coupled with rumble strips as a means of warning drivers who are drifting into the shoulder and warning cyclists of a potential threat. If used, rumble strips should be placed immediately to the right of the travel lane edge pavement marking. Breaks in the rumble strip should be provided at least every fifty feet and should be ten feet long to allow bicyclists to exit the shoulder without traversing the rumble strip. Rumble strips should not be continued across areas where drainage structures are present within the shoulder area.

Less advanced riders who have a desire, or need, to use Route 25 or Route 111 for trips will likely find sidewalks to be a more attractive alternative. Given the low pedestrian and bicyclist volumes in the study area, the use of sidewalks by bicyclists is unlikely to introduce significant conflict between the user groups. Potential use of sidewalks by bicyclists places more emphasis on the need to develop continuous sidewalks along both Routes 25 and 111. Neither Monroe or Trumbull have municipal ordinances that prohibit the use of sidewalks by bicyclists.



Paved shoulder with rumble strip.
Photo credit: Washington Bikes



Typical Elevation:
Paved Shoulder with Rumble Strip

4.1.7 Transit Enhancements: Plan T

Plan T summarizes recommended improvements to the existing Greater Bridgeport Transit (GBT) service in the area. These recommendations are also shown in more detail on the Route 25 and Route 111 concepts where applicable. As noted on the concept, GBT Routes 14 and 19x has been suspended due to reduced funding and low ridership. These Routes are key to providing service to the Route 111 corridor and should be considered for reactivation as funding and ridership demand supports. The following sections summarize the recommended improvements including:

- Potential Extension of Routes 14 and 19x
- Sidewalks Connecting to Bus Stop Locations
- Relocation of Bus Stop Locations Coordinating with Roadway Improvements
- Installation of New Bus Stop Locations
- Installation of Bus Shelters and Waiting Areas

Potential Extension of Routes 14 and 19x

GBT should consider extending Route 19x and Route 14 (upon reinstatement of service) to the intersection of Route 111 and Route 110 in Monroe Center. The construction of a roundabout at this intersection allows for a convenient turn-around point for the buses; extension into this area would provide access to Monroe Center including Town Hall and Edith Wheeler Library. The route is only three-quarters of a mile north of the existing turn-around point at Cross Hill Road and will be more convenient as a turn-around given that the existing bus route turns left onto Cross Hill Road and left again onto Elm Street before turning right onto Route 111 to resume its route.

Sidewalks Connecting to Bus Stop Locations

Sidewalk construction is recommended for both Route 25 and Route 111, which would greatly improve pedestrian mobility from all bus stops along those routes. Where sidewalks only serve one side of the roadway, crosswalks are recommended at signalized intersections to access bus stops on the opposite side of the roadway. Expansion of the sidewalk network would connect bus stops to residences, places of employment, and goods and services.

Relocation of Bus Stop Locations during Roadway Improvements

Roadway improvements associated with the recommendations of this report will impact eight (8) existing bus stops. This includes bus stops at the following locations:

- Route 59
- Route 25 near Judd Road and Victoria Drive
- The intersection of Routes 25 and 111
- Route 111 at Spring Hill and Purdy Roads

Installation of New Bus Stop Locations

Fifteen (15) new bus stops are recommended along the two study corridors. These new stops replace stops that are impacted by recommended roadway improvements and are intended to provide service to areas along the corridors that are not currently served by stops. Suggested new bus stop locations include:

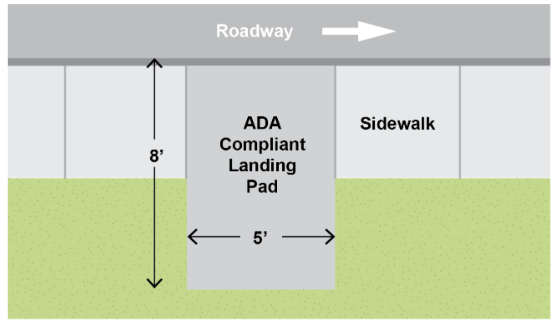
- Route 59
- Route 25 near Judd Road and Victoria Drive
- Spring Hill Road
- The intersection of Routes 25 and 111
- Route 111 at Old Mine Road, Trefoil Drive, Spring Hill and Purdy Roads
- Route 111 at Route 110 (if service is expanded to this area)

Bus Shelters and Waiting Areas

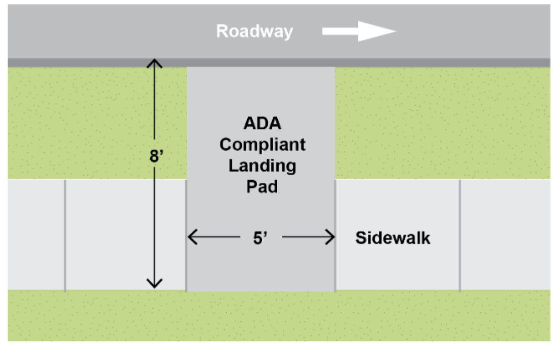
Paved bus waiting areas of sufficient size to accommodate an ADA compliant landing pad (required for operation of wheel chair lifts) are recommended at all bus stop locations. Bus shelters and benches are also recommended where space and sight-lines (shelters should not obstruct critical sight-lines at intersections) permit. Bus shelter designs should be selected in coordination with both towns, to ensure that shelters are architecturally suitable for each community.

The preferred surface for the ADA compliant landing pad is concrete. The pad must be a minimum of 5 feet wide by 8 feet deep without obstruction within that area. When accompanied by a shelter, the landing pad may extend into the shelter, providing there are no obstructions such as shelter posts or benches.

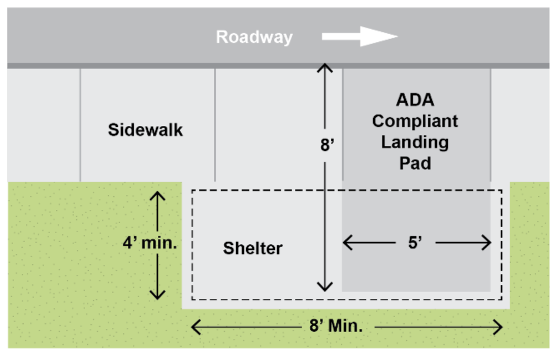
Shelters typically range in depth from a minimum of 4 feet to 6 feet and range in length from 8 feet to 18 feet. Benches are only provided if the shelter is large enough to accommodate without obstructing with the ADA landing pad area if that area falls within the shelter.



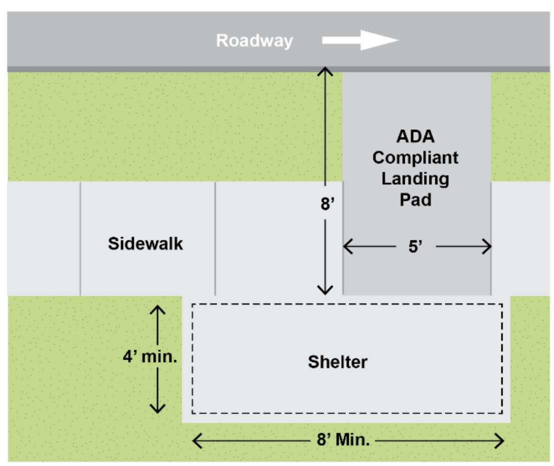
ADA Compliant Bus Landing Pad: Sidewalk Adjacent to Curb



ADA Compliant Bus Landing Pad: Sidewalk Offset from Curb



Bus Shelter and ADA Compliant Bus Landing Pad: Sidewalk Adjacent to Curb



Bus Shelter and ADA Compliant Bus Landing Pad: Sidewalk offset from curb

Bus Shelter and Waiting Area Layout

The installation of shelters and benches will require the establishment of a maintenance agreement between the Towns, CTDOT, and GBT.

Bus Shelter Examples

4.1.8 Plans AM-1 through AM-18: Access Management

Access management is the practice of regulating access to land to facilitate safe and adequate access while preserving safe and efficient traffic flow on the surrounding roadway system. Access management focuses on ensuring the safety of travel and minimizing potential conflict points (locations where vehicles can cross paths) which in turn helps to maintain the smooth flow of traffic along a roadway. Maintaining smooth traffic flow can reduce the need for roadway widening induced by growing congestion.

Access design characteristics of a roadway that directly impact traffic flow and safety include the location, spacing, and design of driveways as well as the location of signals, medians and turn lanes. Planning and regulatory tools that can manage access include the plan of conservation and development, transportation plans, zoning regulations, subdivision regulations, and specific local ordinances adopted to control driveway location and construction.

The following sections summarize the benefits, typical design guidelines, implementation procedures including zoning regulation recommendations and access management guidelines/tools to assist both municipalities to enact access management principles along both Route 25 and Route 111. The final section includes a discussion of specific access management treatments along the existing corridors or for planned developments that can be progressed where possible as development and redevelopment occurs.

Benefits

Access management has the following benefits:

- Ensure that traffic can access land uses safely and efficiently and that traffic generated by local development will not create congestion or induce accidents. Access management can, by limiting the number and location of curb cuts, help ensure that potential conflicts between vehicles and pedestrians can be minimized.
- Can improve or protect the quality of the pedestrian environment. The fewer driveway openings with cars and trucks that a pedestrian needs to navigate along the sidewalk, the safer and more inviting the walking experience will be.
- Can help improve access to local roads which also serves economic development goals.
- Access management can help maintain the safety and capacity of roadways relative to the functions they are expected to serve.

Typical Design Guidelines/Standards

The following are typical design guidelines/standards that might be adopted to facilitate proper access management:

- Driveways should/shall intersect public streets at an angle greater than or equal to 60 degrees
- Corner Lot driveways should/shall be located as far from the intersection of the street lines of the lot as is practical, but a driveway shall not be located within 50 feet of such intersection.
- Access drives should/shall not be located within the functional area of an intersection unless they are incorporated into the intersection operation.
- Driveways serving the same lot should/shall be at least 150 feet apart (measured centerline to centerline), unless they are one-way driveways.
- All curb cuts and/or roadway intersections on opposite sides of the roadway should/shall be aligned directly opposite one another
- Sight Distance – Apply CTDOT Highway Design Manual criteria based on measured travel speed.
- Maximum Driveway Widths:
    - 26-30 (varies by Town) feet maximum driveway width, measured at and parallel to the street line, except for non-residential drives with a raised median divider.
    - 40-44 feet (varies by Town) maximum width of a non-residential driveway with a median divider, measured at and parallel to the street line.
    - *Driveways in excess of the maximum width may be allowed if there is a demonstrated need to accommodate multiple traffic queuing lanes or the turning movements of long-wheelbase vehicles such as tractor-trailers.*

- Minimum Driveway Widths:
    - 20 feet minimum width for two-way non-residential driveways.
    - 12 feet minimum width for one-way non-residential driveways.

Implementation Procedures

The recommended strategy for implementing access management within the study area is to integrate access management design guidelines or standards within the zoning codes of Trumbull and Monroe. This can take the form of an access management overlay zone or can be applied to all zones within the community. Access management provisions can be prescriptive (required by zoning) or can be in the form of guidelines (non-mandatory advisory recommendations).

The Towns of Trumbull and Monroe should consider integrating access management guidelines or standards as recommended above. The Town of Monroe has limited provisions in place via its zoning regulations. These should be expanded to provide additional guidance regarding location of driveways relative to intersections and driveway width. Specific recommendations for the Town of Monroe are as follows:

<table>
<tr><th>Town of Monroe Chapter 117 Code of the Town of Monroe Zoning Regulations</th><th>Recommended Section Number</th><th>Recommended Regulations</th></tr>
<tr><td rowspan="3">New Recommended Section:
§ 6.1.18. Access Management.</td><td>A.</td><td>All curb cuts and/or roadway intersections on opposite sides of the roadway should be aligned directly opposite one another.</td></tr>
<tr><td>B.</td><td>Maximum Driveway Widths:
26 feet maximum driveway width, measured at and parallel to the street line, except for non-residential drives with a raised median divider.
40 feet maximum width of a non-residential driveway with a median divider, measured at and parallel to the street line.
Driveways in excess of the maximum width may be allowed if there is a demonstrated need to accommodate multiple traffic queuing lanes or the turning movements of long-wheelbase vehicles such as tractor-trailers.</td></tr>
<tr><td>C.</td><td>Minimum Driveway Widths:
20 feet minimum width for two-way non-residential driveways.
12 feet minimum width for one-way non-residential driveways.</td></tr>
</table>

The Town of Trumbull has limited regulations regarding site access. The following access standards are recommended for addition to Article IV Garages, Parking Spaces, and Loading Areas.

Town of Trumbull Zoning Regulations	Recommended Section Number	Recommended Regulations
Article IV-Garages, Parking Spaces and Loading Areas	5.	Title: "Site Access Standards"
	5.1	Driveways shall intersect public streets at an angle greater than or equal to 60 degrees.
	5.2	For corner lots, driveways shall be located as far from the intersection of the street lines of the lot as is practical, but a driveway shall not be located within 50 feet of such intersection.
	5.3	Access drives should not be located within the functional area of an intersection.
	5.4	Driveways serving the same lot shall be at least 150 feet apart (measured centerline to centerline), unless they are one-way driveways.
	5.5	All curb cuts and/or roadway intersections on opposite sides of the roadway should be aligned directly opposite one another.
	5.6	Maximum Driveway Widths: 30 feet - maximum driveway width, measured at and parallel to the street line, except for non-residential drives with a raised median divider. 44 feet - maximum width of a non-residential driveway with a median divider, measured at and parallel to the street line. *Driveways in excess of the maximum width may be allowed if there is a demonstrated need to accommodate multiple traffic queuing lanes or the turning movements of long-wheelbase vehicles such as tractor-trailers.*
	5.7	Minimum Driveway Widths: 20 feet minimum width for two-way non-residential driveways. 12 feet minimum width for one-way non-residential driveways.

Access Management Tools

In addition to zoning code provisions, multiple tools can be used to encourage the implementation of access management. This includes:

1. The requirement of a Traffic Impact Analysis and Third Party Review for all proposed developments
2. Addressing non-conforming accessways/driveways
3. The provision of incentives

1. Traffic Impact Analysis and Third Party Review

A Traffic Impact Analysis (TIA) may be required by a planning and zoning commission for new development and redevelopment projects particularly under the following conditions:

- When the access point is on a State road or major arterial
- When the access point could create traffic impacts that affect intersecting state roads or major arterials or their intersections
- Where the access point results in traffic impacts that, based on P&Z review, are considered to be potentially significant enough to warrant a detailed engineering evaluation

A TIA should conform to standard accepted traffic engineering practices and generally include the site driveway(s) and potentially impacted intersections. Standard elements of a TIA should include:

- Existing and future traffic estimation
- Review of crash data and a safety analysis
- Trip generation and distribution analysis
- Capacity analysis (for both site access and adjacent roadway network)
- Engineering design review including sight distance analysis
- Internal site circulation review
- Identification of improvements necessary to accommodate the development
- Coordination preview with Town Engineer, Town Planner or P&Z Administrator, and P&Z Commission.

In cases where a full TIA is not warranted, but some questions arise during the preliminary application review relating to safety and operations potentially resulting from a proposed new driveway or system of access design, the P&Z Commission may elect to require the applicant to prepare an engineering analysis of the proposed access point(s).

The engineering analysis may be 'tiered' to include some, or all, of the elements listed above for the TIA; however, the analysis may be limited to the access point(s) in question and may not take into account the surrounding roadway network. The tiered analysis approach is intended to answer only those questions regarding site access design that require further investigation and to streamline the approval process. The determination of which components of a TIA analysis will be required to be completed will be based on:

- Aspects of site access in question
- Professional judgment of the Town Engineer and Town Planner
- Professionally accepted engineering practices

A Third Party Review of the TIA and other related application materials may also be required for developments in the study area as a means of providing an objective review of a proposed development's impacts with respect to access management and traffic operations.

2. Addressing Nonconforming Accessways/Driveways

The following sample language could be incorporated into zoning regulations to assist with addressing nonconforming accessways and driveways (language provided below that is redundant with other sections of the code should be omitted):

> Nonconforming access features are those access points or driveways in existence and lawful at the time of adoption of this section of the zoning regulations, but which would be prohibited, regulated or restricted under the provisions of this section. Such nonconforming access features are considered incompatible with the intent and purposes of this section. It is the intent of these regulations to permit these nonconforming access features to continue until they are removed or until any substantial change to an existing use is approved on the lot where the nonconforming access feature exists. After the effective date of adoption of this section of the zoning regulations, no nonconforming access feature may be moved, extended, or enlarged unless the result will be to bring the access into closer compliance with these Access Management Regulations.
>
> Substantial Change to an Existing Use: The provisions of this section shall apply to any Substantial Change to an Existing Use. The provisions of this section shall also apply to any Change to an Existing Use requiring site plan approval or modification of an existing approved site plan, as defined in Section ___ of these regulations. A substantial change" is one which involves (1) a change in use from residential to any commercial or industrial use, (2) a __% or greater increase in gross floor area or required parking spaces of any non-residential land use, (3) a ___square foot or greater increase in gross floor area, (4) a ___ space or greater increase in the required or provided parking spaces. Notwithstanding the above, the Commission may determine that the character of a Change to an Existing Use will not have an impact on adjacent properties and/or surrounding neighborhood such that this requirement does not apply.

3. Provision of Incentives

Incentives could be used to improve access management. Under an incentive-based policy, an increase in the intensity of a proposed development could be granted by the Planning and Zoning Commission where a development plan complies with all required access management provisions and provides one or more of the following additional benefits to the community:

- Improvement of the Level of Service on existing intersections in the vicinity of the proposed project
- Reduction in the number of existing access points onto a public street, or would result in fewer access points than would otherwise be permitted
- Provides shared access connections between adjoining uses to eliminate or reduce curb cuts and the demand for turning movements onto or from a public street to or from those properties
- Provides shared access in the form of access easements for adjoining properties which are not otherwise required or obtains access through an easement across adjoining property which is not otherwise required.
- Provides expanded pedestrian and transit circulation improvements which enhance the movement of travelers within the site and/or the community

Such density bonuses may include a reduction in parking space requirements, a modification of signage requirements, an increase in floor area ratios, an increase in allowable building coverage, or other similar incentive.

Access Management Plan for Routes 25 and 111

The Access Management Plan (Plans AM-1 through AM-18) illustrates a number of improvements that could establish improved property access, while also enhancing traffic flow, traffic safety, and the quality of the pedestrian environment where sidewalks are present. Specific recommendations include:

- Closure of driveways (where other means of access are present or could be provided)
- Reduction of driveway width
- Establishment of interconnections between adjacent parcels
- Construction of new driveways (to replace driveways that are recommended for closure so as to maintain site access)
- Restriction of driveways to exit or enter only

4.1.9 Other Improvements

In addition to the recommended improvements outlined in the previous sections, there are locations adjacent to the study area that were identified to likely require mitigating improvements due to existing and future congestion. Although capacity analyses were not conducted at these locations, the need for improvements is based on empirical observations of corridor operations and feedback from members of the public. The following improvements should be investigated when planning for adjacent projects or as the need arises from deteriorating traffic operations:

Route 25 at Clock Tower Plaza

The northernmost limit of the Route 25 study area is the intersection with Route 59 (Easton Road). However, issues with congestion extend farther north through the signalized intersection with the Clock Tower Plaza driveway, located approximately 800’ north of Route 59. There are existing issues with queueing between the two closely spaced intersections resulting in blocking and lengthy delays. This is likely to be exacerbated by the addition of background traffic growth and future development volumes. Therefore, it is recommended that the existing southbound right turn lane on Route 25 be converted into a shared through-right lane. It is anticipated that the existing driveway and northbound Route 25 configurations will be sufficient to accommodate 2040 traffic volumes. It appears that ROW impacts will be reasonable with minimal impacts on the surrounding properties. This work should be conducted in conjunction with Plans 14 & 15 (Project 4) in order to coordinate the widening of the corridor and address all the operational issues along that segment of Route 25.

Cross Hill Road at Elm Street

The intersection of Cross Hill Road and Elm Street currently operates under all-way stop control. It was observed that issues with traffic congestion exist there today and are expected to worsen over time. Similar to the intersection of Cutler’s Farm Road and Purdy Hill Road, this intersection should be monitored for deteriorating operations. The installation of a traffic signal should be considered once volumes meet traffic control signal warrants. Signalization appears to be achievable with minimal impacts to the surrounding properties. Additionally, pedestrian accommodations should be implemented into the signal design in order to facilitate the existing sidewalks, ramps, and painted crosswalks; especially if it is determined that turn lanes will be required.

Section 5
Implementation Plan

The implementation plan identifies and prioritizes recommended improvements that can be planned, programmed, and built as funding becomes available and project need is realized. The implementation plan includes the overall project costs, complexity, and benefit. This section of the report seeks to provide the Towns of Monroe and Trumbull, CTDOT, and METROCOG a menu of projects with guidance for implementation over time based on a series of qualitative and quantitative metrics.

5.1 Transportation Improvement Program

The Transportation Improvement Program (TIP) includes 17 improvement projects that address the roadway network, transit system, and pedestrian and bicycle mobility and safety needs in the study area. The TIP recommends physical roadway improvements and identifies numerous improvements to enhance pedestrian, bicycle, and transit access to the roadway system through construction of new and improved facilities for alternative mode travelers. These alternative transportation mode recommendations are shown on the concept plans (Plans 1 through 25 in Appendix C), where applicable. Additionally, the alternative mode enhancements are shown collectively in Plans B&P and T in Appendix C.

5.1.1 Project Categorization

The TIP classifies projects as small, medium, and large based on project size, complexity, and project cost. The projects are also prioritized as short-term, mid-term, and long-term to represent when implementation of the project is anticipated to be necessary. A short-term project prioritization indicates an immediate need for the project to address an existing deficiency or operational concern. Conversely, a project prioritized as long-term is intended to address an anticipated future issue or need such as operational issues that are expected to occur due to future traffic growth. Table 5.1 provides additional information related to the project type categorization metric utilized in the TIP.

TABLE 5-1
Project Type Characteristics

Project Type	Implementation Time	Complexity	Approximate Project Cost
Small	Less than 3 years	Low	Less than $1 million
Medium	Between 3-6 years	Moderate	$1 million - $2 million
Large	More than 6 years	High	More than $2 million

Implementation time refers to the time frame required to initiate a project, conduct the remaining planning and engineering design work required to prepare the project for construction, and to initiate constructing the improvement assuming that funding for all phases of the project is available. Section 5.2.1 identifies potential funding sources to support the implementation of each project. Implementation time is not intended to indicate the priority or a relative timeframe with respect to the completion of this Study, but rather to provide planners and decision makers with a measurement of the potential total time to implement the improvements from the date of initiation.

The complexity of each project has been established based on the overall effort to plan, design, and construct the improvement. Several metrics were considered in the establishment of each project's relative complexity. Projects are categorized into Low, Moderate, and High Complexity based on the qualitative metrics described in Table 5-2.

TABLE 5-2
Summary of Project Complexity Characteristics

Complexity Level	Project Characteristics
Low Complexity	• Little to no additional planning needed - concept planning sufficient to proceed into design • Design effort is limited and typical • None to minor right of way action • Environmental resource impacts and permitting requirements are very low • Utility impacts are considered minor or not anticipated • Project has broad support by both policymakers and the public
Moderate Complexity	• Additional planning required to define comprehensive project scope • Detailed design effort needed to define construction and impacts • Right of way impacts and acquisitions anticipated • Environmental impacts and permitting expected • Comprehensive environmental documentation under CEPA/NEPA not anticipated • Potential for utility impacts and relocations • Project costs require additional planning to identify funding well in advance of project initiation
High Complexity	• Significant planning still required to define project • Environmental documentation to meet CEPA/NEPA regulations is likely required prior to initiation of the design phase • Detailed design effort following planning is required • Significant right of way actions and acquisitions needed – private ownership coordination • Major environmental impacts, significant State & Federal permitting process, and agency involvement at all levels of government • Major utility relocations and design efforts to coordinate Project costs require additional planning to identify funding well in advance of project initiation

Project costs have been estimated following the guidelines published by the Connecticut Department of Transportation and are presented in 2018 dollars. Project costs may require inflation factors looking out into the future to determine actual funding needs for funding programming. The "Preliminary Cost Estimating Guidelines" provide unit costs and percentage based lump sum costs to facilitate the estimation of project costs at the Preliminary Engineering level of project development. The approximate project costs presented in this Study are limited to the construction item costs and exclude costs related to rights of way actions and environmental remediation and engineering. The estimates include contingency (25%) and incidentals (25%) in the total opinion of probable costs for each project.

5.1.2 Project Prioritization

The priority for each of the recommended improvement projects has been established based on two primary criteria: project necessity and local interest for implementation. Project necessity is based on the urgent need to mitigate an existing deficiency within the overall transportation system. Projects are deemed to have a higher priority when they address an identified safety deficiency, address accessibility, or mitigate a current mobility or operational issue. The project priority categories are defined at Short-Term, Mid-Term, and Long-Term based on the criteria described in Table 5-3.

TABLE 5-3

Summary of Project Need Priority Metrics

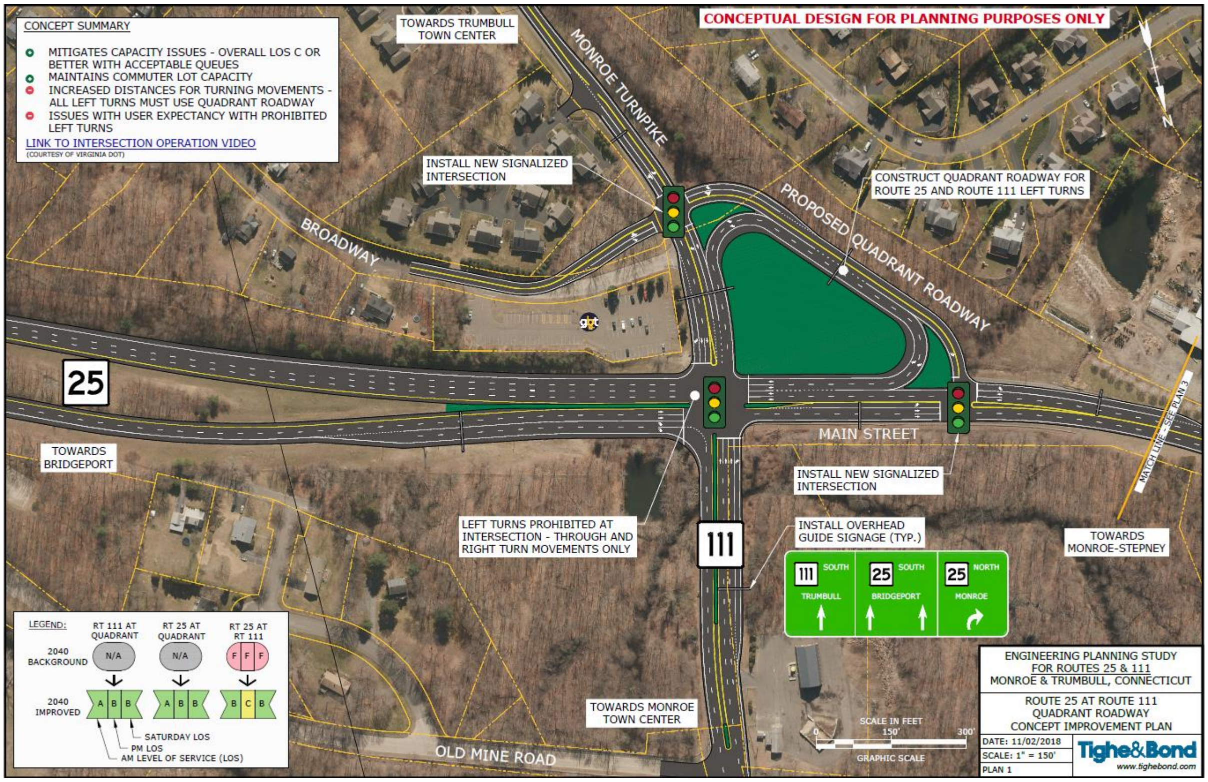
Project Priority	Project Characteristics
Short-Term	• Project addresses an urgent safety issue • Project is intended to address an existing operational deficiency • Project addressed a deficiency in accessibility that has been identified as a local concern
Mid-Term	• Project scope provides operational and mobility benefits that are currently an issue, but traffic operations are not poor or failing • Local stakeholders have expressed interest in implementing the improvement to enhance the transportation system
Long-Term	• Project does not address an identified safety concern • Project addresses future travel demand and traffic operations • Project may have mobility, accessibility, or multi-modal benefits

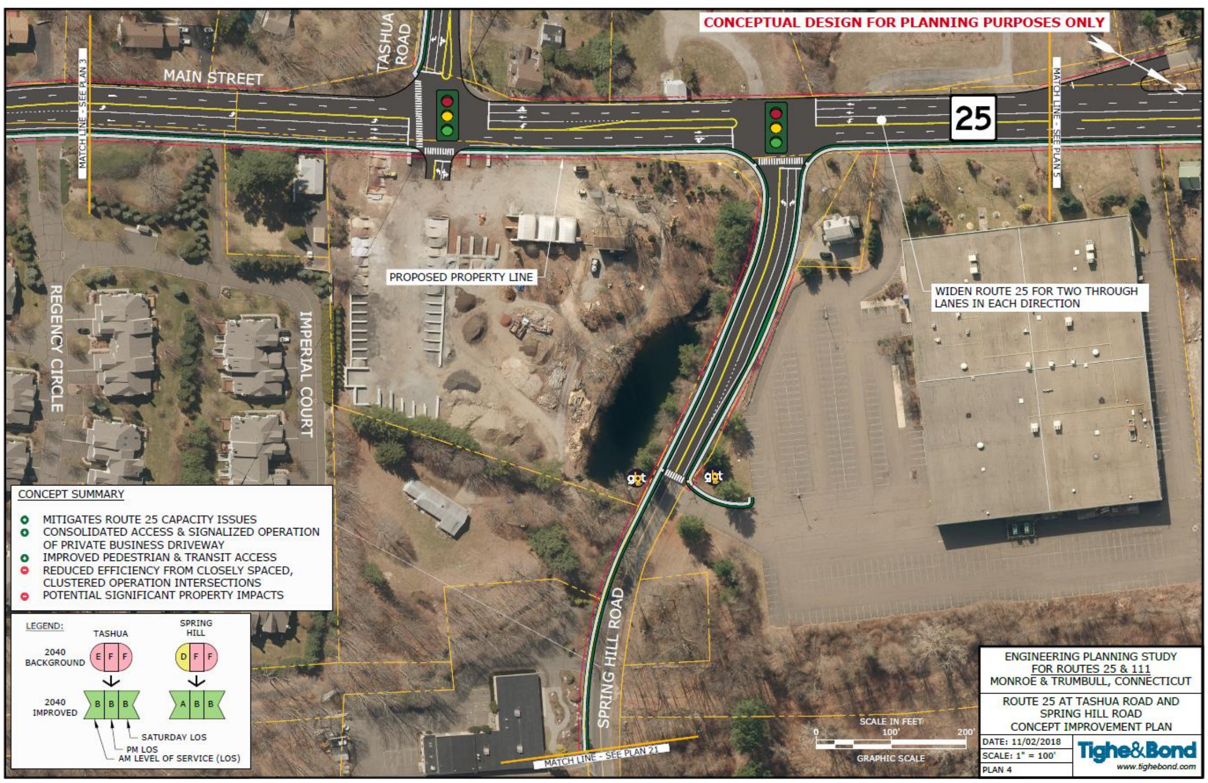
In addition to the priority assigned to the project based on project need, input from the Towns and METROCOG was obtained for each of the projects to determine their relative importance from a local and regional planning and policy perspective. The overall priority presented for each of the projects is predominately based on transportation need. However, in cases where the Towns or METROCOG has indicated that a project is a higher priority to address local interests, adjustments have been made to factor local input into the prioritization process.

5.1.3 Recommended Projects Summary

The following section outlines each of the recommended proposed improvement projects and describes them in terms of the scope of the improvements, project type, priority, estimated project cost, and required development and construction permits (See Section 5.2.2.3 for Additional Permitting and Compliance). It should be noted that some priorities described in this report are subjective and founded in the policies and goals of the Towns, METROCOG, and project stakeholders at the time of implementation. The local and regional priorities should continue to be reviewed and evaluated to determine if changes to the priorities of the recommendations are needed to remain current with local and state trends, policies, and priorities as well as the conditions within the study area.

Project 1 (At-Grade): Route 25 (Main Street) from Route 111 (Monroe Turnpike) to Spring Hill Road Improvements and Relocate Pequonnock River Trail Crossing (Plans 1, 3, 4, 5, & 14)			
Project Goals:	Improve Route 25/111 intersection operations by increasing capacity and safety; implement Route 25 four-lane cross-section north of 25/111 intersection area; improve safety by restricting left turns along Route 25; improve trail safety by eliminating Route 111 crossing	**Project Type:**	Large
		Project Complexity:	High
		Project Priority:	Short-Term
		Project Cost:	$22 Million
Major Project Elements:	• Construct Route 25 at Route 111 Quadrant intersection: o Prohibit left turns at the Route 25 and 111 intersection and widen both roadways to provide additional through capacity o Construct quadrant roadway southwest of the intersection to accommodate left turn movements restricted at the main intersection o Signalize intersections at both ends of the quadrant roadway with free flow right turns onto and off of the quadrant roadway o Realign Broadway across from the quadrant roadway intersection on Route 111 o Provide overhead guide signage on all approaches to direct turning traffic • Widen Route 25 north of Route 25 at Route 111 Intersection: o Widen Route 25 to four lanes (two travel lanes in each direction) o Remove landscaping and vegetation at Regency Meadows Driveway o Improve safety by installing raised median between Route 111 and Tashua Road to restrict left turns into and out of properties – provide median breaks for select left turns or U-turns as needed o Relocate commercial driveway directly across from Tashua Road and incorporate into traffic signal • Relocate Pequonnock River Trail to new alignment under new Route 111 bridge • Provide bicycle, pedestrian, and transit accommodations		
Permits:	• Town roadway construction permits for construction within Town right-of-way • CTDOT approval and/or encroachment permit for construction within CTDOT right-of-way • Environmental permitting requirements		





Note: Project 1 requires implementation of Plan 4, however Plan 4 can be implemented as a standalone project

Project 1 (Grade Separated): Route 25 (Main Street) from Route 111 (Monroe Turnpike) to Spring Hill Road Improvements and Relocated Pequonnock River Trail Crossing (Plans 2, 3, 4, 5, & 14)

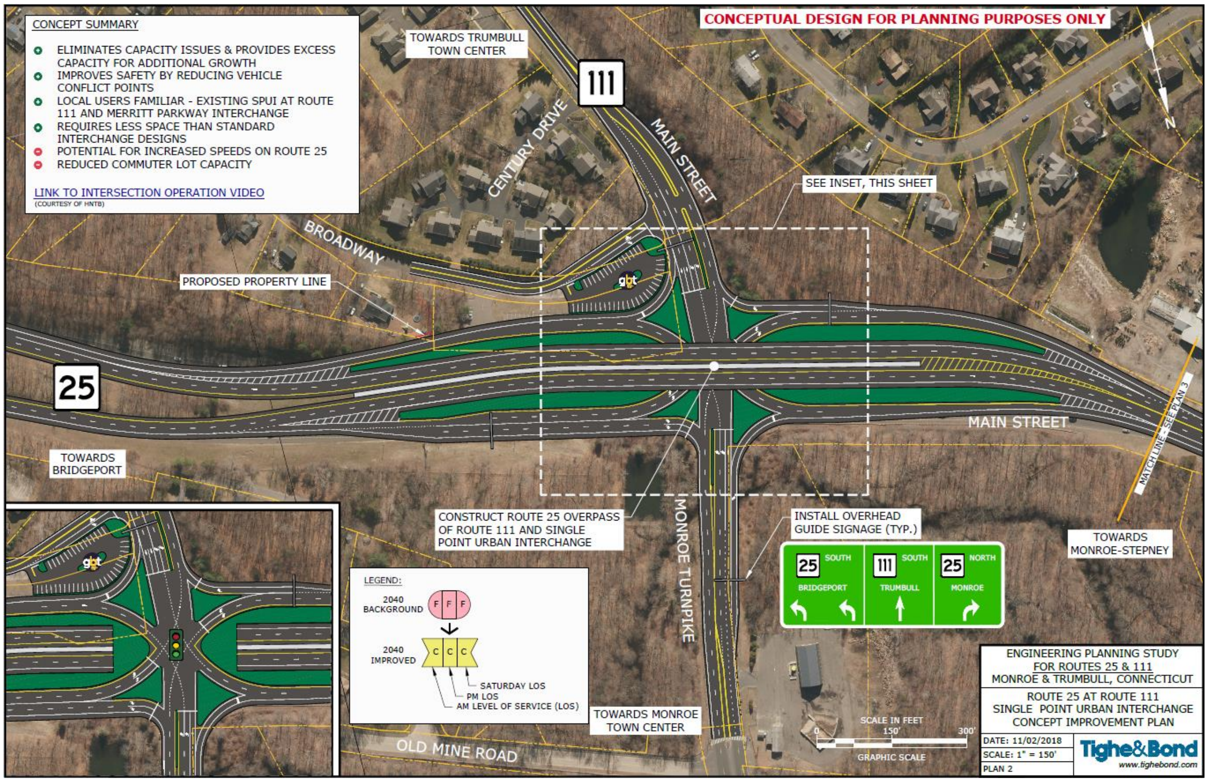
Project Goals:	Improve Route 25/111 intersection operations by increasing capacity and safety; implement Route 25 four-lane cross-section north of 25/111 intersection area; improve safety by restricting left turns along Route 25; improve trail safety by eliminating Route 111 crossing	**Project Type:**	Large
		Project Complexity:	High
		Project Priority:	Short-Term
		Project Cost:	$45 Million

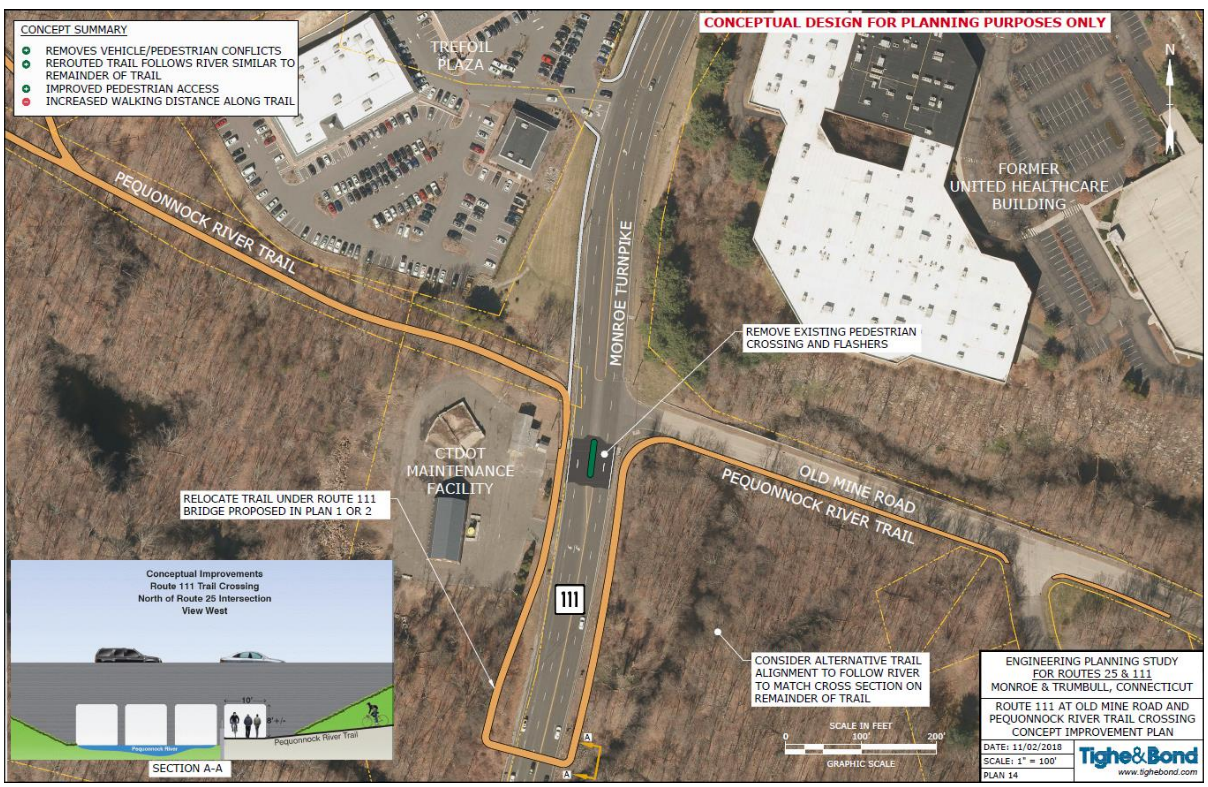
Major Project Elements:

- Construct Single Point Urban Interchange:
    - Grade separate Route 25 over Route 111
    - Create one signalized intersection to process all vehicles through interchange
    - Realign Broadway to the south
    - Reconfigure existing commuter lot
    - Widen and restripe Route 111
- North of Route 25 at Route 111 Intersection:
    - Widen Route 25 to four lanes (two travel lanes in each direction)
    - Remove landscaping and vegetation at Regency Meadows Driveway
    - Install raised median between Route 111 and Tashua Road to restrict left turns into and out of properties – provide median breaks for select left turns or U-turns as needed
    - Relocate landscaping business driveway across from Tashua Road and incorporate into signal
- Relocate Pequonnock River Trail to new alignment under new Route 111 bridge
- Provide bicycle, pedestrian, and transit accommodations

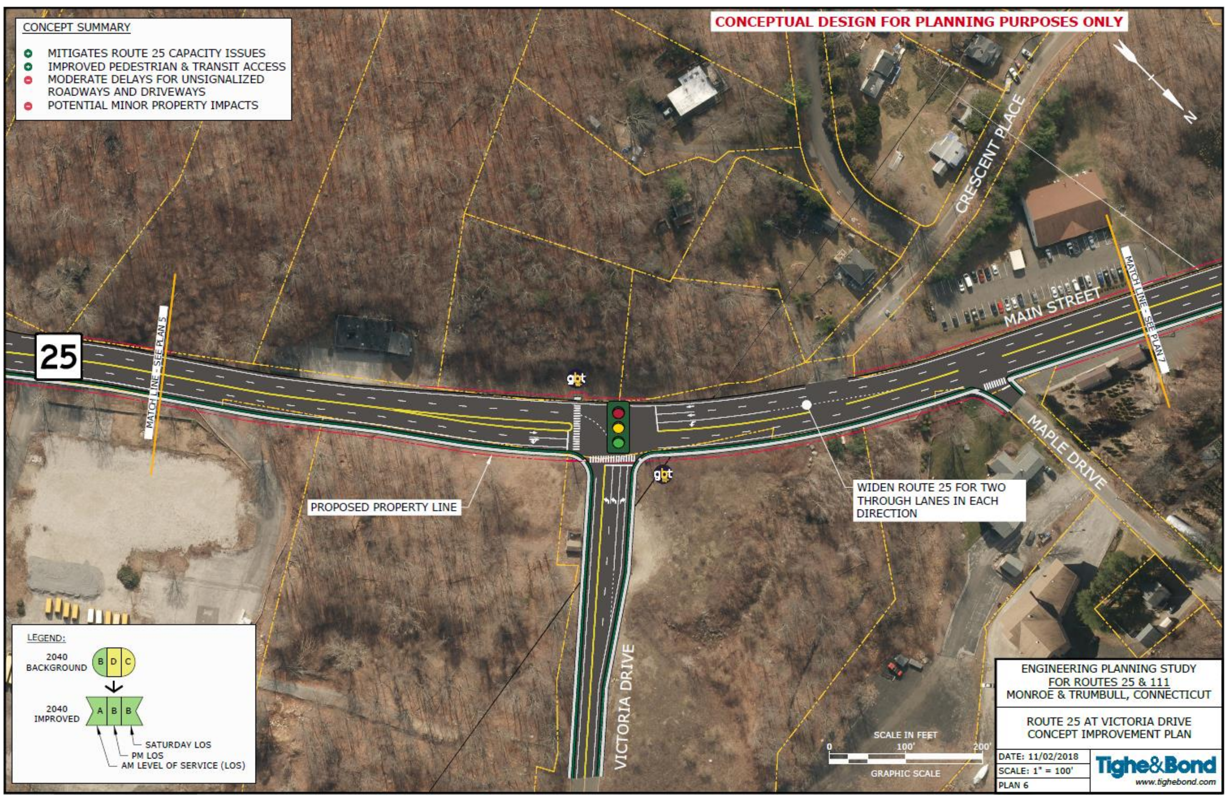
Permits:

- Town roadway construction permits for construction within Town right-of-way
- CTDOT approval and/or encroachment permit for construction within CTDOT right-of-way
- Environmental permitting requirements

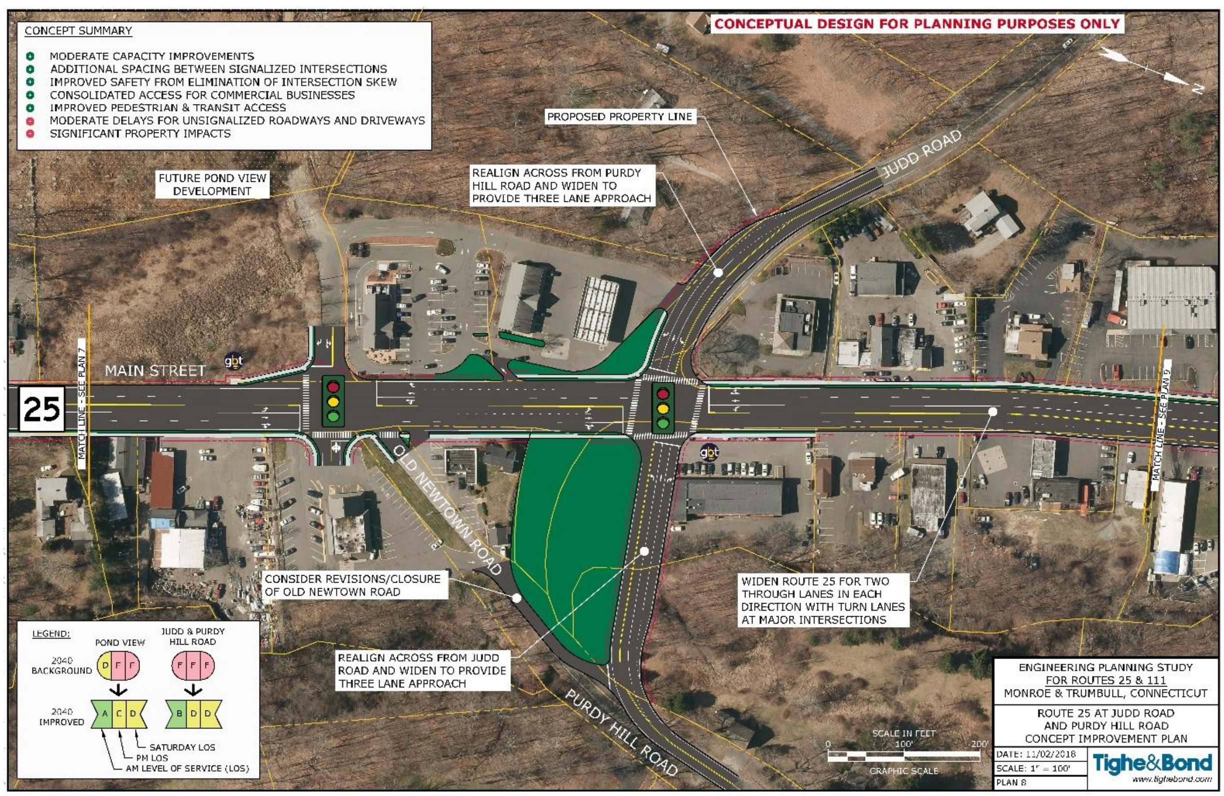

CONCEPTUAL DESIGN FOR PLANNING PURPOSES ONLY
CONCEPT SUMMARY
ELIMINATES CAPACITY ISSUES & PROVIDES EXCESS CAPACITY FOR ADDITIONAL GROWTH
IMPROVES SAFETY BY REDUCING VEHICLE CONFLICT POINTS
LOCAL USERS FAMILIAR - EXISTING SPUI AT ROUTE 111 AND MERRITT PARKWAY INTERCHANGE
REQUIRES LESS SPACE THAN STANDARD INTERCHANGE DESIGNS
POTENTIAL FOR INCREASED SPEEDS ON ROUTE 25
REDUCED COMMUTER LOT CAPACITY
LINK TO INTERSECTION OPERATION VIDEO
(COURTESY OF HNTB)
TOWARDS TRUMBULL TOWN CENTER
111
CENTURY DRIVE
MAIN STREET
SEE INSET, THIS SHEET
BROADWAY
PROPOSED PROPERTY LINE
25
TOWARDS BRIDGEPORT
MAIN STREET
MATCHLINE - SEE PLAN 3
CONSTRUCT ROUTE 25 OVERPASS OF ROUTE 111 AND SINGLE POINT URBAN INTERCHANGE
MONROE TURNPIKE
INSTALL OVERHEAD GUIDE SIGNAGE (TYP.)
25 SOUTH BRIDGEPORT
111 SOUTH TRUMBULL
25 NORTH MONROE
TOWARDS MONROE-STEPNEY
LEGEND:
2040 BACKGROUND
2040 IMPROVED
SATURDAY LOS
PM LOS
AM LEVEL OF SERVICE (LOS)
TOWARDS MONROE TOWN CENTER
OLD MINE ROAD
ENGINEERING PLANNING STUDY FOR ROUTES 25 & 111
MONROE & TRUMBULL, CONNECTICUT
ROUTE 25 AT ROUTE 111
SINGLE POINT URBAN INTERCHANGE
CONCEPT IMPROVEMENT PLAN
SCALE IN FEET
0 150' 300'
GRAPHIC SCALE
DATE: 11/02/2018
SCALE: 1" = 150'
PLAN 2
Tighe&Bond
www.tighebond.com


CONCEPTUAL DESIGN FOR PLANNING PURPOSES ONLY
CONCEPT SUMMARY
REMOVES VEHICLE/PEDESTRIAN CONFLICTS
REROUTED TRAIL FOLLOWS RIVER SIMILAR TO REMAINDER OF TRAIL
IMPROVED PEDESTRIAN ACCESS
INCREASED WALKING DISTANCE ALONG TRAIL
TREFOIL PLAZA
FORMER UNITED HEALTHCARE BUILDING
PEQUONNOCK RIVER TRAIL
MONROE TURNPIKE
REMOVE EXISTING PEDESTRIAN CROSSING AND FLASHERS
CTDOT MAINTENANCE FACILITY
OLD MINE ROAD
PEQUONNOCK RIVER TRAIL
RELOCATE TRAIL UNDER ROUTE 111 BRIDGE PROPOSED IN PLAN 1 OR 2
111
Conceptual Improvements
Route 111 Trail Crossing
North of Route 25 Intersection
View West
Pequonnock River
Pequonnock River Trail
SECTION A-A
CONSIDER ALTERNATIVE TRAIL ALIGNMENT TO FOLLOW RIVER TO MATCH CROSS SECTION ON REMAINDER OF TRAIL
SCALE IN FEET
0 100' 200'
GRAPHIC SCALE
ENGINEERING PLANNING STUDY FOR ROUTES 25 & 111
MONROE & TRUMBULL, CONNECTICUT
ROUTE 111 AT OLD MINE ROAD AND PEQUONNOCK RIVER TRAIL CROSSING
CONCEPT IMPROVEMENT PLAN
DATE: 11/02/2018
SCALE: 1" = 100'
PLAN 14
Tighe&Bond
www.tighebond.com

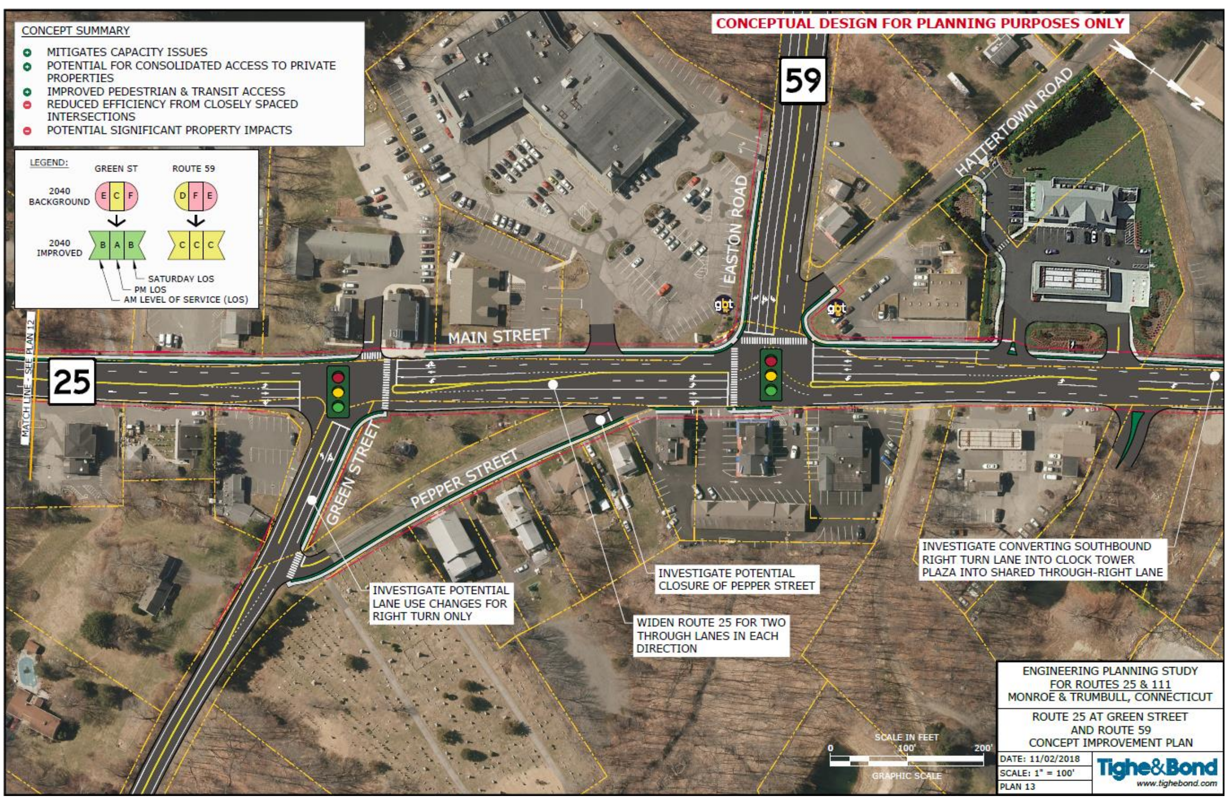
Project 2: Route 25 (Main Street) Corridor and Victoria Drive Intersection Area Improvements (Plan 6)			
Project Goals:	Improve Route 25 mainline capacity; improve intersection operations to mitigate future development and regional traffic growth; improve pedestrian mobility and access to transit	**Project Type:**	Medium
		Project Complexity:	High
		Project Priority:	Mid-Term
		Project Cost:	$2,500,000
Major Project Elements:	• Widen Route 25 to four lanes (two travel lanes in each direction) • Provide double-left turn lanes and an exclusive right turn lane out of Victoria Drive • Improve bicycle, pedestrian, and transit access, amenities, and mobility • Rights of Way actions		
Permits:	• Revised Office of the State Traffic Administration (OSTA) approval for the Victoria Drive development • Town roadway construction permits for construction within Town right-of-way • CTDOT approval and/or encroachment permit for construction within CTDOT right-of-way		



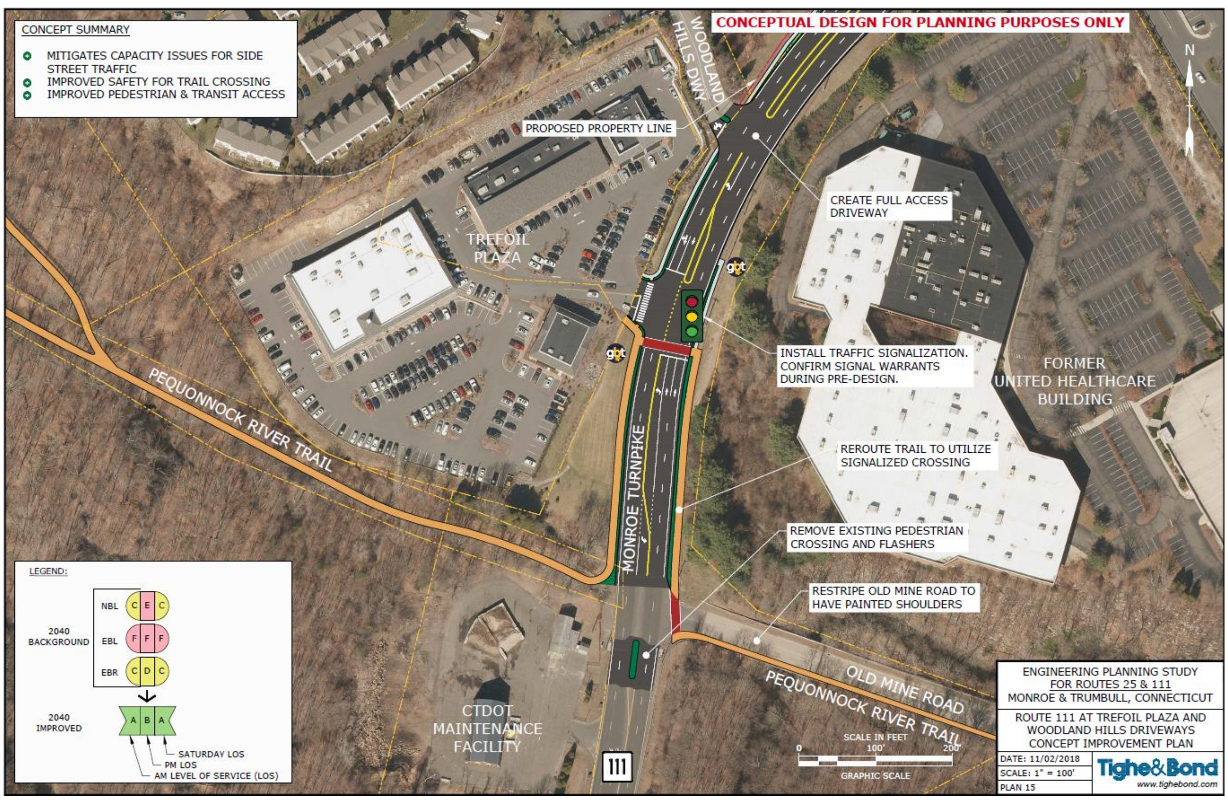
Project 3: Route 25 (Main Street) Corridor and Pond View Driveway / Judd Road & Purdy Hill Road Intersection Improvements (Plans 7, 8, & 9)			
Project Goals:	Improve Route 25 mainline capacity with four lane cross-section; improve intersection operations to mitigate future development and regional traffic growth; improve safety and intersection operational efficiency by realigning skewed intersection geometry; improve alternative mode mobility and access	**Project Type:**	Large
		Project Complexity:	High
		Project Priority:	Short-Term
		Project Cost:	$8,600,000
Major Project Elements:	• Widen Route 25 to four lanes (two travel lanes in each direction) • Widen Judd Road and Purdy Hill Road to include exclusive right turn lanes • Realign Judd Road and Purdy Hill Road with more conventional geometry farther north of the current intersection and consider revisions to Old Newtown Road • Remove frontage road adjacent to the west side of Route 25 and consolidate and extend parcel driveways to Route 25 • Improve bicycle, pedestrian, and transit access, amenities, and mobility • Significant Right of Way actions; the realignment of Purdy Hill Road would include the full taking of the commercial parcel on the northeast corner of the intersection		
Permits:	• OSTA approval for the Pond View development • Town roadway construction permits for construction within Town right-of-way • CTDOT approval and/or encroachment permit for construction within CTDOT right-of-way • Environmental permitting requirements		



Project 4: Route 25 (Main Street) Corridor from Brook Street to Route 59 (Easton Road) and Green Street and Route 59 Intersection Improvements (Plans 12 & 13)			
Project Goals:	Improve intersection operations by increasing capacity to mitigate congestion; continue the Route 25 four lane cross-section, and improve safety by realigning Brook Street; improve alternative mode access and mobility	**Project Type:**	Large
		Project Complexity:	High
		Project Priority:	Short-Term
		Project Cost:	$4,900,000
Major Project Elements:	• Widen Route 25 to four lanes (two travel lanes in each direction) north of Brook Street • Provide double left turn lanes from Route 25 North onto Route 59 • Realign Brook Street to be perpendicular to Route 25 and improve intersection sight distance by regrading and clearing vegetation • Investigate converting southbound right turn lane into Clock Tower Plaza into shared through-right lane • Improve bicycle, pedestrian, and transit access, amenities, and mobility • Right-of-way actions		
Permits:	• Town roadway construction permits for construction within Town right-of-way • CTDOT approval and/or encroachment permit for construction within CTDOT right-of-way		

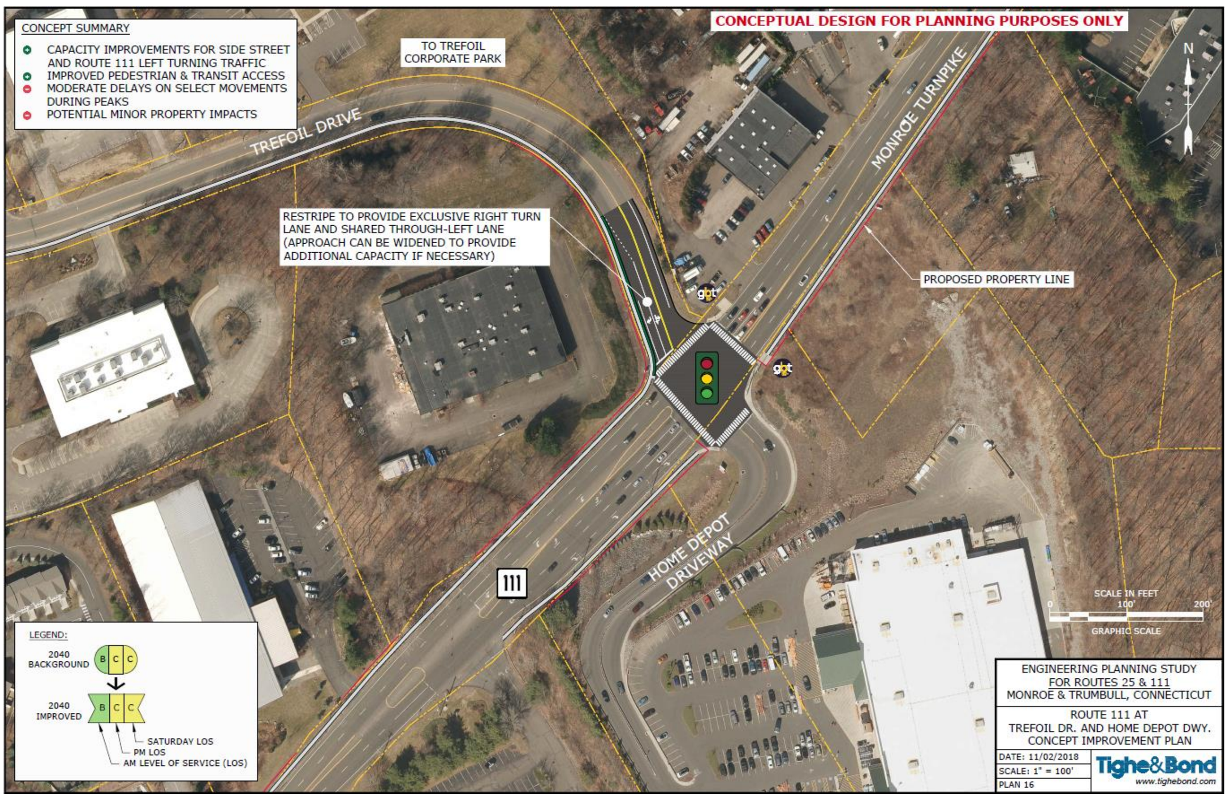


Project 5: Route 111 (Monroe Turnpike) at Trefoil Plaza and Woodland Hills Intersection Improvements (Plan 15)			
Project Goals:	Improve Trefoil Plaza driveway operations and safety through signalization; facilitate left turns into and out of Woodland Hills due to safety concerns arising from low compliance; improve trail safety; improve access and mobility for alternative travel modes	**Project Type:**	Medium
		Project Complexity:	Moderate
		Project Priority:	Short-Term
		Project Cost:	$1,500,000
Major Project Elements:	• Traffic control signalization of Trefoil Plaza driveway • Reroute Pequonnock River Trail to intersection and provide an exclusive pedestrian phase for crossing • Convert Woodland Hills driveway to unrestricted ingress/egress with a northbound left turn pocket on Route 111 • Restripe Old Mine Road to delineate shoulder width for bicyclists • Improve bicycle, pedestrian, and transit access, amenities, and mobility		
Permits:	• Revised OSTA approval for Trefoil Plaza development • CTDOT approval and/or encroachment permit for construction within CTDOT right-of-way • Environmental permitting requirements		

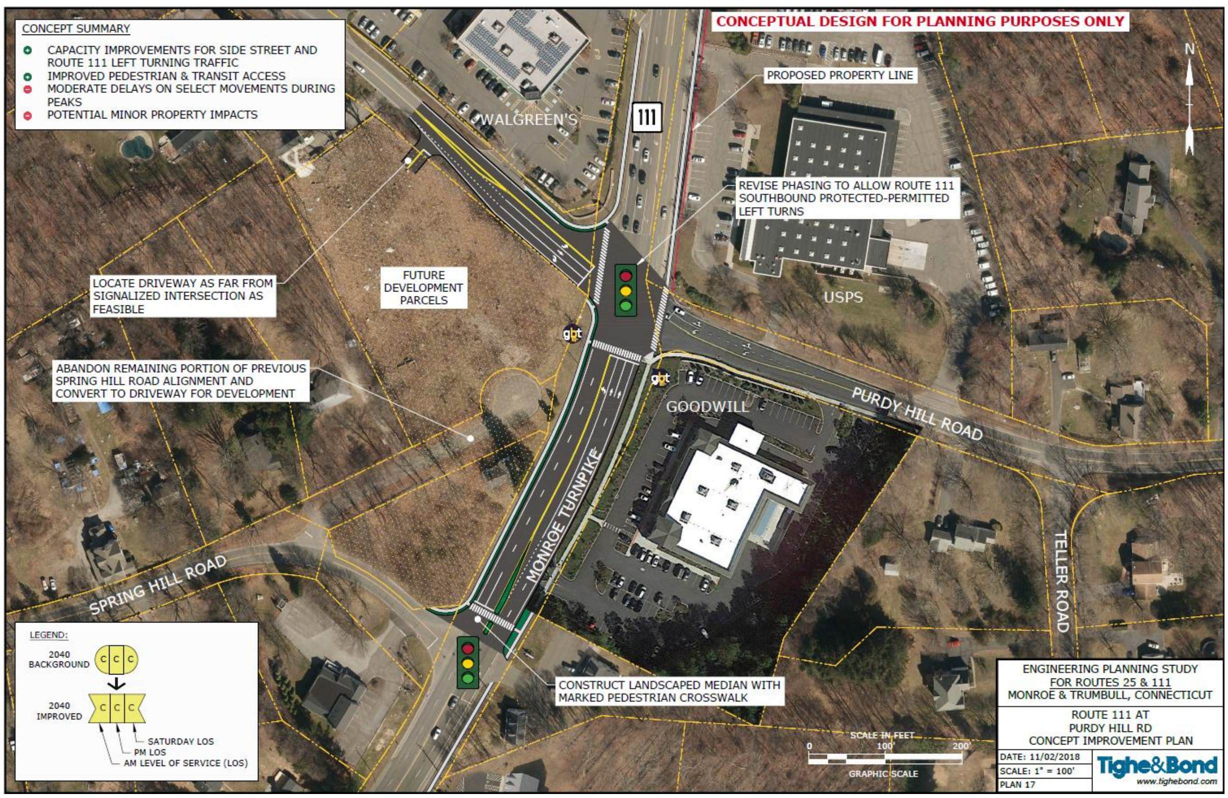


Note: The Town of Trumbull and METROCOG are currently pursuing a grant under the CTDOT Local Transportation Capital Improvement Program to fund this project.

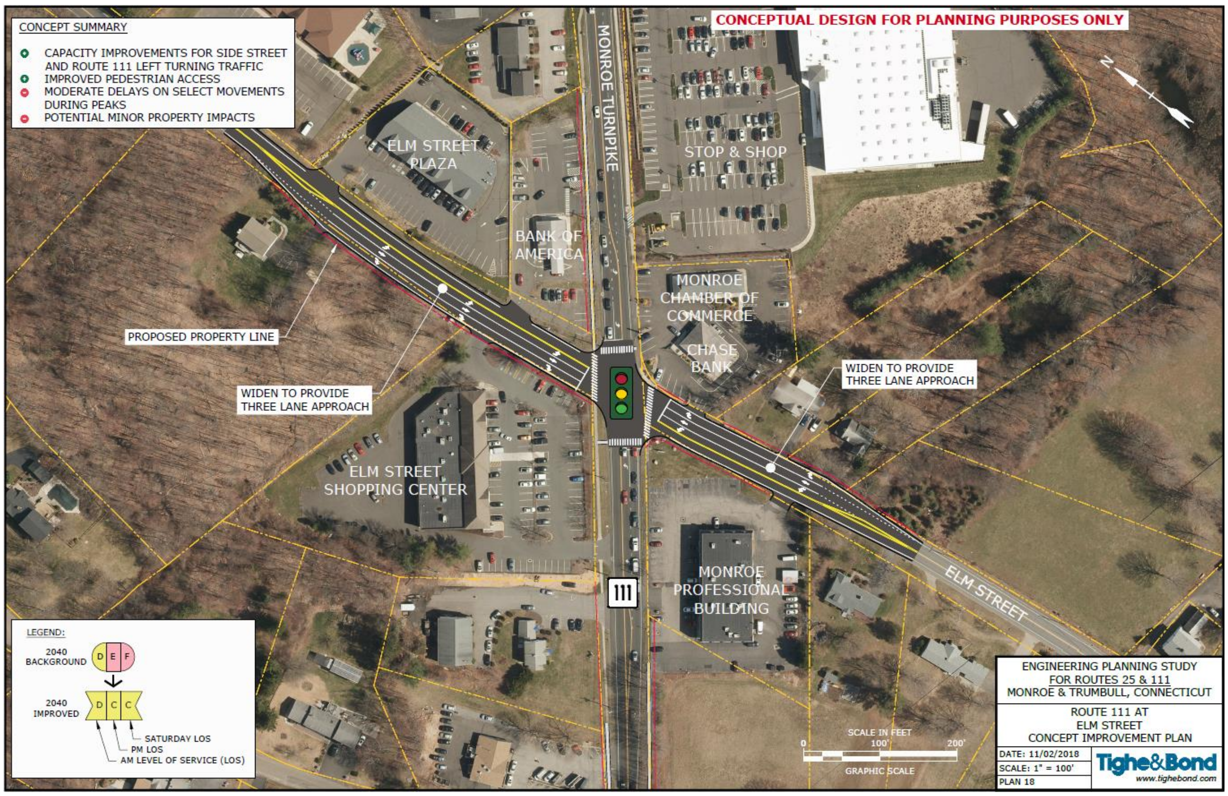
Project 6: Route 111 (Monroe Turnpike) at Trefoil Drive Intersection Improvements (Plan 16)			
Project Goals:	Improve intersection operations and capacity by modifying lane use	**Project Type:**	Small
		Project Complexity:	Low
		Project Priority:	Long-Term
		Project Cost:	$80,000
Major Project Elements:	• Restripe Trefoil Drive to provide eastbound right turn and through-left lanes (minor widening along approach to provide additional capacity if necessary) • Improve bicycle, pedestrian, and transit access, amenities, and mobility		
Permits:	• Town roadway construction permits for construction within Town right-of-way • CTDOT approval and/or encroachment permit for construction within CTDOT right-of-way		



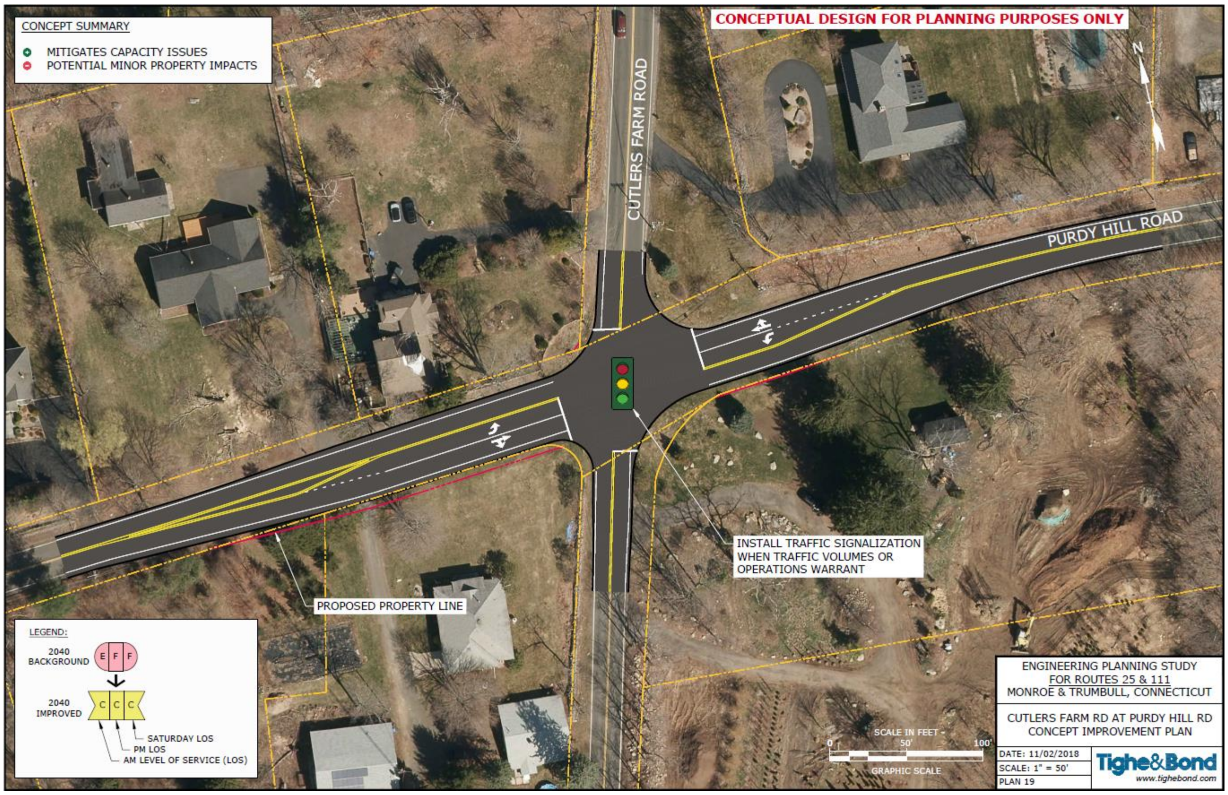
Project 7: Route 111 (Monroe Turnpike) at Purdy Hill Road Intersection Improvements (Plan 17)			
Project Goals:	Improve intersection operations by increasing side street capacity and storage length; improve safety by providing a protected left-turn phase for Route 111 South; provide improved pedestrian accommodations at Spring Hill Road	**Project Type:**	Small
		Project Complexity:	Low
		Project Priority:	Long-Term
		Project Cost:	$1,000,000
Major Project Elements:	• Provide eastbound right turn lane on Purdy Hill Road • Lengthen westbound left turn lane on Purdy Hill Road to accommodate design queues • Revise traffic signal phasing for protected-permitted left turns on Route 111 Southbound • Install landscaped median with marked crosswalk on north leg of intersection of Route 111 and Spring Hill Road • Improve bicycle, pedestrian, and transit access, amenities, and mobility		
Permits:	• Town roadway construction permits for construction within Town right-of-way • CTDOT approval and/or encroachment permit for construction within CTDOT right-of-way		



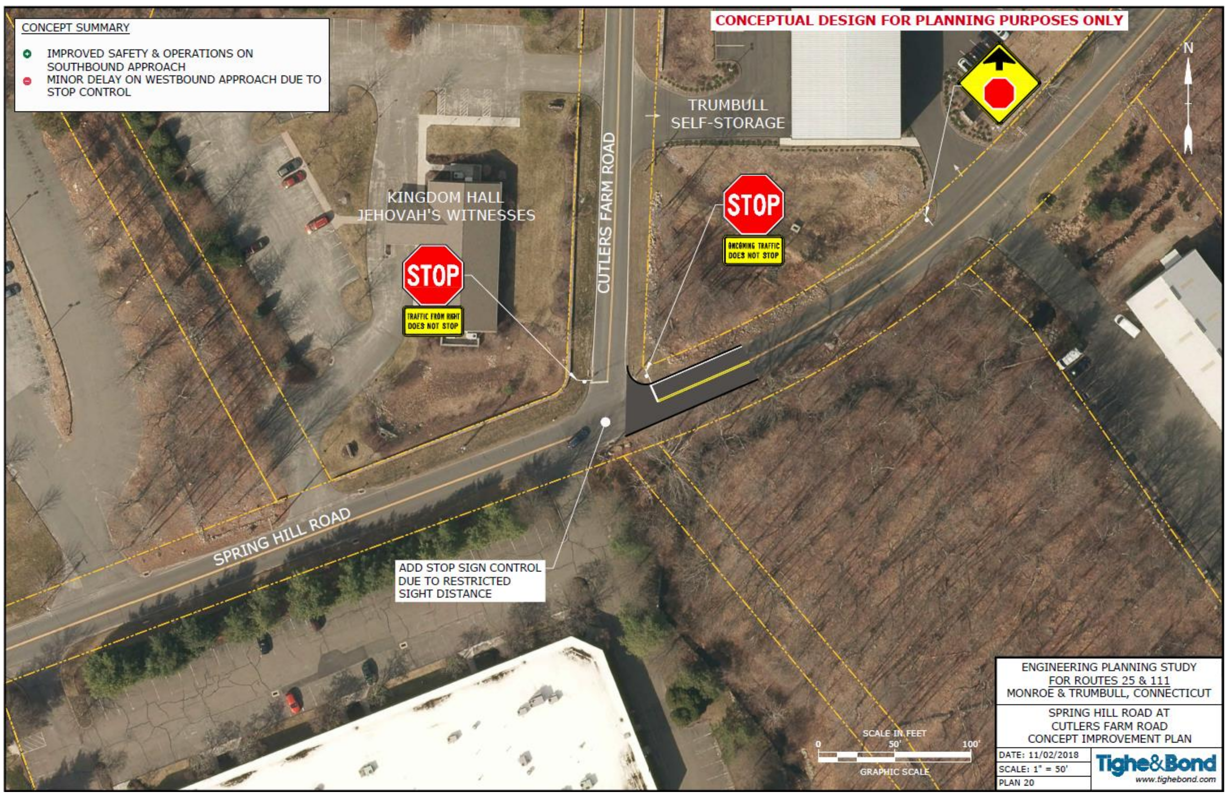
Project 8: Route 111 (Monroe Turnpike) at Elm Street Intersection Improvements (Plan 18)			
Project Goals:	Improve intersection operations by increasing side street capacity	**Project Type:**	Medium
		Project Complexity:	Moderate
		Project Priority:	Mid-Term
		Project Cost:	$1,350,000
Major Project Elements:	• Provide exclusive left-turn lanes on the eastbound and westbound Elm Street approaches • Improve bicycle, pedestrian, and transit access, amenities, and mobility		
Permits:	• Town roadway construction permits for construction within Town right-of-way • CTDOT approval and/or encroachment permit for construction within CTDOT right-of-way		



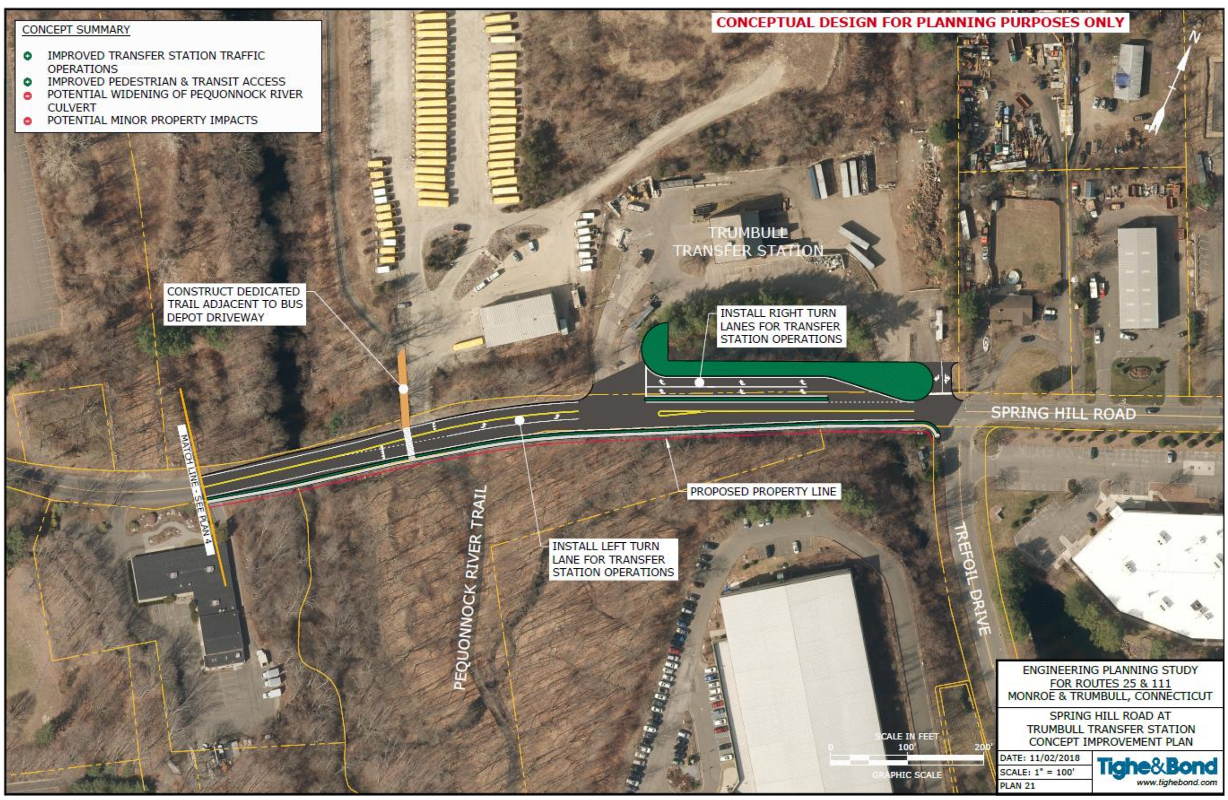
Project 9: Purdy Hill Road at Cutler's Farm Road Intersection Improvements (Plan 19)			
Project Goals:	Improve intersection operations through signalization	**Project Type:**	Small
		Project Complexity:	Moderate
		Project Priority:	Long-Term
		Project Cost:	$1,100,000
Major Project Elements:	• Install traffic control signal • Provide left turn lanes on eastbound and westbound Purdy Hill Road approaches		
Permits:	• Town approval and/or roadway construction permits for construction within Town right-of-way		



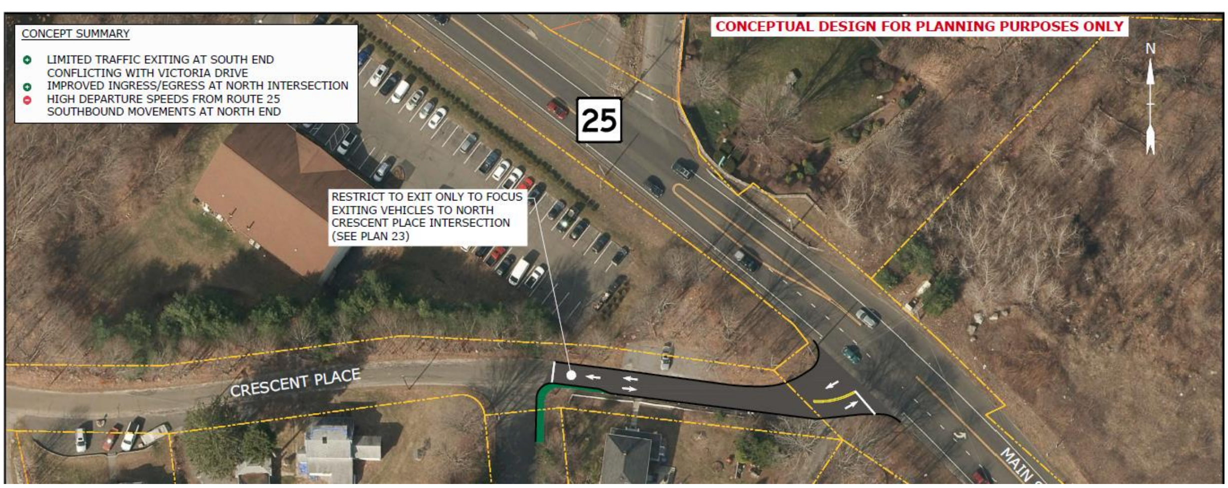
Project 10: Spring Hill Road at Cutler's Farm Road Safety Improvements (Plan 20)			
Project Goals:	Improve intersection safety by installing a stop sign on the low visibility Spring Hill Road westbound approach	**Project Type:**	Small
		Project Complexity:	Low
		Project Priority:	Short-Term
		Project Cost:	<$5,000
Major Project Elements:	• Install stop sign and stop ahead sign on Spring Hill Road westbound approach • Install traffic from right/oncoming traffic does not stop plaques on intersection stop signs		
Permits:	• Town approval and/or roadway construction permits for construction within Town right-of-way		



Project 11: Spring Hill Road at Trumbull Transfer Station Operational Improvements (Plan 21)			
Project Goals:	Improve Transfer Station traffic operations during peak traffic conditions by providing queueing space for vehicles on Spring Hill Road; improve trail access and safety by relocating segment on the bus depot driveway	**Project Type:**	Small
		Project Complexity:	Moderate
		Project Priority:	Short-Term
		Project Cost:	$1,200,000
Major Project Elements:	• Provide eastbound left turn lane into Transfer Station from Spring Hill Road • Provide westbound stop controlled double right turn lanes into Transfer Station from Spring Hill Road • Fill in existing open channel stream and wetland and replace with underground box culvert to convey the existing watercourse • Relocate Transfer Station exit to the east across from Trefoil Drive • Construct dedicated trail path adjacent to bus depot driveway • Provide bicycle and pedestrian accommodations		
Permits:	• Town approval and/or construction permits for construction within Town right-of-way • Environmental permitting requirements		

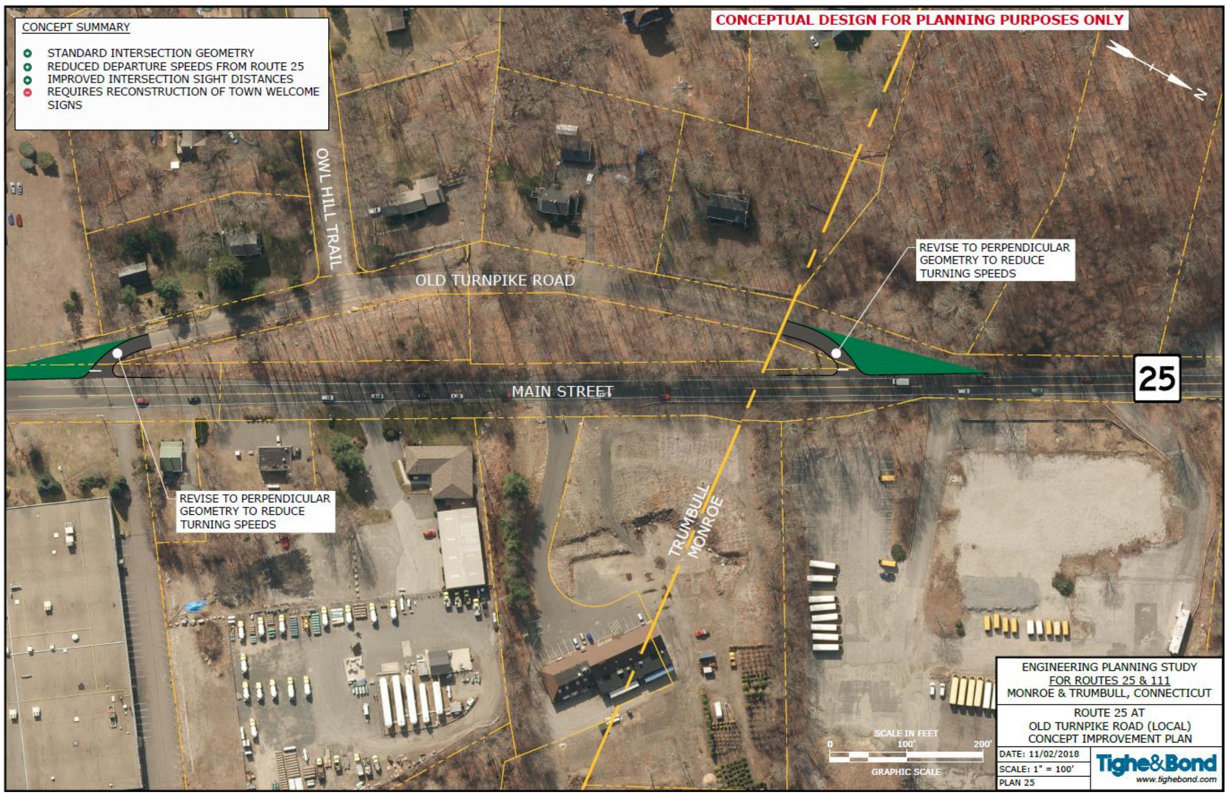


Project 12: Crescent Place at Route 25 (Main Street) Intersection Improvements (Plans 22 & 23)			
Project Goals:	Improve intersection configurations to reduce number of access points along Route 25 and improve safety and ingress/egress to Crescent Place	**Project Type:**	Small
		Project Complexity:	Low
		Project Priority:	Long-Term
		Project Cost:	$50,000
Major Project Elements:	• Restrict eastbound access to portion of Crescent Place east of Autumn Drive • Maintain full access at the Crescent Place south junction with Route 25 • Convert the northern fork of the Crescent Place north junction with Route 25 to one-way yield-controlled ingress only • Widen southern fork of intersection to allow for easier full access turns		
Permits:	• Town roadway construction permits for construction within Town right-of-way • CTDOT approval and/or encroachment permit for construction within CTDOT right-of-way		

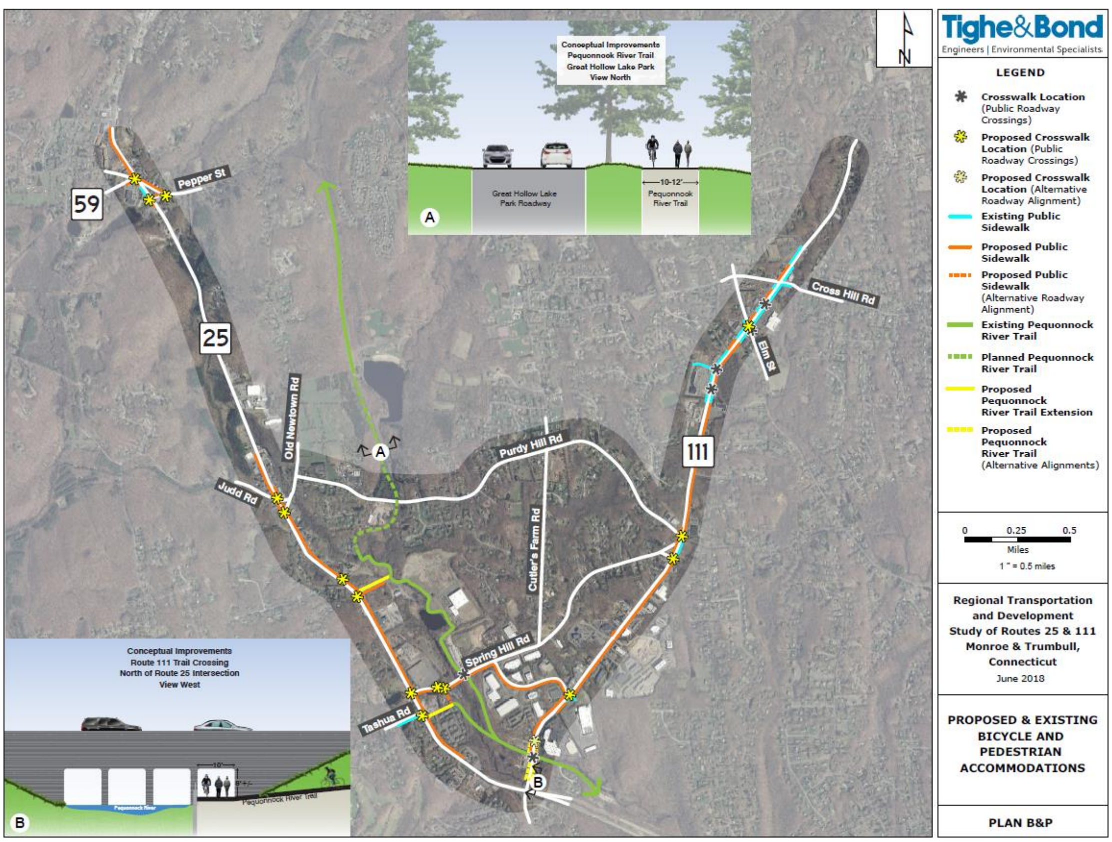


Project 13: Mill Street Operational Improvements (Plan 24)			
Project Goals:	Modify Mill Street directional operation to reduce number of access points along Route 25	**Project Type:**	Small
		Project Complexity:	Low
		Project Priority:	Long-Term
		Project Cost:	<$5,000
Major Project Elements:	• Convert Mill Street to one-way eastbound • Maintain full access to fire station		
Permits:	• Town roadway construction permits for construction within Town right-of-way • CTDOT approval and/or encroachment permit for construction within CTDOT right-of-way		

Project 14: Old Turnpike at Route 25 (Main Street) Intersection Improvements (Plan 25)			
Project Goals:	Improve intersection configurations to improve safety and ingress/egress to Old Turnpike Road	**Project Type:**	Small
		Project Complexity:	Low
		Project Priority:	Long-Term
		Project Cost:	$200,000
Major Project Elements:	• Realign both ends of Old Turnpike Road to be perpendicular to Route 25		
Permits:	• Town roadway construction permits for construction within Town right-of-way CTDOT approval and/or encroachment permit for construction within CTDOT right-of-way		



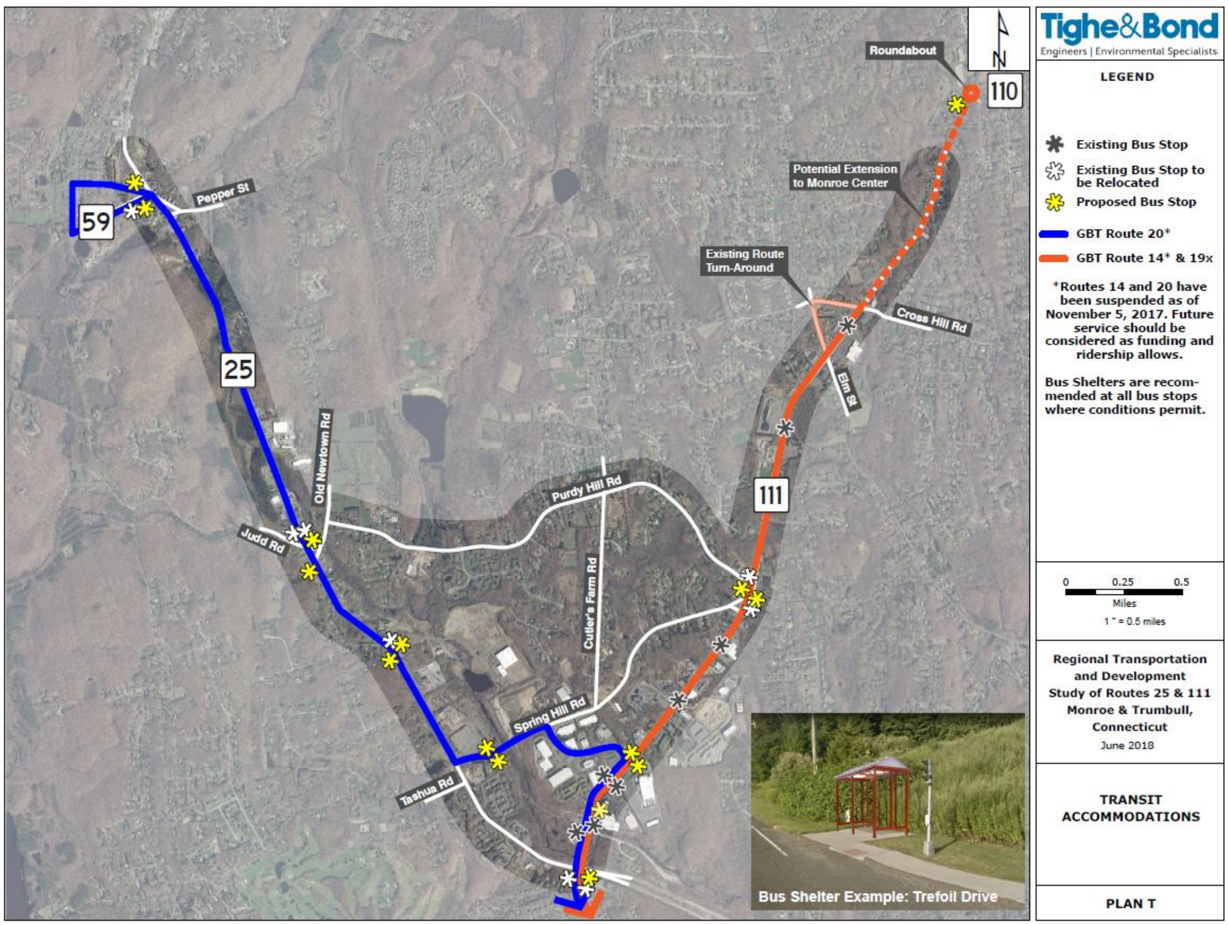
Project 15: Bicycle and Pedestrian Improvements[1] (Plan B&P)			
Project Goals:	Provide improved bicycle and pedestrian accommodations throughout the study to increase safety and promote alternative travel modes	**Project Type:**	Large
		Project Complexity:	Moderate
		Project Priority:	Short-Term
		Project Cost[2]:	See Individual Projects
Major Project Elements:	• Provide a connected sidewalk network along the Route 25 and 111 corridors • Provide painted crosswalks and sidewalk ramps at major intersections to facilitate safe crossings • Improve segments of the Pequonnock River Trail • Reroute the Route 111 trail crossing to a safer location		
Permits:	• Town roadway construction permits for construction within Town right-of-way • Encroachment permits for construction within CTDOT right-of-way		



[1]Project type, complexity, and priority pertain to completing the entirety of the pedestrian bicycle and pedestrian improvements plan under a single project. Separate projects have included bicycle, pedestrian, and transit improvements, where applicable, and have been ranked accordingly.

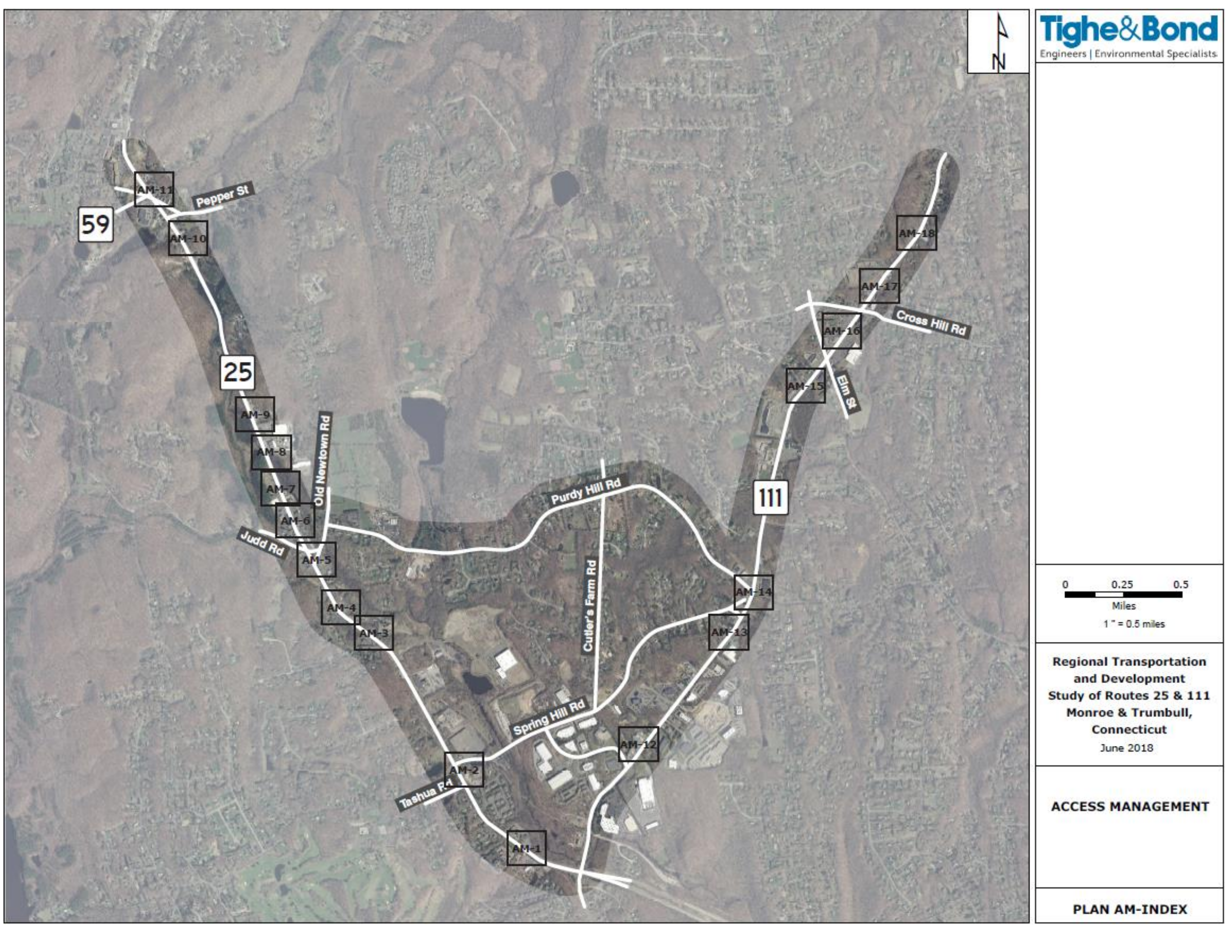
[2]Project costs included within separate, individual projects as their construction would facilitate completion of the bicycle and pedestrian improvement.

Project 16: Transit Improvements (Plan T)			
Project Goals:	Improve transit infrastructure and service to promote alternative travel modes	**Project Type:**	Small
		Project Complexity:	Low
		Project Priority:	Mid-Term
		Project Cost[1]:	$25,000 per stop location
Major Project Elements:	• Provide additional bus stop locations along GBT routes • Provide bus shelters at all bus stops • Extend GBT Routes 14 and 19x service to roundabout at Route 110 and Route 111 intersection		
Permits:	• Town roadway construction permits for construction within Town right-of-way • Encroachment permits for construction within CTDOT right-of-way		



[1]Cost includes sidewalk, landing pad, and ramps along with basic shelter amenities at bus stop locations only.

Project 17: Access Management (Plans AM-1 through AM-18)			
Project Goals:	Modify and coordinate driveway access to parcels along the corridor to minimize unnecessary curb cuts and improve safety and operations for entering and exiting traffic	**Project Type:**	Medium
		Project Complexity:	Moderate
		Project Priority:	Mid-Term
		Project Cost[1]:	N/A
Major Project Elements:	• Modify driveway ingress/egress restrictions as needed • Reduce select driveway widths • Close unnecessary driveway access to corridors • Provide interconnects between adjacent parcels when appropriate • Review and implement access management strategies into local regulations to ensure implementation during development and other regulatory activities		
Permits:	• OSTA approval for large developments • Town Planning and Zoning approvals for development • Encroachment permits for construction within CTDOT right-of-way		



[1]Project cost would be incurred by private development or public improvement project.

5.1.4 Implementation Plan Summary

Table 5-4 on the following page summarizes the implementation plan recommendations. Seven projects have been identified as Short-Term priorities, four projects as Mid-Term priorities, and six projects as Long-Term priorities. The projects prioritized as Short-Term indicate that funding sources should be sought to address the existing needs and deficiencies.

As shown in Table 5-4, the widening of Route 25 to a four-lane cross-section with associated improvements to the major intersections has been grouped into 4 separate projects based on their relatedness to one another and to provide planners with project scopes that can be funded, designed, permitted, and implemented. Grouping the plans as they are shown improves the ease of coordinating the improvements along the corridor. The worksheets used to develop the project costs can be found in Appendix O.

Project 1 includes the quadrant or single point interchange at the Route 25 and 111 intersection, the associated rerouted Pequonnock River Trail under the new Route 111 bridge, the raised median between Route 111 and Tashua Road, and standard corridor widening and intersection improvements at Tashua Road and Spring Hill Road. The improvements are grouped this way due to the potentially high operating speeds north of the Route 25 expressway necessitating the raised median up to Tashua Road. The improvements to the clustered intersections with Tashua Road and Spring Hill Road are therefore tied to these improvements as well. Project 1 is classified as a short-term priority due to the high levels of congestion along this segment as well as safety concerns for the driveways and local roadways north of the expressway. The project is complex in nature with a cost of $22 million for the quadrant roadway alternative and $45 million for the single point interchange alternative.

The remaining Route 25 widening is divided into Project 2 at Victoria Drive, Project 3 at the Pond View development driveway and Judd/Purdy Hill Road, and Project 4 at Green Street and Route 59 (Easton Road). These projects are all complex with costs of $2.5 million, $8.6 million, and $4.9 million, respectively. Higher costs and levels of congestion classify Projects 3 and 4 as short-term priority. Conversely, Project 2 is classified as a mid-term priority.

The signalization of the Trefoil Plaza Driveway with the rerouted and protected Pequonnock River Trail crossing and modified Woodland Hills access management is grouped under Project 5. This project is considered a short-term priority due to safety concerns with the driveway operations and existing trail crossing. It is only moderately complex and costs approximately $1.7 million.

Spot improvements are proposed along Route 111 at the intersections with Trefoil Drive (Project 6), Purdy Hill Road (Project 7), and Elm Street (Project 8). Projects 6 and 7 are classified as long-term priorities due to issues with traffic operations not being significant until the 2040 design year. Project 8, however, is a mid-term priority as operations are worse at the Elm Street intersection. The complexity of the improvements at Trefoil Drive and Purdy Hill Road are low and the projects are easily implementable. The improvements at Elm Street are moderate in complexity. The costs associated with Projects 6, 7, and 8 are $80,000, $1,000,000, and $1,350,000, respectively.

Project 9 is the signalization of the intersection of Purdy Hill Road at Cutler's Farm Road. It is a long-term priority as existing volumes would not meet the traffic signal warrants, but future volumes would. The project is moderately complex and comes at a cost of approximately $1,100,000.

The addition of westbound stop control to the intersection of Spring Hill Road at Cutler's Farm Road, Project 10, is a short-term priority due to the safety issue resulting from poor intersection sight distance. Additionally, the project is not complex and can be implemented at a very low cost of less than $5,000. This improvement can feasibly be made shortly after the conclusion of the Study.

The conceptual improvements to the Trumbull Transfer Station, Project 11, are classified as a short-term priority due to the severe operational issues on Saturdays that impact traffic on Spring Hill Road with issues extending onto Route 25. The project is only moderately complex with an associated cost of $1,200,000.

Projects 12, 13, and 14 involve reconfiguring local roadway access to Route 25 at Crescent Place, Mill Street, and Old Turnpike Road. They are all long-term priorities as the improvements are mostly necessitated by the widening of Route 25 to a four lane cross-section. They are low in both complexity and cost and can be easily implemented in conjunction with the adjacent Route 25 improvement concepts. The Projects are estimated to cost $50,000, less than $5,000, and $200,000, respectively. Although Project 13 could be easily implemented after the conclusion of the study and does not directly depend on the widening of Route 25, it would shift traffic exiting Mill Street to Maple Street which has issues with grade and sight lines. It is recommended that these issues be resolved as part of the Route 25 widening process and Project 13 be subsequently implemented.

Bicycle and pedestrian improvements are grouped under Project 15. Due to the lack of adequate existing infrastructure, this project is considered a short-term priority with moderate complexity. The construction of sidewalks along Route 25 is included within Projects 1 through 4 as their design will be directly impacted by the widening. However, sidewalks along Route 111 and the local roadways, as well as improvements to the Pequonnock River Trail, can be more readily implemented.

Project 16 encompasses improvements to the study area transit accommodations. It is classified as a mid-term priority due to the fact that GBT Routes 14 and 20 were suspended on November 5, 2017. The addition of bus shelters and extension of existing routes should be implemented pending the restoration of service as funding and ridership allow. The project is low in both complexity and cost with a short implementation time.

Access management to the properties along the Route 25 and 111 corridors constitutes the scope of Project 17. It is considered a mid-term priority as there are well known benefits to access management, but it is not critical to corridor operations. Project 17 has moderately complex elements and is somewhat tied to the conceptual corridor and sidewalk improvements.

Table 5-4
Summary of Projects in Implementation Plan

	Project Description	Project Priority	Project Complexity	Project Cost
1 (At-Grade)	Route 25 (Main Street) from Route 111 (Monroe Turnpike) to Spring Hill Road Improvements and Relocate Pequonnock River Trail Crossing	Short-Term	High	$22 Million
1 (Grade Separated)	Route 25 (Main Street) from Route 111 (Monroe Turnpike) to Spring Hill Road Improvements and Relocate Pequonnock River Trail Crossing	Short-Term	High	$45 Million
3	Route 25 (Main Street) at Pond View Driveway and Judd & Purdy Hill Road Corridor and Intersection improvements	Short-Term	High	$8.6 Million
4	Route 25 (Main Street) from Brook Street to Route 59 (Easton Road) Corridor and Intersection Improvements	Short-Term	High	$4.9 Million
5	Route 111 (Monroe Turnpike) at Trefoil Plaza and Woodland Hills Intersection Improvements	Short-Term	Moderate	$1.5 Million
10	Spring Hill Road at Cutler's Farm Road Safety Improvements	Short-Term	Low	<$5,000
11	Spring Hill Road at Trumbull Transfer Station Operational Improvements	Short-Term	Moderate	$1.2 Million
15	Bicycle and Pedestrian Improvements	Short-Term	Moderate	See Projects
2	Route 25 (Main Street) at Victoria Drive Corridor and Intersection Improvements	Mid-Term	High	$2.5 Million
8	Route 111 (Monroe Turnpike) at Elm Street Intersection Improvements	Mid-Term	Moderate	$1.35 Million
16	Transit Improvements	Mid-Term	Low	$25,000 /location
17	Access Management	Mid-Term	Moderate	N/A
6	Route 111 (Monroe Turnpike) at Trefoil Drive Intersection Improvements	Long-Term	Low	$80,000
7	Route 111 (Monroe Turnpike) at Purdy Hill Road Intersection Improvements	Long-Term	Low	$1.0 Million
9	Purdy Hill Road at Cutler's Farm Road Intersection Improvements	Long-Term	Moderate	$1.1 Million
12	Crescent Place at Route 25 (Main Street) Intersection Improvements	Long-Term	Low	$50,000
13	Mill Street Operational Improvements	Long-Term	Low	<$5,000
14	Old Turnpike at Route 25 (Main Street) Intersection Improvements	Long-Term	Low	$200,000

5.2 Project Implementation

The transition from project planning to implementation is the critical step forward in the project development process. Utilizing the ideas and plans developed under this Study, and with the help from METROCOG, CTDOT, and the Towns of Monroe and Trumbull projects have been identified for implementation to address the needs and future concerns in the study area. Once a project has been identified, the actual implementation will follow a well-defined process. The most critical hurdle for the projects is the identification of a funding source to support the engineering, right-of-way acquisition, utility modifications, and the ultimate construction of the improvements. Utilizing the concept plans and costs defined in this Study, funding through an appropriate funding source can be sought.

5.2.1 Project Initiation and Funding

The majority of the recommendations and improvements identified in this Study will be publicly funded through State and/or Federal Transportation Funding Programs as provided for in the Federal Transportation Legislation, through State funding made available in the State of Connecticut transportation budget, or through the State Bond Commission. However, there are other improvements that could be constructed by private entities as mitigation for proposed development in the study area. The Towns should rely on the recommendations of this Study to ensure that local regulatory approvals consider the recommendations of this Study when determining the appropriate level of mitigation to be included as a condition of approval of new development.

There are many current funding sources to support the recommendations presented in the Study. Current funding programs include:

- Congestion Mitigation and Air Quality Improvement Program (CMAQ)
- Local Capital Improvement Program (LoCIP)
- Local Transportation Capital Improvement Program (LoTCIP)
- National Highway Performance Program (NHPP)
- Highway Safety Improvement Program (HSIP)
- Local Road Accident Reduction Program (LRARP)
- Recreational Trails Program
- Special Tax Obligation Bonds
- Surface Transportation Program (STP)
- Transportation Alternatives Program (TAP)

It is worth noting that with any program reliant on public funding, either by the Federal Government or State of Connecticut, priorities may change in the future along with available funding for transportation system improvements. In addition, there are several large construction projects currently underway and in design in the State of Connecticut that can constrain transportation spending looking forward as available funds are channeled to complete these projects. The State of Connecticut Department of Transportation published the "Transportation Infrastructure Capital Plan: 2017 – 2021" describing the state of available funds and programmed spending over the next few years.

However, the current fiscal constraints should not limit the identification and pursuit of projects and funding for the priority projects identified by the Study so that as funding becomes available, projects are ready.

5.2.2 Design, Permitting and Construction

5.2.2.1 Engineering Design

Following the initiation of a project and identification of a funding source, the remaining steps to implement an improvement will involve design and construction. Based on the complexity of a project, an initial Preliminary Engineering phase may be required to conduct a more detailed engineering study and refine the concept plans and project scope. A preliminary engineering study can help establish the potential impacts to environmental and natural resources, identify potential property and utility impacts, and help refine the expected costs in current dollars rather than forecasting based on estimates reported in this Study which are provided in current, 2018 dollars.

Once Preliminary Engineering is complete and the decision is made to move forward with a project, Final Design will take place to add detail to the plan, conduct a right-of-way acquisition process, address utility conflicts and possible relocations, and develop construction documentation to facilitate bidding and construction of the improvements. Generally, projects that are identified as having a low level of complexity can be designed within 12-18 months from initiation of the project. As complexity grows, so does the timeframe required to design improvements. Design phases can potentially last three years or more for highly complex projects.

5.2.2.2 Green Infrastructure and Landscaping

Corridor improvement should be accompanied by green infrastructure and landscaping including trees, median island plantings, and low impact design (LID) techniques that minimize stormwater runoff and mitigate against the expansion of impervious surface associated with roadway widening. The provision of landscaping with roadway improvements will also seek to preserve the rural character of the study area. The concepts are discussed in more detail in the following sections with the final section providing suggested applications within specific improvement projects identified by this study.

Tree Planting

Tree planting should accompany roadway improvements so as to improve air quality, aesthetics, and to provide a traffic calming effect. Trees should be located, and appropriate species should be selected, so as not to adversely impact traffic sight-lines, sidewalks, or utility infrastructure. Trees should be selected for drought and salt tolerance when located close to the roadway. Native species are preferred and invasive species such as Norway Maple should not be planted.

The tree species identified in the table below are recommended street trees by the University of Connecticut Department of Plant Science and Landscape Architecture. These species are recommended for use within the study area.

Latin Name	Common Name
Acer buergerianum 1	Trident Maple
Acer campestre	Hedge Maple
Acer rubrum 'Armstrong'	Armstrong Red Maple
Acer rubrum 'Columnare'	Columnar Red Maple
Acer rubrum 'Northwood'	Northwood Red Maple
Acer rubrum 'October Glory'	October Glory Red Maple
Acer rubrum 'Red Sunset'	Red Sunset Red Maple
Aesculus octandra flava	Yellow Buckeye
Aesculus x carnea	Red horsechestnut
Aesculux x carnea 'Briotii'	Briotii Red horsechestnut
Celtis occidentalis 2	Common Hackberry
Cercidiphyllum japonicum 3	Katsuratree
Corylus colurna	Turkish Filbert
Crataegus x lavallei	Lavalle Hawthorn
Crataegus x mordenensis 'Toba'	Toba Hawthorn
Crataegus phaenopyrum	Washington Hawthorn
Crataegus phaenopyrum 'Fastigiata'	Fastigiate Washington Hawthorn
Crataegus viridis 'Winter King'	Winter King Hawthorn
Fraxinus pennsylvanica 'Marshall's Sdls.'	Marshall's Seedless Green Ash
Fraxinus pennsylvanica 'Newport'	Newport Green Ash
Fraxinus pennsylvanica 'Patmore'	Patmore Green Ash
Fraxinus pennsylvanica 'Summit'	Summit Green Ash
Fraxinus pennsylvanica 'Urbanite'	Urbanite Green Ash
Ginkgo biloba	Ginkgo
Ginkgo biloba 'Fastigiata'	Fastigiate Ginkgo
Ginkgo biloba 'Sentry'	Sentry Ginkgo
Gleditsia triacanthos inermis	Thornless Honeylocust
Gleditsia tri. in. 'Halka'	Halka Honeylocust
Gleditsia tri. in. 'Moraine'	Moraine Honeylocust
Gleditsia tri. in. 'Shademaster'	Shademaster Honeylocust
Gleditsia tri. in. 'Skyline'	Skyline Honeylocust
Gleditsia tri. in. 'Sunburst'	Sunburst Honeylocust
Koelreuteria paniculata 3	Goldenrain Tree
Liquidambar styraciflua 1	Sweetgum
Maackia amurensis 3	Amur Maackia
Malus 'Adams'	Adams Crabapple
Malus x atrosanguinea	Carmine Crabapple
Malus baccata 'Jackii'	Jackii Crabapple
Malus baccata mandshurica	Manchurian Crabapple
Malus 'Baskatong'	Baskatong Crabapple
Malus 'Beverly'	Beverly Crabapple
Malus 'Bob White'	Bob White Crabapple
Malus 'Centurion'	Centurion Crabapple
Malus 'Donald Wyman'	Donald Wyman Crabapple
Malus 'Doubloons'	Doubloons Crabapple
Malus 'Evelyn'	Evelyn Crabapple
Malus floribunda	Japanese Flowering Crabapple
Malus 'Harvest Gold'	Harvest Gold Crabapple
Malus hupehensis	Tea Crabapple
Malus 'Jewelberry'	Jewelberry Crabapple
Malus 'Katherine'	Katherine Crabapple
Malus 'Liset'	Liset Crabapple
Malus 'Prairifire'	Prairifire Crabapple
Malus 'Prince Georges'	Prince Georges Crabapple
Malus 'Professor Sprenger'	Professor Sprenger Crabapple
Malus 'Red Jade'	Red Jade Crabapple
Malus 'Robinson'	Robinson Crabapple
Malus 'Selkirk'	Selkirk Crabapple
Malus 'Sentinel'	Sentinel Crabapple
Malus sieboldii zumi 'Calocarpa'	Zumi Crabapple
Malus 'Snowdrift'	Snowdrift Crabapple
Malus tschonoskii	Tschonoski Crabapple
Malus 'White Angel'	White Angel Crabapple
Malus 'Zumirang'	Zumirang Crabapple
Ostrya virginiana	Hop Hornbeam
Phellodendron amurense	Amur Cork Tree
Platanus x acerifolia 'Bloodgood'	London Plane Tree
Pyrus calleryana 'Aristocrat'	Aristocrat Callery Pear
Pyrus calleryana 'Chanticleer'	Chanticleer Callery Pear
Pyrus calleryana 'Redspire'	Redspire Callery Pear
Quercus coccinea	Scarlet Oak
Quercus palustris	Pin Oak
Quercus robur	English Oak
Quercus robur 'Concordia'	Golden Leaved English Oak
Quercus robur 'Fastigiata'	Fastigiate English Oak
Quercus rubra	Red Oak
Quercus x shumardii	Shumard Oak
Sophora japonica	Japanese Scholar Tree
Sophora japonica 'Fastigiata'	Fastigiate Scholar Tree
Syringa reticulate	Japanese Tree Lilac
Tilia americana 'Redmond'	Redmond American Linden
Tilia cordata	Littleleaf Linden
Tilia cordata 'Chancellor'	Chancellor Littleleaf Linden
Tilia cordata 'Glenleven'	Glenleven Littleleaf Linden
Tilia cordata 'Greenspire'	Greenspire Littleleaf Linden
Tilia tomentosa	Silver Linden
Tilia x euchlora	Crimean Linden
Ulmus 'Homestead'	Homestead Elm
Ulmus 'Pioneer'	Pioneer Elm
Ulmus 'Urban Elm'	Urban Elm
Ulmus parvifolia	Lacebark Elm
Zelkova serrata	Zelkova
Zelkova serrata 'Halka'	Halka Zelkova
Zelkova serrata 'Village Green'	Village Green Zelkova

Median Island Plantings

Median islands can be comprised of a combination of plantings, sod, and hardscape elements. Given sight line and visibility concerns, small shrubs, perennials, grasses, and bulbs are recommended. Landscaped areas cost approximately $10 per square foot, sodded areas cost approximately $2 per square foot and hardscaped areas cost approximately $10 to $15 per square foot.

Plants used in landscaped medians should be drought resistant, low maintenance, and salt tolerant species. The use of native plants whenever possible is recommended. Below is a list of suitable species for use in landscaped medians.

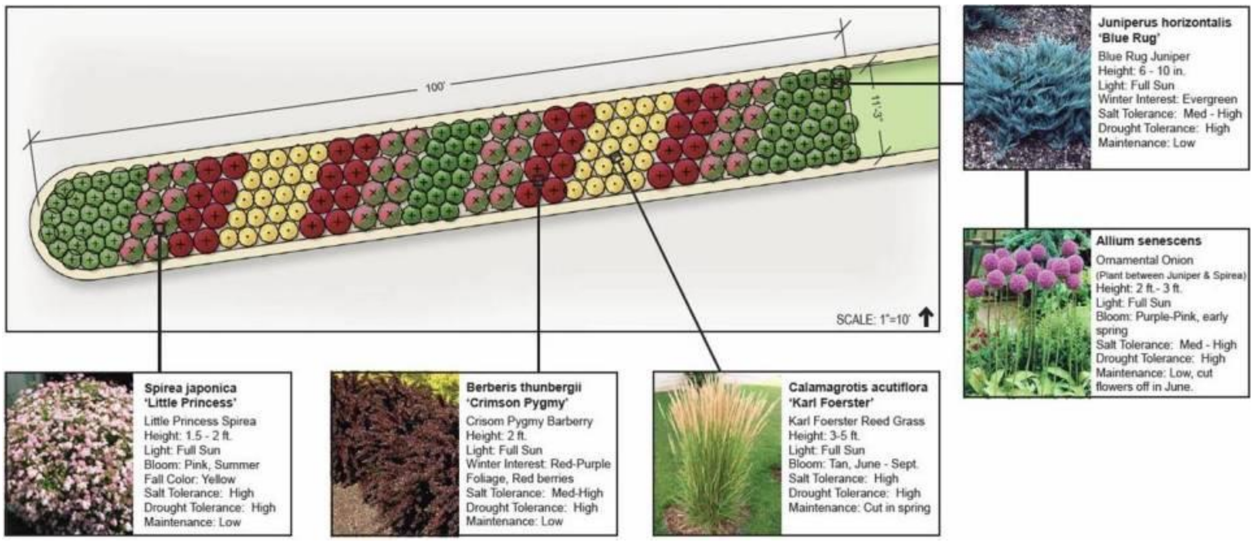
Curb-height median with plantings set back from the curb to allow for easier maintenance: Merrick Boulevard, Queens, New York. Source; NY DOT Street Design Manual

	Appearance									Tolerances				
	Height	Spread	Characteristics							Drought-Flood		Light	Salt	High pH
Shrubs			Bloom/Showy Flowers		Showy Fruit	Distinct Foliage	Fall Color	Distinctive Bark	Evergreen	Drought	Flood			
Hydrangea paniculata 'DVPinky' Pinky Winky Hydrangea	6'-8'	5'-6'	JUL SEP	✓							✓	●►◐	◆	◆
Cornus sericea 'Farrow' Arctic Fire Red Twig Dogwood	3'-4'	3'-4'	MAY JUN	✓			✓	✓			✓	●►◐	◆	◆
Rosa 'Radcor' Rainbow Knock Out Rose		4'-5'	MAY NOV	✓	✓						✓	●	◆	◆
Abelia x grandiflora 'Rose Creek' Rose Creek Glossy Abelia	<3'	3'-4'	MAY SEP	✓		✓			✓	✓		●►●	◆	–
Caryopteris x clandonensis 'Dark Knight' Dark Knight Blue Mist Shrub		1.5'-2'	JUL SEP	✓		✓				✓		●	◆	–
Juniperus chinensis var. sargentii 'Glauca' Blue Sargent Juniper		6'-9'			✓	✓			✓	✓	✓	●	◆	◆
Lagerstroemia indica 'Gamad II' Razzle Dazzle Crepe Myrtle		3'-4'	JUL SEP	✓			✓			✓	✓	●	◆	◆
Potentilla fruticosa Shrubby Cinquefoil		3'-4'	JUN NOV	✓						✓	✓	●	◆	◆
Rhus aromatica 'Gro Low' Gro Low Sumac		6'-8'	APR	✓		✓	✓	✓		✓	✓	●►◐	◆	◆
Spiraea x bumalda 'Goldmound' Goldmound Spirea		3'-4'	MAY	✓		✓	✓			✓	✓	●►◐	◆	◆
Yucca filamentosa 'Color Guard' Color Guard Adam's Needle		2'-3'	JUN SEP	✓		✓			✓	✓	✓	●	◆	◆
Perennials														
Liriope muscari 'Big Blue' Big Blue Lilyturf	1'-2'	1'-2'	AUG SEP	✓		✓			✓	✓	✓	●►●	◆	◆
Nepeta x 'Walker's Low' Walker's Low Catmint	2'-2.5'	2.5'-3'	AUG SEP	✓		✓				✓	✓	●	◆	◆
Perovskia atriplicifolia 'Little Spire' Little Spire Russian Sage	1.5'-2'	1.5'-2'	JUN NOV	✓		✓				✓	✓	●	◆	◆
Echinacea purpurea Coneflower	2'-3'	1.5'-2'	JUN AUG	✓	✓					✓	✓	●►◐	◆	◆
Grasses/Grass-like Plants														
Chionodoxa forbesii 'Pink Giant' Pink Giant Glory of the Snow	3'-5'	1.5'-2.5'	JUN FEB	✓		✓	✓			✓	✓	●	◆	◆
Bulbs														
Narcissus 'Improved King Alfred' Trumpet Daffodil	1'-2'	.5'-1'	APR MAY	✓						✓	✓	●►◐	◆	◆
Allium 'Globemaster' Globemaster Ornamental Onion	1.5'-2.5'	1'-1.5'	JUN	✓						✓	✓	●	◆	◆

* Fall Dig Hazard ^ ALB Host Species Bloom/Showy Flowers Showy Fruit Distinct Foliage Fall Color Distinctive Bark Evergreen

Source; NY DOT Street Design Manual

Typical Planting Schematic for Median Islands



Typical planting schematic of landscaped median, source; Pennsylvania Department of Transportation

Low Impact Design Options

This section provides an overview of landscaping and Low Impact Development (LID) techniques that can be considered for incorporation into improvement projects. Integrating LIDs will reduce the strain on the existing drainage system with the increased impervious surface area associated with the improvements. The LID options presented include the use of pervious pavements and bioswales. Sample landscaping options are also provided for use within the medians.

Bioswales

Bioswales are vegetated channels that provide treatment and retention as they move stormwater from one place to another. Vegetated swales slow, infiltrate, and filter stormwater flows. Bioswales are typically used as parking lot islands, in medians, as roadside swales, or as landscape buffers. Bioswales can offer the following benefits:

- Treat stormwater using vegetation, soil, and microbes
- Reduce the total volume of stormwater runoff
- Slow the velocity of runoff and reduce the peak discharge
- Increase infiltration and groundwater recharge
- Can be an aesthetic part of the landscape and increase biodiversity

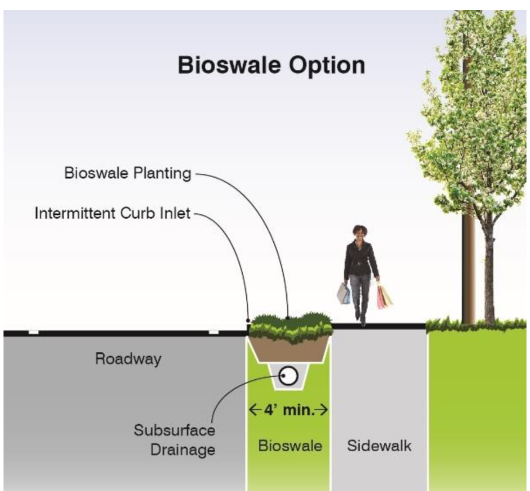
Bioswales should be considered in areas with well drained soils. Areas with poorly drained sites will require an underdrain to remove overflow stormwater. Compacted soils, short runoff contact time, large storm events, and steep slopes reduce the effectiveness of bioswales.

Bioswales are inexpensive relative to traditional curb and gutter treatment or underground stormwater systems. Maintenance (seasonal trimming and removal of debris) is required more often but is much less expensive than that of traditional curb and gutter system maintenance. Installation cost per square foot varies depending on drainage requirements and density of planting. Typical costs range from $5 to $10 per square foot.

Typical plant types used in bioswales include:

- Achillea millefolium, Common Yarro
- Aronia arbutifolia, Chokeberry
- Baptisia sphaerocarpa, Yellow Wild Indigo
- Echinacea, Coneflower
- Iris laevigata, Iris
- Kalimeris incisa, Japanese Aster
- Monarda, Bee Balm
- Phlox paniculata, Perennial Phlox
- Solidaga rugosa, Goldenrod
- Ilex verticillata, Winterberry
- Lindera Benzoin, Spicebush
- Panicum virgatum, Switch grass
- Schizachyrium scoparium, Little Bluestem

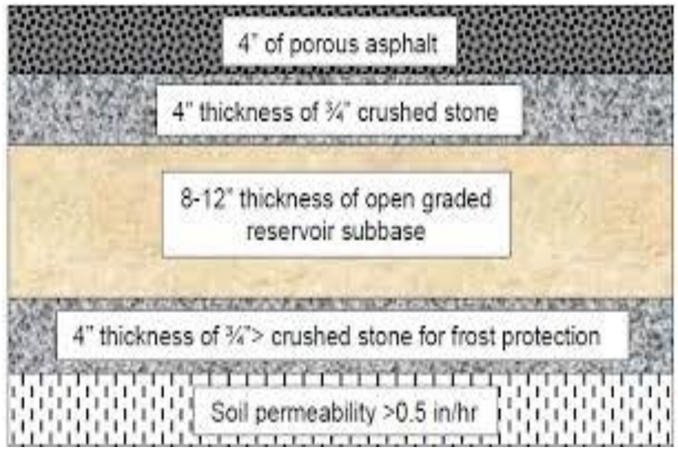
Bioswales should be planted with a mix of close growing vegetation that is water and salt tolerant. Plants should be selected for their nutrient uptake ability and appropriateness for the site. The use of native plants is recommended.



Bioswale Detail and Example

Pervious Asphalt

Pervious (or porous) asphalt is a mix that is designed to allow for onsite stormwater infiltration. This pavement type is not suitable for high traffic areas, but is suitable for pathways, sidewalks, and low traffic parking areas. Pervious asphalt has been shown to reduce slipping hazards by absorbing water from the surface in cold climates. It can be installed with the same equipment as traditional asphalt and is designed to have an equal lifespan. Installation involves less labor than is required with pervious concrete. Typical uses of this treatment include; parking lots, driveways, walkways.



Typical Pervious Pavement Section

(Source: Tompkins County Soil and Water Conservation Stormwater Program)

Plowing and poor drainage can lessen the life span. Tight parking lots which cause many turning movements can cause spalling. This product is also prone to clogging, leaves and sand reduce the infiltration rates.

Pervious asphalt has been used in multiple locations at the University of Connecticut Storrs Campus. The product has held up well in these locations and the university is in the process of purchasing a maintenance vacuum.

Installation costs approximately $5 a square foot. Required maintenance includes twice yearly truck vacuuming and special snowplow blades designed to not damage the surface. The implementation of this type of LID measure may be appropriate for shared use pathways but is not considered a feasible solution for roadway pavement.

Application to Routes 25 & 111

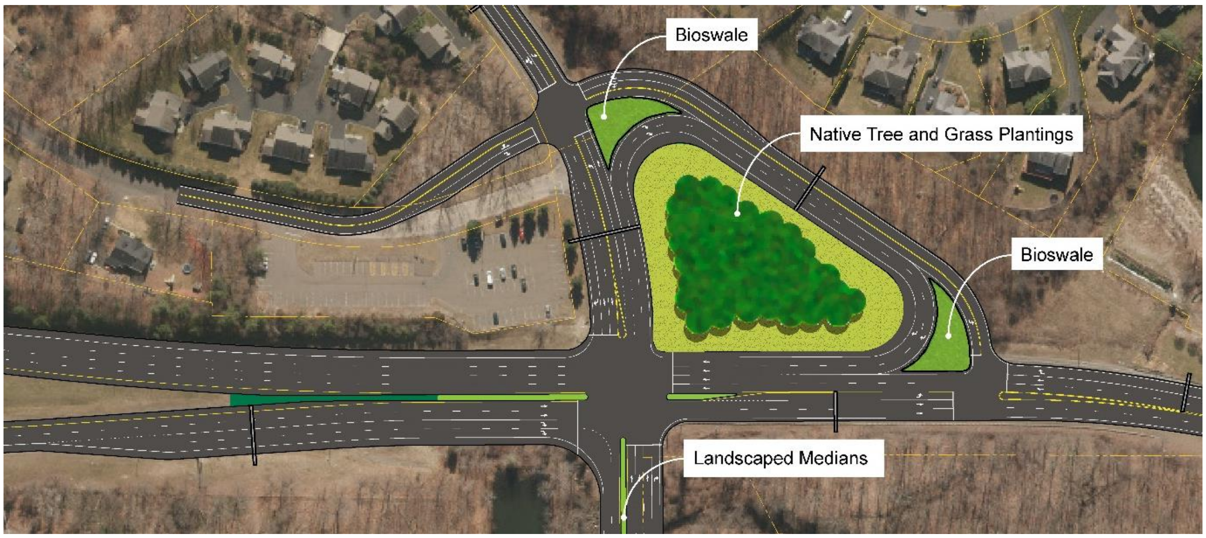
Street Trees: Street trees should be considered for all areas where adequate space exists within the right-of-way, or on private property through agreement with the private property owner. Trees should be spaced 25 feet to 30 feet apart and should be located at least 3 feet away from a sidewalk. If planted between the sidewalk and curb, the space between the curb face and sidewalk should be at least 6 feet. Tree planting should be considered as a short-term measure in areas that are unlikely to be impacted by expansion of the roadway. In areas where roadway or right-of-way expansion is recommended, tree planting should follow those improvements.

Median Island Plantings: Median islands are proposed at a number of locations in the study area, with the largest proposed island extending along the center of Route 25 at the southern extend of the study area. Planting of these island should be considered as a means of minimizing stormwater runoff and improving the aesthetics of the corridor.

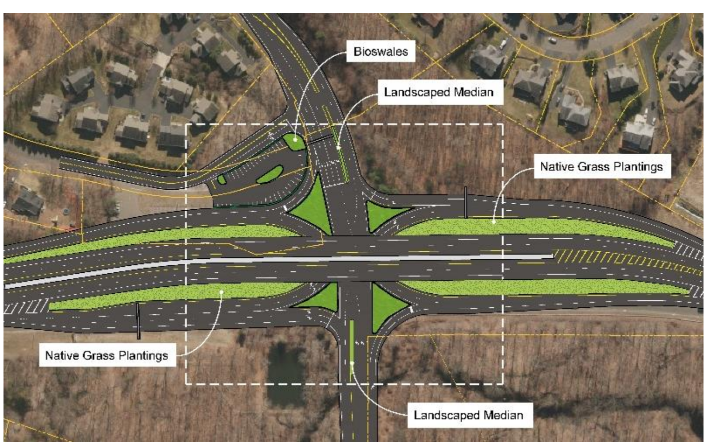
LID Measures: Lid measures should be considered and incorporated into the improvement designs to reduce the strain of the additional impervious area on the existing stormwater system. LID measures such as a bioswale could be integrated with new sidewalk construction. This would assist with capturing stormwater runoff as well as providing separation between pedestrians and vehicles.

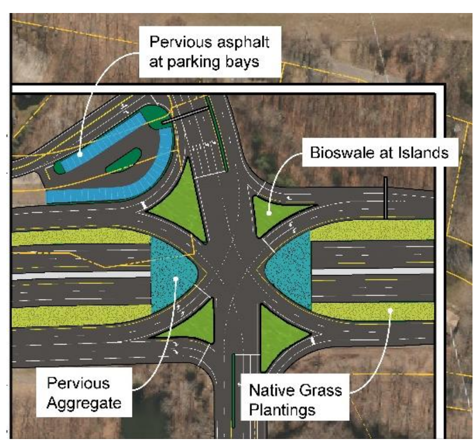
Route 25 at 111 Intersection Area (Plans 1 & 2)

The most significant opportunity for landscaping in Plan 1 is within the large island on the southwest corner of the Route 25/111 intersection. Native tree and grass planting are recommended at this location. The tree line should be kept offset from the edge of roadway so as not to obstruct traffic sight-lines. The smaller islands at either end of the new connection roadway could be constructed as bioswales with openings in the surrounding curb that would allow for infiltration of stormwater runoff from the roadway. Other opportunities for landscaping include decorative median plantings in the islands on the north, east, and west approaches to the intersection.



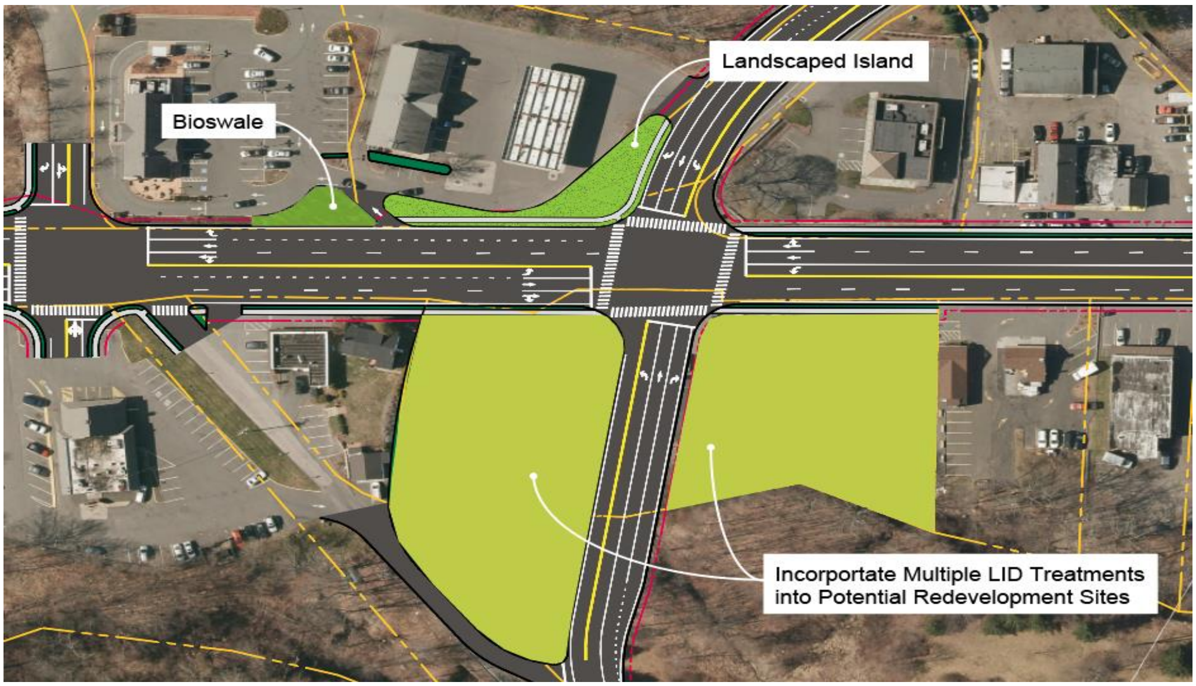
Plan 2 presents many opportunities for landscaping and LID treatments. The embankments of the elevated Route 25 roadway on either side of the Route 111 intersection could be planted with native grass plants. The interchange islands could be used as bioswales with openings in the surrounding curb to allow for infiltration of stormwater runoff. Islands at the modified commuter parking lot could also be constructed as bioswales. Pervious asphalt could be used in the commuter lot and is most appropriate for parking stalls where traffic is minimal. The landscaped medians on Route 111 could also be constructed to accommodate decorative median plantings.





Purdy Hill Road and Judd Road Intersection Area (Plan 8)

The reconstruction of Purdy Hill Road presents an opportunity for multiple LID treatments to be integrated into the redevelopment of two parcels on the east side of Route 25 that will be impacted/created by realignment of the roadway. On the west side or Route 25, the creation of an island at the southwest corner presents an opportunity for low level landscaping within the island and a limited number of trees provided they don't obscure sight-lines. The smaller island to the south of the driveway entrance would be suitable for a bioswale as there is not sidewalk at this location that would otherwise obstruct run-off from the roadway.



Pequonnock Trail Crossing Underpass (Plan 14)

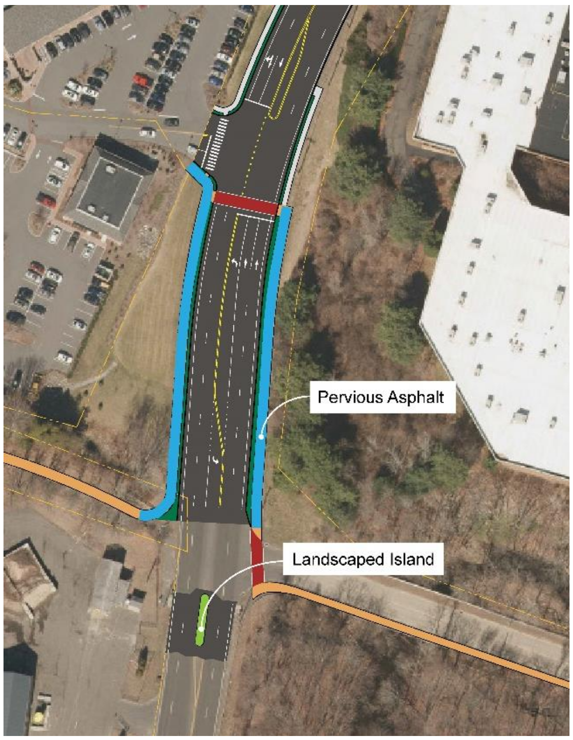
The proposed pathway could be constructed of pervious asphalt between the existing trail surfaces. This would reduce stormwater runoff into the nearby Pequonnock River. The landscaped island on the south side of the Old Mine Road intersection could be landscaped with median plantings to provide an aesthetic gateway into the area.

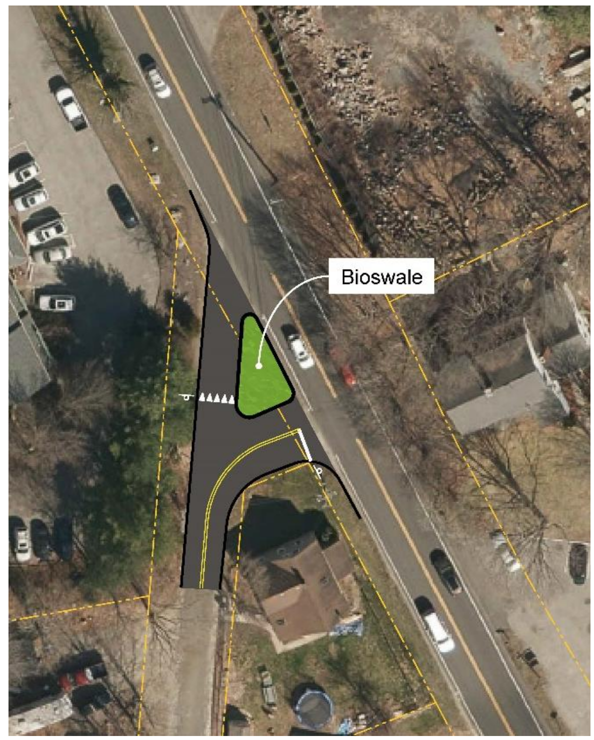
Pequonnock Trail Crossing Realignment (Plan 15)

The proposed pathway could be constructed of pervious asphalt between the existing trail surfaces. This would exclude curb ramps which would be constructed of concrete. The landscaped island on the south side of the Old Mine Road intersection could be landscaped with median plantings to provide an aesthetic gateway into the area.

Route 25 at Crescent Street – North End (Plan 23)

The island at the intersection of Route 25 and Crescent Place could be constructed as a bioswale with openings in the surrounding curb that would allow for infiltration of stormwater runoff from the roadway.





5.2.2.3 Permitting and Compliance

The following sections detail the various permitting and compliance activities that need to be considered as the Study recommendations move into the design and implementation stages. Each section describes the purpose and need for the permitting/compliance activity as well as the locations where they need to be considered. Included are sections on Environmental Permitting, Federal Funding and Preservation Compliance, Stormwater Permitting, and CTDOT Construction and Development Permitting.

Environmental Permitting

As noted in Section 2.12 of this report, there are numerous regulated natural resources within the study area. Resources of note include: Threatened and Endangered Species and Critical Habitats, Floodplains, and Wetlands. The Threatened and Endangered Species information is available through the CTDEEP Natural Diversity Data Base (NDDB). Within the study area, only one NDDB area was mapped; it is located in the vicinity of the intersection of Routes 111 and 25. Generally, the floodplains exist in the vicinity of the

Pequonnock River and Farmill River. The wetlands are generally mapped in the vicinity of the aforementioned rivers, and at smaller streams located throughout the study area. It is worth noting that natural resource mapping is based on statewide databases and from project development. More detailed investigations will better define the scope and nature of the resources that may be impacted by the projects. Project improvements planned within these mapped resource areas have been identified. Work proposed within these mapped resource areas would likely require obtaining permits from local, state, and federal regulatory entities. The environmental permits anticipated for each proposed concept are described in the following sections and summarized in Table 5-5. Funding sources also play a role in which environmental permits may be required for future work.

TABLE 5-5
Environmental Permitting Requirements by Concept

Location of Improvement	Anticipated Approvals	Comments
Route 25 at Route 111		
Plan 1	N, F, W	All within mapped resource areas
Plan 2	N, F, W	All within mapped resource areas
Route 25 at Spring Meadows and St. Stephen's		
Plan 3	F, W	Improvements located just outside of mapped wetland area, but there is a stream crossing and road widening. Located within mapped floodplains.
Route 25 at Tashua & Spring Hill Road		
Plan 4	F, W	Improvements located outside of mapped wetland area, but there is a stream crossing included. Located within mapped floodplains.
Route 25 at Crescent Place, Mill Street, and Maple Drive		
Plan 7	W	Within mapped wetlands
Route 25 at Pond View and Judd & Purdy Hill Road		
Plan 8	F, W	Within mapped wetlands and floodplains
Route 25 at North of Purdy Hill Road & Judd Road		
Plan 9	F, W	Within mapped wetlands and floodplains
Route 111 at Old Mine Road & Pequonnock River Trail Crossing		
Plan 14	N, F, W	All within mapped resource areas
Route 111 at Trefoil Plaza & Woodland Hills		
Plan 15	N, F, W	All within mapped resource areas
Trumbull Transfer Center on Spring Hill Road		
Plan 21	F, W	Improvements located outside of mapped wetland area but there is a stream crossing. Located within mapped floodplains.

N = NDDB coordination

F = Floodplains permit

W = Wetlands permit

Threatened and Endangered Species and Critical Habitats

There was one mapped NDDB area identified in the southeastern portion of the study area, along the Pequonnock River, near the intersection of Routes 111 and 25. Concepts with improvements proposed within the mapped NDDB areas will be required to coordinate with CTDEEP to determine what species may be affected by the project and any preventative or mitigative measures needed in the project design/schedule/approach. To request an NDDB state listed species review, the NDDB review request form package must be completed and submitted to CTDEEP. NDDB mapping is updated on an annual basis, so projects should be re-screened if they move forward in the future. The concepts that currently will require an NDDB review include:

- Route 25 Corridor (Plans 3 through 13)
- Route 25 at Route 111 (Plans 1 and 2)
- Route 111 at Old Mine Road & Pequonnock River Trail Crossing (Plan 14)
- Route 111 at Trefoil Plaza & Woodland Hills (Plan 15)

Preparation of the NDDB form submittal is estimated to take approximately two weeks, with an estimated agency review time of one to three months.

Floodplains

The Pequonnock River enters the study area in the northwest and crosses Route 25 twice before exiting the study area southeast of the Routes 111 and 25 intersection. The Farmill River enters the study area southeast of the intersection of Cross Hill Road and Route 111 and exits northwest of Mayfair Court in Monroe. There are floodway and 100-year floodplains mapped along these two rivers. There is also an unnamed stream with mapped 100-year floodplains and floodway located north of Tashua Road. There are also 500-year floodplains located just outside of the 100-year floodplains throughout the study area.

Concepts with improvements proposed within the mapped floodway and 100-year floodplains will be required to obtain a Flood Management Certification approval. Areas of 500-year floodplain also exist within the study area, and these will need to be considered during design and permitting. It is assumed that since the work is proposed on state roadways, that state funding would be used, and the applicant for permits would be CTDOT. Depending upon the impacts and extent of the work, this permit could be a CTDEEP Individual Flood Management Certification or CTDOT Flood Management General Certification (CTDOT applicant and minimal impacts). The concepts that would require a Flood Management Certification include:

- Route 25 at Route 111 (Plans 1 and 2)
- Route 25 at Spring Meadows and St. Stephens (Plan 3)
- Route 25 at Tashua and Spring Hill Road (Plan 4)
- Route 25 at Pond View and Judd & Purdy Hill Road (Plan 8)
- Route 25 at North of Purdy Hill Road & Judd Road (Plan 9)
- Route 111 at Old Mine Road & Pequonnock River Trail Crossing (Plan 14)
- Route 111 at Trefoil Plaza & Woodland Hills (Plan 15)
- Alternative Travel Modes (Plans B&P and T)
- Trumbull Transfer Center on Spring Hill Road (Plan 21)

Preparation of the Flood Management permit package is estimated to take approximately six weeks, with an estimated agency review time of four to six months.

If CTDOT is the permit applicant, there would be no municipal floodplains permits required.

Wetlands

There are mapped wetlands surrounding the Pequonnock and Farmill Rivers as described in the Floodplains section above. Wetlands are also mapped along smaller streams, ponds, and wet areas throughout the study area. There are mapped wetlands identified along both Routes 111 and 25. The mapped wetland areas are those comprised of poorly and very poorly drained soils, as well as alluvial and floodplain soils. In addition, both waterbodies and watercourses (intermittent and perennial) are regulated resources under the state Wetland Protection Act.

To determine if a project requires a wetlands permit, wetlands must be delineated in the field by a professional soil scientist, as well as waterbodies and watercourses. For purposes of this study, concepts within mapped wetland areas, waterbodies or watercourses have been identified as having the potential for wetland permitting needs.

Concepts with improvements proposed within the mapped wetland resource areas have the potential to be required to obtain an Inlands Wetlands and Watercourses permit through CTDEEP. If there are activities that alter or fill wetlands or watercourses, a United States Army Corps. of Engineers (USACE) Section 404 permit would be required. Generally, for USACE Section 404 approval, if impacts are less than 5,000 square feet (sf), then submitting a Self-Verification (SV) form to USACE would be needed. If impacts are greater than 5,000 sf and less than one acre, then a Pre-Construction Notification (PCN) would be needed. If the extent of the work within wetlands and watercourses causes greater impacts than one acre, an individual Section 404 permit would be required. Authorization would likely be through General Permit (GP) No. 18, however, if authorization under a different GP was required, then thresholds may be different than those outlined above.

In addition to the USACE Section 404 permit, a Water Quality Certification (WQC) approval under Section 401 of the Federal Clean Water Act would be needed. If authorization under GP 18 is sought, WQC approval would be granted as part of the SV approval process, if SV applies to the project. If the PCN is being sought and the project has under 0.5 acres of impact, the CTDEEP Connecticut Addendum Army Corps of Engineers General Permit State of CT (CT Addendum) would be required for the WQC. If impacts are over 0.5 acres, an individual WQC through CTDEEP would be required. If USACE Section 404 approval were through a GP other than GP 18, then Section 401 WQC thresholds may change. If a USACE Section 404 permit is needed, the CTDEEP General Permit for Water Resource Construction Activities will also apply as long as the project has under one acre of wetland and watercourse impacts.

If CTDOT is the permit applicant, there would be no municipal wetlands permits required, as CTDOT coordinates with the municipalities during the design process.

The concepts that may require a wetlands permit include:

- Route 25 at Route 111 (Plans 1 and 2)
- Route 25 at Spring Meadows and St. Stephens (Plan 3)
- Route 25 at Tashua and Spring Hill Road (Plan 4)
- Route 25 at Crescent Place, Mill Street, and Maple Drive (Plan 7)
- Route 25 at Pond View and Judd & Purdy Hill Road (Plan 8)
- Route 25 at North of Purdy Hill Road & Judd Road (Plan 9)
- Route 111 at Old Mine Road & Pequonnock River Trail Crossing (Plan 14)
- Route 111 at Trefoil Plaza & Woodland Hills (Plan 15)
- Alternative Travel Modes (Plans B&P and T)
- Trumbull Transfer Center on Spring Hill Road (Plan 21)

Preparation of the SV form submittal is estimated to take approximately two weeks, with no agency review time. Preparation of the PCN, General Permit for Water Resource Construction Activities permit, and/or CT Addendum packages are estimated to take approximately six weeks, with an estimated agency review time of four to six months. Preparation of Individual USACE and/or Individual WQC permit packages are estimated to take approximately twelve weeks, with an estimated agency review time of eight to twelve months.

Federal Funding and Preservation Compliance

Depending upon the funding source for projects, federal and/or state-level environmental documentation would be required. If federal funding is used, and if impacts are minimal, a Categorical Exclusion (CE) would likely satisfy the federal requirements. If the project has federal funding and greater impacts are anticipated, then the preparation of an Environmental Assessment (EA) may be necessary. If state funding is involved, to satisfy Connecticut Environmental Policy Act (CEPA) state environmental documentation requirements, a Post Scoping Notice or an Environmental Impact Evaluation (EIE) would be required. As the project advances into conceptual design and additional project details are known, a determination should be made about the applicability of NEPA and CEPA and the proper class of documentation. Opportunities for streamlining the environmental documentation process should be used, if available (e.g., preparation of a combined NEPA/CEPA document).

If federal funds are used for the improvements, the project would be subject to Section 4(f) of the US Department of Transportation Act. Given their locations and the recommended improvements a use under Section 4(f) of the following properties is unlikely: the Thomas Hawley House, Monroe Elementary School, Gregory's Four Corners Burial Ground, and Barnum Curtis Mills. However, there is the potential for a Section 4(f) use of the Old Mine Park and the Pequonnock River Trail. Improvements at Green Street in proximity to the Birdsey's Plain/Stepney Cemetery may also be subject to 4(f). As the project advances into conceptual design and additional project details are known an assessment should be undertaken to determine what documentation is required in order to comply with Section 4(f) of the US Department of Transportation Act.

Section 106 of the National Historic Preservation Act requires that federal agencies take into account the effects of their actions on properties listed in, or eligible for listing in, the National Register of Historic Places. Given the locations of the two historic properties and the nature of the improvements, adverse effects are unlikely. However, once the design has been advanced to the concept level, and if federal funds are used for the improvements, consultation should be undertaken with the CT State Historic Preservation Office. Similarly, consultation will have to be undertaken with the Connecticut State Historic Preservation Office regarding any potential effects to the state-listed Monroe Elementary School.

Stormwater Permitting

It is unknown which concepts and segments will be constructed together, however if the soil disturbance proposed for a project is over one acre, a CTDEEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (Stormwater GP) would be required. With CTDOT as the applicant, this project would be classified as a locally exempt project. Any concepts that require the Stormwater GP, even if located outside of a mapped NDDB area, must also request the NDDB review and include the CTDEEP response in the stormwater permit package.

Preparation of the Stormwater GP package is estimated to take approximately six weeks. This permit filing must be submitted to CTDEEP 60 days before the start of construction if the soil disturbance area is between one (1) and twenty (20) acres. If the project's soil disturbance is greater than 20 acres, the permit should be submitted 90 days before the start of construction. CTDEEP has the 60- or 90-day timeframe to review the filing and provide any feedback to the applicant.

If CTDOT is the permit applicant, there would be no municipal stormwater permits required. If soil disturbance for the project is less than one acre, and a CTDEEP wetlands permit is required, no municipal stormwater permits would be needed.

CTDOT Improvement Construction & Development Permitting

In addition to the permitting for natural resources, CTDOT will require permits for developments and construction of improvements within the State right-of-way for Municipal roadway improvements and driveways to developments. The permits include encroachment permits and signal revision permits for the Municipal roadway and development driveway improvements and Office of State Traffic Administration (OSTA) permits for large developments that exceed the OSTA size limits. The permits required for the recommended improvement plan are summarized in the improvement matrices in Section 5.1.3. Depending on the scope of the work and the entity, the Municipality or a private developer performing the design, funding for the permits may come from public and/or private resources.

5.2.2.4 Construction

Following the completion of the design phase, the projects will begin the construction phase. The steps involved in a publicly funded project include advertisement for bids to contractors, collecting bids on the work and awarding the contract, and finally conducting the construction to build the improvement. Utility relocations typically take place during construction, but in some instances a utility company may relocate facilities in advance of a project taking place once a utility agreement is in place. Generally, smaller projects are completed within one construction season between March and November. Larger projects can span several construction seasons depending on the complexity of the work, the construction staging and phasing needed to facilitate the maintenance and protection of traffic operations during construction, and possibly the availability of funding. Projects identified as having Moderate Complexity can be expected to take up to two construction seasons and highly complex projects could take more than two construction seasons to build.