
TOWN OF STRATFORD, CT

COMPLETE STREETS PLAN

ACKNOWLEDGEMENTS

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The project was made possible through a grant from the State of Connecticut Office of Policy & Management.

The thoughtful input and constructive feedback regularly provided by the Technical Advisory and Community Advisory Committees and the Town of Stratford's Planning & Zoning Department significantly improved the quality of this plan.

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EXECUTIVE SUMMARY



Stratford is undertaking several long-term, integrated smart growth initiatives that will balance economic development with the preservation of natural and cultural resources. These planning and development initiatives include transit-oriented development, complete streets, coastal resiliency, greenway planning and implementation, brownfield remediation, and cultural arts. Individually, none of these initiatives is the solution for a thriving Stratford Center. Instead, these initiatives must be integrated and collectively implemented, ensuring that each one supports the goals of the other.

Stratford is committed to planning for and implementing complete streets throughout the Town. This Complete Streets Plan articulates a vision, justification, and action agenda for redefining Stratford's transportation network. In particular, this plan provides a framework to:

- Provide a safe, accessible environment for users of all ages and abilities;
- Transform streets into active, healthy corridors for all modes of travel;
- Connect residents and visitors to major destinations;
- Beautify the public realm;
- Stimulate investment and revitalize Stratford Center; and,
- Promote coordination across agencies, initiatives, and organizations to better achieve shared smart growth goals.

1.1 STUDY AREA

The Stratford Complete Streets study area includes all streets within a one-half mile radius of the Stratford Rail Station. In order to address connectivity between Stratford Center and neighboring residential and commercial areas, the study area also extends north along Main Street to Paradise Green and northwest along Nichols Avenue to Lincoln Street. Site-specific analysis and design recommendations focus on nine key street corridors, all of which provide connectivity between local and regional destinations. The nine corridors include: Barnum Avenue, Broad Street, Broadbridge Avenue, E. Broadway, Ferry Boulevard, King Street, Main Street, Nichols Avenue, and W. Broad Street. Recommendations for these key street corridors are intended to serve as a model for the future expansion of complete streets to all Town neighborhoods and districts.

1.2 PUBLIC ENGAGEMENT

The development of this plan was guided by a Community Advisory Committee, a Technical Advisory Committee, and extensive engagement with the public. A variety of opportunities were provided for local residents, business-owners, Town employees/officials, and other community stakeholders to engage in conversation with the design team, provide ongoing constructive feedback, react to design alternatives, and contribute local knowledge. These opportunities included:

- Two public meetings held on April 19, 2016 and December 14, 2016;
- A four-day, interactive public design workshop held from May 31 to June 3, 2016;
- An interactive web map that allowed participants to contribute data for seven months; and,
- Open public comment on the draft plan.

All feedback received from the public was incorporated into the final plan and used to refine and inform design recommendations.



Public feedback received during the four-day public design workshop.



STRATFORD COMPLETE STREETS STUDY AREA

1.3 EXISTING CONDITIONS INFORM RECOMMENDATIONS

This plan's recommendations focus on creating a cohesive network of pedestrian, bicycle, and public transit systems throughout Stratford. An integrated multimodal transportation network will ensure the Town is well-connected, from the Historic District to Paradise Green, and that users of all ages and abilities have access to multiple transportation choices.

PEDESTRIAN NETWORK

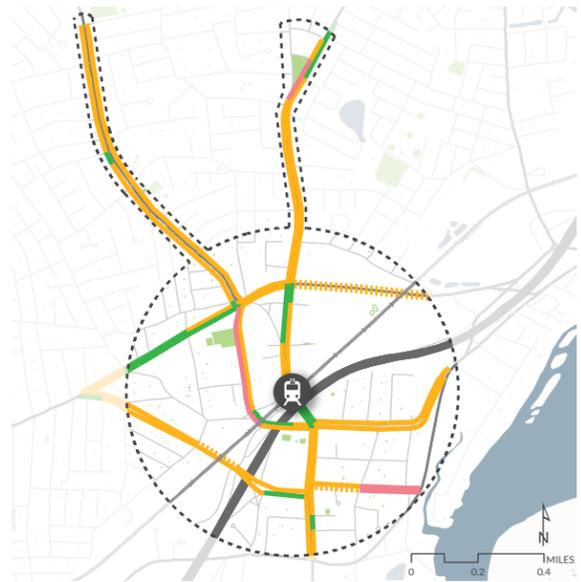
Stratford's pedestrian infrastructure is well-developed along sections of Main Street and Barnum Avenue. However, there are several discontinuities in the existing pedestrian network, and several routes that connect residential areas to Stratford Center have little to no pedestrian infrastructure. The Town should prioritize closing gaps in the pedestrian network, including: installing sidewalks along both sides of Broad Street, Ferry Boulevard, King Street, and the sec-

tion of Barnum Avenue to the east of Main Street. Several existing sidewalks are in poor condition and pose tripping hazards to pedestrians. The Town should also target sidewalk upgrades along Nichols Avenue, particularly around Nichols School, and E. Broadway. Specific recommendations that aim to improve the experience and safety of pedestrians include the addition of street furniture, pedestrian-scale lighting, landscape buffers, street trees, and curb extensions.

BICYCLE NETWORK

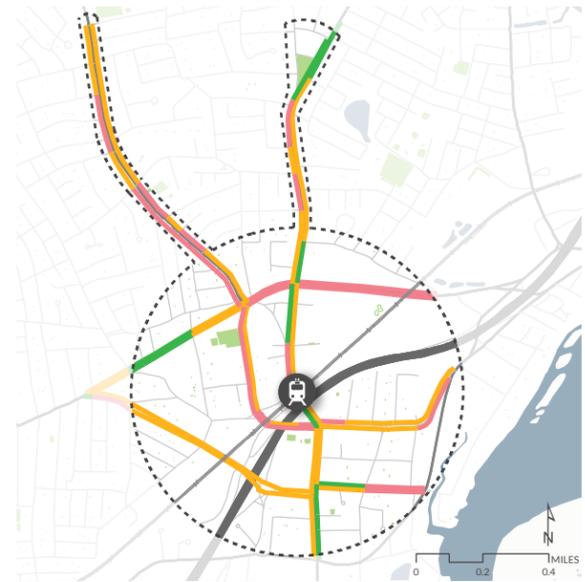
Bicycle transit infrastructure (e.g., bike lanes) are absent in Stratford and bicycle parking facilities are limited. Despite this lack of infrastructure, there is an active bicycling community in Stratford, and with targeted infrastructure improvements, this community could be expanded to include bicyclists of all abilities. The two most immediate opportunities for improving Stratford's bicycle network include the expansion of bicycle parking and the installation of bicycle transit facilities. Short- and long-term bicycle parking should be available throughout the Town. As Stratford expands its bicycle parking, key destinations, such as Stratford Center, Paradise Green, and schools, should be prioritized. The installation of bicycle transit infrastructure should be prioritized along the East Coast Greenway and Housatonic Greenway routes. Bicycle infrastructure connecting residential areas to schools should also be prioritized.

STREETScape AUDIT RESULTS



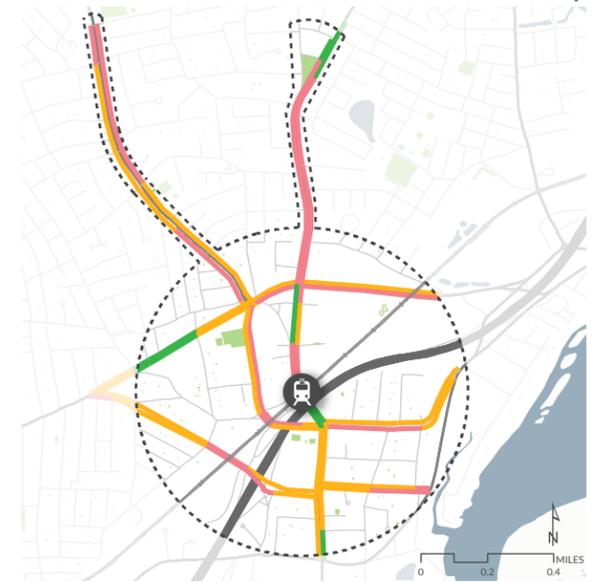
SIDEWALK CONDITION

■ Good
 ■ Poor - Incomplete
 ■ Missing
■ Poor - Tripping Risk



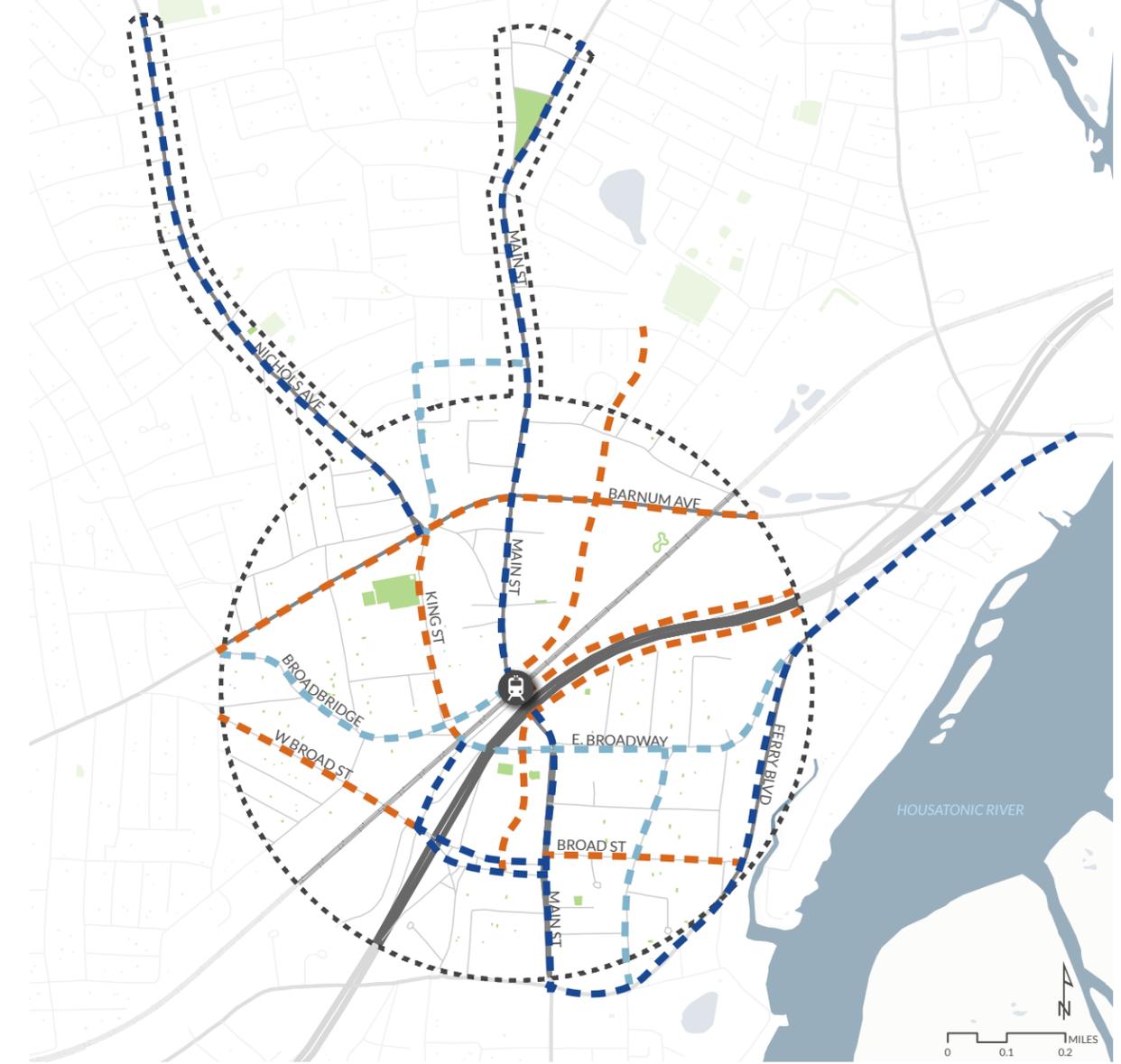
STREET TREE CONDITION

■ Good
 ■ Poor
 ■ Missing



STREET LIGHT CONDITION

■ Good
 ■ Poor



PROPOSED BIKE FACILITIES NETWORK

■ Bike Boulevard
 ■ Protected Bike Lane
 ■ Multi-Use Path

PUBLIC TRANSIT NETWORK

The Greater Bridgeport Transit bus system and the MetroNorth rail station provide critical regional transportation services. However, the accessibility of these systems and the integration between public transit and other modes of transportation should be significantly improved.

Opportunities for improvement include:

- Upgrade all bus stops to ensure they provide accessible waiting areas;
- Improve signage at bus stops to improve safety and wayfinding;
- Provide safe and comfortable waiting areas for transit passengers, including shelters, benches, and lighting;
- Integrate bus and rail service by coordinating arrival and departure schedules and improving access between bus stops and the rail station. The creation of an intermodal transit hub at the rail station that services both the bus and rail systems should be a long-term goal;
- Integrate bus, rail, and bicycle networks by providing bicycle parking at major transit stops and increasing the amount of bike racks provided on buses (currently, every GBT bus can accommodate a maximum of two bikes); and,
- Connect pedestrian and bicycle networks directly to the rail station with on- and off-road facilities.

TRANSIT USER EXPERIENCE IMPROVEMENTS



Improved access for bicyclists and pedestrians

Wayfinding signage provides direction to a user's final destination

Covered bus stop provides seating + shelter from harsh weather

Pedestrian-scale lighting improves visibility

INTERSECTION CROSSINGS

Several intersections within the study area pose challenges for users of all modes of transportation. High volumes of motor vehicle traffic, frequent car crashes, poorly maintained crossing infrastructure, long crossing distances, and a lack of crosswalks, pedestrian signals, and sidewalk ramps with detectable warnings are all factors contributing to unsafe and inaccessible crossing conditions. Enhancing the pedestrian and bicycle crossing infrastructure at major intersections within the study area will increase safety and accessibility and improve connectivity between local and regional destinations. The Town should prioritize improvements for the following key intersections:

- Main Street and Barnum Avenue
- Nichols Avenue, Barnum Avenue, King Street, and Essex Place
- W. Broad Street and Linden Avenue
- W. Broad Street, Beardsley Avenue, and I-95 access ramps
- Paradise Green intersections

STORMWATER MANAGEMENT

Flooding caused by storm events, prolonged periods of precipitation, and sea level rise poses a nuisance to Stratford residents, visitors, and business owners, and places people, vehicles, and infrastructure at risk. Green infrastructure offers an environmentally-friendly approach to managing the excess water generated during storm and flood events. Opportunities for installing green infrastructure are identified throughout the study area. These opportunities focus on using green infrastructure to sustain-

INTERSECTION CROSSING OPTIONS



Textured Intersection

more extreme alternative would be textured and tabled for traffic calming.



Pedestrian Scramble

techniques are used to stop traffic in all directions while pedestrians cross an intersection in any direction, including diagonally.



Bike Crossings

are exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of conventional bike lanes.



Curb Extensions

shorten crossing distance as well as calm traffic. Also carves out parking spaces.

ably manage stormwater, improve streetscape aesthetics, serve as Town gateways, provide educational opportunities, and calm traffic.

PLACEMAKING

Opportunities to enhance the public realm and transform spaces into vibrant, sociable places that reflect the local culture and environment include:

- Incorporate public art into the streetscape in Paradise Green, Stratford Center, and under the rail and I-95 bridges;
- Soften infrastructure barriers with art installations (e.g., lighting, water features);
- Engage cultural arts and historical community groups to assist with the programming of spaces;
- Create flexible streets that can serve multiple community needs (e.g., streets that can be periodically closed to cars and used for local celebrations) along Paradise Place and North Parade Street; and,
- Create small, informal spaces that are woven throughout the Town, inviting residents to pause, relax, and socialize.

PLACEMAKING ELEMENTS



Decorative lighting illuminates streetscape



Public artwork



Group seating



Gathering spaces

1.4 DESIGN RECOMMENDATIONS

The implementation of complete streets throughout Stratford will improve the Town's competitive edge in attracting and retaining residents and high-quality businesses. Stratford is situated in a region that is highly desirable given its close proximity to large metropolitan areas and regional rail connectivity. Several studies have shown that the implementation of complete streets can benefit local businesses, reduce transportation costs for residents, spur economic investment, and increase property values.¹

- **Local business benefits.** Improved pedestrian and bicycle access to local businesses can increase local business sales. For example, the addition of a bike lane along Valencia Street in San Francisco's Mission District resulted in a 60% sales increase for neighboring businesses.
- **Transportation cost savings.** Improved and expanded pedestrian, bicycle, and public transit infrastructure provides residents with several cost-effective alternatives to driving cars. For example, people living in Cleveland, Ohio who switch from driving to public transit save an average of \$9,576 annually.

¹ Smart Growth America. Benefits of Complete Streets: Complete Streets Stimulate the Local Economy. Fact sheet is accessible online at: <https://www.smartgrowthamerica.org/app/legacy/documents/cs/factsheets/cs-economic.pdf>

- **Increased economic investment.** Complete street improvements that make pedestrians and cyclists feel more welcome, particularly in retail or business districts, can spur increased economic investment. For example, the city of Lancaster, California (located 70 miles north of Los Angeles with a population of approximately 168,000) invested \$10.6 million to install traffic calming features, wider sidewalks, and a pedestrian-only plaza. These improvements spurred \$125 million in private investment and corresponded with a 26% increase in sales tax revenue.
- **Increased property values.** Comprehensive complete street policies can lead to an interconnected network of complete

streets that increase transportation options, improve safety, enhance accessibility, and increase walkability. In a survey of 15 real estate markets from across the nation, a one-point increase in walkability as measured by WalkScore.com corresponded with a \$700 - \$3,000 increase in home values.

Complete street design recommendations were developed for six street corridors within the study area during the public design workshop in June 2016. Based on feedback from the public and Town staff, the complete street designs were refined and cost estimates were developed for each of the six corridors (for detailed cost estimates, please see Appendix B).

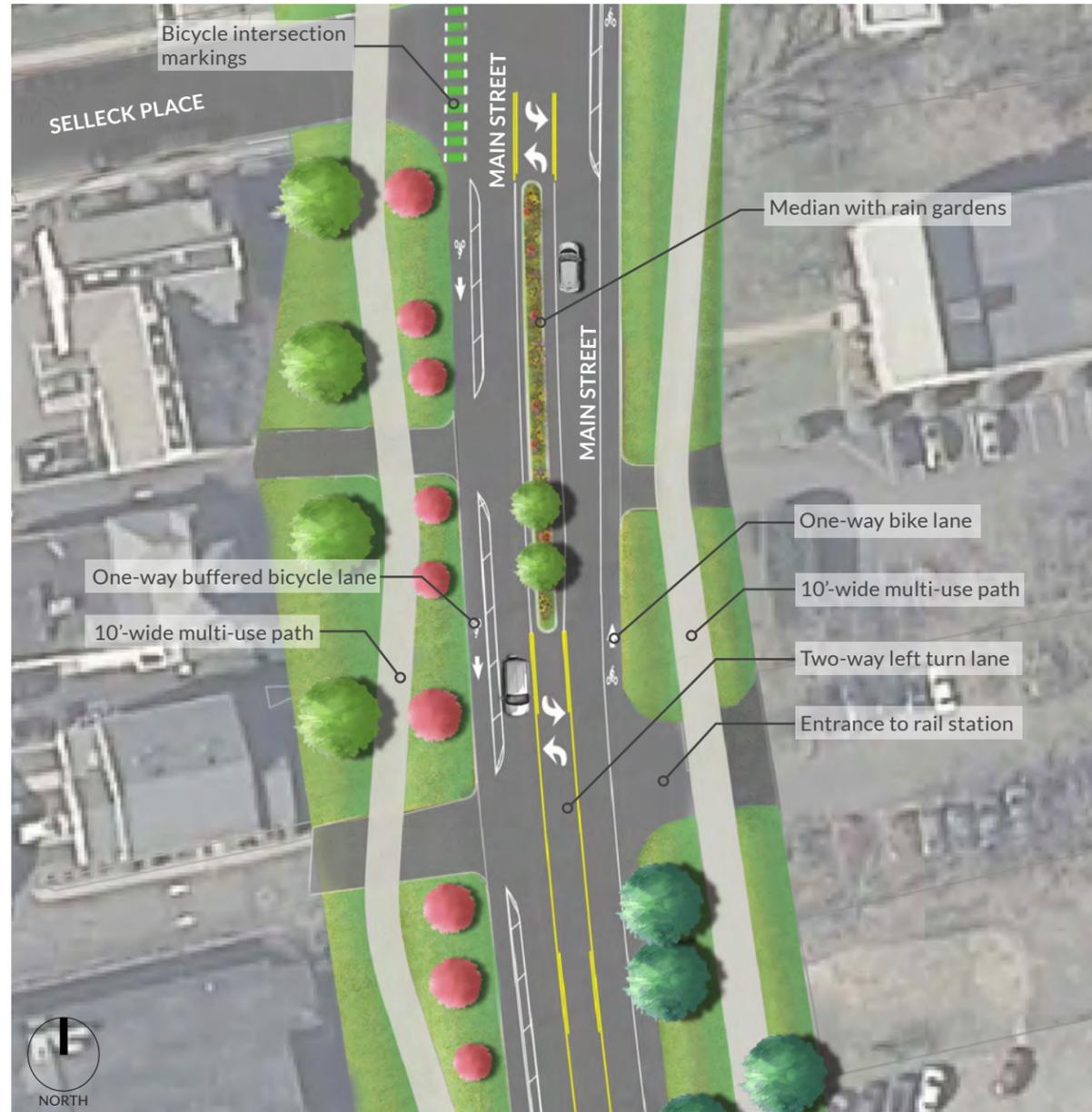


Pedestrian-friendly streetscape in Kennett Square, Pennsylvania.

1. MAIN STREET (from E. Broadway to Barnum Avenue)

Main Street is the primary north-south connector in Stratford, and this section of Main Street provides critical access to the rail station. The following recommendations will improve multi-modal connectivity between the Historic District, Stratford Center, the rail station, and Barnum Avenue; increase connectivity to the Housatonic Greenway (via E. Broadway) and the East Coast Greenway; and, enhance access and safety for pedestrians and bicyclists.

It is recommended that this four-lane street be reduced to three-lanes: a northbound lane, a southbound lane, and a two-way center turn lane. Reducing the number and width of travel lanes provides sufficient space for on-road, buffered bicycle lanes, expansion of the east and west sidewalks into 10-foot wide multi-use paths, curb extensions with green infrastructure, and parking in Stratford Center. All intersection crossings should be upgraded to include high visibility crosswalks and sidewalk ramps with warning texture. Bicycle intersection markings should also be added. To further enhance the pedestrian experience in Stratford Center, plaza space, site furnishings, and bike racks should be added. The total estimated cost for recommended improvements along this section of Main Street is \$2.2 million.



2. MAIN STREET (north of Barnum Avenue to Paradise Green)

Main Street is an important component of the East Coast Greenway, and the following recommendations will increase connectivity within Stratford as well as regional connectivity between Stratford and the surrounding area.

It is recommended that this four-lane street be reduced to three-lanes: a northbound lane, a southbound lane, and a two-way center turn lane. Reducing the number and width of travel lanes provides sufficient space for on-road, buffered bicycle lanes, expansion of the east and west sidewalks into 10-foot wide multi-use paths, curb extensions with green infrastructure, and parallel parking along the east side of Paradise Green park. All intersection crossing should be upgraded to include high visibility crosswalks and sidewalk ramps with warning texture. Bicycle intersection markings should also be added. To further enhance the pedestrian experience in Paradise Green, art, site furnishings, and bike racks should be integrated into the sidewalks, and Paradise Green Place should be converted into a festival street.¹ Further study is needed to determine if Huntington Road can be re-configured to intersect Main Street at a 90-degree angle. The total estimated cost for recommended improvements along this section of Main Street is \$3.5 million.

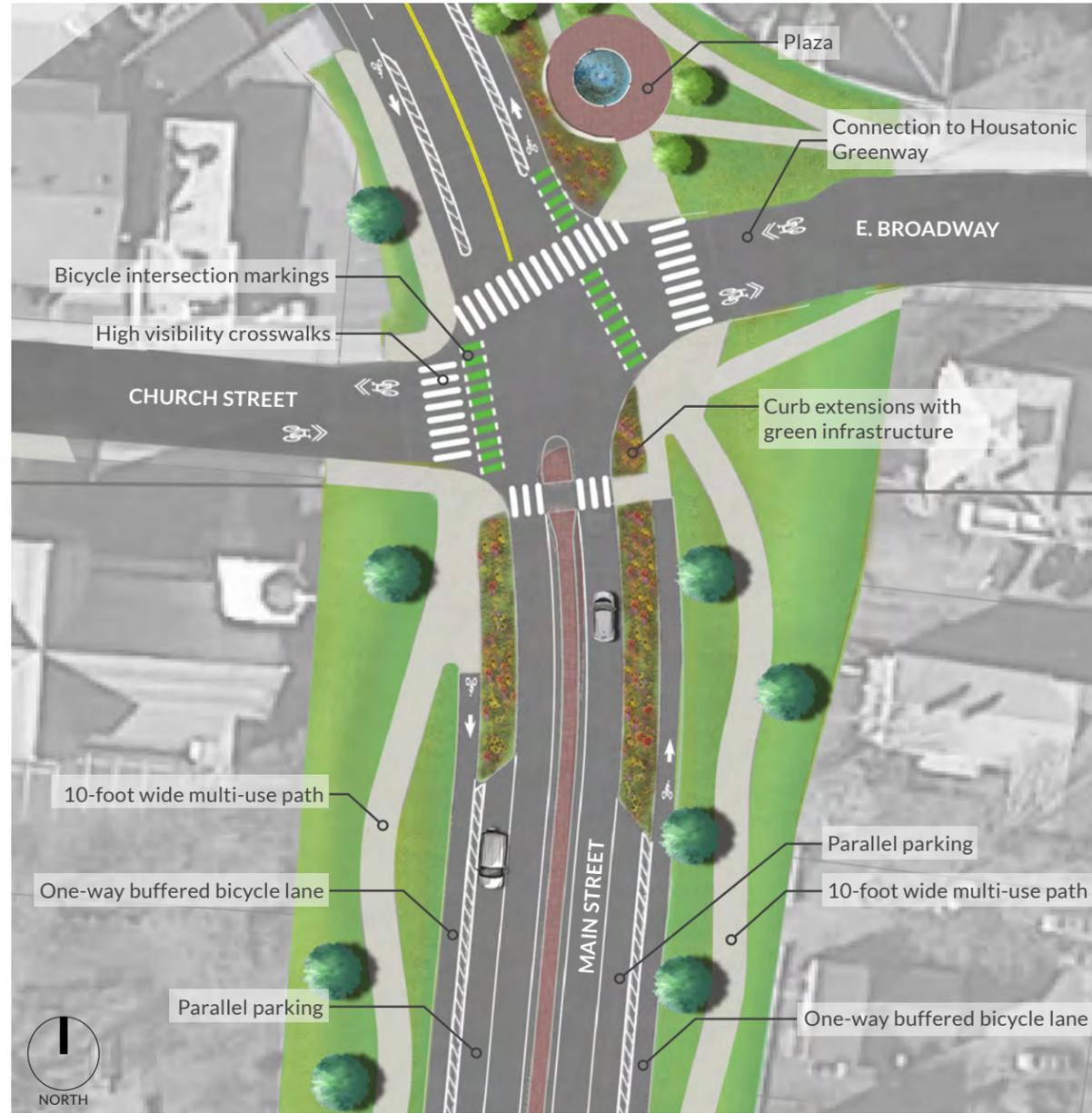
¹ Festival streets typically function as normal streets, but can be rapidly converted into pedestrian-only space in order to support markets, concerts, festivals, and other community activities.



3. MAIN STREET (south of E. Broadway to Stratford Avenue)

This section of Main Street provides an important connection between the newly constructed transit-oriented housing development at the intersection of Main Street and Stratford Avenue, the Historic District, and Stratford Center. Main Street plays a key role in the East Coast Greenway system and connects to the Housatonic Greenway system via E. Broadway.

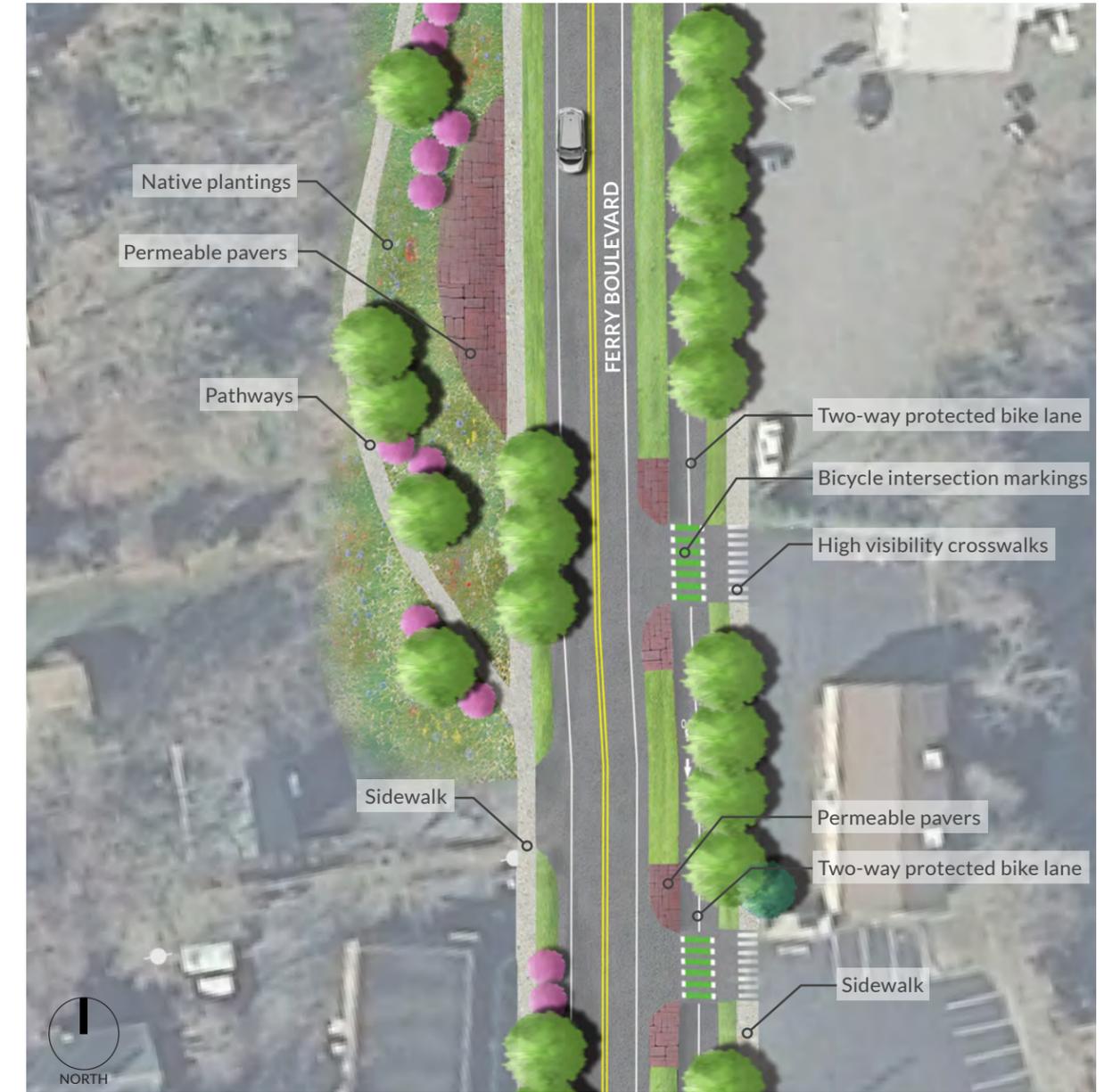
Recommended improvements along this stretch of Main Street include retaining the central median and reducing the width of travel lanes to enable the addition of one-way, buffered bicycle lanes, parallel parking, and curb extensions with green infrastructure. All intersection crossings should be upgraded to include high visibility crosswalks and sidewalk ramps with warning texture. Bicycle intersection markings should also be added. To further enhance the pedestrian experience along this section of Main Street, site furnishings and bike racks should be integrated into the streetscape, particularly near the library. The total estimated cost for recommended improvements along this section of Main Street is \$2.0 million.



4. FERRY BOULEVARD

Ferry Boulevard is an important component of the East Coast Greenway. The improvements suggested below will improve local and regional connectivity; address flooding issues; further the Town's initiative to redevelop brownfields; and, create opportunities to attract new businesses.

The width of travel lanes along Ferry Boulevard should be reduced in order to provide sufficient space for a two-way protected bike lane, connecting Main Street and neighborhoods in the Historic District to the Docks shopping area. Sidewalks should be added along both sides of the street. In areas where the right of way widens and coincides with flood zones, park space should be installed that enhances recreational opportunities and manages stormwater during rain events. All intersection crossings should be upgraded to include high visibility crosswalks, sidewalk ramps with warning texture, and pedestrian crossing signals. Pavement markings that delineate bicycle crossing areas should be added at each intersection. The total estimated cost for recommended improvements along Ferry Boulevard is \$4.9 million.



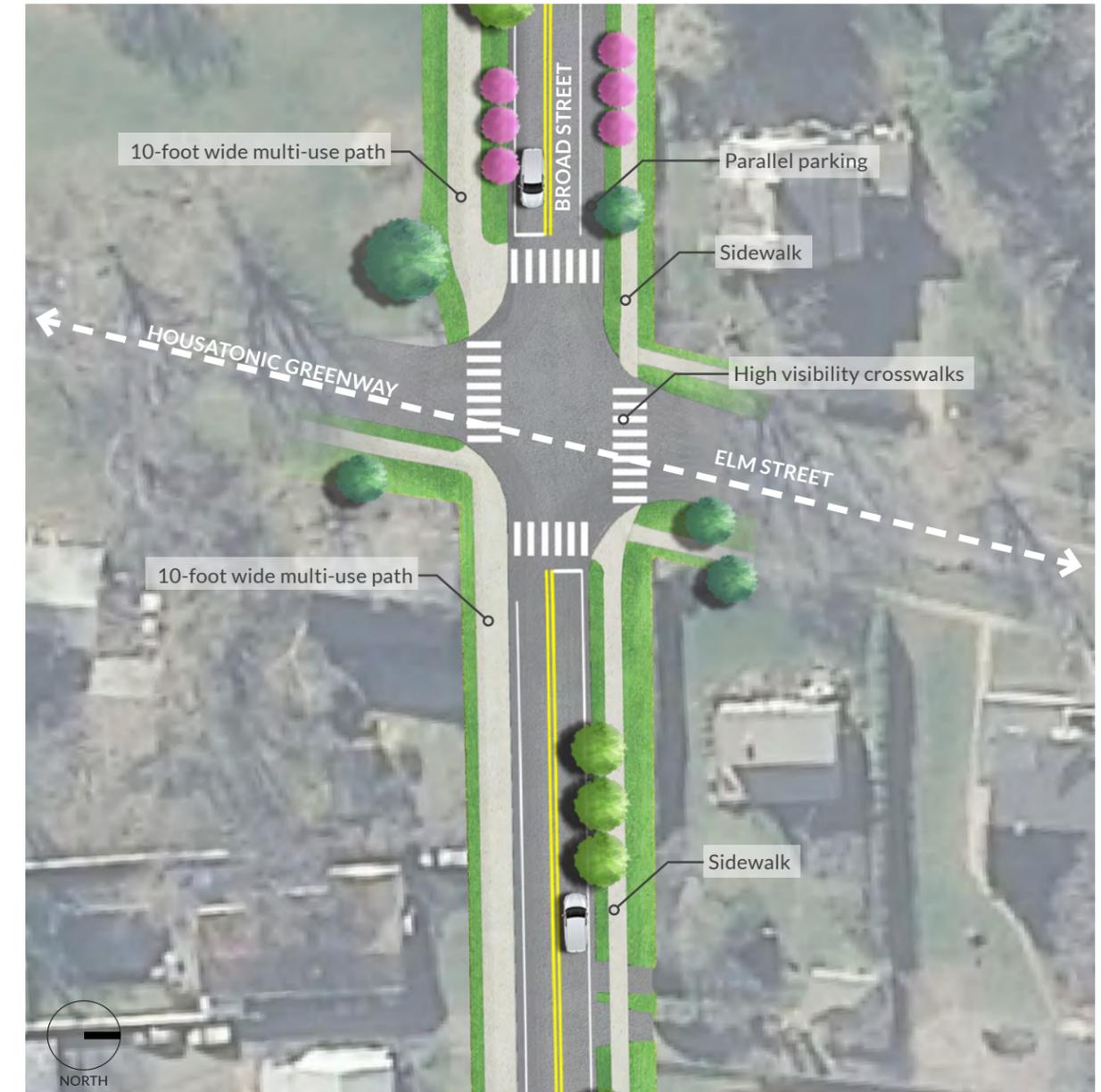
5. NICHOLS AVENUE

The wide right of way along Nichols Avenue, and many other streets in Stratford, creates an opportunity to make significant improvements for pedestrians and bicyclists, while leaving the existing street intact. Along Nichols Avenue, the wide landscape buffer should be divided into separated bicycle and pedestrian facilities. Where space is constrained, the bicycle and pedestrian facilities should merge into a 10-foot wide multi-use path. All intersections should be upgraded to include high visibility crosswalks and sidewalk ramps with warning texture. Pavement markings that delineate bicycle crossing areas should be added at each intersection. Pedestrian crossing signals should also be installed at all intersections adjacent to schools (Nichols School and David Wooster School) and at Barnum Avenue. Long-term and short-term bike racks should be provided at the two schools, encouraging students to use active transportation. The total estimated cost for recommended improvements along Nichols Avenue is \$5 million.



6. W. BROAD AND BROAD STREETS

Reducing the width of travel lanes along this corridor provides sufficient space for bike lanes to be installed between Main Street and Linden Avenue and for a 10-foot wide multi-use path to be installed along the south side of the street between Main Street and Ferry Boulevard. When added, bicycle infrastructure along Broad Street will provide important connections to the Housatonic and East Coast Greenways. Sidewalks should be installed along the length of the corridor. All intersections should be upgraded to include high visibility crosswalks and sidewalk ramps with detectable warning, and bicycle intersection markings should be added. Pedestrian crossing signals should also be installed at all intersection crossings at Linden Avenue, Beardsley Avenue, Main Street, and Ferry Boulevard. The total estimated cost for recommended improvements along Broad and W. Broad Street is \$1.3 million.



1.5 ACTION PLAN

Implementing complete streets in Stratford will require a long-term strategy and an incremental approach. The Town’s complete street strategy should be guided by policy and integrated with current and future Town initiatives, such as greenway planning, coastal resiliency, and brownfield redevelopment.

ADOPT A COMPLETE STREETS POLICY

The Town is encouraged to develop and implement a complete streets policy as soon as possible to ensure future development adheres to complete street principles. Developing and adopting a policy could take as little as six-months. A complete streets policy will enable the Town to:

- Advance an integrated, town wide transportation network that supports safe travel for users of all modes, ages, and abilities;
- Ensure complete streets are prioritized for all projects and all phases, including design, planning, construction, maintenance, and operations of new and existing streets and facilities;
- Enhance the Town’s Transit-Oriented Development District;
- Improve connectivity to existing and future greenway systems;
- Establish measurable goals; and,
- Prioritize transportation spending.

ESTABLISH A COMPLETE STREETS GOVERNANCE STRUCTURE

This plan, like any other, requires a champion to achieve sustained, coordinated action. A governance structure for complete streets could be accomplished by creating a new advisory board (e.g., merging the Technical and Community Advisory Boards assembled for this project) or by integrating complete street functions into an existing committee. The governance body would be responsible for championing the cause of complete streets, making budgetary recommendations, and creating, revising, and enforcing policy. Representation from relevant Town departments, commissions, and organizations is necessary to ensure the coordination of complete streets projects throughout Stratford.

IMPLEMENT PRIORITY PROJECTS

Priority complete streets projects are identified and ranked based on the following criteria: community need and impact, connectivity, synergies with existing efforts, and the benefit/cost. The top three priority projects will achieve connectivity between the Historic District, Stratford Center, and Paradise Green, as well as better integration with the East Coast Greenway and Housatonic Greenway systems. These priority projects include:

1. Main Street, north of E. Broadway to Barnum Avenue;
2. Main Street, north of Barnum Avenue to Paradise Green;
3. Main Street, south of E. Broadway to Stratford Avenue;
4. Ferry Boulevard;

5. Nichols Avenue; and,

6. W. Broad and Broad Streets.

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2

PROJECT OVERVIEW + GOALS



Stratford is rich in cultural and natural resources, and the Town is committed to preserving and enhancing these resources, while also promoting sustainable economic development. Roosevelt Forest, the Housatonic River, Long Island Sound, and the Town's many parks and beaches demonstrate the Town's commitment to conservation, open space, and healthy, active living. The Arts Commission provides the community with inspirational opportunities to experience music, theater, art, literature, films, and architecture. The Historic District preserves and protects the distinct characteristics of historic buildings and places for the enjoyment and education of the community. The Economic Development Commission supports strategic and sustainable growth of the Town.

Stratford is undertaking several long-range, integrated initiatives to achieve the ultimate goal of smart growth in order to balance economic development with preservation of natural and cultural resources. These planning and development initiatives include complete streets, transit-oriented development, coastal resiliency, greenway planning and implementation, brownfield remediation, and cultural arts. Individually, none of these initiatives is the solution for a thriving Stratford Center. Instead, these initiatives must be integrated and collectively implemented, ensuring that each one supports the goals of the other.

2.1 PROJECT OVERVIEW + STUDY AREA

The Stratford Complete Streets project aims to improve connectivity between residential and commercial areas, support multiple modes of transportation, increase safety and accessibility, and foster healthy lifestyles. The Town of Stratford has taken several steps to promote safe streets and encourage a more vibrant Stratford Center - from the Housatonic Greenway to implementing a Transit-Oriented Development Overlay District to drafting a complete streets policy.

By focusing on key street corridors in the public right of way, this project builds on past and ongoing initiatives to achieve the project goals.

The Stratford Complete Streets study area (Map 2.1) includes all streets within a one-half mile radius of the Stratford Rail Station. In order to address connectivity between Stratford Center and neighboring residential and commercial areas, the study area also extends north along Main Street to Paradise Green and northwest along Nichols Avenue to Lincoln Street. Site-specific analysis and design recommendations focus on nine key street corridors, all of which provide connectivity between local and regional destinations. The nine corridors include: Barnum Avenue, Broad Street, Broadbridge Avenue, E. Broadway, Ferry Boulevard, King Street, Main Street, Nichols Avenue, and W. Broad Street. Recommendations for these key street corridors are intended to serve as a model for the future expansion of complete streets to all Town neighborhoods and districts.

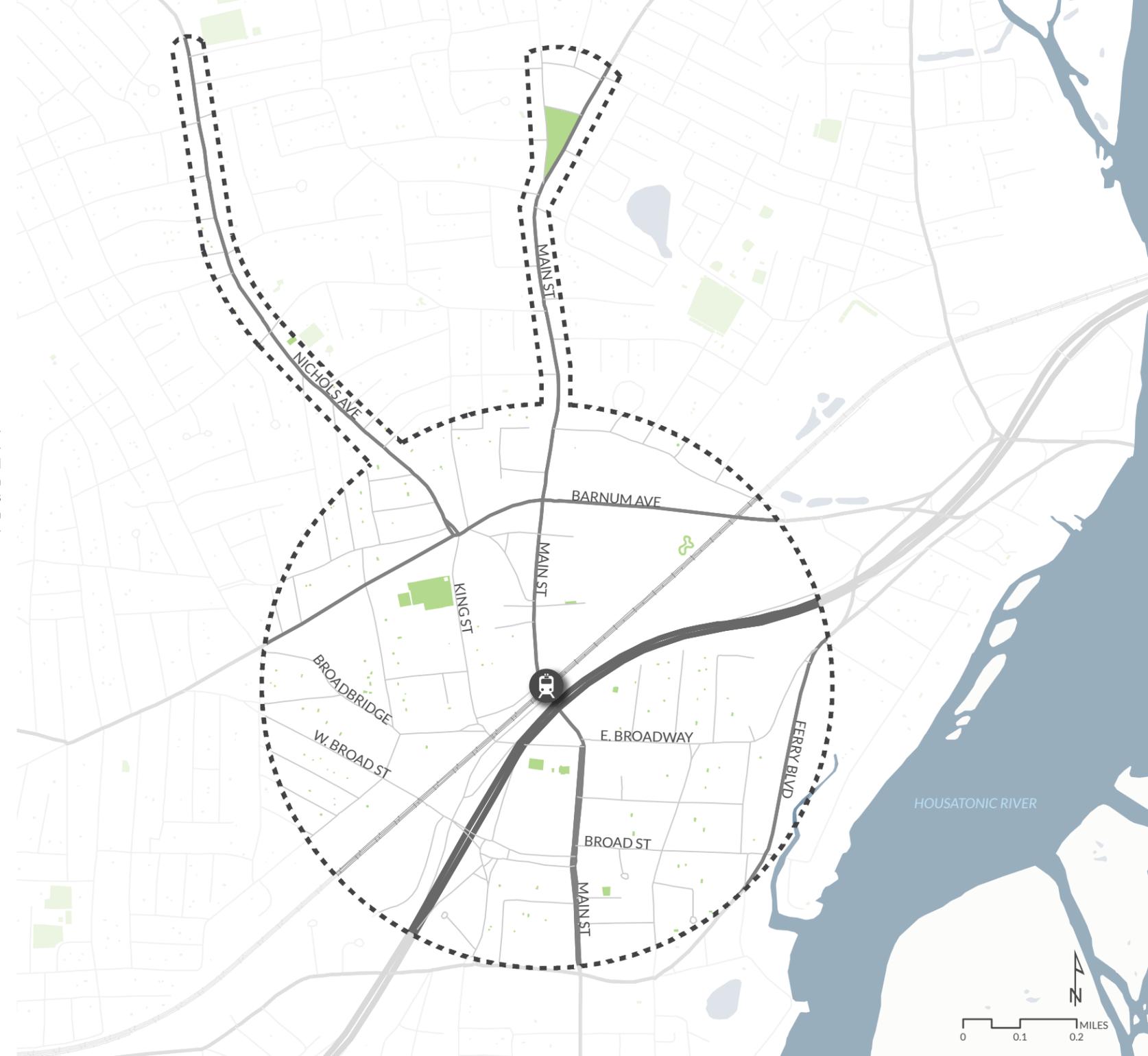
PROJECT GOALS

- Provide a safe, accessible environment for users of all ages and abilities;
- Transform streets into active, healthy corridors for all modes of travel;
- Connect residents and visitors to major destinations;
- Beautify the public realm;
- Stimulate investment and revitalize Stratford Center; and,
- Promote coordination across agencies, initiatives, and organizations to better achieve shared smart growth goals.

MAP 2.1
STUDY AREA

The study area encompasses all streets within one-half mile of the Stratford rail station. The study area also includes extensions along Main Street to Fenlon Place and along Nichols Avenue to Lincoln Street.

-  Rail station
-  Study area
-  Parks + open space



MAIN STREET

Main Street (State Route 113) is a principal arterial and is the Town's major north-south street corridor. Main Street connects the study area to Long Island Sound, the Lordship Neighborhood, Sikorsky Airport, a newly constructed transit-oriented housing development on Stratford Avenue, residential neighborhoods north of Paradise Green, and State Route 110. Within the study area, Main Street connects Stratford Center to the rail station, the Town's Historic District, community services (e.g., Town Hall and the fire station), single family residences, and Paradise Green. Main Street also intersects major east-west corridors within the study area, including Stratford Avenue (State Route 130) to the south and Barnum Avenue (U.S. Route 1) to the north. Furthermore, Main Street is an important component of both the East Coast Greenway and Housatonic Greenway systems.

NICHOLS AVENUE

Nichols Avenue is a minor arterial. It is a two-lane state road (Route 108) that connects Stratford Center with Routes 8 and 15. Nichols Avenue is largely characterized by single-family residences, and it provides an important connection to the Nichols School and the David Wooster Middle School.

BARNUM AVENUE

Barnum Avenue is a principal arterial. Within the study area, Barnum Avenue coincides with U.S. Route 1, a national highway system spanning the length of the east coast from the Florida Keys to Maine. In Connecticut, U.S. Route 1 runs east-west, paralleling Interstate 95, and is maintained by the Connecticut Department of Transportation (CTDOT). This four-lane principal arterial serves as a major commercial corridor for the Town of Stratford, as well as an important con-

necting to neighboring towns and cities.

BROADBRIDGE AVENUE

Broadbridge Avenue is a two-lane local road that extends northwest from the Stratford Rail Station into single-family residential areas. Broadbridge Avenue intersects the two major north-south and east-west street corridors in Stratford - Main Street and Barnum Avenue, respectively - and provides an important connection between residential, commercial, and transit-oriented land uses.

FERRY BOULEVARD

Ferry Boulevard is a minor arterial, and it coincides with State Route 130, which connects Fairfield, Bridgeport, and Stratford. Ferry Boulevard generally runs north-south along the eastern edge of the study area and merges with U.S. Route 1 just to the northeast of the study area. Ferry Boulevard is characterized by commercial uses and is bordered to the east by Ferry Creek, the Housatonic River, and several marinas and other water-dependent uses. Locally, Ferry Boulevard is an important connector between neighborhoods near Stratford's Historic District and the large shopping centers along Barnum Avenue (e.g., the Docks), and it is expected to experience an increase in future transit-oriented developments given its proximity to the Stratford rail station. Regionally, Ferry Boulevard is an important component of the East Coast Greenway system and intersects the Housatonic Greenway system at Elm Street.

KING STREET

King Street is a local two-lane road that runs north-south through the study area. King Street is largely residential, and it intersects Barnum Avenue to the north and merges with Church Street near Stratford Center to the south. Im-

portantly, Stratford High School and its sports facilities are located on King Street, and, therefore, this street serves as an important route for students walking to and from school (most often from the South End neighborhood). King Street is also a key component of the Housatonic Greenway system.

BROAD STREET + E. BROADWAY

E. Broadway is a collector and Broad Street is a local road. Both streets transect single-family residential neighborhoods near Stratford's Historic District. These streets, which intersect Main Street to the west and Ferry Boulevard to the east, provide important connections between residential and commercial areas. Also, Broad Street and E. Broadway, between Elm and Main Streets, are important components of the Housatonic Greenway system.

W. BROAD STREET

W. Broad Street is a minor arterial and runs northwest through the study area, connecting Barnum Avenue and Main Street. This street provides access to Interstate 95 entrance and exit ramps, residential neighborhoods, and the Baldwin Center.

2.2 WHAT IS A COMPLETE STREET?

A street can be a place or a connection. A majority of roadways in the United States have been designed with the primary function of serving as a link for automobile travel. Roadways designed in this fashion typically function as efficient conduits for motor vehicle travel, but are often poor links for other modes of transportation (e.g., pedestrians, bicyclists, public transit users). Additionally, roadways have the ability to function as a social space by establishing a relationship to the places where people live, work and play. Treating streets simply as links for automobiles often ignores the other important contexts and functions that streets should address.

The complete streets design philosophy is an approach that enhances our current streets by enabling safe, convenient, and comfortable travel and access for users of all ages and abilities regardless of their transportation mode. It is a person-oriented design philosophy that seeks to facilitate safe travel and a sense of place for those walking, bicycling, driving an automobile, or riding public transportation - thus creating a Complete Street for all users and their mode of choice. It will be important to consider both the movement and placemaking zones, as well as streetscape aesthetics, when designing Stratford streets as complete streets.

The components of a Complete Street and design strategies are described further in Appendix A.

Complete Streets provide...

safe, convenient, and comfortable travel and access for users of all ages, abilities, and modes.



2.3 GOALS + OBJECTIVES

The goal of this project is to create a strategic plan for implementing a comprehensive network of complete streets. Implementing complete streets will ensure the Town's roadways complement and enhance the surrounding land use and neighborhood character and safely accommodate all users, including drivers, bicyclists, pedestrians, transit patrons, older residents, and children.

In order to facilitate and guide the complete streets planning process, the Town of Stratford formed two advisory committees: a community advisory committee and a technical advisory committee. The community advisory committee was comprised of local business-owners, residents, and community leaders. The technical advisory committee was comprised of state, local, and regional agencies and was responsible for assessing the feasibility and safety of the design recommendations.

Both advisory committees met regularly to define the project's objectives, review and provide feedback on design recommendations, and foster interagency communication and coordination. Members of the technical and community advisory committees are listed in Tables 2.1 and 2.2.

The project objectives highlighted in the panel to the right were defined by the project advisory committees and through discussions with the Town of Stratford's Office of Planning and Zoning.

PROJECT OBJECTIVES



Increase safety and access for all ages, abilities, and modes of transportation



Create better connections between residential and commercial areas



Ensure Stratford Center will support future development and growth



Improve access to and between public transit systems (e.g., rail and bus)



Develop safe routes to school for students



Explore design interventions that create a sense of place, reflect the character of Stratford's different neighborhoods, and evoke a sense of safety and vibrancy



Soften existing barriers (e.g., I-95 and rail corridor)



Embrace Stratford's cultural arts, history, and natural resources



Integrate traffic calming measures to slow traffic and encourage active transportation



Incorporate green infrastructure and integrate coastal resilience

TABLE 2.1. Technical Advisory Committee

Committee Member	Title/Department	Agency
Jay Habansky	Administrator, Planning & Zoning	Town of Stratford
Karen Kaiser	Director, Economic Development	Town of Stratford
Amy Knorr	Supervisor, Economic Development	Town of Stratford
John Casey	Town Engineer	Town of Stratford
Christina Batoh	Director, Conservation	Town of Stratford
Frank Eannotti	Lieutenant, Police Department	Town of Stratford
David Gugliotti	Police Department	Town of Stratford
Robert Joy	Police Department	Town of Stratford
Lawrence Ciccarelli	Public Safety	Town of Stratford
Brian Lampart	Fire Department	Town of Stratford
Maurice McCarthy	Director, Public Works	Town of Stratford
Chris Tymniak	Chief Administrative Officer	Town of Stratford
Marc Dillon	Chief of Staff	Town of Stratford
Brian Bidolli	Executive Director	MetroCOG
Patrick Carleton	Deputy Director	MetroCOG
Colleen Kelleher	Administrative Services Manager	MetroCOG
Meghan Sloan	Planning Director	MetroCOG
David Elder	Policy Unit, Bureau of Policy & Planning	CTDOT
Elise Ross	Policy Unit, Bureau of Policy & Planning	CTDOT
Roxane Romson	RPO Coordination Unit	CTDOT
Sara Radacsi	RPO Coordination Unit	CTDOT
Gary Sojka	Trip & Traffic Analysis	CTDOT
Melanie Zimyeski	Intermodal Planning Unit	CTDOT
Barbara Ricozzi	Traffic Division	CTDOT
Thomas Tavella	Principal, Landscape Architect	Alta Planning + Design
Branden Bergeron	Engineer	Alta Planning + Design
Elizabeth King	Landscape Designer	Alta Planning + Design
Andrew Bevilacqua	Engineer	Team DTC

Committee Member	Stratford Community Role
Tom Dillon	Resident of Historic District; Chamber of Commerce member
Marc Jarvis	Property owner in Stratford Center
Linda Pepin	Greenway Committee member; Vice Chair of Zoning Commission
George Perham	Principal of Antinozzi Architecture; Stratford Redevelopment Agency member
Neil Sherman	Economic Development Commission member
Harold Watson	Greenway Committee member; Planning Commission member
Jay Habansky	Planning and Zoning Administrator; CAC meeting facilitator

2.4 PUBLIC ENGAGEMENT

Public engagement was a critical part of the planning process. A variety of opportunities were provided for local residents, business-owners, Town employees/officials, and other community stakeholders to engage in conversation with the design team, provide ongoing constructive feedback, react to design alternatives, and contribute local knowledge.

PUBLIC MEETINGS

Two public meetings were conducted. The meetings were advertised on the Town of Stratford's Planning and Zoning website, on the Town's Facebook page, through communication with the Community Advisory Committee, and by fliers posted in key public locations (e.g., Town Hall). The intent of these in-person meetings was to inform the public about the project's goals, discuss the importance and relevance of the project to Stratford, and share design recommendations generated from the planning process.

In order to launch the project, the first public meeting was held on April 19, 2016 at 6:30PM in the Stratford Town Hall. Alta Planning + Design defined complete streets, discussed the goals and objectives for Stratford's Complete Street project, and provided several examples of complete street projects around the country. Time was also reserved for public questions and discussion. Approximately 25 people attended this meeting.

The second public meeting was held on December 14, 2016 in order to present the analysis, findings, and final design recommendations for Stratford's streets.

WEB-BASED PARTICIPATION

Recognizing that not everyone can attend in-person meetings, the Town of Stratford launched a Wikimap – an interactive, web mapping application that allows users to contribute data. The Stratford Complete Streets Wikimap¹

¹ www.wikimapping.com/wikimap/stratford.html

was launched during the first public meeting on April 19, 2016 and will remain active and available to the public through March 2017. The Wikimap enables users to identify and describe destinations, opportunity areas, and problem areas in Stratford. Users are also able to delineate and describe their daily commute, routes they currently use for walking and biking, and routes they would like to use in the future for walking and biking, but may not currently use due to safety, access, or other concerns.

Availability of the Wikimap and the importance of public participation was advertised on the Town's Planning and Zoning webpage, on the Town's facebook page, on the Stratford Complete Streets' Facebook page, and during public meetings and the public design studio (description below).

As of November 16, 2016, the public has submitted 131 data points to the Stratford Complete Streets Wikimap. Representative comments received through the Wikimap are summarized on page 2-9.



The project kick-off meeting was held in Stratford's Town Hall on April 19, 2016.

STRATFORD COMPLETE STREETS WIKIMAP: PUBLIC FEEDBACK



OPPORTUNITIES

- Add trees to the Barnum Avenue and Main Street intersection to improve character
- Improve walkability between Stratford library and Cumberland Farms along W. Broad Street
- Increase commercial uses near the rail station
- Expand pedestrian and bicycle infrastructure along Elm Street
- Expand pedestrian and bicycle infrastructure on Broad Street and slow traffic



CHALLENGES

- Fast-moving traffic and limited space for bicyclists cause safety issues at the Main Street and North Avenue intersection
- The Main Street and Barnum Avenue intersection is very busy and is a poor gateway into the Town
- The bus stop across from the Baldwin Center requires passengers to cross W. Broad Street, which is busy and lacks pedestrian crossing infrastructure
- North of the rail station, it is difficult to bike along Main Street due to a narrow shoulder



DESTINATIONS

- The Historic Perry House: a gateway into Stratford and one of the Town's oldest homesteads
- The Judson House: one of Stratford's oldest historic homes
- The Historic Cemetery: one of Stratford's little treasures and full of history
- Bond's Dock: nice views of the water with picnic tables and seating
- Two Roads Brewery



WALKING/BIKING ROUTES

- East Coast Greenway
- Would like to walk/bike from Stratford Center to Ferry Boulevard to dine at restaurants
- Scenic bike loop beginning in Stratford's Historic District and hitting the major coastal waterfront attractions (e.g., Shakespeare Theater, Long Beach, McKinney Salt Marsh)
- Main Street, from Paradise Green to Stratford Center to the Historic District

PUBLIC DESIGN STUDIO

A four-day public design studio was held in Stratford's Baldwin Center from May 31st to June 3rd, 2016.¹ The event was advertised using fliers (see image on the right), the Town's Planning and Zoning webpage, the Town's Facebook page, and on Facebook pages dedicated to the Stratford Complete Streets project and the Housatonic Greenway.

During the event, a team of designers developed several concepts for improving the connectivity, accessibility, and safety of Stratford's streets. The public was encouraged to come and go as they pleased during the entire event, and attendees were invited to respond to the work generated by the design team, as well as contribute ideas and suggestions. Throughout the event, information about attendees' current and desired modes of transportation and their preferred type of bicycle facility(s) was collected. The Wikimap was also available, and the design team helped several attendees input information about problem areas, destinations, and biking/walking routes.

A public review of the concepts generated during the design studio was held on Thursday evening, June 2nd, from 6PM to 8PM. Design concepts for Main Street, Nichols Avenue, W. Broad Street, Broad Street, and Ferry Boulevard were displayed, and all attendees were invited to place sticky notes on the drawings with their comments.

PUBLIC DESIGN STUDIO FLIER



WHEN

PUBLIC DESIGN STUDIO (May 31 - June 3, 2016)
Come for 5 minutes or all 4 days! The format is informal so you may come and go as you please.
Tuesday, May 31, from 1PM - 4:30PM • Wednesday, June 1 from 8:30AM - 8PM
Thursday, June 2, from 8:30AM - 6PM • Friday, June 3, from 8:30AM - 12:30PM

WHERE

Raymond Baldwin Center, Main Hall (2nd floor)
1000 West Broad Street, Stratford, CT 06615

WHY

Your input will help to shape the future of Stratford.

For more information about the Stratford Complete Streets project, please visit www.townofstratford.com

CONTACT

Jay Habansky, Town of Stratford
Planning & Zoning Administrator
203.385.4017, JHabansky@townofstratford.com

CONTRIBUTE YOUR IDEAS ONLINE!

<http://wikimapping.com/wikimap/stratford.html>
Use the link above to submit feedback about how you currently use Stratford's streets and future improvements you would like to see.

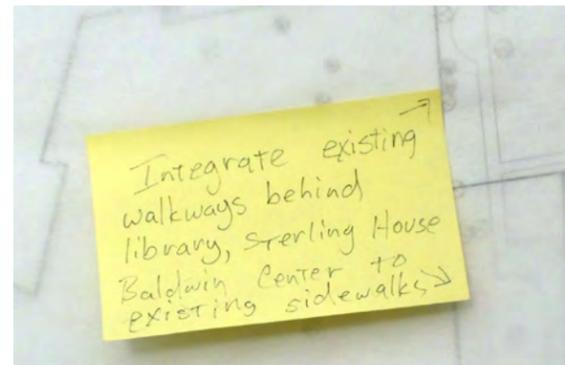
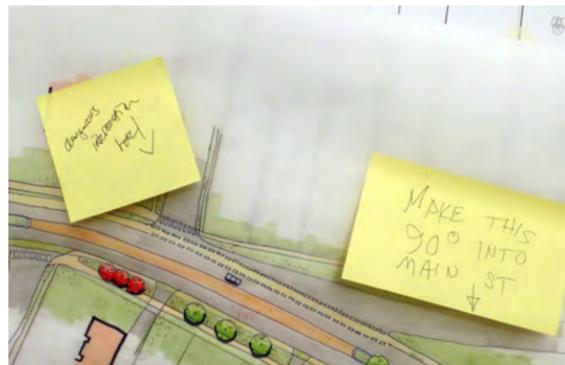
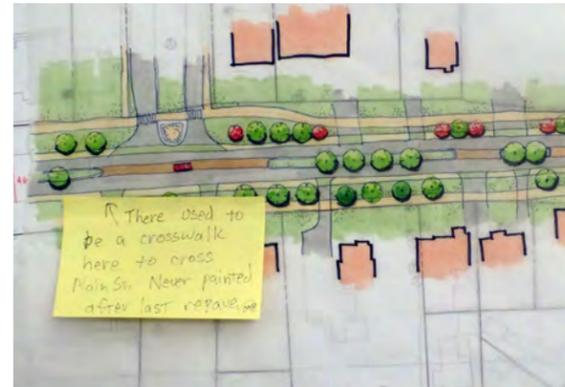
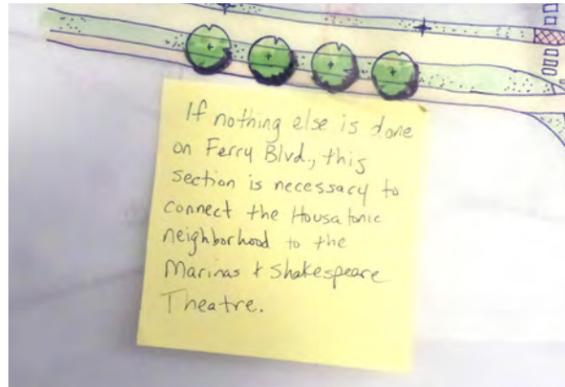
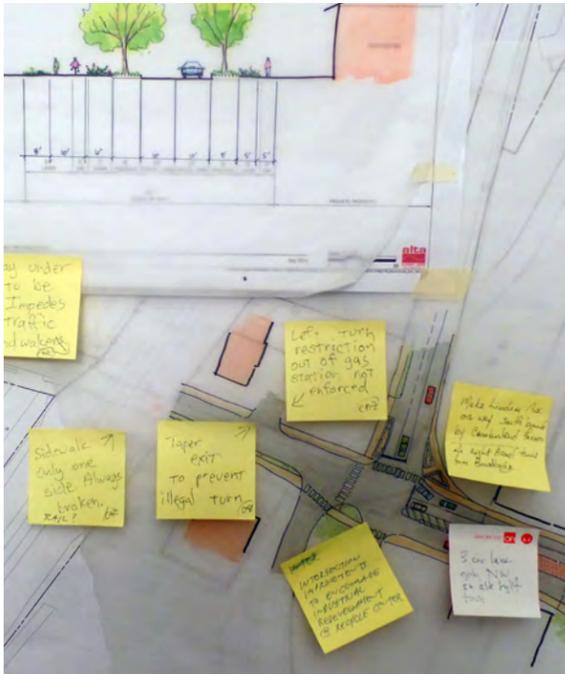
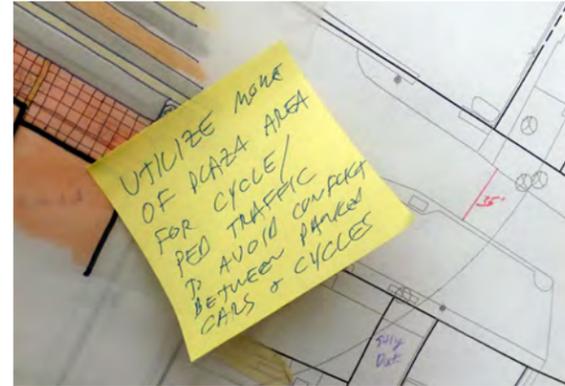
Overall, the public feedback received during the design studio was positive and constructive.

- Participants supported the expansion and improvement of bicycle and pedestrian networks, particularly along E. Broadway, Nichols Avenue, and Ferry Boulevard. They also noted that current conditions along Main Street are dangerous for bicyclists, and recommended integrating existing walkways behind the library, Sterling House, and Baldwin Center into the existing sidewalk network.
- Connections to destinations (e.g., marinas, Shakespeare Theatre, beaches) and regional trail systems were emphasized.
- Participants expressed support for the additional trees, stormwater plantings, and open space proposed in the plans; however, the maintenance that additional landscaping will require was also noted.
- Dangerous intersections and opportunities for improvement were identified at Exit 32, Huntingdon Road and Main Street, and Garden Street East and Main Street.
- Traffic calming measures, such as raised crosswalks and speed humps, were suggested.

All of the feedback received during the public design studio was used to refine and develop additional design concepts, which are discussed further in Chapter 5.



The public design studio was held in the Baldwin Center from May 31st to June 3rd. The public was encouraged to attend and participate in the design process throughout the event. On Thursday, June 2nd, an informal public meeting was held to review, discuss, and respond to the complete street design alternatives generated over the course of the week.



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Public feedback received during the design studio.

3

EXISTING CONDITIONS



Stratford's complete street initiatives aim to...



Revitalize Stratford Center & Paradise Green



Connect residential & commercial areas



Develop safe routes to school



Expand bicycle facilities



Improve pedestrian facilities



Increase access to public transit



Encourage active, healthy lifestyles



Embrace natural, historic, & cultural resources



Integrate resilience and climate change

3.1 POLICY CONTEXT

The Town of Stratford has made many steps toward becoming a more walkable and bikeable community through the creation of transportation policies, recommendation reports, and zoning overlays. These previous efforts include: the 2015 Town of Stratford Transit-Oriented Development Pilot Program and the 2015 Stratford Transit-Oriented Development Overlay District. These efforts have been supported by the 2014 CTDOT Complete Streets Policy.

TRANSIT-ORIENTED DEVELOPMENT PILOT PROGRAM

The Town of Stratford's transit-oriented development (TOD) pilot program is a strategic recommendations report that outlines a transit-oriented approach to transportation network improvements, economic growth, and mixed-use development in Stratford Center. Through engagement with community residents, stakeholders, and municipal representatives, goals and objectives were developed for the Stratford Center vicinity. The main objectives include: an emphasis on mixed-use and pedestrian-oriented development, greater transit and active modes of transit, preservation of neighborhood characteristics, and enabling a TOD Overlay District.

In order to increase active modes of transportation the report proposed pedestrian pathways and shared bike lane and cycle track routes. Four pedestrian pathways were located to link the surrounding Town to the Center by utilizing vacant land and public space. These pathways largely consist of pedestrian-only corridors or multi-use trails that accommodate both pedestrians and bicyclists. The plan also highlighted

the proposed Housatonic Greenway as a key component for the active modes initiative. As for cycle tracks and shared roadways, the plan recommended a north-south route along Main Street, as well as a shared lane perimeter loop around Stratford Center that would act as a collector to many intersecting streets, sidewalks and dedicated multi-use paths.

The plan also discussed the TOD Overlay District that was approved by the Town of Stratford's Zoning Commission on March 31, 2015. The main purposes of the TOD Overlay District are to encourage pedestrian-oriented development, reduce auto dependence, and support a range of housing options.

TRANSIT-ORIENTED DEVELOPMENT OVERLAY DISTRICT

According to the 2015 Stratford TOD Overlay District Zoning Requirements the TOD Overlay District's purpose is to, "enhance Stratford's residential neighborhoods, to preserve its historic character, to revitalize Stratford Town Center and commercial areas and to promote mixed-use development that increases employment and the Town's tax base." It does this by:

- Emphasizing mixed-use, pedestrian-oriented development
- Allowing market driven growth while accommodating additional activity
- Encouraging the redevelopment of underutilized areas
- Creating an environment that encourages walking, biking, and transit use
- Re-using existing buildings and infill development

development

- Reducing auto dependency and traffic congestion by locating destinations within walking distance
- Providing a range of housing options
- Ensuring that new development is aesthetically consistent
- Encouraging a mix of moderate-density development within walking distance of the train station

The purpose and methods are achieved by creating TOD Overlay District Development Standards that require developments to follow certain provisions. One of the provisions specifically focuses on pedestrian circulation and requires new development to:

- Construct sidewalks along the frontage of all public streets;
- Connect all main entrances to a continuous sidewalk network lined by open space and landscaping, with designated crosswalks or pedestrian-oriented paving treatments at internal and external intersections; and,
- Ensure sidewalks have a minimum unobstructed width of 5 feet (sidewalks may extend up to a width of 20-feet).

CTDOT COMPLETE STREETS POLICY

In 2014, The Connecticut Department of Transportation released a Complete Streets Policy¹ that would enable the alignment of transportation funds to encourage improvements for non-motorized users. The policy describes the formation of a Complete Streets Standing Committee with members from each Bureau that will guide the implementation of Complete Streets. The policy will be implemented by:

- Training its engineers and planners on complete streets best practices
- Utilizing the “Connecticut Department of Transportation Bike and Pedestrian Travel Needs Assessment Form” on every applicable project
- Amending the current design, construction and maintenance guidelines to include best practices for all users
- Increasing funding opportunities for complete streets projects
- Collecting data on non-motorized users
- Establishing performance measures for safety and mobility of non-motorized users

¹ http://www.ct.gov/dot/lib/dot/plng_plans/bikepedplan/cs-exo31-signed.pdf

3.2 COMMUNITY CONTEXT

DEMOGRAPHICS

Stratford has a population of 52,092, with a population density of 2,979 people per square mile.² The total population map shows where people reside throughout Stratford and the study area (Map 3.1). A majority of people live north of the study area. The study area proper has a very low residential population. The population density map (Map 3.2) provides a better idea of the density of residents in each census block. For example, the census block to the northeast has a relatively high total population (557 people); however, its population density is low (1,732 people per square mile) due to its large size of 0.3 square miles (the average area of census blocks intersecting the study area is 0.01 square miles). Overall, a majority of Stratford’s population resides in areas to the north, west, and southwest of the study area, with denser pockets directly to the west.

Stratford has a relatively even distribution of both genders (53% female, 47% male), and the median age of its population is 43 years old.³ The age distribution maps (Map 3.3) display the spatial distribution of four different age groups within and adjacent to the study area, which include: individuals less than 18 years old; 18 to 34 years old; 35 to 64 years old; and, 65 years and older. Areas within and adjacent to the study area are most densely populated by individuals in the age group of 35 to 64 years old, and

² Census Bureau. 2014. 5-Year American Community Survey. Retrieved from: <http://censusreporter.org/profiles/16000US0974260-stratford-ct/>

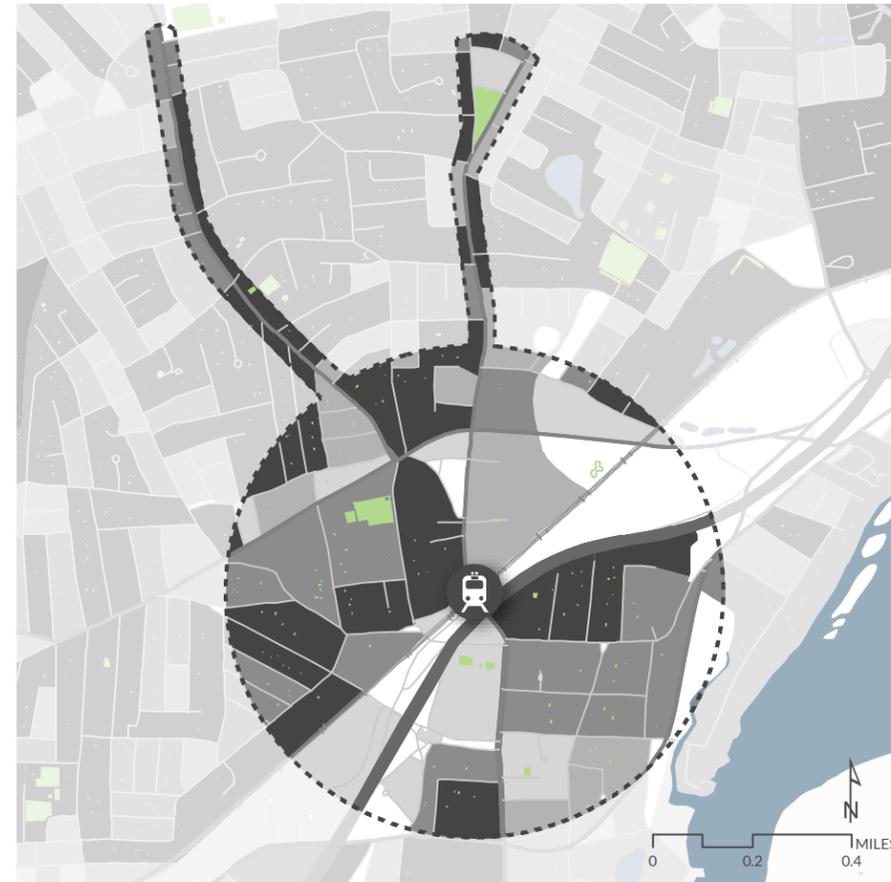
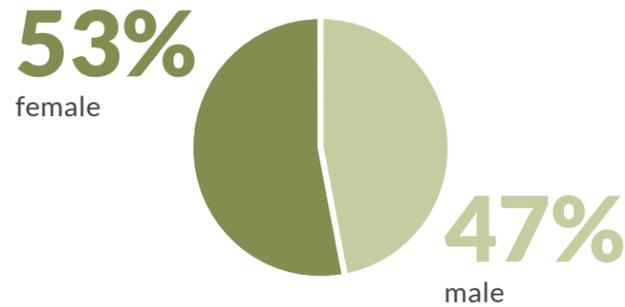
³ Statistics obtained from: <http://censusreporter.org/profiles/16000US0974260-stratford-ct/>



52,092
people live in Stratford

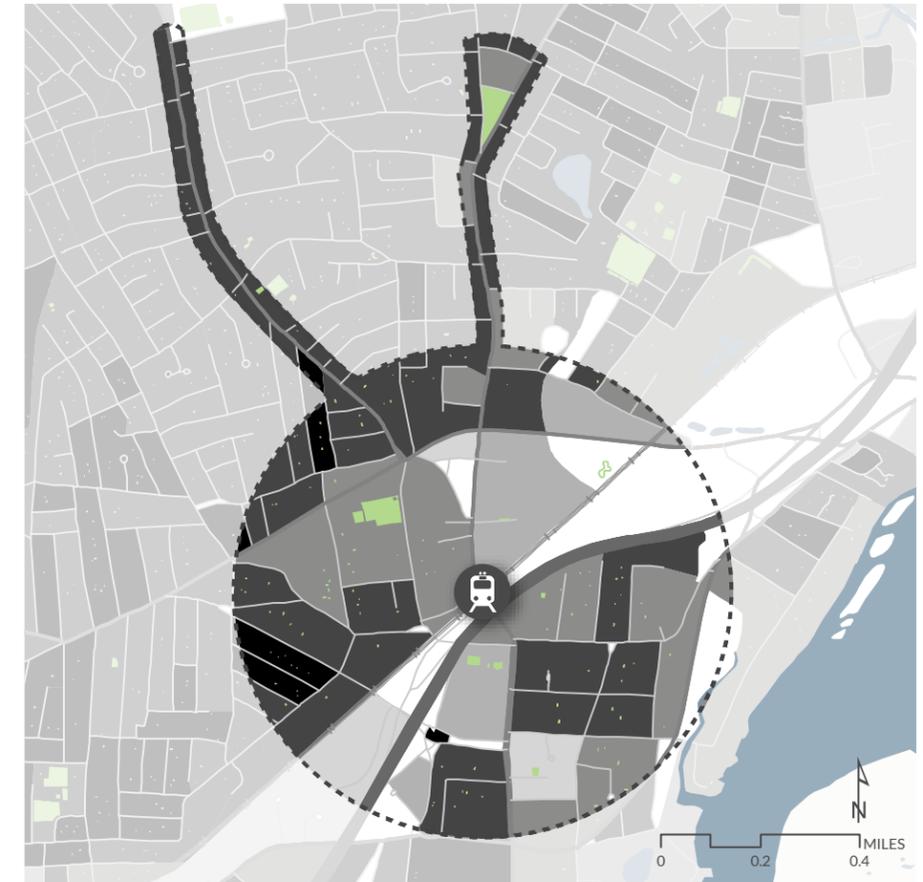
~3,000
people live in the study area

43 years old
median age of Stratford residents



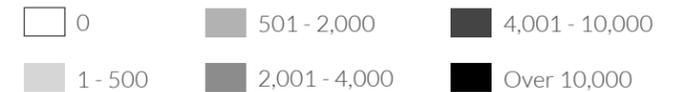
Data source: U.S. Census 2010 block data

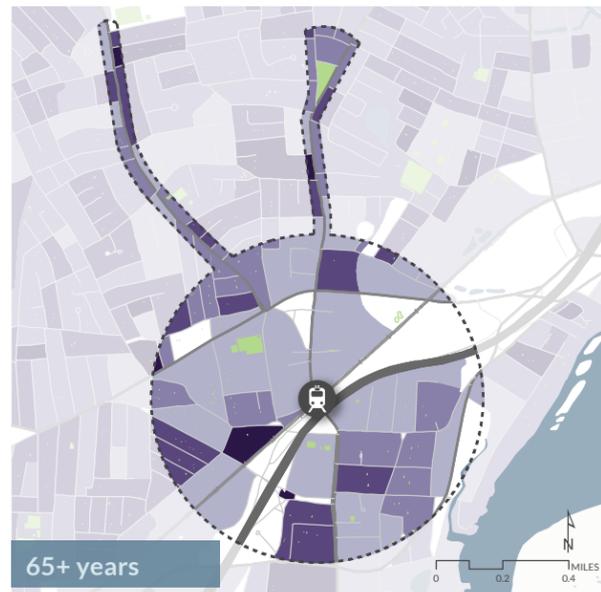
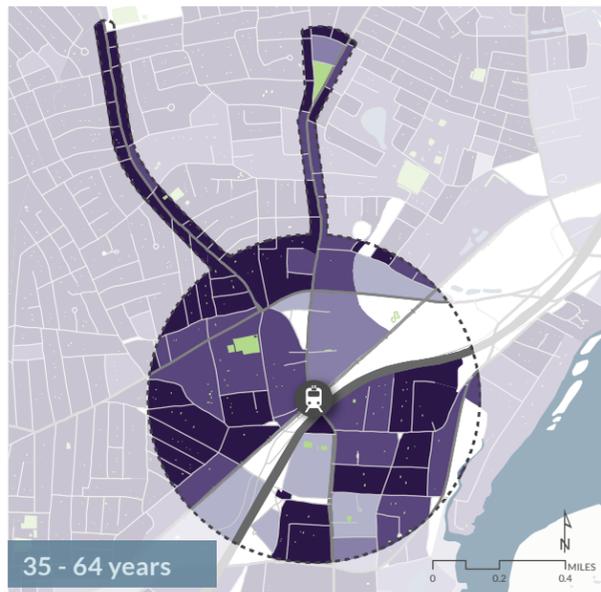
MAP 3.1
TOTAL POPULATION
number of residents



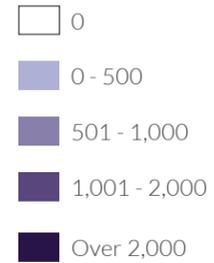
Data source: U.S. Census 2010 block data

MAP 3.2
POPULATION DENSITY
residents per square mile





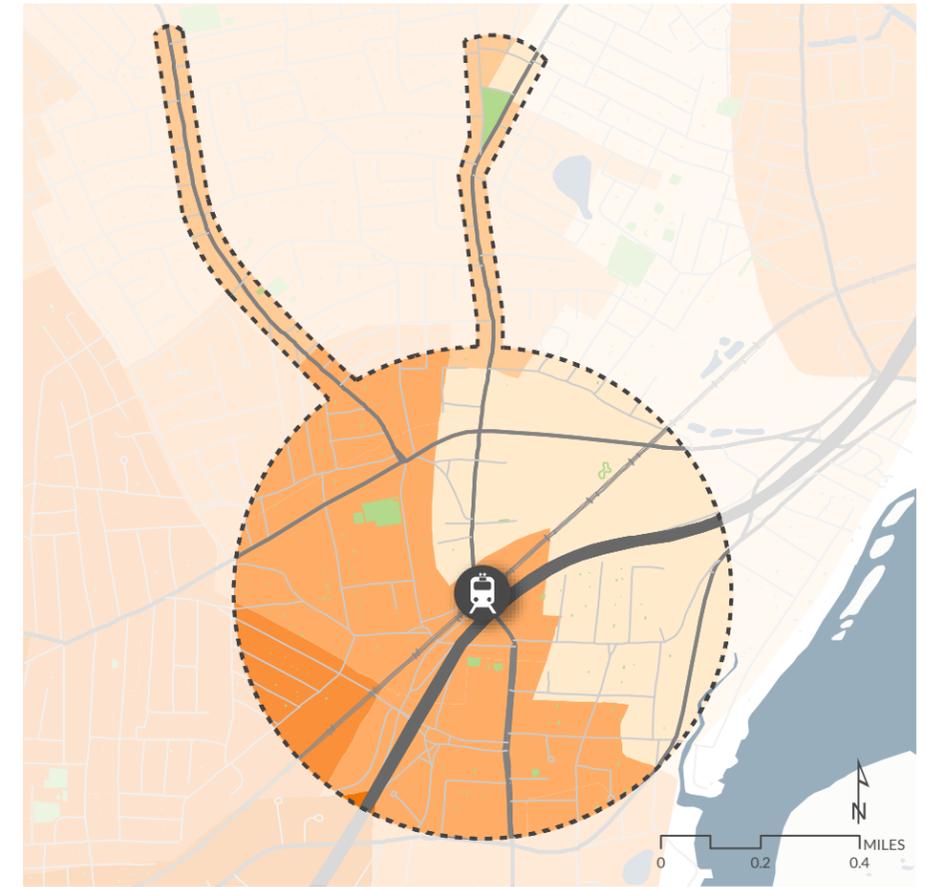
MAP 3.3
AGE DISTRIBUTION
residents per square mile



Data source: U.S. Census 2010 block data

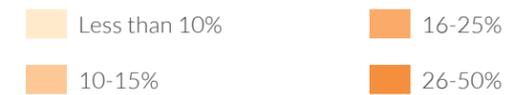
patterns of high density in this age group extend approximately 3 miles beyond the Stratford rail station. The spatial distribution of individuals in the 18 to 34 year old age group is most dense within approximately 1.5 miles of the Stratford rail station. The highest density of individuals younger than 18 years old occurs to the west and south of the study area, likely representing the location of family residences. The population density of individuals aged 65 and older is relatively low in and around the study area, with the exception of census blocks immediately south of the study area and west of Main Street (between Garden Street and North Avenue).

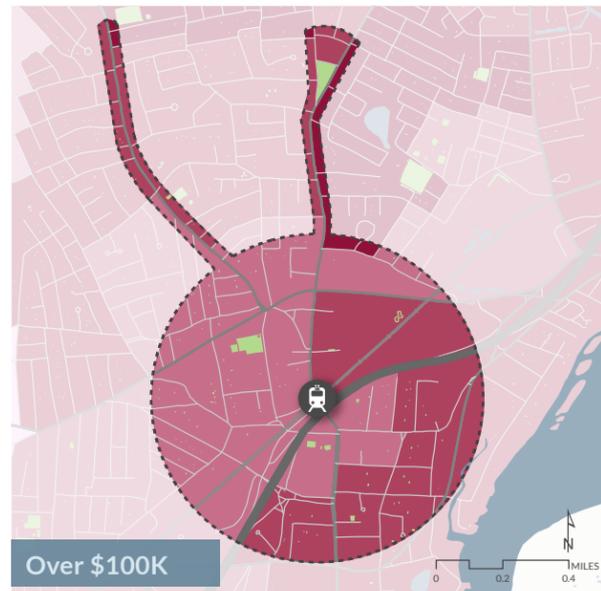
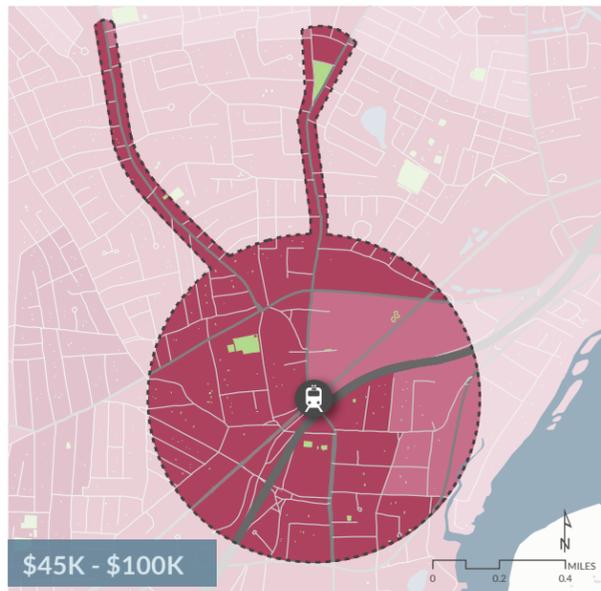
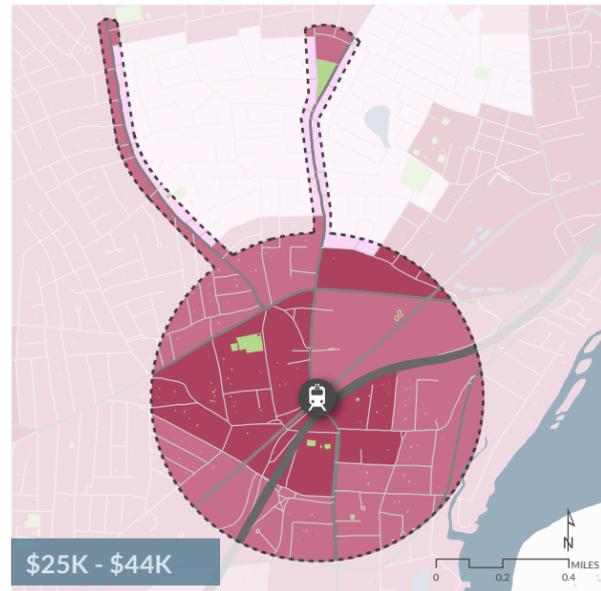
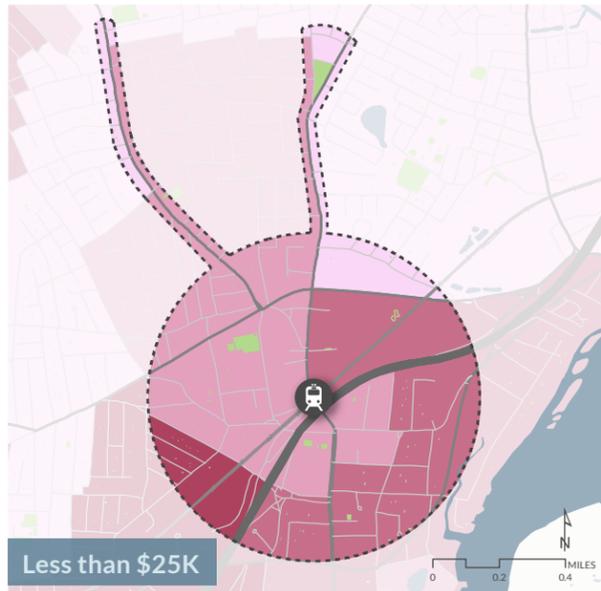
Stratford has a racial makeup of 76.4% white, 14.3% Black or African American, 2.4% Asian, 0.2% Native American, 0.1% Pacific Islander, 4.2% from other races, and 2.5% from two or more races. In the eastern portion of the study area (Map 3.4), minorities make up 10% or less of the total population in each census block group. Minority representation is slightly higher in the western portion of the study area where minorities comprise approximately 20% of the total population in each block group. Stratford's highest concentration of minorities - 50% or more of the total population in a given block group - reside southwest of the study area (immediately south of Stratford Avenue), underscoring the need to extend complete street improvements from Stratford Center to the perimeter of the study area (and beyond in the future) to ensure access to Town services and transit is equitable.



Data source: U.S. Census 2010 block group data

MAP 3.4
MINORITY POPULATION DISTRIBUTION
percent of total population that is a minority





Data source: U.S. Census 2010 block group data

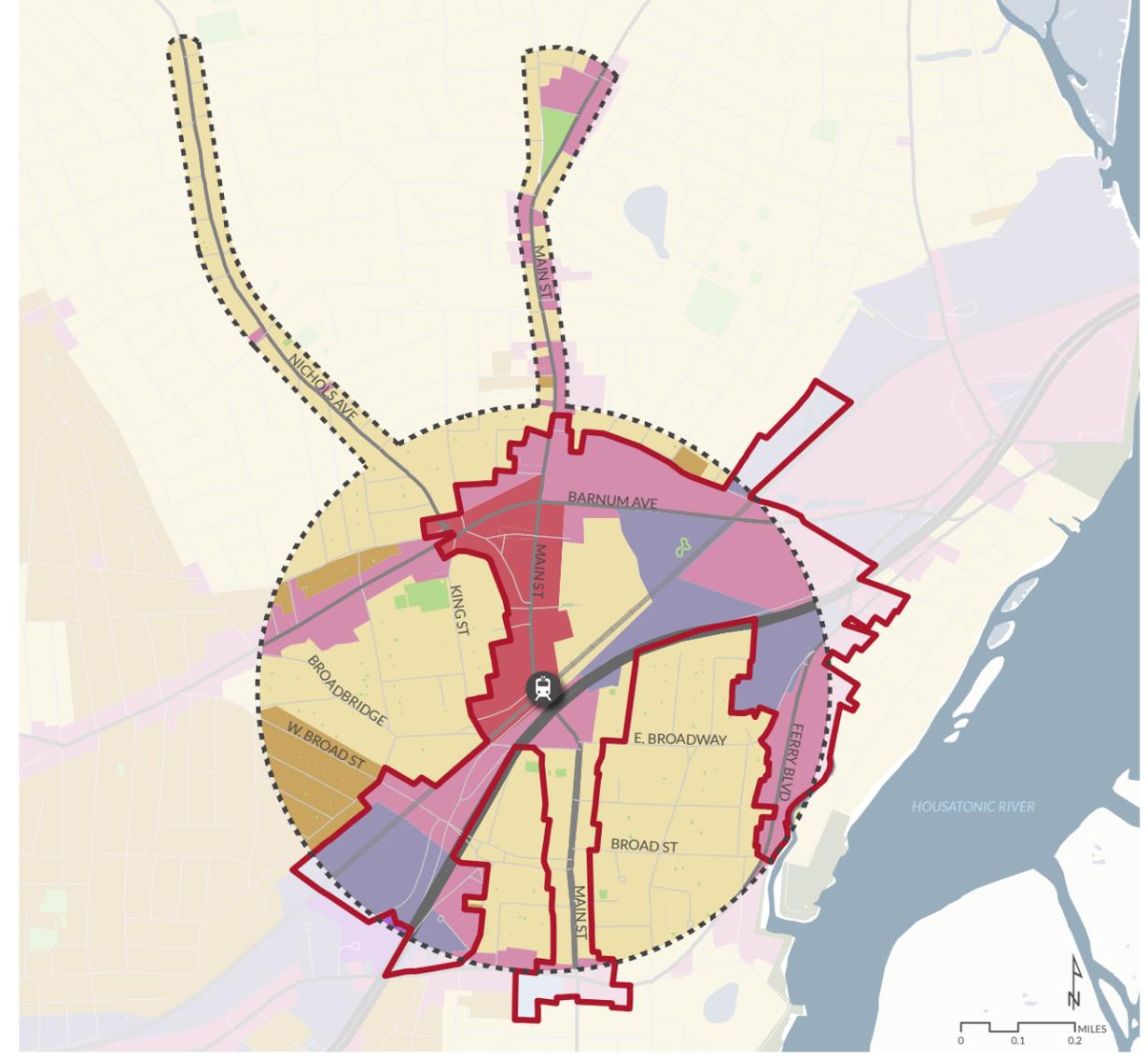
MAP 3.5
ANNUAL INCOME
% of residents in each income group

- Less than 10%
- 10-15%
- 16-25%
- 26-50%
- Over 50%

The median income for a household in Stratford is \$66,451.5. In 2010, approximately 3.5% of families and 5% of the population were below the poverty line, including 5.6% of those under the age of 18 and 5.8% of those aged 65 and older. Households with an income of \$100,000 or greater are concentrated to the east and north of the study area. In the western portion of the study area, many households earn between \$45,000 and \$100,000 per year. Households with the lowest income are predominantly located to the southwest of the study area (Map 3.5).

ZONING + LAND USE

Before the adoption of the TOD Overlay District, previous zoning regulations were restrictive and did not allow for a mixture of land uses. This caused the segregated land uses illustrated in the zoning map (Map 3.6). The purpose of the new TOD Overlay District is to enhance Stratford's neighborhoods, preserve its historic character, revitalize Stratford Center and commercial areas, and promote mixed-use development in order to increase employment and the Town's tax base. This purpose is accomplished through an emphasis on mixed-use, pedestrian-oriented development instead of the previous segregated zoning regulations. Currently within the study area, business, commercial, and light industrial land uses are clustered along the main arterial roads, while the remaining areas are comprised of low-density residential land uses.



Data source: Town of Stratford

MAP 3.6
ZONING

- Study Area
- Business
- Light Industrial
- Residential - Single Family
- TOD District Overlay
- Commercial
- Park/Open Space
- Residential - Multi Family

DESTINATIONS

Within the study area, there are a number of cultural and historical destinations, as well as schools, parks, and community services (summarized in the panel to the right and Map 3.7). Complete street corridors should link these destinations in order to create a safer, more walkable and bikeable Stratford.

Destinations beyond the study area should be kept in mind when considering future connections from Stratford Center to the surrounding region (Map 3.8). Regional destinations are summarized on page 3-12 and include Long Island Sound beaches and nature preserves, Roosevelt Park, Booth Memorial Park, public marinas and boat ramps, and the Stratford Lighthouse.

Several residents also noted that the shopping centers located near the intersection of Barnum Avenue and I-95 - just beyond the study area - are popular destinations, including the Dock Shopping Center and Stop & Shop. Currently, these areas prioritize motor vehicle traffic, and residents expressed concerns regarding the high volumes of traffic and unsafe conditions. Residents recommended bicycle and pedestrian improvements in this area. Residents also noted the proximity of this shopping area to a marina, which could offer a great opportunity to attract tourists and economically enliven the area.



Town Hall



Paradise Green



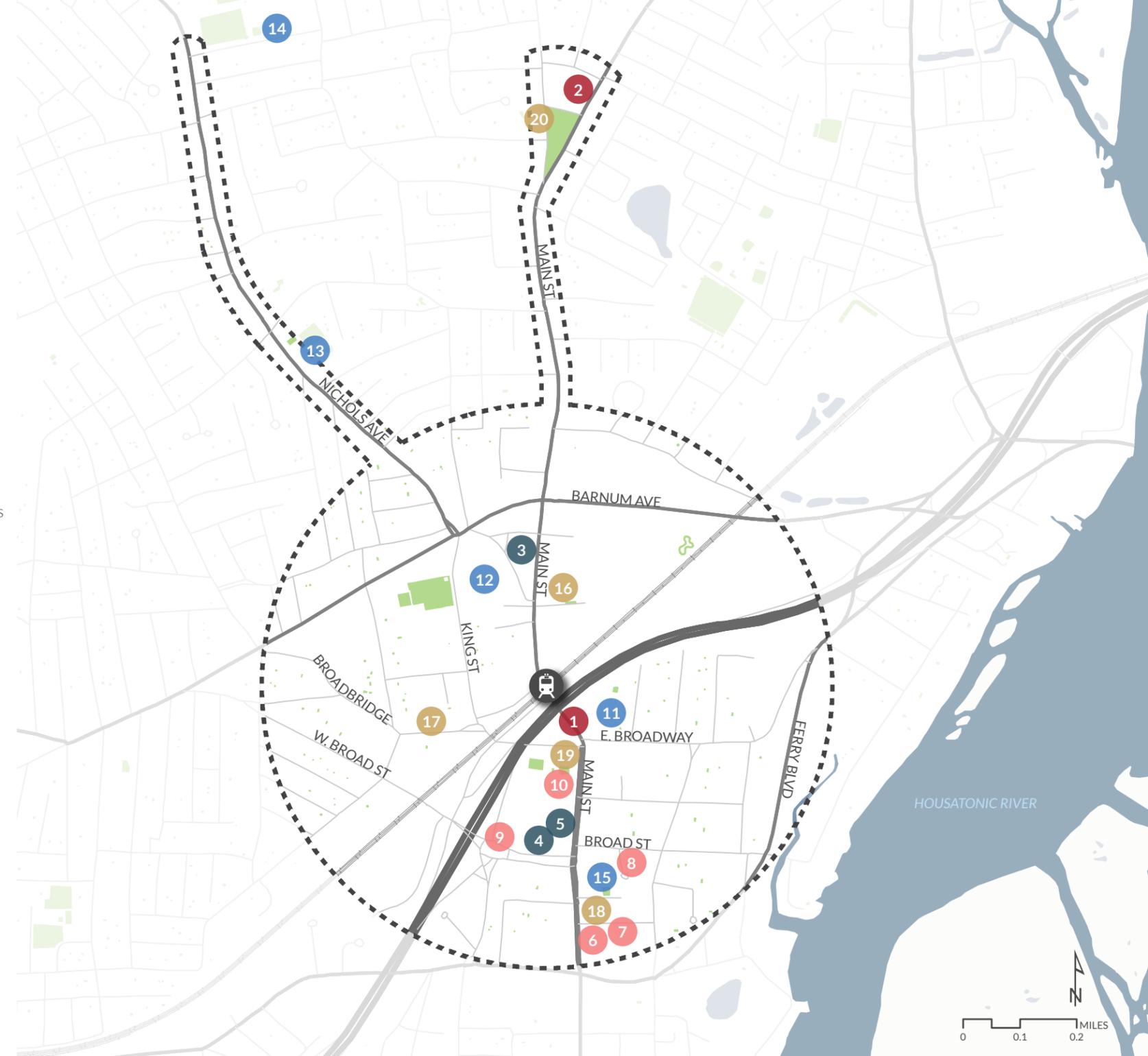
Stratford High School

LOCAL DESTINATIONS

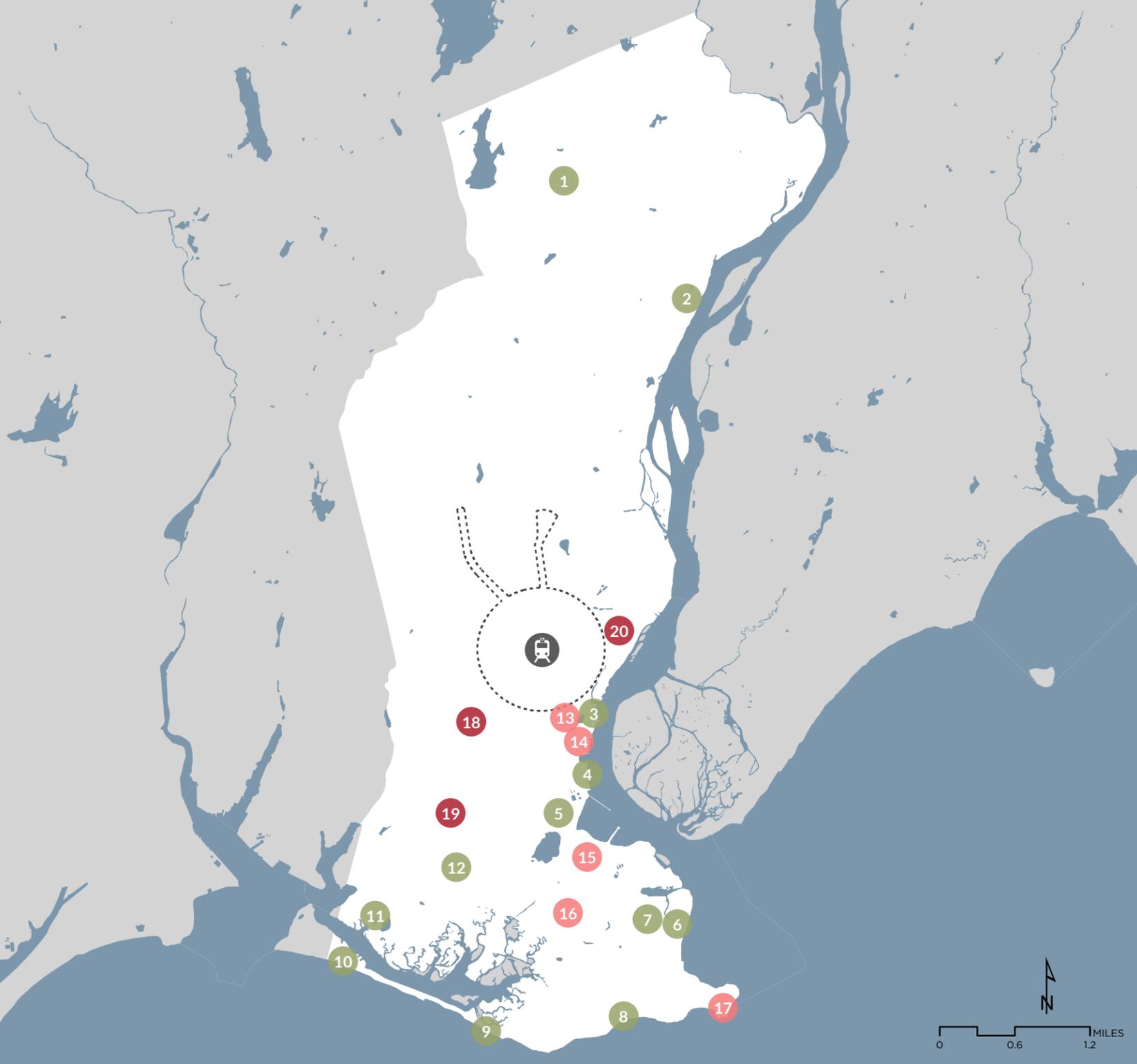
1. Stratford Center
2. Paradise Green
3. Town Hall
4. Baldwin Center
5. Stratford Public Library
6. Stratford Historical Society
7. Judson House
8. Historic Cemetery
9. Historic Perry House
10. Sterling House Community Center
11. Board of Education
12. Stratford High School
13. Nichols School
14. David Wooster Middle School
15. St. James Roman Catholic Church & School
16. Stratford United Methodist Church
17. Orthodox Greek Catholic Church
18. Christ Episcopal Church
19. First Congregational Church
20. Stratford Baptist Church

MAP 3.7
LOCAL
DESTINATIONS

- Commercial
- Community Services
- Cultural/Historic
- Schools
- Churches
- Parks/Open Space



Data source: Stratford Complete Streets Wikimap; Technical and Community Advisory Committees.



MAP 3.8
REGIONAL
DESTINATIONS

- Commercial
- Cultural/Historic
- Recreation

Data source: Stratford Complete Streets Wikimap; Technical and Community Advisory Committees.

REGIONAL DESTINATIONS

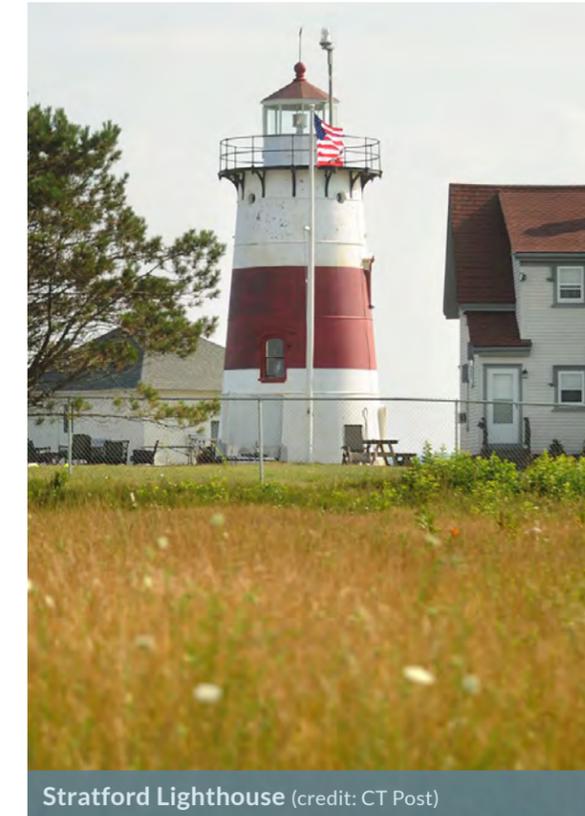
1. Roosevelt Forest
2. Booth Memorial Park
3. Bond's Dock
4. Birdseye Boat Ramp
5. Deluca Field
6. Short Beach
7. Short Beach Golf Course
8. Russian Beach
9. Long Beach
10. Long Beach West
11. McKinney Salt Marsh
12. Jump Off Trampoline Park
13. The White House (Nicoll-Benjamin House)
14. Shakespeare Theatre
15. Connecticut Air and Space Center
16. Sikorsky Memorial Airport
17. Stratford Point Lighthouse
18. Two Roads Brewery
19. Fairfield Craft Ales
20. Dock Shopping Center



Two Roads Brewery (credit: Stratford Star)



Shakespeare Theater (credit: WSHU public radio)



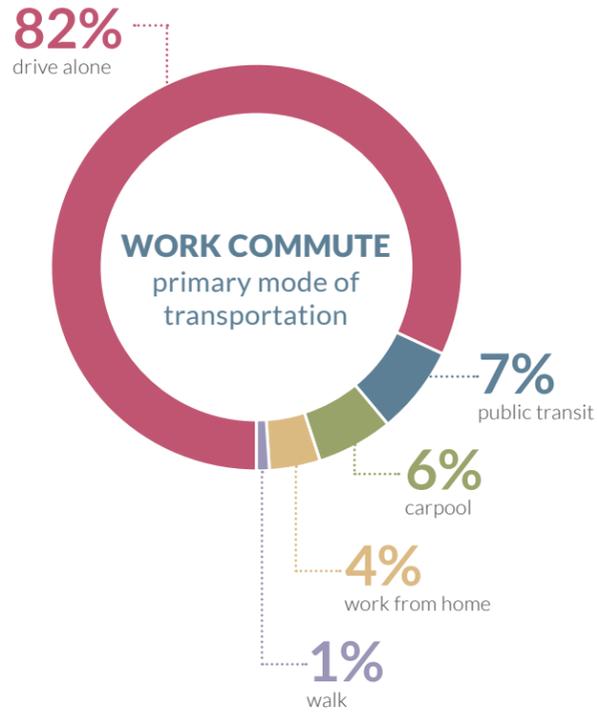
Stratford Lighthouse (credit: CT Post)



Long Beach Salt Marsh (credit: U.S. Fish & Wildlife Service)

3.3 TRANSPORTATION CONNECTIVITY

The 2014 Census Bureau's 5-Year American Community Survey indicates that 82% of Stratford residents drive alone to work, while 7% use public transit, 6% carpool, and 1% walk to work; 0% of the Town bikes to work and 4% of the population works from home. Note, these statistics do not account for trips that use a combination of transportation modes. For example, an individual that bikes to the rail station and then takes the train to work is included in the "public transit" category, not the "bike to work" category.



Data source: <https://censusreporter.org>

TRAILS AND GREENWAYS

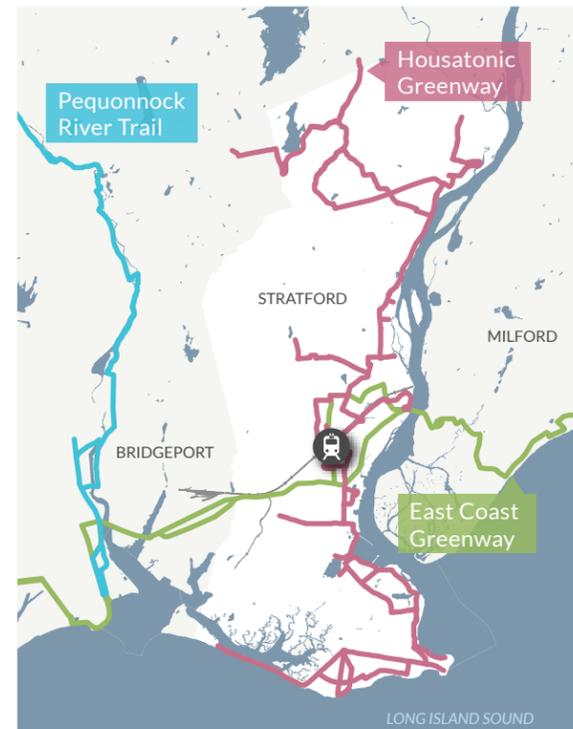
Generally speaking, Stratford is well connected by local and regional greenways. In Connecticut, the East Coast Greenway connects the major cities of Hartford, New Haven, Milford, Stratford, Bridgeport, and Stamford. In Stratford, the Greenway is an on-road trail with no bicycle facilities and limited signage. The Greenway enters Stratford from the east (Milford) where it crosses the Housatonic River via the Washington Bridge and then bifurcates at Barnum Avenue and Ferry Boulevard (Map 3.9). From Barnum Avenue, the Greenway follows E. Main Street (Route 110) north to Patterson Avenue and then west to Longbrook Avenue and Main Street (Route 113). The Greenway then travels south along Main Street and merges with the Ferry Boulevard segment at the intersection of Main Street and Stratford Avenue (Route 130); it then continues west to Bridgeport.

The Housatonic Greenway is a partially constructed greenway consisting of off-road and on-road segments that will eventually create a continuous connection between Stratford Point (in the south) to Roosevelt Forest (in the north), with additional connections along Long Beach and the Merritt Parkway. Where possible, the greenway will be aligned with the Housatonic River corridor and will link visitors to scenic overlooks and small pocket parks. The following streets in the study area are important on-road segments of the Housatonic Greenway: King Street/Church Street, Elm Street, E. Broadway, Sutton Avenue, Main Street, Hurd Avenue, Hillside Avenue, Wilcoxon Avenue, and Fenelon Place.

The Pequonnock River Trail is a 16-mile, multi-use trail that follows the Pequonnock River Valley and connects Bridgeport (in the south), Trumbull, and Monroe (in the north).¹ While not entirely complete, the trail provides an important connection between town centers, parks, historic points of interest, and public transit systems. The Pequonnock River Trail is not in the study area; however, from the Stratford Rail Station, cyclists can follow the East Coast Greenway to the west and reach the Pequonnock River Trail in less than 4 miles.

Complete street improvements along with the East Coast Greenway route in the study area will be an important first step in achieving regional connectivity between different trail systems.

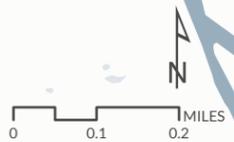
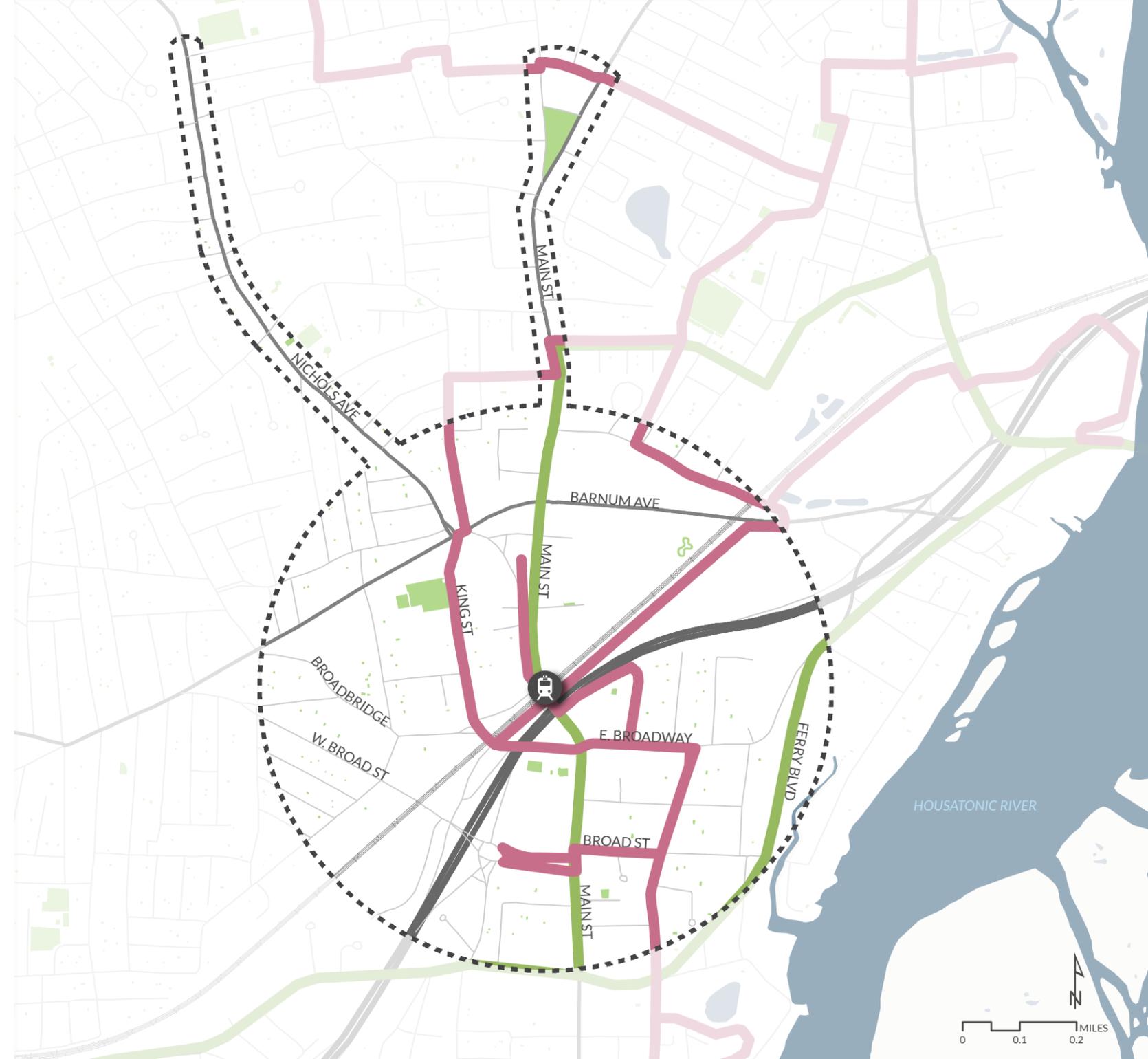
¹ <http://pequonnockrivertrail.org/index.php>



MAP 3.9 REGIONAL TRAIL SYSTEMS

- Housatonic Greenway
- East Coast Greenway

Data source: Town of Stratford; East Coast Greenway



PUBLIC TRANSIT

Bus

Greater Bridgeport Transit (GBT) operates the regional bus system that provides service to Stratford, Fairfield, Monroe, and Trumbull, as well as connections to the Milford and Norwalk service areas via the Coastal Link. Several GBT bus lines extend through the study area, including Routes 1, 10, 16, and 23 as well as connections to the Coastal Link (Map 3.10).

The Coastal Link travels between Norwalk and Milford and provides direct service to the Stratford rail station. On weekdays, the Coastal Link provides service to Stratford from 6AM until 11:30PM and operates at a 30-minute frequency. On Saturdays, the Coastal Link operates at a 30-minute frequency until approximately 8PM, when service is reduced to hourly through 11PM. On Sundays, buses on this route arrive at stops hourly from 9:30AM until 8:30PM.

Route 1 travels between Bridgeport and the Dock Shopping Center in Stratford. Buses on this route arrive at stops every 30-minutes on weekdays. On Saturdays, service to Stratford is provided from 6:30AM to 10:30PM at a 30-minute frequency until 7PM, when the frequency is reduced to hourly. On Sundays, service to Stratford is provided from 9AM until 7PM, with a 45-minute frequency in the morning and a 30-minute frequency in the afternoon and evening. Route 1 does not directly service the Stratford rail station.

Route 10 travels between Fairfield and Stratford (route terminates at Stratford Avenue and Beardsley Avenue). Buses on Route 10 arrive at stops every 30-minutes in the morning and evening, and every hour at mid-day and night during weekdays. On the weekends, service along this route is reduced to hourly and is not provided to Stratford after 7:30PM. Route 10 does not provide direct service to the Stratford rail station.

Route 16 travels between south Stratford and the Trumbull Corporate Park. Route 16 provides direct service to the Stratford rail station; it arrives at the rail station every 1.5 hours, with service beginning at 6:36AM and ending at 6:20PM. This route does not provide service on the weekends.

Route 23 travels between Bridgeport and Shelton and provides direct service to Stratford rail station. Route 23 arrives at the Stratford rail station every hour; however, there is a gap in service from approximately 9AM to 2:30PM on weekdays. This route does not provide service on the weekends.

Table 3.1 displays intermodal connections between Stratford bus routes and other forms of transportation. Table 3.2 displays Stratford bus ridership in March 2015 and March 2016.

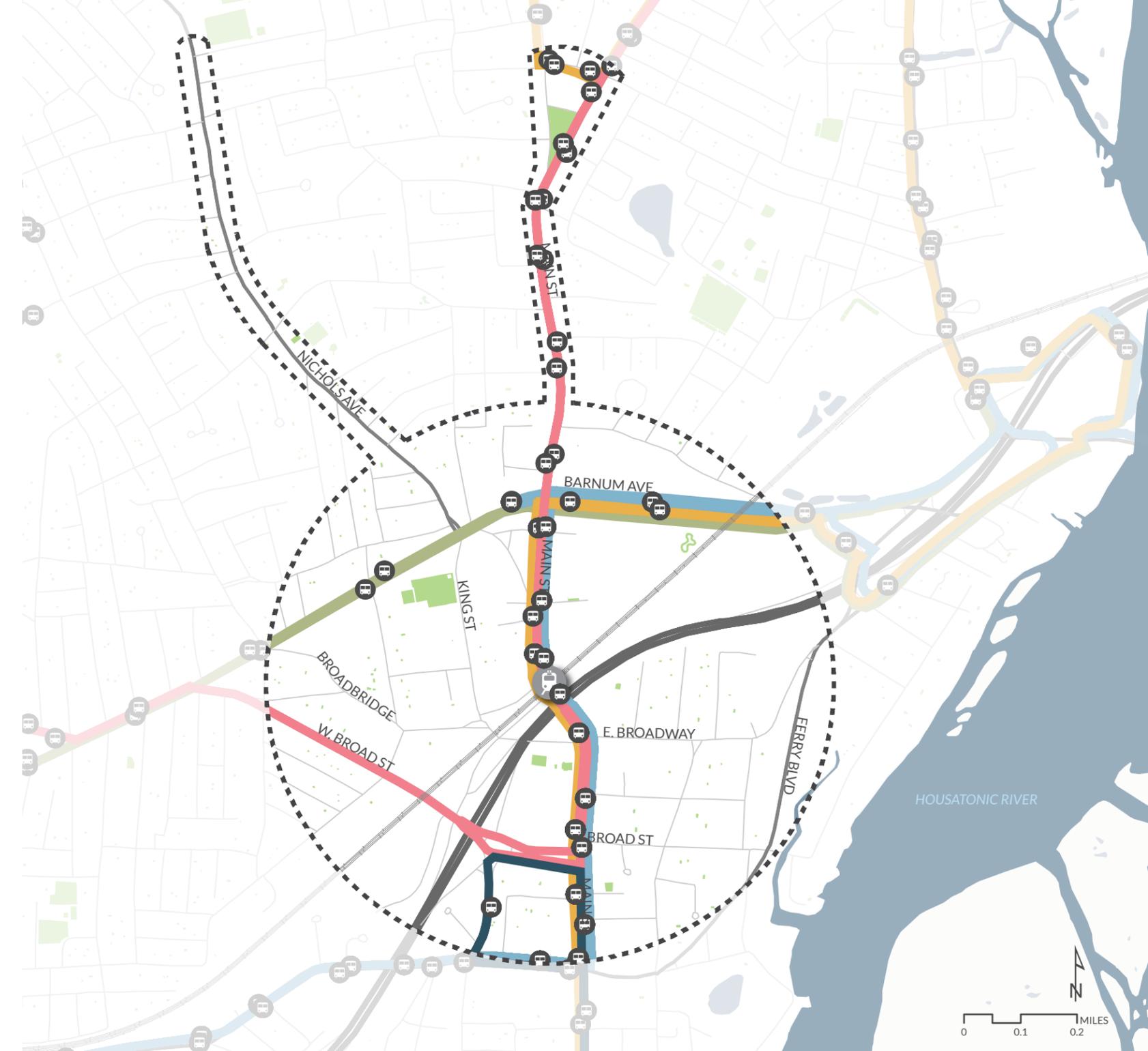
TABLE 3.1. Intermodal Connections* Between Bus, Rail, and Ferry Systems

ROUTE	RAIL STATIONS	FERRY
● Coastal Link	Stratford, Bridgeport, Fairfield	Bridgeport --> Port Jefferson
● 1	Bridgeport	Bridgeport --> Port Jefferson
● 10	Bridgeport	Bridgeport --> Port Jefferson
● 16	Stratford	None
● 23	Stratford, Bridgeport, Derby	Bridgeport --> Port Jefferson

*All GBT buses are equipped with bicycle racks to accommodate bicyclists.

**MAP 3.10
BUS ROUTES**

-  Bus Stops
-  Coastal Link
-  Route 1
-  Route 10
-  Route 16
-  Route 23



Data source: Greater Bridgeport Transit (GBT)

GBT is currently developing its Long Range Transit Plan, which will provide the blueprint for the GBT system over the next 25 years.¹ The goals of the plan are to:

- Increase bus service in high ridership areas
- Respond to community requests for more and/or different bus services
- Identify necessary improvements for implementing Bus Rapid Transit (BRT)
- Address infrastructure and operational modification necessary to implement new bus services
- Consider local and regional land use changes that will impact bus transit

The Long Range Transit Plan takes a phased approach for the planned service and route upgrades.

- Short-term changes (one to three years) proposed for Stratford include frequency improvements for the Coastal Link and Route 1.
- Medium-term changes (three to five years) include the combination of Route 1 with the Coastal Link, the realignment of Route 10, the termination of Route 23 at Barnum Station, and the straightening of Route 16 along Main Street as well as the extension of Route 16 south to Point Stratford. Routes 10, 16, and 23 and the Coastal Link will provide direct service to the Stratford rail station. Also, Route 25 will be added to the system, providing bus service to Ferry Boulevard and better connecting the study area to the GBT Transit Station and the Dock Shopping Center.

- Long-term changes (three to ten years) require roadway infrastructure improvements and will convert the Coastal Link into a BRT system. Frequency improvements for Routes 10 and 16 will also be made. The conversion of the Coastal Link into a BRT system will increase efficiency by providing limited stop services, pre-payment opportunities, and real-time bus information along the corridor. The proposed Coastal Link BRT system will also connect Stratford to the New Haven/Stamford BRT service and provide opportunities to transfer at GBT Transit Station onto the Route 8 BRT, with service north to Trumbull. The Coastal Link BRT will have a 15-minute frequency.

New bus stop facilities are also included in the Long Range Transit Plan. A new bus interchange facility is planned for Stratford Center, adjacent to the Stratford rail station. This new bus interchange facility would provide access to the Coastal Link, Route 10, Route 16, Route 23, and the rail station.

¹ <http://gogbt.com/the-gbt/projects/tod>

TABLE 3.2. Stratford Bus Ridership			
ROUTE	MARCH 2015 RIDERSHIP	MARCH 2016 RIDERSHIP	% CHANGE BETWEEN 2015 & 2016
● Coastal Link	64,065	67,012	+5%
● 1	65,947	67,722	+3%
● 10	37,782	38,003	+1%
● 16	1,330	1,901	+43%
● 23	5,901	7,943	+35%

Rail

Rail transit is available at the Metro-North Station in Stratford. The rail is owned by the State of Connecticut, and the station is served by trains originating or terminating in New Haven and New York City. The Stratford rail station is 59 miles from Grand Central Terminal and the average travel time from Grand Central Terminal is one hour and twenty-seven minutes, although this varies depending on run and time of day. Average weekday service includes 40 trains traveling northbound from Grand Central Terminal to New Haven and 50 trains traveling southbound from New Haven to Grand Central Terminal.

Currently, the rail station is most easily accessed by car. Gaps in sidewalk coverage, a lack of crossing infrastructure, and narrow underpasses can make it difficult for pedestrians to walk between the rail station, parking facilities, and side streets. Car parking facilities at the station are in high demand, and there is a waiting list of approximately 700 people for commuter parking spaces. Improving bicycle, pedestrian, and bus facilities at and around the rail station will provide additional options for commuters and help alleviate the demand for parking.

Bicycle parking facilities are currently available at the rail station, and a new ramp and stairs for pedestrians were recently installed. To address the limited pedestrian and bicycle infrastructure, the Transit-Oriented Development Pilot Program Report recommended three different pedestrian pathways, a shared curb lane, and a cycle track.¹

¹ The full report is available online: http://www.townofstratford.com/filestorage/39879/40866/Stratford_TOD_Pilot_Program_FINAL_DRAFT_12-18-2015_.pdf

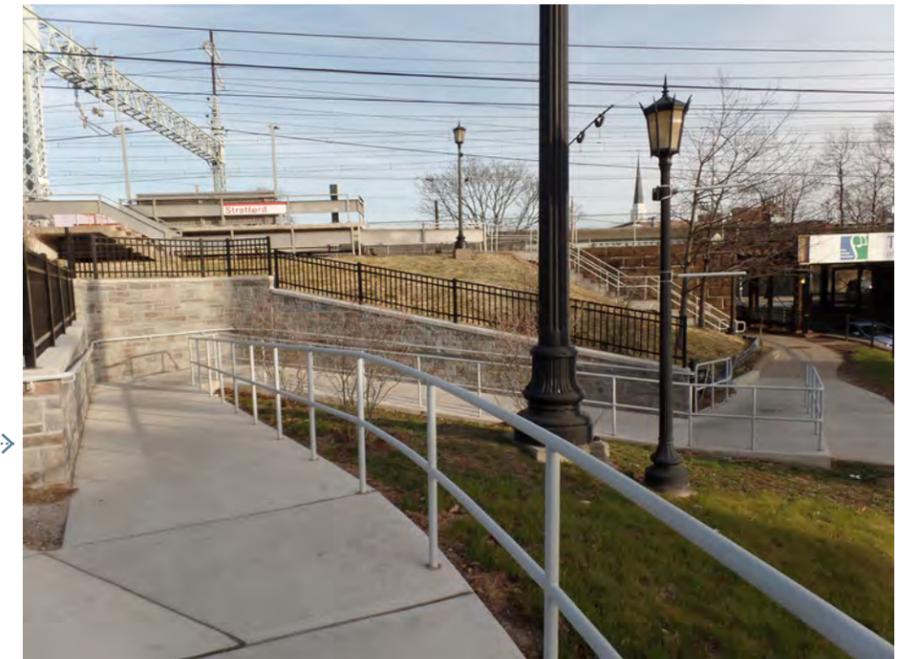
BIKE RACKS

at the rail station provide an important amenity for cyclists; expansion of these facilities and complete street improvements would help increase bicycling activity.



PEDESTRIAN ACCESS

at the rail station was recently upgraded with the addition of a ramp. Future rail-oriented projects that improve internal pedestrian circulation and increase access from the road and bus stops are also important.



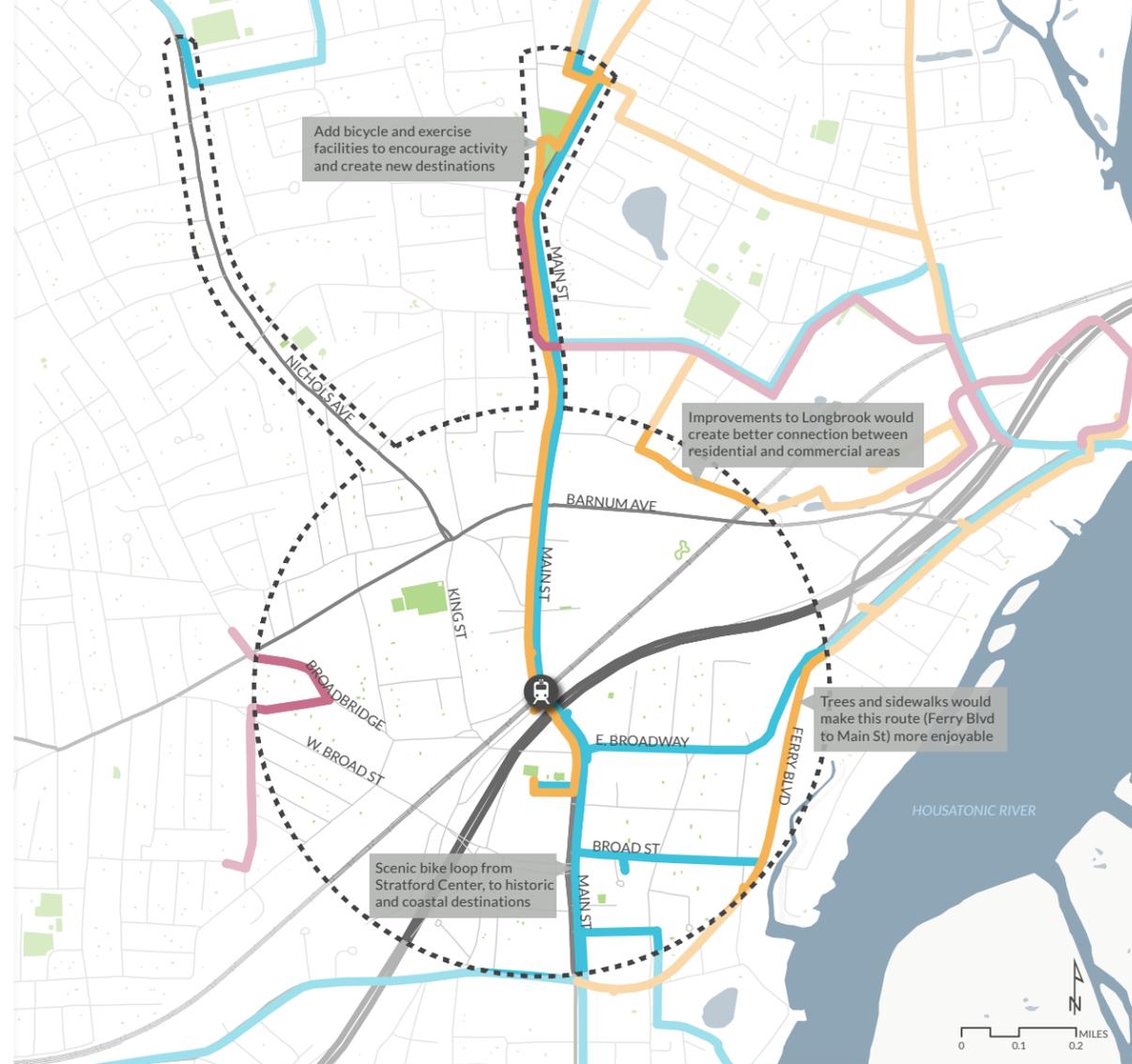
All Stratford bus routes service Stratford's rail station. Bus routes 1 and 10, however, do not directly connect to the rail station; instead, passengers can walk to the station (approximately 0.3 miles) or transfer to the Coastal Link, Route 16, or Route 23 to reach the rail station.

WALKING + BIKING

Sidewalks exist along most major street corridors in Stratford. Some areas are in need of improvement to terminate gaps and upgrade roadway intersections for safety and to encourage bicycling and walking (see Section 3.5 for more information regarding sidewalk condition). A number of concerns raised by the public regarding streetscape conditions throughout Stratford include: inadequate shoulder widths for biking, dangerous intersections, high traffic volumes along major arterials, and a lack of pedestrian facilities.

Strava, an online social network, uses mobile applications to enable users to record their bicycle and running trips anywhere in the world. Strava compiles recorded trips and makes this information publicly accessible through an online map viewer.¹ Strava maps indicate the most concentrated pedestrian activity in the study area occurs along Main Street, E. Broadway, Elm Street, Stratford Avenue, W. Broad, Nichols Avenue, and Broadbridge Avenue. Bicycle activity is concentrated along Main Street, Ferry Boulevard, Barnum Avenue, and Nichols Avenue.

Additional information regarding the preferred and desired walking and biking routes was collected using Stratford's Complete Streets Wikimap (Map 3.11). The public expressed a strong



Data source: Stratford Complete Streets Wikimap

MAP 3.11
PUBLICLY-IDENTIFIED WALKING + BIKING ROUTES

— Commuting route — Existing walking/biking routes — Desired walking/biking routes

preference for walking and biking along Main Street. Several participants also requested pedestrian and bicycle improvements along Ferry Boulevard and Longbrook Avenue, both of which are components of the East Coast Greenway and are important east-west connectors that link commercial areas to neighborhoods.

3.4 SAFETY

CAR CRASHES

The spatial distribution and frequency of car crashes are important measures of street and intersection safety for motor vehicles, pedestrians, and bicyclists.

Car crash data were obtained from the University of Connecticut's Crash Data Repository (CCDR), which provides public access to crash information collected by state and local police.¹ The CCDR database contains the time, date, road on which the crash occurred, and location (e.g., intersection or non-intersection); it documents the site conditions at the time of the crash (e.g., weather, light, and road surface conditions); and it records the first harmful event, number of motor vehicles involved, and whether a pedestrian or cyclist was involved. In January 2015, the CCDR developed a new database using the Model Minimum Uniform Crash Criteria guidelines to enhance the crash information collected and submitted by law enforcement. This upgrade included the submission of latitude and longitude coordinates for each crash event, which standardizes location information and facilitates mapping of the crash data.

¹ <http://www.ctcrash.uconn.edu/>

Given the CCDR's recent database upgrade, two different datasets were mapped and analyzed:

1. Car crashes occurring anywhere in Stratford from January 2015 through May 2016; and,
2. Car crashes occurring at intersections from January 2013 through May 2016.

Car crashes at all locations in the study area

From January 2015 through May 2016, 361 car crashes occurred within the study area (Map 3.12). Car crashes were most concentrated along Barnum Avenue between Main Street and Nichols Avenue. Crash hotspots also occurred at the W. Broad traffic circle, at the intersection of Barnum Avenue and Broadbridge Avenue, and north along Main Street, with a peak near the intersection of Fenelon Place and Main Street. A less intense, crash hotspot was present on Nichols Avenue between Wood Avenue and North Avenue and adjacent to the entrance to Nichols School. Beyond the study area, several car crashes occurred near the Docks shopping center, which is a popular shopping destination for Stratford residents.

Four of these crashes involved pedestrians, and one involved a cyclist. Two of the four crashes involving pedestrians occurred on Main Street – one at Hurd Avenue and the other at Linden Avenue, near the rail station. The other two crashes involving pedestrians occurred at the intersection of Barnum Avenue and Nichols Avenue, and the intersection of Huntington Road and Park Street. The car crash involving a cyclist occurred on Main Street at Brewster Street – a location where the width of the shoulder is very narrow.

Car crashes at intersections in the study area

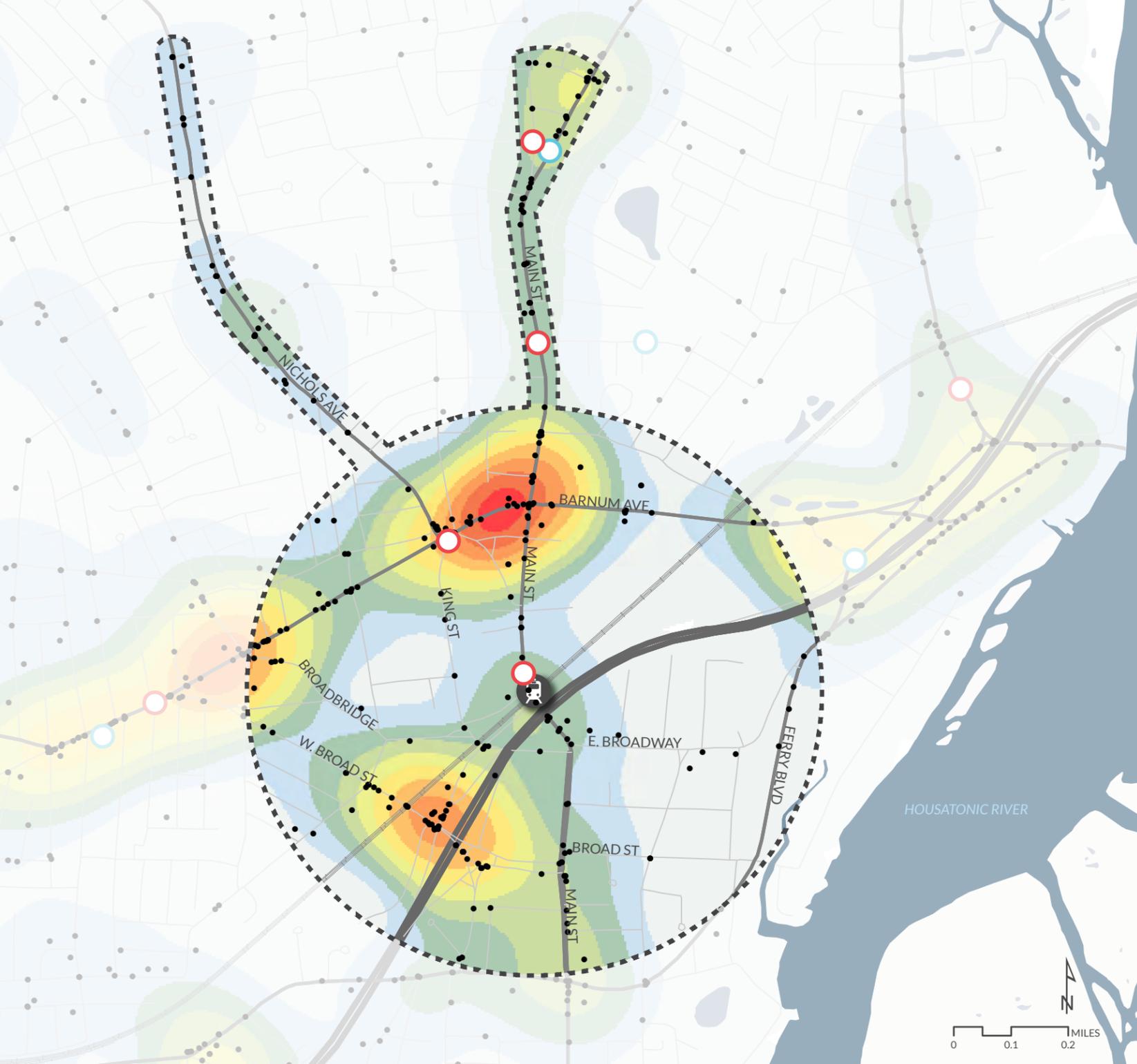
From January 2013 through May 2016, 431 car crashes occurred at intersections within the study area (Map 3.13). The highest density of intersection collisions occurred at Barnum Avenue and Main Street, Barnum Avenue and King Street, and Barnum Avenue and Nichols Avenue. A relatively high density of crashes also occurred at Broadbridge Avenue and Barnum Avenue, and at W. Broad where it intersects Beardsley Avenue and Linden Avenue. Along Main Street, crashes were also prevalent to the north at Paradise Green between Birch Place and Fenelon Place and to the south between Broad Street and Stratford Avenue. Very few crashes occurred during this time period east of Main Street. Several crashes also occurred along Nichols between Greenfield Avenue and Lincoln Street, and similar to the trend observed from 2015 to 2016, a hotspot of crashes occurred near the Nichols School.

Three crashes occurred between 2013 and 2014 that involved pedestrians. These crashes were located at the following intersections: Main Street and Curtis Place, Main Street and Cemetery Drive, and Nichols Avenue and London Terrace.

Recent Car Crash at Paradise Green

On August 8, 2016, a fatal car crash occurred on Main Street near Paradise Green. The driver reportedly veered off Main Street and collided with a large tree. The driver was transported to Bridgeport Hospital, where she died due to internal injuries.²

² <http://www.ctpost.com/local/article/Stratford-crash-shuts-Main-Street-at-Paradise-9128600.php>

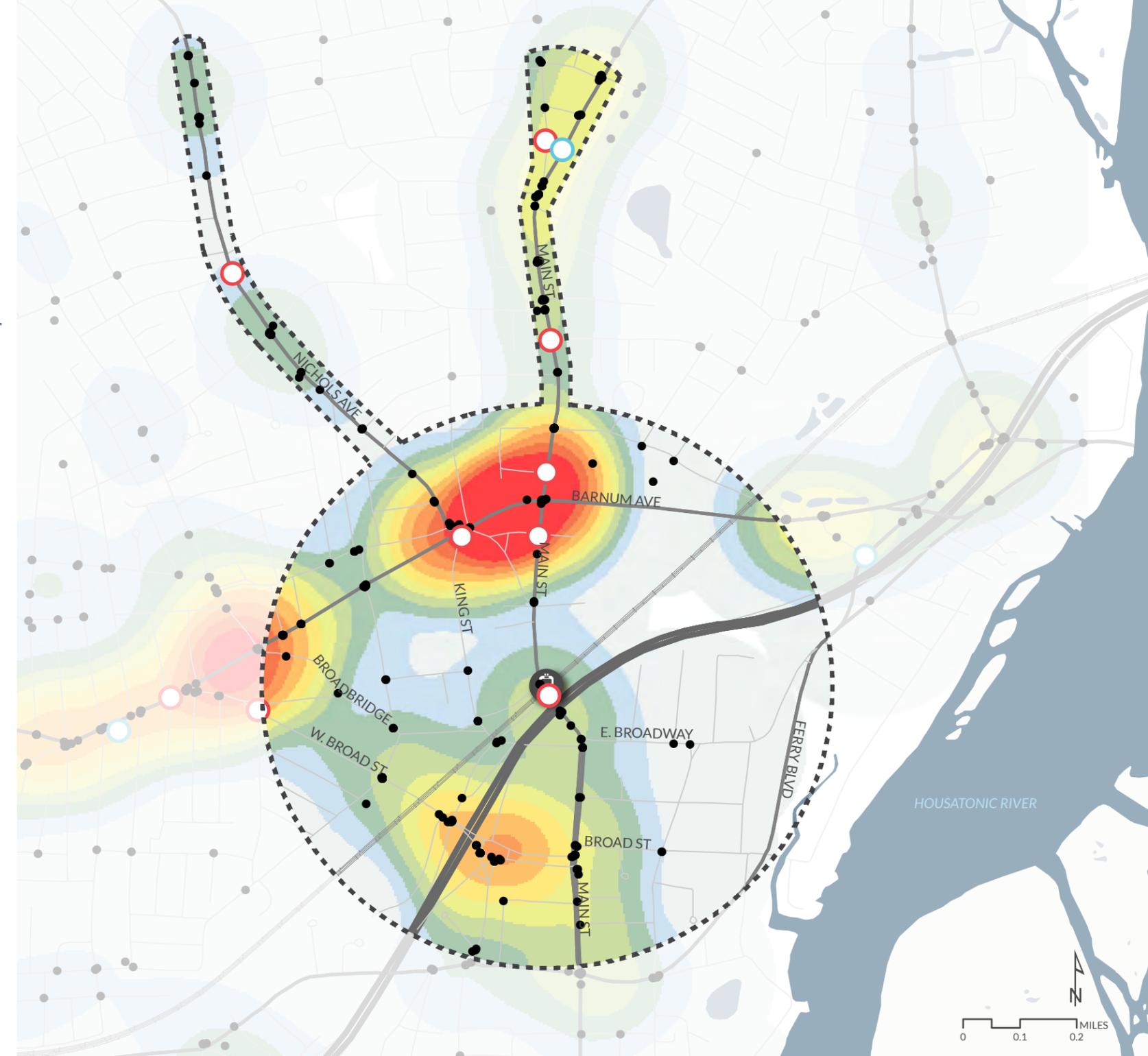


MAP 3.12
**CAR CRASHES
 IN STRATFORD**
 Jan. 2015 - May 2016

TOTAL CRASHES
 ● 361 in study area
 ○ 4 involved pedestrians
 ○ 1 involved a cyclist

CRASH DENSITY
 crashes per square mile
 Low (<150)
 High (>1,000)

Data source: Connecticut's
 Crash Data Repository



MAP 3.13
**CAR CRASHES AT
 INTERSECTIONS**
 Jan. 2013 - May 2016

TOTAL CRASHES
 ● 431 in study area
 ○ 7 involved pedestrians
 ○ 1 involved a cyclist

CRASH DENSITY
 crashes per square mile
 Low (<150)
 High (>1,000)

Data source: Connecticut's
 Crash Data Repository

REPORTED SLIPS + FALLS

Locations of slips and falls are useful indicators for understanding the quality and safety of sidewalk conditions. Between January 2010 and May 2016, 24 claims for slips and falls on sidewalk locations within Stratford were filed with the town attorney (Map 3.14). Of those claims, six occurred within the study area. One slip and fall incident was reported on the west side of Nichols Avenue, across from Glenfield Avenue. The remaining five incidents were reported along Main Street, with two occurring on sidewalks along the east side of Main Street near Paradise Green and three occurring in Stratford Center between Linden Avenue and E. Broadway/Church Street. In particular, two slip and fall incidents occurred at 2415 Main Street, both of which were reportedly caused by a utility cover.

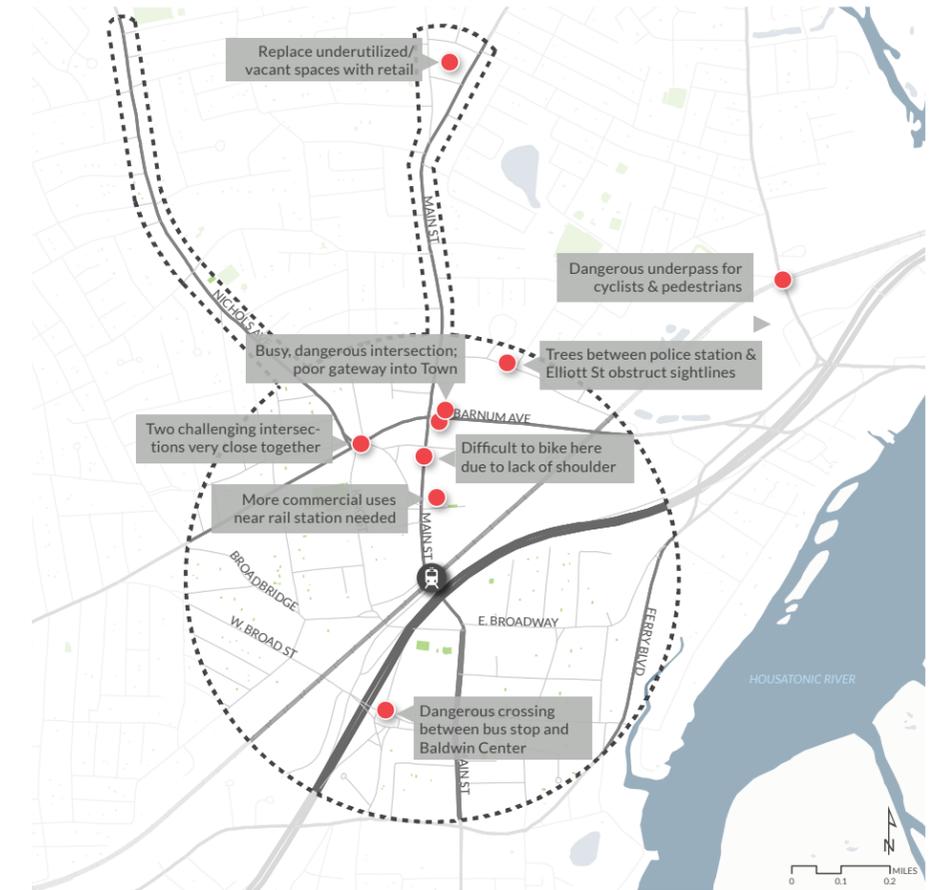
PUBLICLY-IDENTIFIED PROBLEM AREAS

In addition to the quantitative data presented throughout this section, residents of Stratford shared their knowledge and experience of unsafe street and intersection conditions using the Stratford Complete Streets Wikimap (Map 3.15). The following comments were received from the public:

- The intersection at Barnum Avenue and Main Street is busy and dangerous. It is also a poor gateway into the Town of Stratford.
- The railroad underpass on East Main Street (Route 110) is very dangerous for pedestrians and cyclists. While there is a narrow shoulder for cyclists, catch basin grates in the shoulder create a hazard.
- Trees between the police station driveway and Elliott Street obstruct sightlines. In particular, when turning onto Longbrook Avenue from Elliott Street, it is difficult to see cars approaching from the west along Longbrook Avenue.
- Barnum Avenue intersections with King Street and Nichols Avenue are very close to one another and both are very challenging.
- On Main Street, just south of Barnum Avenue, it is very difficult to bike due to a lack of a paved shoulder and designated space for cyclists.
- On W. Broad, a bus drops passengers off across the street from the Baldwin Center. W. Broad has high volumes of car traffic and crossing from the bus stop to the Baldwin Center is treacherous, particularly for senior citizens or those less abled.



MAP 3.14
○ SLIPS + FALLS
2010 - 2016



MAP 3.15
● PROBLEM AREAS
IDENTIFIED BY THE PUBLIC

FLOOD ZONES + NUISANCE FLOODING

Stratford is a coastal community, bordered to the east by the Housatonic River and to the south by the Long Island Sound. These diverse coastal natural resources support wildlife habitats and water dependent activities, such as boating, swimming, and fishing, that attract residents and tourists and sustain businesses. However, with its extensive coastline and several areas where ground elevations are only a few feet above high tide, Stratford is exposed to flood hazards due to storm surges, precipitation events, and future sea level rise.

Understanding where flood hazards currently exist (Map 3.16) and where they will likely exist in the future, is an important component of developing a sustainable and safe complete streets plan, as well as increasing the community's coastal resilience. The impacts flood hazards have on economic, social, and ecological

assets can be ameliorated by strategically introducing green infrastructure, such as permeable pavement, rain gardens, and bioretention cells, into the public right of way. If installed in appropriate locations and maintained over time, green infrastructure can slow, absorb, and filter stormwater runoff, ultimately decreasing the amount of water that enters the stormwater system and coastal environment. Another option for creatively addressing future climate change is to incorporate flexible open space into coastal areas that are, or will be, prone to flooding. For example, a waterfront park that is designed to flood can increase flood storage capacity during storm events, create space for habitat migration, and, most importantly, provide a valuable public amenity.

One percent of the study area is currently within the floodway, which represents areas with the greatest flood hazards. The Federal Emergency

Management Agency (FEMA) defines the floodway as, "the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height." Starting near the rail station, the floodway extends southwest, paralleling the rail line, and then continues north between King and California Streets to the Stratford High School's sports fields. There is also a small area in the northeastern extent of the study area that is within the floodway. Streets intersecting the floodway include Broadbridge Avenue, King Street, Catherine Street, and Longbrook Avenue.

Eleven percent of the study area is within the 100-year floodplain (areas with a 1% annual chance of reaching or exceeding the base flood elevation). The chance of experiencing a 100-year flood increases over time; within a 30-year



Sign warns drivers of flood risks near the Stratford rail station.



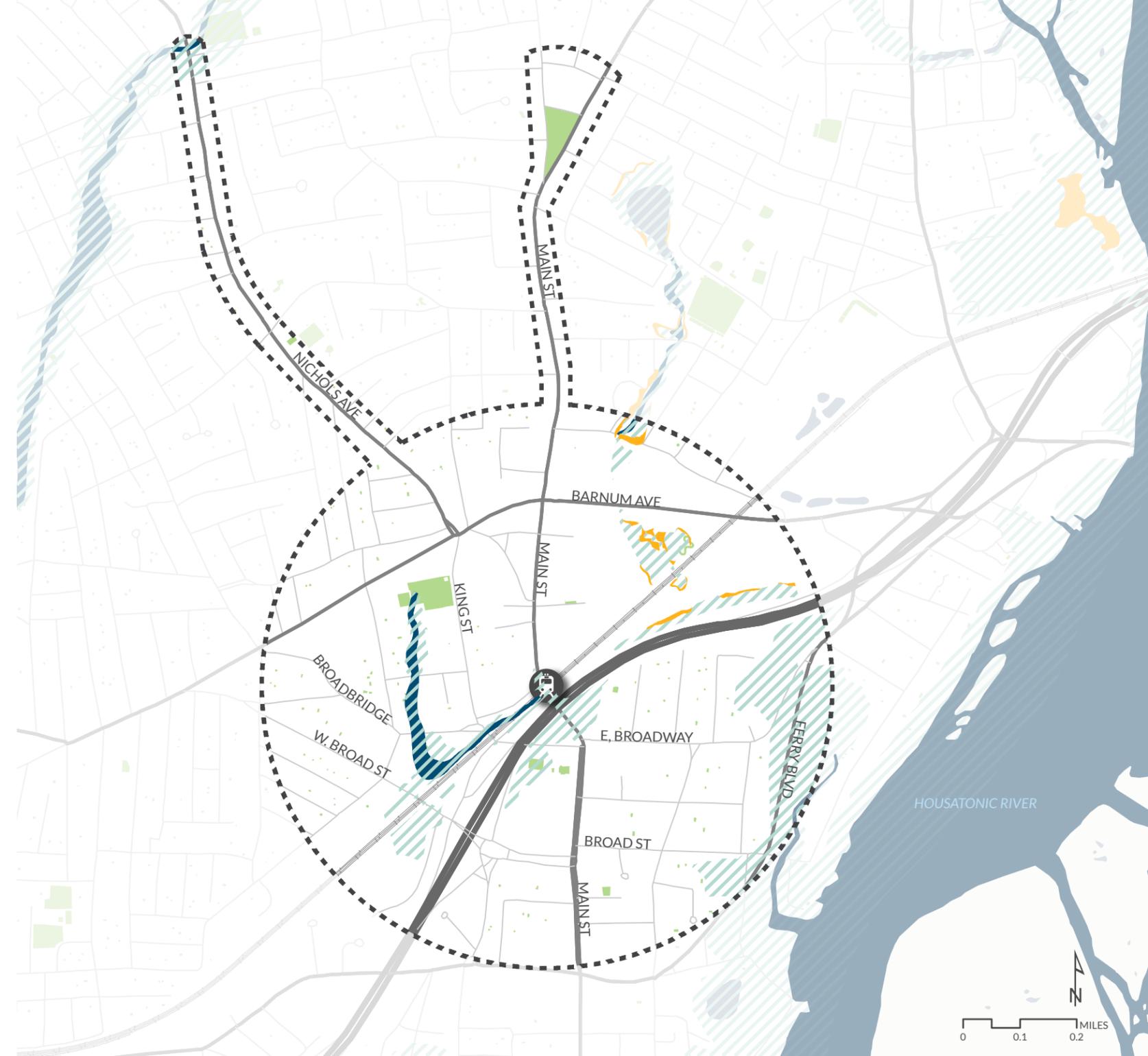
Stormwater planters create a buffer between the street and sidewalk (photo credit: U.S. EPA).



Corktown Common park in Toronto, Canada converts a brownfield into public open space that provides flood protection and restores native landscapes (photo credit: MVVA).

MAP 3.16
FLOOD ZONES

- Floodway
- 100-year floodplain
- 500-year floodplain



Data source: FEMA Flood Map Service Center

period (the length of a typical mortgage), there is a 25% chance that the base flood elevation will be reached or exceeded. A majority of Ferry Boulevard, the Stratford Rail Station, Church Street, and Main Street from E Broadway to north of the rail station are within the 100-year floodplain.

Less than one percent (0.3%) of the study area is within the 500-year floodplain (areas with a 0.2% annual chance of reaching or exceeding the base flood elevation). Currently, Longbrook Avenue is the only street within the 500-year floodplain.

While flood zones provide a helpful snapshot of current flood hazards, future changes in sea level rise and storm frequency will significantly affect the frequency with which flooding occurs and the geographic extent of impacted areas. The draft Stratford Coastal Community Resilience Plan (Coastal Resilience Plan) evaluates current and future flood hazards and risk levels within Stratford.¹ In particular, the report projects that a six-foot rise in sea level by 2115 (a high sea level rise scenario) could result in flooding on a daily basis similar to that experienced during Hurricane Sandy. The study area is largely contained within the “Town Center” region defined in the Coastal Resilience Plan, where the projected flood risk is low across all future scenarios evaluated. The draft Coastal Resilience Plan also notes that areas located close to the Housatonic River, particularly those within the Stratford Center Historic District and Academy Hill neighborhoods east of Ferry Boulevard, are vulnerable to coastal flooding.

¹ Town of Stratford Coastal Community Resilience Plan: DRAFT. 2016. Prepared by GZA GeoEnvironmental, Inc.

BROWNFIELDS

Stratford’s industrial past has created a legacy of contamination, which is identified as a potential barrier to revitalizing the study area. There are numerous brownfield properties in Stratford with many already in the process of assessment and remediation (e.g., Raymark Industries, Inc. superfund site). A number of sites are within or in very close proximity to the study area. Once remediated, sites within the study area will offer excellent TOD potential due to their proximity to the Stratford rail station and relatively large surface areas. Furthermore, future investments in complete streets and off-road pedestrian and bicycle infrastructure (e.g., multi-use paths) will greatly increase the current value and development potential of these brownfield sites, as the modernization of the infrastructure network is a key factor in attracting private investment.

3.5 STREETScape AUDITS

A modified version of the Center for Disease Control’s “Microscale Audit of Pedestrian Streetscapes-Mini” (MAPS-mini) was used to evaluate the streetscape condition and intersection crossing safety along each block of seven different street corridors, including: Barnum Avenue, Broad Street, E. Broadway, King Street, Main Street, Nichols Avenue, and W. Broad. A total of 97 blocks and 108 intersection crossings were assessed in the spring of 2016.

The MAPS-Mini is designed to rapidly evaluate the presence and quality of 15 different microscale streetscape elements, such as crosswalks, streets trees, and lighting, that are associated with physical activity across all age

groups.² Understanding a street’s microscale features is particularly important, as these features can be modified more quickly, easily, and at a relatively lower cost than macroscale features, such as land use and residential density. The MAPS-Mini considers microscale features that encourage both active transportation and leisure physical activity. In particular, street lights, benches, curb cuts, sidewalk presence and quality, and buffers between streets and sidewalks are most strongly related to encouraging active transportation (walking and bicycling) across all age groups.³

To better fit the needs of this project, the MAPS-Mini was modified slightly. The presence of bicycle storage facilities (e.g., bike racks) and questions specific to ADA accessibility were added. Also, street crossing conditions were evaluated independently of the streetscape conditions in order to facilitate the rapid identification of unsafe intersections.

STREETScape CONDITION

For the streetscape condition component of the audit, 97 street blocks were evaluated using the criteria displayed in the “Streetscape Condition Audit Form” on page 3-29. This component of the evaluation focused on assessing the presence and quality of microscale streetscape features. The maximum score achievable was 25.

² For an unmodified version of the MAPS-Mini evaluation tool, see: http://sallis.ucsd.edu/Documents/Measures_documents/MAPS_Mini_Tool_SegmentMethod_090815.pdf

³ Sallis JF, Cain KL, Conway TL, Gavand KA, Millstein RA, Geremia CM, et al. Is Your Neighborhood Designed to Support Physical Activity? A Brief Streetscape Audit Tool. *Prev Chronic Dis* 2015;12:150098. DOI: <http://dx.doi.org/10.5888/pcd12.150098>

STREETScape CONDITION AUDIT FORM

This form was used to assess the presence and quality of streetscape features that are associated with increasing physical activity across all age groups.

STREETScape CONDITIONS

Street Name: _____ Side: **N S E W**

Starting / Ending Cross Street: _____ Posted speed limit: _____

1. First floor uses along street:
 Residential ⁽⁰⁾ Offices ⁽¹⁾ Commercial ⁽²⁾ Other: _____

2. Number of public parks adjacent to the street:
 0 ⁽⁰⁾ 1 ⁽¹⁾ 2+ ⁽²⁾
 Describe park conditions (relationship to street grade, maintenance, activity level):

3. Number of public transit stops present:
 0 ⁽⁰⁾ 1 ⁽¹⁾ 2+ ⁽²⁾

4. Number of benches or other places to sit (including bus stop benches and seat walls)?
 0 ⁽⁰⁾ 1 ⁽¹⁾ 2+ ⁽²⁾

5. Are street lights installed? List total number of street lights present.
 No ⁽⁰⁾ Some ⁽¹⁾ Ample ⁽²⁾

6. Are street trees installed? List total number of street trees present.
 None ⁽⁰⁾ Some, irregularly spaced/empty tree pits ⁽¹⁾ Ample ⁽²⁾

7. Are the buildings well-maintained?
 None ⁽⁰⁾ Some ⁽⁰⁾ All ⁽¹⁾

8. Is graffiti/tagging present (exclude murals and other art projects)?
 None ⁽²⁾ Some ⁽¹⁾ A lot ⁽⁰⁾

9. Is there a designated bike path on the street?
 No ⁽⁰⁾ Yes, painted line ⁽¹⁾ Yes, protected lane ⁽²⁾

10. Number of bike racks present?
 0 ⁽⁰⁾ 1 ⁽¹⁾ 2+ ⁽²⁾

11. Is a sidewalk present? If no, skip to Q13
 No ⁽⁰⁾ Yes ⁽¹⁾

12. Are there poorly maintained sections of the sidewalk that constitute MAJOR trip hazards? (e.g., heaves, misalignments, cracks, overgrowth, incomplete sidewalk)
 No, none ⁽¹⁾ Yes, some or many ⁽⁰⁾

13. Is a buffer present that sufficiently and consistently separates pedestrians from traffic?
 No ⁽⁰⁾ Yes ⁽¹⁾

14. What percent of the sidewalk/walkway is covered by trees, awnings, or other overhead structures (exclude scaffolding)?
 0-25% ⁽⁰⁾ 26-75% ⁽¹⁾ 76-100% ⁽²⁾

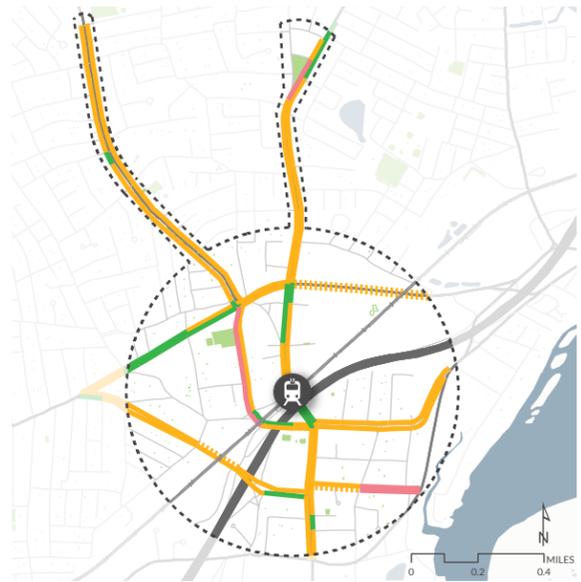
While no street block achieved 100% of the available points, several blocks on Main Street and Barnum Avenue received a score above 50% (Map 3.20). The highest scoring blocks along Main Street were located near Paradise Green, Stratford Center between Linden Avenue and E. Broadway/Church Street, along Town Hall, and on the west side of Main Street between W. Broad and Kings College Place. The east side of Main Street between Brewster and Wilcoxson received the highest score (18; 72% of the maximum score) of all street blocks evaluated. This area was characterized by dense retail, wide and well maintained sidewalks, ample street trees and pedestrian-scale lighting, benches, and bus stops. This section was also the only block of the

97 evaluated that provided bike racks and accessible on-street parking spaces. Of note, this section of Main Street was part of a business improvement district ten years ago, which likely contributed to the high scores this area received during the audit.

Stratford Center (Main Street) was also relatively pedestrian-friendly; it provided access to public transit and retail, was well-maintained, included ample pedestrian-scale lighting, and had relatively wide sidewalks with street trees. Main Street also had the highest concentration of park and open space, which helped improve the streetscape conditions along the west side of Main Street at Paradise Green, Town Hall, and the W. Broad crossing.

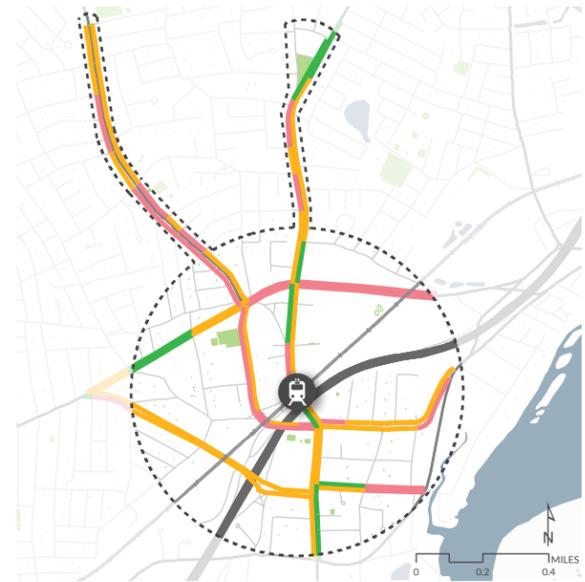
The western section of Barnum Avenue also contained several high scoring blocks; similar to Paradise Green, this area was also formerly part of a business improvement district. A combination of commercial activity, bus stops, and recent streetscape upgrades - including sidewalk improvements, regularly spaced street trees, and pedestrian-scale lighting - resulted in scores above 50% for the Barnum Avenue blocks between California Street and Broadbridge Avenue.

A majority of the blocks evaluated (67 blocks) received between 24% and 40% of the total available points. These relatively low scores were largely attributed to poorly maintained sidewalks with several tripping hazards and a lack of parks,



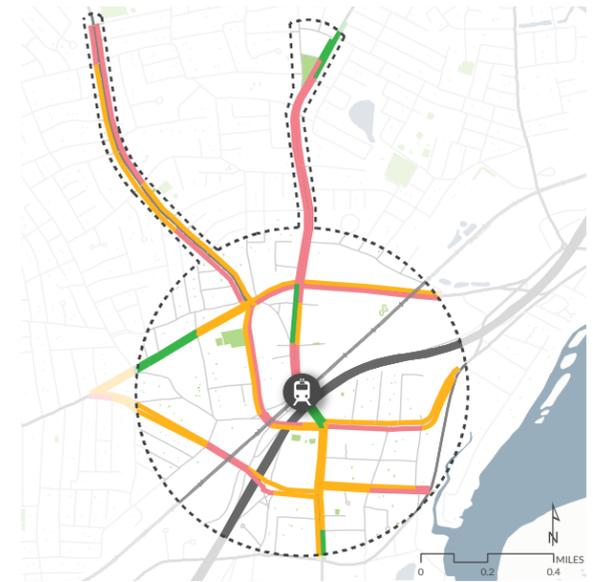
SIDEWALK CONDITION

Good (green), Poor - Incomplete (orange), Poor - Tripping Risk (yellow), Missing (red)



STREET TREE CONDITION

Good (green), Poor (orange), Missing (red)

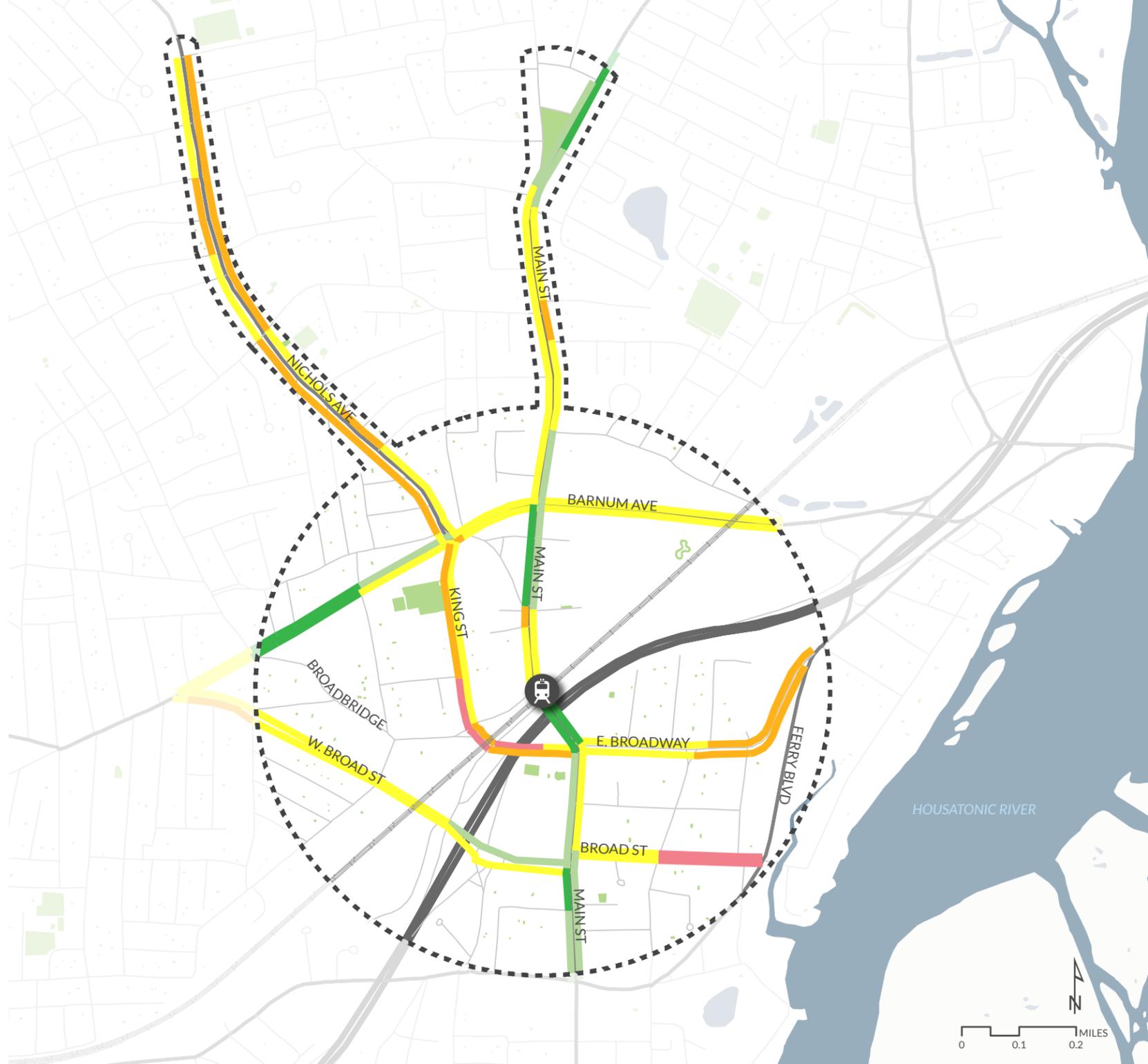


STREET LIGHT CONDITION

Good (green), Poor (orange), Missing (red)

MAP 3.20 STREETScape CONDITION
% of maximum available points received

Less than 20% (red), 20 - 30% (orange), 31 - 40% (yellow), 41 - 50% (light green), 51 - 72% (dark green)



Data source: Alta Planning + Design

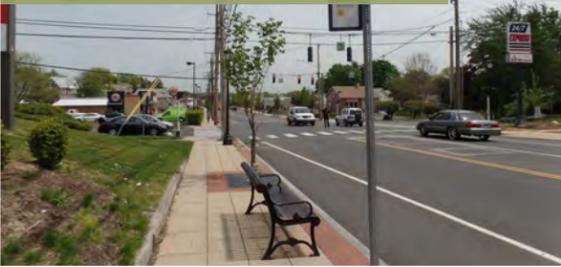
pedestrian-scale lighting, bicycle infrastructure, benches, and commercial activity. In particular, missing or incomplete sidewalks were observed throughout the study area, which creates unsafe and inaccessible conditions for pedestrians. Incomplete sidewalks occurred along the east side of W. Broad under the railroad bridge and on the north and south sides of Barnum Avenue to the east of Main Street. Sidewalks were not present along the west side of King Street between Barnum Avenue and Linden Avenue and along the north and south sides of Broad Street between Elm Street and Ferry Boulevard.

Overall, the most common streetscape elements missing from the evaluated street blocks include parks and open space, benches (particularly at bus stops), bike lanes, bike racks, and well-maintained sidewalks. Improving the presence and quality of these elements throughout Stratford will encourage physical activity and active transportation across all ages.

AMENITIES FOR PEDESTRIANS + BICYCLISTS

encourage physical activity and active transportation across all age groups and enhance the streetscape experience for non-motorists

Benches at bus stops on Barnum Ave.



Bus shelter in Paradise Green



Lighting on Barnum Ave.



Public art in Paradise Green



Bike rack in Paradise Green



Patio space in Stratford Center



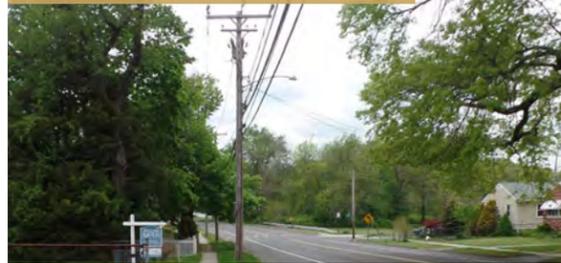
CAR-ORIENTED STREETSAPES

create an uncomfortable, and sometimes unsafe, environment for pedestrians and bicyclists

Inaccessible bus stop on Main St.



Lighting on Nichols Ave.



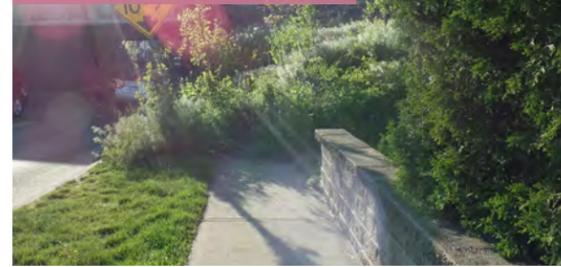
Dark underpass on King St.



INCOMPLETE/MISSING SIDEWALKS

create discontinuous pedestrian networks and discourage active transportation

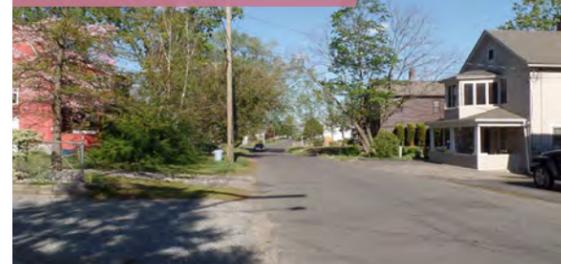
W. Broad St. at rail bridge



Barnum Ave. at rail overpass



Broad St.



POORLY MAINTAINED SIDEWALKS

create tripping hazards and decrease accessibility for users of all ages and abilities

E. Broadway



Nichols Ave. south of Reitter St.



Nichols Ave. south of Grace St.



INTERSECTION CROSSING SAFETY

For the intersection crossing safety component of the audit, 108 street crossings were evaluated using the criteria displayed in the “Intersection Crossing Audit Form” to the right. This component focused on both the safety and accessibility of street crossings. The maximum score achievable was eight.

Four of the street crossings assessed met 100% of the evaluation criteria, while 18 street crossings met none of the criteria (Map 3.21). The four street crossings that received a score of 100% were all located at the intersection of Barnum Avenue and Main Street. This intersection was recently renovated and included pedestrian walk signals with audible and visual cues, sidewalk ramps with detectable warnings, and highly visible crosswalks. Street crossings that received a score of zero included 29% of the street crossings along E. Broadway, 27% of the street crossings along Nichols Avenue, 26% of the street crossings along King Street, 20% of the street crossings along Barnum Avenue, and 3% of the street crossings along Main Street.

Less than half of the crossings (47%) had crosswalks. Of those with crosswalks, 60% of the crosswalks were in poor condition (e.g., faded or chipping).

A majority of crossings (65%) had sidewalk ramps at both curbs. Of the crossings with sidewalk ramps at both curbs, 42% had detectable warnings, 13% had detectable warnings on one of the ramps, and 45% did not have detectable warnings. The presence of sidewalk ramps and detectable warnings are an important aspect of ensuring that street crossings are safe and accessible for all users and all abilities.

Walk signals with visual cues were present at 21% of the crossings evaluated, while walk signals with both visual and audible cues were only present at 4% of the crossings evaluated. 75% of crossings did not have a walk signal.

INTERSECTION CROSSING AUDIT FORM

This form was used to assess the accessibility and safety of intersection crossings.

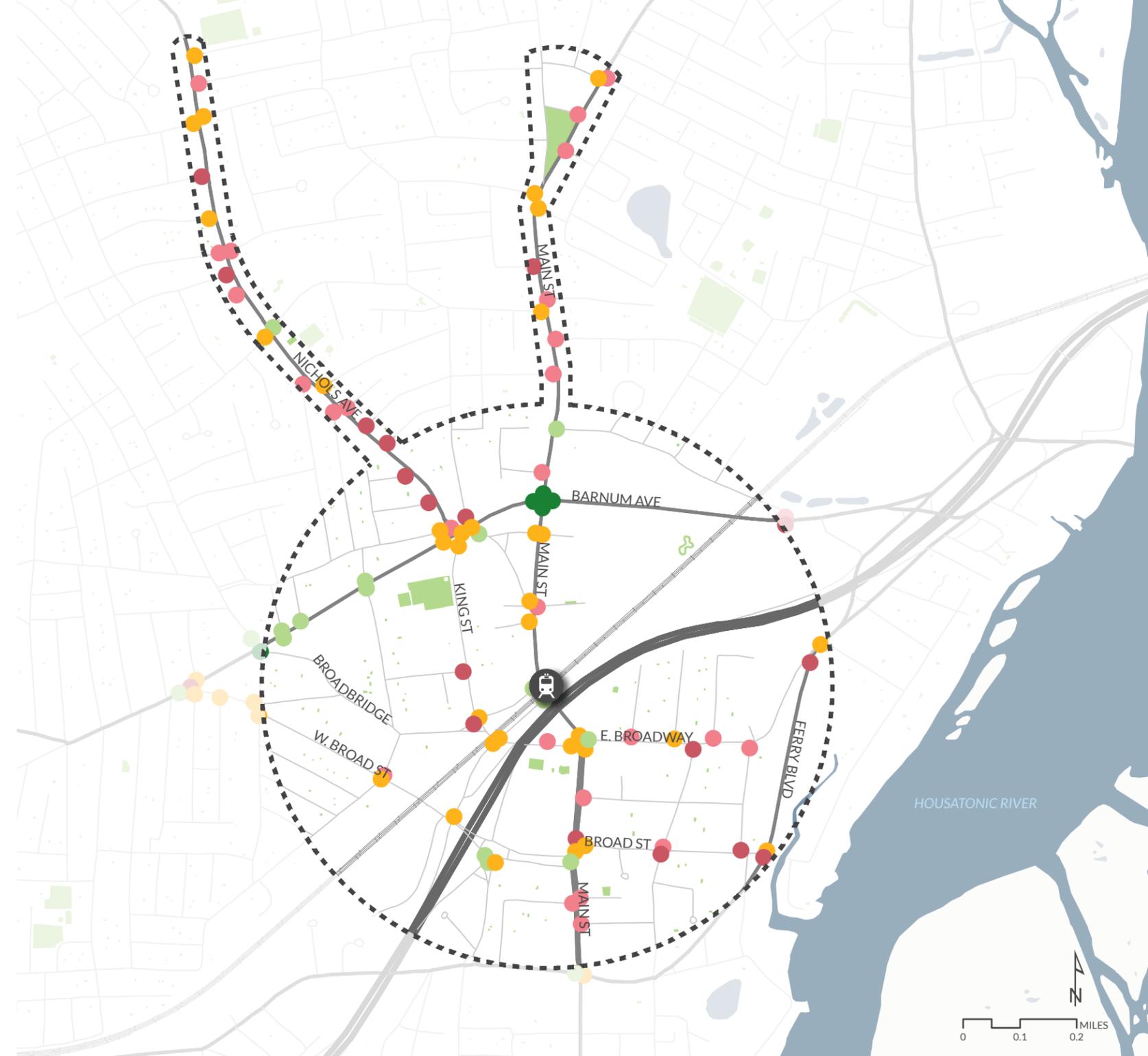
STREET CROSSING CONDITIONS

Intersection: _____

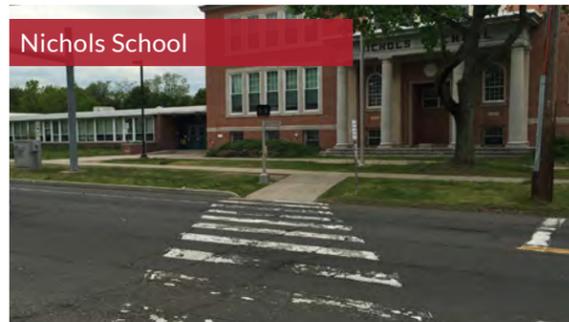
1. Is a pedestrian walk signal present at each crossing?
 No ⁽⁰⁾ Yes, visual cues ⁽¹⁾ Yes, visual & non-visual cues ⁽²⁾
2. Is there a ramp at the curb(s)?
 No ⁽⁰⁾
 Yes, at one curb only ⁽¹⁾
 Yes, at both pre- and post-crossing curbs ⁽²⁾
3. If a ramp is present, are there detectable warnings?
 No ⁽⁰⁾ Yes, at one curb only ⁽¹⁾ Yes, at both curbs ⁽²⁾
4. Is there a marked crosswalk?
 No ⁽⁰⁾ Yes, poor condition ⁽¹⁾ Yes, good condition ⁽²⁾
 Describe crosswalk condition and type (e.g., painted, raised):

MAP 3.21
INTERSECTION CROSSING SAFETY
 % of maximum available points received

- 0%
- 1 - 25%
- 26 - 50%
- 51 - 75%
- 76 - 100%



Data source: Alta Planning + Design



4
of the 108 crossings evaluated meet all of the evaluation criteria

35%
of crossings do not have ramps at both curbs

45%
of sidewalks with ramps are missing detectable warnings

21%
of crossings have a pedestrian walk signal

53%
of crossings do not have crosswalks

60%
of existing crosswalks are in poor condition (e.g., chipping, faded)

4

NEEDS ANALYSIS



This Chapter synthesizes the information presented in Chapter 3: Existing Conditions in order to identify opportunities and challenges related to the goals of this project. The challenges and opportunities associated with intersection crossings, access to destinations, supporting multiple modes of transportation, regional connectivity, and localized flooding are discussed below.

4.1 SWOT ANALYSIS

A SWOT analysis was conducted to evaluate the Strengths, Weaknesses, Opportunities, and Threats that exist within the study area. In general, strengths and weaknesses are related to policy and infrastructure within the control of the Town of Stratford, while opportunities and threats are related to environmental, cultural, and other external factors that are likely beyond the Town's control.



Crossing conditions at Main St. + Church St.

SWOT ANALYSIS



STRENGTHS

- Stratford has several policies in place that promote transit-oriented development and safe, accessible streets
- A diversity of transportation options are currently available to residents and visitors
- Commercial districts, particularly, Stratford Center and Paradise Green, attract residents and visitors
- Wide right of ways along many streets provide ample space for new/improved bicycle and pedestrian facilities



WEAKNESSES

- Intermodal connectivity between the rail station and other modes of transportation needs to be improved
- There is a lack of bicycle infrastructure and facilities throughout the study area
- Several sidewalks pose tripping hazards or are incomplete
- Intersection crossing infrastructure for pedestrians and bicyclists is in poor condition or non-existent
- Pedestrian-scale amenities, such as benches and lighting, are largely absent
- Low density of parks and open space



OPPORTUNITIES

- Residents are open to and supportive of using alternative modes of transportation
- The Housatonic Greenway and East Coast Greenway are major assets for encouraging active transportation, both locally and regionally
- Rich historic and natural resources are accessible from Stratford Center
- Stratford's proximity to major metropolitan areas and access to the Metro North Railroad are attractive amenities for current and future residents

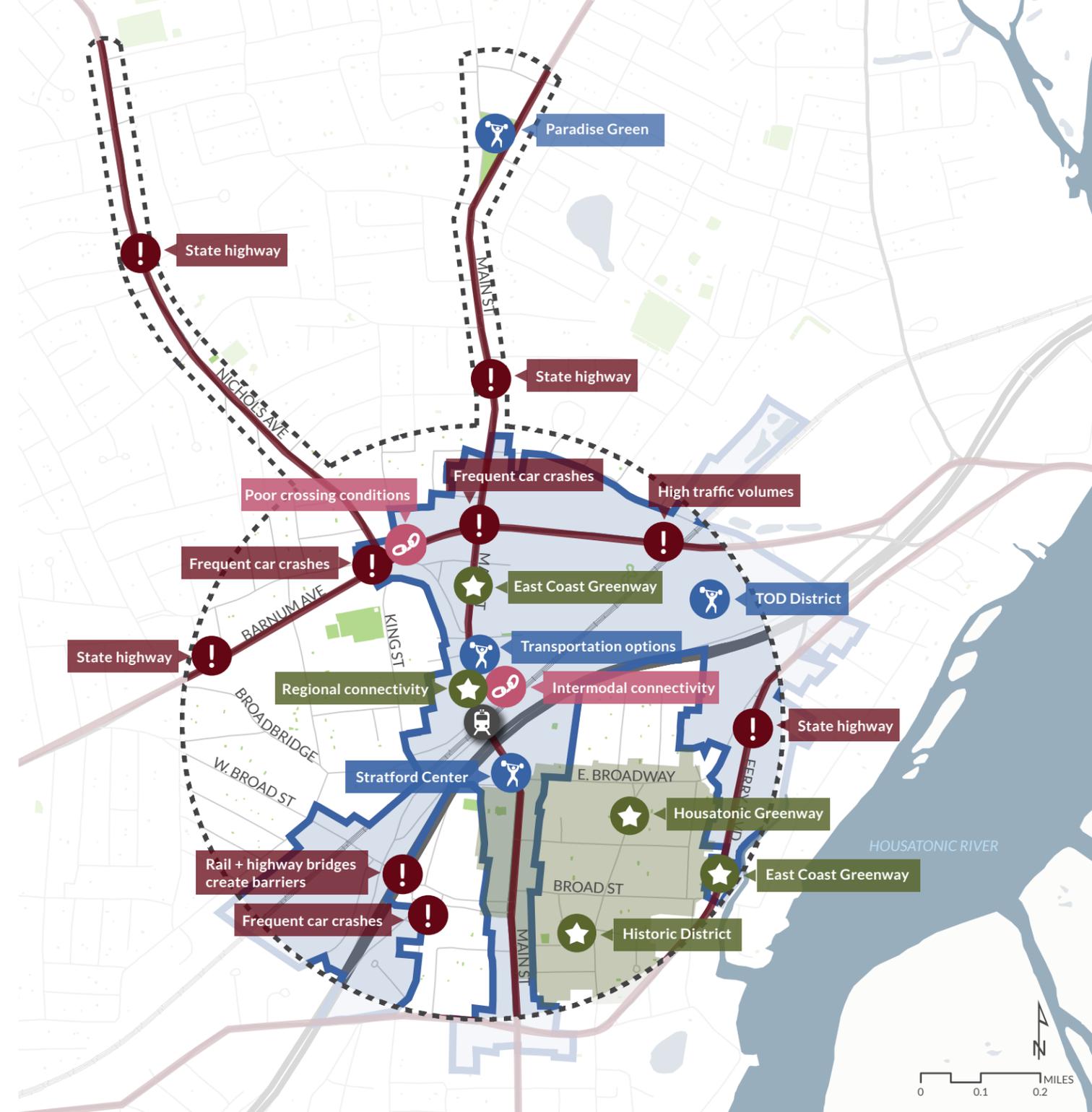


THREATS

- State highways require additional coordination, resources, and approvals
- Rail and highway infrastructure create physical, visual, and auditory barriers between destinations in Stratford Center
- High volumes of traffic adjacent to the rail station (Main Street) and along Barnum Avenue make crossing the street difficult
- High frequency of crashes at major intersections
- Winter conditions make bicycling and walking difficult year-round and create challenges for maintenance of bicycle/pedestrian facilities
- Flooding poses a hazard in Stratford Center
- Lack of restaurants and retail in Stratford Center

MAP 4.1
SWOT ANALYSIS

- Strength
- Weakness
- Opportunity
- Threat



4.2 ENCOURAGING MULTIPLE MODES OF TRANSPORTATION

Motor vehicles are the most common mode of transportation used by Stratford residents. According to the 2010 Census, 82% of Stratford residents drive to work. Similarly, of the 48 people surveyed during the public design studio in May 2016, over half (52%) indicated they typically drive alone for every day purposes (e.g., commuting, running errands, recreational trips, etc.). Despite the dominance of motor vehicles, several residents expressed a willingness and desire to use alternate forms of transportation, particularly if services and infrastructure that supported alternate modes were made available. For example, 25 participants interviewed during the public design studio indicated their current mode of transportation is driving alone. However, when asked which mode of transportation participants would like to use in the future, 14 participants indicated a preference for using a combination of modes, 10 indicated a preference for bicycling, 8 indicated a preference for walking, and only 5 indicated a preference for driving alone.

Improving and expanding the infrastructure for pedestrians, bicyclists, and public transit users is a critical first step in making alternative modes of transportation safe, accessible, and convenient. The following sections summarize the challenges and opportunities related to the existing pedestrian, bicycle, and public transit networks in Stratford and propose targeted upgrades to support and encourage multiple modes of transportation.

PEDESTRIAN NETWORKS

Stratford's pedestrian infrastructure¹ is most well-developed along sections of Main Street and Barnum Avenue. However, there are several discontinuities in the existing pedestrian infrastructure network. Several routes that connect residential areas to Stratford Center have little to no pedestrian infrastructure.

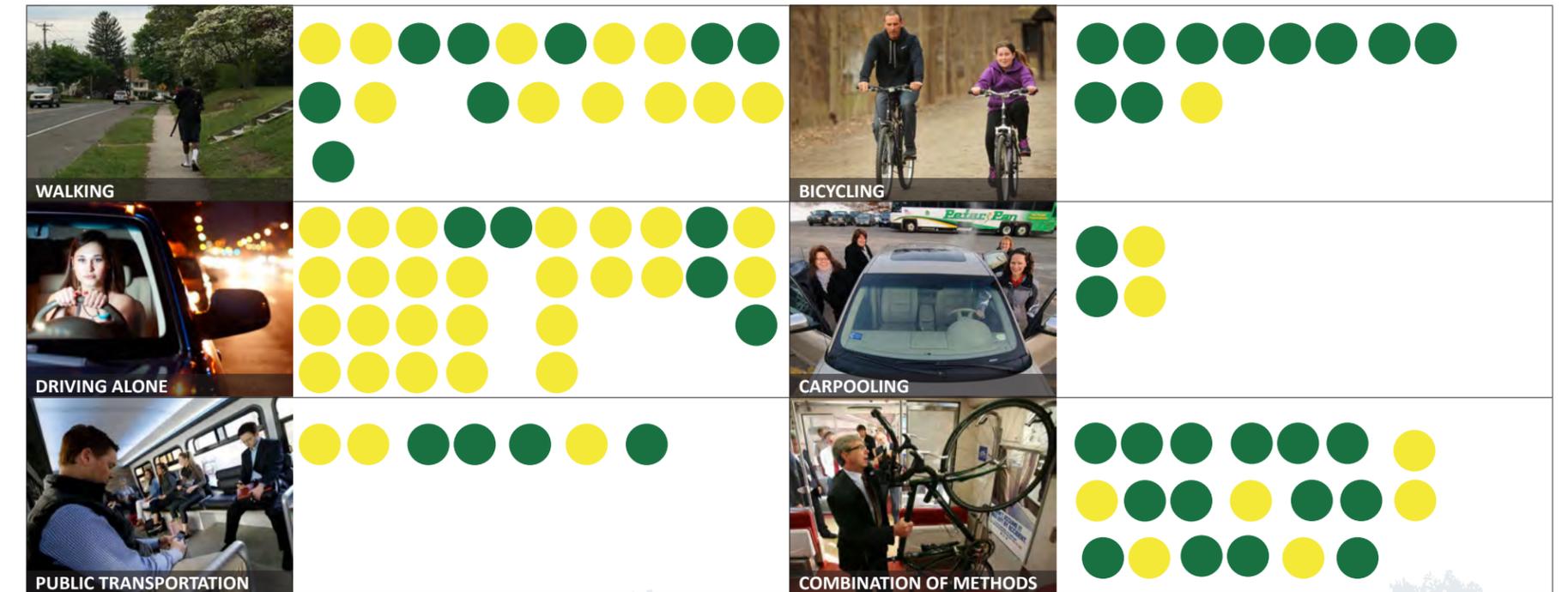
Improving the pedestrian network will help ensure residents reach their destinations safely and will also encourage adults and children to spend more time outdoors – playing, exercising, and socializing. Key opportunities and design strategies for improving the pedestrian network throughout Stratford are discussed in detail below.

¹ Stratford's pedestrian infrastructure includes sidewalks, sidewalk ramps, crosswalks, and streetscape amenities (e.g., benches, lighting, waste receptacles, etc.)

What mode of transportation do you prefer?

place a YELLOW dot next to the mode of transportation you currently use for everyday purposes

place a GREEN dot next to the mode of transportation you would like to use for everyday purposes



Main Street

Main Street is the most important north-south corridor within the study area; it traverses a diversity of land uses and connects major local and regional destinations. The condition of the pedestrian network along Main Street is irregular, with relatively good pedestrian infrastructure in Stratford Center and Paradise Green. Gaps in pedestrian infrastructure and amenities occur between Barnum Avenue and Paradise Green and immediately north of the rail station. Given its importance and current condition, one of the goals for implementing a complete streets

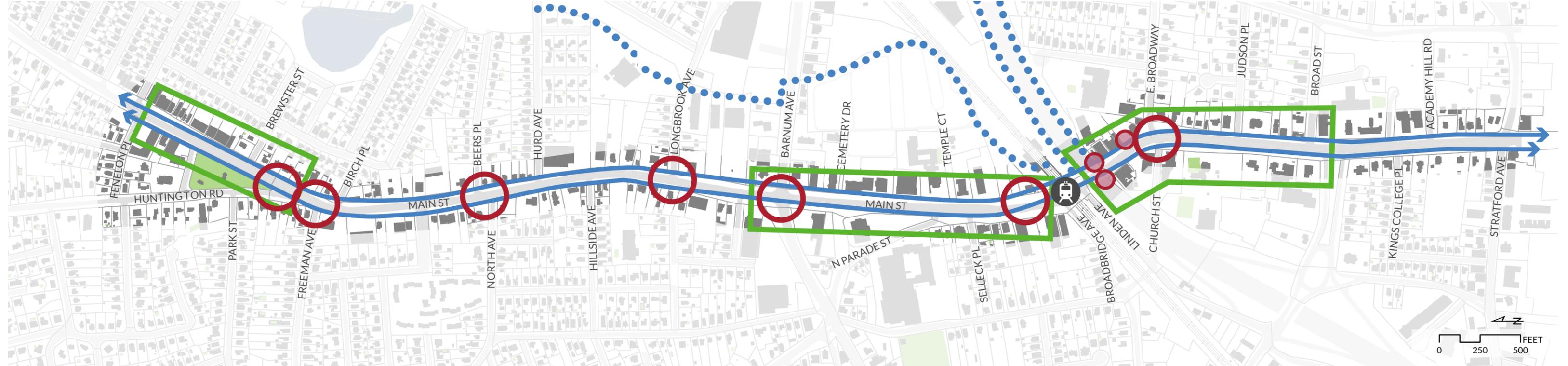
approach in Stratford should be the creation of a continuous, safe, and accessible network of pedestrian infrastructure along Main Street.

In particular, residents have noted that motor vehicle traffic can pose challenges to pedestrians at the North Avenue and Barnum Avenue intersections; north of the rail station, especially at the beginning and end of the school day and when trains arrive; and, in Stratford Center where cars emerging from alleyways create low visibility scenarios (for both the driver and pedestrian) that place pedestrians at risk. Like

many of the streets within the study area, Main Street has wide public right of ways, which create significant opportunities for improving and expanding pedestrian infrastructure and implementing design strategies that minimize conflicts between pedestrians and motor vehicles, such as:

- Improving the sidewalk condition to eliminate tripping hazards;
- Expanding sidewalks into multi-use paths, where space allows;
- Installing street trees, pedestrian scale lighting, and benches along the length of the corridor;
- Incorporating outdoor café space into the pedestrian zones of Stratford Center and Paradise Green;
- Upgrading pedestrian crossing infrastructure, ensuring all crossings have sidewalk ramps with detectable warnings and high-visibility crosswalks;
- Implementing traffic calming measures in Stratford Center and Paradise Green areas, such as curb extensions at intersections that shorten the crossing distance for pedestrians, slow traffic, and provide space for incorporating green infrastructure into the streetscape;
- Creating medians that serve as pedestrian refuge islands to facilitate crossing intersections; and,
- Transforming Paradise Green Place into a festival street that expands the edge of the park and prioritizes pedestrian and bicycle traffic.

MAP 4.2
MAIN STREET
IMPROVEMENTS

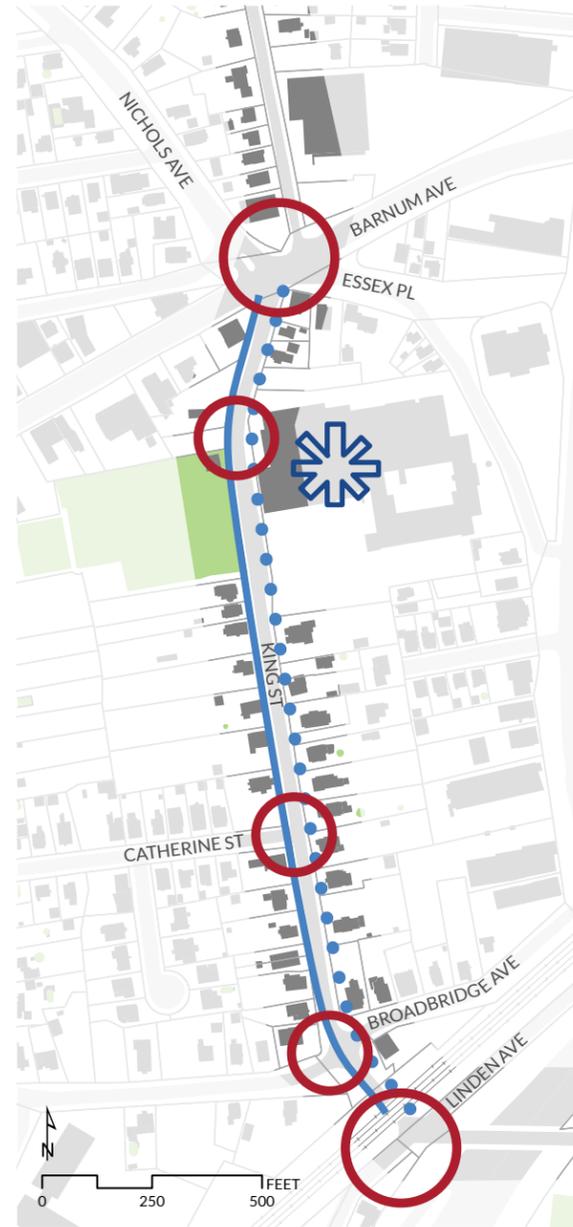
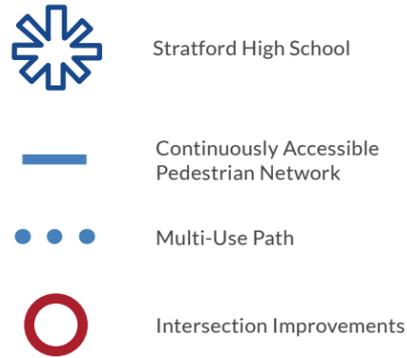


- Continuously Accessible Pedestrian Network
- Off-Road Pedestrian Connection
- ▭ Key Pedestrian Zone
- Intersection Improvements
- Hidden Driveways

King Street

King Street is a residential street that ties into Barnum Avenue at its northern extent and Main Street at its southern extent. Importantly, Stratford High School is located on King Street. All students enrolled in grades 9 through 12 that live within 2-miles of their school are considered to be within walking distance and do not have access to public school bus services. Many students walk along King Street when traveling between the high school and their homes. The most significant challenge for pedestrians on King Street is the lack of a sidewalk on the western side of the street and a relatively narrow sidewalk on the eastern side of the street. Although the public right of way along King Street is relatively narrow (approximately 40-feet), it still provides sufficient space to install a sidewalk on the western side of the road and expand the eastern sidewalk into a 10-foot wide multi-use path that would better accommodate students walking to and from school. Whether students are biking, walking, or skateboarding, they could comfortably share the space provided by a multi-use path, while also avoiding conflicts with motor vehicle traffic. Additional streetscape improvement opportunities include the installation of pedestrian-scale lighting, street trees, and accessible crossing infrastructure.

MAP 4.3
KING STREET IMPROVEMENTS

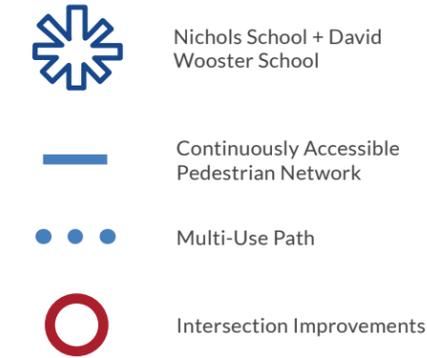


Nichols Avenue

Nichols Avenue is a predominantly residential street with two schools along its length in the study area: the Nichols School and David Wooster Middle School. Improving the pedestrian network along Nichols Avenue is particularly important in terms of providing a safe, accessible environment for children traveling to and from school. Despite its complete network of sidewalks within the study area, most of the sidewalks along Nichols Avenue are narrow and in poor condition. The public right of way along Nichols Avenue is large (approximately 70-foot wide) and provides sufficient space for improving and expanding pedestrian infrastructure without changing the existing parking and travel lane configuration on the street. Opportunities along Nichols Avenue include:

- Expanding existing sidewalks and where space allows, the creation of wide multi-use paths that accommodate joggers, walkers, skaters, bicyclists, and children walking to school;
- Installing street trees, pedestrian scale lighting, and where appropriate, benches; and,
- Implementing traffic calming measures, such as curb extensions at intersections that shorten the crossing distance for pedestrians, slow traffic, and provide space for incorporating green infrastructure into the streetscape.

MAP 4.4
NICHOLS AVENUE IMPROVEMENTS



Ferry Boulevard

The greatest challenge for pedestrians along Ferry Boulevard is the lack of sidewalks within the study area. This challenge is exacerbated by the long distance between intersecting streets. For example, to walk from Broad Street to E. Broadway along Ferry Boulevard, a pedestrian would have to travel nearly 2,000 feet (almost a half mile) without a sidewalk. The right of way along Ferry Boulevard ranges from approximately 85 to 115 feet, which creates significant space and opportunity to create pedestrian (as well as bicycle) infrastructure.

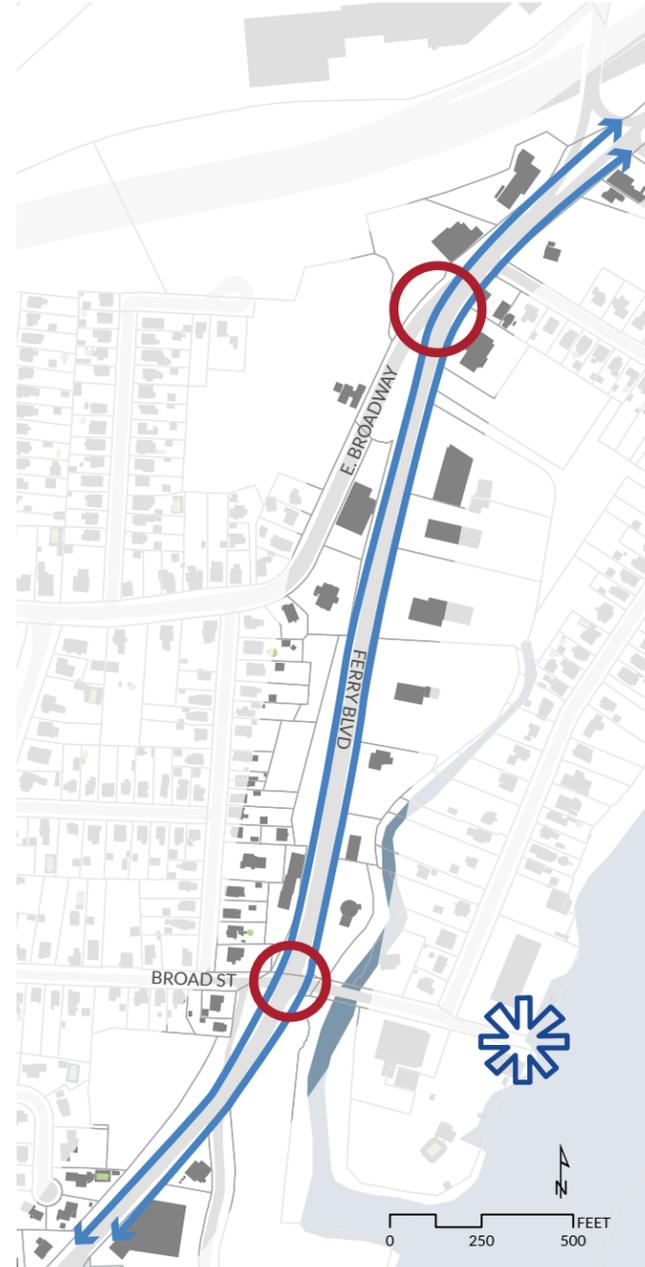
Given Ferry Boulevard's importance as a regional connector, a component of the East Coast Greenway, and its proximity to waterfront destinations, improving the pedestrian infrastructure along this corridor should be a priority. Sidewalks and crossing infrastructure should be installed along Ferry Boulevard, at a minimum. Other opportunities include the installation of pedestrian-scale lighting, street trees, benches, a multi-use path, and park space in areas where the public right of way is sufficiently wide.

A majority of the parcels adjacent to Ferry Boulevard within the study area are part of the U.S. Environmental Protection Agency's (EPA) proposed plan for cleaning up the Raymark Superfund.¹ These properties have soil, sediment, and groundwater contamination and have been classified into Operable Unit 6 (OU6) by the EPA. Planned clean-up activities for OU6 include the excavation and removal of Raymark waste to a

depth of four-feet. The excavated areas will be lined with geotextile fabric, filled with clean material, and restored to the pre-excavation condition.² Coordinating with the EPA to align the objectives and timing of the Raymark Superfund clean-up process with streetscape improvements along Ferry Boulevard is a significant opportunity to leverage resources and potentially reduce costs.

² U.S. Environmental Protection Agency. 2016. Proposed Plan: Raymark Industries, Inc. U.S. EPA Hazardous Waste Program at EPA New England. <http://www.townofstratford.com/filestorage/39832/39846/39915/40411/40497/PROPOSED_PLAN-FINAL-2016-06-24.pdf>

MAP 4.5
FERRY BOULEVARD IMPROVEMENTS

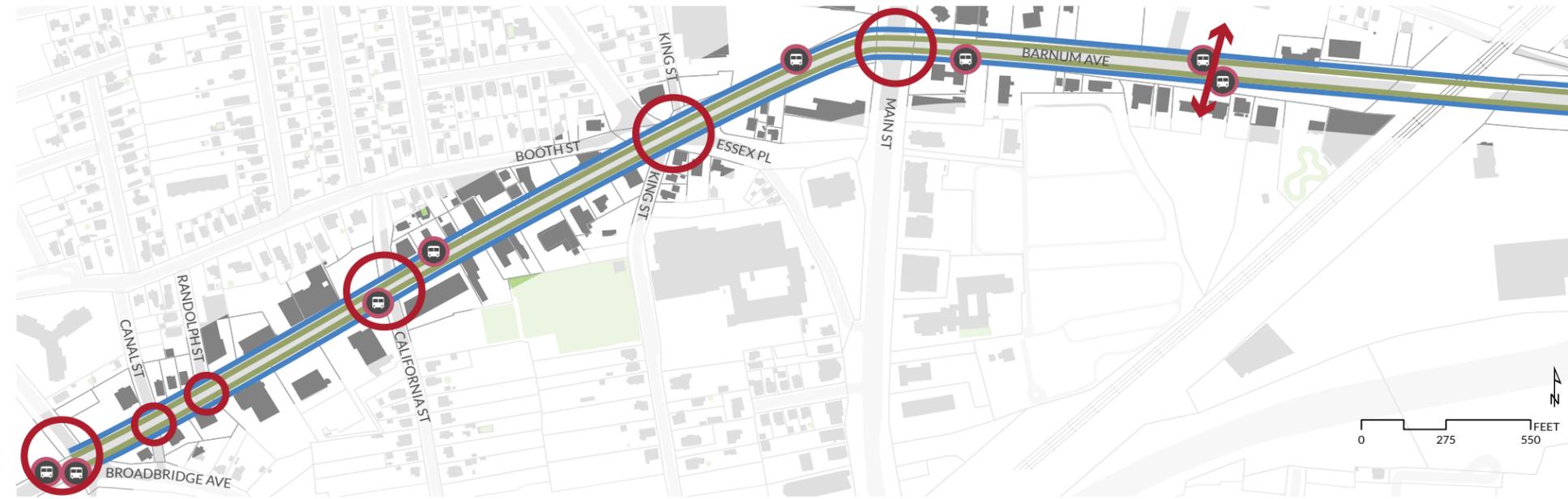


Barnum Avenue

Barnum Avenue is Stratford's main commercial corridor, and as such, a complete, safe, and accessible pedestrian network that connects the retail located along the entire length of this corridor should be a priority. The main challenges along Barnum Avenue are the lack of sufficient buffers between pedestrians and motor vehicle traffic and an incomplete sidewalk network east of the Main Street intersection. Several streetscape upgrades were recently completed along Barnum Avenue between California Street and Broadbridge Avenue, including a new sidewalk, street trees, pedestrian-scale lighting, and benches adjacent to bus stops. At a minimum, there is an opportunity to implement similar upgrades the entire length of Barnum Avenue. Additional opportunities for improving the walkability of Barnum Avenue include:

- Installing and upgrading sidewalks on the north and south sides of Barnum;
- Creating a planted buffer on both sides of the street to separate pedestrian and car traffic;
- Expanding Barnum's relatively narrow sidewalks into 10-foot wide multi-use paths, where space allows;
- Upgrading bus stops so that pedestrians can wait comfortably, particularly during inclement weather (see section on transit networks below for more information);
- Installing street trees, pedestrian-scale lighting, and benches; and,
- Improving pedestrian crossing infrastructure, including high visibility crosswalks, sidewalk ramps with detectable warnings, and pedestrian signals.

MAP 4.6
BARNUM AVENUE IMPROVEMENTS



E. Broadway and Broad Street

E. Broadway and Broad Street are residential streets that provide important connections between Stratford Center, the historic district, residential areas, and retail and restaurants along Ferry Boulevard. The sidewalk condition along both of these streets is poor and several tripping hazards exist due to sidewalk heaving and cracking. Along Broad Street, sidewalks are absent between Ferry Boulevard and Elm Street, and the sidewalk is incomplete on the south side of Broad Street between Main Street and Elm Street. Furthermore, pedestrian crossing infrastructure – specifically, crosswalks and sidewalk ramps with detectable warnings – are largely absent along both of these streets. Residents also noted that the intersection at Broad Street and Ferry Boulevard is particularly difficult for pedestrians due to the lack of a sidewalk, fast-moving motor vehicle traffic, minimal crossing infrastructure, and poor road surface conditions.

The most immediate opportunities for improving the pedestrian infrastructure along E. Broadway and Broad Street include: the installation of sidewalks to create a continuous pedestrian network; upgrades to existing sidewalks to remove tripping hazards; and, intersection improvements – such as crosswalk striping/restriping, sidewalk ramps, and detectable warnings – to ensure each intersection crossing is safe and accessible. Given the residential character of these streets, traffic calming and streetscape improvement opportunities should also be considered. Traffic calming measures that reduce and slow vehicular traffic, such as mini roundabouts, curb extensions, and speed humps or speed tables, would prioritize pedestrians and bicyclists and provide a safer environment for alternative modes of transportation. The addition of street trees, expanded buffers between pedestrian and motor vehicle traffic, and pedestrian-scale lighting would significantly improve the pedestrian experience along these streets.

EXAMPLES OF TRAFFIC CALMING MEASURES



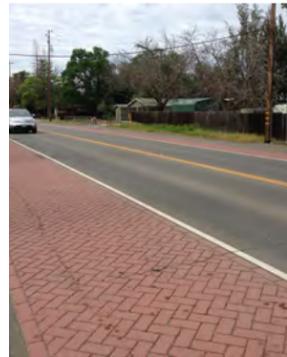
Curb Extensions



Mini Roundabouts



Speed Humps/Tables

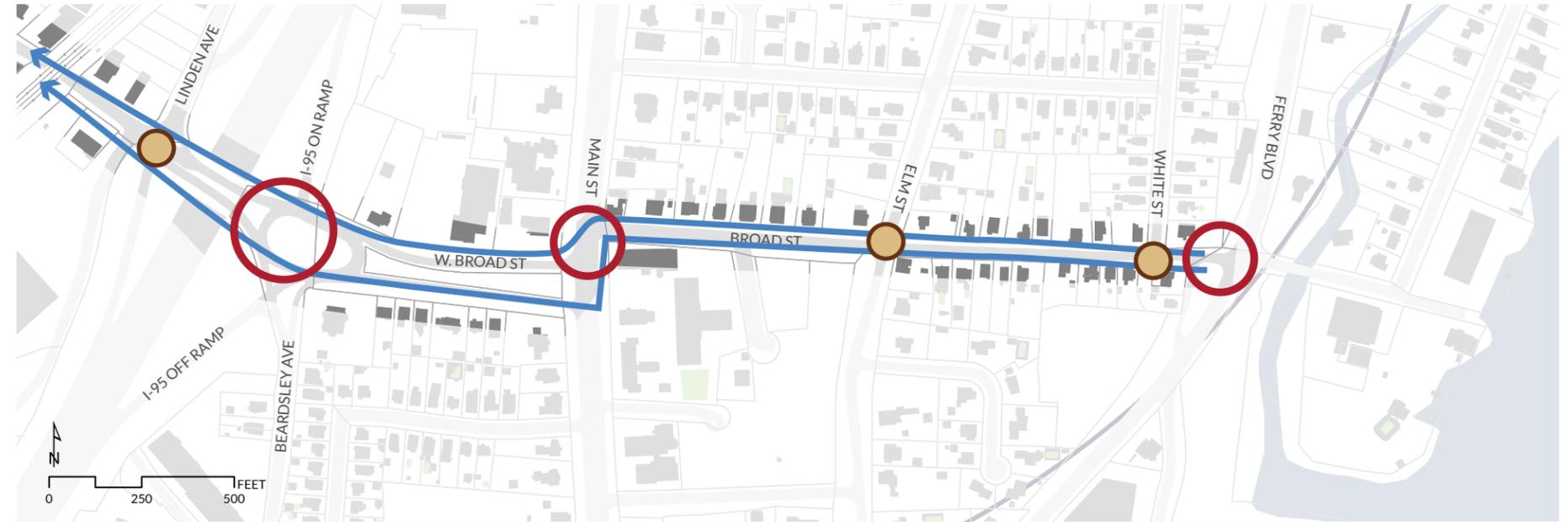


Textured Shoulders

MAP 4.7
BROAD ST. IMPROVEMENTS



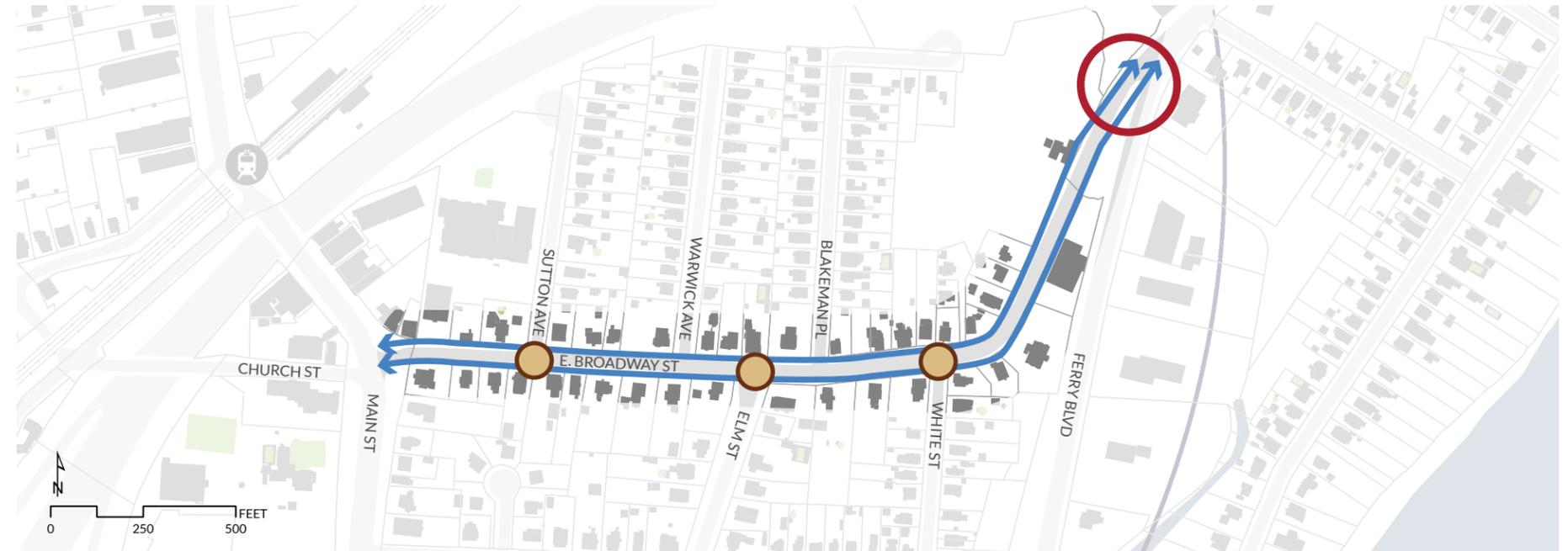
- Continuously Accessible Pedestrian Network
- Intersection Improvements
- Traffic Calming Measures



MAP 4.8
E. BROADWAY IMPROVEMENTS



- Continuously Accessible Pedestrian Network
- Intersection Improvements
- Traffic Calming Measures



BICYCLE NETWORKS

One of the main challenges related to bicycling in Stratford is the lack of facilities. For example, the only bicycle parking facilities observed during the streetscape audits were located at Paradise Green and the rail station. On-road bicycle infrastructure, such as bike lanes, were not observed. Despite this lack of infrastructure, there is an active bicycling community in Stratford. This community could be expanded to include bicyclists of all abilities, if suitable infrastructure was installed that made bicycling more accessible, safe, and convenient. The two most immediate opportunities for improving Stratford's bicycle network include the expansion of bicycle parking and the installation of on-road bicycle facilities.



SHORT-TERM BICYCLE PARKING

BICYCLE PARKING

Bicycle parking facilities are an important component of bicycle networks. The provision of ample and convenient bicycle parking ensures that bicyclists have a safe place to store their bicycles once they reach their destination. Insufficient bicycle parking facilities may deter individuals from choosing bicycling as their mode of transportation and/or from traveling to particular locations.

There are two main types of bicycle parking: short- and long-term. Short-term parking facilities are designed for users who need to store their bicycles for a short duration, typically two hours or less. Short-term parking facilities focus on ease of use and proximity to destinations. Long-term parking facilities are



LONG-TERM BICYCLE PARKING

designed to serve the needs of users who need to leave their bicycle unmonitored for extended periods of time, such as employees and public transit users. Long-term parking facilities focus on security and weather protection.

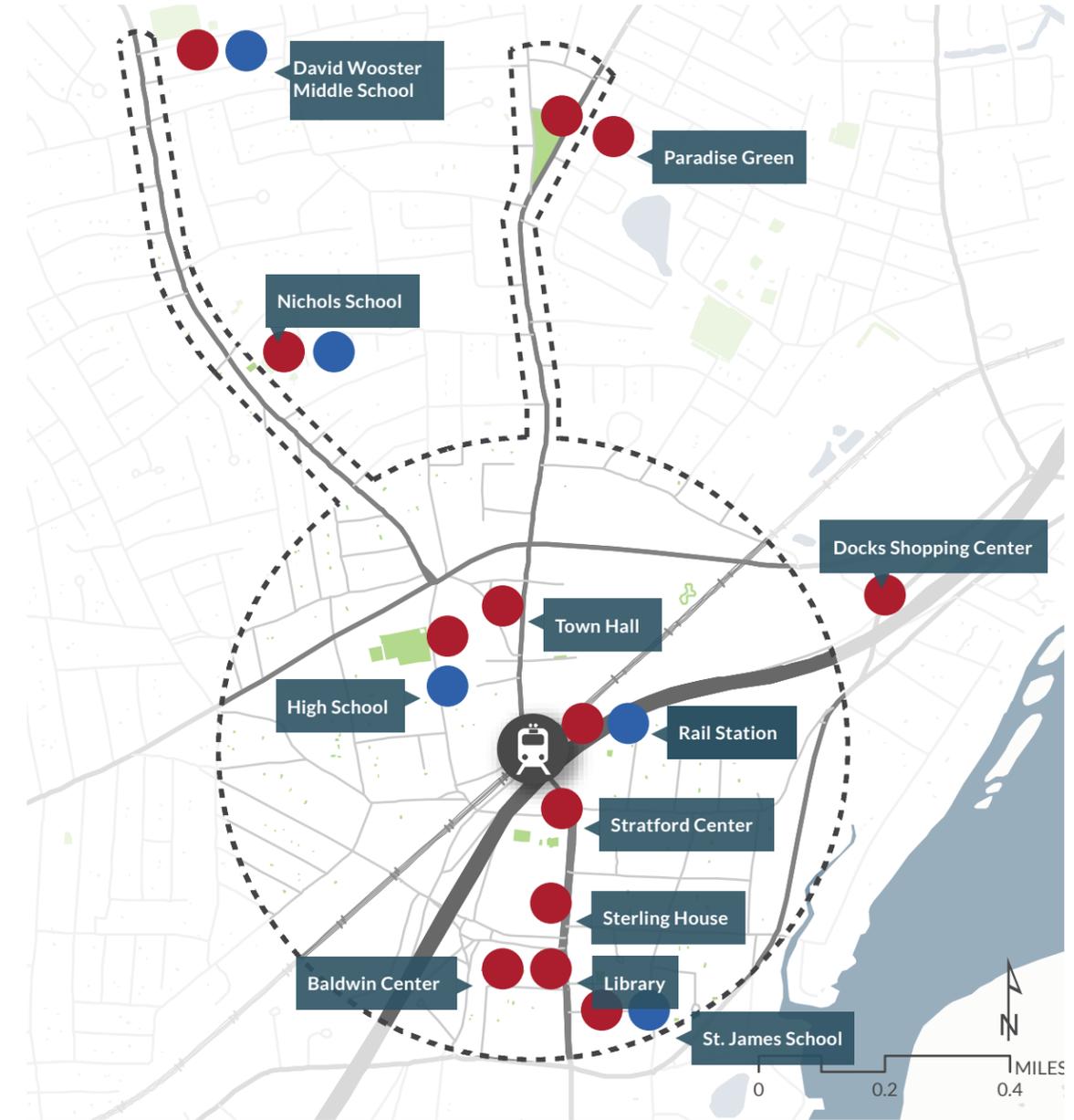
Stratford's Transit-Oriented Development Overlay District requires that, "For developments including non-residential uses, bike racks shall be provided as appropriate to serve employees, customers and visitors. For residential uses, internal safe, secure and lighted storage shall be provided on the first level for all tenants wishing to own bikes." There are also several opportunities for enhancing existing and creating new bicycle parking facilities in the public realm. The opportunities identified and described below focus on ensuring bicycle parking facilities



COVERED BICYCLE PARKING

are located at major destinations and are well-distributed throughout the study area:

- Rail station.** Currently, inverted U bicycle racks are available at the rail station. These racks are designed for short-term use and do not necessarily meet the needs of public transit users. Individuals biking to the train station and then commuting by rail typically leave their bicycles unmonitored for extended periods of time and require additional security and weather protection to assuage concerns about theft or damage. To encourage more residents to cycle to the rail station, as opposed to driving, it is recommended that long-term bicycle parking be installed. While long-term bicycle parking facilities come in a variety of forms, a covered, secure facility that provides protection from adverse weather conditions, damage, and theft is recommended.



MAP 4.9
BICYCLE
PARKING

- Short-term parking
- Long-term parking

- Paradise Green and other parks.** Paradise Green is a local destination for shopping, dining, and recreation. Two bicycle racks were observed along the eastern sidewalk of Main Street in Paradise Green during the streetscape audits. To encourage more people to bicycle to Paradise Green, the number of short-term bicycle parking facilities should be increased. One option for substantially increasing bicycle parking while preserving sidewalk space is to convert one or more parking spots into a bicycle corral. One parking spot can typically fit 8 to 12 bicycles. Bicycle parking should also be provided in parks and open space throughout Stratford.

- Stratford Center and other retail destinations.** Stratford Center does not have any bicycle parking facilities. Adding short-term bicycle parking in this area creates an opportunity to attract existing cyclists that are biking along the East Coast Greenway (Main Street) and encourage residents who currently drive to bicycle downtown when running errands or socializing. Similarly, providing ample short-term bicycle parking at major retail destinations, such as the Docks Shopping Center and Shop Rite, is an important step in encouraging residents to run errands on a bicycle instead of in a car.

- Community Services.** Several destinations within the study area provide important resources for the community, including the Sterling House Community Center, the Baldwin Center, the library, and Town Hall. Several

residents do not have access to a car and rely on public transit to access these resources. Installing short-term bicycle parking facilities at these locations would increase accessibility and equity, encourage active transportation, and demonstrate the Town's commitment to supporting sustainable modes of transportation.

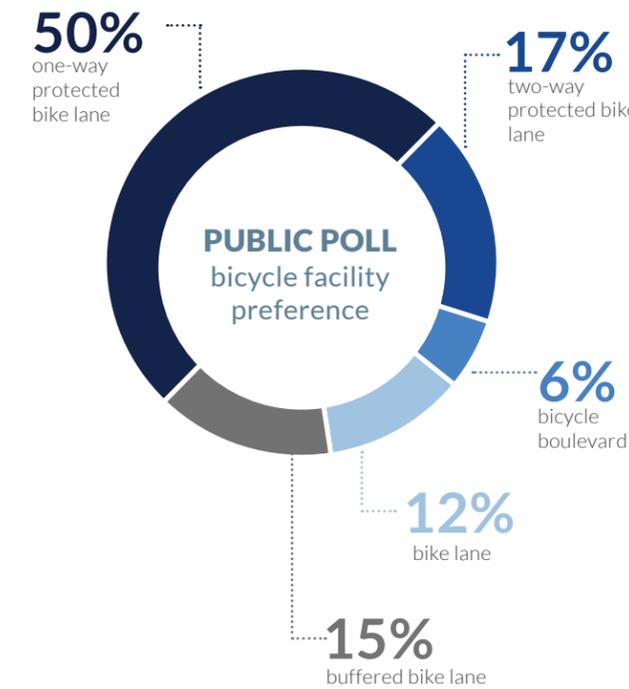
- Schools.** Stratford High School, the Nichols School, St. James School, and David Wooster Middle School are within or adjacent to the study area. Students biking to school need a dry, safe, and secure place to store their bicycles during the school day. Providing students with access to long-term bicycle parking facilities would make biking to school more convenient, accessible, and worry-free.

BICYCLE TRANSIT FACILITIES

A bicycle network should be planned and designed to ensure it meets the needs and abilities of all users. In general, bicyclists can be categorized into four distinct groups based on comfort level and riding skills. Bicyclists' skill levels greatly influence expected speeds and behavior, both in separated bikeways and on shared roadways. Each of these groups has different bicycle facility needs, so it is important to consider how different facilities will accommodate each type of cyclist when planning and designing a bicycle network. Bicycle infrastructure should accommodate as many user types as possible, with decisions for separate or parallel facilities based on providing a comfortable experience for the greatest number of people. The characteristics, attitudes,

and infrastructure preference of each of the four generalized cyclist types are described in Appendix A.

The public engagement undertaken as part of this project provided insight to the comfort levels of cyclists in Stratford. During the public design studio in May 2016, Stratford residents were asked which bicycle facilities would



STRATFORD BICYCLE FACILITY POLL
During the design workshop, the public provided input on their preferred bicycle facility types.

make them feel the most comfortable: shared roadways, bike lanes, buffered bike lanes, one-way protected bike lanes, two-way protected bike lanes, or a bicycle boulevard. 70% of the participants selected bike lanes that were protected from motor vehicle traffic and no one selected shared lanes, where cars and bicycles intermix.

Several opportunities exist within the study area to create a network of bike lanes with varying levels of protection.

East Coast Greenway

The East Coast Greenway follows two different routes through the study area. The East Coast



East Coast Greenway signage at the intersection of Main Street and Stratford Avenue.

Greenway bisects the study area, following Main Street from Longbrook Avenue to Stratford Avenue. On the eastern edge of the study area, the East Coast Greenway follows Ferry Boulevard, connecting Washington Bridge to Stratford Avenue. Neither of these streets, both of which are integral to the East Coast Greenway system, have bicycle infrastructure.

Main Street is a major north-south corridor, connecting neighborhoods and retail around Paradise Green, Stratford Center, and Stratford's Historic District. Currently, this north-south connection is challenging for bicyclists as it is constrained by narrow shoulders between Paradise Green and the rail station and two underpasses (I-95 and the rail line). The right-



Ferry Boulevard is a key component of the East Coast Greenway in Stratford; however, current conditions discourage walking and cycling.

of-way along Main Street is wide, and with a reduction in travel lane width, ample space is available for the installation of protected bicycle facilities, such as buffered bike lanes or cycle tracks.

Ferry Boulevard provides an important connection between the neighborhoods in Stratford's Historic District, the Dock Shopping Center, and waterfront marinas. The right-of-way along Ferry Boulevard is wide, ranging from 80 to 115-feet, and each travel lane is approximately 20-feet wide. Travel lanes could be reduced by nearly half (to 11-feet wide), creating ample space for the installation of protected bicycle facilities, such as buffered bike lanes or cycle tracks.



East Coast Greenway route through Stratford.



SEPARATED BICYCLE FACILITY



BICYCLE BOULEVARD



MULTI-USE PATH

Nichols Avenue

Nichols Avenue is a major street corridor providing important local connections between residential areas, schools, and destinations within Stratford Center. This is also a frequently used route by bicyclists, according to Strava data, and bicycle facility improvements along this street would benefit and broaden the existing cycling population. Nichols Avenue has a wide right-of-way (approximately 70-feet), and substantial space is available between the curb line and private property lines. Without changing the street configuration, protected bicycle facilities and/or multi-use paths could be installed at grade with the sidewalk.

Bicycle Boulevards

Other opportunities for improving the bicycle facilities in Stratford include the creation of bicycle boulevards on local streets that have low existing speeds and volumes, such as Broad Street, King Street, and E. Broadway. Bicycle boulevards could provide a low-stress bicycle network that complements and interconnects with protected bicycle facilities on major street corridors. Bicycle boulevards could also provide an opportunity to improve bicycle facilities along on-road sections of the Housatonic Greenway, where conditions are appropriate.

Local streets with higher traffic volumes and speeds that are not appropriate for bicycle boulevards may be good candidates for bike lanes, which provide a higher level of protection.

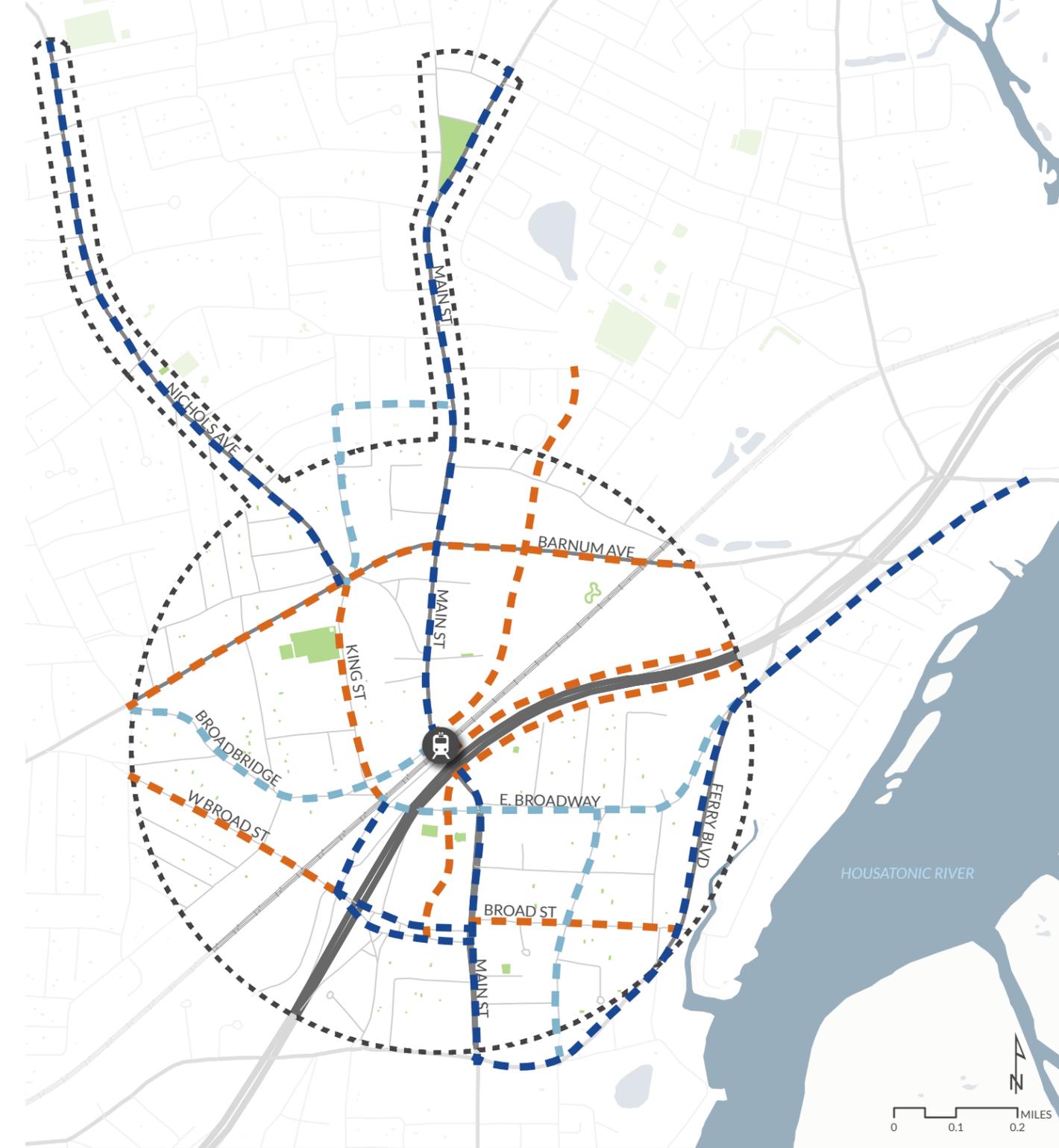
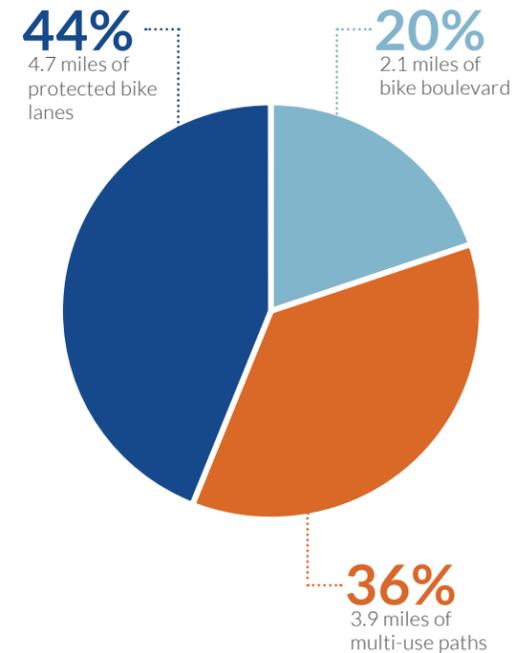
Multi-Use Paths

Multi-use paths are off-road alternatives that accommodate bicyclists and pedestrians. Multi-use paths can be installed parallel to a street where there is sufficient space within the right-of-way (e.g., along Nichols Avenue and King Street) or they can create new opportunities for pedestrian and bicycle circulation within or between blocks. Opportunities for adding multi-use paths to the Stratford grid include the following locations:

- Through the superblock created by Main Street, Barnum Avenue, and the railroad and then north along Ferry Creek to safely connect pedestrians and cyclists between the rail station and Paradise Green.
- Along the I-95 corridor east of the rail station to provide a direct connection between future development and the rail station for pedestrians and cyclists;
- Along the eastern side of King Street, between Nichols Avenue and Linden Street, to improve walking and bicycling conditions for students traveling to and from school;
- Along the south side of Barnum Avenue; and,
- Through the open space associated with Sterling Park to safely connect pedestrians and cyclists to Stratford Center, the library, and the Baldwin Center.

MAP 4.11
BIKE FACILITIES NETWORK

- Bike Boulevard
- Protected Bike Lane
- Multi-Use Path



PUBLIC TRANSIT NETWORKS

Bus

Since 2011, ridership on the GBT bus network has been increasing. Five different routes service Stratford; however, there are several opportunities to improve the system in order to appeal to a broader demographic and increase ridership. The GBT's Long Range Transit Plan outlines a series of interventions aimed to improve service and ridership in Stratford, including increased frequency of service, the addition of new routes that provide access to currently underserved areas, the conversion of the Coastal Link into a BRT system, and the creation of a bus interchange facility adjacent to the rail station.

Despite GBT's proposed future changes, there are additional opportunities that can be pursued to improve user experience, increase access, and improve interconnectivity between modes within Stratford. These opportunities include:

- Upgrading all bus stops to ensure they provide accessible waiting and alighting areas;
- Increasing lighting and signage at bus stops to improve safety and wayfinding;
- Providing safe and comfortable waiting areas for passengers at bus stops, including bus shelters to protect passengers during inclement weather and benches to ensure passengers have an opportunity to rest, if needed;

TRANSIT USER EXPERIENCE IMPROVEMENTS



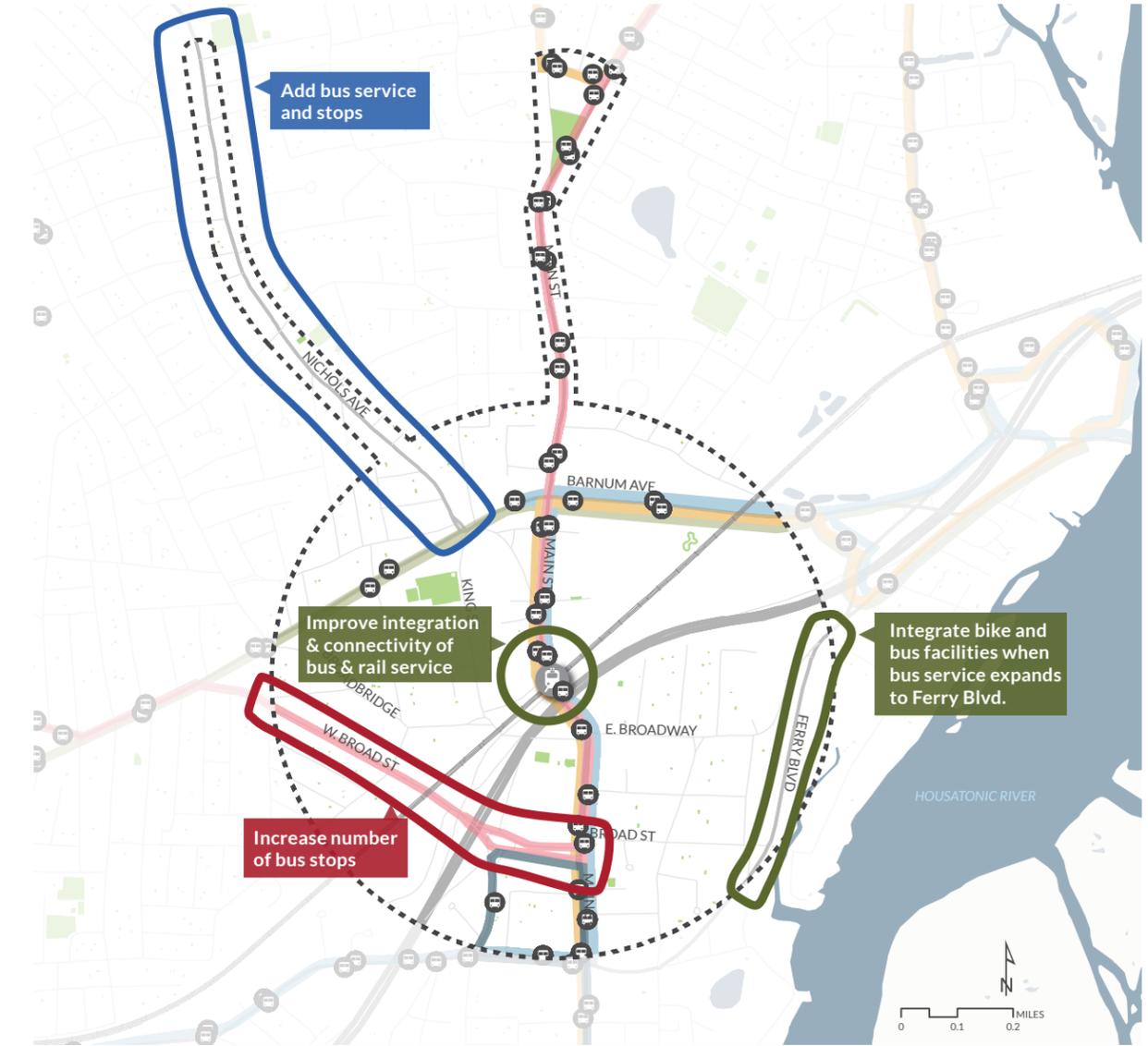
Improved access for bicyclists and pedestrians

Wayfinding signage provides direction to a user's final destination

Pedestrian-scale lighting improves visibility

Covered bus stop provides seating + shelter from harsh weather

- Adding bus service to Nichols Avenue between Second Hill Lane and Barnum Avenue. Residential areas along this corridor are underserved by the bus system and no future plans are in place to address this lack of service;
- Improving bus and rail service integration, including the coordination of arrival and departure schedules, frequency of operation, and improved access between bus stops and the rail station. The creation of an intermodal transit hub at the rail station that services both the bus and rail systems should be a long-term goal; and,
- Improving integration between bus and bicycle networks, including the provision of bicycle parking at major transit stops and increasing the amount of bike racks provided on buses (currently, every GBT bus can accommodate a maximum of two bikes).



MAP 4.12
BUS NETWORK IMPROVEMENT OPPORTUNITIES



Integration of bus and rail service will improve safety (e.g., reduce the need for pedestrians to cross busy streets) and ensure Stratford's residents and visitors have access to transportation options.



Pedestrians and bicyclists have limited access to the rail station. All entrances should include facilities for multiple modes of transportation, not just motor vehicles.

Rail

The current layout and design of the rail station prioritizes cars over other modes of transportation. The rail station's parking lot, topography, and setback disconnect rail services from the street, where bicyclist and pedestrian circulation is concentrated. Improving the integration between bicycle, pedestrian, and bus systems at the rail station is an important step in encouraging alternate modes of transport and alleviating demand for parking. Opportunities for improving the integration between modes includes:

- Connecting pedestrian and bicycle networks directly to the rail station through multi-use paths;
- Increasing the number of access points for pedestrians and bicyclists;
- Increasing the amount of bicycle parking;
- Diversifying the types of bicycle parking available (e.g., long-term and short-term facilities); and,
- Improving connectivity between bus stops and the rail station, particularly bus stops on the west side of Main Street, as crossing Main Street during rush hour can be difficult and dangerous.

4.3 CREATING SAFE, ACCESSIBLE INTERSECTION CROSSINGS

Several intersections within the study area pose challenges for users of all modes of transportation. High volumes of motor vehicle traffic, frequent car crashes, poorly maintained crossing infrastructure, and a lack of crosswalks, pedestrian signals, and sidewalk ramps with detectable warnings are all factors contributing to unsafe and inaccessible crossing conditions. Enhancing the pedestrian and bicycle crossing infrastructure at major intersections within the study area would increase safety and accessibility and improve connectivity between local and regional destinations. The challenges and opportunities associated with five key intersections are described below.

BARNUM AVENUE + MAIN STREET

Main Street and Barnum Avenue connect the study area to the surrounding region, and both streets carry high volumes of traffic. Between January 2013 and May 2016, 47 car crashes occurred at this intersection, which represents the highest concentration of car crashes in the study area during this time period. New crosswalks, sidewalk ramps with detectable warnings, and pedestrian signals with audible cues were recently installed at this intersection. Despite these improvements, this intersection remains challenging due to high traffic volumes, wide streets (i.e., long crossing distances), and a lack of bicycle crossing infrastructure. Main Street is a critical north-south connector within Stratford, linking Paradise Green, the rail station, Stratford Center, and waterfront destinations.

Further, Main Street has the potential to serve as a major corridor for bicycle traffic, as it is part of the East Coast Greenway system. Given the wide right of ways on both Main Street and Barnum Avenue, there is an opportunity to introduce traffic calming measures and dedicated bicycle crossing infrastructure in order to slow traffic, facilitate crossing for pedestrians and bicyclists, and buffer pedestrians and bicyclists from motor vehicle traffic. Additionally, the regional connectivity of these two streets creates an opportunity to establish this intersection as a gateway into Stratford.



Detectable Warnings

provide a tactile cue warning pedestrians of a street or driveway crossing.



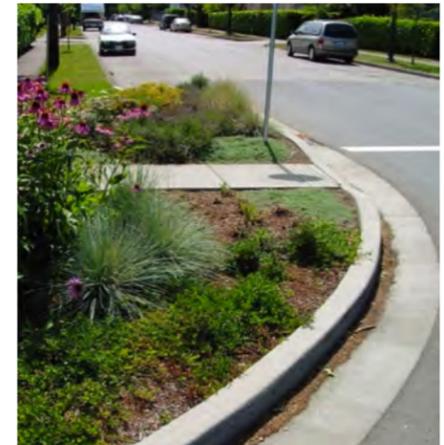
Pedestrian Signals

use a visual and audible signal to notify pedestrians when it is safe to cross a street.



Wayfinding Signage

increases the spatial awareness of bicyclists and pedestrians, helping them easily navigate to their destination.



Curb Extensions

are used to increase visibility and shorten crossing distances.

BARNUM AVENUE + NICHOLS AVENUE + KING STREET + ESSEX PLACE

The convergence of four streets makes this intersection particularly challenging. Nichols Avenue provides an important connection to residential neighborhoods and state highways to the north, King Street links residential neighborhoods to Stratford High School, Essex Place directly connects Stratford’s commercial corridor to Town Hall and the rail station, and Barnum Avenue links Stratford’s commercial corridor to surrounding areas. These streets are important components of the Town’s urban fabric, however, pedestrian and bicycle crossing infrastructure at this intersection is either severely degraded or absent. Between January 2013 and May 2016, 45 car crashes occurred at this complex of intersections, including one pedestrian collision. Increasing the safety of this intersection for all modes of transportation is a priority, and opportunities for improvement include upgrades to pedestrian and bicycle crossing infrastructure, protective features to buffer pedestrians and bicyclists from motor vehicles and calm traffic, and adjustments to traffic signal timing.

INTERSECTION CROSSING OPTIONS



Textured Intersection
more extreme alternative would be textured and tabled for traffic calming.



Pedestrian Scramble
techniques are used to stop traffic in all directions while pedestrians cross an intersection in any direction, including diagonally.



Bike Crossings
are exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of conventional bike lanes.



Curb Extensions
shorten crossing distance as well as calm traffic. Also carves out parking spaces.

PEDESTRIAN CROSSING INFRASTRUCTURE



Marked Crosswalk



Raised Intersection



Crosswalk with Beacon



Signalized Crosswalk

W. BROAD STREET + LINDEN AVENUE

Students traveling between Stratford High School and residential areas south of the study area frequently cross this busy intersection, where 11 car crashes occurred between January 2013 and May 2016. The intermittent presence of a sidewalk along Linden Avenue, the lack of crosswalks across W. Broad Street, and the proximity to I-95 on- and off-ramps make this intersection difficult for pedestrians and bicyclists to cross. In particular, westbound traffic on W. Broad can make a right-hand turn onto Linden Avenue without stopping and often do not yield to pedestrians, making it difficult and dangerous for pedestrians to cross Linden Avenue. Opportunities to improve this intersection include enhancing pedestrian and bicycle crossing infrastructure and reconfiguring the W. Broad traffic lanes to reduce conflicts with vehicles, pedestrians, and

bicyclists. Furthermore, sidewalk gaps along W. Broad Street and Linden Avenue should be closed to ensure pedestrians are not required to unnecessarily cross mid-block in order to access a sidewalk.

W. BROAD STREET + BEARDSLEY AVENUE + I-95 RAMPS

Similar to the W. Broad and Linden Avenue intersection, the W. Broad roundabout is an important crossing for high school students traveling between school and residential areas. The roundabout is characterized by relatively high traffic volumes due to the presence of on- and off-ramps for I-95, and 34 car crashes occurred around the perimeter of the roundabout between January 2013 and May 2016, with a particularly high concentration at the intersection of Beardsley Avenue and W. Broad.

The streets feeding into the roundabout bisect the sidewalk network, requiring pedestrians to cross several intersections in order to travel along the edge of the roundabout. High traffic volumes, frequent car crashes, and several street crossings – many of which lack crosswalks – create challenges for pedestrians and bicyclists trying to navigate this roundabout. The wide travel lanes on W. Broad create an opportunity to narrow lanes, which would help slow traffic, and install bicycle infrastructure within the street right of way. Upgrades to crossing infrastructure would create more comfortable, safe, and accessible conditions for pedestrians. Further, there is a significant amount of open space in the central median, which could be enhanced to create a parklet that serves as a gateway into Stratford and provides a comfortable refuge for pedestrians as they navigate the roundabout.

EXISTING CONDITIONS



Paradise Green offers several pedestrian amenities, such as benches, bike racks, waste receptacles, and pedestrian-scale lighting.

FUTURE IMPROVEMENTS



The "pedestrian-friendly" atmosphere of Paradise Green should be extended to the street during events and festivals (e.g., establishment of a festival street).

EXISTING CONDITIONS



Many intersection crossings are lacking crosswalks, pedestrian walk signals, and curb ramps with detectable warnings.

FUTURE IMPROVEMENTS



Upgrading all intersection crossings with high visibility crosswalks, curb ramps, and detectable warnings will ensure Stratford provides an accessible streetscape for all residents and visitors.

PARADISE GREEN

With wide sidewalks, a high density of retail, park access, benches, street trees, pedestrian-scale lighting, bike racks, and a covered bus stop, Paradise Green is one of the most walkable, pedestrian-friendly areas within the study area. However, intersection crossings throughout Paradise Green are challenging for pedestrians and bicyclists. Between January 2013 and May 2016, a total of 32 car crashes occurred at the intersection of Main Street with Huntington Road, Brewster Street, Paradise Green Place, and Fenelon Place/Wilcoxson Avenue. The highest concentration of car crashes occurred at Main Street and Fenelon Place/Wilcoxson Avenue (14 crashes). One collision at the intersection of Main and Brewster Street involved a bicyclist. Conflicts between motor vehicles and pedestrians and bicyclists are the most challenging issue for Paradise Green. Many opportunities exist to minimize these conflicts within the existing right of way. In particular, the Community Advisory Committee recommended reconfiguring the intersection of Main Street and Huntington Road so that Huntington intersects Main Street at a 90-degree angle. This reconfiguration would help calm traffic and reduce the risk of vehicle collisions. Other opportunities include: improving pedestrian crossing infrastructure; installing bicycle crossing infrastructure; narrowing traffic lane widths on Main Street; reducing the number of travel lanes on Main Street from four to three, with the center lane dedicated to turning movements; and, transforming Paradise Green Place into a festival street, with traffic calming measures and the option to close the street to motor vehicle traffic.

**INTERSECTION IMPROVEMENTS
PARADISE GREEN**

-  Intersection improvement
-  Park access improvement

Proposed reconfiguration of Huntington Road:



4.4 IMPROVING STORMWATER MANAGEMENT

Flooding caused by storm events, prolonged periods of precipitation, and sea level rise is not only a nuisance, but also places people, vehicles, and infrastructure at risk. Several locations within the study area are prone to flooding:

- Main Street and Broadbridge Avenue intersection, adjacent to the rail station
- Ferry Boulevard
- Areas adjacent to the I-95 and Metro-North Rail corridors
- Areas between King Street and California Street
- Areas between Access Road and South Avenue

Conventional approaches to stormwater management focus on rapidly removing water from the urban environment. A network of drains, culverts, and underground pipes facilitates the capture, conveyance, and discharge of stormwater away from populated areas and into natural water bodies. Despite its efficiency, this approach can negatively impact receiving water bodies (e.g., Long Island Sound). Stormwater carrying urban pollutants and discharged at a high rate into receiving water bodies can destabilize shorelines, increase erosion and sedimentation, and degrade water quality. Furthermore, these systems can fail if the capacity is exceeded or an obstruction blocks water flow, potentially causing even more severe flooding.



Infrastructure to improve stormwater in Portland, OR.

Green infrastructure offers an environmentally-friendly approach to managing stormwater and is a viable supplement to conventional stormwater management. Green infrastructure intercepts and treats stormwater runoff at its source and includes a suite of different applications, such as bioswales, rain gardens, permeable pavement, and green roofs and walls. In addition to flood storage capacity and water quality benefits, green infrastructure can also help achieve aesthetic, educational, and biodiversity goals, especially when native plants are used (see palette of recommended native plants on page 4-29).

Green infrastructure installations within the study area have the potential to sustainably manage stormwater, improve streetscape aesthetics, serve as Town gateways, provide educational opportunities, and calm traffic. Five immediate opportunities for incorporating green infrastructure into the study area were identified and are described in the following



sections.

In order to have a long-term, positive impact on stormwater quality and quantity, however, green infrastructure should be planned for at the watershed-scale and implemented as a network of integrated installations.

Green infrastructure is encouraged within the Transit-Oriented Development Overlay District. To further encourage the implementation and maintenance of green infrastructure, the Town could pursue several other strategies. The Town could establish a stormwater utility district to fund construction, operations, and maintenance of stormwater facilities, including green infrastructure. The Town could also integrate green infrastructure into its site plan review process. For example, new construction or redevelopment would be required to evaluate the feasibility of green infrastructure as an alternative for stormwater management.

NATIVE PLANT PALETTE FOR GREEN INFRASTRUCTURE



Witch Hazel



Highbush Blueberry



Flowering Dogwood



Hawthorn



Eastern Red Cedar



Switchgrass



Elderberry



Viburnum



Red Twig Dogwood



Spirea



Butterfly Milkweed



Sweet Pepperbush



New England Aster



Rush



Blue Flag Iris

STRATFORD CENTER

The areas adjacent to the Broadbridge Avenue and Main Street intersection are located at low elevations and frequently flood. In order to alleviate flooding at and around this intersection, green infrastructure could be installed to intercept stormwater north and south of the rail station along Main Street. For example, bioswales could be incorporated into Stratford's streetscape along Main Street between E. Broadway and the I-95 overpass in order to reduce the volume of stormwater runoff and create a gateway into Town. Additionally, bioswales planted with low growing natives incorporated into curb extensions would serve the dual purpose of traffic calming and stormwater management. North of the rail station, the creation of a center median would provide an opportunity to plant extensive rain gardens on Main Street between Broadbridge and Barnum Avenues. These rain gardens present an opportunity to transform Main Street into a green boulevard, strengthening and beautifying the connection between the rail station and the regional corridor of Barnum Avenue.

EXISTING CONDITIONS



Medians along Main Street are typically landscaped with grass and trees.

FUTURE IMPROVEMENTS



Grass medians could be transformed into rain gardens or bioswales that infiltrate and filter stormwater.

EXISTING CONDITIONS



Stratford Center lacks a gateway.

FUTURE IMPROVEMENTS



A combination of rain gardens and plaza space could define downtown and demonstrate Stratford's commitment to smart growth and sustainability.

GREEN INFRASTRUCTURE STRATFORD CENTER



Bioswale



FERRY BOULEVARD

Flooding is a significant challenge along Ferry Boulevard. Within the study area, almost the entire length of Ferry Boulevard, which parallels Ferry Creek, is in the 100-year floodplain. Fortunately, the right of way along Ferry Boulevard is very wide - ranging from 80 to 115 feet - and provides substantial space to integrate large-scale green infrastructure practices into the streetscape. Green infrastructure opportunities include:

- The installation of bioswales designed to receive, infiltrate, and filter stormwater runoff from the street, while also serving as a buffer between motor vehicle and pedestrian/bicycle traffic;
- The creation of rain gardens, where space is available, that increase flood storage capacity, increase biodiversity, and beautify the public realm; and,
- The establishment of a permeable pavement pilot program for bike lanes and sidewalks, which could be expanded to the vast parking lots along Ferry Boulevard in the future.

EXISTING CONDITIONS



Existing streetscapes are not designed to manage stormwater runoff in Stratford.

EXISTING CONDITIONS



Currently, there is a need for bike lanes and sidewalk improvements in Stratford.

FUTURE IMPROVEMENTS



Green infrastructure can be used to enhance water quality and improve the streetscape.

FUTURE IMPROVEMENTS



Permeable paving sidewalks can be used to address accessibility, stormwater management, and aesthetics.

GREEN INFRASTRUCTURE FERRY BOULEVARD



Streambank restoration



Opportunity for a flood resilient landscape



Permeable paving



PARADISE GREEN

While flooding in Paradise Green is not an immediate hazard, the characteristics of this area create an opportunity to pursue green infrastructure, which would reduce flooding downstream. Paradise Green has a wide public right of way, which provides sufficient space for installing green infrastructure. Paradise Green is also a major destination and developing green infrastructure in this area will increase public awareness, understanding, and acceptance of green infrastructure practices. Furthermore, Paradise Green contains one of the largest parks within the study area, which could be enhanced with interconnected rain gardens and/or artwork that celebrate rain water.

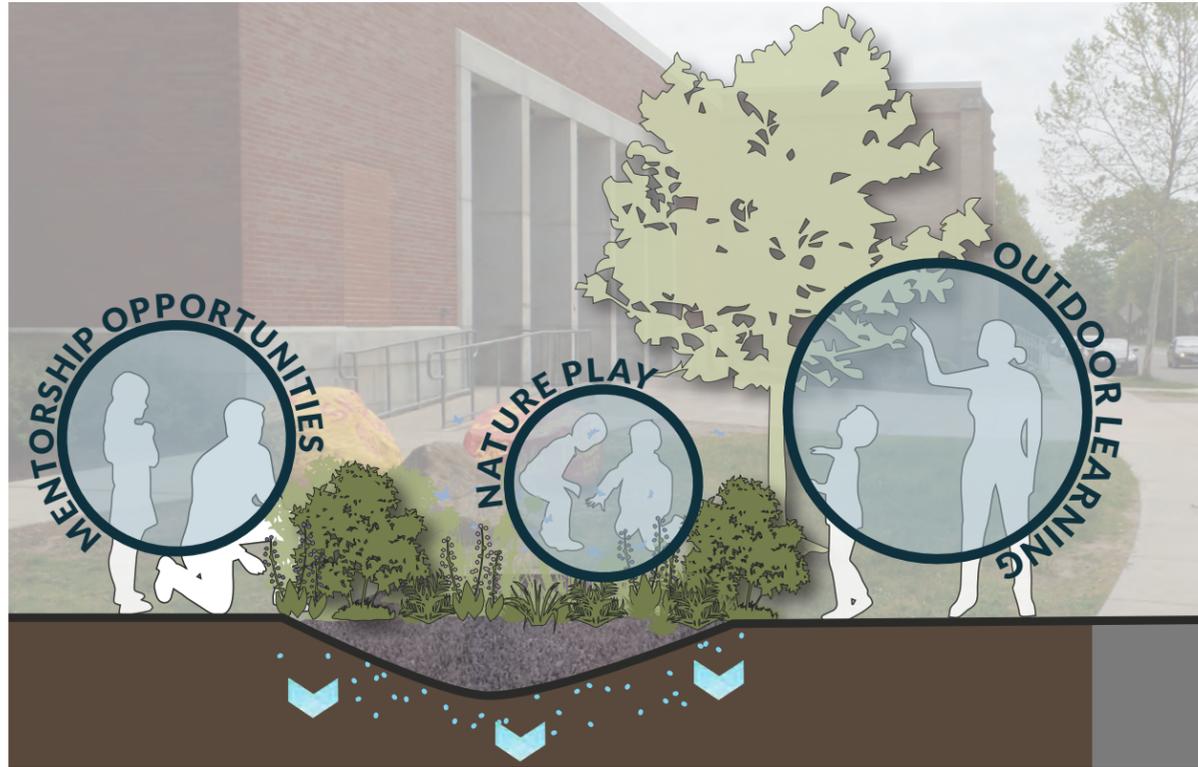
STRATFORD HIGH SCHOOL + NICHOLS SCHOOL

The installation of green infrastructure at public schools would create several educational opportunities, in addition to the water quality and flood storage capacity benefits these practices provide. Rain gardens, green roofs, bioswales, and other vegetated stormwater systems create interactive outdoor laboratories, where students can explore plant-animal relationships, study plant life cycles, learn about the water cycle, test water quality, and importantly, become familiar with these alternative forms of stormwater management.

BARNUM AVENUE + MAIN STREET

The intersection of these two regional connectors is one of the busiest in Town and is a gateway into Stratford from regional destinations. While this area is not prone to flooding, the installation of green infrastructure at this major intersection serves multiple purposes, including:

- Demonstrating Stratford's commitment to sustainable design and development;
- Reducing peak flow water volumes during storm events by slowing, retaining, and infiltrating stormwater, which would help alleviate stress on downstream stormwater drainage infrastructure; and,
- Traffic calming, where there is sufficient space within the public right of way to install curb extensions or reduce traffic lane widths in order to accommodate green infrastructure .



RAIN GARDENS AS LEARNING OPPORTUNITIES

GREEN INFRASTRUCTURE BARNUM AVENUE + MAIN STREET

- Bioswale
- Road diet



4.5 PLACEMAKING

Placemaking is an important consideration in the design and implementation of complete streets projects. Opportunities to enhance the public realm and transform a space into a vibrant, sociable place that reflects the local culture and environment should be identified early in the planning process and developed over time with extensive public input. Opportunities for placemaking in the study area, which will be further developed in the Design Recommendations section of this report (Chapter 5), include:

- Softening barriers, specifically I-95 and railroad bridge underpasses that divide the town with lighting, art, and/or water features;
- Incorporating public art into the streetscape;
- Engaging cultural arts and historical community groups to assist with the programming of spaces;
- Creating flexible streets that can serve multiple community needs, such as the conversion of Paradise Green Place into a festival street that can be periodically closed to cars and used for local celebrations, markets, or fairs; and,
- Designing small, informal spaces that are woven throughout the study area and invite residents to pause, relax, and socialize.

PLACEMAKING ELEMENTS



Decorative lighting illuminates streetscape



Public artwork



Group seating



Gathering spaces

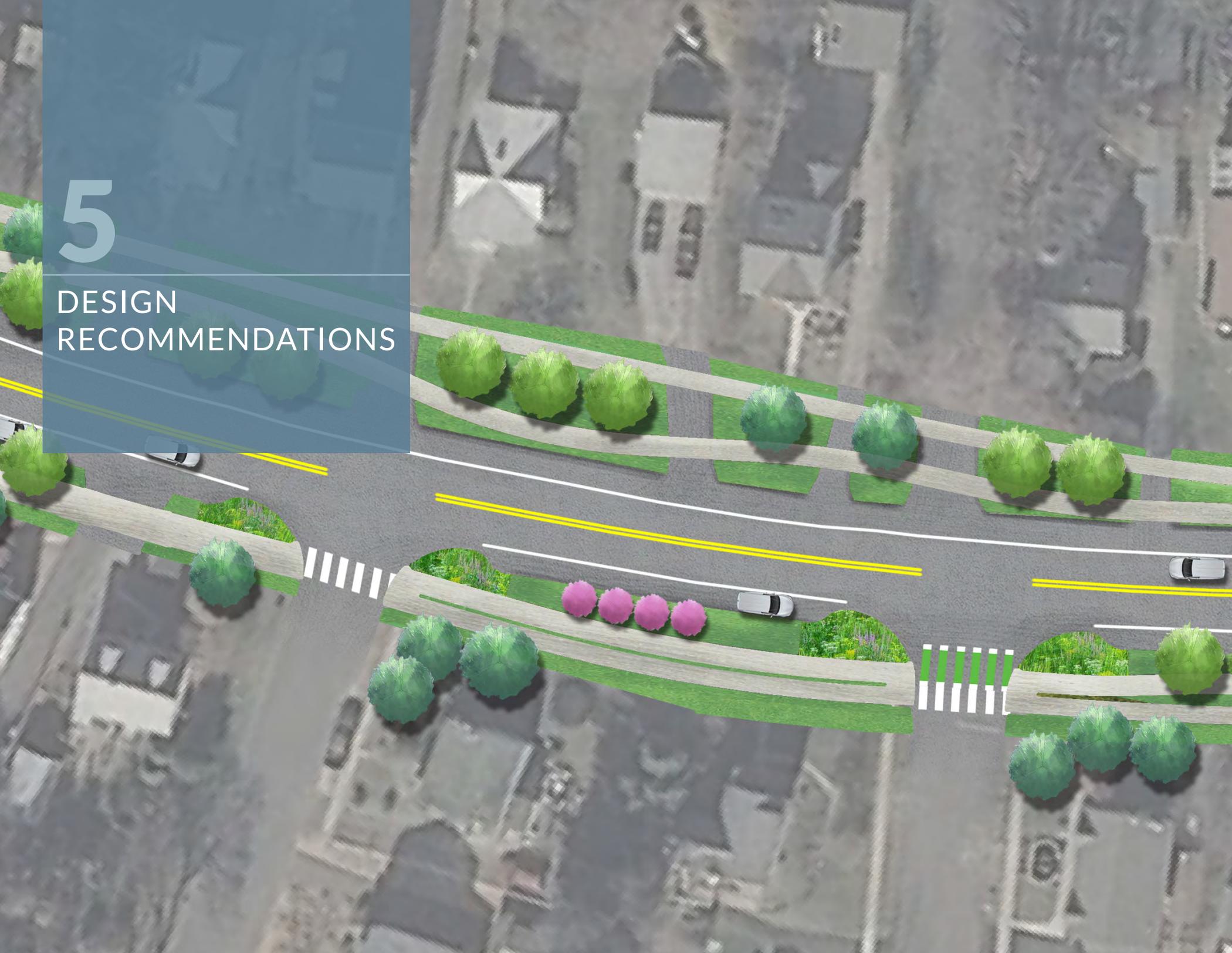
PLACEMAKING OPPORTUNITIES

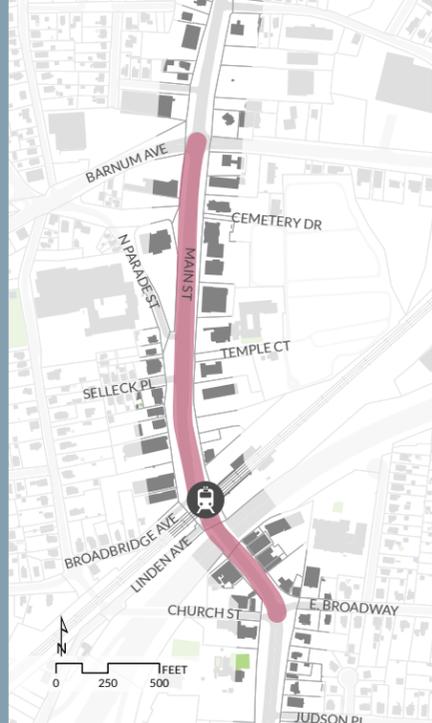
Landscape improvements, bike lanes, and a mural that speaks to the Town of Stratford's character (right) improve existing conditions (below) by creating a sense of place.



5

DESIGN RECOMMENDATIONS





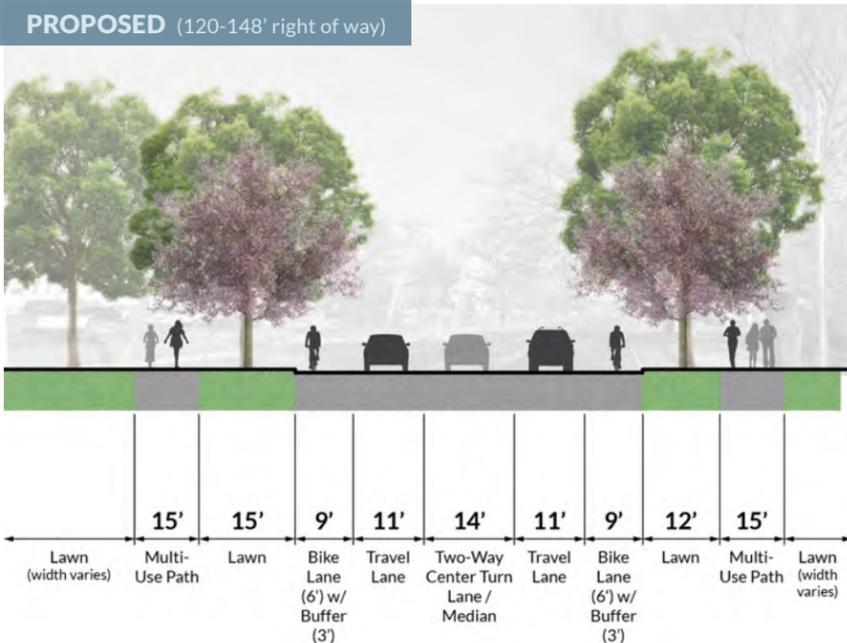
MAIN STREET

NORTH OF E. BROADWAY TO BARNUM AVENUE

EXISTING (120-148' right of way)



PROPOSED (120-148' right of way)



RECOMMENDATIONS

- Implement a road diet to narrow Main Street from 4 lanes to 3 lanes: one lane for each direction of travel and a two-way left turn lane, which is replaced by a landscaped medians when turning movements are unnecessary.
- Add northbound and southbound buffered bike lanes.
- Increase the size of the landscape buffer separating pedestrians from the street.
- Expand sidewalks on the east and west sides of the street into 10-foot wide multi-use paths.
- Integrate ADA-compliant crossing infrastructure at all intersections.
- Install a rectangular rapid flash beacon (RRFB) at the mid-block crossing in Stratford Center;
- Add bicycle crossing markings to all intersections.
- Provide back-in angled parking in Stratford Center;
- Enliven the I-95 and MetroNorth underpasses with public art and lighting installations
- Convert the corner of E. Broadway and Main Street into a pocket park, creating a gateway into Stratford Center;
- Install curb extensions to calm traffic and provide space for green infrastructure; and,
- Conduct traffic analysis to analyze effects of moving the flag pole into the center median in Stratford Center.



TOTAL COST = CONSTRUCTION COST + DESIGN FEE

X \$778 (construction cost per linear foot of complete street)*
2,500 (linear feet of complete street)

\$2.0 M CONSTRUCTION COST

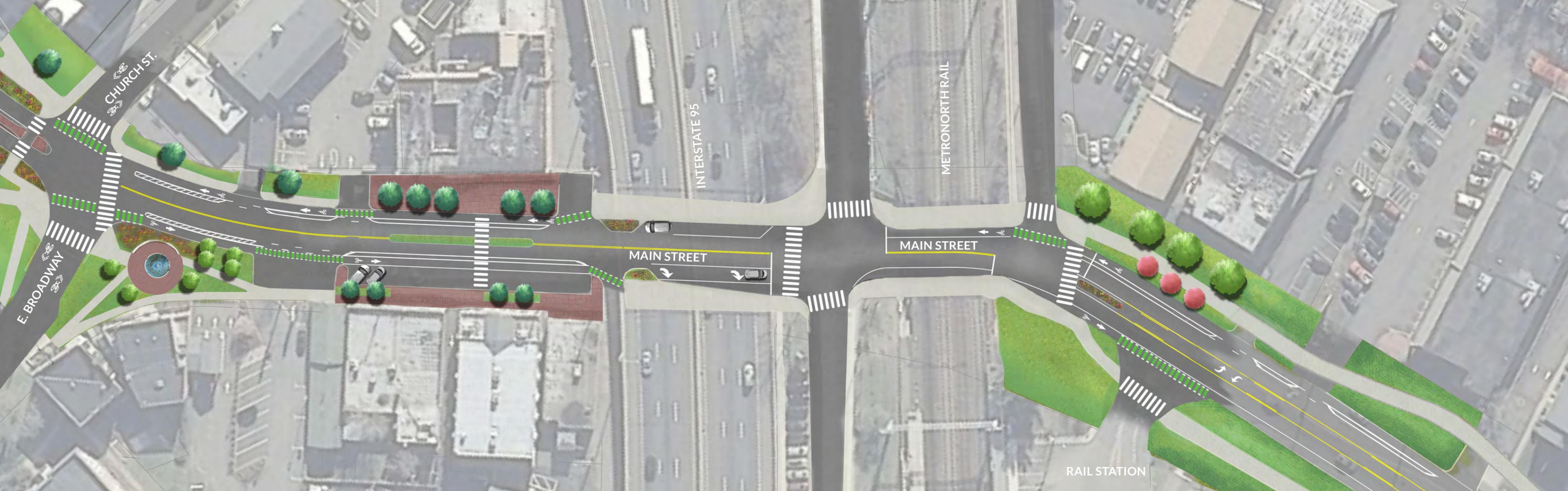
construction cost break-down

- 6% for demolition and removals
- 4% for mobilization & traffic protection
- 36% construction of paved facilities
- 19% landscaping and site furnishings
- 16% incidentals
- 19% contingencies

X \$2.0 M (construction cost)
0.1 (multiplier for design fee)

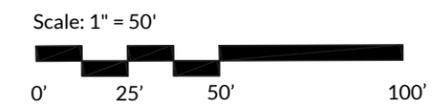
\$200,000 DESIGN FEE

*for a detailed break-down of construction costs, see Appendix B



MAIN STREET (central)

-  Tree (proposed)
-  Tree (existing)
-  Flowering tree (proposed)
-  Green infrastructure
-  Crosswalk
-  Bicycle crossing markings





MAIN STREET (central)

-  Tree (proposed)
-  Flowering tree (proposed)
-  Tree (existing)
-  Green infrastructure
-  Crosswalk
-  Bicycle crossing markings





MAIN STREET

NORTH OF BARNUM AVENUE TO FENELON PLACE

RECOMMENDATIONS

- Implement a road diet to narrow Main Street from 4 lanes to 3 lanes: one lane for each direction of travel and a two-way left turn lane, which is replaced by a landscaped medians when turning movements are unnecessary;
- Add northbound and southbound buffered bike lanes;
- Increase the size of the landscape buffer separating pedestrians from the street;
- Expand sidewalks on the east and west sides of the street into 10-foot wide multi-use paths;
- Integrate ADA-compliant crossing infrastructure at all intersections;
- Add bicycle crossing markings to all intersections;
- Normalize the parking in Paradise Green: include one row of back-in diagonal parking along the east side of the street and parallel parking along the west side (48 total parking spaces);
- Incorporate public art, rain gardens, and site furnishings into the Paradise Green retail area;
- Convert Paradise Place into a festival street, which can be temporarily closed to automobiles during events or festivals; and,
- Conduct feasibility study to assess impacts of reconfiguring Huntington Road so it intersects Main Street at a right angle. This reconfiguration would significantly reduce crossing distances for pedestrians and bicyclists.



TOTAL COST = CONSTRUCTION COST + DESIGN FEE

X \$778 (construction cost per linear foot of complete street)*
 4,100 (linear feet of complete street)

\$3.2 M CONSTRUCTION COST

- construction cost break-down
- 7% for demolition and removals
 - 5% for mobilization & traffic protection
 - 38% construction of paved facilities
 - 15% landscaping and site furnishings
 - 16% incidentals
 - 19% contingencies

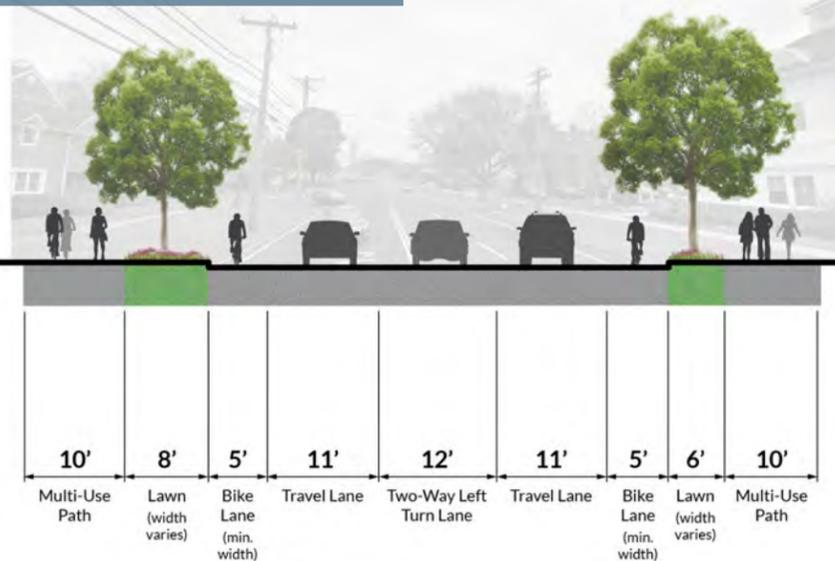
X \$3.2 M (construction cost)
 0.1 (multiplier for design fee)

\$320,000 DESIGN FEE

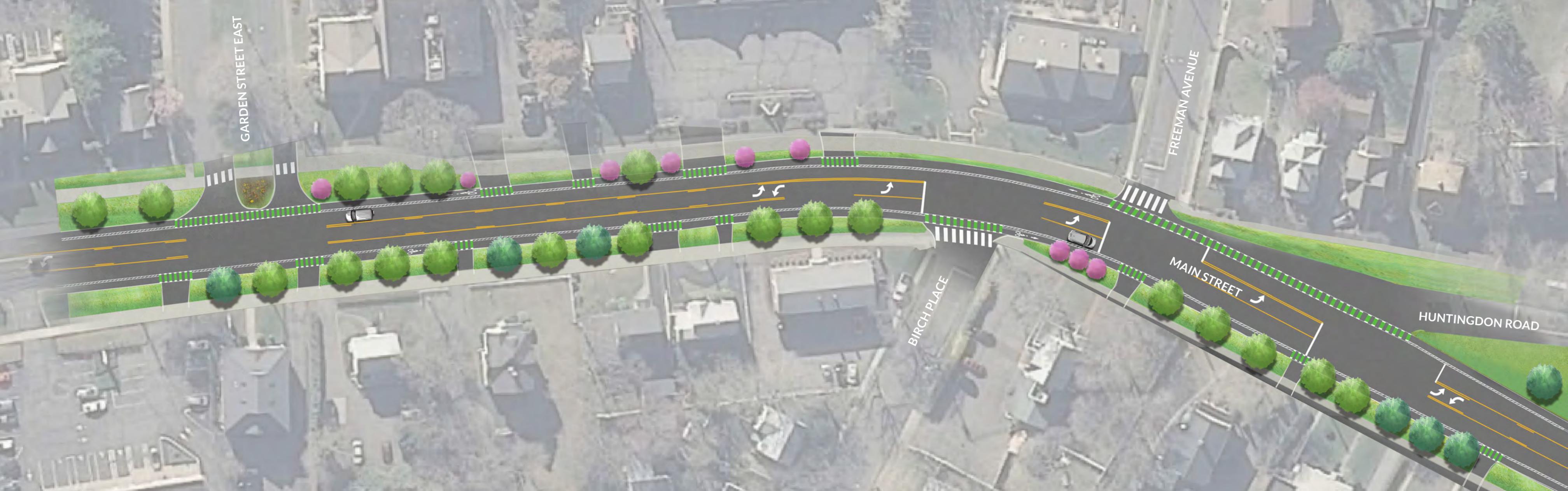
EXISTING (110-115' right of way)



PROPOSED (110-115' right of way)



*for a detailed break-down of construction costs, see Appendix B



MAIN STREET (north)



Tree (proposed)



Flowering tree (proposed)



Tree (existing)



Green infrastructure

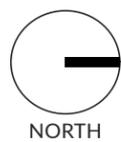


Crosswalk



Bicycle crossing markings

Scale: 1" = 50'



NORTH



MAIN STREET (north)



Tree (proposed)



Flowering tree (proposed)



Tree (existing)



Green infrastructure



Crosswalk



Bicycle crossing markings

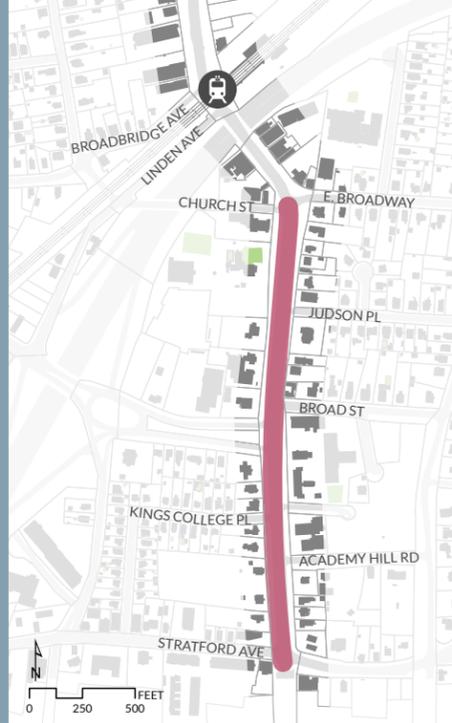


Sculptures/Art

Scale: 1" = 50'



NORTH



MAIN STREET

SOUTH OF E. BROADWAY TO STRATFORD AVENUE

RECOMMENDATIONS

- Narrow existing travel lanes and retain existing parallel parking and center median;
- Add northbound and southbound buffered bike lanes along entire corridor;
- Expand sidewalk space to accommodate outdoor patios and active recreation. Sidewalks should be a minimum of 6-feet wide and could be expanded up to 15- feet wide;
- Integrate ADA-compliant crossing infrastructure at all intersections; and
- Add bike crossing markings to all intersections and adjacent to driveway entrances.



TOTAL COST = CONSTRUCTION COST + DESIGN FEE

X \$778 (construction cost per linear foot of complete street)*
 2,300 (linear feet of complete street)

\$1.8 M CONSTRUCTION COST

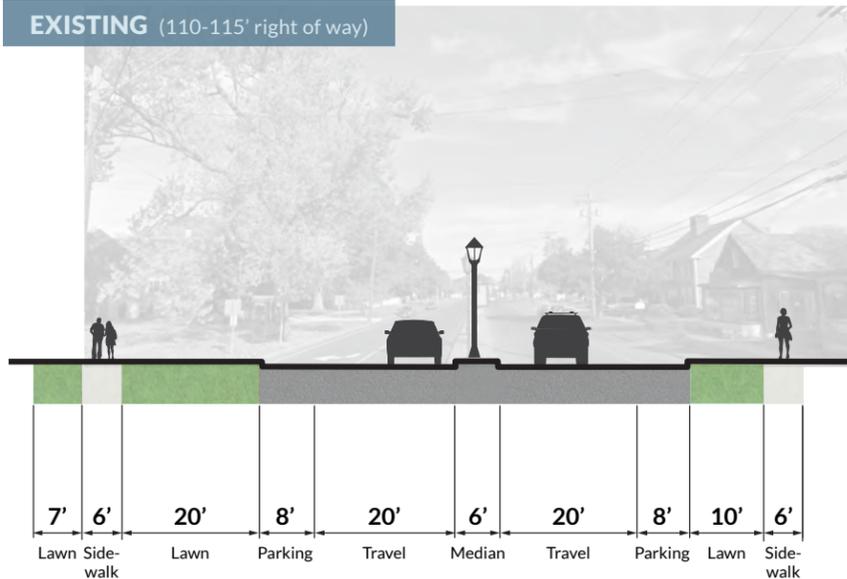
- construction cost break-down
- 6% for demolition and removals
 - 4% for mobilization & traffic protection
 - 36% construction of paved facilities
 - 19% landscaping and site furnishings
 - 16% incidentals
 - 19% contingencies

X \$1.8 M (construction cost)
 0.1 (multiplier for design fee)

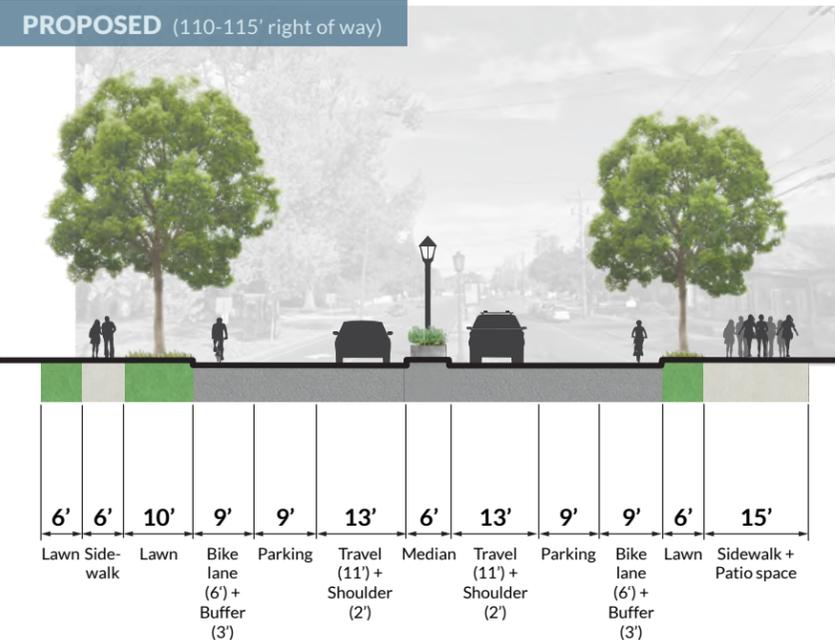
\$180,000 DESIGN FEE

*for a detailed break-down of construction costs, see Appendix B

EXISTING (110-115' right of way)



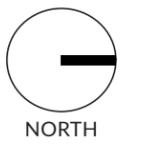
PROPOSED (110-115' right of way)





MAIN STREET (south)

-  Tree (proposed)
-  Tree (existing)
-  Flowering tree (proposed)
-  Green infrastructure
-  Crosswalk
-  Bicycle crossing markings





FERRY BLVD.

FROM MAIN STREET EAST TO THE EXIT 33 OFF-RAMP

RECOMMENDATIONS

- Reduce the width of travel lanes.
- Remove on-street parallel parking.
- Add sidewalks to both sides of the street.
- Install a landscaped buffer between pedestrians and on-street traffic.
- Add a two-way separated bike lane on the street, and install a vegetated median to separate bicycle and motor vehicle traffic.
- Provide pedestrian-scale lighting along the median that separates bicycle and motor vehicle traffic.
- Integrate ADA-compliant crossing infrastructure at all intersections.
- Add bike crossing markings to all intersections.
- On the west side of Ferry Boulevard, between E. Broadway and Broad Street, convert the underutilized public right of way into a flood-resilient park, with native plantings, plazas with permeable pavers, and meandering pathways.



cost break-down

TOTAL COST = CONSTRUCTION COST + DESIGN FEE

X \$955 (construction cost per linear foot of complete street)*
 4,650 (linear feet of complete street)

\$4.4 M CONSTRUCTION COST

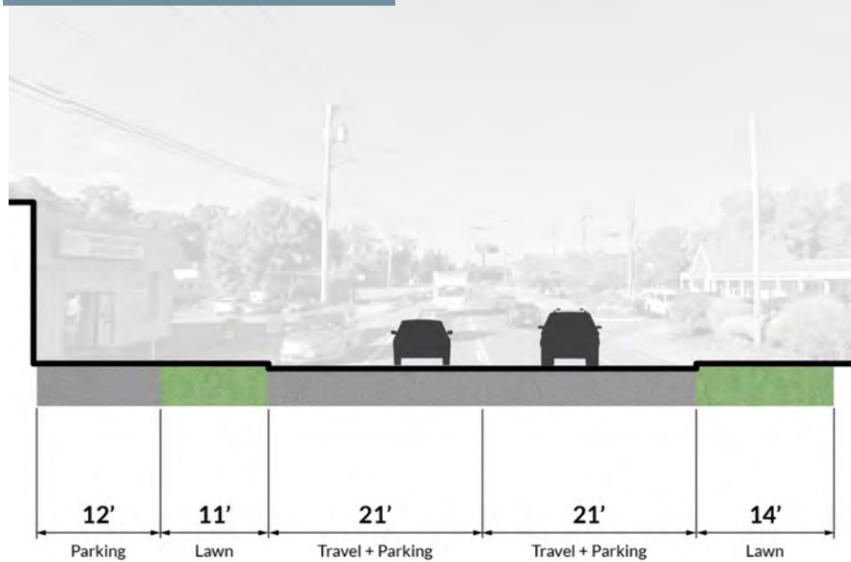
construction cost break-down

- 9% for demolition and removals
- 4% for mobilization & traffic protection
- 33% construction of paved facilities
- 19% landscaping and site furnishings
- 16% incidentals
- 19% contingencies

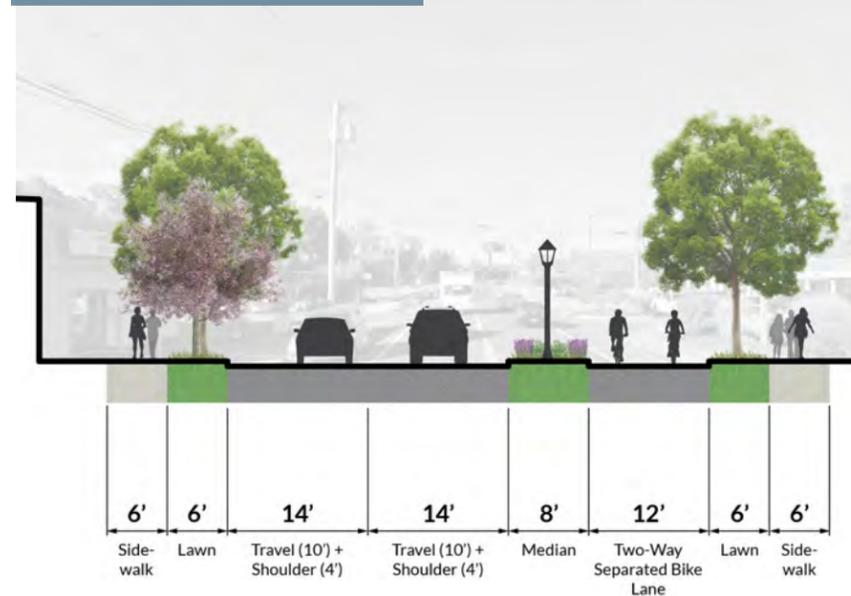
X \$4.4 M (construction cost)
 0.1 (multiplier for design fee)

\$440,000 DESIGN FEE

EXISTING (80-115' right of way)



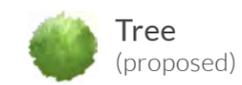
PROPOSED (80-115' right of way)



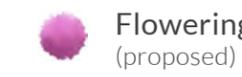
*for a detailed break-down of construction costs, see Appendix B



FERRY BOULEVARD



Tree
(proposed)



Flowering tree
(proposed)



Tree
(existing)



Green
infrastructure

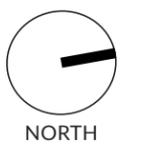


Crosswalk

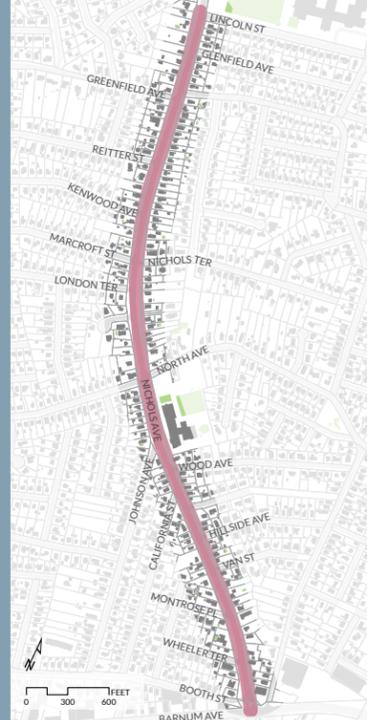


Bicycle crossing
markings

Scale: 1" = 50'



NORTH



NICHOLS AVE.

FROM BARNUM AVENUE NORTH TO LINCOLN STREET

RECOMMENDATIONS

- Maintain the existing street configuration: 12-foot wide travel lanes and 8-foot wide parallel parking on each side of the street.
- Where space allows, add separated bicycle and pedestrian facilities.
- Where space is constrained, merge bicycle and pedestrian facilities into a 10-foot wide multi-use path.
- Integrate ADA-compliant crossing infrastructure at all intersections.
- Add pedestrian crossing signals at intersections adjacent to schools (Lincoln Street, North Avenue, and Johnson Avenue) and at the Barnum Avenue intersection.
- Add bike crossing markings to all intersections and adjacent to driveway entrances.
- Install curb extensions at intersections to calm traffic and provide space for green infrastructure.



TOTAL COST = CONSTRUCTION COST + DESIGN FEE

X \$855 (construction cost per linear foot of complete street)*
 5,280 (linear feet of complete street)

\$4.5 M CONSTRUCTION COST

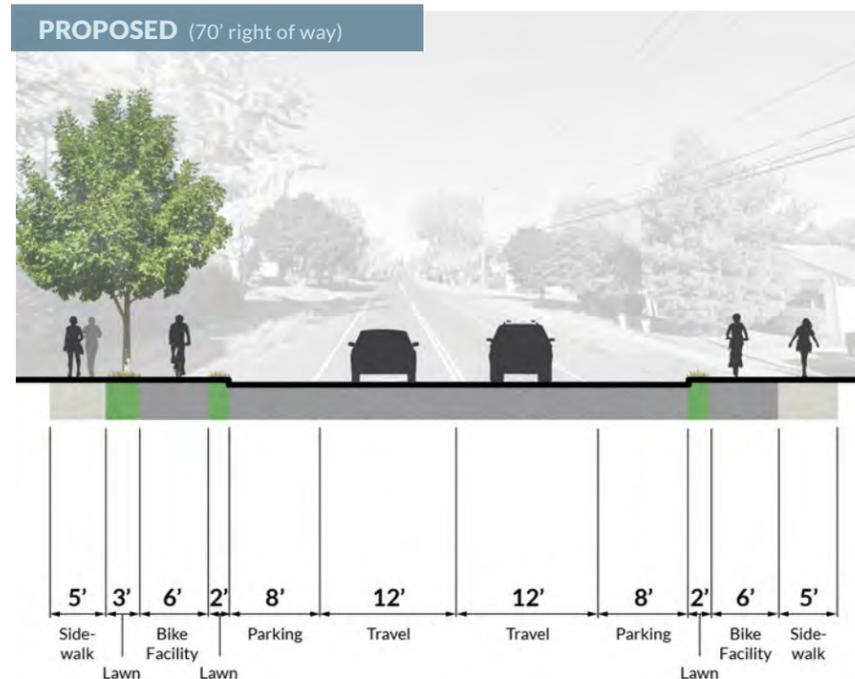
construction cost break-down

- 3% for demolition and removals
- 4% for mobilization & traffic protection
- 35% construction of paved facilities
- 21% landscaping and site furnishings
- 19% incidentals
- 19% contingencies

X \$4.5 M (construction cost)
 0.1 (multiplier for design fee)

\$450,000 DESIGN FEE

*for a detailed break-down of construction costs, see Appendix B





NICHOLS AVENUE



Tree (proposed)



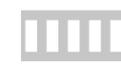
Flowering tree (proposed)



Tree (existing)



Green infrastructure



Crosswalk

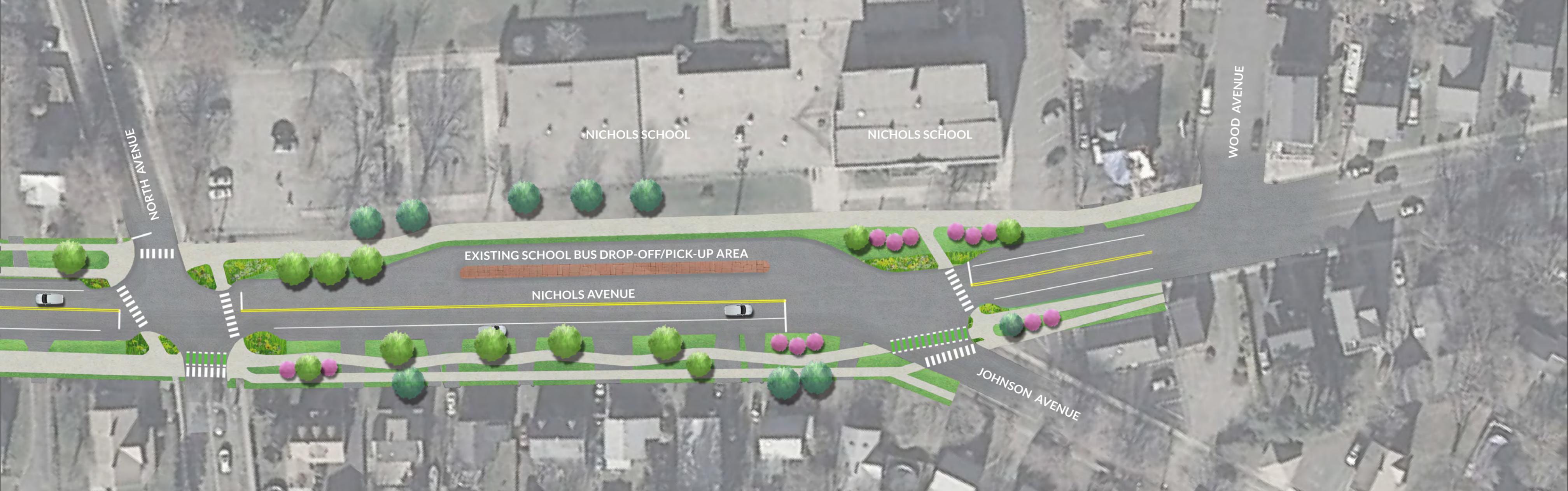


Bicycle crossing markings

Scale: 1" = 50'



NORTH



NICHOLS AVENUE

-  Tree (proposed)
-  Tree (existing)
-  Flowering tree (proposed)
-  Green infrastructure
-  Crosswalk
-  Bicycle crossing markings





BROAD STREET

FROM FERRY BOULEVARD WEST TO LINDEN AVENUE

RECOMMENDATIONS: BROAD STREET

- Maintain width of existing travel lanes;
- Install a 10-foot wide multiuse path along the south side of Broad Street;
- Add a sidewalk to the north side of Broad Street, bound on either side by lawn; and,
- Integrate ADA-compliant crossing infrastructure at all intersections.

RECOMMENDATIONS: W. BROAD STREET

- Narrow travel lane widths to provide space for east- and west-bound bike lanes (6-foot wide);
- Retain existing sidewalks;
- Expand sidewalks under the I-95 bridge into 10-foot wide multi-use paths;
- Integrate ADA-compliant crossing infrastructure at all intersections; and,
- Add bike crossing markings to all intersections and adjacent to driveway entrances.



cost break-down

TOTAL COST = CONSTRUCTION COST + DESIGN FEE

X \$290 (construction cost per linear foot of complete street)*
4,075 (linear feet of complete street)

\$1.2 M CONSTRUCTION COST

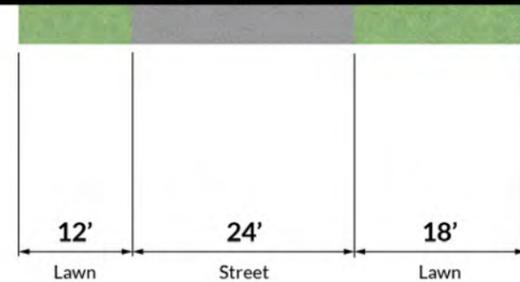


X \$1.2 M (construction cost)
0.1 (multiplier for design fee)

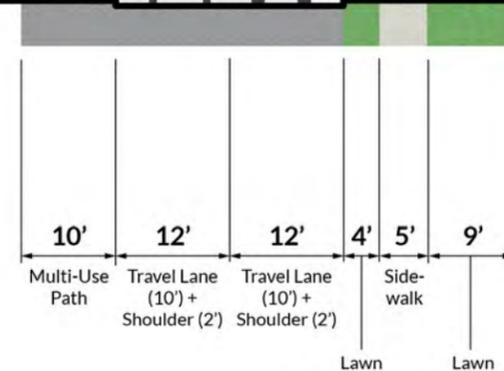
\$120,000 DESIGN FEE

*for a detailed break-down of construction costs, see Appendix B

EXISTING (54' right of way)



PROPOSED (54' right of way)





BROAD STREET

 Tree (proposed)

 Flowering tree (proposed)

 Tree (existing)

 Green infrastructure

 Crosswalk

 Bicycle crossing markings

Scale: 1" = 50'

0' 25' 50' 100'





W. BROAD STREET

-  Tree (proposed)
-  Tree (existing)

 Crosswalk

 Bicycle crossing markings



6

ACTION PLAN



Implementing complete streets in Stratford will require a long-term strategy and an incremental approach. The Town's complete street strategy should be guided by policy and integrated with current and future Town initiatives, such as greenway planning, coastal resiliency, and brown-field redevelopment.

To assist the Town with the development of a long-term complete streets strategy and project phasing, this chapter outlines a Complete Streets Action Plan. The Action Plan includes the development and adoption of a Complete Streets Policy, prioritization of complete street projects, establishment of a complete streets advisory board, permitting considerations, and funding opportunities.

6.1 ADOPT A COMPLETE STREETS POLICY

The Town of Stratford should prioritize the development and implementation of a complete streets policy. While the policy can be drafted and adopted after complete street projects are initiated, the Town is encouraged to develop and implement the policy as soon as possible to ensure future development adheres to complete street principles. A complete street policy will enable the Town to:

- Advance an integrated, town wide transportation network that supports safe travel for users of all modes, ages, and abilities;
- Ensure complete streets are prioritized for all projects and all phases, including design, planning, construction, maintenance, and operations of new and existing streets and facilities;
- Enhance the Town's Transit-Oriented Development District;
- Improve connectivity to existing and future greenway systems;
- Establish measurable goals; and,
- Prioritize transportation spending.

Several resources exist to aid the Town in developing a context-sensitive and comprehensive complete streets policy. National and local models for complete street policy development are described herein.

NATIONAL POLICY MODEL

Smart Growth America, a non-profit advocating for and supporting smart growth nationwide, has developed an evaluation tool for assessing complete street policies. The assessment considers ten objective categories. These categories are described below and should provide the framework for developing Stratford's Complete Streets Policy:

- Vision. The policy establishes a motivating vision for why the community wants Complete Streets: to improve safety, promote better health, make overall travel more efficient, improve the convenience of choices, or for other [locally-specific] reasons.
- All users and modes. The policy specifies that "all modes" includes walking, bicycling, riding public transportation, driving trucks, buses and automobiles, and "all users" includes people of all ages and abilities.
- All projects and phases. All types of transportation projects are subject to the policy, including design, planning, construction, maintenance, and operations of new and existing streets and facilities.
- Clear, accountable exceptions. Any exceptions to the policy are specified and approved by a high-level official.
- Network. The policy recognizes the need to create a comprehensive, integrated and connected network for all modes and encourages street connectivity.

- Jurisdiction. All other agencies that govern transportation activities can clearly understand the policy's application and may be involved in the process as appropriate.
- Design. The policy recommends use of the latest and best design criteria and guidelines, while recognizing the need for design flexibility to balance user needs in context.
- Context sensitivity. The current and planned context – buildings, land use, transportation, and community needs – is considered when planning and designing transportation solutions.
- Performance measures. The policy includes performance standards with measurable outcomes, such as: miles of bicycle infrastructure installed; percent of population accessing the rail station by foot, bicycle, or other transit; and, number of collisions.
- Implementation steps. Specific next steps for implementing the policy are described.

LOCAL POLICY MODEL

West Hartford, Connecticut adopted a complete streets policy in July 2015, which was ranked as the second best complete streets policy in the nation by Smart Growth America in 2015. This policy is included in Appendix C and should serve as a model as Stratford develops its own policy.

West Hartford's Complete Streets Policy is divided into seven sections: vision, goals, guiding principles, applicability and scope, implementation, best practices – design guidance, and reporting to Town Council (includes metrics for tracking progress). The goals of the West Hartford policy include:

- To protect and preserve the environment of the Town of West Hartford by reducing the emission of greenhouse gases, and reducing the consumption of non-renewable energy resources.
- To ensure the neighborhoods of West Hartford remain vibrant and livable.
- To expand opportunities for bicyclists and pedestrians throughout the Town.
- To make the roadway and street environment safer and more inviting by reducing the frequency and severity of vehicular, bicycle and pedestrian-related accidents.
- To ensure safe pedestrian and bicycle routes for children to get to school.
- To improve and enhance the health and fitness of the city's residents by providing more safe and convenient opportunities for biking and walking in West Hartford.

- To improve the Town's quality of life and local economy by providing high quality recreational and multimodal transportation facilities and providing non-motorized means of transportation.

Stratford's Greenway Committee recently drafted a complete streets policy for Stratford based on the content and structure of West Hartford's policy. The Greenway Committee made several recommendations that deviated from West Hartford's policy and are specific to the Town of Stratford:

- The policy should address sea level rise resiliency issues by integrating transportation with remediation planning.
- The policy should be consistent and compatible with the Town's Plan of Conservation and Development, the Stratford Transit Oriented District, and the Town's Greenway Facilities Plan.
- The policy should require the formalization and adoption of a Greenway and Facility Plan, which should be reviewed and/or updated every three years.
- The policy should be implemented through a cross-collaboration between the Town of Stratford's Planning, Zoning, and Engineering Departments. Other transportation and planning agencies, including CTDOT and the Connecticut Metropolitan Council of Governments will utilize this policy as they coordinate and assist the Town with transportation projects and plans.

6.2 ESTABLISH A COMPLETE STREETS GOVERNANCE STRUCTURE

This plan, like any other, requires a champion to achieve sustained, coordinated action. A governance structure for complete streets could be accomplished by creating a new advisory board or by integrating complete street functions into an existing committee. The governance body would be responsible for championing the cause of complete streets, making budgetary recommendations, and creating, revising, and enforcing policy. Representation from relevant departments, commissions, and organizations is necessary to ensure the coordination of complete streets projects throughout Stratford. Representatives should include, but are not limited to: Planning and Zoning, Conservation, Economic Development, Emergency Medical Service, Engineering, Fire, Highway, Parks, Police, Public Works, Recreation, Senior Services, Arts Commission, Historic District Commission, Greenway Committee, and the Greater Bridgeport Transit Authority.

6.3 PROJECT PRIORITIZATION

In order to prioritize complete street projects within the study area, projects were evaluated based on: community need and impact, connectivity, synergies with existing efforts, and the benefit/cost. These criteria were selected to ensure prioritized projects achieve the goals specified in Chapter 2 of this complete streets plan. As the Town pursues complete street projects in the future, these evaluation criteria can be used to rapidly prioritize additional projects.

PROJECT PRIORITIZATION CRITERIA

1. COMMUNITY NEED AND IMPACT

This category considers existing street conditions, such as accessibility, safety concerns, and multimodal infrastructure, and assesses the ability of a given project to significantly improve existing conditions and positively impact the community.

2. CONNECTIVITY

This category considers how well a proposed project connects residents and visitors to local and regional destinations and the integration of different modes of transportation.

3. SYNERGIES WITH EXISTING EFFORTS.

This category assesses the extent to which a proposed project advances the goals of other local and regional projects related to smart growth. For example, projects that achieve goals relevant to complete streets, coastal resilience, and greenway implementation should be prioritized over projects that address only one of these Town initiatives.

4. BENEFIT/COST.

This category compares the long-term community health, safety, and welfare benefits of a project to capital investment required to construct the project. Projects that positively impact community health, safety, and welfare and require a small capital investment should be prioritized, such as adding bike lanes, high visibility crosswalks, and sidewalks ramps with warning textures to a street during routine street resurfacing. However, projects that require a large capital investment, but also have a long-term positive impact on the community should also be considered high priority.

PRIORITY 1: MAIN STREET (South of Barnum Avenue to)

Community need and impact. Barnum Avenue, the I-95 bridge, and the MetroNorth bridge create significant barriers along the Main Street corridor, isolating Paradise Green and Stratford Center from the rail station. In particular, the Barnum Avenue and Main Street intersection is challenging for pedestrians and bicyclists due to its long crossing distance and prevalence of car crashes. Complete street improvements along this section of Main Street will ensure residents and visitors feel comfortable walking and biking to access public transit, for exercise or leisure, and/or to reach major destinations.

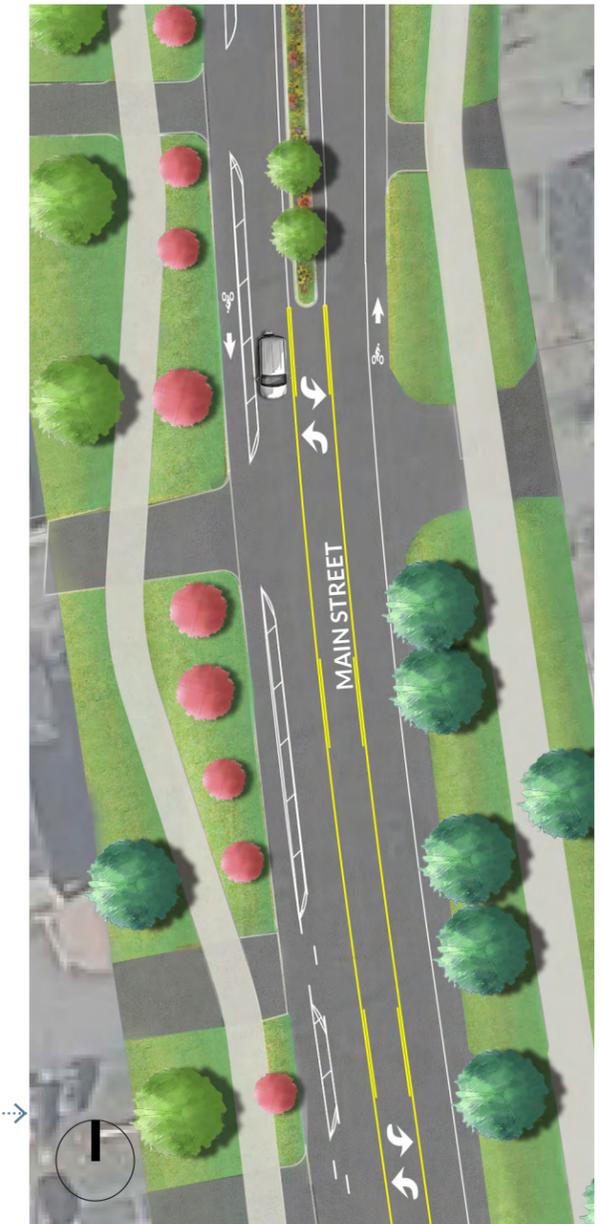
Connectivity. This project connects several important local destinations, including Town Hall, Stratford United Methodist Church, the Rail Station, and Stratford Center. This section of Main Street also connects Stratford to the surrounding region, as it is an important component of both the Housatonic Greenway (via E. Broadway) and East Coast Greenway systems. Conversion of this corridor into a complete street would also significantly improve intermodal connectivity. In addition to the rail station, there are 8 bus stops along this corridor, and improving the pedestrian and bicycle facilities will ensure residents and visitors have several options to easily travel between local and regional destinations.

Synergies with existing efforts. Complete street improvements along this section of Main Street will contribute to the implementation of and improvements to the East Coast Greenway and Housatonic Greenway systems. This section of Main Street is also part of the Transit-Oriented

Development (TOD) District. Complete street improvements along Main Street will directly reinforce the TOD District and help attract residents by providing a safe, convenient way to access transit services. Recommended green infrastructure improvements will help address flooding issues near the rail station, contributing to the goals of coastal resiliency planning.

Benefit/Cost. The estimated cost to design and implement complete streets along this section of Main Street is \$2.2 million. While this is a significant capital investment, the community benefits that will be realized over many years are equally significant and include: increased opportunities for multimodal transportation and physical activity; improved safety at intersections and along the length of the corridor; sustainable stormwater management; a gateway into Stratford that conveys the Town's commitment to sustainability and smart growth; and, an active, revitalized streetscape. Importantly, these complete street improvements will attract and retain individuals, families, and businesses interested in settling in walkable and bikeable communities.

PROPOSED IMPROVEMENTS ALONG MAIN STREET NEAR THE RAIL STATION



PRIORITY 2: MAIN STREET
(North of Barnum Avenue to Paradise Green)

Community need and impact. Several residents noted the lack of a safe, accessible north-south corridor between Paradise Green, the rail station, and Stratford Center. In addition to the busy Barnum Avenue and Main Street intersection, several intersections lack crosswalks, pedestrian signals, and sidewalk ramps with detectable warnings and bike facilities are absent. Combined, these factors discourage walking and biking along this section of Main Street. Complete street improvements will ensure residents and visitors feel comfortable walking and biking between the rail station, Paradise Green, and Stratford Center, as well as neighboring residential areas.

Connectivity. This project connects several important local destinations, including Paradise Green, Stratford Baptist Church, and residential areas. This section of Main Street also connects Stratford to the surrounding region, as it is an important component of both the Housatonic Greenway (via Fenelon Place and Longbrook Avenue) and East Coast Greenway systems. Conversion of this corridor into a complete street would also significantly improve intermodal connectivity. Thirteen bus stops are located along this corridor and improving the pedestrian and bicycle facilities will ensure residents and visitors have several options to easily travel between local and regional destinations.

Synergies with existing efforts. Complete street improvements will directly contribute to the implementation of and improvements to the East Coast Greenway and Housatonic Greenway systems. The section of Main Street between

Longbrook Avenue and Barnum Avenue is also part of the Transit-Oriented Development (TOD) District; therefore, complete street improvements along this corridor will reinforce the TOD District and help attract residents by creating a more walkable, bikeable community and providing a safe, convenient way to access transit services.

Benefit/Cost. The estimated cost to design and implement complete streets along this section of Main Street is \$3.5 million. This is a significant capital investment. However, the community benefits that will be realized over many years are significant and include: increased opportunities for multimodal transportation and physical activity; improved safety at intersections and along the length of the corridor; enhanced accessibility of Paradise Green; and, a pedestrian-friendly neighborhood that attracts and retains businesses and residents.

PROPOSED IMPROVEMENTS
ALONG MAIN STREET (NORTH)



PRIORITY 3: MAIN STREET
(South of E. Broadway St. to Stratford Ave.)

Community need and impact. Between January 2015 and January 2016, several car crashes occurred along Main Street near the W. Broad Street intersection and in Stratford Center. Furthermore, several intersection crossings are lacking crosswalks, pedestrian signals, and sidewalk ramps with detectable warnings. Complete street improvements along this section of Main Street will ensure residents and visitors feel comfortable walking and biking to access public transit, for exercise or leisure, and/or to reach major destinations, such as the Historic District.

Connectivity. This project connects several local destinations along Main Street, including Stratford Center, the First Congregational Church, the Sterling House Community Center, Stratford Public Library, the Baldwin Center, St. James Roman Catholic Church & School, Christ Episcopal Church, and the Stratford Historical Society. This section of Main Street also connects Stratford to the surrounding region, as it is an important component of both the Housatonic Greenway and East Coast Greenway systems. Several residents noted that Main Street is a popular biking route for cyclists beginning in Stratford and traveling south to cultural (e.g., Shakespeare Theater and the Stratford Point Lighthouse) and natural (e.g., Long Beach and McKinney Salt Marsh) destinations. Conversion of this corridor into a complete street would also significantly improve intermodal connectivity. There are six bus stops along this corridor, and improving the pedestrian and bicycle facilities will ensure residents and visitors have several options to easily travel between local and regional destinations.

Synergies with existing efforts. This section of Main Street is entirely within the TOD District, and complete street improvements will enhance the effectiveness of this District by improving access between the rail station and the recently constructed TOD located on Stratford Avenue, just west of Main Street. Complete street improvements along this section of Main Street will contribute to the implementation of and improvements to the East Coast Greenway and Housatonic Greenway systems. Recommended green infrastructure improvements will help address flooding issues near Stratford Center, furthering the goals of coastal resiliency planning.

Benefit/Cost. The estimated cost to design and implement complete streets along this section of Main Street is \$2.0 million. While this is a significant capital investment, the community benefits that will be realized over many years are equally significant and include: increased opportunities for multimodal transportation and physical activity; improved safety at intersections and along the length of the corridor; sustainable stormwater management; a vibrant Town Center; and, better access to and integration of Stratford's Historic District. Implementation of the recommendations for priorities one, two, and three will create a continuous, complete Main Street, from Paradise Green to Stratford Avenue. The presence of a safe, accessible, and pedestrian- and bike-friendly corridor will significantly improve Stratford's competitive ability to attract and retain businesses and residents.

PROPOSED IMPROVEMENTS
ALONG MAIN STREET (SOUTH)



PRIORITY 4: FERRY BOULEVARD
(From Main Street to the Docks Shopping area)

Community need and impact. During public meetings and workshops, several residents expressed the desire to walk and bike along Ferry Boulevard, but felt uncomfortable due to the lack of pedestrian and bicycle facilities. Further, several residents noted that Ferry Boulevard is the most direct route for accessing the Docks Shopping Center and surrounding retail from neighborhoods in Stratford’s historic district. Ferry Boulevard is entirely within the 100-year floodplain, which poses flood risks. While few car crashes occurred along the length of Ferry Boulevard between 2013 and 2016, several car crashes occurred at the intersection of Main Street and Ferry Boulevard. Complete street improvements along Ferry Boulevard will address flooding issues and ensure residents feel comfortable walking and biking to reach destinations.

Connectivity. Ferry Boulevard connects neighborhoods in the historic district to waterfront destinations and the Docks shopping area. Ferry Boulevard is also an important component of the East Coast Greenway, connecting residents and visitors to regional destinations. Currently, no bus service is available along Ferry Boulevard; therefore, intermodal connections would be limited to bicycle, walking, and car services.

Synergies with existing efforts. Ferry Boulevard coincides with the Raymark Superfund remediation efforts being undertaken by the U.S. Environmental Protection Agency. The implementation of complete streets along Ferry Boulevard complements future brownfield redevelopment and will also significantly improve the East Coast Greenway. Recommended green infrastructure

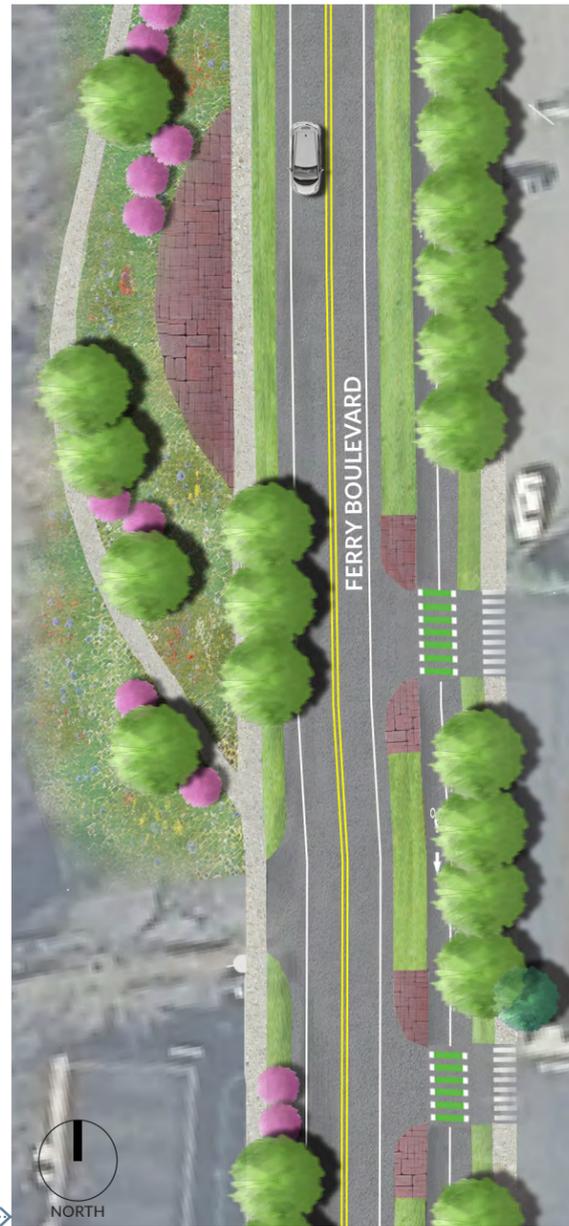
improvements will help address flooding issues along and adjacent to Ferry Boulevard, furthering the goals of coastal resiliency planning.

Benefit/Cost. The estimated cost to design and implement complete streets along this section of Main Street is \$4.9 million. The community benefits, however, are also significant and they include: increased opportunities for multimodal transportation and physical activity; improved safety at intersections and along the length of the corridor; sustainable stormwater management; expanded parks and open space; and, improved access to retail, residential, and historic/cultural destinations.

PRIORITY 5: NICHOLS AVENUE AND BROAD STREET

The implementation of complete streets along Nichols Avenue and Broad Street is an important component of establishing a safe, accessible street network and transforming Stratford into a walkable, bikeable community. However, unlike Nichols Avenue and Broad Street, Main Street and Ferry Boulevard play a critical role in establishing a backbone of complete street corridors that traverse Stratford from north to south and east to west and connect residents to local and regional destinations. Complete street improvements should be installed along Main Street and Ferry Boulevard first, allowing subsequent improvements to Nichols Avenue and Broad Street to tie into a well-connected network.

PROPOSED IMPROVEMENTS
ALONG FERRY BOULEVARD



6.4 PERMITTING AND REVIEWS

The permits and reviews required at the local, state, and federal level for complete streets projects will vary based on each project’s size, geography, potential impact to natural and cultural resources, proposed interventions, and funding source. In particular, given the prevalence of brownfields in Stratford, designers and engineers must conduct thorough due diligence prior to the start of construction, with the understanding that test borings, hazardous material removal, and/or site remediation may be necessary. If hazardous or foreign materials are discovered on a construction site, work should stop immediately and the local authorities should be contacted. The local authorities will make the determination as to whether additional testing/action is needed.

Coordination with relevant local, state, and federal agencies should occur at the beginning and continue throughout the development of every project. Early coordination and frequent communication will support efficient and successful project implementation by building consensus around the project, minimizing impacts to natural and cultural resources, and ensuring all phases of the project meets the requirements of regulatory agencies.

LOCAL PERMITS/REVIEWS

Stratford Public Works Engineering Department. All work done within the public right of way is required by Town ordinance to have a permit from the Town’s Public Works Department. Typical permits include sidewalk repair, driveway apron, sewer connection, and street opening.

Erosion and Sediment Control Plan. A soil erosion and sediment control plan must be submitted to the Zoning Commission for administrative review when a proposed project will cumulatively disturb more than one-half acre of land. The plan must include: the schedule for grading and construction activities; the design criteria, construction details, and operations and maintenance for the proposed soil erosion and sediment control measures and stormwater management facilities; a site plan showing existing structures, proposed area alterations, and the locations of soil erosion and sediment control measures and stormwater facilities; and, any other information deemed pertinent by the Zoning Administrator.

The Erosion and Sediment Control application can be accessed here: http://www.townofstratford.com/filestorage/39879/72577/erosion_&_sediment_control_revised.16.pdf

Inland Wetlands and Watercourses Permit. The Inland Wetlands and Watercourses Agency of the Town of Stratford was established in April 1988 and enforces the Inland Wetlands and Watercourses Act within the Town of Stratford. All regulated activities¹ that occur in the Town’s upland review zone must file an application with the Inland Wetlands and Watercourses Agency. The Town’s upland review zone includes regulated activities within 100-feet of all inland wetlands and watercourses, as well as activities within the following distances from the specified wetlands and watercourses (see Table 6.1).

Several sections of the streets discussed in this study will require an Inland Wetlands and Wa-

¹ Regulated activities involve the removal or deposition of material, or any obstruction, construction, alteration or pollution of wetlands or watercourses, but do not include the activities specified in Section 4 of the Town of Stratford Inland Wetlands & Watercourses Regulations. Furthermore, regulated activities include any clearing, grubbing, filling, grading, paving, excavating, constructing, depositing or removal of material and discharging of storm water on the land within specified distances of a wetland or watercourse

Fall Mill River	350 Feet	Frash Pond	250 Feet
Cranberry Pond	250 Feet	Selby Pond	250 Feet
Beaver Dam Lake	250 Feet	Wooster Pond	250 Feet
Cooks Pond	250 Feet	North End Pond	250 Feet
Pumpkin Ground Brook	250 Feet	Bruce Pond	250 Feet
Cemetery Pond	250 Feet	Brewster Pond	250 Feet
Pecks Mill Pond	250 Feet	Armory Road Wetlands (Snake Pit)	250 Feet
Pecks Mill Brook	250 Feet	Black Brook/Oronoque Brook	250 Feet

tercourses permit. Multiple sections of Ferry Boulevard are located within 100-foot of Ferry Creek. Nichols Avenue crosses Bruce Brook north of the Lincoln Street intersection. Barnum Avenue crosses a riverine wetland that connects Long Brook Pond to Ferry Creek. Broadbridge Avenue crosses a riverine wetland just east of California Street.

For more information about the Inland Wetlands and Watercourses permit, please visit: <http://townofstratford.com/content/39832/39846/39927/52620/default.aspx>

Coastal Site Plan Review. Any regulated activity conducted within the coastal area boundary by a municipal agency (i.e., plan of development) must be conducted in a manner consistent with the requirements of the Connecticut Coastal Management Act.¹ Ferry Boulevard, the section of Broad Street that is east of Elm Street, and the northern section of E. Broadway coincide with the coastal area boundary. Development activities along these streets require the submission of a Coastal Site Plan application.

The Coastal Site Plan application can be accessed here: http://www.townofstratford.com/filestorage/39879/40866/COASTAL_SITE_PLAN_APPL.pdf

Waterfront Harbor Management Commission. The Waterfront Harbor Management Commission, per its review responsibilities under the Connecticut General Statutes, Town Code, and the Harbor Management Plan, shall review any proposal affecting the real property on, in, or contiguous to the harbor. Any proposal located

within the Coastal Impact Area, as held on file in the Office of Planning and Zoning, shall require such review.

Connecticut General Statutes Section 8-24 Referral. Under this State regulation, municipalities expending funds for redevelopment/renewal projects must refer such redevelopment to their local Planning & Zoning Commission for review and approval.

STATE PERMITS/REVIEWS

Connecticut Environmental Policy Act The Connecticut Environmental Policy Act. (CEPA) requires any State agency that is proposing or funding (in part or in full) a project to conduct an environmental assessment that identifies and evaluates the project's environmental impacts. The environmental review process includes preparation of an Environmental Classification Document (ECD) by the funding State agency, and if necessary, a scoping phase, the development of an Environmental Impact Evaluation (EIE), and opportunities for public review and comment. Unless significant impacts to historical, archeological, or endangered species are identified, it is unlikely that extensive evaluation or reporting will be required under CEPA for this project.

For more information about CEPA, please visit: http://www.ct.gov/deep/cwp/view.asp?a=2709&q=324144&depNav_GID=1643

Stormwater and Dewatering Wastewaters from Construction Activities General Permit. This program was developed by the State to regulate sediment and erosion control from construction sites, as well as construction and post-con-

struction stormwater runoff. Since projects developed under Stratford's Complete Streets program will be subject to local regulatory review and approval, no registration is required under this program for projects with a total area of disturbed soils of less than five acres. Greater than five acres of disturbance requires registration of the project with the State, as well as preparation of a Stormwater Pollution Control Plan. Projects registered under this program are also subject to stormwater sampling and testing, as well as regular written reporting throughout the construction process.

For more information about the Stormwater and Dewatering Wastewaters from Construction Activities General Permit, please visit: http://www.ct.gov/deep/cwp/view.asp?a=2721&q=558612&DEEPNav_GID=1654

Coastal Area Management Permit. The Connecticut Department of Energy & Environmental Protection regulates all activities conducted in Connecticut's coastal area. The permit program aims to avoid or minimize navigational conflicts, encroachments into the State's public trust area, and adverse impacts on coastal resources and uses, consistent with the policies defined in the Coastal Management Act (https://www.cga.ct.gov/current/pub/chap_444.htm). Since projects implemented under the Stratford Complete Streets Program will be subject to local review and approval, CAM related issues would be regulated through the local Coastal Area Management process. As part of this process, all local applications are referred to the State for review and comment.

For more information about the CAM permit, please visit: http://www.ct.gov/deep/cwp/view.asp?a=2705&q=323580&depNav_GID=1635

Connecticut Department of Transportation (CTDOT) – Highway Encroachment Permit. Any work proposed within a State highway right-of-way, must obtain an Encroachment Permit from the local CTDOT District Office. The permit is applied for by the Construction Contractor, who must also post a bond and present a certificate of insurance. Coordination under this permit program is generally initiated by the Consulting Engineer prior to permit application by the Contractor in order to define the CTDOT's requirements for traffic control, construction standards, and management of stormwater.

The following Stratford streets are part of the State highway system and will be subjected to the permit program: Main Street (State Route 113), E. Main Street (State Route 110), Nichols Avenue (State Route 108), Barnum Avenue (U.S. Route 1), and Ferry Boulevard (State Route 130).

For more information about the Highway Encroachment Permit, please visit: <http://www.ct.gov/dot/cwp/view.asp?A=1394&Q=259544>

Connecticut Department of Energy and Environmental Protection (CT DEEP) – Flood Management Certification. Under this program, State agencies providing funding must certify that the proposed project is consistent with State Flood Management Regulations, or seek an exemption. Although technically a State Agency certification, the project sponsor agency (in this case the Town of Stratford) is generally responsible for completing an application form and providing appropriate backup for use by the

State funding agency to complete the required certification. Impacts subject to this certification program include work within or affecting development of a FEMA designated flood plain, or projects with unmitigated stormwater impacts. Projects that are unable to fully comply with the State Statutes for Flood Management must seek an exemption. Exemptions generally require public participation and possible CT DEEP Adjudication prior to adoption.

For more information about the Flood Management Certification, please visit: http://www.ct.gov/deep/cwp/view.asp?a=2709&q=324172&depNav_GID

FEDERAL PERMITS/REVIEWS

For projects that receive federal funding or require a federal permit, a National Environmental Policy Act (NEPA) review is required and all related federal laws and authorities apply. Federal laws and authorities that will likely affect complete streets projects in Stratford include, but are not limited to: the National Historic Preservation Act, Coastal Zone Management Act, Executive Order 11988 Flood Plain Management, and Section 1404 of the Fixing America's Surface Transportation Act.

6.5 FUNDING OPPORTUNITIES

When considering possible funding sources for complete streets projects in Stratford, it is important to remember that not all design and construction activities or programs will be accomplished with a single funding source. It will be necessary to consider several sources of funding that when combined will support full project implementation. Funding sources can

be used for a variety of activities, including: programs, planning, design, implementation, and maintenance. This section outlines the most likely sources of funding from the federal, state, and local government levels. Note: this section reflects the funding available at the time this report was written. Funding amounts, cycles, and programs may change over time.

LOCAL FUNDING STRATEGIES

Municipalities often plan for the funding of pedestrian and bicycle facilities or improvements through the development of Capital Improvement Programs (CIP). CIPs should include all types of capital improvements (water, sewer, buildings, streets, etc.) versus programs for single purposes. This allows municipal decision-makers to balance all capital needs. Typical capital funding mechanisms include the capital reserve fund, capital protection ordinances, municipal service district, tax increment financing, taxes, fees, and bonds. Each category is described below. Please note, many of these strategies require specific local action to establish the program, if it is not already in place.

Municipal Reserve Fund. Municipalities in Connecticut have the authority to create a municipal reserve fund for the financing of all or part of the planning, construction, reconstruction or acquisition of a specific capital improvement project (e.g., complete streets projects). Reserve funds can be established upon the approval of the Town's budget-making authority and majority vote of the Town's legislative body. Appropriations from the reserve fund for a specific capital project must be approved by the budget-making authority and legislative body.

¹ https://www.cga.ct.gov/current/pub/chap_444.htm

For more information about municipal reserve funds, please visit: https://www.cga.ct.gov/2016/sup/chap_108.htm

Special Services Districts. Special Services Districts (SSD), also referred to as Business Improvement Districts, provide public services within a designated area by levying property taxes to pay for those public services. The establishment of an SSD requires a Town ordinance to be passed through referendum. Once established, SSDs can construct, own, operate and maintain public or common improvements, such as street lights, street trees and planters, and other streetscape improvements.

For more information about special services districts, please visit: https://www.cga.ct.gov/current/pub/chap_105a.htm#sec_7-339p

Tax Increment Financing. Tax Increment Financing (TIF) is a relatively new tool that allows municipalities to use future gains in taxes to finance the current improvements that will create those gains. When a public project (e.g., complete street improvements) is constructed, surrounding property values generally increase and encourage surrounding development or redevelopment. The increased tax revenues are then dedicated to finance the debt created by the original public improvement project. TIF typically occurs within designated development financing districts.

New legislation in Connecticut allows municipalities to establish TIF districts that include a project (e.g., complete streets network) and the properties that will benefit from that project. Revenue accrued from TIF can be used for capital projects, financing, professional services,

operations and maintenance, and others activities/costs. TIF revenue can also be used to fund improvements outside of the district, as long as the improvements directly relate to the project (e.g., infrastructure projects).

For more information about TIF in Connecticut, please visit: <https://www.cga.ct.gov/2015/act/pa/pdf/2015PA-00057-ROOSB-00677-PA.pdf>

Other Local Funding Strategies include:

- Bonds/Loans
- Taxes
- Impact fees
- Exactions
- Installment purchase financing
- In-lieu-of fees
- Public-Private Partnerships

STATE/REGIONAL FUNDING SOURCES

Connecticut Metropolitan Council of Governments (MetroCOG). MetroCOG administers several different grant programs and provides technical assistance that could help advance complete streets in Stratford. The most relevant programs include:

- Transportation: MetroCOG develops and maintains a short-range Transportation Improvement Program (TIP), which lists all proposed highway and transit improvement projects programmed to receive federal funding during a five-year cycle. The current TIP lists projects to be funded from 2015 to 2018, several of which occur within Stratford. MetroCOG is committed to working collaboratively with local municipalities and the Connecticut Department of Transportation to develop project scope, financial plans, and schedules. For more information, please visit: <http://www.ctmetro.org/programs/transportation-improvement-programs/#.WBtBuSOrJhF>
- Brownfield Remediation: This program, which is part of the EPA Brownfields Program, provides funding for the brownfield redevelopment projects in the vicinity of and around existing and potential transit centers and corridor. For more information, please visit: http://www.ctmetro.org/programs/environmental-programs/brownfield-remediation/#.WBtB_COrJhE

Connecticut Recreational Trails Program. This program is administered by the Connecticut Department of Energy and Environmental Research, and it provides grant funding for the development and maintenance of recreational trails and trail facilities. Grant funds can be used for planning, design, and construction of new trails; maintenance and restoration of existing trails; improved trail access for persons with disabilities; purchase and lease of trail construction equipment; acquisition of land or easements for a trail; and, operation of educational programs to promote safety and environmental protection related to recreational trails.

For more information about the Recreational Trails Program, please visit: http://www.ct.gov/deep/cwp/view.asp?a=2707&Q=576550&deep-Nav_GID=1642

Greater Bridgeport Transit Authority

Greater Bridgeport Transit Authority is a designated recipient of Federal Transit Administration funding. These funds can be used for public transit improvements, including wayfinding, shelters, benches, and other transit related amenities.

Local Transportation Capital Improvement Program (LOTICIP).

The LOTICIP programs provides municipal governments with State funding to perform capital improvements related to transportation. Applications for funding must be submitted through the Council of Governments (COG) to the Connecticut Department of Transportation.

For more information about the LOTICIP, please visit: <http://nvcogct.org/sites/default/files/%21LOTICIP-guidelines-2016-03.pdf>

FEDERAL FUNDING SOURCES

Federal funding is typically directed through state agencies to local governments either in the form of grants or direct appropriations, independent from state budgets. Federal funding often requires a local match that ranges between five and fifty percent, but there are sometimes exceptions.

Federal Highway Administration (FHWA) Bicycle and Pedestrian Program. The FHWA's Bicycle and Pedestrian Program, "promotes safe, comfortable, convenient walking and bicycling for people of all ages and abilities." The Program supports multimodal transportation through funding, policy guidance, program management, and resource development. In particular, the Program maintains a comprehensive matrix of U.S. Department of Transportation funding opportunities for pedestrian and bicycle improvements. Each state has a designated Bicycle and Pedestrian Coordinator. Connecticut's coordinator is Melanie Zimyeski, CTDOT Bureau of Policy and Planning, melanie.zimyeski@ct.gov.

To access the matrix of U.S. DOT pedestrian and bicycle funding opportunities, please visit: http://www.fhwa.dot.gov/environment/bicycle_pedestrian/funding/funding_opportunities.cfm

Congestion Mitigation and Air Quality Improvement (CMAQ) Program.

The CMAQ program is administered by the Federal Highway Administration (FHWA) and provides funding for surface transportation projects and other related efforts that improve air quality and relieve congestion. Funding is available on an annual basis for State DOTs, metropolitan planning organizations, and local governments.

For more information about the CMAQ Program, please visit: http://www.fhwa.dot.gov/environment/air_quality/cmaq/

Community Development Block Grant (CDBG).

The Community Development Block Grant (CDBG) program, administered by the U.S. Department of Housing and Urban Development (HUD), provides annual grants on a formula basis to local governments and states. The program is designed to ensure decent affordable housing, to provide services particularly to low- and moderate-income residents, and to create jobs through the expansion and retention of businesses. Bicycle and pedestrian projects, including trail projects that can demonstrate benefits to low- and moderate-income communities may qualify for CDBG funds.

For more information about CDBG grants, please visit: http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs

Partnerships to Improve Community Health (PICH).

Partnership to Improve Community Health is a three year grant program administered by the Center for Disease Control to support the implementation of evidence-based

strategies to improve community health and reduce chronic disease. Active transportation infrastructure and programs that promote healthy lifestyles are a good fit for this program, particularly if the benefits of such improvements encourage physical activity among population groups experiencing the greatest burden of chronic disease.

For more information about PICH grants, please visit: <http://www.cdc.gov/nccdphp/dch/programs/partnershipstoimprovecommunity-health/index.html>

National Endowment for the Arts (NEA): Our Town grant program: The Our Town grant program provides support for creative placemaking projects that craft a distinct sense of place and transform communities into vibrant, resilient, and beautiful places. The grant program supports two general categories of projects: 1) Arts engagement, cultural planning, and design projects; and, 2) Projects that build knowledge about creative placemaking.

For more information about the Our Town grant program, please visit: <https://www.arts.gov/grants-organizations/our-town/introduction>

EPA Clean Water State Revolving Fund (CWSRF). The CWSRF is a federal-state partnership that provides low-cost financing and loan assistance for stormwater management, non-point source abatement, watershed and estuary protection, and wastewater treatment projects. The CWSRF can fund the capital costs associated with water quality improvement and green infrastructure, but it cannot be used to fund operations and maintenance activities.

For more information about CWSRF, please visit: <https://www.epa.gov/green-infrastructure/green-infrastructure-approaches-managing-wet-weather-clean-water-state>

EPA Clean Water Act Nonpoint Source Grant program (Section 319 grants). This grant program makes federal funding available to states, territories, and Indian tribes to support a variety of activities related to improving water quality, including: technical and financial assistance, education and training, technology transfer, demonstration projects, and monitoring to assess the success of projects implemented under the grant. Funding decisions are made by the State. Connecticut's nonpoint source pollution coordinator is: Charles Lee, Connecticut Department of Energy and Environment, Charles.lee@ct.gov.

For more information about Section 319 grants, please visit: <https://www.epa.gov/nps/319-grant-current-guidance>

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APPENDIX A

COMPLETE STREET COMPONENTS

There are many considerations that factor into the design of a Complete Street. This chapter explains the elements that comprise a Complete Street and the various design considerations for each component.

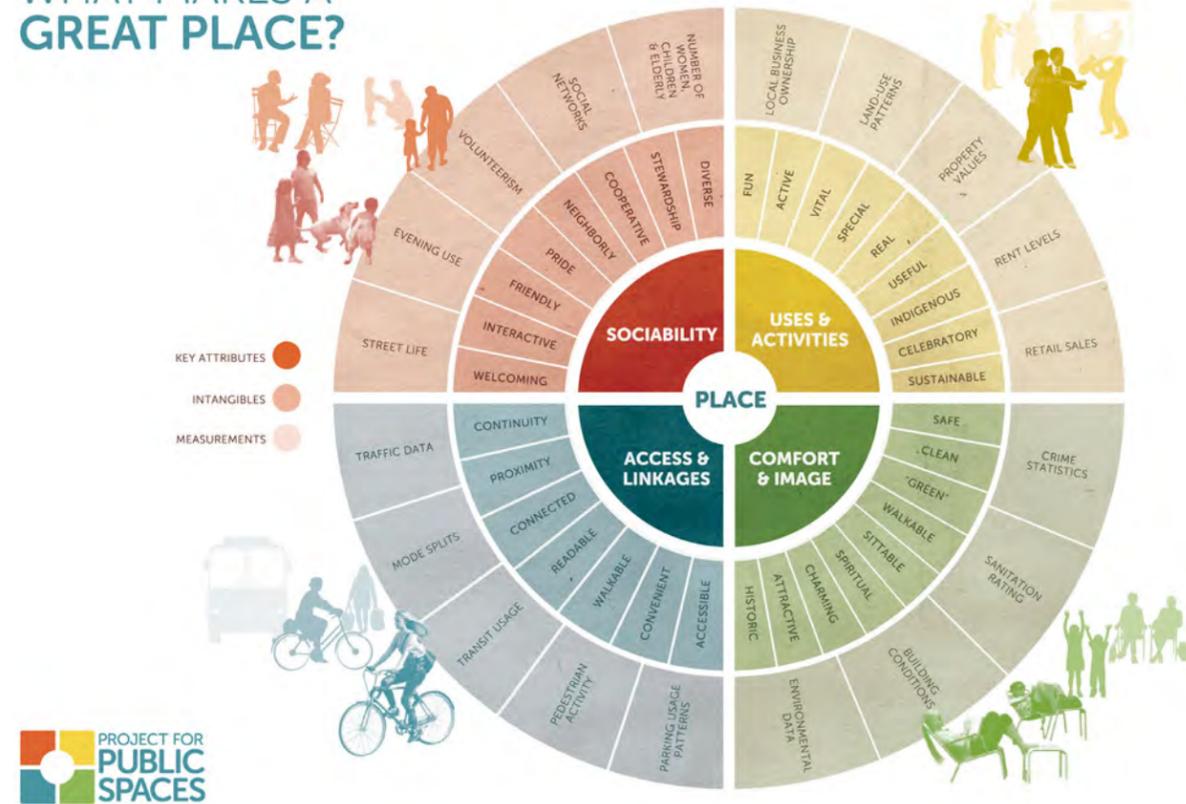
7.1 PLACEMAKING

Placemaking is a collaborative process that prioritizes people and communities in the planning, design, and programming of public spaces. This community-based process deliberately shapes the physical environment to facilitate social interaction and improve the community's quality of life.

Complete street projects focus on public space, and placemaking is an important consideration when selecting and implementing complete street design strategies. Implementing a placemaking approach ensures that complete street design strategies meet community needs; are inclusive and flexible; celebrate the local community, culture, and environment; and, foster the creation of sociable, equitable, and vibrant spaces.

Project for Public Spaces has developed several tools to support the process of placemaking, including The Place Diagram and the Power of Ten¹. The Place Diagram is a tool that helps communities understand and identify the key attributes of a place, as well as quantify and evaluate those attributes (see image on the right). The Power of Ten focuses on creating several focal points of activity within a community, with the intent of establishing a critical mass of connected destinations that transform every day spaces into great places.

WHAT MAKES A GREAT PLACE?



Complete Streets enable safe, convenient, and comfortable travel and access for users of all ages and abilities. Placemaking is an important consideration during the complete street design process.

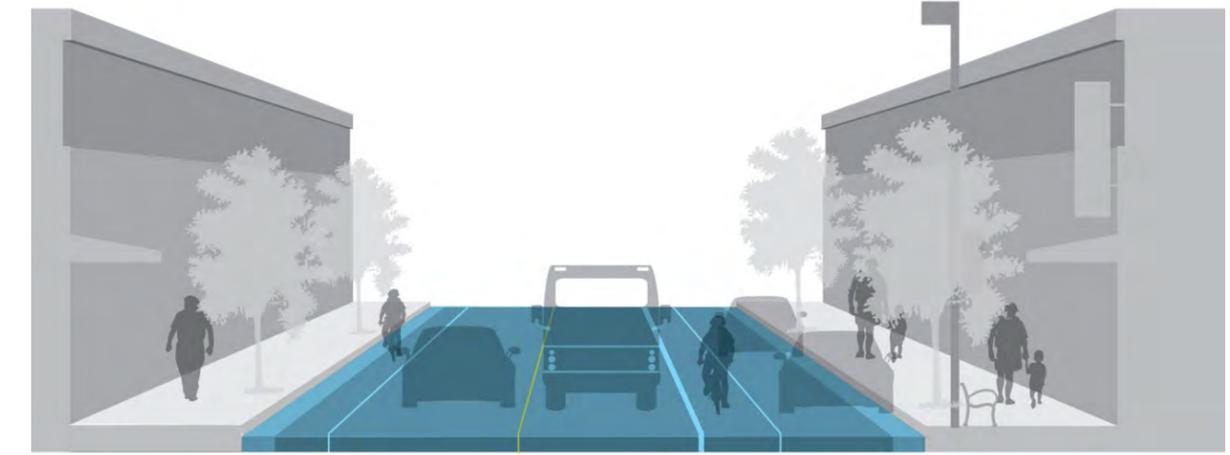
7.2 PEDESTRIAN DESIGN

The transportation network should accommodate pedestrians with a variety of needs, abilities, and possible impairments. Age is one major factor that affects pedestrians' physical characteristics, walking speed, and environmental perception. Children have low eye height and walk at slower speeds than adults. They also perceive the environment differently at various stages of their cognitive development. Older adults walk more slowly and may require assistive devices for walking stability, sight, and hearing.

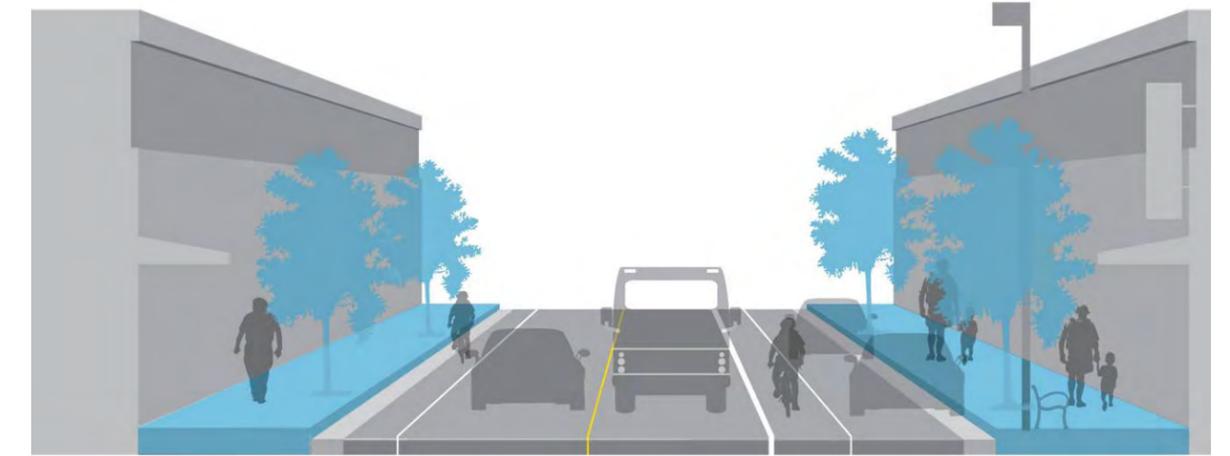
The Manual of Uniform Traffic Control Devices (MUTCD) recommends a normal walking speed of three and a half feet per second when calculating the pedestrian clearance interval at traffic signals. Typical walking speeds can drop to three feet per second in areas with older populations and persons with mobility impairments. While the type and degree of mobility impairment varies greatly across the population, the transportation system should accommodate these users to the greatest reasonable extent.

SIDEWALKS

Sidewalks are the most fundamental element of the walking network, as they provide an area for pedestrian travel that is separated from vehicle traffic. Sidewalks are typically constructed of concrete and are separated from the roadway by a curb and gutter and preferably a landscaped planting strip area. Sidewalks are a common application in both urban and suburban environments. Attributes of well-designed sidewalks include the following:



Movement zone of a street - this zone focuses on traffic flow for vehicles, transit, and bicyclists.



Placemaking zone of a street - this zone is responsible for developing the character of a street, acting as social space, and facilitating pedestrian movement.

¹ http://www.pps.org/reference/what_is_placemaking/

Accessibility: A network of sidewalks should be accessible to all users. Roadway crossing distances and distances between crossings should be minimized to integrate and encourage pedestrian travel. ADA accessibility, such as curb ramps, is a necessary requirement to improve the accessibility of the mobility impaired.

Adequate width: Two people should be able to walk side-by-side. Different walking speeds should be possible. In areas of intense pedestrian use, sidewalks should accommodate the high volume of walkers.

Safety: Design features of the sidewalk should allow pedestrians to have a sense of security and predictability. Sidewalk users should not feel they are at risk due to the presence of adjacent traffic.

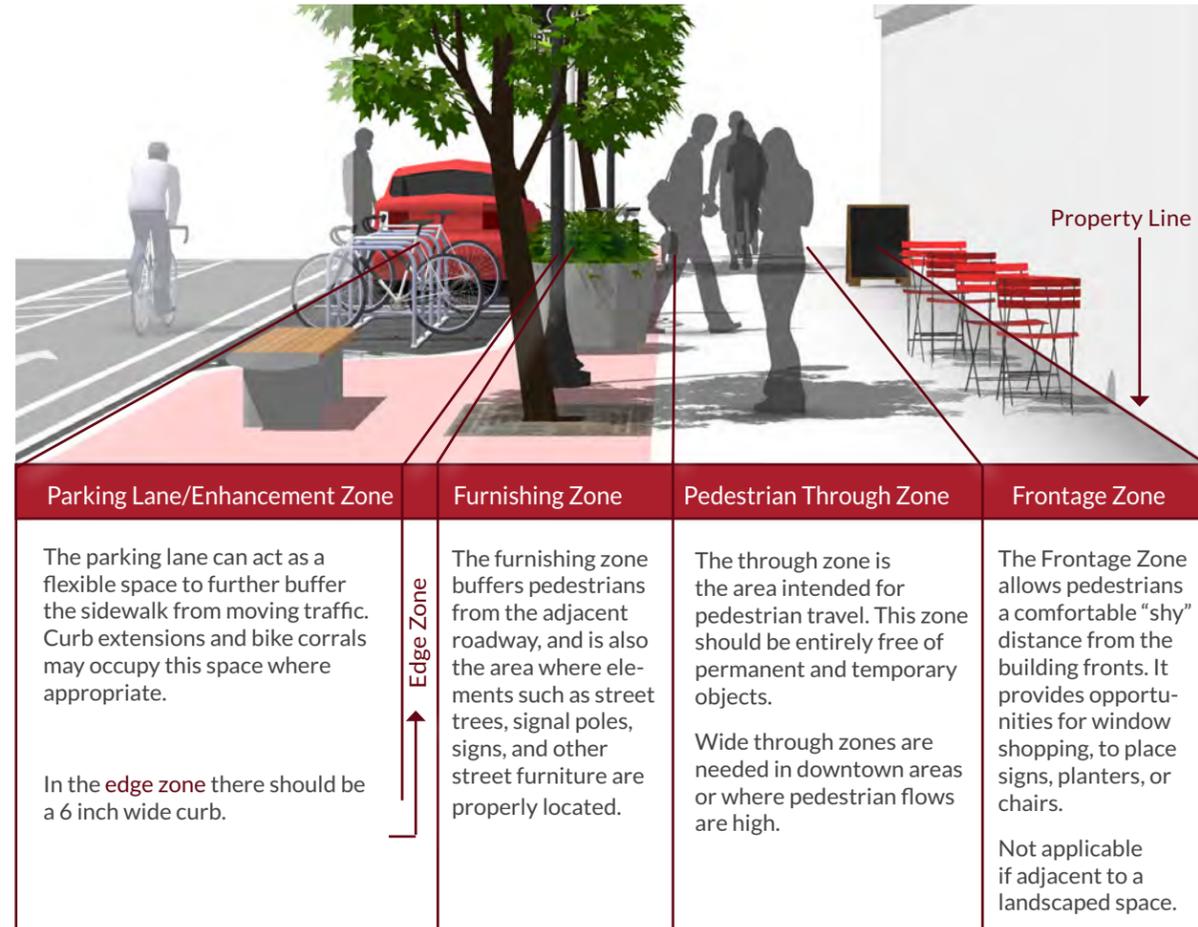
Continuity: Walking routes should be obvious and should not require pedestrians to travel out of their way unnecessarily.

Landscaping: Plantings and street trees should contribute to the overall psychological and visual comfort of sidewalk users, and be designed in a manner that contributes to the safety of people.

Drainage: Sidewalks and curb ramps should be designed so that standing water is minimized.

Social space: There should be places for standing, visiting, and sitting. The sidewalk area should be a place where adults and children can safely participate in public life.

Quality of place: Sidewalks should contribute to the character of neighborhoods and business districts.



SIDEWALK ZONES

The sidewalk area can be broken down into four distinct zones. The concept of sidewalk zones should be strictly followed for a sidewalk to function properly and provide safe passage for all users. This is especially important for users with visual or physical impairments to be able to effectively navigate the corridor.

Other considerations such as sidewalk obstructions, driveways, width and access through construction areas are important to consider as well.

INTERSECTIONS

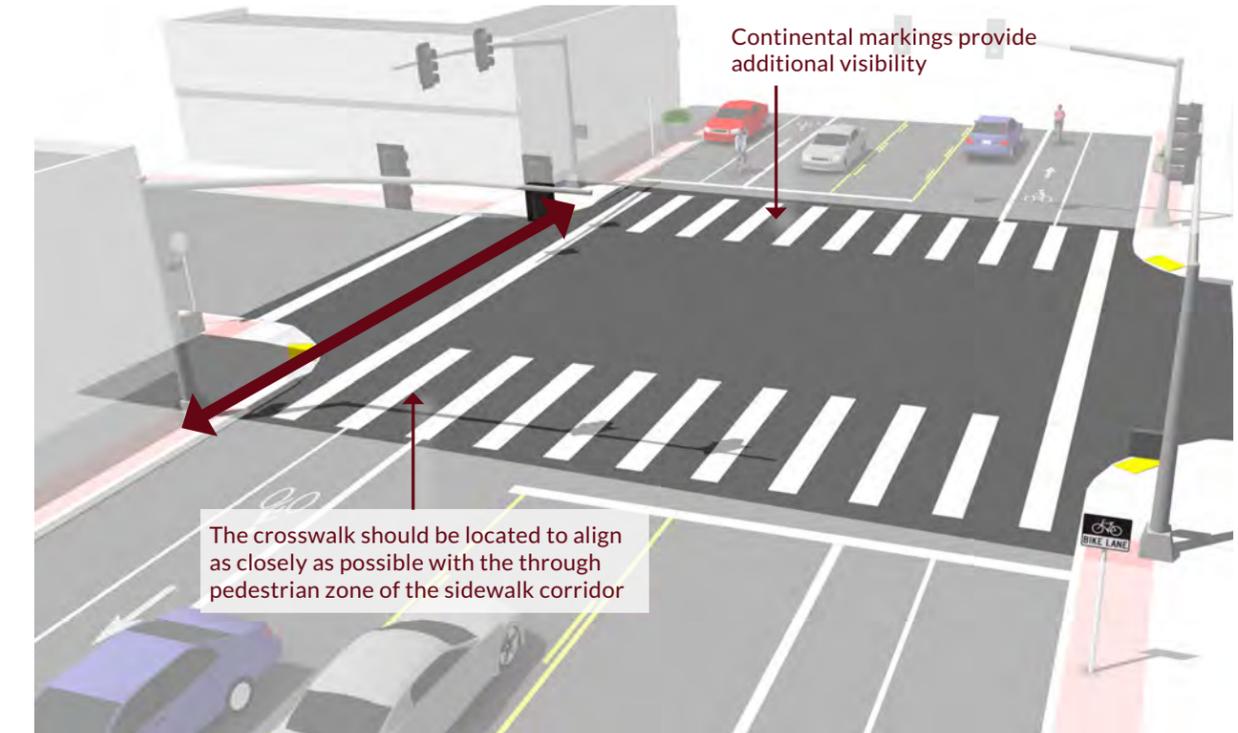
Intersections are also an important piece of the pedestrian realm. Attributes of pedestrian-friendly intersection design include:

Clear Space: Corners should be clear of obstructions. They should also have enough room for curb ramps, for transit stops where appropriate, and for street conversations where pedestrians might congregate.

Visibility: It is critical that pedestrians on the corner have a good view of vehicle travel lanes and that motorists in the travel lanes can easily see waiting pedestrians.

Legibility: Symbols, markings, and signs used at corners should clearly indicate what actions the pedestrian should take.

Accessibility: All corner features, such as curb ramps, landings, call buttons, signs, symbols, markings, and textures, should meet accessibility standards.



The consideration of pedestrian movement on sidewalks and across intersections is a critical component to developing a Complete Street. Standardizing sidewalk and crossing guidelines will create a predictable, comprehensive pedestrian element.

Separation from Traffic: Corner design and construction should be effective in discouraging turning vehicles from driving over the pedestrian area. Crossing distances should be minimized.

Lighting: Good lighting is an important aspect of visibility, legibility, and accessibility.

These attributes will vary with context but should be considered in all design processes. For example, more remote intersections may have limited or no signing. However, legibility regarding appropriate pedestrian movements should still be taken into account during design.

PARKLETS

A parklet repurposes part of the street into an extension of the sidewalk to provide amenities and green space for people using the street. It is typically the size of several parking spaces and is intended as aesthetic enhancements to the streetscape in an economical package. Parklets offer a place to stop, to sit, and to rest while taking in the activities of the street. A parklet may also provide greenery, art, or some other visual amenity.

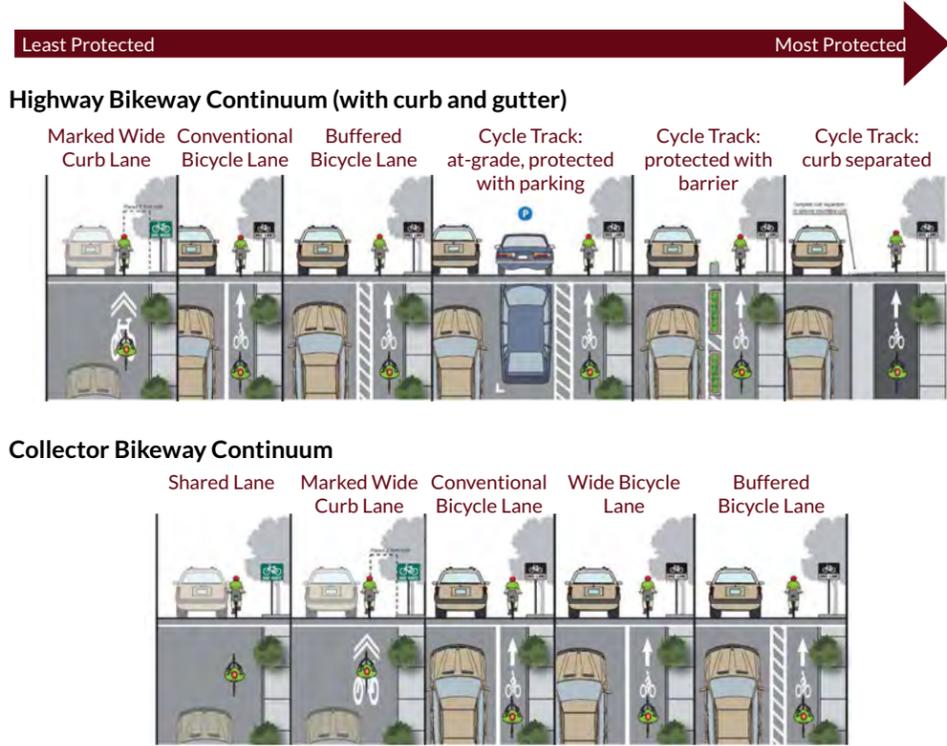
7.3 BICYCLE FACILITY DESIGN

By understanding the unique characteristics and needs of bicyclists, a facility designer can provide quality facilities and minimize user risk. Bicyclists and bicycles come in a variety of sizes and configurations. These variations occur in the types of vehicle (such as a conventional bicycle, a recumbent bicycle, or a tricycle), and the behavioral characteristics of the user (e.g., the comfort level of the bicyclist). The design of a bikeway should consider reasonably expected

bicycle types and the comfort level of users, which will directly influence bikeway dimensions.

It is important to consider bicyclists of all skill levels when creating a non-motorized plan or project. Bicyclist skill level greatly influences expected speeds and behavior, both in separated bikeways and on shared roadways. Bicycle infrastructure should accommodate as many user types as possible, with decisions for separate or parallel facilities based on providing a comfortable experience for the greatest number of people. The bicycle planning and engineering professions

currently use several systems to classify the population, which can assist in understanding the characteristics and infrastructure preferences of different bicyclists. The most conventional framework classifies the “design cyclist” as Advanced, Basic, or Child. A more detailed understanding of the US population as a whole was developed by planners in Portland, Oregon and supported by data collected nationally since 2005. This classification provides the following alternative categories to address varying attitudes towards bicycling in the US (see the “Types of Cyclists” graphic):



The range of bicycle facilities displayed above should be considered for the roads in Stratford. Facility application will depend on roadway type and desired degree of separation.

TYPES OF CYCLISTS



Strong and Fearless 30% of population

This category is characterized by bicyclists that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections, even if shared with vehicles, over separate bicycle facilities such as shared use paths.



Enthusied and Confident 60% of population

This user group encompasses bicyclists who are fairly comfortable riding on all types of bikeways, but usually choose low traffic streets or shared use paths when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of bicyclists such as commuters, recreationalists, racers and utilitarian bicyclists.



Interested, but Concerned 5-10% of population

This user type comprises the bulk of the cycling population and represents bicyclists who typically only ride a bicycle on low traffic streets or multi-use trails under favorable weather conditions. These bicyclists perceive significant barriers to their increased use of cycling, specifically traffic and other safety issues. These people may become “Enthusied & Confident” with encouragement, education, experience, and higher level facilities, such as buffered and protected bike lanes.



No Way, No How 1% of population

Persons in this category are not bicyclists, and perceive severe safety issues with riding in traffic. Some people in this group may eventually become regular cyclists with time and education. A significant portion of these people will not ride a bicycle under any circumstances.

BICYCLE FACILITY TYPES

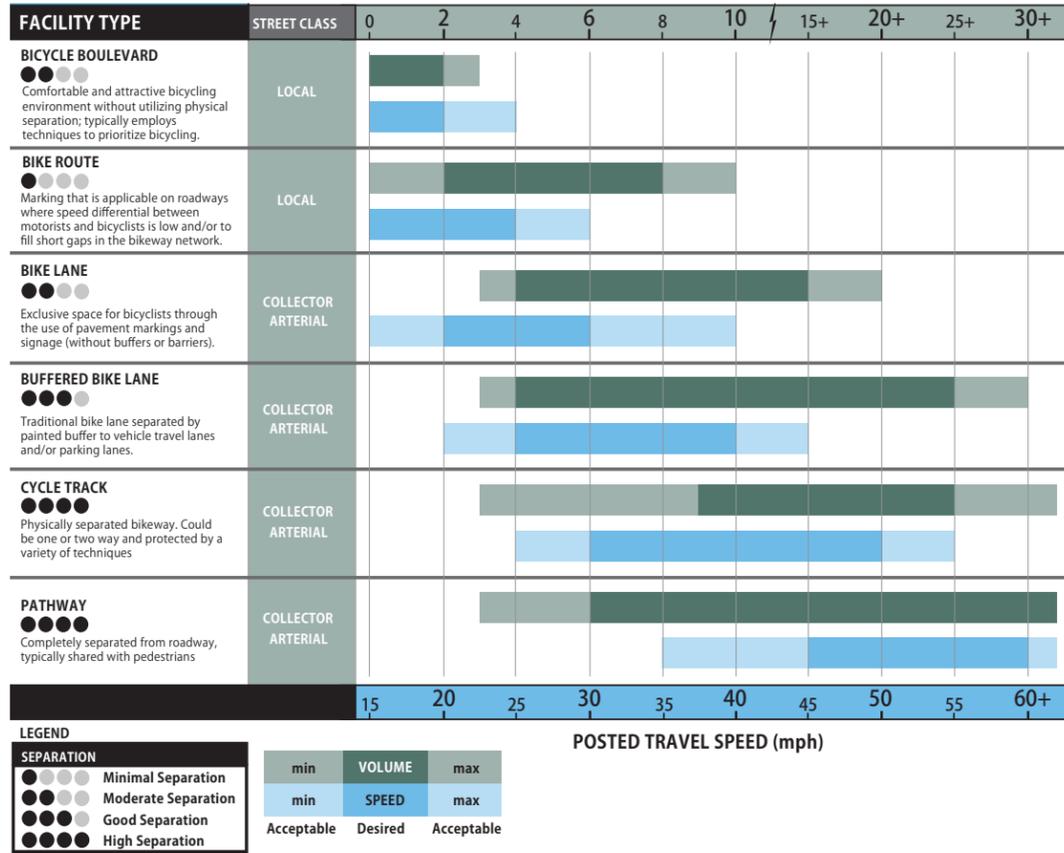
The facility types presented in the figures below identify classes of facilities by degree of separation from motor vehicle traffic. In general, the wider the roadway, the higher the traffic volume, and the greater the traffic speed, the more separation is necessary to provide safe and comfortable riding conditions for bicyclists. The most common bicycle facility types are as follows:

Shared Roadways are bikeways where bicyclists and cars operate within the same travel lane, either side by side or in single file depending on roadway configuration. The most basic type of bikeway is a signed shared roadway. This facility provides continuity with other bicycle facilities (usually bike lanes), or designates preferred routes through high-demand corridors.

Shared Roadways with Pavement Markings
Shared roadways may also be designated by pavement markings, signage and other treatments including directional signage, traffic diverters, chicanes, chokers and /or other traffic calming devices to reduce vehicle speeds or volumes. Such treatments often are associated with Neighborhood Greenways (also known as Bicycle Boulevards).

Separated Bikeways, such as bike lanes and buffered bike lanes, use signage and striping to delineate the right-of-way assigned to bicyclists and motorists. Bike lanes encourage predictable movements by both bicyclists and motorists.

Cycle Tracks are exclusive bike facilities that combine the user experience of a separated path with the on-street infrastructure of conventional bike lanes. These are also referred to as protected bike lanes.



Consider the above chart to account for multiple factors that influence bicycle users' comfort and safety.

Shared-Use Paths are facilities separated from roadways for use by bicyclists and pedestrians. Sidepaths usually refer to shared use paths immediately adjacent to the roadway.

BICYCLE PARKING

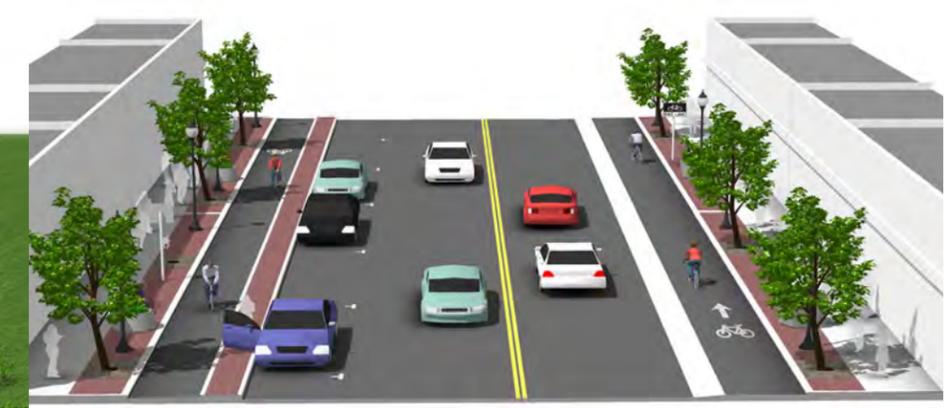
Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of two hours or less, or long-term parking for employees, students, residents, and commuters. In order to encourage bicycling in Stratford, plentiful, convenient and attractive bicycle parking must be provided.

SHARED ROADWAYS



Shared Roadways with pavement markings are used to reduce speeds along roadways to allow for bicyclists to share the road, these are most appropriate in low speed areas such as downtowns and neighborhoods.

CYCLE TRACKS



Cycle Tracks are physically separated from motor traffic and distinct from the sidewalk, providing a higher level of comfort and attracting a larger user base.

SEPARATED BIKEWAYS



Separated Bikeways are exclusively designed for bicycle travel, and are most appropriate on streets with higher traffic volumes and speeds.

SHARED-USE PATH



Shared-Use Paths provide a desirable facility for users of all skill levels preferring separation from traffic, particularly for recreation.

7.4 VEHICLE DESIGN

TRAFFIC CALMING DESIGN

Motor vehicle speeds affect the frequency at which automobiles pass bicyclists as well as the severity of bicycle and pedestrian crashes that can occur on a roadway. Slower vehicular speeds also improve motorists' ability to see and react to non-motorized users, minimize conflicts at driveways and other turning locations and in many cases can improve vehicular throughput. Maintaining slower motor vehicle speeds and reducing traffic in areas where pedestrian and bicycle traffic is regularly expected greatly improves comfort and safety for non-motorized users on a street.

Traffic calming devices are engineering measures with the sole intent of slowing traffic and reducing conflict. Other approaches to traffic calming include placemaking design measures that have the added effect of traffic calming, as well as educational and enforcement measures. Not all treatments listed here are appropriate for all roadways.

Speed limit reduction - A reduction in speed limit is a simple way to make the roadway a safer place for pedestrians and bicyclists. Statistically, eighty percent of pedestrians struck by a car going 40 mph will die; at 30 mph the likelihood of death is 40 percent. At 20 mph, the fatality rate drops to just 5 percent (The National Highway Traffic

Safety Administration).

Road diet - Road diets are a reduction in the number of lanes along a roadway. Typically, these are four lane roads reduced to three lanes (although larger road diets are done as well), often with the addition of bike lanes. This not only improves conditions for bicyclists, but it enhances the pedestrian environment and often improves traffic flow and vehicle-on-vehicle collision rates as well.

Lane narrowing - Lane narrowing is when an excessively large lane is reduced through the striping of a shoulder or the addition of bike lanes. This helps reduce traffic speed and adds dedicated space for bicyclists.

Speed humps/Speed tables - Speed humps are raised areas usually placed in a series across both travel lanes. Longer humps reduce impacts to emergency vehicles. Some speed hump designs can be challenging for bicyclists, however gaps can be provided in the center or by the curb for bicyclists and to improve drainage. Speed humps can also be offset to accommodate emergency vehicles as seen in the image above.

Traffic Diversion - Motor vehicle traffic volumes affect comfort for bicyclists and pedestrians on local streets. Higher vehicle volumes reduce bicycle and pedestrian comfort and can result in more conflicts. Traffic diversion treatments reduce motor vehicle volumes by completely or partially restricting through traffic on select neighborhood streets such as bicycle boulevards.

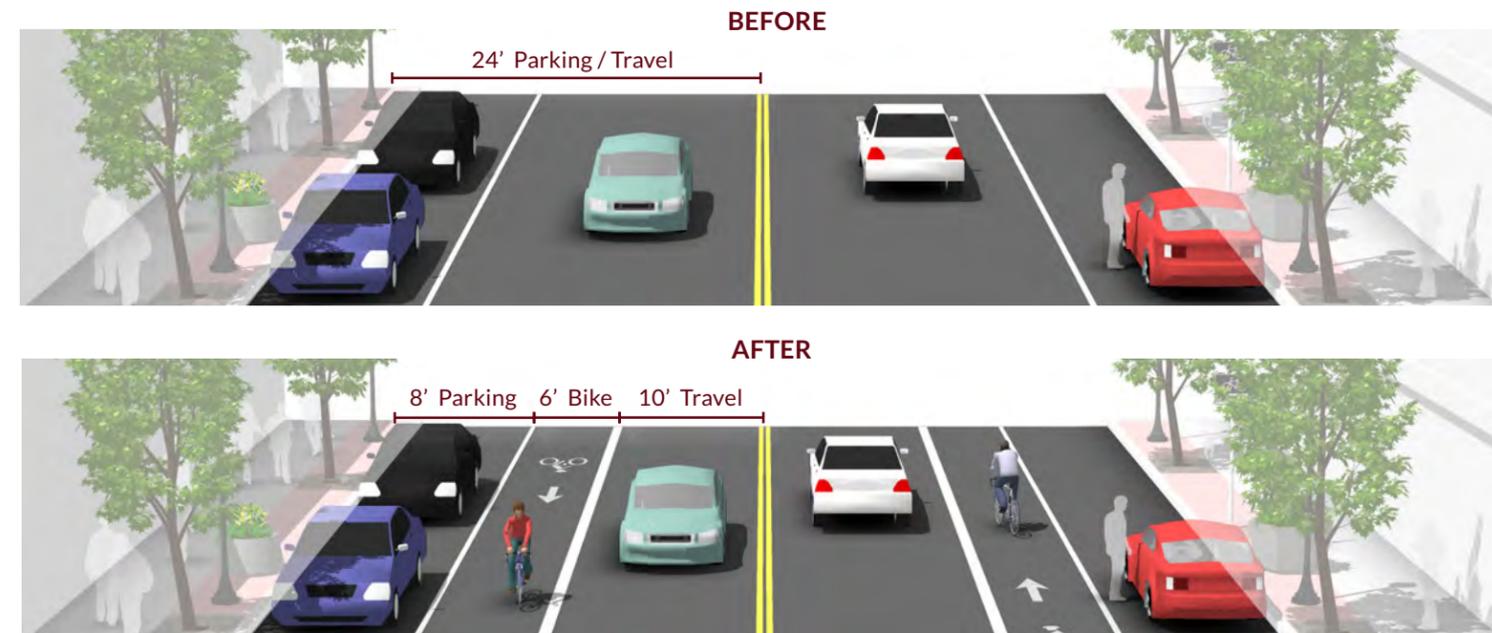
Pinchpoints/neckdowns - These are curb extensions placed on both sides of the street, narrowing the travel lane and encouraging all road users to slow down. When placed at intersections, pinchpoints are known as chokers or neckdowns. They reduce curb radii and further lower motor vehicle speeds.

Chicanes - Chicanes are essentially curb extensions arranged in an alternating pattern that require cars to oscillate along a roadway to avoid them. These are effective on long-straight neighborhood streets where speeding is an issue.

Setback reduction - Large setbacks in roadside development are a result of car-oriented development practices which typically locate a large parking lot in the front of the building. Redeveloping these properties with little or no setback creates a sense of enclosure, adds visual stimuli, and creates a pedestrian friendly environment, all of which help to slow traffic.



Speed Humps are a form of hard traffic calming that are effective at reducing vehicular speeds, improving the comfort and safety of all road users.



Road Diets, or lane narrowing, utilize excess roadway space to accommodate separated bicycle facilities.



Chicanes are a horizontal element of hard traffic calming that reduce vehicle speeds by requiring motorists to shift laterally through narrowed travel lanes.

Street trees, landscaping and other aesthetic elements - Street trees, landscaping and other aesthetic elements such as art or banners produce a feeling of enclosure and add visual stimuli along a roadway corridor. Green elements often have added environmental benefits as well.

Street material - Textured street material, such as the use of pavers, creates visual stimuli and a feeling of a special district or pedestrian-oriented area which can help to calm traffic.

Appropriately scaled street lighting - Appropriately scaled street lighting can provide a safer, more inviting and more visible environment for all roadway users. Pedestrian scaled street lighting along with other improvements such as street trees can alert motorists to a potential presence of pedestrians and bicycles, slowing down traffic in these areas.



Street Trees provide visual stimuli, encourage reduced speeds, and provide added environmental benefits along the corridor.

Enforcement and awareness measures - Enforcement and awareness measures such as signage, speed traps and educational programs can help to reduce speeding in problem areas. However, the effectiveness of these programs depends on adequate frequency and duration.

7.5 TRANSIT DESIGN

According to the South Florida East Coast Corridor (SFECC) Transit Analysis: Station Design Guidelines, successful transit design depends on 6 elements. These include:

1. Integration into the contextual fabric - ensuring that transit stops are coherent with surrounding visual themes and that transit stops serve transit-compatible land uses such as day-cares, shopping areas, employment areas and schools.



Street Material, such as pavers or bricks used in crosswalks, create a visual and tactile distinction from the roadway and signal that it is a separate element.

2. Accessibility via multiple modes - making sure that transit stations and routes connect other modes such as pedestrians, bicyclists, park and ride centers, and airports.

3. Functional simplicity - Transit stops should provide users with clear and informative system information and provide easy access and payment options.

4. Security - Transit stops and systems should look, feel and be clean and secure. This can be accomplished through a number of methods including call boxes and lighting.

5. Comprehensive systems sustainability - The design of transit should be environmentally conscious and be a tool to promote sustainable development.

6. Articulation of form and identity - Transit stops should respond to public art or community



Transit Design and stop location are dependent on ease of operation, pedestrian transfer situations, space availability, and traffic operation.

landmarks; or local, relevant art should be incorporated into the stops and stations themselves.

Specifically incorporating art and design into all aspects of the transit system will provide users with an attractive place to wait for transit and may increase user traffic. In most cases, transit shelters and waiting platforms should be placed in the Enhancement or Furnishing Zone.

It is important to also consider the accommodation of bicycles at transit stops. Designs that reduce conflict between bicycle travel and transit stations include secure bicycle parking and provide ample loading space for bicycles on bus-mounted bicycle racks.

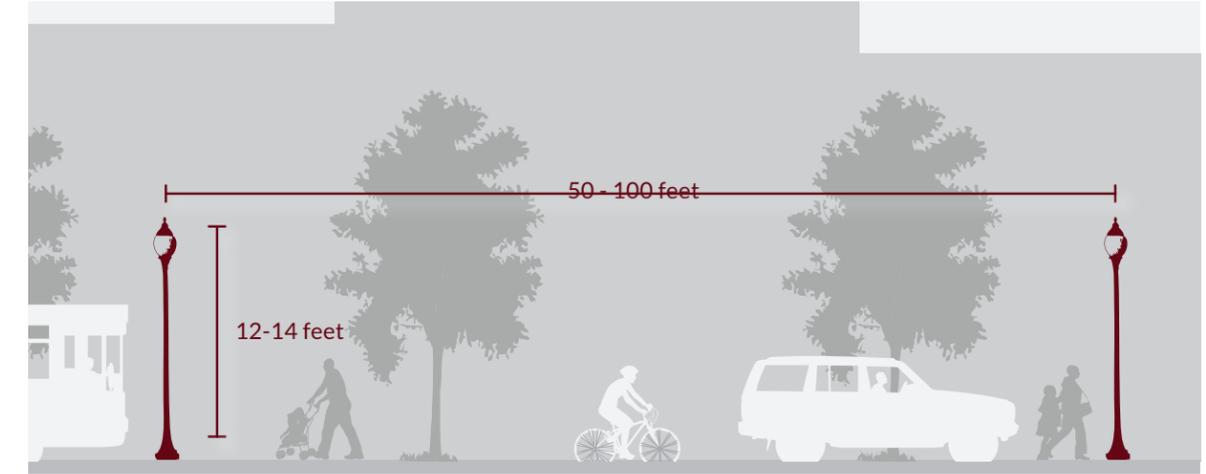
The location and design of transit stops along a block are important considerations. Where feasible, transit stops should be located immediately after the intersection to reduce conflict with turning vehicles and resolve sight line issues at the intersection. Bus stops should be designed so that buses can pull out of the vehicular travel lane when stopping to preserve traffic flow, especially on major streets. Transit stops can be also incorporated into curb extensions, where appropriate.

7.6 STREET FURNISHINGS

The furnishing zone of a sidewalk buffers pedestrians from the adjacent roadway and is an important area for pedestrian and placemaking amenities such as street trees, signal poles, and street furniture.

STREET TREES

Urban forests provide a wide range of benefits and services to society, and a robust tree canopy



Pedestrian Scaled Lighting improves personal and traffic safety and is crucial in areas where people will walk after dark.



Site Furnishings, such as benches, provide a place to rest and encourage social and economic interaction at key points along a corridor.

is one of the great contributors to a healthy and livable urban landscape. While the benefits provided by urban forests are not easily bought or sold, they have major economic implications. For example, several studies have demonstrated that the presence of mature trees and forest cover within a parcel are directly correlated to increased property values, and the value of properties adjacent to urban park or open space is approximately 8 to 20% higher than comparable properties without access to park or open space.¹

Trees also provide many benefits in terms of stormwater flow regulation and water quality treatment. Mechanisms for these benefits include interception, transpiration, sequestration, and increased infiltration. Additional benefits provided by trees include enhancing the character of a place; improving air quality; reducing noise and light pollution; traffic-calming; and, reducing the heat island effect. Trees provide numerous habitat benefits, including refuge from predators and food and nesting resources. Trees enhance the quality of open space and provide visual relief within the urban environment, leading to stress reduction and other health benefits. Because trees can take fifteen years or more to develop a full canopy, preserving healthy existing trees wherever practicable is a cost effective and efficient way to obtain the most value from trees.

The U.S. Department of Agriculture (USDA) Forest Service provides a suite of online, publicly-accessible tools to assess the benefits provided by street trees at the parcel, street, and landscape level. These tools can be accessed online at: www.itreetools.org.

¹ Wolf, Kathleen. 2007. City Trees and Property Values. Originally published in Arborist News. Accessed online: http://www.nature-within.info/Policy/Hedonics_Citations.pdf

LIGHTING

Pedestrian scale lighting improves visibility for both pedestrians and motorists, particularly at intersections. Pedestrian scale lighting can provide a vertical buffer between the sidewalk and the street, defining pedestrian areas. Pedestrian scale lighting should be used in areas of high pedestrian activity. Pedestrian scale lighting should be located in the furnishing/utility zone so as not to impede pedestrian traffic in the through area. Lamp fixtures should be at a height of about 12-14 feet, and poles should be spaced approximately 50-100 feet apart depending on the intensity of lights. Lamp fixtures should be shaded so as to project light downward and provide sufficient illumination of the sidewalk while limiting excess light pollution. Illumination should be warm and moderate, rather than dim or glaring, and provide a balanced coverage of the corridor and surrounding area for comfort and security.

SITE FURNISHINGS

Site furnishings are critical components of a socially and economically vibrant streetscape, accommodating a wide range of needs and activities. Providing benches at key rest areas and viewpoints encourages people of all ages to use the walkways by ensuring that they have a place to rest along the way. Bike racks accommodate bicyclists traveling to their destinations and trash and recycle receptacles promote cleanliness and sustainability. Landscaped planters and movable furniture also offer aesthetic and placemaking benefits to the sidewalk.

7.7 GREEN STREETS

Green streets is a term associated with a range of stormwater management techniques that convert impervious street surfaces into landscaped green spaces that capture and filter stormwater. Conventional stormwater solutions operate by collecting the groundwater and directing it to adjacent water bodies or sewage treatment plants. The collected stormwater can cause infrastructure problems and transfer pollutants from the street into local water bodies. Green streets convert stormwater into a resource that replenishes groundwater supplies.

BIORETENTION

Bioretention facilities use amended soils and vegetation to absorb, hold, evaporate and clean polluted runoff from the streets. By reducing the peak rate and the total runoff volume, these facilities decrease the negative downstream or downslope impacts of storm events. With the right underlying geologic conditions, bioretention systems can be designed to clean stormwater then allow it to infiltrate, thus decreasing transport of some pollutants and recharging groundwater supply. In the right-of-way, bioretention systems can be integrated into site design as linear features (e.g. bioretention swales) or as cells (e.g. rain gardens and stormwater planters). Additional community benefits from bioretention facilities can include improved property values, increased habitat, a better environment for walking, and traffic calming. Opportunity areas for using bioretention systems in streets include within traffic calming curb bulbouts, in roadside bioswales, and in place of standard landscape plantings on streets.

Bioretention Cells/Bioretention Swales

Bioretention cells are shallow planted depressions that utilize climate-appropriate plants and soils to retain and treat stormwater. Bioretention cells promote transpiration of stormwater through the vegetation; detention of stormwater in the pores of amended and native soils; cleansing of stormwater through various mechanisms that include sedimentation, filtration, adsorption, and phytoremediation; and retention of stormwater via infiltration into native soils.

Bioretention cells may have underdrains to help convey excess water below the soil surface. Conveyance may be a secondary, but not the primary purpose for bioretention cells. All bioswales perform some amount of conveyance, but those considered to be bioretention systems also allow infiltration of stormwater into surrounding soils. Bioswales have been shown to remove 70% of total suspended solids, 30% of total phosphorus, 25% of total nitrogen, 50-90% of certain metals, and 67-93% of oil and



Green Streets use a range of stormwater management techniques to establish point-source filtration and mitigate problems from pooling.

grease pollutants in stormwater.¹ Bioswales are recommended for use adjacent to drive lanes, in place of conventional in-road features (such as curbs and gutters) and as vegetated buffers between vehicular and pedestrian areas.

Rain gardens are typically designed with a ponding depth of less than 18" in order to meet small-scale flow control and water quality requirements and may be formed in any shape. An overflow, either piped or natural, is typically included to manage higher flows and convey runoff to a public storm drain, channel or natural outlet. The area of a rain garden is generally sized to equal 5% of the area being treated. They can be particularly effective at removing heavy metals; reductions of up to 95% of lead, copper and zinc, and 70-85% of total phosphorus and nitrogen have been noted.² Rain gardens are useful strategies for managing stormwater in areas adjacent to parking, such as

- 1 Davis, A.P. and McCuen, R.H. 2005. Stormwater Management for Smart Growth. Springer. Page 236.
- 2 Davis, A.P. and McCuen, R.H. 2005. Stormwater Management for Smart Growth. Springer. Page 241.



Bioswales remove silt and contaminants from surface water runoff and are commonly implemented near parking lots where vehicle pollution is aggregated.

within tree islands, along pedestrian zones, in center roadway medians, and in unused open space, including front yards.

Bioretention Planters

Bioretention planters are similar in design and function to rain gardens, but have a more defined shape and vertical sides, and may employ an impermeable bottom layer or enclosure. The planters are often constructed of concrete, making them well-suited for urban applications where water needs to be directed away from building foundations. Stormwater planters consist of a planter box made of sturdy material, amended soils, a gravel drainage layer, and plants. An overflow is incorporated to manage higher flows and convey runoff to the public storm drain system, either via a perforated pipe or via surface flow. Although stormwater planters can be designed without a bottom to allow infiltration, they are typically designed to focus on flow control and attenuation to the public storm drain system. They are particularly effective at handling low intensity storms. In the right of way, stormwater



Bioretention Planters combine engineered stormwater control with aesthetic landscaping to collect and absorb runoff from nearby paved surfaces.

planters are recommended adjacent to buildings, sidewalks, and pedestrian plazas where flow control is a significant concern and space is at a premium. Planters can also be designed to serve a conveyance function in the public right of way where there is insufficient width to provide sloped sides (i.e., a swale) or the grade would be too steep. Stormwater planters provide aesthetic benefits and, depending on plant selection and design, can provide water, food and nesting materials for birds.

7.8 INTERSECTION IMPROVEMENTS

The quality of treatments at an intersection can significantly affect the efficiency, comfort, and safety of all modes as they pass through the area. The treatments needed to improve

an intersection will depend on factors such as vehicle traffic, the importance of the connection, and the age and abilities of the users. Special attention should be paid to the design and material treatments to provide comfortable and safe bicycle and pedestrian crossings. Intersection improvements include:

Minimize curb radius - The size of a curb's radius can have a significant impact on pedestrian comfort and safety. A smaller curb radius provides more pedestrian area at the corner, allows more flexibility in the placement of curb ramps, results in a shorter crossing distance and requires vehicles to slow more on the intersection approach. During the design phase, the chosen radius should be the smallest possible for the circumstances. One effective way of minimizing the curb ramp radius is by adding curb extensions.

High-visibility crosswalks - A marked crosswalk signals to motorists that they must stop for pedestrians and encourages pedestrians to cross at designated locations. Installing crosswalks alone will not necessarily make crossings safer, especially on multi-lane roadways. However, high-visibility crosswalks make crossings more visible to motorists and add a sense of security for pedestrians. High-visibility crosswalks should be combined with advanced stop bars and other tools to increase safety. At mid-block locations, crosswalks can be marked where there is a demand for crossing and there are no nearby marked crosswalks.

Median pedestrian refuge: - Median pedestrian refuges at intersections provide pedestrians with a secure place to stand in case they are unable to walk the entire distance of the crossing in one movement. This is especially important for young,

elderly and disabled users in areas where crossing distances are great.

Raised crosswalks and intersections - A raised crosswalk or intersection can eliminate grade changes from the pedestrian path and give pedestrians greater prominence as they cross the street. Raised crosswalks should be used where a special emphasis on pedestrians is desired.

Bicycle intersection treatments - Designs for intersections with bicycle facilities should reduce conflict between bicyclists (and other vulnerable road users) and vehicles by heightening the level of visibility, denoting clear right-of-way and facilitating eye contact and awareness with other modes. Intersection treatments can improve both queuing and merging maneuvers for bicyclists, and are often coordinated with timed or specialized signals. The configuration of a safe intersection for bicyclists may include elements such as color, signage, medians, signal detection and pavement markings. Intersection design should take

into consideration existing and anticipated bicyclist, pedestrian and motorist movements. In all cases, the degree of mixing or separation between bicyclists and other modes is intended to reduce the risk of crashes and increase bicyclist comfort. The level of treatment required for bicyclists at an intersection will depend on the bicycle facility type used, whether bicycle facilities are intersecting, and the adjacent street function and land use.

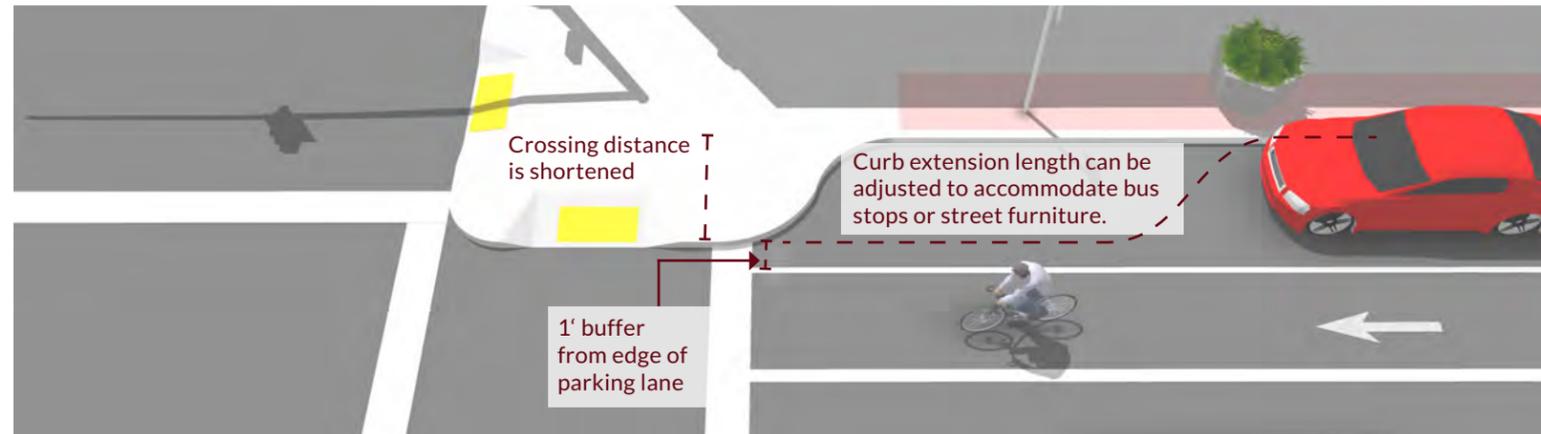
Curb extensions - Curb extensions minimize pedestrian exposure during crossing by shortening crossing distance and giving pedestrians a better chance to see and be seen before committing to crossing. They are appropriate for any crosswalk where it is desirable to shorten the crossing distance and there is a parking lane adjacent to the curb.

Intersection parking control - Parking control involves restricting or reducing on-street parking near intersections with high pedestrian activity. Locating parking away from the intersection

improves motorist's visibility on the approach to the intersection and crosswalk. Improved sight lines at intersections reduces conflicts between motorists and pedestrians. This can be accomplished in part through the use of curb extensions.

ADA compliant sidewalk ramps - Sidewalk ramps are the design elements that allow all users to make the transition between the street and the sidewalk. There are a number of factors to be considered in the design and placement of curb ramps at corners. Properly designed sidewalk ramps ensure that the sidewalk is accessible from the roadway. A sidewalk without a ramp can be useless to someone in a wheelchair, forcing them back into a driveway and out into the street for access.

Roundabouts - Roundabouts are circular intersections that provide an alternative to stop-controlled intersections. Roundabouts allow vehicles to freely flow through an intersection; they use yield control for all entering traffic and channelized approaches induce slower speeds. Compared to



Curb Extensions shorten the crossing distance and minimize pedestrian exposure on the roadway.



Continental Crosswalk Markings should be used at crossings with high pedestrian use or where vulnerable pedestrians are expected.



Roundabout are much smaller than modern roundabouts and are typically used in residential neighborhoods to slow traffic speeds and reduce accidents.

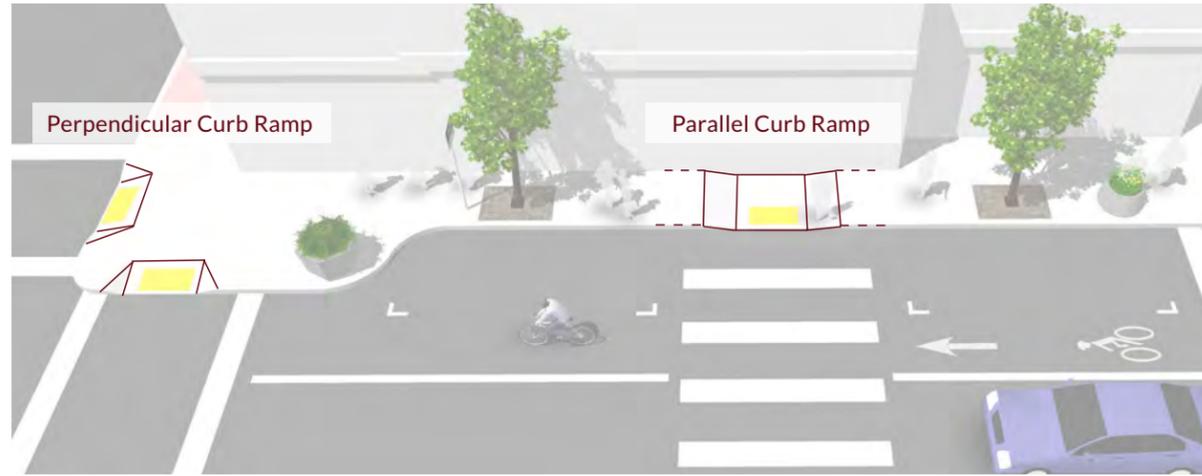
stop-controlled intersections, roundabouts improve safety, reduce crashes and vehicle speeds, increase capacity, and improve aesthetics. Considerations for determining whether a roundabout is appropriate for a given location include: the design vehicle(s), typical vehicle capacity, thoroughfare type, use by disabled and visually impaired individuals, and the effects on pedestrian route directness.¹ It is also important to indicate to motorists, bicyclists, and pedestrians the right of way rules and the correct way for them to circulate through the intersection by using appropriately designed signage, pavement markings, and geometric design elements.

MID-BLOCK CROSSING TREATMENTS

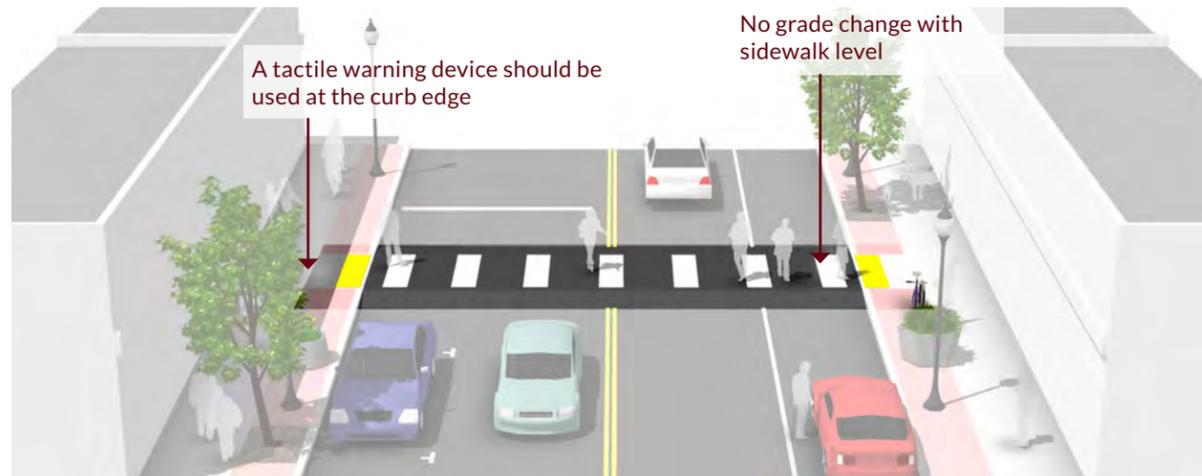
Median pedestrian refuge island - Median refuge islands are located at the mid-point of a marked crossing and help improve pedestrian safety by allowing pedestrians to cross one direction of traffic at a time. Refuge islands minimize pedestrian exposure by shortening crossing distance and increasing the number of available gaps for crossing. These can be combined with curb extensions for added traffic calming.

Active warning beacons - Active warning beacons are pedestrian or bicyclist actuated illuminated devices designed to increase motor vehicle yielding compliance at crossings of multi lane or high volume roadways. Types of active warning beacons include conventional circular yellow flashing beacons, in-roadway warning lights, or Rectangular Rapid Flash Beacons (RRFB).

¹ Institute of Transportation Engineers. 2006. Designing Walkable Urban Thoroughfares: A Context Sensitive Approach.



ADA Compliant Curb Ramps will be marked with a tactile and color contrasting material to alert people with visual impairments to changes.



Mid-Block Crossings use a combination of refuge islands, active warning beacons, hybrid beacons, or high visibility/raised material to maximize safety.

In-street pedestrian crossing signs - In-street pedestrian crossing signs reinforce the presence of crosswalks and remind motorists of their legal obligation to yield for pedestrians in marked or unmarked crosswalks. This signage is often placed at high-volume pedestrian crossings that are not signalized. This is a low-cost treatment that has shown significant improvements to driver slowing and yielding rates at crosswalks.

BICYCLE + PEDESTRIAN SIGNALS

Countdown pedestrian signals - Pedestrian signal indicators demonstrate to pedestrians when to cross at a signalized crosswalk. Ideally, all traffic signals should be equipped with pedestrian signal indications except where pedestrian crossing is prohibited by signage.

Countdown pedestrian signals are particularly valuable for pedestrians, as they indicate whether a pedestrian has time to cross the street before the signal phase ends. Countdown signals should be used at all signalized intersections. Designers



Push Buttons should be located so that someone in a wheelchair can reach the button from a level area and marked so it is clear which signal is affected.

should allow greater signal timing for crossing along large roadways, areas with a high frequency of pedestrian crossing and areas where seniors or disabled persons are expected.

Accessible pedestrian signals should be used in locations where visual or hearing impaired individuals can be expected. Also consider utilizing a leading pedestrian interval, where pedestrians are allowed in the intersection 3 seconds in advance of vehicles, in areas with frequent motor vehicle and pedestrian traffic

Hybrid Beacons - A hybrid beacon, previously known as a High-intensity Activated Crosswalk (HAWK), consists of a signal-head with two red lenses over a single yellow lens on the major street, and pedestrian and/or bicycle signal heads for the minor street.

Hybrid beacons are primarily applied at mid-block pedestrian or trail crossings where non-motorized crossing volumes and crossing distance and/or motorized traffic volumes and speeds raise



Wayfinding signage is often designed to reflect the unique local character and history of a city or location.

significant safety and accessibility concerns. Hybrid Beacons are also sometimes used to improve non-motorized crossings of major streets at intersections where side-street volumes do not support installation of a conventional traffic signal (or where there are concerns that a conventional signal will encourage additional motor vehicle traffic on the minor street).

7.9 WAYFINDING

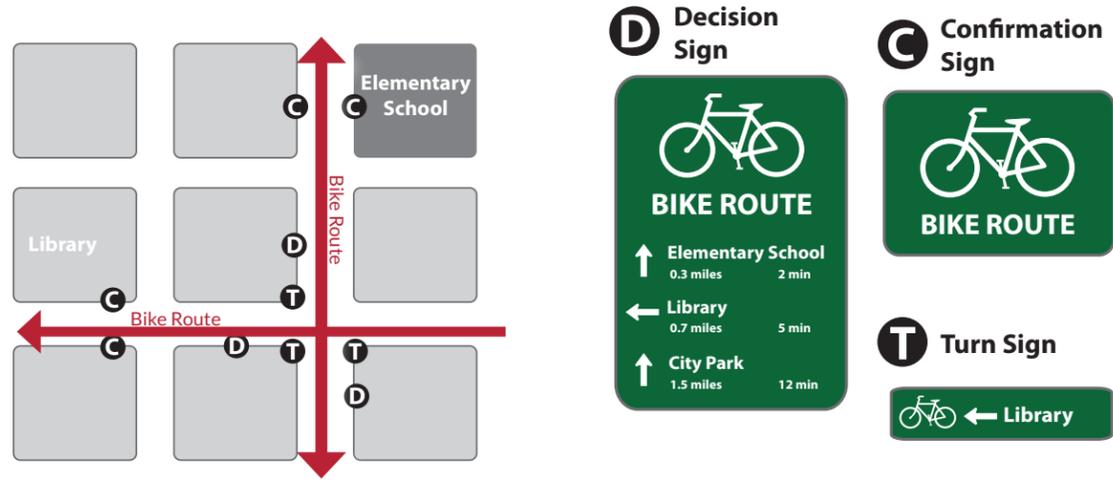
The ability to navigate through a city is informed by landmarks, natural features, and other visual cues. Signs along a corridor exist to raise awareness of a topic and to provide wayfinding for all modes. Wayfinding signage should indicate the location of destinations, the travel distance/time to those destinations, and the location of travel. Wayfinding signage can also improve the safety and awareness of bicyclists and pedestrians by alerting motorists that they are driving along a bicycle route or pedestrian-trafficked area.



A Bicycle Wayfinding System consists of comprehensive signing and/or pavement markings to guide bicyclists to their destination.

Wayfinding signs are typically placed at key locations leading to and along important transportation routes. It is recommended that these signs be posted at a level where the intended users may best view the information. As such, pedestrian, bicyclists, and motor vehicle wayfinding signs will be posted at various levels.

Gateway signage is also an important component to a wayfinding system. A gateway sign reflects the City's brand and should be designed to reflect the historical aspects of Stratford. A family of sign types based on the gateway logo and color palette can also be created to establish an easily-recognizable theme to complement streetscaping elements and wayfinding clarity.



Wayfinding signs placed along important transportation routes help users navigate to key destinations.

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APPENDIX B

COST ESTIMATES

PROPOSAL ESTIMATE FOR THE CONSTRUCTION OF:
MAIN STREET, CENTRAL

- Area studied to develop cost per linear foot: between Judson Place and Essex Place
- Total corridor length: from E. Broadway Street to Barnum Avenue

ITEM	UNIT	QUANTITY	PRICE	AMOUNT
CLEARING AND GRUBBING	l.s.	1	\$16,026.01	\$16,026.01
EARTH EXCAVATION	c.y.	380	\$18.00	\$6,844.00
REMOVAL OF CONCRETE CURBING	l.f.	717	\$3.60	\$2,581.20
SUBBASE	c.y.	108	\$30.20	\$3,261.60
HMA S1	ton	75	\$96.80	\$7,260.00
HMA S0.5	ton	38	\$106.80	\$4,058.40
HMA S0.375	ton	28	\$103.80	\$2,906.40
MATERIAL FOR TACK COAT	gal	33	\$4.40	\$145.20
ASPHALT ADJUSTMENT COST	est.	1	\$1,000.00	\$1,000.00
CONCRETE CURBING	l.f.	5600	\$20.80	\$116,480.00
CONCRETE SIDEWALK	s.f.	45600	\$10.40	\$474,240.00
CONCRETE DRIVEWAY APRON	s.f.	5800	\$12.80	\$74,240.00
REMOVAL OF BITUMINOUS TYPE PAVEMENT	s.y.	1700	\$50.00	\$85,000.00
DETECTABLE WARNING STRIP	ea.	29	\$150.00	\$4,350.00
MAINTENANCE AND PROTECTION OF TRAFFIC	l.s.	1	\$32,052.03	\$32,052.03
MOBILIZATION	l.s.	1	\$56,091.05	\$56,091.05
CONSTRUCTION STAKING	l.s.	1	\$8,013.01	\$8,013.01
12" WHITE EPOXY RESIN PAVEMENT MARKINGS	l.f.	2150	\$1.00	\$2,150.00
12" GREEN EPOXY RESIN PAVEMENT MARKINGS	l.f.	450	\$15.00	\$6,750.00
4" WHITE EPOXY RESIN PAVEMENT MARKINGS	l.f.	8397	\$0.20	\$1,679.32
4" YELLOW EPOXY RESIN PAVEMENT MARKINGS	l.f.	2055	\$0.40	\$821.80
EPOXY RESIN PAVEMENT MARKINGS, SYMBOLS AND LEGENDS	s.f.	479	\$3.20	\$1,532.80
REMOVAL OF PAVEMENT MARKINGS	s.f.	10000	\$0.60	\$6,000.00
3" CALIPER DECIDUOUS TREE	ea.	60	\$900.00	\$54,000.00
FURNISHING AND PLACING TOPSOIL	s.y.	5365	\$5.80	\$31,117.00
TURF ESTABLISHMENT	s.y.	4690	\$1.40	\$6,566.00
RAIN GARDENS	s.f.	6065	\$42.00	\$254,730.00
BENCHES	ea.	10	\$1,500.00	\$15,000.00
BIKE RACKS	ea.	6	\$1,000.00	\$6,000.00
TRASH RECEPTACLES	ea.	5	\$1,250.00	\$6,250.00
SUBTOTAL				\$1,287,145.82
25% INCIDENTALS				\$321,786.46
30% CONTINGENCIES				\$386,143.75
CONSTRUCTION COST OF STUDIED CORRIDOR				\$1,995,076.02
CORRIDOR LENGTH STUDIED (FEET)				2530
CONSTRUCTION COST PER LINEAR FOOT				\$788.57
TOTAL CORRIDOR LENGTH (FEET)				2500
CONSTRUCTION COST FOR ENTIRE CORRIDOR				\$1,971,418.99
DESIGN FEE FOR ENTIRE CORRIDOR				\$197,141.90
GRAND TOTAL FOR ENTIRE CORRIDOR				\$2,168,560.89

PROPOSAL ESTIMATE FOR THE CONSTRUCTION OF:
MAIN STREET, NORTH

- Area studied to develop cost per linear foot: between Garden Street East and Wilcoxson Avenue
- Total corridor length: from Barnum Avenue to Wilcoxson Avenue

ITEM	UNIT	QUANTITY	PRICE	AMOUNT
CLEARING AND GRUBBING	l.s.	1	\$13,627.80	\$13,627.80
EARTH EXCAVATION	c.y.	400	\$18.00	\$7,200.00
REMOVAL OF CONCRETE CURBING	l.f.	2000	\$3.60	\$7,200.00
CONCRETE CURBING	l.f.	6000	\$20.80	\$124,800.00
CONCRETE SIDEWALK	s.f.	37600	\$10.40	\$391,040.00
CONCRETE DRIVEWAY APRON	s.f.	4750	\$12.80	\$60,800.00
REMOVAL OF BITUMINOUS TYPE PAVEMENT	s.y.	1500	\$50.00	\$75,000.00
DETECTABLE WARNING STRIP	ea.	12	\$150.00	\$1,800.00
MAINTENANCE AND PROTECTION OF TRAFFIC	l.s.	1	\$27,255.60	\$27,255.60
MOBILIZATION	l.s.	1	\$47,697.30	\$47,697.30
CONSTRUCTION STAKING	l.s.	1	\$6,813.90	\$6,813.90
12" WHITE EPOXY RESIN PAVEMENT MARKINGS	l.f.	550	\$1.00	\$550.00
12" GREEN EPOXY RESIN PAVEMENT MARKINGS	l.f.	400	\$15.00	\$6,000.00
4" WHITE EPOXY RESIN PAVEMENT MARKINGS	l.f.	11300	\$0.20	\$2,260.00
4" YELLOW EPOXY RESIN PAVEMENT MARKINGS	l.f.	2100	\$0.40	\$840.00
EPOXY RESIN PAVEMENT MARKINGS, SYMBOLS AND LEGENDS	s.f.	600	\$3.20	\$1,920.00
REMOVAL OF PAVEMENT MARKINGS	s.f.	3300	\$0.60	\$1,980.00
3" CALIPER DECIDUOUS TREE	ea.	70	\$900.00	\$63,000.00
FURNISHING AND PLACING TOPSOIL	s.y.	4100	\$5.80	\$23,780.00
TURF ESTABLISHMENT	s.y.	3800	\$1.40	\$5,320.00
RAIN GARDENS	s.f.	2700	\$42.00	\$113,400.00
BENCHES	ea.	6	\$1,500.00	\$9,000.00
BIKE RACKS	ea.	6	\$1,000.00	\$6,000.00
TRASH RECEPTACLES	ea.	5	\$1,250.00	\$6,250.00
SUBTOTAL				\$1,003,534.60
25% INCIDENTALS				\$250,883.65
30% CONTINGENCIES				\$301,060.38
CONSTRUCTION COST OF STUDIED CORRIDOR				\$1,555,478.63
CORRIDOR LENGTH STUDIED (FEET)				2000
CONSTRUCTION COST PER LINEAR FOOT				\$777.74
TOTAL CORRIDOR LENGTH (FEET)				4100
CONSTRUCTION COST FOR ENTIRE CORRIDOR				\$3,188,731.19
DESIGN FEE FOR ENTIRE CORRIDOR				\$318,873.12
GRAND TOTAL FOR ENTIRE CORRIDOR				\$3,507,604.31

PROPOSAL ESTIMATE FOR THE CONSTRUCTION OF:
MAIN STREET, SOUTH

- Area studied to develop cost per linear foot: between Judson Place and Essex Place
- Total corridor length: from Stratford Avenue to E. Broadway Street

ITEM	UNIT	QUANTITY	PRICE	AMOUNT
CLEARING AND GRUBBING	l.s.	1	\$16,026.01	\$16,026.01
EARTH EXCAVATION	c.y.	380	\$18.00	\$6,844.00
REMOVAL OF CONCRETE CURBING	l.f.	717	\$3.60	\$2,581.20
SUBBASE	c.y.	108	\$30.20	\$3,261.60
HMA S1	ton	75	\$96.80	\$7,260.00
HMA S0.5	ton	38	\$106.80	\$4,058.40
HMA S0.375	ton	28	\$103.80	\$2,906.40
MATERIAL FOR TACK COAT	gal	33	\$4.40	\$145.20
ASPHALT ADJUSTMENT COST	est.	1	\$1,000.00	\$1,000.00
CONCRETE CURBING	l.f.	5600	\$20.80	\$116,480.00
CONCRETE SIDEWALK	s.f.	45600	\$10.40	\$474,240.00
CONCRETE DRIVEWAY APRON	s.f.	5800	\$12.80	\$74,240.00
REMOVAL OF BITUMINOUS TYPE PAVEMENT	s.y.	1700	\$50.00	\$85,000.00
DETECTABLE WARNING STRIP	ea.	29	\$150.00	\$4,350.00
MAINTENANCE AND PROTECTION OF TRAFFIC	l.s.	1	\$32,052.03	\$32,052.03
MOBILIZATION	l.s.	1	\$56,091.05	\$56,091.05
CONSTRUCTION STAKING	l.s.	1	\$8,013.01	\$8,013.01
12" WHITE EPOXY RESIN PAVEMENT MARKINGS	l.f.	2150	\$1.00	\$2,150.00
12" GREEN EPOXY RESIN PAVEMENT MARKINGS	l.f.	450	\$15.00	\$6,750.00
4" WHITE EPOXY RESIN PAVEMENT MARKINGS	l.f.	8397	\$0.20	\$1,679.32
4" YELLOW EPOXY RESIN PAVEMENT MARKINGS	l.f.	2055	\$0.40	\$821.80
EPOXY RESIN PAVEMENT MARKINGS, SYMBOLS AND LEGENDS	s.f.	479	\$3.20	\$1,532.80
REMOVAL OF PAVEMENT MARKINGS	s.f.	10000	\$0.60	\$6,000.00
3" CALIPER DECIDUOUS TREE	ea.	60	\$900.00	\$54,000.00
FURNISHING AND PLACING TOPSOIL	s.y.	5365	\$5.80	\$31,117.00
TURF ESTABLISHMENT	s.y.	4690	\$1.40	\$6,566.00
RAIN GARDENS	s.f.	6065	\$42.00	\$254,730.00
BENCHES	ea.	10	\$1,500.00	\$15,000.00
BIKE RACKS	ea.	6	\$1,000.00	\$6,000.00
TRASH RECEPTACLES	ea.	5	\$1,250.00	\$6,250.00
			SUBTOTAL	\$1,287,145.82
			25% INCIDENTALS	\$321,786.46
			30% CONTINGENCIES	\$386,143.75
			CONSTRUCTION COST OF STUDIED CORRIDOR	\$1,995,076.02
			CORRIDOR LENGTH STUDIED (FEET)	2530
			CONSTRUCTION COST PER LINEAR FOOT	\$788.57
			TOTAL CORRIDOR LENGTH (FEET)	2300
			CONSTRUCTION COST FOR ENTIRE CORRIDOR	\$1,813,705.47
			DESIGN FEE FOR ENTIRE CORRIDOR	\$181,370.55
			GRAND TOTAL FOR ENTIRE CORRIDOR	\$1,995,076.02

PROPOSAL ESTIMATE FOR THE CONSTRUCTION OF:
FERRY BOULEVARD

- Area studied to develop cost per linear foot: between Lockwood Avenue and Willow Avenue
- Total corridor length: from Main Street to the Exit 33 off-ramp

ITEM	UNIT	QUANTITY	PRICE	AMOUNT
CLEARING AND GRUBBING	l.s.	1	\$9,249.50	\$9,249.50
EARTH EXCAVATION	c.y.	1900	\$18.00	\$34,200.00
SUBBASE	c.y.	950	\$30.20	\$28,690.00
HMA S1	ton	650	\$96.80	\$62,920.00
HMA S0.5	ton	350	\$106.80	\$37,380.00
HMA S0.375	ton	250	\$103.80	\$25,950.00
MATERIAL FOR TACK COAT	gal	300	\$4.40	\$1,320.00
ASPHALT ADJUSTMENT COST	est.	1	\$2,000.00	\$2,000.00
CONCRETE CURBING	l.f.	7800	\$20.80	\$162,240.00
CONCRETE SIDEWALK	s.f.	35700	\$10.40	\$371,280.00
CONCRETE DRIVEWAY APRON	s.f.	1800	\$12.80	\$23,040.00
REMOVAL OF BITUMINOUS TYPE PAVEMENT	s.y.	3050	\$50.00	\$152,500.00
DETECTABLE WARNING STRIP	ea.	10	\$150.00	\$1,500.00
BITUMINOUS CONCRETE DRIVEWAY	s.y.	350	\$41.20	\$14,420.00
MAINTENANCE AND PROTECTION OF TRAFFIC	l.s.	1	\$36,998.00	\$36,998.00
MOBILIZATION	l.s.	1	\$64,746.50	\$64,746.50
CONSTRUCTION STAKING	l.s.	1	\$9,249.50	\$9,249.50
12" WHITE EPOXY RESIN PAVEMENT MARKINGS	l.f.	850	\$1.00	\$850.00
12" GREEN EPOXY RESIN PAVEMENT MARKINGS	l.f.	100	\$15.00	\$1,500.00
4" YELLOW EPOXY RESIN PAVEMENT MARKINGS	l.f.	5600	\$0.40	\$2,240.00
EPOXY RESIN PAVEMENT MARKINGS, SYMBOLS AND LEGENDS	s.f.	200	\$3.20	\$640.00
REMOVAL OF PAVEMENT MARKINGS	s.f.	3800	\$0.60	\$2,280.00
PERMEABLE PAVERS	s.f.	3960	\$22.00	\$87,120.00
3" CALIPER DECIDUOUS TREE	ea.	200	\$900.00	\$180,000.00
FURNISHING AND PLACING TOPSOIL	s.y.	8050	\$5.80	\$46,690.00
TURF ESTABLISHMENT	s.y.	3860	\$1.00	\$3,860.00
WETLAND GRASS ESTABLISHMENT	s.y.	4000	\$2.00	\$8,000.00
RAIN GARDENS	s.f.	1700	\$42.00	\$71,400.00
BENCHES	ea.	10	\$1,500.00	\$15,000.00
DECORATIVE LIGHT POLE W/ SINGLE LUMINAIRE	ea.	25	\$5,000.00	\$125,000.00
TRASH RECEPTACLES	ea.	3	\$1,250.00	\$3,750.00
			SUBTOTAL	\$1,586,013.50
			25% INCIDENTALS	\$396,503.38
			30% CONTINGENCIES	\$475,804.05
			CONSTRUCTION COST OF STUDIED CORRIDOR	\$2,458,320.93
			CORRIDOR LENGTH STUDIED (FEET)	2575
			CONSTRUCTION COST PER LINEAR FOOT	\$954.69
			TOTAL CORRIDOR LENGTH (FEET)	4650
			CONSTRUCTION COST FOR ENTIRE CORRIDOR	\$4,439,297.98
			DESIGN FEE FOR ENTIRE CORRIDOR	\$443,929.80
			GRAND TOTAL FOR ENTIRE CORRIDOR	\$4,883,227.78

PROPOSAL ESTIMATE FOR THE CONSTRUCTION OF:
NICHOLS AVENUE

- Area studied to develop cost per linear foot: between Johnson Avenue and Marcroft Street
- Total corridor length: from Barnum Avenue to Lincoln Street

ITEM	UNIT	QUANTITY	PRICE	AMOUNT
CLEARING AND GRUBBING	l.s.	1	\$9,629.80	\$9,629.80
EARTH EXCAVATION	c.y.	400	\$18.00	\$7,200.00
REMOVAL OF CONCRETE CURBING	l.f.	750	\$3.60	\$2,700.00
CONCRETE CURBING	l.f.	1900	\$20.80	\$39,520.00
CONCRETE SIDEWALK	s.f.	32000	\$10.40	\$332,800.00
CONCRETE DRIVEWAY APRON	s.f.	5500	\$12.80	\$70,400.00
REMOVAL OF BITUMINOUS TYPE PAVEMENT	s.y.	350	\$50.00	\$17,500.00
DETECTABLE WARNING STRIP	ea.	28	\$150.00	\$4,200.00
MAINTENANCE AND PROTECTION OF TRAFFIC	l.s.	1	\$19,259.60	\$19,259.60
MOBILIZATION	l.s.	1	\$33,704.30	\$33,704.30
CONSTRUCTION STAKING	l.s.	1	\$4,814.90	\$4,814.90
12" WHITE EPOXY RESIN PAVEMENT MARKINGS	l.f.	1750	\$1.00	\$1,750.00
12" GREEN EPOXY RESIN PAVEMENT MARKINGS	l.f.	300	\$15.00	\$4,500.00
4" YELLOW EPOXY RESIN PAVEMENT MARKINGS	l.f.	2300	\$0.40	\$920.00
3" CALIPER DECIDUOUS TREE	ea.	50	\$900.00	\$45,000.00
FURNISHING AND PLACING TOPSOIL	s.y.	4060	\$5.80	\$23,548.00
TURF ESTABLISHMENT	s.y.	3585	\$1.40	\$5,019.00
RAIN GARDENS	s.f.	4280	\$42.00	\$179,760.00
BENCHES	ea.	5	\$1,500.00	\$7,500.00
BIKE RACKS	ea.	10	\$1,000.00	\$10,000.00
TRASH RECEPTACLES	ea.	3	\$1,250.00	\$3,750.00
SUBTOTAL				\$823,475.60
30% INCIDENTALS				\$247,042.68
30% CONTINGENCIES				\$247,042.68
CONSTRUCTION COST OF STUDIED CORRIDOR				\$1,317,560.96
CORRIDOR LENGTH STUDIED (FEET)				1540
CONSTRUCTION COST PER LINEAR FOOT				\$855.56
TOTAL CORRIDOR LENGTH (FEET)				5280
CONSTRUCTION COST FOR ENTIRE CORRIDOR				\$4,517,351.86
DESIGN FEE FOR ENTIRE CORRIDOR				\$451,735.19
GRAND TOTAL FOR ENTIRE CORRIDOR				\$4,969,087.05

PROPOSAL ESTIMATE FOR THE CONSTRUCTION OF:
BROAD AND W. BROAD STREETS

Total corridor length: from Ferry Boulevard to Linden Avenue

ITEM	UNIT	QUANTITY	PRICE	AMOUNT
CLEARING AND GRUBBING	l.s.	1	\$9,984.26	\$9,984.26
EARTH EXCAVATION	c.y.	200	\$18.00	\$3,600.00
REMOVAL OF CONCRETE CURBING	l.f.	717	\$3.60	\$2,581.20
BITUMINOUS CONCRETE PATCHING - FULL DEPTH	s.y.	350	\$78.20	\$27,370.00
CONCRETE CURBING	l.f.	3600	\$20.80	\$74,880.00
CONCRETE SIDEWALK	s.f.	12500	\$10.40	\$130,000.00
CONCRETE DRIVEWAY APRON	s.f.	900	\$12.80	\$11,520.00
REMOVAL OF BITUMINOUS TYPE PAVEMENT	s.y.	350	\$50.00	\$17,500.00
BITUMINOUS CONCRETE SIDEWALK	s.y.	3000	\$72.60	\$217,800.00
DETECTABLE WARNING STRIP	ea.	24	\$150.00	\$3,600.00
MAINTENANCE AND PROTECTION OF TRAFFIC	l.s.	1	\$19,968.53	\$19,968.53
MOBILIZATION	l.s.	1	\$34,944.92	\$34,944.92
CONSTRUCTION STAKING	l.s.	1	\$4,992.13	\$4,992.13
12" WHITE EPOXY RESIN PAVEMENT MARKINGS	l.f.	3250	\$1.00	\$3,250.00
12" GREEN EPOXY RESIN PAVEMENT MARKINGS	l.f.	300	\$15.00	\$4,500.00
4" WHITE EPOXY RESIN PAVEMENT MARKINGS	l.f.	7300	\$0.20	\$1,460.00
4" YELLOW EPOXY RESIN PAVEMENT MARKINGS	l.f.	2400	\$0.40	\$960.00
EPOXY RESIN PAVEMENT MARKINGS, SYMBOLS AND LEGENDS	s.f.	60	\$3.20	\$192.00
3" CALIPER DECIDUOUS TREE	ea.	55	\$900.00	\$49,500.00
FURNISHING AND PLACING TOPSOIL	s.y.	2905	\$5.80	\$16,849.00
TURF ESTABLISHMENT	s.y.	2670	\$1.40	\$3,738.00
RAIN GARDENS	s.f.	2130	\$42.00	\$89,460.00
BENCHES	ea.	5	\$1,500.00	\$7,500.00
SUBTOTAL				\$736,150.05
30% INCIDENTALS				\$220,845.01
30% CONTINGENCIES				\$220,845.01
CONSTRUCTION COST FOR ENTIRE CORRIDOR				\$1,177,840.08
TOTAL CORRIDOR LENGTH (FEET)				4075
CONSTRUCTION COST PER LINEAR FOOT				\$289.04
DESIGN FEE FOR ENTIRE CORRIDOR				\$117,784.01
GRAND TOTAL FOR ENTIRE CORRIDOR				\$1,295,624.08

APPENDIX C

WEST HARTFORD COMPLETE STREETS POLICY

SUBSTITUTE

RESOLUTION ADOPTING A COMPLETE STREETS POLICY FOR THE TOWN OF WEST HARTFORD

WHEREAS, the Town of West Hartford actively promotes safe streets through design, education and enforcement of all of its transportation network; and

WHEREAS, Complete Streets are Right-of-Ways that are planned, designed, constructed, operated and maintained in such a way as to enable safe, comfortable and convenient access along and across the Right-of-Way by users of all ages and abilities, including but not limited to, pedestrians, bicyclists, transit riders, motorists, emergency, freight and commercial vehicle operators; and

WHEREAS, Complete Streets may include facilities and amenities, including but not limited to, pavement markings and signs; sidewalks and pedestrian safety improvements such as medians, curb extensions and crosswalks; ADA (Americans with Disabilities Act) accessible curb ramps and accessible pedestrian signals; transit shelters and signage and improved pedestrian and bicycle access to transit stops and stations; bicycle detection at intersections and wide travel lanes, bike lanes, or shared use lanes; bicycle parking facilities; street trees, landscaping, street lighting, street furniture; and adequate drainage facilities, including opportunities for storm water quality treatment facilities; and

WHEREAS, the Town's Bicycle Advisory Committee advocates for and the Town's Master Bike Plan recommends "Adopt[ing] a Complete Streets Policy"; and

WHEREAS, the Town's Plan of Conservation and Development has specifically recommended "Promot[ing] an integrated and balanced 'complete street' transportation systems which provides the best possible service, mobility, convenience, and safety while reinforcing positive social, economic, and environmental influences on West Hartford"; and

WHEREAS, the Town Council adopted a resolution directing the Town Manager to consult with interested stakeholders and prepare a policy that demonstrates the Town's commitment to the development of Complete Streets for the benefit of the entire community; and

NOW, THEREFORE, BE IT RESOLVED BY THE TOWN COUNCIL OF WEST HARTFORD that the attached Complete Streets Policy is adopted and shall be applicable to the planning and design of all new transportation and Complete Streets Improvements initiated after the adoption hereof.

Community Planning and Physical Services Committee
(Davidoff, Kindall, Hall)
7-21-15

Town of West Hartford Complete Streets Policy

1. VISION

Complete Streets are necessary to promote an integrated and balanced transportation network. Complete Streets strive to provide the best possible blend of service, mobility, and convenience, and safety while reinforcing a positive social, economic, and environmental influence on West Hartford.

Complete Streets are a vital component of the Town's transportation network and contribute directly to the health, safety, economic vitality and quality of life in the West Hartford Community. Through implementation of Complete Streets principles, the transportation network in West Hartford will be safe, accessible, comfortable and convenient for all transportation users.

2. GOALS

The goal of the Complete Street Policy is to ensure our Town roadways complement and enhance the surrounding land use and neighborhood character and accommodate all users, including drivers, bicyclists, pedestrians and transit patrons, older residents, children and persons with mobility impairments. The specific goals are:

- a. To protect and preserve the environment of the Town of West Hartford by reducing the emission of greenhouse gases, and reducing the consumption of non-renewable energy resources.
- b. To ensure the neighborhoods of West Hartford remain vibrant and livable.
- c. To expand opportunities for bicyclists and pedestrians throughout the Town.
- d. To make the roadway and street environment safer and more inviting by reducing the frequency and severity of vehicular, bicycle and pedestrian-related accidents.
- e. To ensure safe pedestrian and bicycle routes for children to get to school.
- f. To improve and enhance the health and physical fitness of the city's residents by providing more safe and convenient opportunities for bicycling and walking in West Hartford.
- g. To improve the Town's quality of life and local economy by providing high quality recreational and multi-modal transportation facilities and providing non-motorized means of transportation.

3. GUIDING PRINCIPLES

It is recognized that each Complete Street is unique and the following principles shall guide the development of transportation projects:

- a. Shall be suitable and appropriate to the function and context of the transportation facility;
- b. Shall be sensitive to the neighborhood context and cognizant of the neighborhood needs;
- c. Shall be flexible in project design to ensure that all users have basic safe access and use;
- d. Shall be considered a component of a comprehensive, integrated and interconnected transportation network that allows all users to choose between different modes of travel; and
- e. Shall be consistent and compatible with the Town's Plan of Conservation and Development and the Town's Bicycle Facilities Plan.

4. APPLICABILITY AND SCOPE

All Transportation Improvements and phases fall under this policy. Complete Streets principles will be applied to all Town- or State-sponsored improvements and all privately-funded projects and developments that impact the right-of-way. The Town will approach every planned Transportation Improvement as an opportunity to create safer and more accessible streets for all users. Transportation improvement phases include, but are not limited to, planning, programming, designing, engineering, construction and reconstruction, operation and maintenance.

Maintenance activities alone are not Complete Streets Improvements, nor should they prompt street improvements that necessitate Complete Streets consideration except those improvements that may be necessary to satisfy legal mandates such as the Americans with Disabilities Act. To the maximum extent possible, provisions for safe access shall be made for pedestrians and bicyclists during maintenance activities.

Complete Streets policy objectives may be achieved by implementing single elements into a project, completing a series of improvements over the course of time, or by developing major network level improvements.

The Town recognizes that its infrastructure includes a transportation network that should provide convenient access and safe travel for all users within the Town and beyond the Town's borders. Because of its regional impact, implementation of this policy reinforces the need for collaboration among the many regional partners and stakeholders affected by the implementation of this policy.

5. IMPLEMENTATION

The Town of West Hartford (Town) will plan, design, construct, operate and maintain appropriate Facilities for pedestrians, bicyclists, transit riders, motorists, children, the

elderly and people of all abilities in all new construction, reconstruction, and repaving improvements subject to the exceptions contained herein.

An important aspect of this Complete Streets policy is to ensure that West Hartford bicycle riders feel safe traveling within and through the Town. The Town currently lacks defined bicycle routes for convenient and easily accessible transportation through and around the Town. To address this, the Town Staff, in consultation with the Town's Bicycle Advisory Committee, shall develop a Bicycle Facility Plan. Such Plan shall be presented to the Council for adoption no later than nine (9) months from the adoption of this Complete Streets Policy, and shall be reviewed and/or updated every three years.

a. Definitions:

Bicycle Facilities Plan – A comprehensive plan and accompanying map that identifies a vision and framework for bicycle facility improvements to implement a continuous and easily accessible bicycle route network within and through the Town.

“Complete Streets” -- Right-of-ways that are planned, designed, constructed, operated and maintained in such a way as to enable safe, comfortable and convenient access along and across the Right-of-Way by users of all ages and abilities and modes of transportation.

Complete Streets Improvements -- Facilities and amenities associated with the transportation network, that are recognized as contributing to Complete Streets, such as, but not limited to, pavement markings and signs; sidewalks and pedestrian safety improvements such as medians, curb extensions and crosswalks; ADA (Americans with Disabilities Act) accessible curb ramps and accessible pedestrian signals; transit shelters and signage and improved pedestrian and bicycle access to transit stops and stations; bicycle detection at intersections and wide travel lanes, bike lanes, or shared use lanes; bicycle parking facilities; street trees, landscaping, street lighting, street furniture; and adequate drainage facilities, including opportunities for storm water quality treatment facilities.

Facilities - An area or structure which is built, installed or established to serve a particular purpose or transportation mode/user.

Maintenance Activity - Ordinary repair designed to keep Facilities in safe working condition, such as, but not limited to, mowing, cleaning, sweeping, spot repair, concrete joint repair, pothole filling, water, sewer and drainage or other utility installation or repairs.

Right-of-Way –An area, public or private, dedicated for use by pedestrians and vehicles. Right-of-way includes thoroughfares such as streets, highways, bike paths and walkways and normally incorporates curbs, lawn strips, street trees, sidewalks, lighting, signage, drainage facilities, street furniture and other similar features.

b. Cooperation and collaboration

The implementation of Complete Streets will require cooperation and collaboration between many stakeholders on a regular basis. As such, the Town will take the following steps to facilitate the process:

- The Planning Division shall review and propose revisions to all appropriate land use ordinances, policies and regulations to support the implementation of Complete Streets.
- The Planning and Engineering Divisions shall review, revise or recommend changes to all policies, procedures and design standards associated with site plan and other requirements for public and private development to ensure best practices are utilized to support Complete Streets.
- The Town shall continue to identify regional, state and federal funds to implement Complete Streets Improvements to supplement the Town's Capital Improvement Program.
- The Town shall promote collaboration and coordination between Town departments and other transportation and planning agencies, including the Connecticut Department of Transportation and Capitol Region Council of Governments that work within the Right-of-Way and utilize the transportation network for programmatic purposes in order to make the most efficient use of limited financial resources.
- The Engineering Division shall establish necessary procedures to ensure the application of Complete Streets principles at the earliest design stage.
- The Town shall encourage staff professional development in the area of Complete Streets through attendance at seminars, conferences and workshops.
- The Town shall actively promote public information and education and solicit feedback about Complete Streets to West Hartford stakeholders including but not limited to, Boards and Commissions, residents, community groups and leaders, the business community, and the private development community.

c. Exceptions

The Town is committed to Complete Streets and application of this policy and/or Complete Street principles will begin at the earliest phase of a project, except in the following extraordinary circumstances:

1. Where pedestrians and bicyclists are prohibited by law from using the Facility. (In such an instance, alternative facilities and accommodations shall be considered within the same transportation corridor.)
2. If the cost of constructing Complete Streets Improvements is disproportionate to the current need or anticipated future demand for such improvements.
3. Where there is an absence of current or projected need.

All requests for exceptions shall be submitted at the earliest project phase (e.g. during initial project planning and budgeting) and may include the following elements if available: a narrative, site photographs, project site map, drawings and any other supporting data. All proposed requests for exception shall be posted to the Town's website and distributed to stakeholder groups, including the Bicycle Advisory Committee, and shall be subject to a seven (7) day public comment period. At the end of the public comment period, all comments received, if any, shall be included in the final documentation for exception request. The final documentation shall be transmitted in the form of an exception request to the Town Manager.

For projects that do not include any state or federal funding, the Town Manager, acting in his or her capacity as the "Local Traffic Authority", in consultation with the Directors of Community Services and Public Works and upon recommendation from the Town Engineer shall determine whether the application of this policy and Complete Streets principles falls under one or more of the exceptions outlined above.

Notwithstanding the above, in accordance with the Connecticut General Statutes, as amended, where a transportation project includes state or federal transportation funding, the determination of the applicability of the exception request must be made by the Town Council. Once the Bicycle Facilities Plan is adopted by the Town Council, any recommendation for an exception to this policy that is objected to, where the exception concerns the Bicycle Facilities Plan, shall be brought to the Town Council for their approval or denial.

All granted exceptions shall be posted to the Town's website. Where exceptions are granted, parallel accommodations for the category of users excluded shall be considered on alternate routes within the transportation system.

6. BEST PRACTICES -- DESIGN GUIDANCE

The Town will follow accepted or adopted design standards and use the best and latest design standards available, including the following:

- American Association of State Highway and Transportation Officials (AASHTO)
 - A Policy on Geometric Design of Highways and Streets (6th Edition, 2011)
 - Guide for the Development of Bicycle Facilities (4th edition, 2012)
 - Guide for the Planning, Design and Operations of Pedestrian Facilities (2004)

- American Planning Association (APA)
 - Complete Streets: Best Policy and Implementation Practices (2012)
 - U.S. Traffic Calming Manual (2009)
- Federal Highway Administration (FHWA)
 - Manual of Uniform Traffic Control Devices (MUTCD)
 - PEDSAFE: Pedestrian Safety Guide and Countermeasures Selection System
- Institute of Transportation Engineers (ITE)
 - Designing Walkable Urban Thoroughfares: A Context Sensitive Approach (2010)
- National Association of City Transportation Officials (NACTO)
 - Urban Bikeway Design Guide (2nd edition, 2014)
 - Urban Street Design Guide (2013)
- U.S. Architectural and Transportation Barriers Compliance Board
 - Accessible Rights-of-Way: Design Guide

7. REPORTING TO TOWN COUNCIL

The application of Complete Streets will be a process that requires regular evaluation to determine progress and effectiveness. To facilitate that regular evaluation, the Town Manager shall provide a written report to the Town Council on an annual basis on the progress and effectiveness of the Complete Streets policy, and any exceptions granted from the Complete Streets policy.

Within the Annual Report from the Town Manager to the Town Council, the performance measures that will be evaluated include, but are not limited to, the following:

- Miles of bicycle lanes, routes, or trails built / dedicated by width and type
- Number of bicycle parking Facilities installed
- Number of traffic calming Facilities built / installed
- Number of traffic control signs/signals installed/ upgraded
- Linear feet of pedestrian accommodations built or repaired
- Number of crosswalks built or improved
- Number of ADA accommodations built / installed
- Number of transit accessibility improvements built
- Number of street trees planted
- Maintenance Activities of existing Complete Streets Facilities.
- Number of exceptions approved
- User data .bicycle, pedestrian, transit and traffic counts
- Bicycle and pedestrian accident data
- Total dollar amount spent on Complete Streets Improvements