CHELSEA HARBOR / DOWNTOWN NORWICH Mobility Study

https://www.downtownnorwichmobilitystudy.com/

Final Report

City of Norwich, CT

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Executive Summary

The Chelsea Harbor/Downtown Norwich Mobility Study details an extensive evaluation and suite of recommendations for improving pedestrian, bicycle, transit, and vehicular transportation in Downtown Norwich. The study addresses key areas such as traffic operations, safety improvements, pedestrian and bicycle accommodations, traffic circulation, parking, and trail connections. The aim is to create a more efficient, safer, and accessible urban environment.

Study Area

The Study area is focused on Downtown Norwich, including State Routes 2, 12, 32, and 82. The Study goals include improvements to livability, mobility, access to essential services, safe routes to the waterfront and Howard T. Brown Park, the Intermodal Transportation Center, the Norwich Marina, and other downtown destinations. This will be accomplished through expanded bicycle facilities, sidewalk network improvements, and the reconfiguration of multi-lane, high-speed through streets that currently exist as a barrier between downtown proper and the City's waterfront area, East, and West Side neighborhoods. The Study proposes alternatives to the current configuration and traffic flows of the study area with the above goals in mind.

Preferred Alternatives

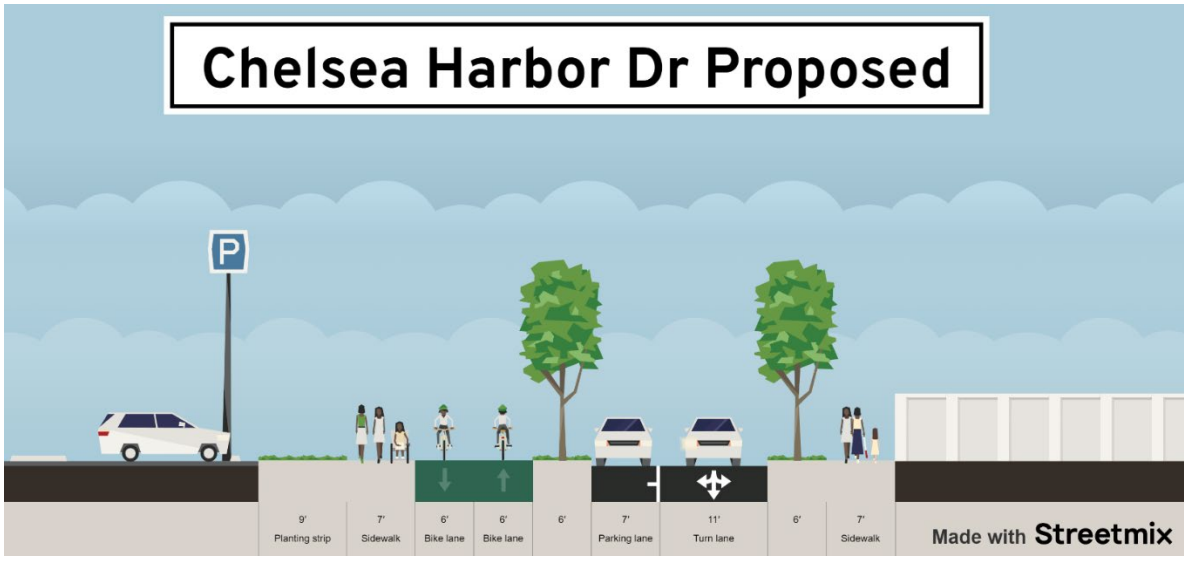
The transportation improvements recommended are a result of extensive discussions and analyses to address mobility, safety, and operational concerns in Downtown Norwich. The proposals include both short-term, lower-cost fixes and long-term, more substantial infrastructure projects. These improvements are designed to enhance safety, create better pedestrian and cyclist infrastructure, improve traffic flow, and make downtown circulation easier. A summary of the changes are:

- Chelsea Harbor Drive is reduced from three lanes to two lanes, becomes a local street and is cut off from Water Street (see Figure ES-1).

- Water Street/Route 2 becomes two-way, with one lane in each direction, carrying both eastbound and westbound traffic.
- With the removal of Chelsea Harbor Drive from the intersection, the traffic signal at the Water Street/Courthouse Square intersection can have a much simpler two-phase operation.
- Install a traffic signal at Water Street and Market Street to allow all vehicle movements from Market Street onto Water Street.
- Install curb extensions and a median island to reduce the crosswalk distance at Main Street/Broadway/Courthouse Square.
- Convert Washington Square into a roundabout, similar to Franklin Square.
- Convert Westside Boulevard from a one-way street to a two-way street and install bicycle lanes on both sides and sidewalks on the south side.
- Install a roundabout at the intersection of W. Main Street/Route 82 and N. Thames Street/N. High Street.
- The W. Main Street bridge/Route 82 also becomes a two-way street between Washington Square and N. Thames Street/N. High Street.
- Install a traffic signal at W. Main Street and Falls Ave/the Norwich Marina.

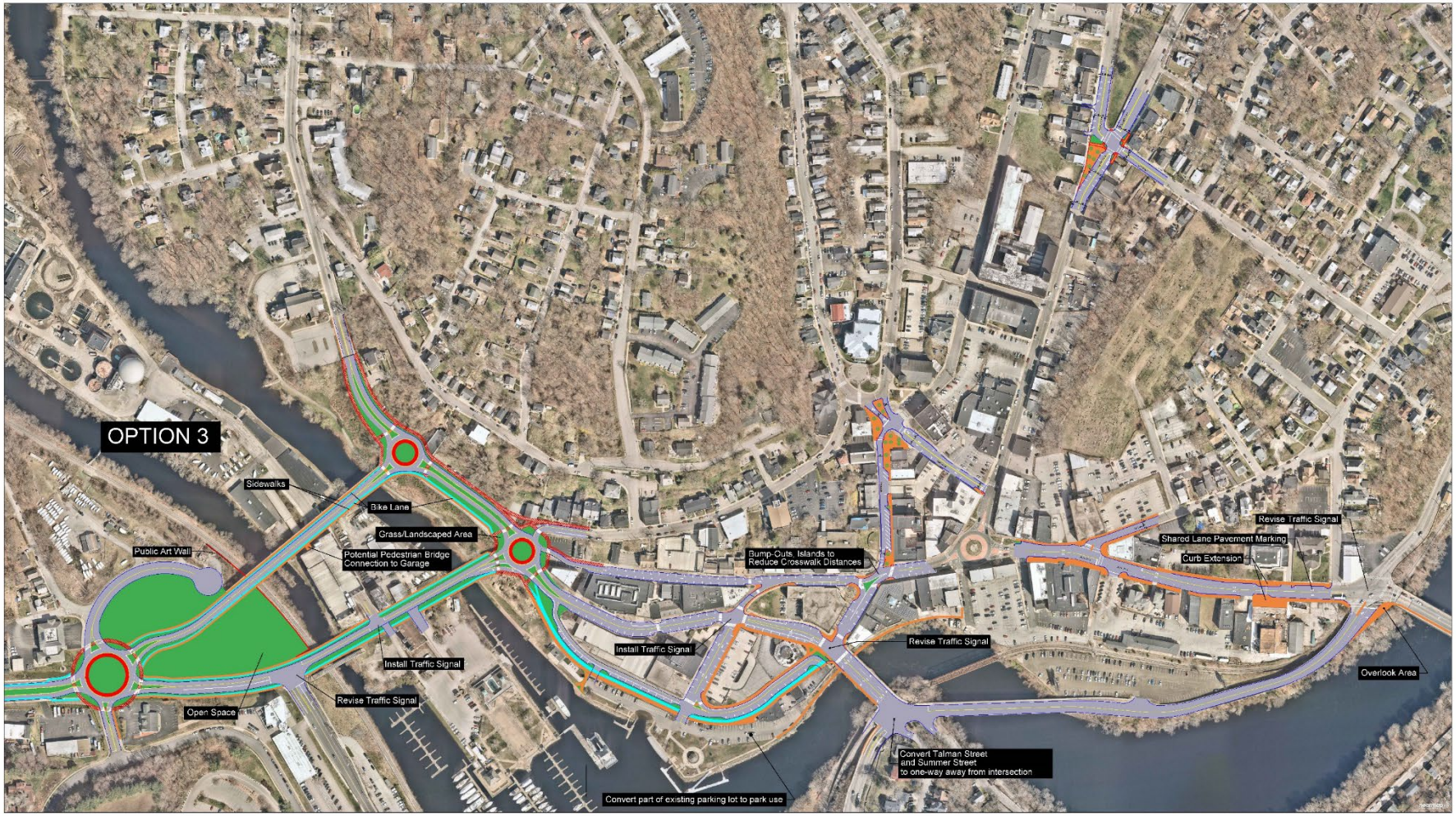
Figure ES-2 shows a map of improvement alternatives. Table ES-1 details the recommended alternatives with phasing and estimated costs.

Figure ES-1 Chelsea Harbor Drive Proposed Cross-Section



Source: VHB

Figure ES-2 Chelsea Harbor/Downtown Norwich Overall Recommended Improvement Alternatives



Source: VHB

Table ES-1 List of Recommended Concept Alternatives With Phasing and Cost for Downtown Norwich

Project Area	Concept Option	Grouping	Project Location	Project Type	Project Details	Proposed Phasing	Order of Magnitude Cost
Downtown East	DE-1A	N/A	Main Street between Franklin Square and Viaduct Road	Complete Streets Improvements	Curb Extensions, shared-lane markings, tighten up Cliff Street intersection, create crossing island	Short Term	$2 million
Downtown East	DE-2A	N/A	Main Street at Viaduct Road/N. Main Street/Route 2 & 12	Intersection	Widen Viaduct Road for right-turn lane, pedestrian overlook	Long Term	$5 million
Downtown North	DN-1	N/A	Franklin Street/Oak Street/Boswell Avenue	Intersection	Reconfigure intersection, curb extensions, convert to all way STOP	Short Term	$1 million
Downtown Central	DC-1	N/A	Union Street/Broadway/Bath Street	Complete Streets & Circulation Improvements	Curb Extensions, shared-lane markings, circulation changes	Short Term	$1 million
Downtown Central	DC-2	N/A	Broadway/Main Street/Courthouse Square	Intersection	Curb extensions, crossing island, circulation changes	Short Term	$500,000
Downtown Central	DC-3	Downtown Central Circulation Changes	Chelsea Harbor Drive	Corridor Complete Streets Improvements	Reduce lanes, circulation changes, separated bike lane, widen sidewalks, streetscape upgrades, convert Market St intersection to all-way Stop	Long Term	$3 million
Downtown Central	DC-4		Water Street	Circulation Changes	Downtown two-way conversion - convert Water Street to two-way	Long Term	$1 million
Downtown Central	DC-5		Water Street at Courthouse Square	Intersection	Revise signal, remove Chelsea Harbor Drive from intersection, curb extensions	Long Term	$1 million
Downtown Central	DC-6		Water Street at Market Street	Intersection	New traffic signal	Long Term	$700,000

Project Area	Concept Option	Grouping	Project Location	Project Type	Project Details	Proposed Phasing	Order of Magnitude Cost
Downtown Central	DC-7		Water Street at Viaduct Road/Laurel Hill Ave	Intersection	Revise/new signal, Summer Street and Talman Street become one-way away	Long Term	$1 million
Downtown Central	DC-8		Washington Square	Intersection	Install Roundabout	Long Term	$5 million
Downtown West	DW-1	N/A	West Main Street at N. Thames Street/Westside Boulevard	Intersection	Install Roundabout	Long Term	$6 million
Downtown West	DW-Bridge3-1	Bridge Option 3	Washington Street at Westside Boulevard	Intersection	Install Roundabout	Long Term	$4 million
Downtown West	DW-Bridge3-2		Westside Boulevard	Corridor Complete Streets Improvements	Convert bridge to two-way; add sidewalks and bike lanes, pedestrian connection between Transportation Center Garage and Westside Boulevard	Long Term	$2 million
Downtown West	DW-Bridge3-3		West Main Street	Corridor Complete Streets Improvements	Convert to two-way, install bike lanes	Long Term	$3 million

Three options were reviewed for the Downtown West area, which includes Washington Square, the Westside Boulevard bridge, the W. Main Street bridge, the Norwich Marina, and the Intermodal Transportation Center. These options considered ways to change circulation on the two bridges over the Yantic River and Hollyhock Island to enhance bicycle and pedestrian conditions and safety. In each option, roundabouts were proposed at Washington Square and the N. Thames Street/W. Main Street intersection. In addition, the options include a pedestrian bridge between the Transportation Center and Westside Boulevard for better pedestrian connectivity.

Option 1: Bridge of Roses

In Option 1, the Westside Boulevard Bridge would be transformed into an exclusive pedestrian/bicycle bridge, featuring widened sidewalks, separated bike lanes, and potentially areas for street vendors and food trucks. This plan would eliminate the road intersection with Washington Street and the vehicular connection to W. Main Street at the west end, creating more open space for parks and public amenities such as planting areas and public art. W. Main Street would become a two-way road to improve access to local businesses and amenities. A new traffic signal at W. Main Street and Falls Ave would also be introduced to enhance traffic flow and safety.

Option 2: W. Main Street Pedestrian Plaza

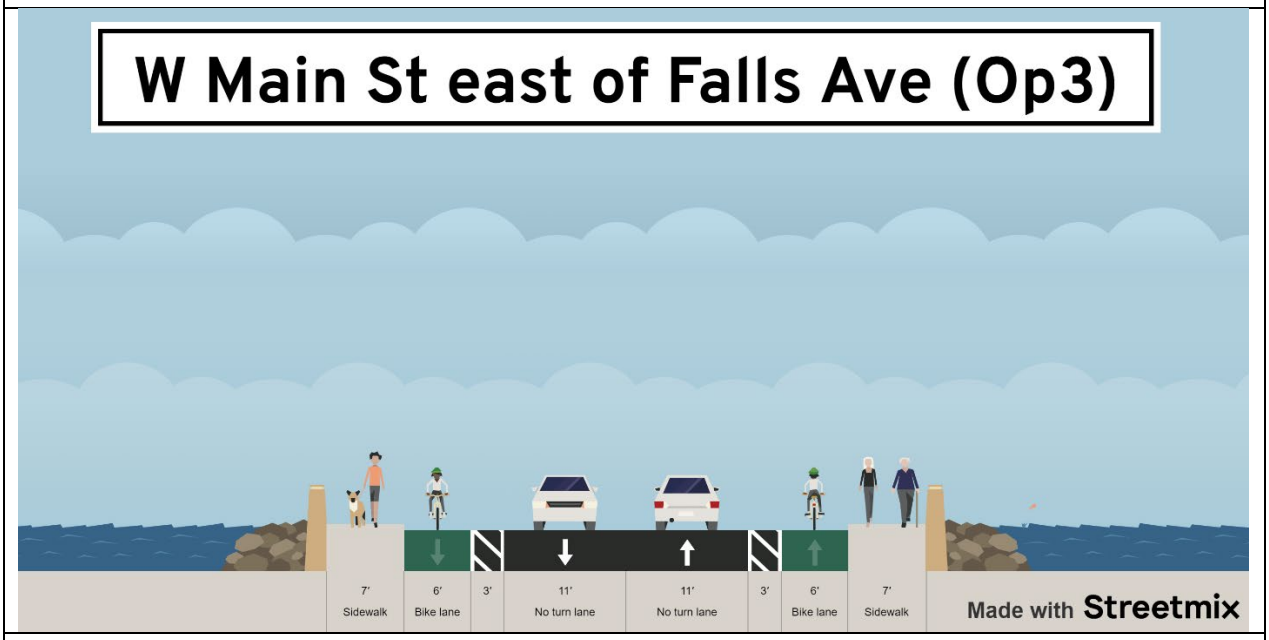
Option 2 proposes converting part of W. Main Street into a pedestrian plaza with multi-use paths, vending areas, seating, and green spaces, which would disconnect W. Main Street from Washington Street for vehicular traffic. Another roundabout would be installed at the intersection of Washington Street and Westside Boulevard, and traffic lanes on Washington Street would be reduced to allow better bike and pedestrian infrastructure. Westside Boulevard would be converted to a two-way street with bike lanes and sidewalks. W. Main Street would be converted to two-way traffic.

Option 3: Both Bridges Become Two-Way (Recommended Option)

Option 3, the recommended plan, would convert both the Westside Boulevard Bridge and W. Main Street into two-way roads, each with one lane in each direction, bike lanes, and sidewalks. Like Option 2, a new roundabout at Washington Street and Westside Boulevard would enhance safety, while reducing traffic lanes on Washington Street would create more open space for pedestrian and biking infrastructure. A new traffic signal at W. Main Street and Falls Ave is also part of this option to improve bus and pedestrian movements and marina access. See Figure ES-3 for a proposed cross-section of W. Main Street east of Falls Ave, and Figure ES-4 showing a top-down planview graphic of the changes proposed in Option 3.

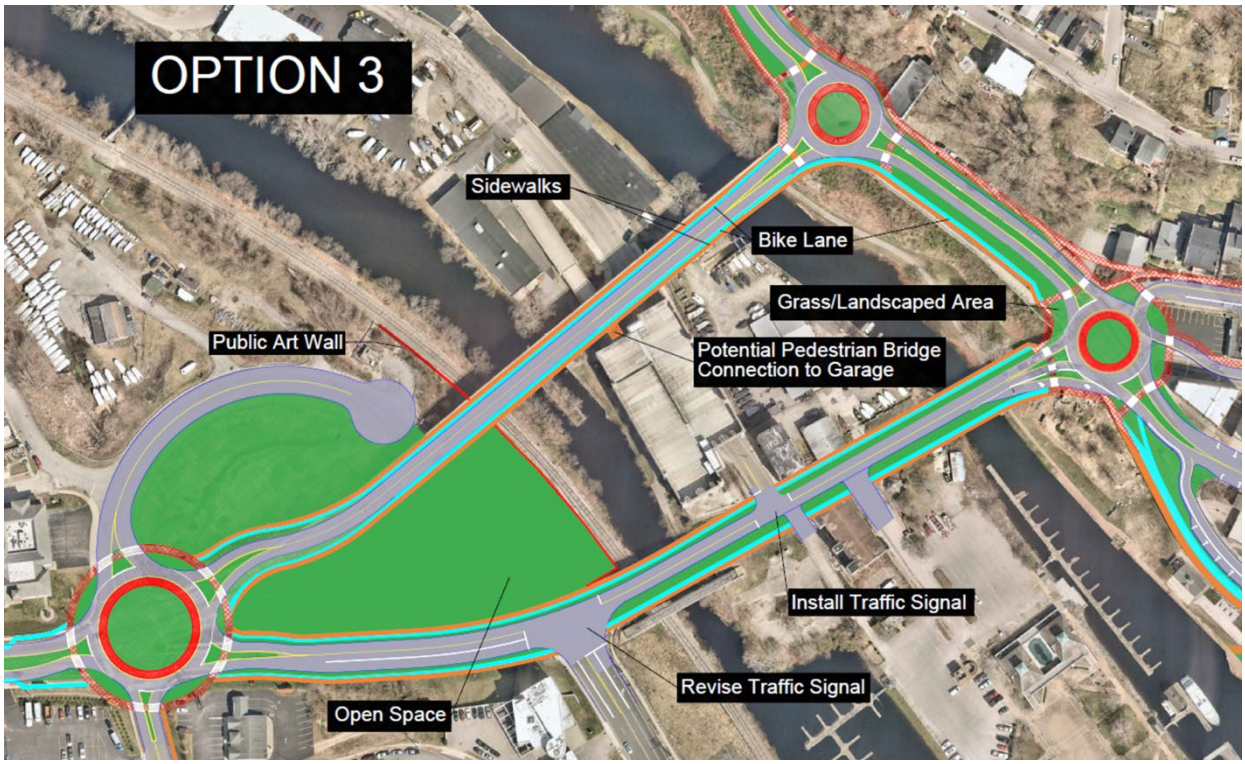
Compared to the other two Options, Option 3 provides better bicycle and pedestrian mobility on both bridges and access to the Norwich Marina and Transportation Center. It also disperses traffic between the two bridges such that drivers going towards or coming from downtown are more likely to use W. Main Street, while drivers coming from the north on Washington Street who are planning to go west on Route 82 can use Westside Boulevard and avoid the roundabout and traffic at Washington Square. Option 3 also does not preclude the City of Norwich from pursuing Options 1 or 2 in the future. In fact, it allows the City to take a phased approach to these options and potentially evaluate them out on a temporary basis before fully committing to the Bridge of Roses in Option 1 or the pedestrian plaza in Option 2. It also allows time for drivers to acclimate to the traffic circulation changes proposed throughout the entire downtown which will need to be phased over many years and projects.

Figure ES-3 West Main Street East of Falls Ave Proposed Cross-Section



Source: VHB

Figure ES-4 Downtown West Option 3: Both Bridges Two-Way



Source: VHB

No-Build and Low-Cost Improvements

Additional improvements to traffic flow and safety can be made via lower-cost/no-cost actions whether the recommended scenario is implemented or not. These improvements include:

- Improve pedestrian infrastructure by maintaining ADA-compliant sidewalks and curb ramps.
- Construct new sidewalks on Westside Boulevard and Viaduct Road during bridge replacements.
- Mark shared roadways for bicycling and construct/enhance bicycle parking facilities.
- Narrow travel lane widths to create space for bicycle lanes, as possible.
- Improve bus frequency, utilize or construct new transit shelters, streamline bus routes, and address occasional flooding issues at the Transportation Center.
- Extend the Heritage Trail to Uncas's Leap and construct a trail under the Water Street bridge to City Landing and along the south side of the Main Street bridge over the Shetucket River.
- Improve navigation and wayfinding for the parking garages, maintain and repair parking facilities, rearrange reserved parking spaces, consolidate on-street regulations, and create loading zones for commercial deliveries.
- Enhance signal timing splits, update traffic signage in compliance with current standards, and maintain pavement markings.

Order of Magnitude Cost Estimates

The total cost for the recommended downtown projects is approximately $36 million, focusing solely on construction costs. This estimate excludes engineering, right-of-way acquisition, and permitting. Downtown East is estimated at $7 million, Downtown North at $1 million, Downtown Central at $13.2 million, and Downtown West at $15 million. Adjustments will be needed for inflation given the long-term nature of some projects.

Identifying federal and state planning and infrastructure grants is critical for funding these projects. Opportunities like the USDOT Reconnecting Communities & Neighborhoods Program offer substantial funding for both planning (up to $2 million with a 20% non-federal match) and construction projects (minimum $5 million, up to 80% federal share). Eligible applicants include state and local governments, MPOs, non-profits, and tribal governments. These funding sources present significant opportunities to address community connectivity challenges and environmental impacts, crucial for successful downtown planning and redevelopment.

Improvement Alternatives Public Engagement

Given the significant transportation changes proposed for Downtown Norwich, public engagement was crucial. Efforts included multiple meetings with residents, city staff, and officials, media coverage, and a dedicated website for updates and feedback. These efforts included two TAC meetings, two City Council informational sessions that were open to the public, a public information meeting, and additional public outreach in the form of a pop-up event and walk-around in Downtown Norwich, a tactical urbanism demonstration, and information dissemination via the Norwich 360 website and Chelsea Harbor/Downtown Norwich Mobility Study website.

Study Summary

The proposed improvements aim to significantly enhance bicycle and pedestrian access, traffic circulation, and traffic safety in Downtown Norwich with a Complete Streets approach for all users. While Option 3 is recommended, the City can re-evaluate Options 1 and 2 if needed. Other proposed changes include improved sidewalks, bicycling routes, transit, multi-use trails, and parking to ensure accessibility and safety. These improvements will foster a more welcoming and efficient urban environment for Downtown Norwich.

1

Introduction

This Transportation and Mobility Study, commissioned by the City of Norwich and Southeastern Connecticut Council of Governments (SCCOG), is primarily centered on Downtown Norwich, CT. Downtown Norwich is the focal point of historic Norwich, while also being the confluence of several state routes and bordering three rivers, with resultant water related activities by the Chelsea Harbor, at Howard T. Brown Park.

1.1 Project Purpose and Study Area

The Chelsea Harbor/Downtown Norwich Mobility Study is a key component in the City of Norwich's efforts to provide streets that are safe and accessible for all users, including pedestrians, bicyclists, motorists, and transit users of all ages and abilities. The Study goals include improvements to livability, mobility, access to essential services, safe routes to the waterfront and Howard T. Brown Park, the Intermodal Transportation Center, the Norwich Marina, and other downtown destinations. This will be accomplished through expanded bicycle facilities, sidewalk network improvements, and the reconfiguration of multi-lane, high-speed through streets that currently exist as a barrier between downtown proper and the City's waterfront area, East, and West Side neighborhoods. The Study has developed recommended alternatives to the current configuration and traffic flows of the study area with the above goals in mind. The recommended alternatives are discussed in Chapter 4 of this document, Transportation Improvement Alternatives Analysis.

The Study area roadways include Main Street, Water Street, Chelsea Harbor Drive, Washington Street, Viaduct Road, Broadway, and Franklin Street. See Figure 1 for a map of the study area. The Study provides the groundwork for improved mobility along these corridors. The need for improved pedestrian, bicycle, motorist, and transit accessibility in the downtown, for residents coming from the east and west side neighborhoods, and the waterfront area adjacent to the Intermodal Transportation Hub, is essential to local regional traffic flows, safety, and economic development efforts in the City of Norwich.

1.2 Report Overview

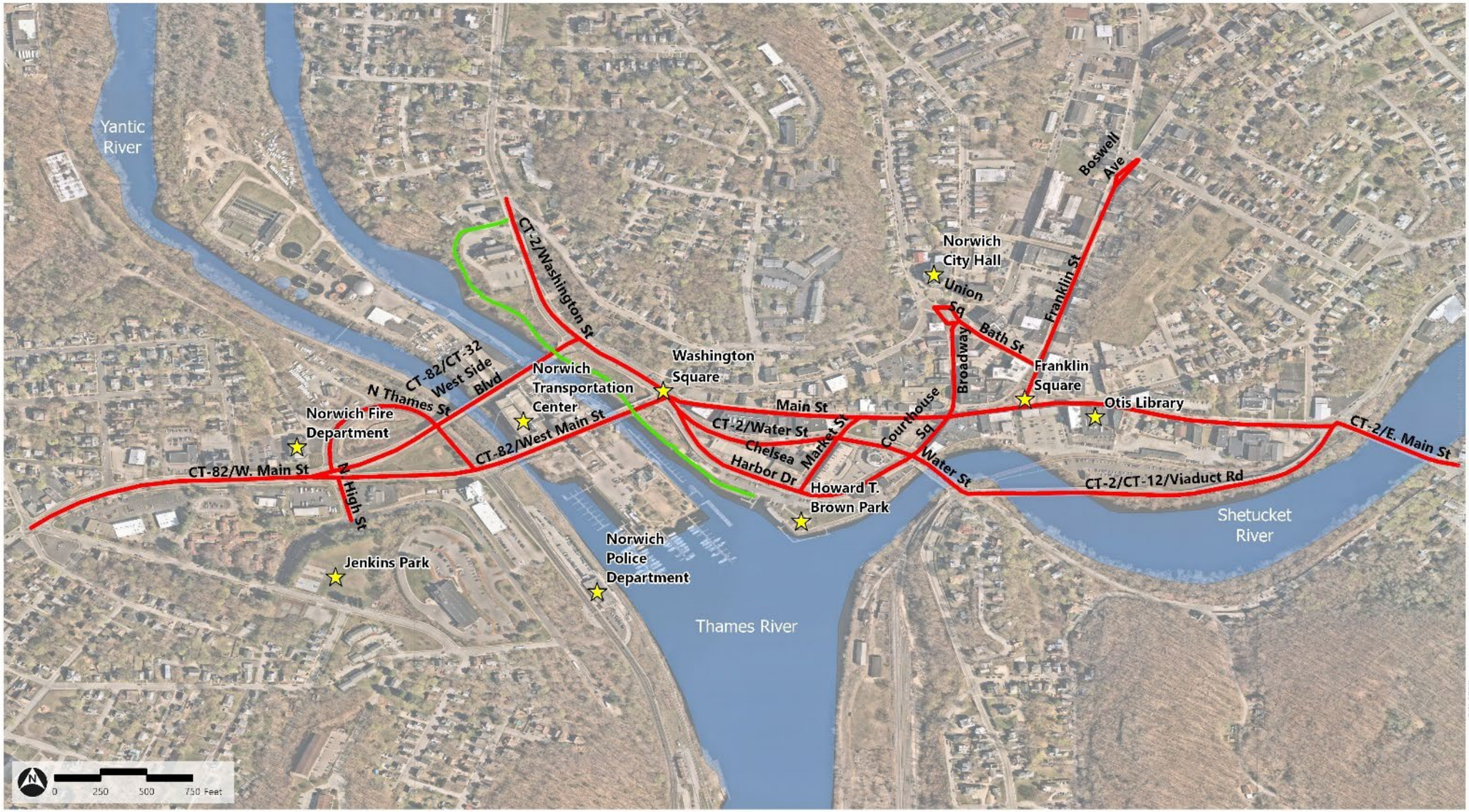
This Report includes three main sections: Existing Conditions, Future Conditions, and the Transportation Improvement Alternatives Analysis. Chapter 2, the Existing Conditions chapter, covers transportation-related data and infrastructure, as well as land use and development information that can impact the demand for transportation services and potentially support alternative modes of transportation. Chapter 2 is split into the following sections:

- Historical Context
- Transportation Data and Analysis of Traffic Movements
- Crash/Safety Data
- Bicycle, Pedestrian, and Vulnerable Road User conditions
- Public Transportation
- Parking
- Public Engagement
- Land Use, Zoning, and Development
- Previous and Current Plans and Studies

Future Conditions are discussed in Chapter 3. This chapter looks at forecasted future traffic volumes in Downtown Norwich and how this will impact traffic operations at the analyzed intersections. No recommended transportation improvements are included in this analysis to understand how traffic operations will change without any major changes. This chapter also goes over the bicycle, pedestrian, and transit potential of the study area.

Chapter 4 details the recommended transportation alternatives for Downtown Norwich. Concept plans have been developed showing various changes and improvements at the sketch level. Each area is described with the benefits of making the changes for traffic operations, multi-modal access, and safety. This chapter also includes a "No-Build" scenario where minor improvements are recommended over time with or without the recommended alternatives. These could be implemented if no alternatives are selected, with limited impact on traffic operations. The final sections of this chapter go over the traffic operations analysis in the recommended alternatives scenario, order of magnitude cost estimates for the alternatives, proposed phasing, potential funding sources, and public engagement to review the alternatives for Downtown Norwich.

Figure 1 Map of the Chelsea Harbor/Downtown Norwich Mobility Study Area



Source: VHB, Near Map

2

Existing Conditions

This chapter presents a summary of the existing conditions in the Downtown Norwich area based upon accumulation of City data, field observations, collection of traffic data, previous plans and studies, and public engagement efforts.

2.1 Historical Context

Having a firm background of the historical and geographic context of Norwich and its place within the transportation system is critical to understanding transportation issues within the city today. The City of Norwich was founded in 1659 and incorporated as a city in 1784, one of the first five Connecticut cities. Downtown Norwich, at the confluence of the Yantic and Shetucket Rivers at the head of where they flow into the Thames, was a critical piece of the city becoming the commercial, transportation, and manufacturing hub of the region in the 19th century. It remains the heart of the city and serves as a crossroad of commercial, recreational, and institutional activity, as well as employment. The narrow streets, with mixed-use buildings connected in a central row, and historic architecture, are all indicative of its early urban development prior to the advent of the automobile.

In the mid-20th century, as automobiles became the dominant mode of transportation and residential and commercial development grew at the fringes of the city, the primary transportation goal in the region was to carry through traffic through the downtown, easterly to the Connecticut and Rhode Island shoreline and beaches. The automobile transportation mode resulted in the development of high-speed expressways around Norwich, including the Connecticut Turnpike (I-395) as well as several state routes through the City and downtown, including Routes 2, 12, 32, and 82. A fifth state route, Route 165, is just outside of the study area across the Main Street bridge. These routes follow the topography and bordering rivers of Norwich, with Route 2 being the only major travelway on the west side of downtown due to topographical constraints on north-south travel. With the rivers, topography converging with four state routes, the downtown is a frequent bottleneck for people trying to go east and west. Hilly terrain and rivers limit the ability to circumvent downtown.

In 1970 a proposal to extend the freeway portion of Route 2 north of Downtown Norwich and continue east was rejected by the City. Instead, the TOPICS program (Traffic Operation to Increase Capacity and Safety) was instituted in the 1970s with new traffic signals and new traffic flow along one-

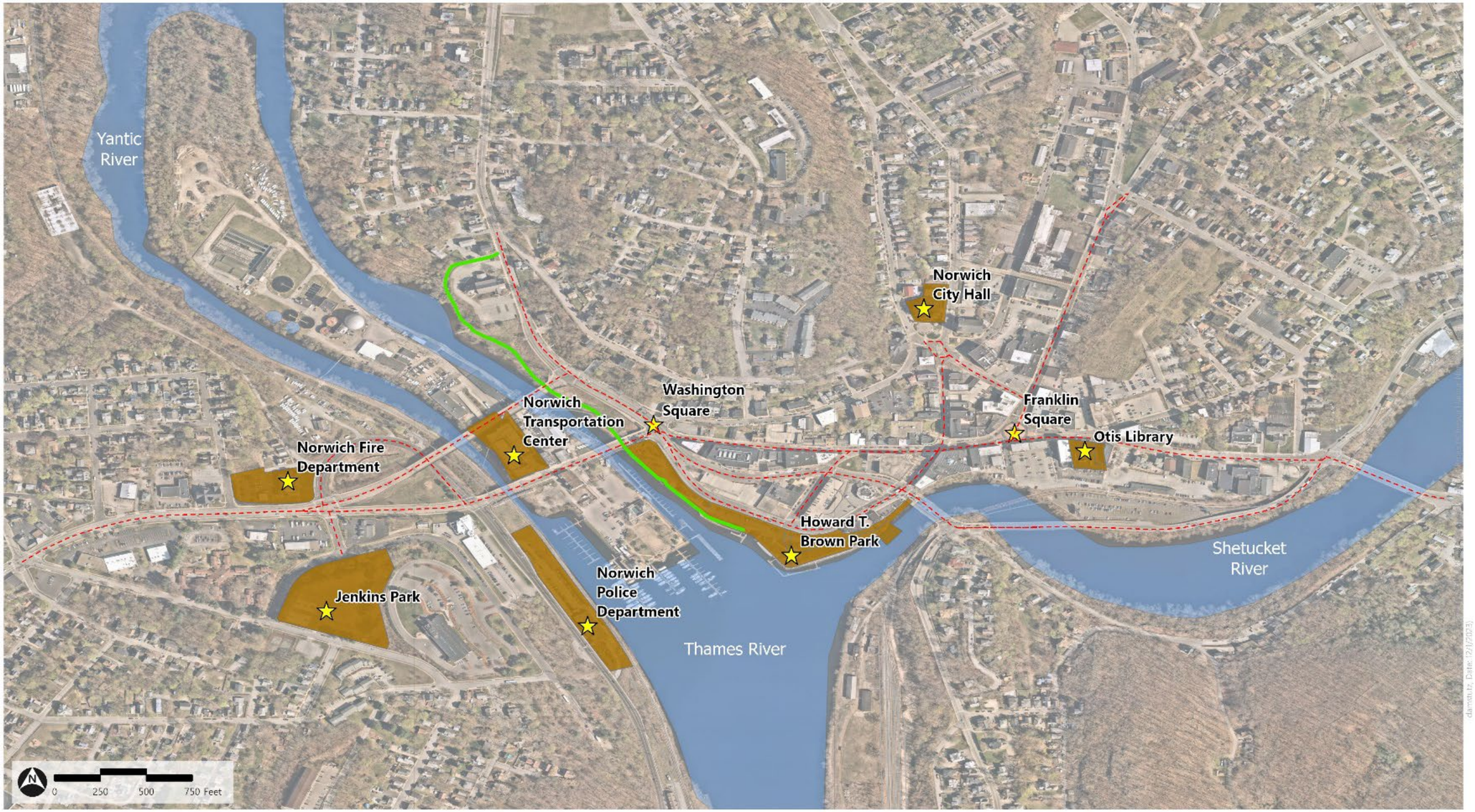
way streets, but it was widely unpopular with travelers and residents. Other proposals to push traffic south across the Thames River Bridge never materialized. The tension of providing fast and convenient travel for automobile through traffic versus the needs of local residents and businesses continues to characterize the challenge of transportation planning in Downtown Norwich.

More recently, the City adopted a Complete Streets Policy in 2022 and has shifted its focus to planning for other transportation modes including walking, bicycling, and public transit. Revitalizing downtown with people-focused transportation and public space improvements is now a key goal of the City. This Mobility Study effort will assist that City to reach their goals for the transportation system and will encourage investment in low-carbon transportation modes.

2.1.1 Notable Community Facilities

Within the study area there are many community facilities that are important destinations for residents and visitors alike as they navigate around the downtown. These facilities include: Norwich City Hall, Otis Library, Howard T. Brown Park, the Norwich Transportation Center, the Norwich Police and Fire Departments, and Jenkins Park. Their locations around the study area are shown on Figure 2.

Figure 2 Notable Community Facilities in the Chelsea Harbor/Downtown Norwich Mobility Study Area



Source: VHB, Near Map

2.2 Traffic Volumes, Speeds, and Vehicle Classification

Routes 2 and 12, both classified as Principal Arterials, along with Route 82 (Minor Arterial) and Franklin Street (Major Collector), all converge downtown. All other streets in the study area are local streets.

2.2.1 Observations

Typical Route 2 traffic was observed on field review days in June. There appeared to be higher speeds along Chelsea Harbor Drive and Water Street due to the wide lanes and lack of geometric conditions that would slow drivers down. It was apparent that the timing of some traffic signals was causing queuing and delays at some key intersections. This includes queuing observed at Water Street and Chelsea Harbor Drive/Courthouse Square, going eastbound on Route 2. Traffic queued back into the right-turn lane on Chelsea Harbor Drive, primarily due to the congested and unusual intersection of Water Street at Viaduct Road/Talman Street/Laurel Hill Avenue and New Wharf Road. This intersection has six approaches which cannot all be adequately served in one signal cycle without causing congestion on at least one approach. This number of approaches results in Water Street backing up across the bridge over the Shetucket River and blocking the right turns from Chelsea Harbor Drive from turning right, with a subsequent spillover of queued vehicles.

The other end of Viaduct Road, intersecting with East Main Street/North Main Street, at another bridge crossing of the Shetucket River, also experiences congested operations from the heavy right turning eastbound traffic and conversely the westbound left turning traffic onto Viaduct Road.

Overall, the observations during the field work confirmed many of the previously discussed and known operations in the downtown apart from Washington Square. This intersection actually operates fairly well, primarily due to the numerous approaches through and exclusive turning lanes on the main approaches, resulting in the largest intersection in the downtown area. This large intersection presents a significant challenge to pedestrian mobility and connectivity due to crosswalks across the intersection at nearly 70 feet to cross five lanes of vehicular traffic flow on the north leg and nearly 90 feet on the south leg with six lanes. This pedestrian crossing under an exclusive pedestrian phase results in over 30 seconds of time and when actuated during a peak hour can cause significant backups for several signal cycles. These crossing distances present significant concerns for vulnerable road users being exposed across 5-6 lanes.

All of the study area intersections were reviewed to confirm number of lanes, turning lanes, storage lengths, crosswalks, No Turn On Red, traffic patterns, operations, traffic signal phasing and timing.

In the Broadway area, and just west of the roundabout, there was also westbound queuing at Main Street and Courthouse Square/Broadway intersection which spilled back into the Franklin Square roundabout at times during the day. This can be addressed with simple retiming of the traffic signal.

2.2.2 Traffic Volumes

To identify current traffic flow characteristics along the study corridor, traffic data was collected in early June 2023 in the form of Turning Movement Counts (TMCs) at the 12 project study intersections and at 9 Automated Traffic Recorder counts (ATRs) along road segments. The TMCs were counted on June 8 and 10, 2023 and the ATRs recorded traffic data from June 7 through June 13, 2023.

The traffic data reviewed in this study includes intersection turning movement traffic counts, roadway daily traffic volumes, vehicle speeds and classification. The following section summarizes this traffic data collection process and documents the results. All traffic count data is provided in the Appendix.

At the intersection of Chelsea Harbor Drive/Water Street/Courthouse Square, there are between 500 and 800 vehicles across all three peak periods turning right from Chelsea Harbor Drive onto Water Street. The high volume causes queuing to build up from the next intersection at Water Street/Viaduct Road/Laurel Hill Ave/Summer Street/Talman Street into the right turn lane on Chelsea Harbor Drive. The bridge between these two intersections does not allow enough room for queuing, and the later intersection has more legs resulting in a longer cycle length than the prior intersection. High volume queueing was also observed in the westbound and northeast directions of the later intersection, and in the northbound and westbound directions at Viaduct Road/Main Street/N. Main Street. At the intersection of Courthouse Square/Main Street/Broadway, westbound traffic has too short of a green time causing queuing into the roundabout at Franklin Street/Main Street. Though the model shows Franklin Street/Boswell Ave/Oak Street as having a normal cycle, upon field inspection it was found that this intersection is flashing. Despite this, no queuing was observed.

2.2.2.1 Daily Traffic Volumes

Automatic Traffic Recorders (ATRs) were installed at eight locations in and around downtown Norwich in June 2023 to collect data on traffic volumes and speeds by direction over a minimum 48-hour period. Table 1 identifies the approximate ATR count locations and the average daily traffic in both directions.

Table 1 2023 Existing Weekday Average Daily Traffic Volume Summary

Location	Weekday Average Daily Traffic (ADT)
Route 82 East of Thames Street (eastbound)	12,590
Broadway North of Main Street	3,594
Main Street between Franklin St/E. Main Street	7,015
Franklin Street North of Bath Street	4,912
Route 2 (Water Street) westbound in Downtown	10,268
Route 2 between bridges	11,205
Route 2/12 (Viaduct Road)	13,459
Route 2 (East Main Street)	15,607

Source: ATR counts conducted in June 2023.

Traffic counts conducted by CTDOT in the downtown area we last completed in 2020. Copies of the CTDOT traffic counts are included in the Appendix to supplement the June 2023 traffic counts for this study.

As shown in Table 1, based upon the June 2023 traffic counts, the highest traffic volumes recorded in the study area were located on Route 2 (East Main Street) with an Average Daily Traffic (ADT) of 15,607 vehicles per day. Route 2 through the heart of downtown also has high traffic volumes relative to the rest of the roadways studied, with ADT between 10,000-15,000. Outside of the immediate downtown, traffic on Franklin Street and local roads is much lower.

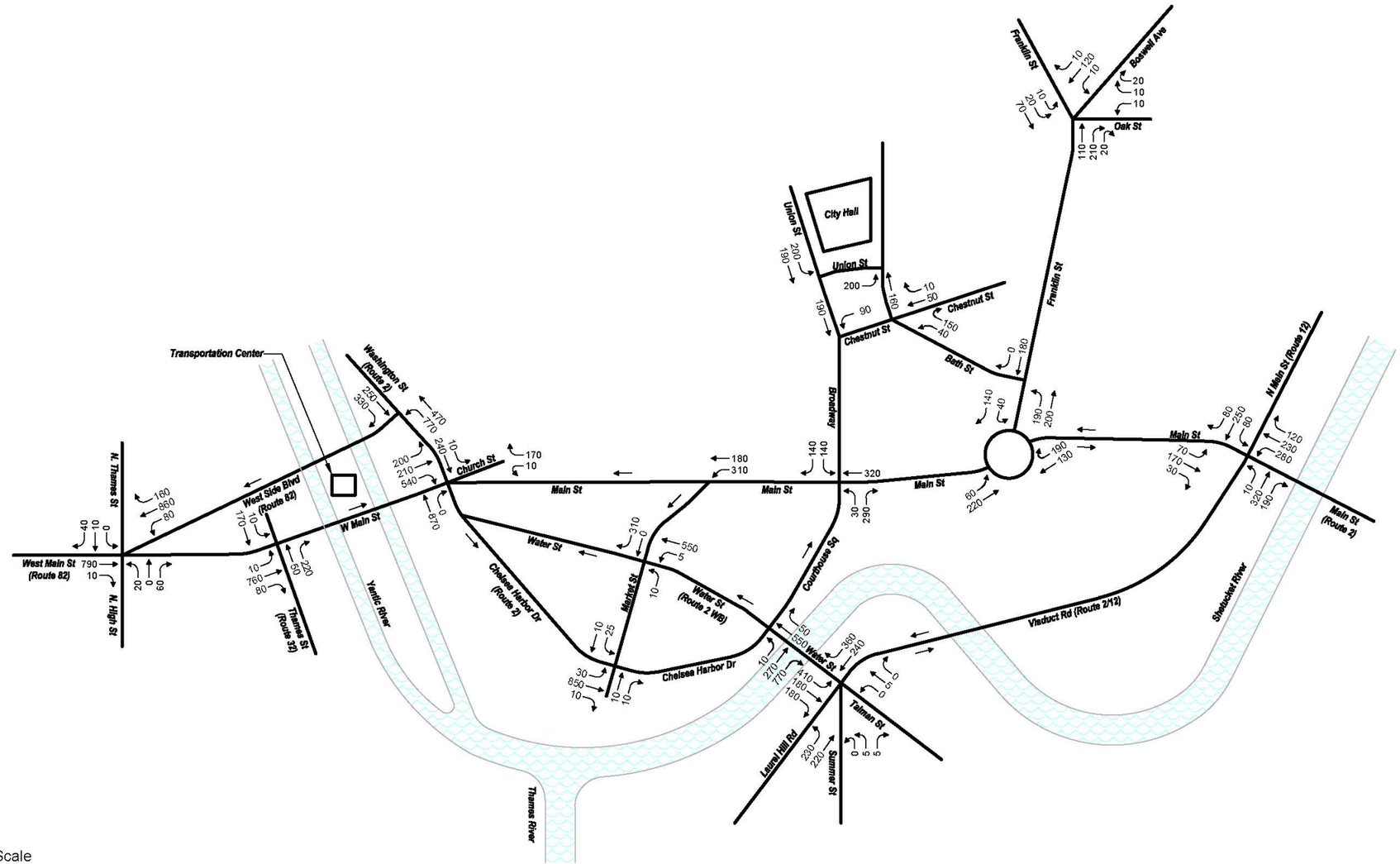
The 2023 traffic counts collected in June were found to be similar to numbers reported by CTDOT in previous years. Traffic volumes were compared between the 2014 and 2020 CTDOT counts as well as

the 2023 counts collected for this study. Traffic volumes have been steady, with not much change over the years, although the 2023 volumes collected are higher than the 2020 CTDOT volumes. The CTDOT traffic counts are also included in the Appendix. There is a high variability in traffic volumes throughout the day with traffic spread out over the day. There are some non-traditional peak hours showing up in the data, with weekday mid-day peaks and 3 pm afternoon peak hours, likely due to school and summertime traffic. See Figures 3, 4, and 5 which show existing peak hour traffic volumes at intersections in the study area, for morning, evening, and weekend mid-day peaks, respectively.

Figure 3 Existing Weekday AM Peak Traffic Volumes

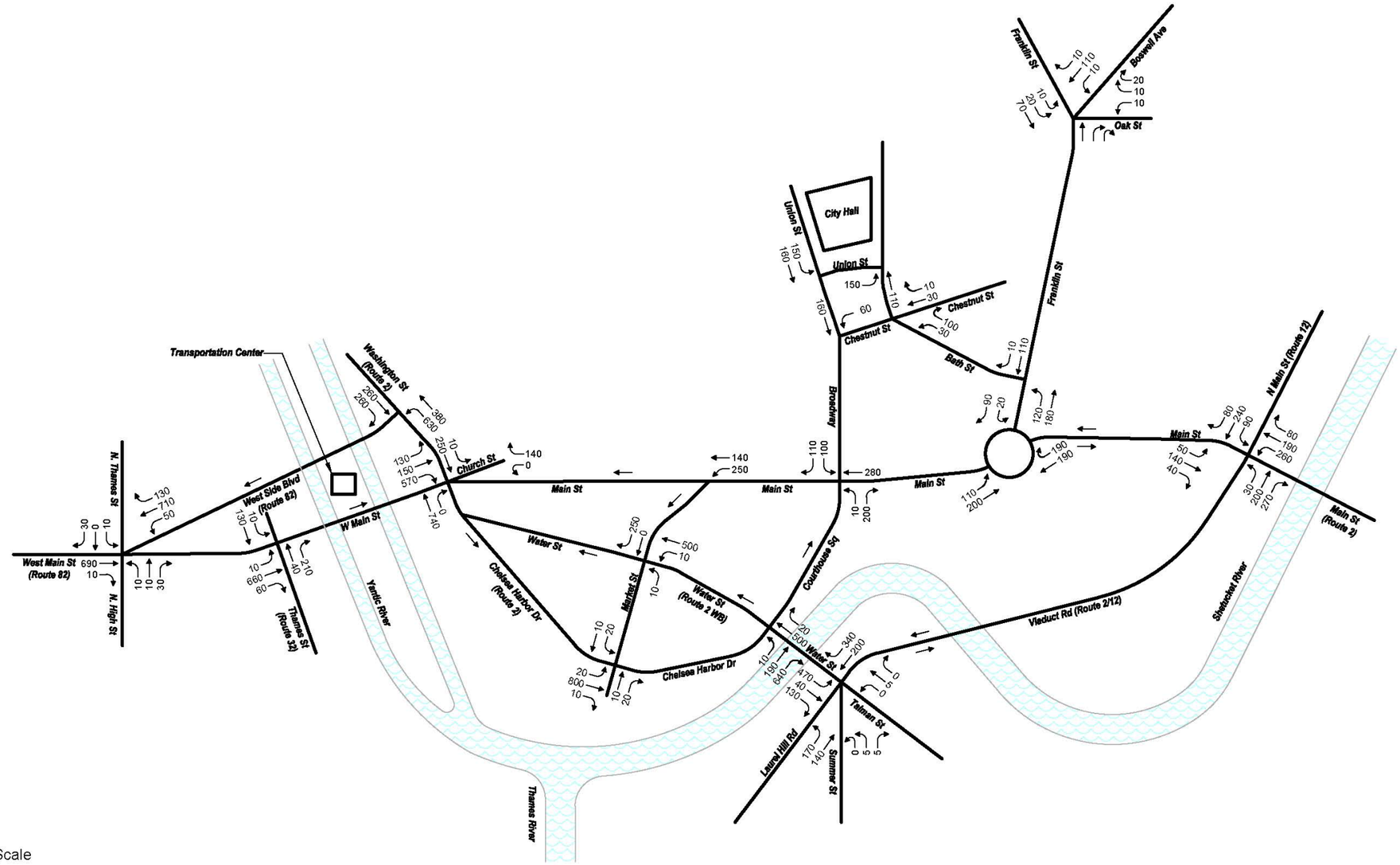
Not to Scale

Figure 4 Existing Weekday PM Peak Traffic Volumes



Not to Scale

Figure 5 Existing Saturday Midday Peak Traffic Volumes



Not to Scale

2.2.3 Vehicle Speeds

In terms of speeds within Downtown Norwich, the 85th percentile speeds are not unusually high – there are not many instances of speeds being 10 mph over the speed limit or higher. However, there are higher speeds along Chelsea Harbor Drive and Water Street due to these roads being wider.

The vehicle speed data was reviewed to determine the average speed and 85th percentile speed at each location where data was collected. The 85th percentile speed is the speed at which 85-percent of vehicles travel at or below, and transportation agencies typically use it to establish speed limits. These data were compared to the posted speed limit to understand whether there is excessive speeding in the project area and beyond the posted speed limit which is understood to be 25 miles per hour throughout.

The most recent data collected show that the 85th percentile speeds were above the speed limit (in any amount) at six out of seven data collection locations. Two locations showed the 85th percentile speeds of drivers at 9-11 miles per hour over the speed limit – considered excessive speeding – at these areas of the corridor: Route 82 east of Thames Street and Route 2/Viaduct Road. Average speeds were typically about 5 miles over the posted speed limit in most of the locations.

The ATR data provided traffic speeds for each of the count locations for each vehicle recorded over the course of each day.

Some examples of the speed data collected include the following locations:

Table 2 Speed Data for Downtown Norwich Study Area

Location	Posted Speed	85th%	50th%
Route 82 East of Thames	25	36	31
Broadway	25	22	17
Route 2 Viaduct Road (E/W)	25	38/39	33/34
Route 2 between bridges (S/N)	25	29/32	25/27
Route 2 Water Street	25	28	24
Route 2 East Main Street (W/E)	25	33/32	29/27
Franklin Street (S/N)	25	26/24	21/20

As shown in Table 2, every ATR recorded speeds higher than the posted speeds except Broadway, which is expected given the narrow roadway, on street parking and limited section of roadway to gain speed even with a green traffic signal.

The highest speeds were recorded on the straightest roadway sections, Route 82, and the Route 2 Viaduct Road section. The Route 82 speeds are likely the result of drivers seeing the traffic signal at the Chelsea Harbor Drive intersection and accelerating to make the green on the downhill section of the roadway through the Transportation Center intersection.

Viaduct Road speeds are understandable because there is limited development along the roadside and a long section of roadway between signals. The Viaduct Road section has the highest speeds recorded in the downtown area.

It should be noted that speeds higher than these recorded speeds have been observed at certain times during the field work, specifically along Chelsea Harbor Drive when drivers accelerate leaving the intersection with Route 82 and along the Harbor.

The data show that, more recently, some speeding over the posted limit is occurring, while in other locations it is below the posted speed limit. Overall, speeds are higher in the long straights of the road corridor such as Viaduct Road, and Route 82 crossing the Yantic River. Higher speeds were also observed on the wider stretches of the road corridor at Chelsea Harbor Drive and Water Street in the downtown area. These high speeds are areas of concern for people biking and walking through the corridor.

2.2.4 Vehicle Classification

In addition to the traffic volume and speed data collected, vehicle classifications were also recorded at each ATR location. The vehicle classifications included motorcycles, cars, buses, single unit box trucks, and semi-trailer trucks across a total of 14 classification categories.

The lowest percentage total of automobiles was 66 percent of the traffic along Route 2 in the section between the bridges, with a substantial percent of non-automobile traffic recorded, including motorcycles, buses, trucks, and semi-trailer trucks accounting for 34% of the total traffic.

Viaduct Road was next lowest with just over 80 percent of the traffic being automobiles and 20 percent other vehicles including motorcycles, box trucks, buses, and semitrailers.

All other ATR locations recorded 84 percent or higher for automobiles and some locations with 89 percent of traffic as automobiles.

2.2.5 Intersection Sight Distances

As part of the field inspection, each intersection was checked for intersection sight distances. The required sight distances were calculated using the daily traffic volume and speed data collected for the project. The following intersections and directions had insufficient sight distances in accordance with the CTDOT Highway Design manual: Main Street EB&WB/N. Main Street SB, Water Street WB at Chelsea Harbor Drive/Courthouse Square, Route 82 WB/N. Thames Street SB, Water Street/Laurel Hill Ave/Summer Street/Talman Street/Viaduct Road all directions, and Route 82 EB at Church Street/Chelsea Harbor Drive/Water Street. Table 3 illustrates.

Table 3 Intersections in Study Area with Insufficient Sight Distances

Intersection	Required Sight Distance	Actual Sight Distances
Main St EB/N. Main St SB	357 ft	EB: 285 ft SB: 95 ft
Water St WB at Chelsea Harbor/Courthouse	313 ft	120 ft
Route 82 WB/N. Thames SB	379 ft	WB: 195 ft SB: 160 ft
Water/Laurel Hill/Summer/Talman/Viaduct all directions	434 ft	SB: 155 ft EB: 180 ft NB (Summer): 100 ft

Intersection	Required Sight Distance	Actual Sight Distances
		NB (Talman): 90 ft WB: 140 ft
Route 82 EB at Church/Chelsea Harbor/Water St	247 ft	126 ft

2.2.6 Intersection Capacity Analysis

To develop an understanding of the operation of the study area intersections during the study peak periods, a traffic model was developed in Synchro for the three peak traffic periods using the data from Turning Movement Counts (TMCs) at the study area intersections. The traffic model was developed using the traffic volumes, the existing traffic control signal plans as well as CTDOT provide timings for coordinated traffic signals. The traffic model development was based upon the existing study area intersection approach geometries including lane widths, on street parking, storage lengths, pedestrian crosswalks, pedestrian signal timing, vehicle signal phasing and timing as well as observations of the traffic operations of the intersections.

The evaluation criteria used to analyze area intersections in this traffic study are based on the 2000 Highway Capacity Manual (HCM). The term 'Level of service' (LOS) is used to denote the different operating conditions that occur on a given roadway segment under various traffic volume loads. It is a qualitative measure that considers several factors including roadway geometry, speed, travel delay and freedom to maneuver. Level of service provides an index to the operational qualities of a roadway segment or an intersection. Level-of-service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions.

In addition to LOS, two other measures of effectiveness (MOEs) are typically used to quantify the traffic operations at intersections; volume-to-capacity ratio (v/c) and delay (expressed in seconds per vehicle). For example, an existing v/c ratio of 0.9 for an intersection indicates that the intersection is operating at 90 percent of its available capacity. A delay of 15 seconds for a particular vehicular movement or approach indicates that vehicles on the movement or approach will experience an average additional travel time of 15 seconds. It should be noted that v/c and delay could have a range of values for a given LOS letter designation. Comparison of intersection capacity results therefore requires that, in addition to the LOS, the other MOEs should also be considered.

The level-of-service designations, which are based on delay, are reported differently for signalized and unsignalized intersections. For signalized intersections, the analysis considers the operation of all traffic entering the intersection and the LOS designation is for overall conditions at the intersection. For unsignalized intersections, however, the analysis assumes that traffic on the mainline is not affected by traffic on the side streets. Thus, the LOS designation is for the critical movement exiting the side street, which is the left turn out of the side street or site driveway. Table 4 shows the level of service criteria for both signalized intersections and unsignalized intersections.

It should be noted that the analytical methodologies typically used for the analysis of unsignalized intersections use conservative analysis parameters, such as long critical gaps. Actual field observations indicate that drivers on minor streets accept shorter gaps in traffic than those used in the analysis procedures and therefore experience less delay than reported by the analysis software. The analysis methodologies also do not fully consider the beneficial grouping effects caused by nearby signalized intersections. The net effect of these analysis procedures is the over-estimation of calculated delays at

unsignalized intersections in the study area. Cautious judgment should therefore be exercised when interpreting the capacity analysis results at unsignalized intersections.

The criteria for determining Levels of Service are presented in Table 4 and based upon the 2000 Highway Capacity Manual.

Table 4 Level of Service Criteria for Signalized and Unsignalized Intersections

Level of Service	Signalized Intersection	Unsignalized Intersection
A	0 to 10 seconds	0 to 10 seconds
B	10 to 20 seconds	10 to 15 seconds
C	20 to 35 seconds	15 to 25 seconds
D	35 to 55 seconds	25 to 35 seconds
E	55 to 80 seconds	35 to 50 seconds
F	Greater than 80 seconds	Greater than 50 seconds

The results of the intersection capacity analyses are presented in the following tables utilizing the above criteria for all project intersections and all three peak hours. Vehicle queueing is also provided for the critical 95th percentile queues (design queue) and the 50th percentile queueing which is typically the average queueing at any point in the peak hour.

As shown, most project study intersections are operating at level of service (LOS) C or better. Two intersections have poor LOS: the intersection of Route 2/12 at Viaduct Road/Laurel Hill Ave/Summer Street/Talman Street, and Route 2 at Route 12 (Viaduct Road at North Main Street). Both ends of Viaduct Road have poorly operating intersections during the peak hours.

The Route 2/12 intersection operates at a failing condition partly because there are too many approaches, with a long signal cycle.

The other intersection of Routes 2 and 12 at Viaduct Road and North Main Street operates at LOS E and F and there are very long queues.

While the Broadway intersection operates at good LOS during the peak hours, vehicle queuing was observed to back up into the roundabout intersection at several times during the peak hours including midday. The timing at the intersection can be adjusted to reduce the queuing.

The unsignalized intersections analyzed for the project do not have any capacity issues.

See Tables 5 and 6 for the existing capacity analysis summaries.

Table 5 Signalized Intersection Capacity Analysis Summary – Existing Conditions

		Morning Peak Hour					Midday Peak Hour					Evening Peak Hour				
Location	**Mov't**	**v/c[1]**	**Del[2]**	**LOS[3]**	**Q50[4]**	**Q95[5]**	**v/c**	**Del**	**LOS**	**Q50**	**Q95**	**v/c**	**Del**	**LOS**	**Q50**	**Q95**
Route 82 at West Side Blvd. & N. Thames St/ N. High St.	EB T/R	0.40	16	B	77	203	0.44	17	B	94	279	0.58	20	C	132	#362
	WB L	0.43	48	D	50	91	0.26	44	D	31	69	0.52	44	D	64	100
	WB T	0.30	7	A	42	180	0.31	8	A	45	207	0.47	9	A	76	270
	WB R	0.15	7	A	0	31	0.09	6	A	0	31	0.13	7	A	0	21
	NB L/T/R	0.04	43	D	0	0	0.04	43	D	0	0	0.06	42	D	0	17
	SB L/T/R	0.21	44	D	14	46	0.03	43	D	0	0	0.13	42	D	10	23
	Overall	**0.33**	**15**	**B**			**0.33**	**15**	**B**			**0.44**	**17**	**B**		
Route 82 at N. Thames St / Thames St.	EB L/T	0.24	9	A	36	119	0.32	10	A	48	170	0.46	15	B	60	222
	EB R	0.05	11	B	0	30	0.04	13	B	0	30	0.06	20	B	0	m34
	NB T	0.10	33	C	20	38	0.15	36	D	25	50	0.13	32	C	28	53
	NB R	0.17	34	C	0	39	0.15	36	D	0	52	0.14	32	C	0	53
	SB L	0.09	33	C	12	29	0.06	35	D	7	18	0.05	31	C	7	16
	SB T	0.66	42	D	124	178	0.62	43	D	103	128	0.70	42	D	146	146
	Overall	**0.32**	**23**	**C**			**0.36**	**21**	**C**			**0.47**	**23**	**C**		
Route 2 at West Side Blvd.	SE T/R	0.62	31	C	94	152	0.46	28	C	64	114	0.51	29	C	66	105
	NW L	0.34	12	B	63	177	0.39	13	B	77	212	0.49	14	B	104	#278
	NW T	0.31	4	A	0	148	0.30	4	A	0	146	0.38	4	A	0	191
	Overall	**0.40**	**18**	**B**			**0.39**	**16**	**B**			**0.47**	**17**	**B**		
Route 2 (Water St) at Route 82 & Church St. & Main St.	WB L/R	0.49	32	C	20	61	0.51	32	C	28	90	0.74	51	D	33	#112
	WB R	0.53	33	C	21	65	0.53	33	C	28	94	0.79	62	E	35	#126
	NB T/R	0.60	21	C	86	215	0.60	22	C	92	212	0.69	26	C	99	#257
	SB L/T	0.54	21	C	65	134	0.33	20	C	43	115	0.33	22	C	40	114
	NE L	0.32	20	C	41	140	0.30	21	C	43	131	0.46	26	C	61	192
	NE T/R	0.45	23	C	45	#208	0.74	32	C	102	#377	0.70	34	C	86	#367
	NE R	0.20	19	B	0	70	0.28	20	C	0	71	0.27	23	C	0	86
	Overall	**0.49**	**22**	**C**			**0.60**	**24**	**C**			**0.61**	**29**	**C**		
Chelsea Harbor Dr. at Market Street	EB L/T/R	0.18	1	A	21	34	0.22	2	A	29	47	0.23	2	A	33	53
	NB T/R	0.12	37	D	5	26	0.12	36	D	5	30	0.10	36	D	5	26
	SB L/T	0.26	38	D	10	32	0.38	39	D	16	41	0.41	39	D	18	45
	Overall	**0.19**	**3**	**A**			**0.23**	**4**	**A**			**0.25**	**4**	**A**		
Route 2 (Water St) at Courthouse Sq. & Chelsea Harbor	NW T/R	0.33	7	A	27	184	0.35	8	A	32	170	0.39	9	A	43	207
	NE L/T	0.22	22	C	10	42	0.29	22	C	16	60	0.44	22	C	32	87
	NE R	0.42	4	A	0	30	0.45	4	A	0	41	0.60	5	A	0	21
	Overall	**0.39**	**8**	**A**			**0.42**	**8**	**A**			**0.56**	**9**	**A**		

Source: VHB, Inc. using Synchro 11 software.

Table 5 Signalized Intersection Capacity Analysis Summary – Existing Conditions (Continued)

		Morning Peak Hour					Midday Peak Hour					Evening Peak Hour				
Location	**Mov't**	**v/c[1]**	**Del[2]**	**LOS[3]**	**Q50[4]**	**Q95[5]**	**v/c**	**Del**	**LOS**	**Q50**	**Q95**	**v/c**	**Del**	**LOS**	**Q50**	**Q95**
Main St at Broadway & Courthouse Sq.	WB T	0.39	17	B	115	183	0.39	17	B	120	218	0.43	18	B	132	#276
	NB L	0.01	34	C	0	0	0.01	34	C	0	0	0.02	34	C	0	0
	NB R	0.11	8	A	0	34	0.13	8	A	0	36	0.20	9	A	0	30
	SB L	0.49	31	C	60	99	0.48	33	C	59	99	0.49	32	C	67	113
	SB R	0.40	31	C	43	77	0.48	33	C	54	92	0.55	33	C	68	116
	Overall	**0.32**	**20**	**B**			**0.32**	**19**	**B**			**0.37**	**20**	**B**		
Route 2 at Viaduct Rd./Laurel Hill Rd/Summer St/Talman St	WB L	1.06	100	F	~188	#305	0.82	47	D	117	#192	0.83	49	D	122	#240
	WB R	0.55	18	B	58	108	0.63	20	B	70	127	0.56	18	B	62	#136
	NB L/T/R	0.42	43	D	5	11	0.49	41	D	11	16	0.61	67	E	7	19
	SE L/T	1.01	79	E	150	#411	>1.20	>120	F	226	#647	>1.20	>120	F	307	#758
	SE R	0.41	16	B	51	150	0.20	13	B	24	91	0.29	14	B	36	125
	NW L/T/R	0.42	41	D	10	8	0.30	42	D	3	13	0.52	49	D	6	10
	NE L/R	>1.20	>120	F	~191	#213	0.89	56	E	89	#162	>1.20	>120	F	~155	#247
	Overall	**1.07**	**104**	**F**			**1.00**	**82**	**F**			**1.20**	**>120**	**F**		
Franklin St at Boswell St/Oak St	WB L/R	0.50	31	C	7	42	0.44	29	C	15	47	0.44	31	C	14	57
	NB T	0.20	18	B	15	65	0.28	23	C	24	86	0.32	22	**C**	35	118
	NB R	0.14	6	A	8	59	0.20	8	A	30	109	0.30	9	**A**	49	160
	SB L	0.21	24	C	5	33	0.29	27	C	9	44	0.32	27	**C**	11	49
	SB T	0.17	12	B	10	70	0.15	16	B	14	60	0.14	13	**B**	15	63
	SW L/R	0.48	19	B	29	116	0.32	18	B	38	111	0.46	22	**C**	49	141
	Overall	**0.33**	**16**	**B**			**0.29**	**17**	**B**			**0.36**	**17**	**B**		
Route 2 at Route 12 (Viaduct Rd & N. Main St)	EB L	0.16	29	C	12	43	0.22	29	C	18	65	0.43	29	C	27	86
	EB T/R	0.61	39	D	97	200	0.61	39	D	94	#231	0.71	43	D	121	#325
	WB L	0.86	44	D	128	#315	0.76	34	C	110	#291	0.94	61	E	130	#374
	WB T/R	0.64	34	C	149	#392	0.66	36	D	138	#406	0.90	57	E	211	#574
	NB L/T/R	0.96	69	E	196	#587	>1.20	>120	F	~384	#816	>1.20	>120	F	~373	#872
	SB L	0.40	22	C	35	115	0.37	22	C	26	98	0.36	23	C	29	86
	SB T/R	0.60	22	C	154	416	0.45	19	B	104	320	0.52	21	C	138	324
	Overall	**0.86**	**40**	**D**			**0.94**	**89**	**F**			**0.99**	**78**	**E**		

Source: VHB, Inc. using Synchro 11 software.

Table 6 Unsignalized Intersection Capacity Analysis Summary – Existing Conditions

Location	Mov't	Morning Peak Hour				Midday Peak Hour				Evening Peak Hour			
		v/c[1]	Del[2]	LOS[3]	Q95[4]	v/c	Del	LOS	Q95	v/c	Del	LOS	Q95
Bath St at Chestnut St	WB T/R	0.06	8	A	0.2	0.06	8	A	0.2	0.06	8	A	0.2
	NW L	0.17	7	A	0.6	0.14	7	A	0.5	0.14	7	A	0.5
	NW T	0.06	8	A	0.2	0.06	8	A	0.2	0.06	8	A	0.2
Chestnut St at Broadway	WB L	0.1	8	A	0.3	0.09	8	A	0.3	0.09	8	A	0.3
	SB T	0.07	6	A	0.2	0.1	6	A	0.4	0.1	6	A	0.4
Main St at Franklin St	EB L/T	0.32	6	A	1	0.27	5	A	1	0.38	7	A	2
	WB T/R	0.34	6	A	1	0.39	7	A	2	0.40	7	A	2
	SB L/R	0.20	5	A	1	0.12	4	A	0	0.19	5	A	1

Source: VHB, Inc. using Synchro 11 software

2.2.7 Roadway System Impact on Downtown

As noted in the Historical Context section of this report, the main concern of traffic planners and engineers in the middle of the 20th century was to move vehicles through the downtown as quickly as possible via Route 2 and the other state routes that converge in downtown. Due to the resistance of the City of Norwich to support the proposed bypass alignment for Route 2 north of downtown (which would have displaced a significant number of homes and businesses), widening and changing the circulation of the downtown area was the next option that was chosen. Downtown buildings were removed for the widening and traffic flows were changed to accommodate a greater amount of fast-moving traffic to pass through the city, and additional bridges were constructed to bypass narrow urban streets and potential congestion from grid-locked streets. As a result, much of downtown Norwich became an obstacle for traffic to get around to reach somewhere else as opposed to a place in and of itself where people would be encouraged to stay and enjoy downtown businesses.

It is difficult to directly assess how downtown businesses have been impacted by the changes to the roadway system that have been in place for over fifty years, but the configuration of traffic that skirts downtown and attempts to move traffic like a separated highway does not give much opportunity for drivers to even see what downtown Norwich has to offer and provides little visibility for businesses. The one-way traffic flow configuration also makes it difficult for customers to find their way around the city to reach businesses that they may want to visit. High-volume and high-speed traffic also make it more difficult for people walking: once someone parks their car, it is an uncomfortable environment to attempt to navigate the downtown area on foot. The perception of downtown as dominated by car traffic is perceived to create an unappealing visual and environment for potential visitors, and thus businesses that otherwise would have thrived in a different roadway network in Downtown may not have in the existing network.

2.3 Safety Data and Crash Analysis

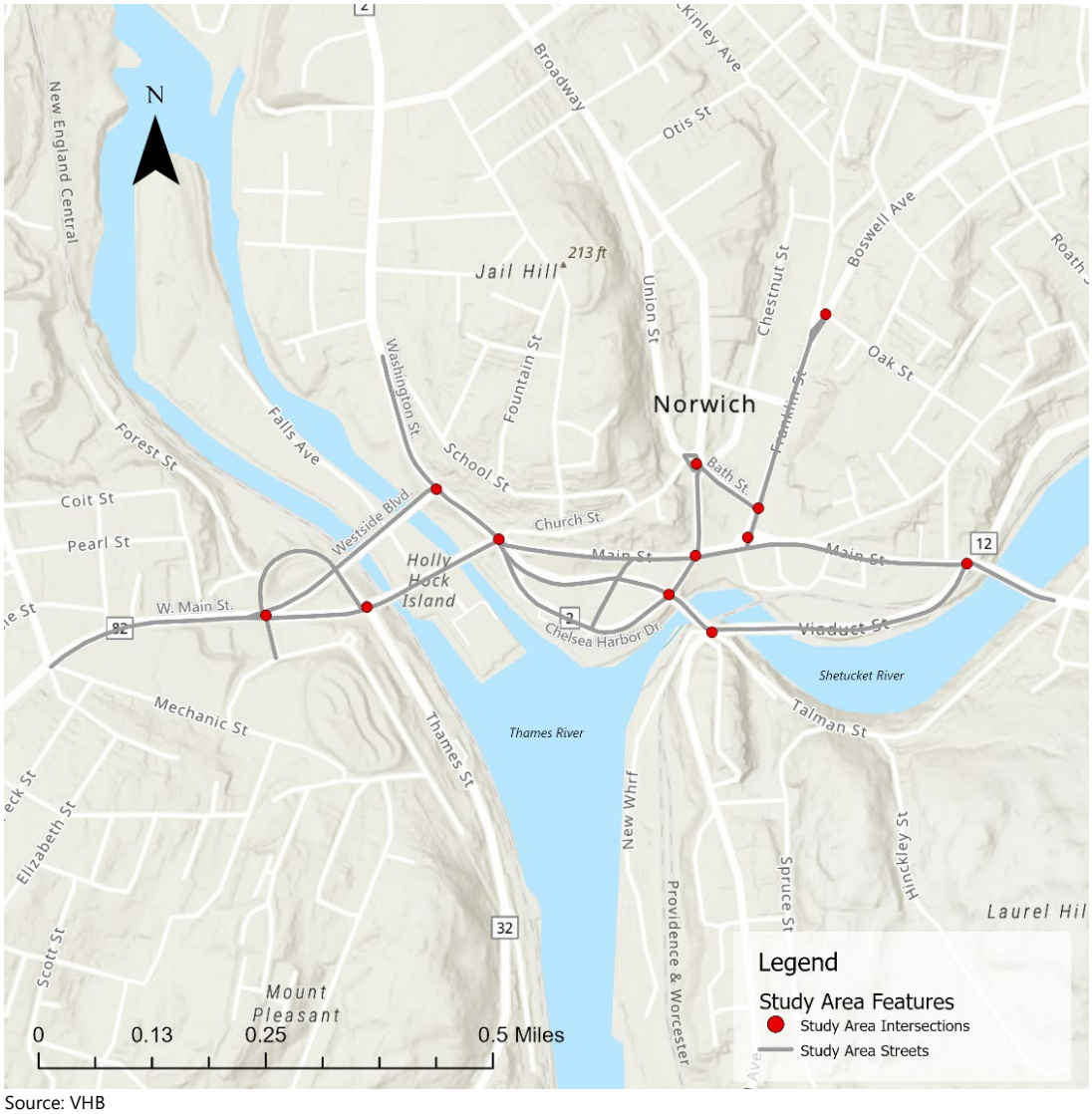
To assess traffic safety conditions within the study area, crash data was collected from the University of Connecticut, Connecticut Crash Data Repository (CTCDR) for the 2018-2022 period (January 1, 2018, through December 31, 2022), the most recent period of five full years of data. It should be noted that only collisions that result in death, injury, or property damage more than $1,000 are required to be

reported. The collision data were reviewed for the downtown Norwich study area, with particular focus given to the 12 study area intersections.

For this period, there were 938 crashes total. Seventeen percent of these crashes resulted in injuries. One fatality occurred during this period. The most common crash types were front to rear (rear-end) crashes at 43%, sideswipe same direction at 20%, and angle crashes at 18%. December accounted for the highest proportion of crashes by month (10%), and Friday accounts for the highest proportion of crashes by day of the week (17%). There were also 20 pedestrian crashes and 4 bicycle crashes.

Crash emphasis areas were queried from the CTCDR database as identified in the 2022-2026 Connecticut Strategic Highway Safety Plan. Several emphasis areas may be involved in a single crash, for example a roadway departure crash involving an impaired driver. The study area is highlighted in Figure 6 below. The extent of the analysis is shown with roads of interest in grey, and key intersections shown as red dots. Crashes that occurred within 300ft of the extent of the study area are included in this analysis.

Figure 6 Study Area Intersections for Crash Analysis



Source: VHB

2.3.1 Overall Norwich Crash Summary

Table 7 below shows an overall breakdown of all the crashes analyzed in the study area. It includes 5 years' worth of crash data, from 2018 to 2022, separated by year, and describes the manner of the collision, the time of day it occurred, the lighting conditions of the crash, the weather conditions, and the crash severity.

Table 7 Overall Norwich Crash Summary

	Front to Rear	Sideswipe, Same Direction	Angle	Sideswipe, Opposite Direction	Other	Front to Front	Rear to Side	Rear to Rear	Unknown	Not Applicable	AM Peak (7am – 10am)	PM Peak (4pm – 7pm)	Off-Peak	Daylight	Dawn/ Dusk	Darkness	Cloudy/Clear	Fog/Mist	Rain	Snow	Other	Dry	Wet	Snowy	Icy	Other	K: Fatal	A: Suspected Serious Injury	B: Suspected Minor Injury	C: Possible Injury	O: No Apparent Injury	
2018	81	39	38	7	5	2	2	1	4	16	30	54	111	142	8	45	173		18	3	1	150	39	4		2		1	15	14	165	**195**
2019	91	42	27	5	5	1			1	25	41	54	102	157	1	39	168	2	27			159	36		2			1	11	18	167	**197**
2020	67	35	33	1	2	3	2		1	17	20	45	96	108	5	48	137		18	6		129	23	9			1		11	18	131	**161**
2021	87	27	36	6	5	3	1		4	19	27	53	108	130	4	54	159		23	6		144	33	8	2	1		3	17	13	155	**188**
2022	98	40	32	4	4	5	1		4	29	35	59	103	150	3	44	176		21			164	31		1	1		5	18	14	160	**197**
Total	**404**	**183**	**166**	**23**	**21**	**14**	**6**	**1**	**14**	**106**	**153**	**265**	**520**	**687**	**21**	**230**	**813**	**2**	**107**	**15**	**1**	**746**	**162**	**21**	**5**	**4**	**1**	**10**	**72**	**77**	**778**	**938**

As shown in this table, the years with the greatest number of crashes were 2019 and 2022 (tied for 197 crashes) and 2018 (195 crashes). The lowest number of crashes occurred in 2020, the year when the COVID-19 pandemic began. 2020 was also the year of the only fatality that occurred during this period. One quarter of crashes occurred in darkness or low-light conditions. Thirteen percent of crashes occurred during precipitation or other weather. Sixteen percent of crashes occurred during the AM peak period while 28% occurred during the PM peak period.

2.3.2 Collision Summary

Table 8 below shows a summary of the manner of collision for the crashes from 2018-2022 that were studied for this project. As noted earlier, the most common crash types were front to rear (rear-end) crashes at 43%, sideswipe same direction at 20%, and angle crashes at 18%, for a total of 81% of crashes being these types. All other collisions (which include front to front [head-on], rear-to-rear, rear-to-side, and not applicable) accounted for about 18% of crashes collectively (percentages do not add up to 100% due to rounding). Seventeen percent of all crashes resulted in injuries, and 9% of all crashes were the most severe injuries types of K, A, or B. Collisions with animals and those involving pedestrians or bicyclists each accounted for about 3% of the total collisions reported in the study area.

Table 8 Collison Summary

Crash Severity	Number of Crashes	*Percent of Total*
Fatal Injury(K)	1	*0%*
Suspected Serious Injury (A)	10	*1%*
Suspected Minor Injury (B)	72	*8%*
Possible Injury (C)	77	*8%*
No Apparent Injury (O)	778	*83%*
Total	**938**	***100%***
KAB Crashes	***83***	***9%***

				K	A	B	C	O	Total
Manner of Collision	Front to Rear	404	*43%*			25	40	339	***404***
	Sideswipe, Same Direction	183	*20%*			4	2	177	***183***
	Angle	166	*18%*		3	21	19	123	***166***
	Sideswipe, Opposite Direction	23	*2%*			2	3	18	***23***
	Other	21	*2%*			3	2	16	***21***
	Front to Front	14	*1%*	*1*		1	2	10	***14***
	Rear to Side	6	*1%*					6	***6***
	Rear to Rear	1	*0%*					1	***1***
	Unknown	14	*1%*					14	***14***
	Not Applicable*	106	*11%*		7	16	9	74	***106***

Note: *The First Harmful Event in 67 of the 106 crashes coded as Not Applicable meet the criteria for a roadway departure crash. Roadway Departure is not listed as a crash type in Manner of Collision. 6 of the 106 involved striking an animal, 24 involved a pedestrian or bicyclist, and 13 had an unknown or other non-collision First Harmful Event.

Source: UConn Connecticut Crash Data Repository

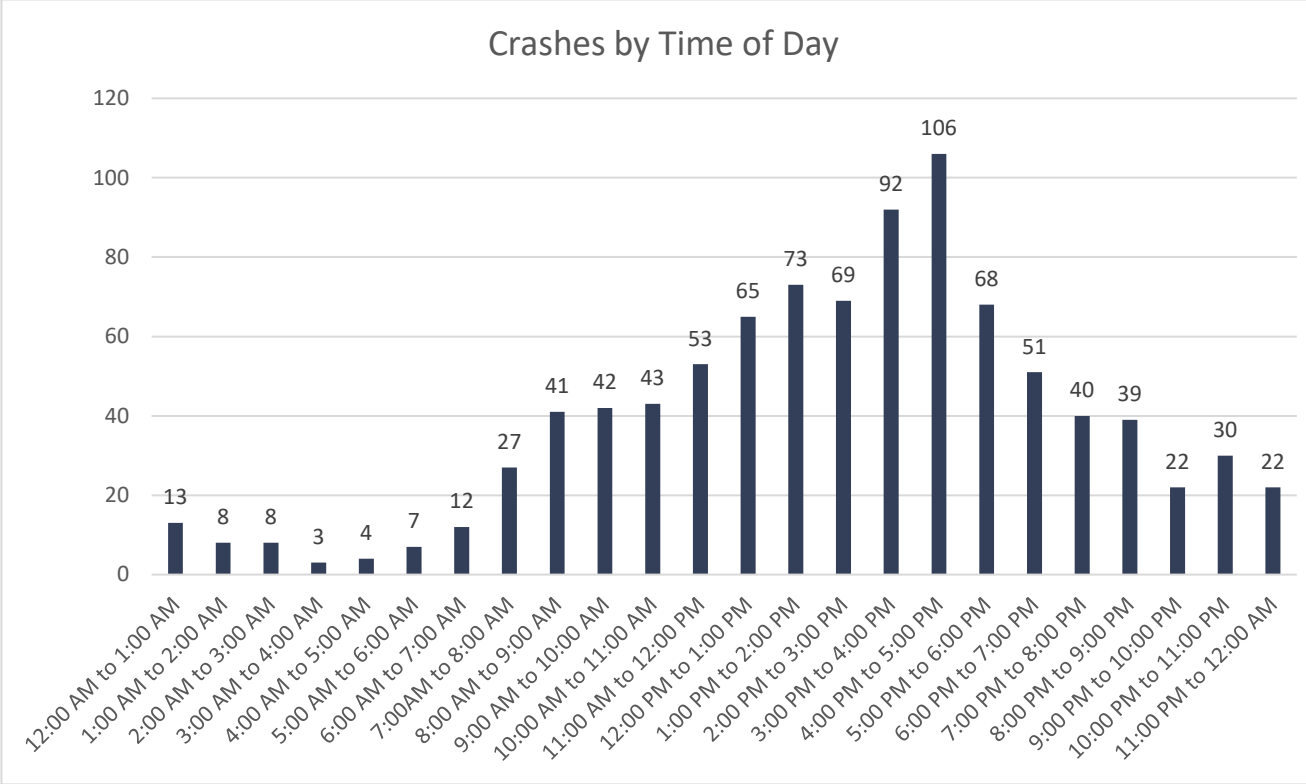
2.3.3 Crashes by Time of Day

During the 2018-2022 period, the hours of 4:00PM to 5:00PM, 8:00PM to 9:00PM, and 2:00PM to 3:00PM account for the highest proportion of KAB level injuries at 12%, 11%, and 10% respectively. The hours of 2:00PM to 5:00PM account for the highest proportion of KAB injuries for a three-hour consecutive period, at 29%. Table 9 shows all crashes and KAB crashes by hour of day for the five-year period. Figure 7 shows this same information in a bar chart format.

Table 9 Crashes by Time of Day

Crash Hour	Number of KAB Crashes	Percent of Total KAB Crashes	Number of Crashes	Percent of Total
12:00 AM to 1:00 AM	1	1%	13	*1%*
1:00 AM to 2:00 AM	3	4%	8	*1%*
2:00 AM to 3:00 AM	0	0%	8	*1%*
3:00 AM to 4:00 AM	1	1%	3	*0%*
4:00 AM to 5:00 AM	0	0%	4	*0%*
5:00 AM to 6:00 AM	2	2%	7	*1%*
6:00 AM to 7:00 AM	1	1%	12	*1%*
7:00AM to 8:00 AM	1	1%	27	*3%*
8:00 AM to 9:00 AM	3	4%	41	*4%*
9:00 AM to 10:00 AM	2	2%	42	*4%*
10:00 AM to 11:00 AM	3	4%	43	*5%*
11:00 AM to 12:00 PM	6	7%	53	*6%*
12:00 PM to 1:00 PM	4	5%	65	*7%*
1:00 PM to 2:00 PM	4	5%	73	*8%*
2:00 PM to 3:00 PM	8	10%	69	*7%*
3:00 PM to 4:00 PM	6	7%	92	*10%*
4:00 PM to 5:00 PM	10	12%	106	*11%*
5:00 PM to 6:00 PM	3	4%	68	*7%*
6:00 PM to 7:00 PM	4	5%	51	*5%*
7:00 PM to 8:00 PM	2	2%	40	*4%*
8:00 PM to 9:00 PM	9	11%	39	*4%*
9:00 PM to 10:00 PM	4	5%	22	*2%*
10:00 PM to 11:00 PM	4	5%	30	*3%*
11:00 PM to 12:00 AM	2	2%	22	*2%*
Total	**83**	**100%**	**938**	***100%***

Figure 7 Crashes by Time of Day



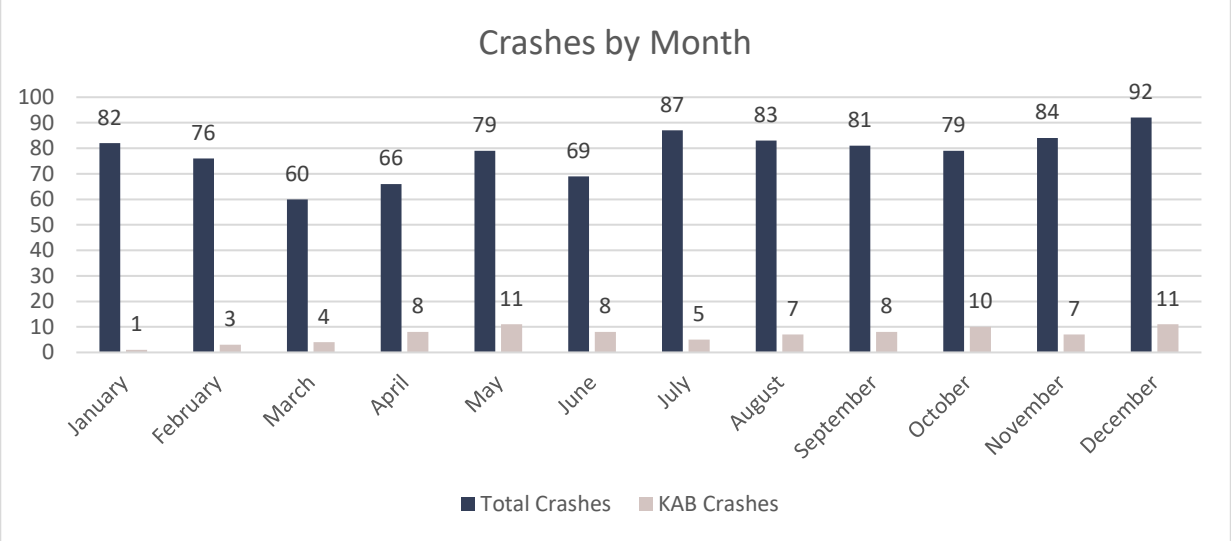
2.3.4 Crashes by Month

Table 10 and Figure 8 show crashes by month of the year. December accounts for the highest proportion of crashes by month (10%). The greatest number of KAB crashes occurred in December and May (13% each) and October (12%).

Table 10 Crashes by Month

Crash Month	Number of KAB Crashes	Percent of Total KAB Crashes	Number of Crashes	Percent of Total
January	1	1%	82	*9%*
February	3	4%	76	*8%*
March	4	5%	60	*6%*
April	8	10%	66	*7%*
May	11	13%	79	*8%*
June	8	10%	69	*7%*
July	5	6%	87	*9%*
August	7	8%	83	*9%*
September	8	10%	81	*9%*
October	10	12%	79	*8%*
November	7	8%	84	*9%*
December	11	13%	92	*10%*
Total	**83**	**100%**	**938**	***100%***

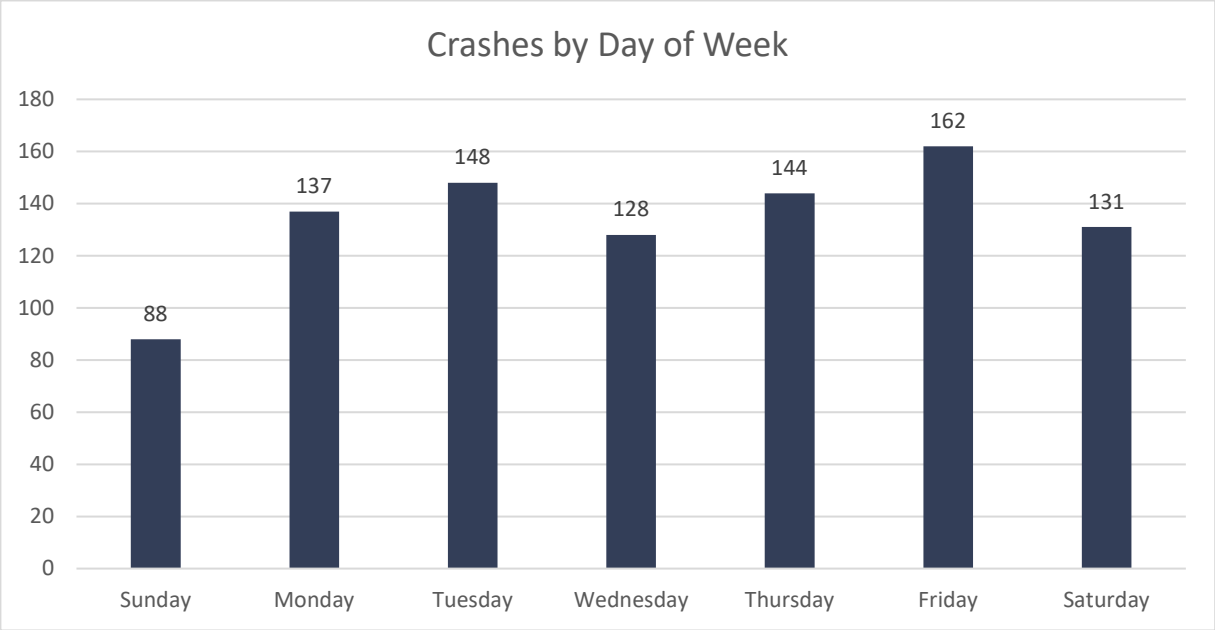
Figure 8 Crashes by Month



2.3.5 Crashes by Day of Week

Friday accounts for the highest proportion of crashes by day of week (17%) in the City of Norwich during the 2018-2022 period. Figure 9 shows this information for the whole week period.

Figure 9 Crashes by Day of Week



2.3.6 Emphasis Area Crashes

As noted earlier, crashes that match specific emphasis areas identified in the 2022-2026 Connecticut Strategic Highway Safety Plan were queried from the CTCDR database. Emphasis area crashes include roadway departure, intersection, impaired driver, aggressive driver, unrestrained occupants, motorcycle, distracted driving, and pedestrians. Table 11 shows the number of crashes in each emphasis area by crash severity. Additional emphasis areas noted include bicyclists, young drivers, and older drivers. Though not core emphasis areas in the Strategic Highway Safety Plan, bicyclists are included given their relevance to the project, and young drivers and older drivers are considered Additional Safety Areas in the plan.

In should be noted that motorcycle-involved crashes resulted in the second highest proportion of KAB level injuries. 50% of motorcycle crashes resulted in a KAB injury. The highest proportion of KAB level injuries were pedestrians at 70%.

Table 11 Emphasis Area Crashes

Emphasis Area	Fatal Injury (K)	Suspected Serious Injury (A)	Suspected Minor Injury (B)	Possible Injury (C)	No Apparent Injury (O)	Total
Roadway Departure	1	2	10	12	90	115
Intersection	1	6	43	40	318	408
Impaired Driving			3	4	25	32
Aggressive Driver			26	34	274	334
Unrestrained Occupants		1	1	3	34	39
Motorcycle		1	10	3	8	22
Distracted Driving			6	10	35	51
Pedestrians		5	9	4	2	20
Bicyclists				3	1	4
Young Drivers (15-20)			18	27	130	175
Older Drivers (65+)	1	2	20	21	148	192

Table 12 Intersection Crashes

Intersection	Fatal Injury (K)	Suspected Serious Injury (A)	Suspected Minor Injury (B)	Possible Injury (C)	No Apparent Injury (O)	Total
W. Main St. and N. Thames St. (westbound)	1		2	1	10	*14*
W. Main St. and N. Thames St. (eastbound)		1	6	3	9	*19*
Washington St. and Westside Blvd.					24	*24*
Washington St. and Main St.			6	8	82	*96*
Chelsea Harbor Dr./Courthouse Sq. and Water St.		1	7	8	15	*31*
Water St. and Viaduct St.			2	2	15	*19*
Viaduct St. and Main St.		2	3	3	30	*38*
Main St. and Franklin St.		1	1		9	*11*
Franklin St. and Bath St.					8	*8*
Main St. and Broadway/Courthouse Sq.			3	1	7	*11*
Broadway and Union St./Chestnut St.			1	1	4	*6*
Franklin St. and Boswell St.		1		1	12	*14*
TOTAL	**1**	**6**	**31**	**28**	**225**	**291***

2.3.7 Intersection Crashes

Intersection crashes are identified as directed in the 2022-2026 Connecticut Strategic Highway Safety Plan. Two hundred ninety-one of the 408 total intersection crashes occurred at the twelve key intersections listed in Table 12. For all crashes, the location with the highest number of crashes was Washington Street and W. Main Street/Water Street/Church Street/Chelsea Harbor Drive (Washington Square) with 96 crashes total. For crashes of high severity (fatality [K], serious injury [A], and minor injury [B]), several intersections had high densities of these crashes, including Washington Square, Water Street/Chelsea Harbor Drive, W. Main Street/Thames Street, and Main Street/Viaduct Road. Figure 10, the "KABCO Heatmap", shows the density of all crashes in the study area from 2018-2022, including injury and non-injury crashes ("O" crashes are those with no apparent injury, also called "property damage only" crashes). Therefore, this map represents the density of all types of crashes in the study area. Figure 11, titled the "KAB Heatmap" shows the density of only the highest severity crashes – KAB, as noted above – in the study area. This map helps to pinpoint the locations and intersections where people are being injured in crashes, which are a higher priority to address due to the risk to human health.

Figure 10 KABCO Heatmap

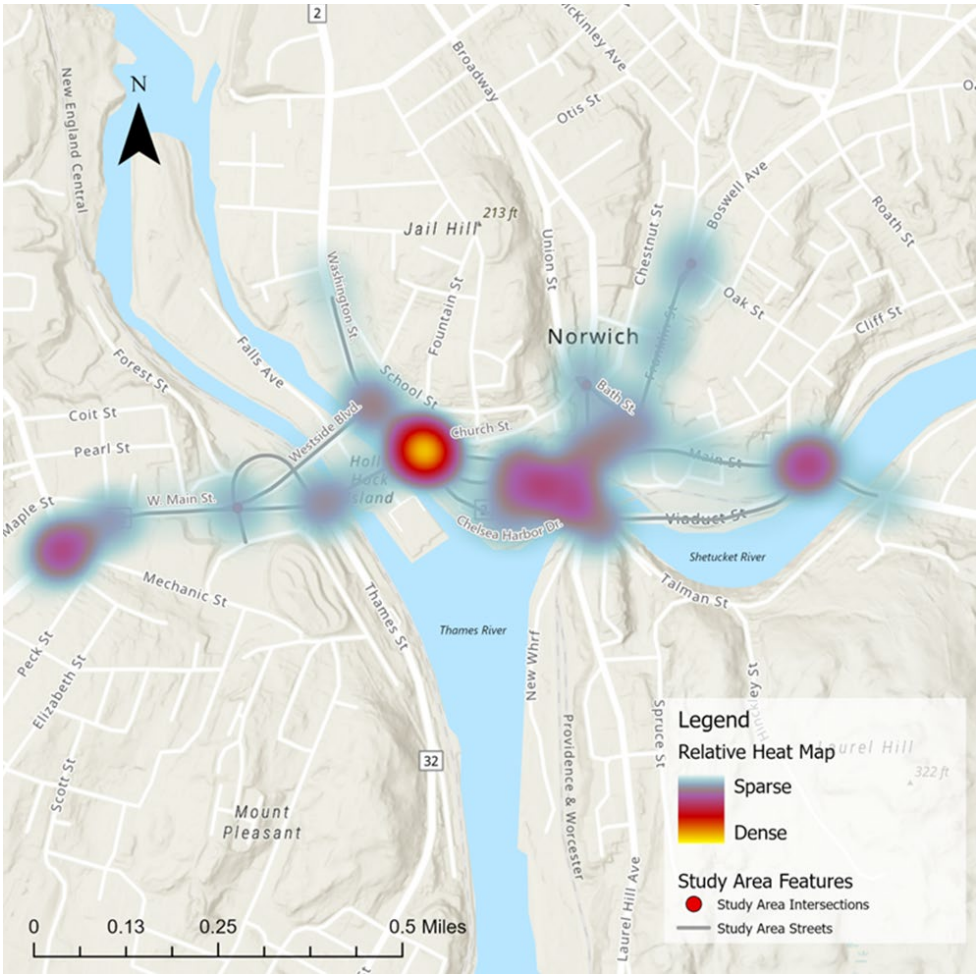
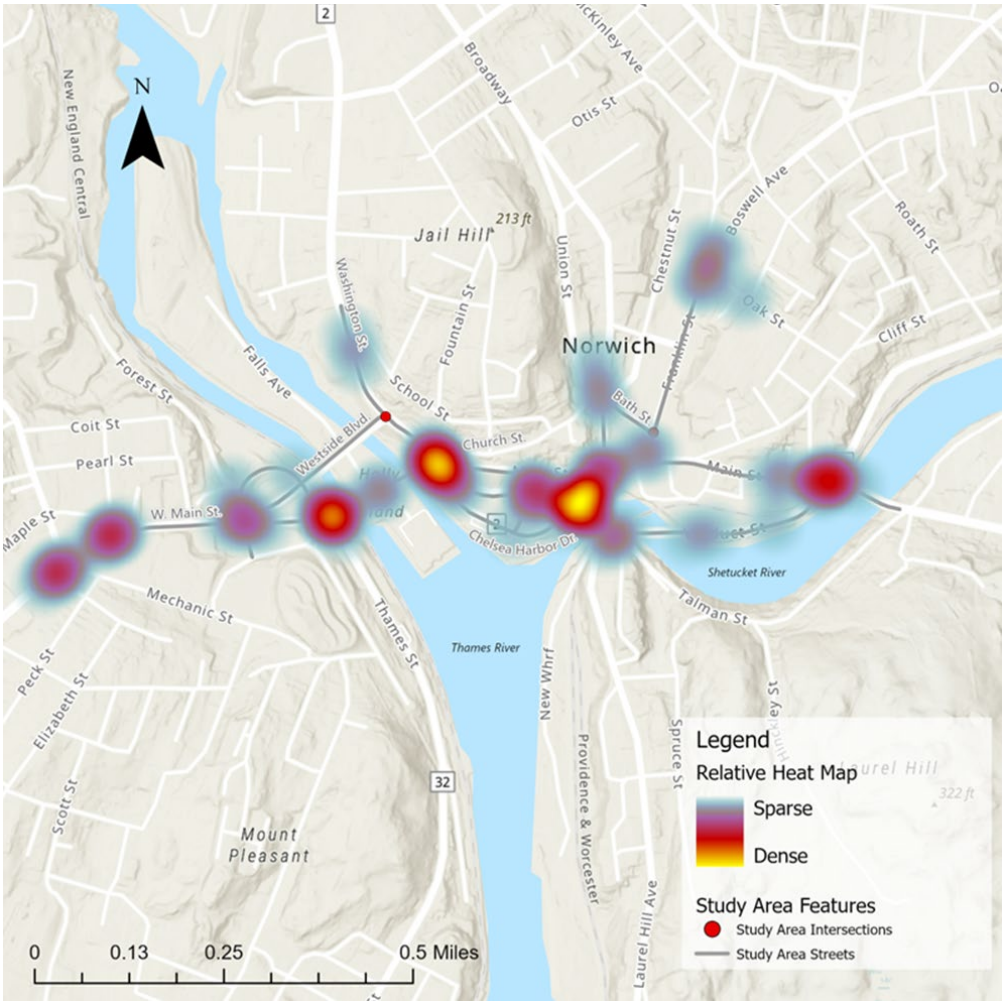


Figure 11 KAB Heatmap



Source: VHB

2.3.8 Pedestrian Involved Crashes

There were 20 pedestrian crashes during the 2018-2022 period. However, pedestrians had the highest KAB injury proportion of all emphasis areas. Seventy percent of pedestrian involved in crashes resulted in a KAB level injury, while the overall proportion of emphasis area crashes resulting in KAB injuries is 9%. In New London County, approximately 2.4% of people commute to work by walking according to the 2021 American Community Survey. Pedestrians also represent only 2% of total crashes in the area. However, pedestrians account for 17% of all KAB level injuries. The number of KAB injuries for pedestrians is highly disproportionate given the small number of pedestrian crashes. Figure 13 shows the locations of pedestrian crashes in the study area. Pedestrian crashes were concentrated in the center and east parts of the study area.

Figure 12 below shows pedestrian involved crashes by light condition. Seventy percent of the pedestrian crashes occurred in low-light or dark conditions.

Figure 12 Pedestrian Crashes by Light Condition

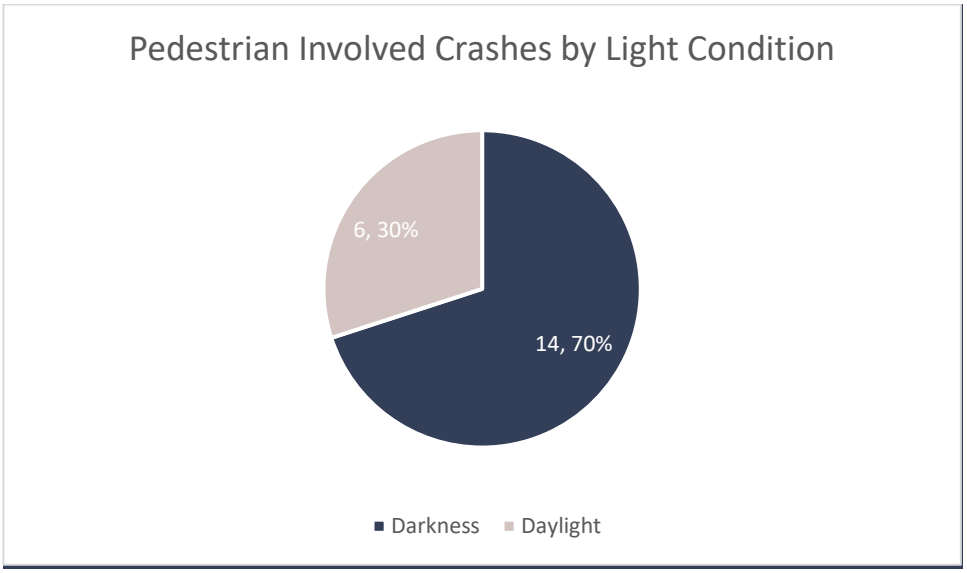
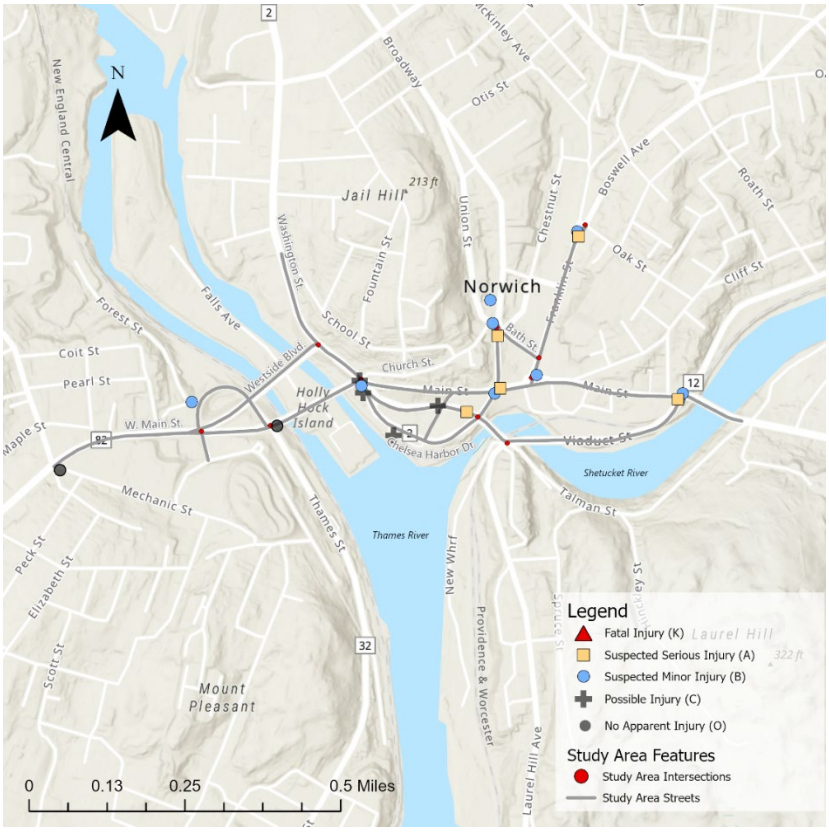


Figure 13 Pedestrian Crash Location Map



Source: VHB

2.3.8.1 Pedestrian Involved Crashes at Key Intersections

Table 13 displays the locations of pedestrian-involved crashes relative to the twelve key intersections. Seventy-five percent of the pedestrian crashes occurred at one of the 12 key intersections. The intersections with the highest number of pedestrian crashes, with three each, were Washington Street at Main Street (Washington Square) and Viaduct Road at Main Street. Four intersections did not have any pedestrian crashes.

Table 13 Pedestrian Involved Crashes at Key Intersections

Key Intersections	Fatal Injury (K)	Suspected Serious Injury (A)	Suspected Minor Injury (B)	Possible Injury (C)	No Apparent Injury (O)	Total
W. Main St. and N. Thames St. (westbound)						0
W. Main St. and N. Thames St. (eastbound)					1	1
Washington St. and Westside Blvd.						0
Washington St. and Main St.			1	2		3
Chelsea Harbor Dr./Courthouse Sq. and Water St.		1				1
Water St. and Viaduct Rd.						0
Viaduct Rd. and Main St.		1	2			3
Main St. and Franklin St.			1			1
Franklin St. and Bath St.						0
Main St. and Broadway/Courthouse Sq.		1	1			2
Broadway and Union St./Chestnut St.		1	1			2
Franklin St. and Boswell St.		1	1			2
Crashes not at a key intersection			2	2	1	5
TOTAL	**0**	**5**	**9**	**4**	**2**	**20**

2.3.9 Bicycle Crash Summary

During the 2018-2022 period, four bicycle crashes were reported in the study area. Three of the crashes resulted in minor injuries, while the fourth had no injury. The crashes occurred at the following locations:

- 1 Minor Injury at W. Main St. and N. Thames St.
- 1 Minor Injury at Washington St. and Main St.
- 1 Minor Injury at W. Main St. and Ann St.

› 1 No Injury crash at W. Main St. and American Way

All four bicycle crashes occurred in daylight. See Figure 14 for a map of the locations of the bicycle crashes in the study area.

Figure 14 Bicycle Crashes in Study Area

Source: VHB

2.4 Bicyclists, Pedestrians, and Vulnerable Users

2.4.1 Pedestrians

Creating a safe and walkable downtown, where people can make fewer trips by car to visit businesses in the area, is very important to the City of Norwich. The VHB Team visited downtown Norwich on several occasions to review pedestrian infrastructure and make observations on safety, connectivity, ADA accessibility, and comfort.

2.4.1.1 Curb Ramps and Crosswalks

Visual inspections of curb ramps were conducted. Widths, slopes, and other measurements were not included as part of the project scope. Curb ramps were noted as being "observed compliant" or "observed non-compliant" based on the visual inspection, with curb ramps that did not have detectable warning strips or landing pads considered "non-compliant." Other observable issues such as crumbling concrete or severe drainage issues were also factors in determining whether the curb ramps could be considered compliant. Figure 15 shows a map of the study area with observed compliant and observed non-compliant curb ramps.

Some intersections did not have compliant curb ramps at all, some appeared fully compliant, and others had a mix of compliant and non-compliant ramps. It was unclear why some curb ramps were upgraded at some intersections while others were left non-compliant. All crosswalks in the study area appeared to include some kind of curb ramp to provide a degree of accessibility. Figure 16 shows the locations of crosswalks in the study area.

Crosswalk locations were identified as part of the project data collection. Although most crosswalks were located at signalized intersections, several crosswalks were at uncontrolled locations (with no signal or stop sign/traffic control present). These uncontrolled locations include:

- Across Route 82/W. Main Street at Falls Ave (by the Transportation Center)
- Across Main Street at 55 Main Street (Social Security Administration building)
- Across Water Street/Route 2 at 82 Water Street
- Across Water Street/Route 2 at its intersection with Market Street
- Main Street at Market Street
- Across Union Street at City Hall
- Across Union Street/Church Street at City Hall
- Across Main Street at 340 Main Street (U.S. Postal Service Building)

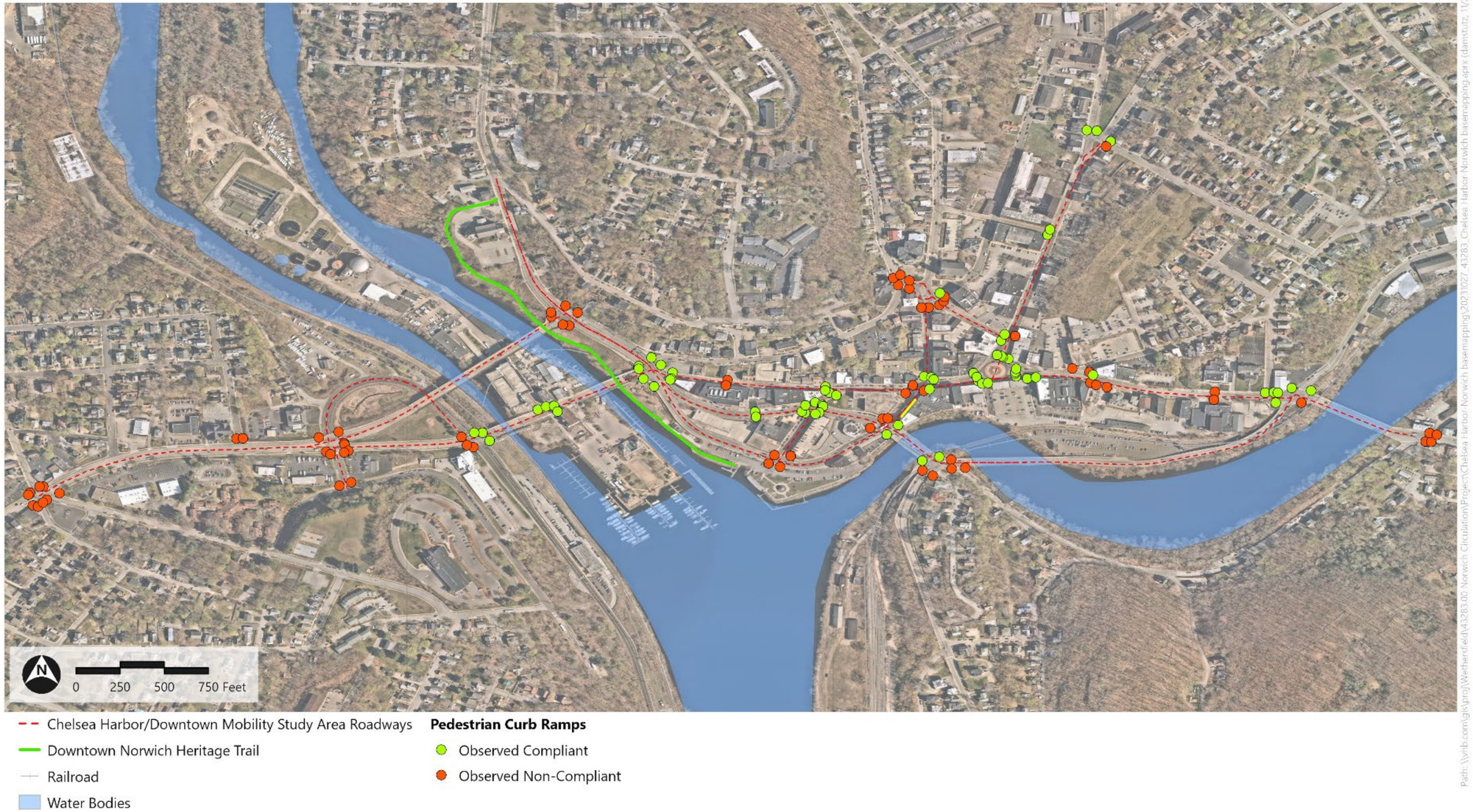
On central downtown streets where traffic speeds are lower, there are more frequent crossing opportunities for pedestrians in the form of crosswalks, either controlled or uncontrolled. Outside of the immediate downtown area, on many of the state roads with higher speeds and higher traffic, crossings are less dense and pedestrians need to travel farther to find an appropriate crossing.

The lack of driver yielding for pedestrians at uncontrolled crosswalks was observed in a few instances. Of special note are the crosswalks across Route 82/W. Main Street at the Transportation Center and the crosswalks across Water Street/Route 2 at Market Street. On one of the field review days, two pedestrians were observed waiting to cross Water Street at Market Street; they waited at the edge of the curb ramp for a driver to stop for them. At least a dozen cars passed by without stopping or slowing before the traffic had cleared and the pedestrians could cross. At the Transportation Center, drivers were observed going eastbound down the hill from N. Thames Street at high speeds (from a pedestrian perspective) and not slowing down for the crosswalk or flashing pedestrian beacon. Finding a gap in traffic to cross the street felt uncomfortable and unsafe.

Aggressive driving was also noted, with drivers pulling past stop bars and into crosswalks in ways that would block pedestrians from crossing, or force pedestrians to go around a car, potentially

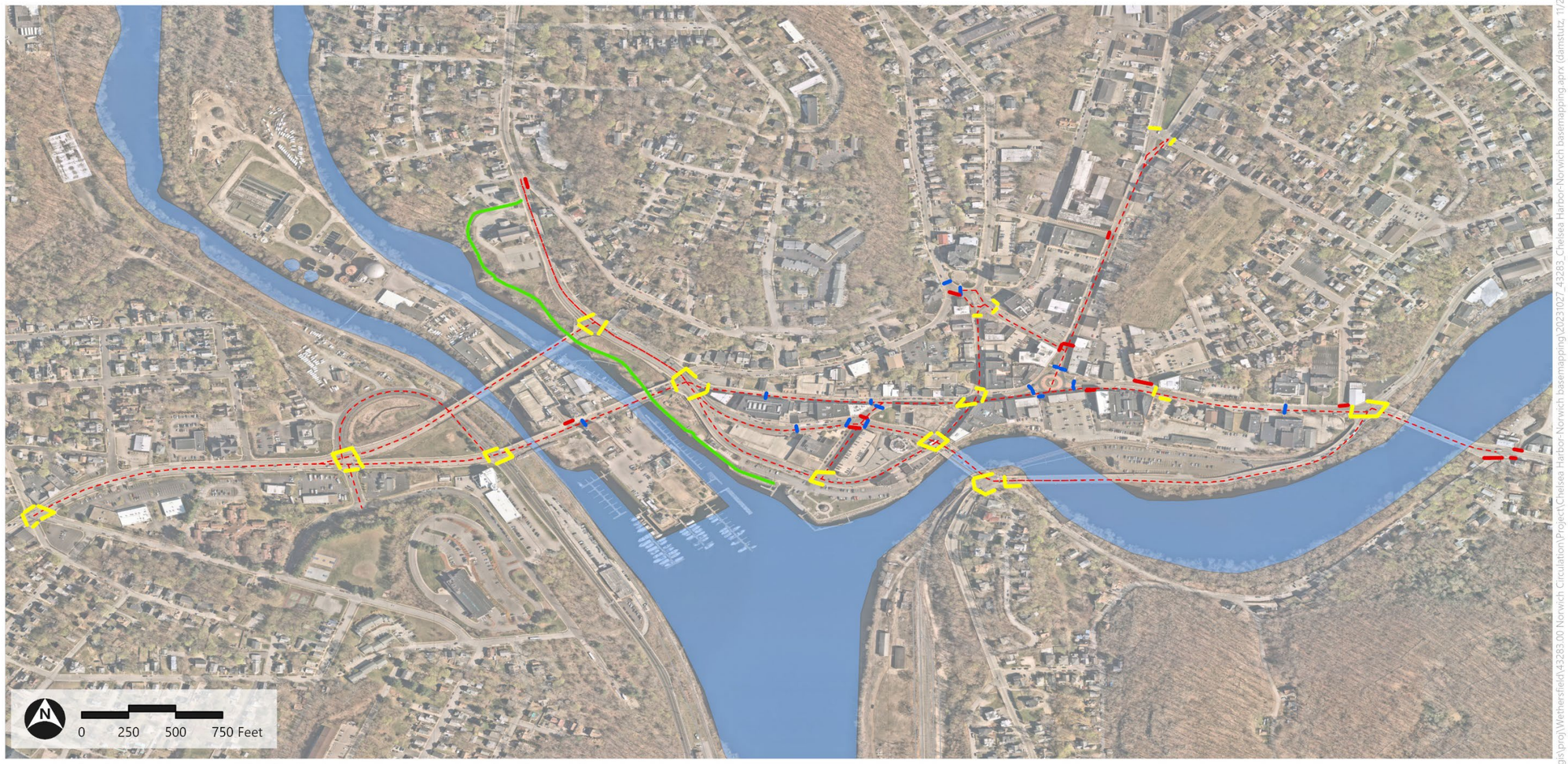
into other traffic lanes or in driver blind spots. This was especially evident at the Chelsea Harbor Drive/Water Street/Courthouse Square intersection, where Route 2 turns right from Chelsea Harbor Drive onto Water Street. This right turn is usually green, allowing drivers to turn freely, and permits right turns on red, setting up an expectation that drivers can roll through the intersection and make this turn with little slowdown. In addition, queuing from the left turn from Water Street to Viaduct Road spills back into the intersection, creating situations where drivers block the crosswalks while waiting for the next intersection to clear.

Figure 15 Curb Ramps in Study Area



Source: VHB

Figure 16 Crosswalks in Study Area



Source: VHB

2.4.1.2 Sidewalks

The sidewalk network in the Downtown Norwich area is nearly complete, with many dense, walkable areas befitting an older urban New England city center. Sidewalks along Main Street are typically wider and more comfortable for walking than other areas of the downtown, with street trees, benches, and other streetscape amenities. Additionally, the narrower streets and on-street parking makes for a physically and visually constrained corridor where drivers must go slower. Other streets, particularly on state routes, have less welcoming pedestrian accommodations. These include narrower sidewalks, no street trees for shade, faster-moving traffic with limited buffers, and long distances between crossings (as noted in the last section). Sidewalks are also missing from some roadways or there are no sidewalks in some sections.

Street sections in the study area without sidewalks include:

- N. Thames Street between Forest Street and W. Main Street/Route 82
- Viaduct Road/Route 12 between the Viaduct Road parking lot and Main Street/Route 12

Street sections with sidewalks on only one side include:

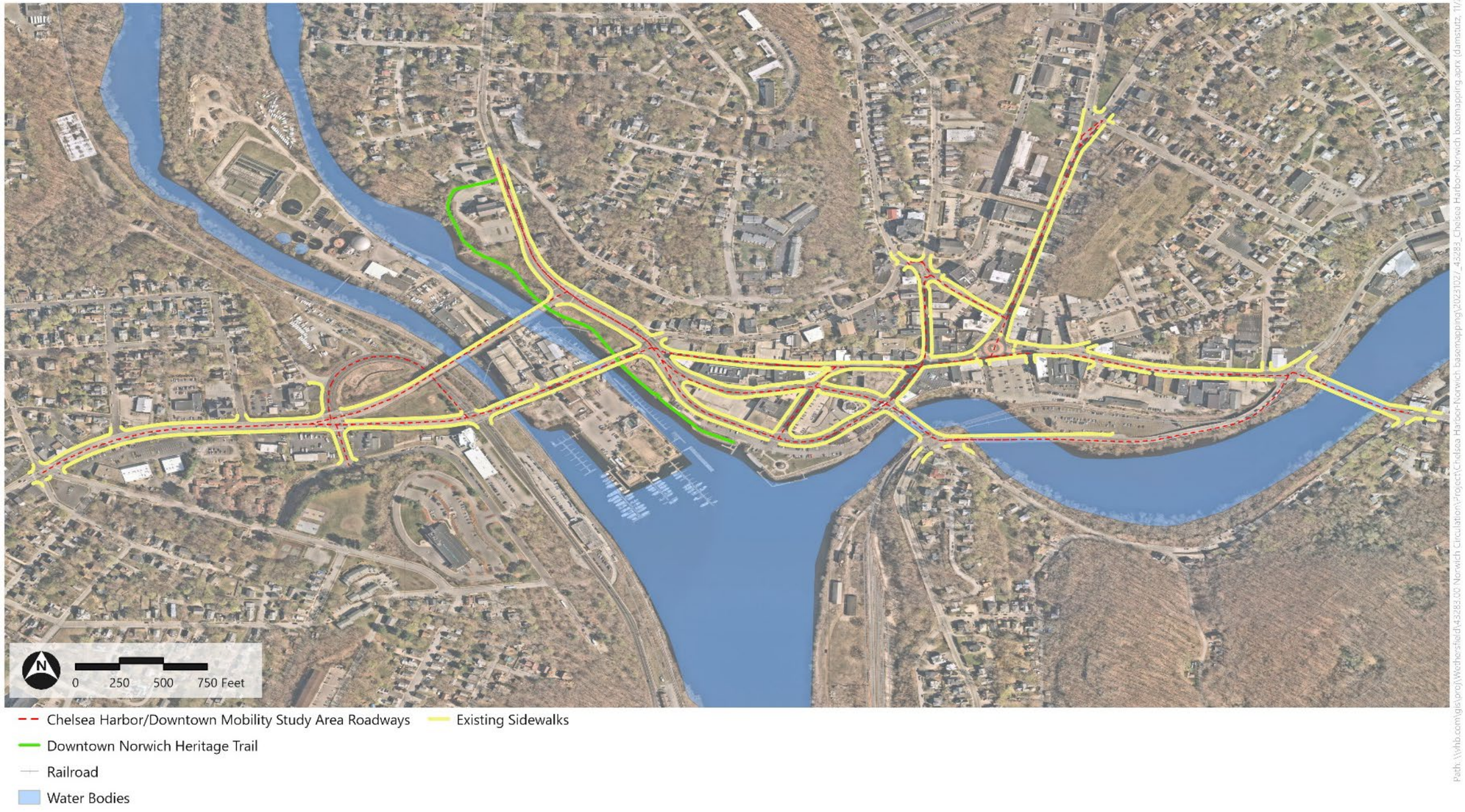
- West Side Boulevard/Route 82 between Washington Street/Route 2 and W. Main Street/N. High Street/N. Thames Street/Route 82; sidewalk is on north side with no sidewalk on south side
- N. Thames Street between W. Main Street/N. High Street/West Side Boulevard/Route 82 and Forest Street; sidewalk is on west side with no sidewalk on east side
- Viaduct Road between Talman Street and the Viaduct Road parking lot; sidewalk is on north side with no sidewalk on south side

In addition, field review observations found that the sidewalk on the east side of W. Main Street/Route 82 between Falls Ave and Washington Square was blocked due to an ongoing water/sewer project that requires the use of the sidewalk during construction. Despite the presence of the crosswalk at Falls Ave for pedestrians to cross to the west side of the street to continue into downtown, and signage directing them to cross, several pedestrians were observed (during multiple field visits) to be walking in the traffic lane on the east side of the street, ignoring the signage saying that the sidewalk was closed. This may be partly due to the difficulty of crossing the street at Falls Ave, as noted in the previous section, and general pedestrian desire lines that are not tolerant of out-of-direction travel.

See Figure 17 for a map of existing sidewalks in the study area.

In addition as noted in the traffic observations, there are a couple of exceedingly long crosswalks (over 75 feet) at the Washington Square intersection. These crosswalks require nearly 30 seconds of crossing time while exposing the pedestrians to 5-6 lanes of stopped traffic. This intersection can be a significant challenge to pedestrians crossing, especially those walking slower than 3.5 feet per second to cross. This is the typical walking speed used to calculate the time required for pedestrians to cross. Slower walkers will need more time and be exposed to the green signal of vehicles.

Figure 17 Existing Sidewalks on Study Area Roadways



Source: VHB

2.4.2 Bicycling

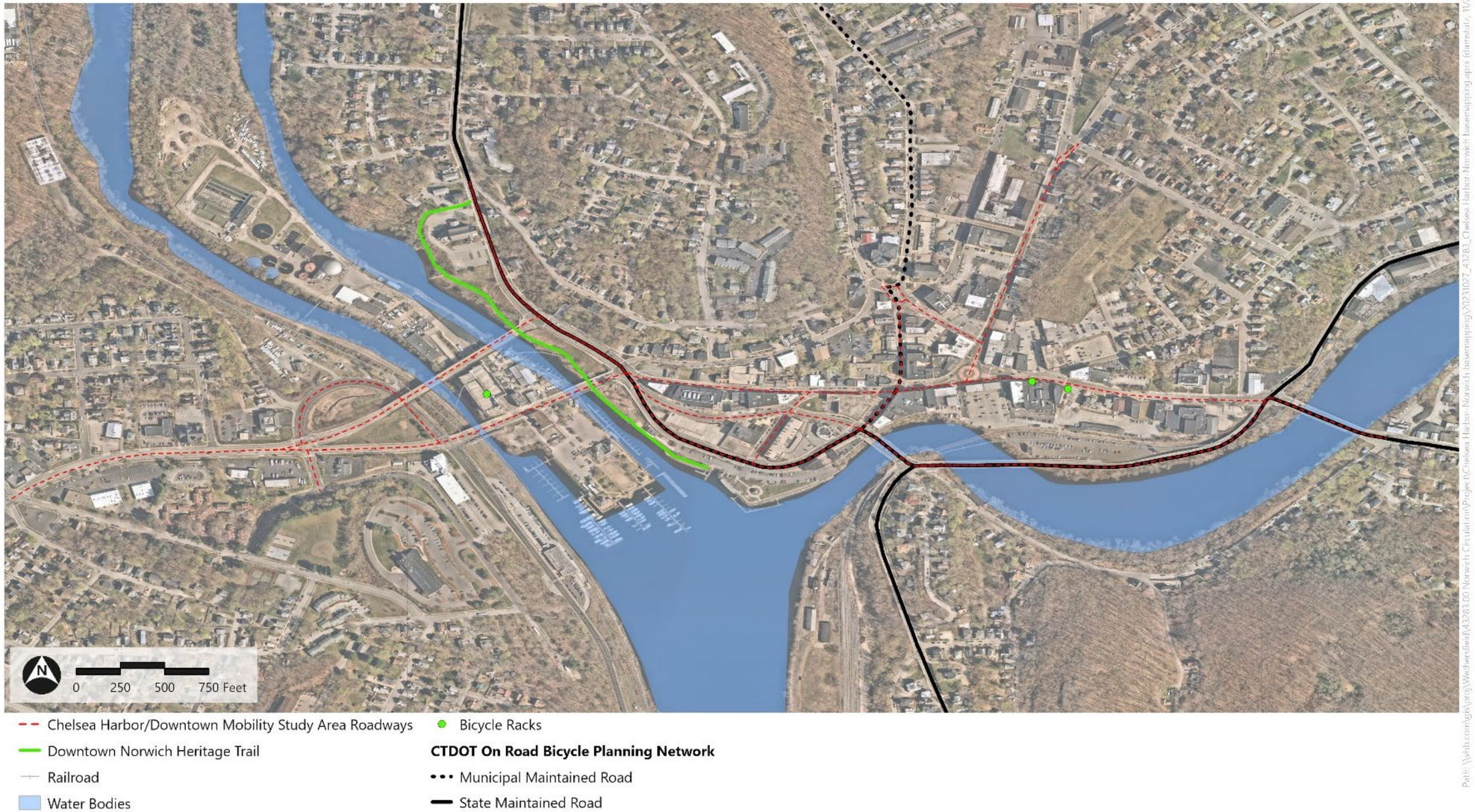
Bicycling is an important part of the transportation system, and it is the goal of the City of Norwich to increase cycling as a healthy, low-carbon, economical and space-efficient way to travel around the city. At the present time, there are few bicycle accommodations in the downtown and surrounding study area. There are no bicycle lanes or designated shared-use roads for bicyclists, although some roads have wide street shoulders and some of the central streets downtown have lower-speed traffic. The Heritage Walk Trail is the only off-road facility in the area, but it has limited connectivity and is oriented to pedestrians. It is unclear if bikes are allowed on the trail. Bike racks were observed near the Otis Library and at the Transportation Center. During field visits, some people bicycling were observed, including on Main Street and around Howard T. Brown Park.

The 2019 SCCOG Regional Bicycle and Pedestrian Plan includes several bicycling-related recommendations for downtown Norwich and on the fringes of downtown:

- Provide bike lanes, sharrows, and "Bikes May Use Full Lane" signs downtown.
- Bicycle accommodations are needed for Boswell Avenue and Talman Street.
- Route 12 from Water Street to the Preston Border: widen roadway for bike-safe shoulders.
- Add short-term and long-term bike parking.
- Add a signed bike route along Norwich Ave from the Town Green in Colchester to downtown Norwich.

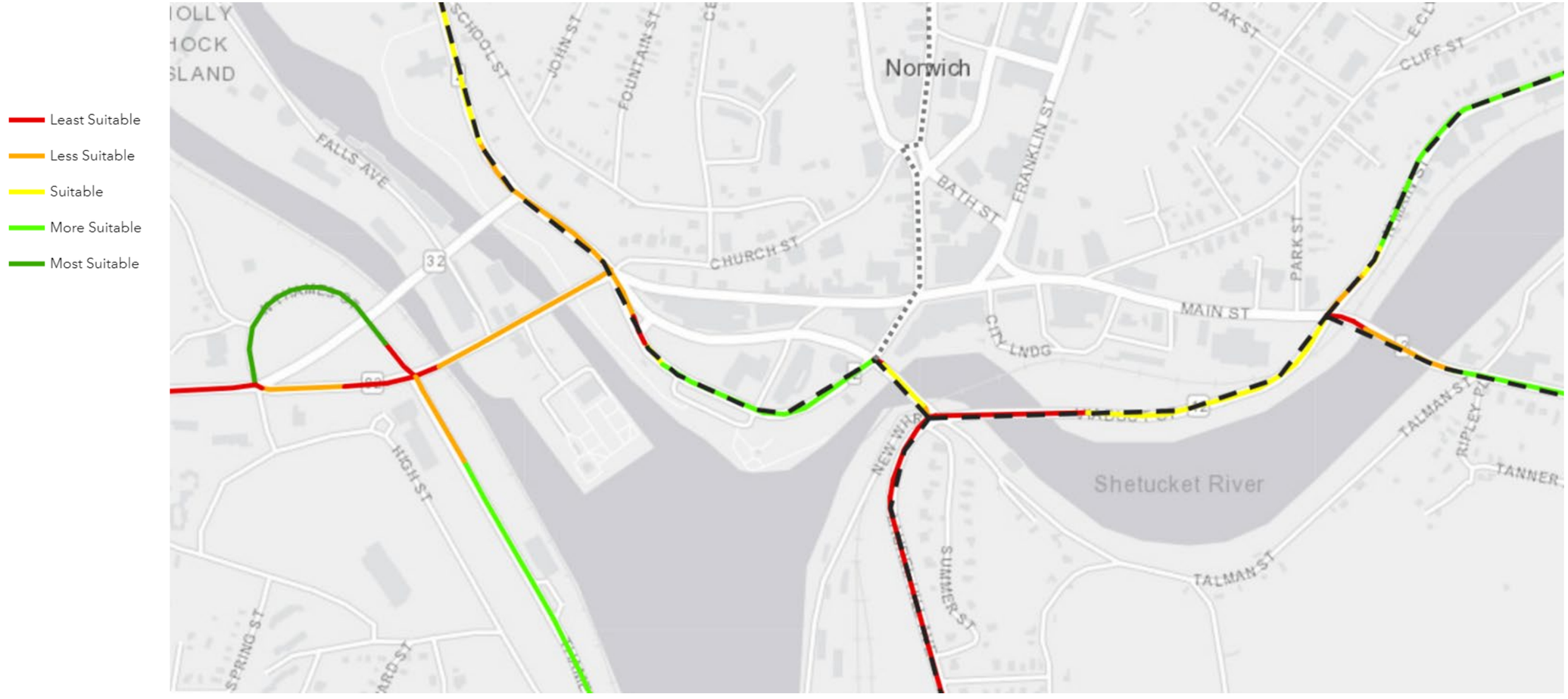
The CTDOT Active Transportation Plan, as discussed in section 2.9, includes a map of state routes that are part of CTDOT's On Road Bicycle Planning Network to indicate priority and desire for improved bicycling conditions on the routes that are part of the Network. As shown on Figure 18, Route 2 and Route 12 are part of the CTDOT On Road Bicycle Planning Network, indicating that improvements to these roadways will receive higher priority for bicycle accommodations. Courthouse Square and Broadway, as city-maintained streets, are also suggested as primary improvement areas for bicycling. The CTDOT Active Transportation Plan included a review of suitability of roads for bicycling, as well as priority implementation tiers for the bicycle planning network on state routes. The roads in the study area have lower suitability for bicycling, including Washington Street, Route 82, and Viaduct Road. These roads have planned Bicycle Facility Implementation Tiers which are in the higher ranges (Tier II-1 to Tier II-5 and Tier II-6 to Tier II-8). See Figure 19 and Figure 20 which are taken from the CTDOT Active Transportation Plan and show the bicycle suitability ratings and the implementation tiers, respectively.

Figure 18 Bicycling along Study Area Roadways



Source: VHB

Figure 19 CTDOT Active Transportation Plan Bicycle Suitability Map



Source: CTDOT Active Transportation Plan

Figure 20 CTDOT Active Transportation Plan Bicycle Facility Implementation Tiers

Source: CTDOT Active Transportation Plan

2.5 Public Transportation

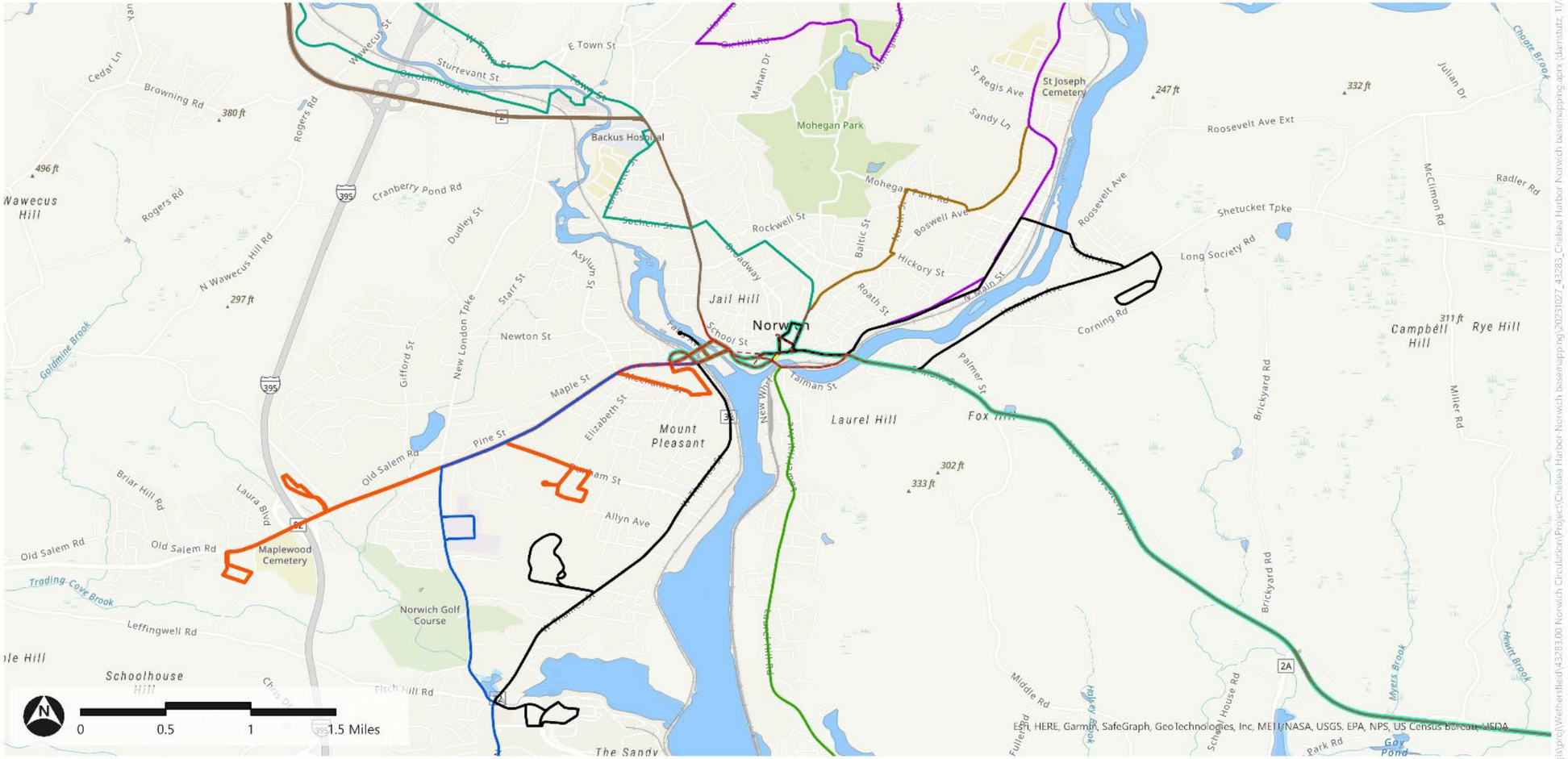
2.5.1 Bus Routes

Public transportation service to the study area includes the Southeast Area Transit District (SEAT) and the Windham Regional Transit District (WRTD) bus routes. There are eight SEAT transit routes that run through downtown Norwich and one WRTD route. The SEAT routes are:

- Route 1 – Norwich/New London via Route 32
- Route 2 – Norwich/New London via Route 12 & Groton
- Route 4 – Norwich to Occum/Taftville
- Route 5 – Norwich to Norwich Business Park via Backus Hospital
- Route 6 – Norwich to Norwich Wal-Mart via Marcus Plaza
- Route 7 – Norwich to Hamilton Ave, Mohegan Sun, and Uncas-On-Thames
- Route 9 – Norwich to Lisbon Landing via Route 12
- Route 982 – Norwich-Foxwoods

The WRTD route is the Willimantic-Norwich route. See Figure 21 for a regional view of the public transit system around the study area.

Figure 21 Regional Public Transportation Around Study Area



Chelsea Harbor/Downtown Norwich Mobility Study Area Roadways
Railroad
Water Bodies

WRTD - Willimantic - Norwich

SEAT Bus Routes

Route 1 - Norwich / New London Via Rt 32
Route 2 - Norwich / New London Via Rt 12 & Groton
Route 4 Norwich To Occum / Taftville
Route 5 - Norwich To Norwich Business Park Via Backus Hospital
Route 6 - Norwich To Norwich Wal-Mart Via Marcus Plaza
Route 7 - Norwich To Hamilton Ave, Mohegan Sun & Uncas-On-Thames
Route 9 - Norwich To Lisbon Landing Via Rt 12
Route 982 - Norwich-Foxwoods

Source: VHB, SEAT

2.5.2 Stops and Shelters

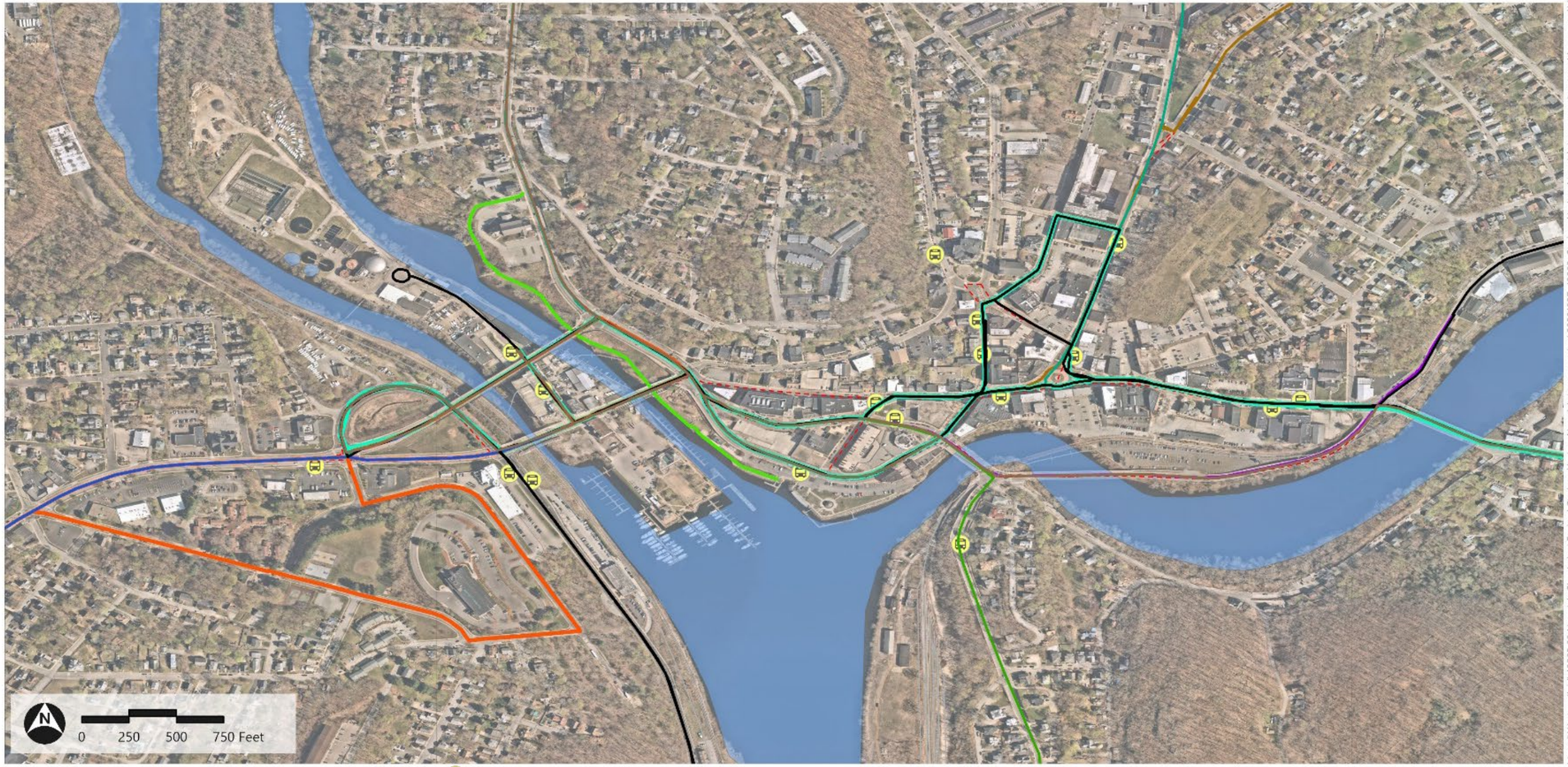
The Southeast Area Transit Service (SEAT) is a "flag-down service" meaning that the bus can be flagged down and boarded at any point, and riders may also stop the bus at any point to get off. However, Google Map and GIS data show bus stops, and there are bus stop signs in certain locations around the study area. On Franklin Street next to the Roundabout, a bus stop area has been designated with pavement markings and a bus stop sign. It is unclear if transit users are expected to use these locations as bus stops, since they are not universally placed around the study area (see Figure 22). The bus stop signs themselves are often affixed to posts that have other signs on them, instead of on independent posts. While this may reduce the number of signposts along the street, it has the effect of cluttering up the signpost with many different signs which may not be directly related to one another.

Three bus shelters were noted in the area:

- Chelsea Harbor Drive at Market Street/Howard T. Brown Park
- W. Main Street/Route 82 at N. Thames Street/N. High Street
- Union Street across from Norwich City Hall (just outside the study area)

None of the shelters had route information or bus service information to assist public transit riders. In addition, only the shelter on Chelsea Harbor Drive appeared to be in use by the Transit District. The shelter at W. Main Street/Route 82 had a printed notice taped to the inside of the shelter that said it was not in use and that riders would need to go to Oaktree Plaza, approximately 700' west and up a hill, to catch the bus. Field review did not clearly locate where the bus would stop, as the notice stated only that the stop would be at a tree near the Plaza. The bus shelter at Union Street appeared well-maintained and included a bike rack. However, this location is not on any bus routes currently.

Figure 22 Bus Routes and Bus Stops in Study Area



Source: VHB

2.6 Parking

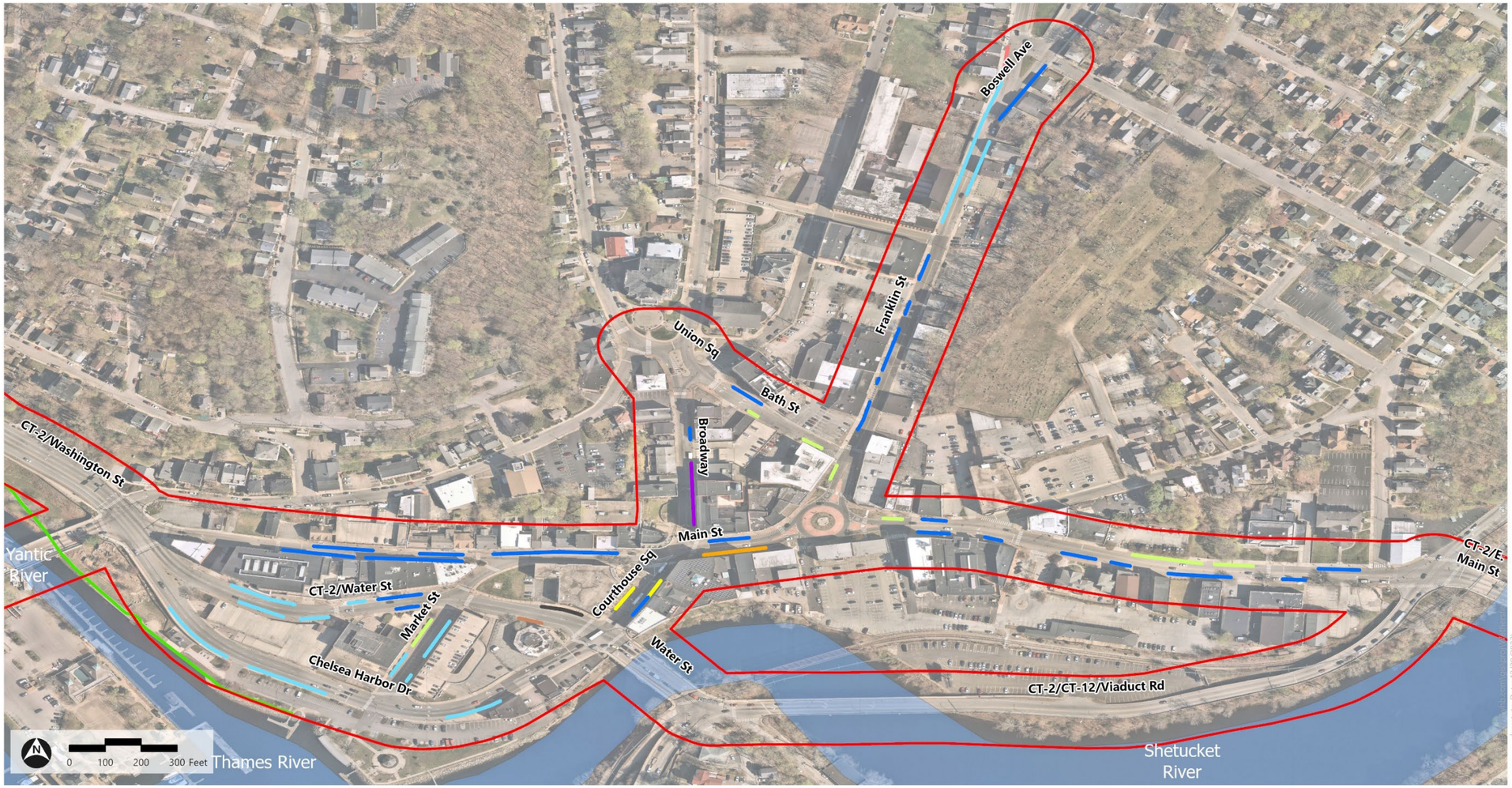
Parking around downtown Norwich includes on-street parking, off-street surface parking lots, and parking garages. Some surface lots and parking garages are owned by the City, while others are owned privately. A recent parking study drafted by the Norwich Community Development Corporation (NCDC) calculated that there are more than 3,000 parking spaces in Downtown Norwich. Many of these spaces are reserved for specific companies or organizations, both on-street and off-street. Main Street, Broadway, and Courthouse Square had the heaviest on-street parking occupancy observed. All on-street parking is unmetered.

2.6.1 On-Street Parking and Loading

A review of on-street parking regulations during the field work noted that there are many different context-specific regulations in place, making it difficult for a downtown visitor to determine where they can and cannot park. See Figure 23 for a map of on-street parking regulations in downtown Norwich. On-street parking next to certain properties are limited to employees of those properties, such as police vehicles (on a section of Water Street) and DCF State Vehicles (on the block of Courthouse Square). Time-limited restrictions were the most common type of parking regulation, typically allowing for up to two hours of parking time, with some areas allowing only 20 or as little as 10 minutes of parking time. Unusually, there were two different times of day for the most common two-hour parking windows, with some signs noting the restriction was from 8 AM to 6 PM, while other signs had the restriction from 7 AM to 4 PM. Time-limited restrictions can also vary block to block, and in one case in the same block: on Water Street/Route 2 between Washington Square and Market Street, the west end of the block allows on-street parking for a maximum of two hours, from 8 am – 6 pm, Monday through Friday. At the east end of the block, signage notes that on-street parking is allowed for two hours, but from 7 am – 4 pm, also Monday through Friday. These different regulations are also evident on Franklin Street. Some on-street parking is unsigned, making it unclear whether any time-limited or other regulations apply.

Except for one location near the Franklin Square Roundabout, no dedicated on-street business loading spaces were observed in the study area. Although many buildings and properties have dedicated off-street parking or a loading alley for taking deliveries, it was clear that most of the older urban properties developed prior to the automobile did not. As a result, deliveries would need to be made from on-street locations. Along Broadway and near the Franklin Square Roundabout, there are sections of parking which are 15-minute “express zones” meant to provide space for quick stopping and loading by customers, likely to pick up food or items ordered online or by phone, which proliferated during the height of the COVID-19 pandemic. However, these are oriented to customers and not business deliveries. If no curbside space is dedicated to loading, business deliveries may be unable to park and deliver their goods, or they are forced to double-park in the street, causing congestion and unsafe conditions for other users. Given the high occupancy of parking observed in some of the densest areas of the study area, it is likely that this is a common occurrence.

Figure 23 On-Street Parking Regulations in Study Area



Source: VHB, Near Map

2.6.2 Parking Garages and Lots

Observations of parking garages and lots was completed during field review in August and September 2023. A more thorough review of off-street parking was completed the afternoon of Tuesday, September 19. This included visiting public and private lots in the study area, principally in the downtown, and determining occupancy by counting actual number of vehicles parked or by visually estimating occupancy. Staff used the parking report completed by the NCDC to determine the number of total parking spaces at each facility and divided the observed occupancy by the total number of parking spaces to come to an occupancy percentage.

The off-street parking facilities reviewed included:

- Transportation Center Garage
- Main Street Garage
- Market Street Garage
- Viaduct Lot off Viaduct Road
- Cliff Street Lot
- Howard T. Brown Park Lot
- Private garage at 43-51 Water Street
- 82 Franklin Street parking lot (Zierler Lot)
- ArtSpace Lot at 113 Franklin Street

The Market Street Garage, which is public, was estimated to be about two-thirds full, the highest occupancy rate of all the parking facilities reviewed. The remaining parking facilities were found to be 40% occupied or less, with several locations found to be around just one quarter full. The Transportation Center garage was about 10% full, while the Main Street garage was 19% full, the Howard T. Brown Park lot was 23% full, and the Cliff Street Lot was about 21% full. Among private lots and garages, the Viaduct Lot was about 36% full and the private garage at 43-51 Water Street was estimated to be less than one quarter full.

The condition and layout of parking garages was also observed, particularly for the public garages and lots. The Transportation Center Garage was observed to be clean, comfortable, and well-lit. Access to the garage and parking within the garage was easy to navigate. The Main Street garage is difficult to locate due to lack of signage and appeared poorly maintained, with unsanitary stairwells and garage areas. The Market Street Garage was confusing to navigate due to the separation between the first-floor garage area and the upper floor garage. The first floor could be accessed from Market Street or Water Street, while the upper floors could only be accessed from an entrance off Chelsea Harbor Drive. The garage stairwells were narrow and uncomfortable, and showed severe signs of maintenance issues, particularly doors that would not open or close properly and one door that would not close all the way because the door frame was heavily damaged.

To add to the confusion of the Main Street and Market Street garages, reserved spaces were found on the first floors, while public parking was on the upper floors, making it unclear to the public where they could park and how far they would need to travel back down to street level. Combined with the issues with the stairwells made for an unpleasant experience.

The parking garages did not appear to have any cost for the public to park, and so were free like the on-street parking spaces.

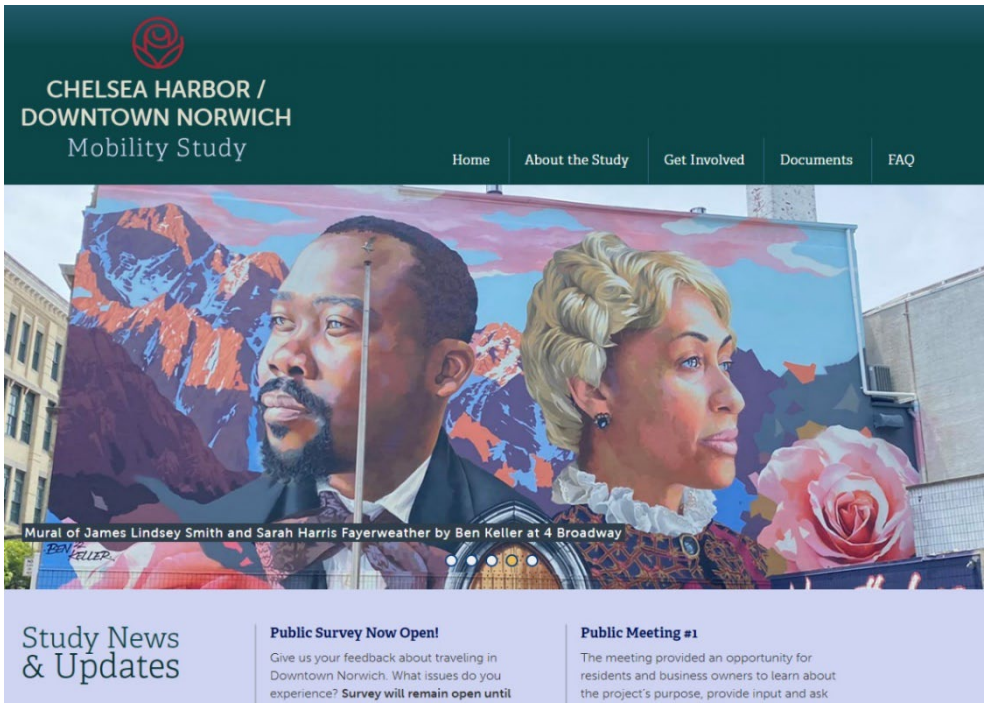
2.7 Public Involvement

Public Involvement has been at the forefront of efforts for this Mobility Study. The VHB Team has developed and maintained a vibrant website, produced and distributed multilingual public surveys online and in paper, attended two community events, and hosted the study's first public information meeting on October 25th, 2023.

The following sections delve into more detail regarding each of the outreach components completed to date.

2.7.1 Project Website

The project has a stand-alone website, **www.downtownnorwichmobilitystudy.com**, that serves as the platform for project information. The website has five main tabs: Home, About the Study, Get Involved, Documents, and a FAQ page. The Home page provides details on the project purpose and provides a high-resolution study map for viewers to understand the exact limits of the project area. The About the Study page explains the schedule of work and goes into more detail about the study background purpose and goals. The Get Involved page highlights all the past and upcoming events and provided links to the project survey in three languages -- English, Chinese, and Spanish. There is also a form for people to subscribe to an email contact list. The Documents page will provide the public with access to the study documents and their supplemental findings. Finally, the FAQ page provides answers to the most common inquiries about the project.



The development of the project website also allowed for the creation of a logo to brand the project. An artistic emblem of a red rose – in honor of Norwich being the Rose City – was created to help identify the project and make it recognizable to the public.

2.7.2 Public Survey

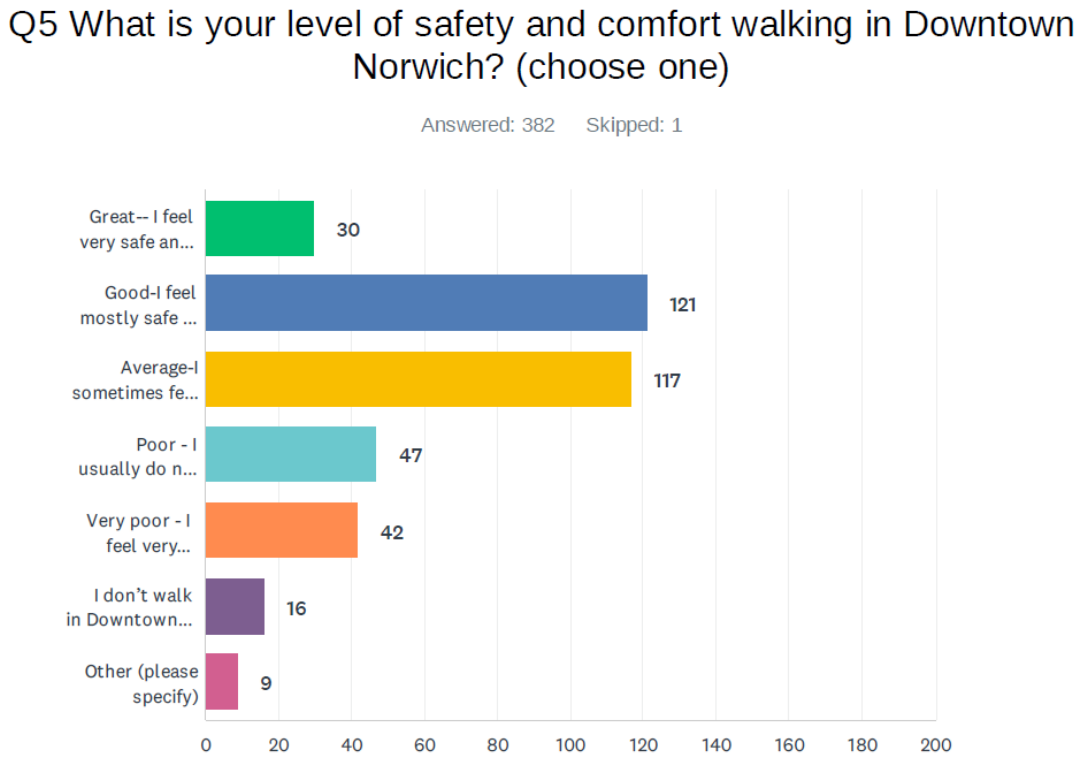
A public survey was developed and made public on August 22, 2023, to gather input from residents, business owners, employees, visitors, and travelers to Norwich. Along with a survey in English, the survey was also translated into Spanish and Mandarin Chinese to meet the demographic needs of the City of Norwich. The survey was primarily online; however, paper surveys were also distributed to various locations in Downtown Norwich to encourage more responses from those who have limited access to Wi-Fi, smartphone technology, or otherwise prefer hard copy versions. The paper surveys were distributed to: Foundry 66, Cream Coffee, The Madonna House, Otis Library, the City Hall Info Desk, and the Norwich Chamber of Commerce office.

Special efforts were taken to reach out to Low English Proficiency (LEP) communities and transit users. The team shared the survey with the Greenville Neighborhood Committee which has a significant Haitian population. Additionally, the Project Team created project posters for the local transit district, SEAT, to be displayed on their buses to reach transit riders. The Project Team also worked with the City of Norwich to use their contacts to find contacts for other hard-to-reach populations in the city. Envision 360, which is a public engagement tool hosted by the Norwich Community Development Corporation (NCDC), posted the public survey along with general information about the study, and linked to the study website.

2.7.2.1 Public Survey Results

The public survey, which stayed open for responses from mid-August to November 22, 2023, garnered 384 total responses to the survey, with 383 in English and one in Spanish. Seventy-six percent of the respondents live in Norwich, while the remaining quarter represent a variety of other towns in the region. Twenty-nine percent travel through downtown to get to other destinations, while 24% visit downtown to work or study, and another 24% visit downtown for shopping, errands, entertainment, or visiting restaurants. The majority drive through downtown and don't walk much (64%), another quarter drives into downtown and walks around, 6% use transit downtown, and 5% typically walk or bike downtown. A majority (58%) do not bike in downtown Norwich, and 22% feel it is unsafe or very unsafe to bike in downtown Norwich. Thirty-nine percent feel that walking in Norwich is good or great, and the remaining respondents feel it is average (31%) or poor to very poor (23%). See Figure 24 for a graph of people's perceptions of walking safety in downtown.

Figure 24 Perception of Walking Safety in Downtown Norwich

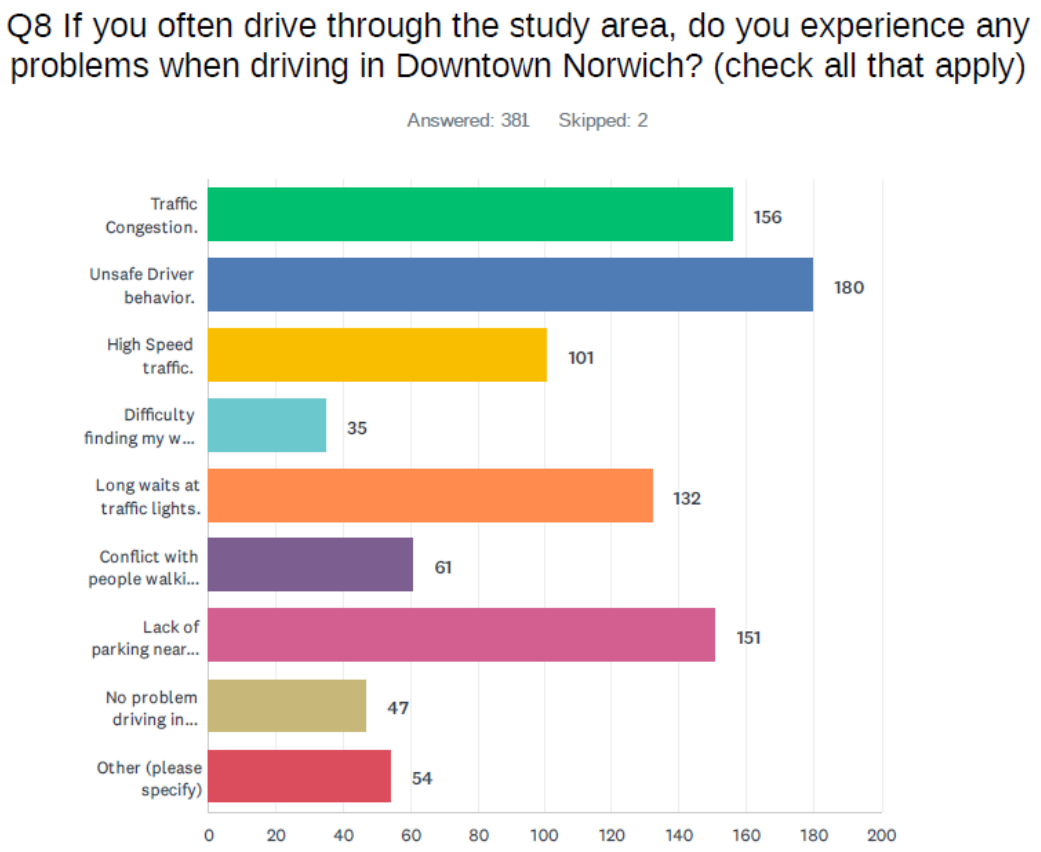


There are many different concerns people have with getting through the study area. They include unsafe drivers (47%), traffic congestion (41%), lack of parking near their destination (40%), long traffic signal wait times (34%), high speed traffic (26%), conflicts with people walking (16%), and issues with wayfinding (9%). See Figure 25 for a breakdown of these concerns in graphical form.

The survey also asked about how people perceive the Franklin Square Roundabout, which was installed in 2021. Overall, people think the roundabout works well or very well (71%) while 26% believe it does not work well or works very poorly.

Finally, many different areas of downtown were referenced as places where people feel it is unsafe or unappealing to walk or bike in. Areas on Main Street by the Post Office and Court House were mentioned, as well as near City Hall, Washington Square, getting from downtown to the marina/intermodal center, Water Street, and Market Street. Speeding was also brought up as another concern people have, and difficulty using pedestrian crossings.

Figure 25 Driving Issues Experienced in Downtown Norwich



2.7.3 Media Attention

The Mobility Study is an important, high-profile project for the City of Norwich; as such, it has received media attention from local and regional news outlets that help to get out information about the study and promote the different ways public input is being sought. The Day, a local independent news outlet in southeastern Connecticut, published several news articles about the study and the public meeting that was held on October 25. They include:

- "Downtown Norwich streets, traffic, pedestrian safety to get close look" (The Day, September 29, 2023)
- "Public forum to be held Wednesday on downtown Norwich transportation issues" (The Day, October 22, 2023)
- "Downtown Norwich traffic, pedestrian safety issues discussed" (The Day, October 25, 2023)

Additionally, the Norwich Bulletin included an article about the public meeting, and Bill Kenny, a columnist for the Bulletin, wrote a piece encouraging people to take the public survey and provide input for the future of downtown Norwich. This media attention, along with the efforts of study partners to get out the word about the public survey and public meeting by sending information to their networks, helps to create more visibility for the study and get people to take the survey and attend the meeting who may not otherwise if they did not see it in the news.

2.7.4 Outreach Events

In summer and fall 2023 The VHB Team attended two community events to promote the project, encourage survey participation, gather input from the public and increase project awareness.

2.7.4.1 Pop-up at Rock the Docks Event

This event took place on August 23, 2023, from 6:00-8:00 PM at Howard T. Brown Memorial Park. Rock the Docks is a musical event put on by the Norwich Chamber of Commerce during the summer to encourage people to come downtown and enjoy the marina area. The Study Team attended this event to provide information on the purpose and scope of the study and take feedback on mobility issues in the downtown Norwich area. It was a productive first outreach event to launch the project to the public. People raised concerns about safety at intersections in the study area, noted confusion about the new roundabout at Franklin Square, and noted various issues in the area including speeding and red-light running.

2.7.4.2 Pop-up at Celebrate Cultural Diversity Event

This event took place September 19, 2023, from 5:00-8:00 PM at Chelsea Parade. Celebrate Cultural Diversity is an annual event put on by the Rotary Club of Norwich and is a lively multicultural event with music, dancing, and food vendors. The Study Team attended this event to provide information on the purpose and scope of the study and take feedback on mobility issues in the downtown Norwich area. This event was conducive to the Team's outreach efforts as there was a steady flow of interest over the three-hour celebration. Feedback received included concerns about sidewalk conditions, traffic congestion around the harbor, long traffic signal cycles, and issues about the location of the water access at Howard T. Brown Park.

2.7.5 Public Information Meeting #1

On October 25 at the Otis Library in Downtown Norwich, the VHB Team hosted the project's first public information meeting. For the meeting, an online option was provided, as well as food and beverages for attendees, to make it more appealing and easier for people to attend the meeting. Approximately 30 people attended the meeting. The purpose of the meeting was to go over the purpose and goals of the study, give an overview of existing conditions found during data collection, and provide an opportunity for attendees to ask questions and give comments on the study area. After the presentation was a lengthy Q & A session where attendees made many different comments about the project. Comments from the meeting were:

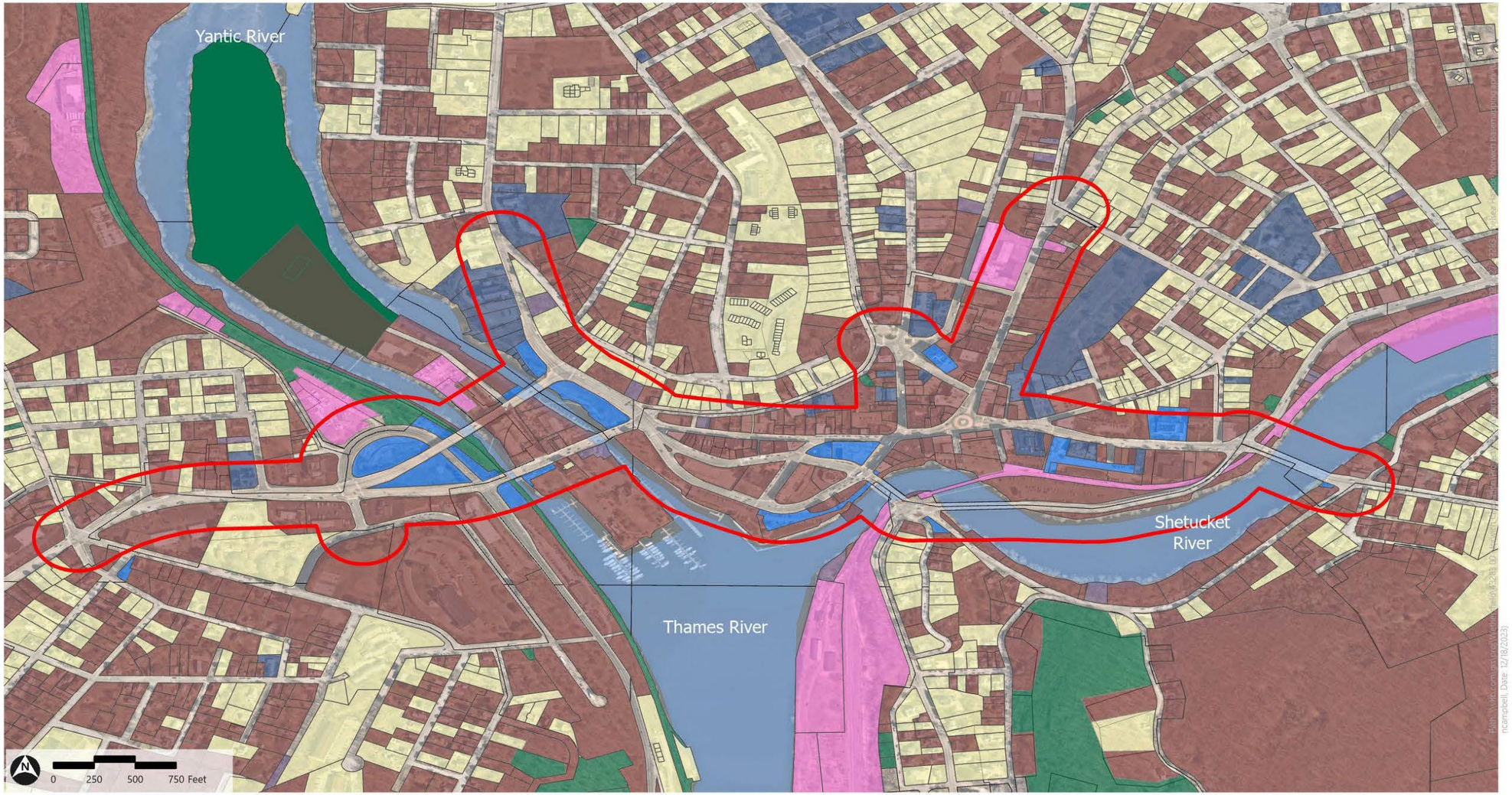
- There was a request for future public meetings to have communication options made available for people who are low-vision or hearing impaired to make them more accessible. Also, please include a reference to wheelchair users in the public survey.
- Ugly trash cans, blank storefronts, bad sidewalks are in downtown and need to be addressed.
- Empty buildings and storefronts are falling into disrepair. Windows should be covered up so people do not see the empty, messy areas inside.
- Consistent litter and weed control is needed – get property owners and businesses to help clean up.
- Too many one-way streets make commutes longer, as you have to go on a circuitous route to get anywhere.
- Better wheelchair accessibility is needed around downtown.
- Encourage more use of the Transportation Center parking garage by the Marina and Park.
- Bike lanes are needed in downtown.
- In front of the City Hall and Post Office, drivers are not stopping for pedestrians in the crosswalks; a few people mentioned almost getting hit while walking across the street.
- Norwich is not very walkable, yet the historical society is investing time, effort and money into promoting walking tours; need to support walkability downtown.
- The Franklin Square roundabout is confusing for people to use.
- There are many unhoused people around the downtown that make people concerned about their personal safety.
- The City should try to close of a street to make it for pedestrians only to support local businesses and do what other communities are doing and testing out.
- Public restrooms are needed downtown for events and visitors.
- More art is needed downtown.
- Trees and vegetation are overgrown and not maintained well. This creates an eyesore downtown.
- Improve public transportation to support as an alternative mode of transportation for residents.
- Making Water Street (for example) walkable may have to come at the cost of lowering the speed limit and causing some congestion. These are trade-offs that need to be made.
- Accessibility for children to youth centers should be considered in this study.
- Reduce on-street parking and make room for bike lanes; encourage people to use the garages instead.
- Parking garages are blocking the view of the river/marina and could be removed to make it easier to see and access the riverfront. That property could then be used for other things, such as an extension of the Howard T. Brown Park.

2.8 Land Use and Development Patterns

As an older urban downtown area, land uses in the downtown area are generally mixed, with many residences and businesses occupying the same properties, often with retail or offices on the ground floor and residential units above them. However, there is also evidence of much single-use properties that were developed later in the city's history as zoning began being used to separate different land uses away from each other. In addition, some properties were deliberately removed by urban renewal and roadway expansion in the mid-20th century, including the expansion of Route 2 as it enters downtown from the west.

The 2023 Plan of Conservation and Development (POCD) for the City of Norwich notes that residential uses make up largest land use category in the city at 53.51%. Other significant land uses include open spaces and parks (11.35%), government and institutional use (14%), commercial (7.27%) and industrial (1.86%). A significant amount of land in the city is also taken up by parking and road infrastructure. Much of the vacant land within the city is zoned for residential or has topographic or natural resource constraints that make it difficult to develop. The City's intent is to redevelop underutilized sites and re-use old infrastructure like mill sites, often referred to as infill development. See Figure 26 for a map of the land uses in the study area.

Figure 26 Land Use in the Study Area



Source: VHB, Near Map

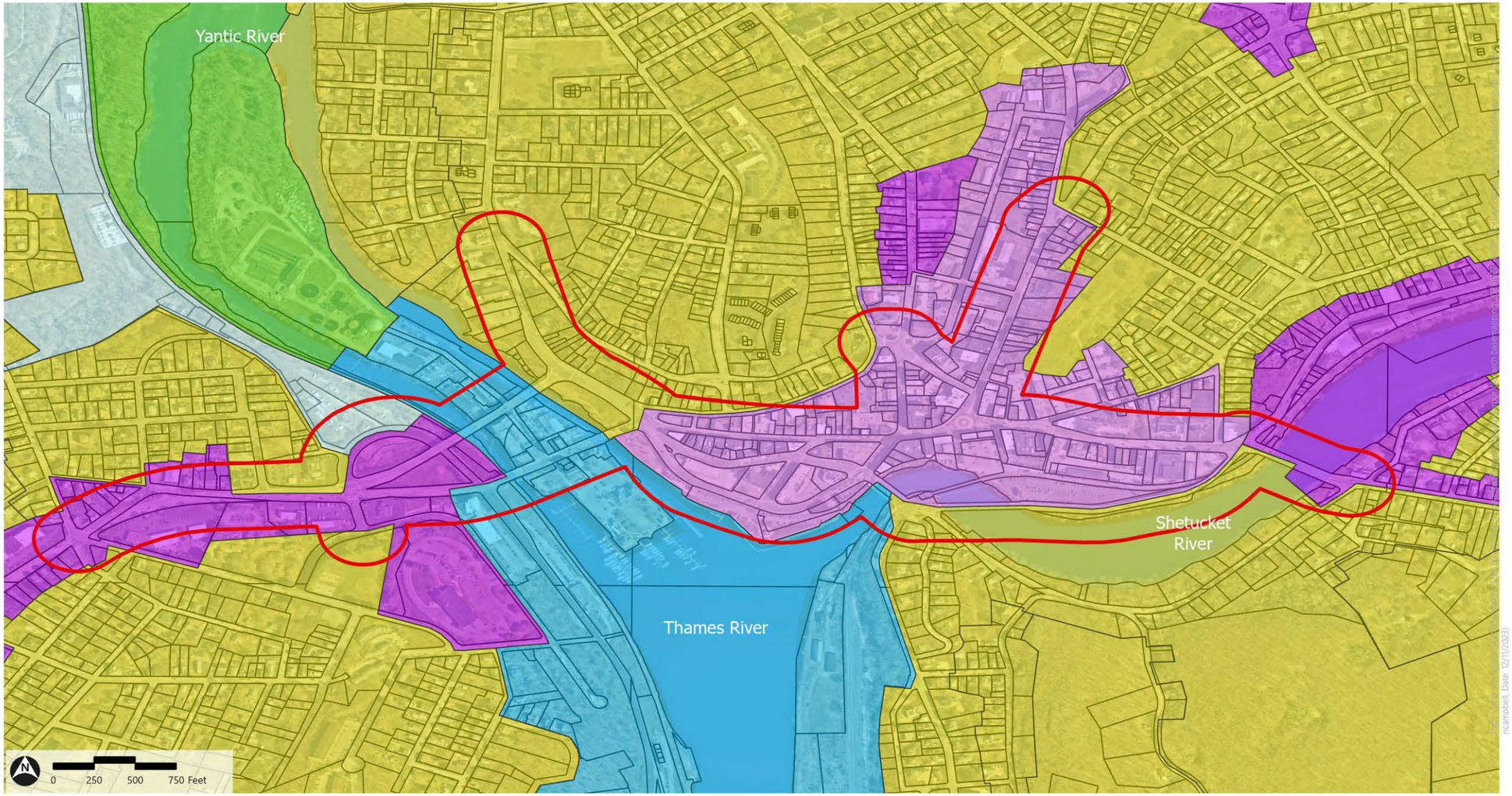
2.8.1 Zoning

The zoning within the study area is mainly made up of commercial, residential, waterfront development, and the Chelsea Central district, which makes up the core of Downtown Norwich. The Norwich POCD notes that the City intends to update its zoning code and zoning map in 2025.

See Figure 27 for a map of the zoning in the study area. The zoning map is made up of the following zones:

- GC: General Commercial
- NC: Neighborhood Commercial
- PC: Planned Commercial
- CC: Chelsea Central
- ROS: Recreation/Open Space
- WD: Waterfront Development
- I: Industrial
- R-20, R-40, R-80, MF: Residential Zones

Figure 27 Zoning in the Study Area



Source: VHB, Near Map

2.8.2 Population and Employment Trends

The Norwich POCD and the report for the Eastern Connecticut Rail and Transit Study (draft as of this writing) provide information on population and employment trends for the City of Norwich and around the study area. Norwich has had a relatively stable population over the last 70 years, which peaked in 1970 with 41,739 people and dropped to 36,117 in 2000. As of the 2020 Census, there are about 40,125 people living in Norwich. The population is most dense in the downtown area and diffuses outward along the Shetucket and Thames Rivers. The population younger than age 60 declined between 2010 and 2020, while the population over 60 saw significant growth during the same period. The median age is 38.8 years old, which is younger than that of New London County and the State. Norwich also has a greater diversity of ethnic and racial groups than the County – it is 54.1% white, 19.3% Hispanic/Latino, 11.4% black/African American, and 7.1% Asian. Between 2010 and 2020, black and Latino demographics grew while the white population decreased. On a regional level, there is slow overall population growth in the state and region. The population of southeastern Connecticut is projected to increase by just 0.28% per year between 2023 and 2050. However, Norwich is expected to see greater population growth due to greater birth and in-migration rates during that time.

Norwich has a lower median household income than New London County and the state ($57,565 compared to $75,831 and $79,855 respectively), with employment primarily in the service industry – 29% of businesses are in services. The largest employer is the William W. Backus Hospital with 1,895 employees as of 2021. Seventy-six percent of Norwich workers live outside Norwich, while 82% of Norwich residents are employed outside the city. Some of the larger employers in the area include General Dynamics Electric Boat in Groton, Mohegan Sun and Foxwoods, the Lawrence & Memorial Hospital in New London, Millstone Power Station in Waterford, Pfizer in Groton, and Day Kimball Healthcare in Putnam. The region relies heavily on gaming and the service industry for job opportunities, both of which were seriously impacted by the COVID-19 pandemic. The Norwich POCD notes that unemployment has improved since the pandemic, when many people lost their jobs. There are three Opportunity Zones and one Enterprise Zone in the city to encourage economic growth and development. Economic development is prioritized by the City in the Chelsea Central District (downtown), mill redevelopment areas, business park, and proposed business park north. The manufacturing industry in the region is expected to grow in the future, with businesses such as General Dynamics Electric Boat.

2.8.3 Environmental and Cultural Resources

Downtown Norwich has considerable history and cultural resources, being an older settled area in the region, and significant environmental resources with its proximity to the Yantic, Shetucket, and Thames Rivers. The study area also contains previously developed sites, that unfortunately are locations where hazardous materials were used and left behind, and which are now in various stages of being cleaned up. Both types of sites – historic and cultural sites, and sites needing environmental remediation – are important to be aware of to understand the context of downtown Norwich. These sites, as well as historic district boundaries and the National Diversity Database boundaries are shown in Figure 28.

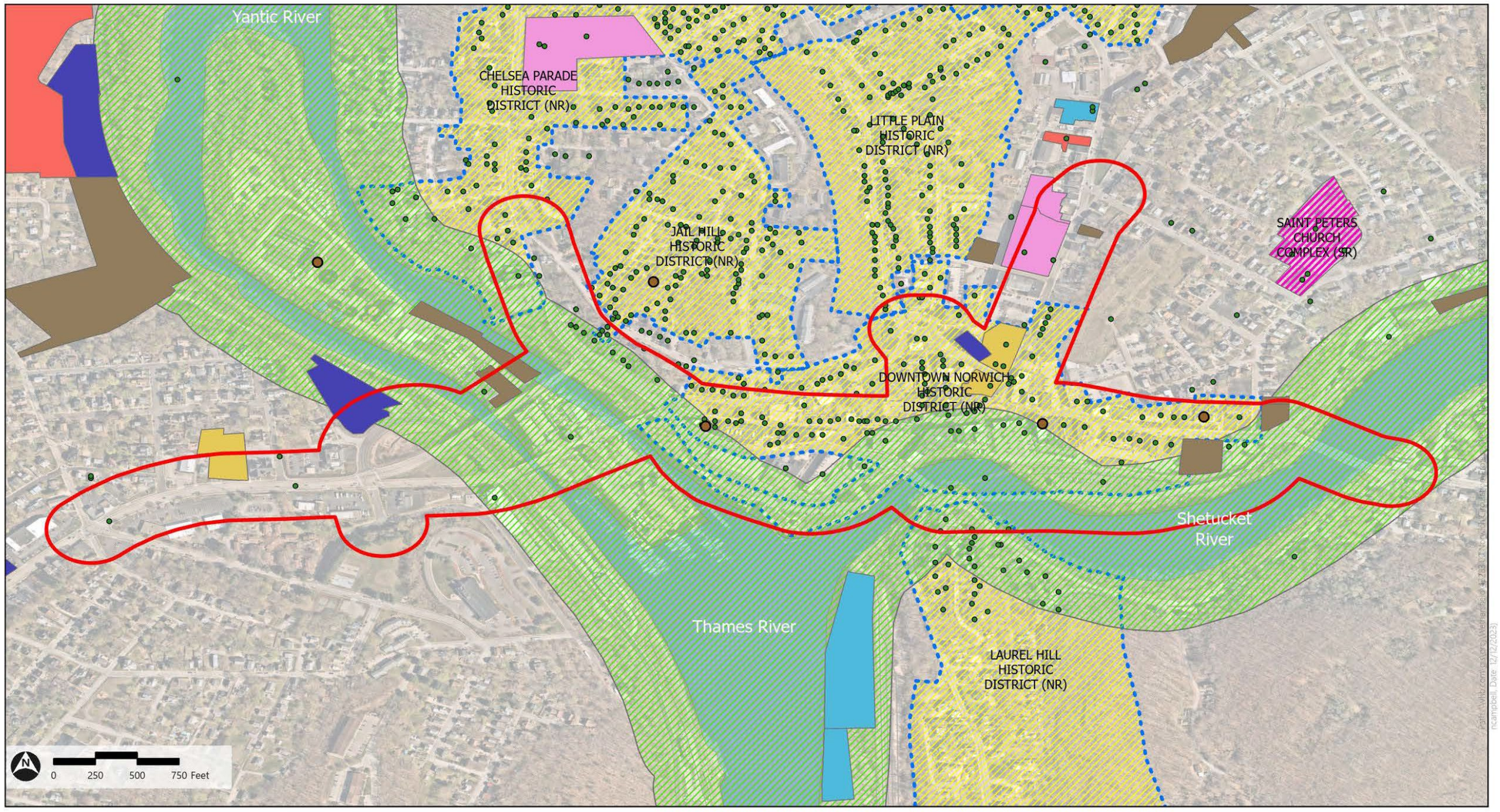
Among historic and cultural resources and sites, there are several historic districts on the National Register of Historic Places that are within or near the boundary of the study area. They include:

- Downtown Norwich Historic District
- Jail Hill Historic District
- Little Plain Historic District
- Chelsea Parade Historic District
- Laurel Hill Historic District

In addition, there are dozens of individual historic buildings and properties (4F/6F sites) within and outside the various historic districts that contribute to the sense of place of the downtown area as an older compact downtown built before the advent of the automobile.

Several brownfield sites can be found within and near the study area, and are marked based on what stage of remediation they are in. This information is accurate as of 2018.

Figure 28 Environmental and Cultural Resources in Study Area



2.8.4 Environmental Justice Communities

According to the CT Department of Energy & Environmental Protection, an environmental justice community is defined by the Connecticut General Statutes as:

- A distressed municipality, as designated by the Connecticut Department of Economic and Community Development; or

Defined census block groups where 30% of the population is living below 200% of the federal poverty level.

Norwich is considered a distressed municipality and all the Census Block Groups that the Mobility Study area passes through are environmental justice communities. Norwich is ranked 7th in the state's 2023 Distressed Municipalities list.

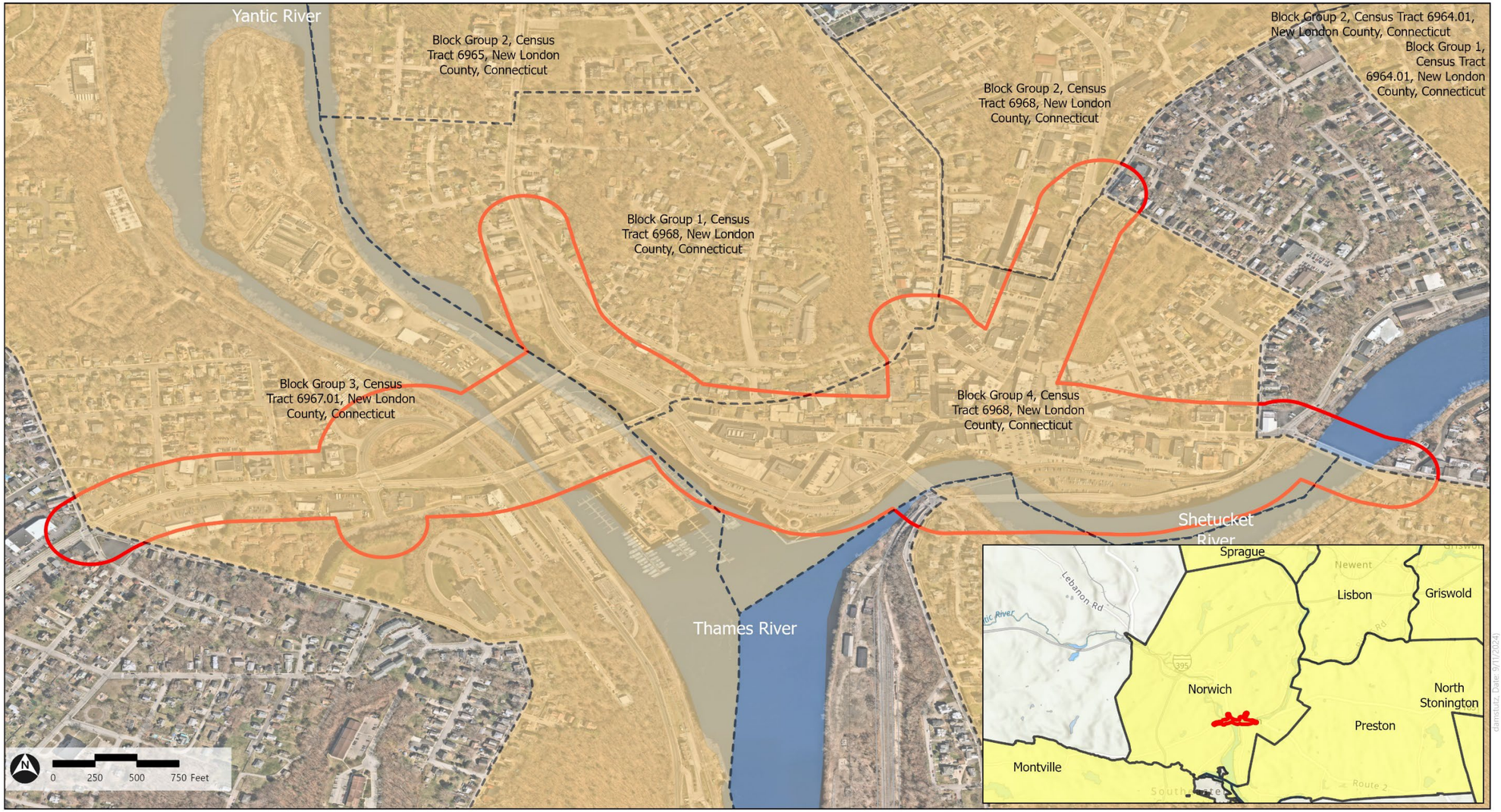
Five New London County Census Block Groups containing environmental justice communities are within Norwich and study area. Along with Percent Population Below 200% of the Federal Poverty Line, the state's data includes percent population minority and percent households as having limited English proficiency (LEP).

- Census Tract 6967.01
    - Block Group 3
        - Percent Population Below 200% Federal Poverty Line: 34.1%
        - Percent Population Minority: 33.1%
        - Percent Households LEP: 16.2%
- Census Tract 6968
    - Block Group 1
        - Percent Population Below 200% Federal Poverty Line: 38.5%
        - Percent Population Minority: 46.8%
        - Percent Households LEP: 3.5%
    - Block Group 2
        - Percent Population Below 200% Federal Poverty Line: 56%
        - Percent Population Minority: 74.9%
        - Percent Households LEP: 5.9%
    - Block Group 4
        - Percent Population Below 200% Federal Poverty Line: 69%
        - Percent Population Minority: 74%
        - Percent Households LEP: 28.3%
- Census Tract 6970
    - Block Group 3

- Percent Population Below 200% Federal Poverty Line: 45.6%
- Percent Population Minority: 51.1%
- Percent Households LEP: 9.5%

See Figure 29 for a map of the environmental justice communities in the study area and Distressed Municipalities in the region.

Figure 29 Environmental Justice Communities in Study Area



Source: VHB, Near Map

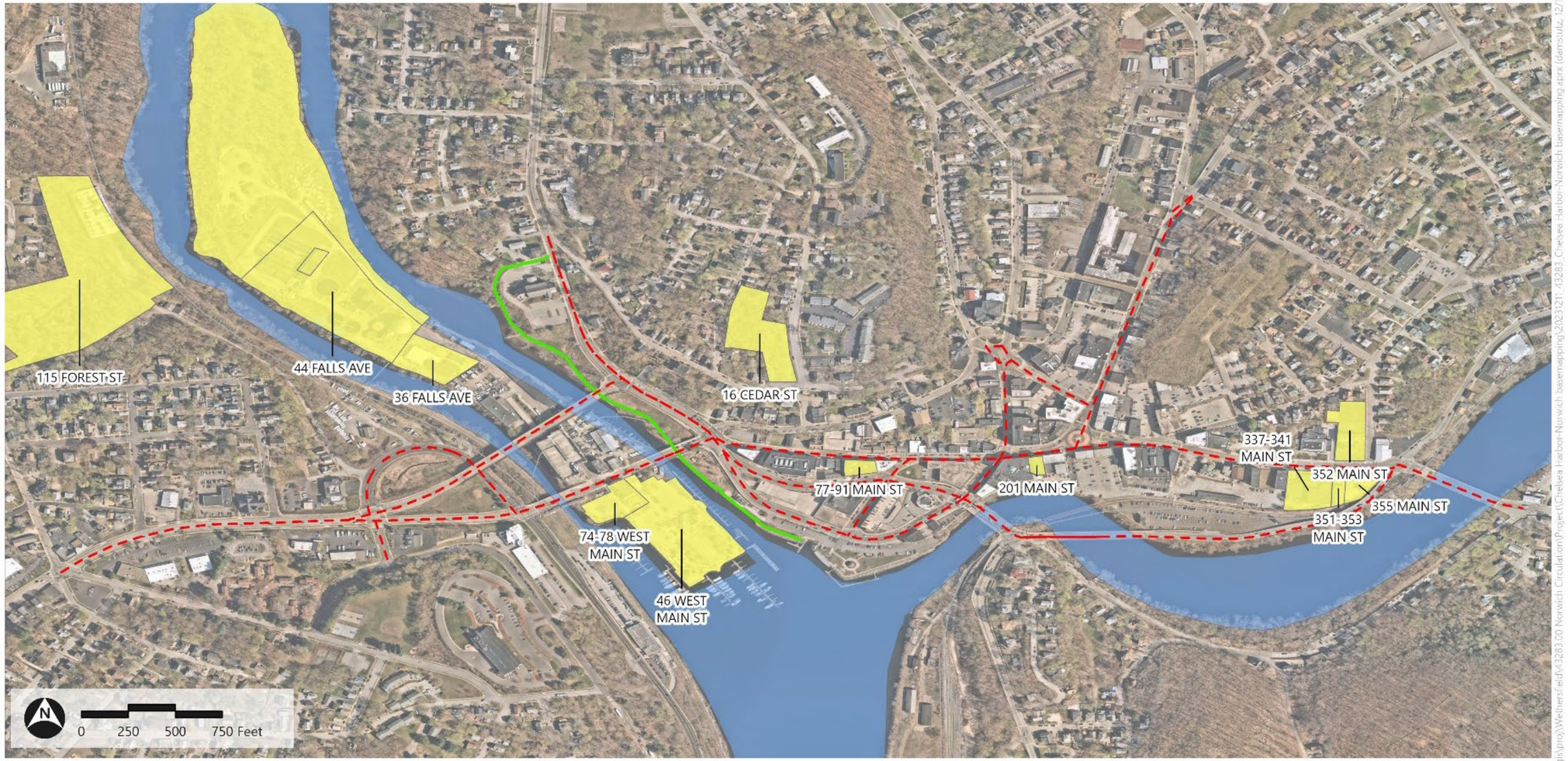
2.8.5 Proposed Development Projects

The City of Norwich has several ongoing or potential development projects in and near downtown Norwich that are important to be aware of as part of this Mobility Study. At the project kick-off meeting in summer 2023, the City provided information on several development projects in the downtown at various stages of implementation. There are also new developments, such as at the planned re-opening of the Norwich Marina, that have begun since the Mobility Study kick-off and are also included. See Figure 30 for a map of locations that were noted by the City.

The following is a list of locations with general development information on each:

- 77-91 Main Street: 42 housing units with mixed-use on the first floor are planned and under construction.
- 201 Main Street: 20 housing units are planned for the former Reid and Hughes department store building.
- 337-341 Main Street (including adjacent parcels of 351-353 Main Street and 355 Main Street): the vacant downtown YMCA property is expected to be redeveloped as a brewery and other retail.
- 352 Main Street: the old Elks Lodge, across from the vacant YMCA, will be developed as a boutique hotel with 20 rooms.
- 16 Cedar Street: the site of a historic jail (the New London County Jail), which was torn down in the 1950s. There is potential for 26-36 units of housing here. Affordable housing is expected with the development.
- 46 West Main Street/74-78 West Main Street: this is the address of the Norwich Marina, which has recently been sold to a new developer and is planned to reopen in 2024.
- 36 Falls Ave/44 Falls Ave: the current wastewater treatment plant on Hollyhock Island is being replaced with a modern facility costing $200 million and will take about 5 years to complete.
- 115 Forest Street: a cannabis cultivation plant has received zoning approval to set up in this former industrial building along the west bank of the Yantic River.

Figure 30 Development Project Locations in Study Area



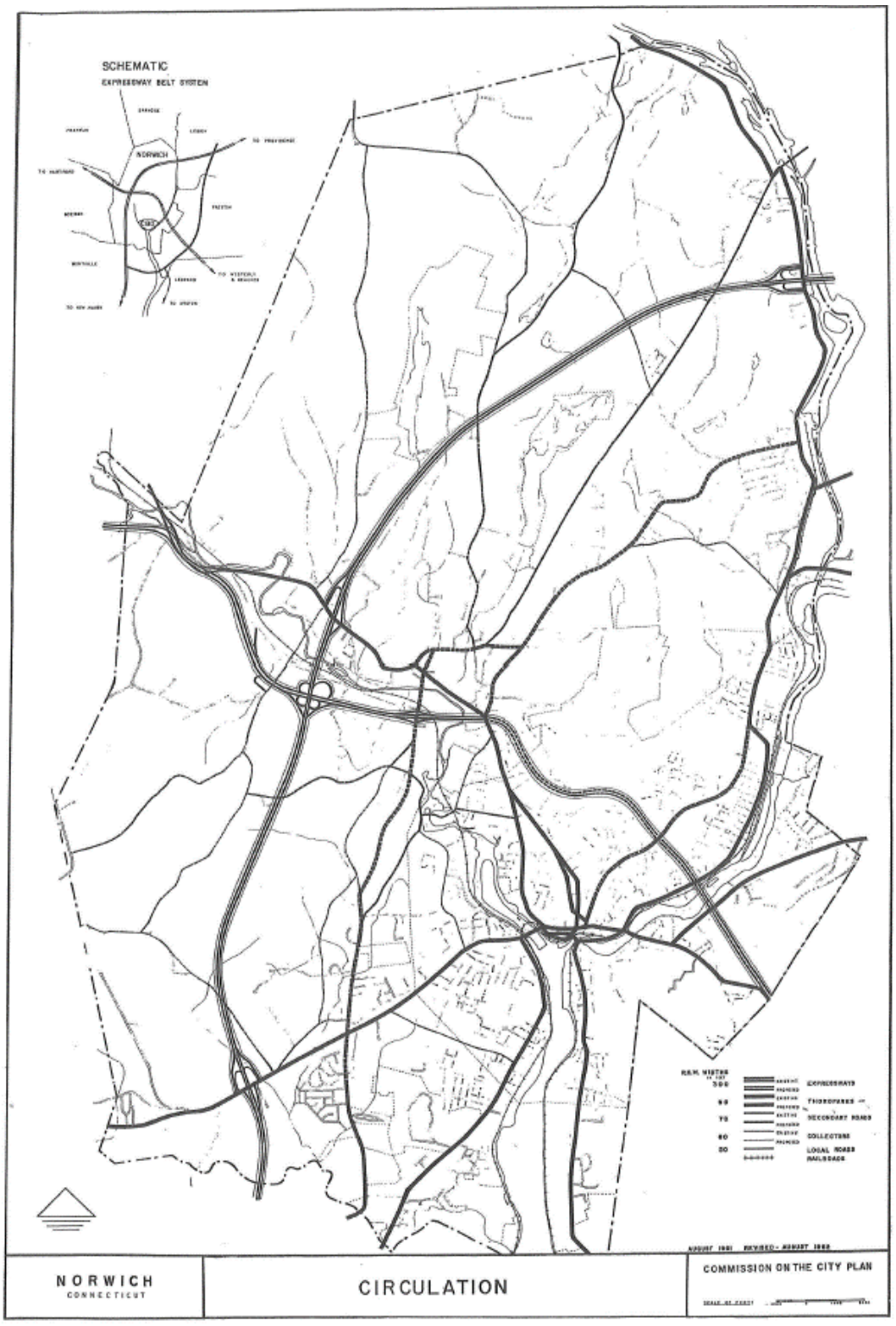
2.9 Previous and Current Plans and Studies

Previous and current plans and studies were reviewed as part of the existing conditions scan for this project. This included historical planning reports from the 1960s onward to help understand the current situation of circulation and transportation in downtown Norwich. Below are summaries of the plans and studies provided for this project.

2.9.1 General Plan for the City of Norwich, Part I (1962)

Several pages from this document were provided for review. The sections provided are relevant to downtown Norwich and the transportation system at that time. A section on the "Rejuvenation of Downtown" focused on the provision of new parking structures and spaces, repaving of downtown streets, and upgrading utilities, as well as underground utilities. New streets were being developed to change traffic flow and new developments and renewal projects were noted. Under the Circulation section, the Plan notes the impact of the new Connecticut Turnpike (now I-395) and new highways connecting the city, the construction of Route 2 as a high-speed highway between Hartford and Rhode Island, a new bridge across the Thames River, and a discussion of the ability of private automobiles to move people in and out of the city. There is an acknowledgement that widening roads in the city and addressing drainage is difficult due to the urban environment. The Plan introduces the road classification system for the roads in the city based on different roadways – local, collector, and thoroughfare. There is also a map showing the planned extension of the Route 2 expressway north of downtown (see Figure 31).

Figure 31 Circulation Map from the General Plan for the City of Norwich, 1962



Source: General Plan of the City of Norwich, 1962

2.9.2 Routes 2 and 82 – Highway Planning Report (1969)

This report makes recommendations for the relocation of Route 2 away from Downtown Norwich to an expressway alignment and improvements to Route 82 to improve traffic flow and reduce congestion. The "Hillside Line" was recommended for the relocation of Route 2, to extend the expressway from its terminus at Washington Street/Harland Corner eastward and north of Downtown Norwich where it would bypass the downtown entirely on its way into Preston and eastern Connecticut. Route 82 was recommended to be widened to a four-lane divided highway. Other recommendations for other streets in the downtown area are included. The report notes that Norwich has become the hub of many different highway routes running through it, which creates congestion in the dense urban center. Its placement next to the three rivers also makes it complicated as the bridges over the rivers become pinch points for traffic. The goal of the study was to review how to provide access to Norwich without going through the central business district. However, a significant factor was also the provision of through traffic from Hartford to the beaches in Westerly, Rhode Island. The problem being solved is how to move traffic through Norwich as fast as possible and with as little congestion as possible, as traffic projections out to 1990 claim that traffic will grow significantly. The report also looked at alignments along the Yantic River and details the impact to businesses and residences from the proposed highways. Of note, the Hillside Line (for the Route 2 expressway) would have impacted 350 residences and 24 businesses. Finally, the report suggests the creation of a circumferential highway through Preston, going north from Route 2.

2.9.3 Proposed Plan of Development, City of Norwich (1972)

VHB was provided with the Street Plan/Transportation section of this report. It highlights the steep and rugged topography which has influenced the development of the road network in Norwich, with no grid network except in Greenville, Taftville, and Thamesville. The mountainous ridge north of Norwich makes east-west travel difficult and explains why much of the traffic ends up going through downtown, as this is the flatter route. It notes that the City of Norwich rejected the extension of Route 2 north of downtown in 1970 and planned to have it follow the Yantic River instead. However, this riverfront expressway was subsequently rejected by the state and there was discussion of creating a controlled-access arterial street instead. The Mohegan-Pequot toll bridge south of the city (Route 2A) opened not long before this plan, but it being a toll bridge hinders its utilization. Even in 1972, on-street parking is considered a problem, and people went into neighborhoods to park wherever they can find a space. The document also introduces the concept of street types and lays out cross-sections for different types with widths and elements of the streets. Summer traffic is still a challenge, and the report suggests moving traffic via Route 2A and the new Mohegan-Pequot bridge instead. Finally, the report refers to the Traffic Operation to Increase Capacity and Safety (TOPICS) road circulation plan and suggests most roads through downtown Norwich should be arterials with the highest number of traffic lanes and right-of-way width.

2.9.4 Norwich Downtown Attitude Survey (1979)

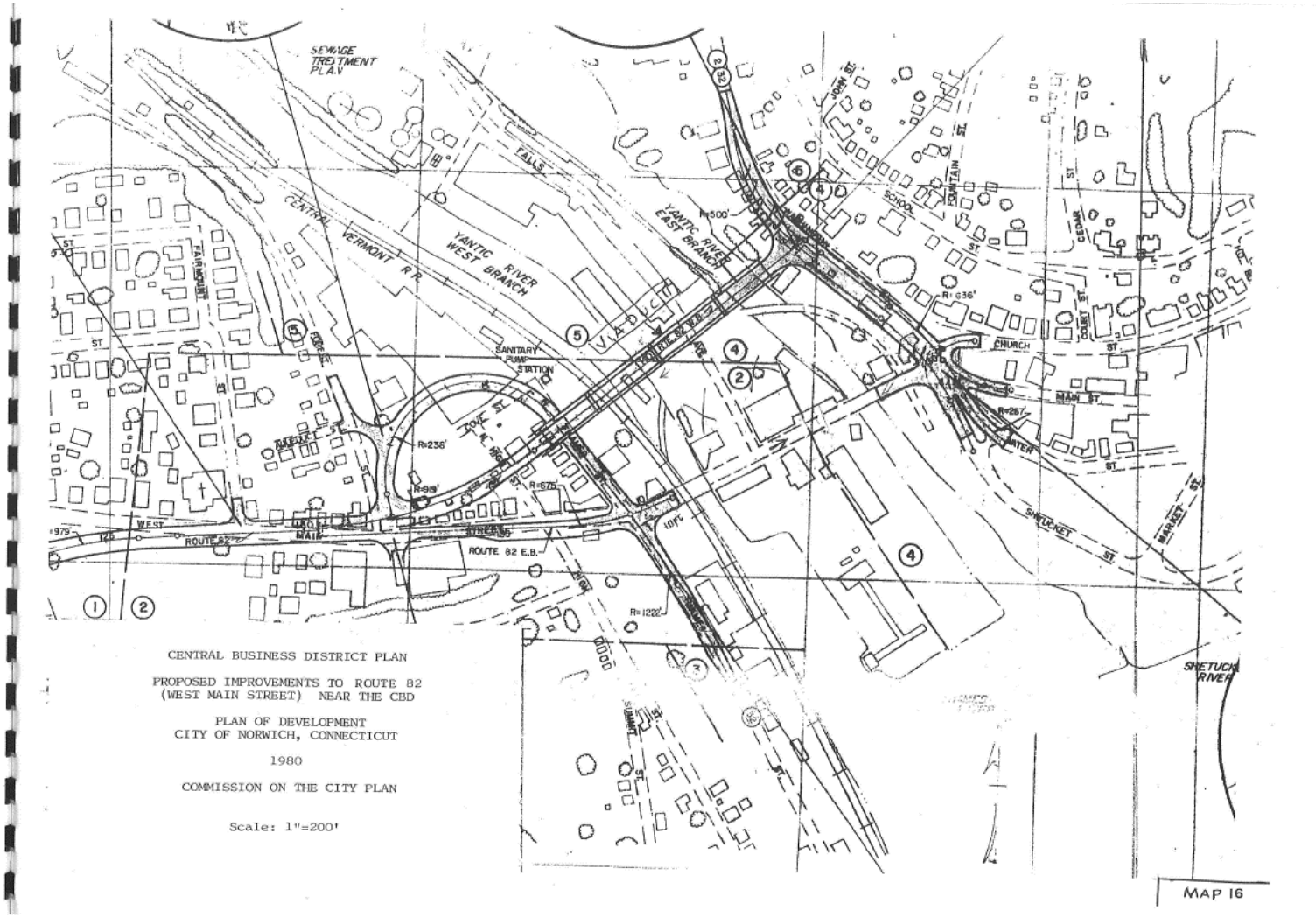
The downtown transportation sections were included in this document. In general, there is low public support for the TOPICS system (noted in section 2.9.3), which created one-way streets downtown and installed additional traffic signals for traffic flow improvements. Responses to the

survey noted that the system forces people to circle more often to find parking and the signal system is not well synchronized (the system was installed shortly before this survey). There are comments that the traffic plan for downtown should be changed, as there are many complaints about it. The lack of focus on downtown by the local chamber of commerce is also an issue, and there seems to be a lack of attention to downtown issues and people who live downtown. People noted the impact of the large shopping centers taking business away from downtown. The condition of downtown was rated very low, as well as traffic flow downtown; people complained about parking and the TOPICS system in open-ended questions.

2.9.5 Central Business District Plan (1980)

This document includes the Traffic Regulations section of this plan as well as maps of the traffic circulation downtown. This plan again notes opposition to the TOPICS circulation plan as discussed earlier, that was installed in summer 1978. People suggested removing some traffic signals, synchronizing them, or turning some one-way streets back to two-way. Another section discusses Franklin Square and how the triangle makes it difficult for transit buses to get though, as many buses at the same time may be parked or laying over there and reiterates the opposition to the one-way streets and TOPICS circulation. This plan also discusses the improvement of the new bridge to go west from Washington Square to create the one-way pair of bridges over the Yantic River and Hollyhock Island (see Figure 32 from the plan). The plan considers the new bridge and circulation to be "inadequate" to provide access to the central business district because it will make access to the marina more difficult and requires drivers to travel extra distance to get to where they need to go. The plan recommends that the new bridge be four lanes divided with two lanes in each direction and keep W. Main Street (the existing bridge) two-way. This recommendation was never implemented. The plan also recommends the provision of a limited-access highway along the west side of the Yantic River for Route 32, consistent with the City's previous plan recommendations to create an expressway along the river instead of north of downtown, which they had rejected. Finally, a map at the end of the section includes a proposed traffic plan for the central business district that revises the system of one-way streets and shows locations of proposed parking facilities.

Figure 32 Proposed Improvements to Route 82 Near the Norwich CBD, 1980



Source: Norwich Central Business District Plan, 1980

2.9.6 Downtown Development Program of Norwich (1982)

This plan covers Washington Square to Burnham Square, which is very similar to the geography of the current Mobility Study. Of particular interest are the descriptions of the different uses of downtown at the time, from residential, retail, office space, etc. Residential uses are primarily single-occupancy units, converted houses, and similar, which are not useful for families or other types of residents. Other points include:

- There was a very high vacancy rate – 25% of total floor space studied (1,626,000 square feet)
- 60% of the floor space downtown is in fair to poor or "dilapidated" condition (65% of buildings); most of the vacant floor space in these buildings is considered substandard.
- The plan notes that most buildings in Norwich are small by current standards, none over 60,000 square feet in size; a typical 8 story office building is 100,000 square feet
- Many old properties were built in the 1700s and 1800s
- City is majority owner of downtown properties at this time (over 1,000,000 square feet) and notes that the City has to act to make changes to properties
- Property values low, likely due to vacancy and building conditions
- Major institutions like banks are still investing in downtown and expanding, so there is still great interest in downtown development.

At the time, about 2,000 parking spaces, both public and private, could be found downtown. The plan argues that the city center actually needs at least 3,000 parking spaces to provide 2 spaces per 1,000 square feet of floor space.

In terms of traffic, the fact that all roads converge to downtown Norwich is both "a blessing and a curse." This document notes that the TOPICS program has been "unnecessarily confusing" and both residents and business owners complain about it. People do not want to go downtown because it is too confusing to navigate. The needs of the street system has been changed to serve through-traffic primarily to the detriment of serving the needs of people (and needs of local residents). The pedestrian environment is mentioned as a problem to address, due to the poor quality of sidewalks and lack of parks or other people-focused destinations, and the TOPICS system intrudes onto the pedestrian environment.

Many different traffic alternatives and parking alternatives are discussed later on in the plan and it suggests that traffic circulation improvements must be made first before other things can be addressed.

2.9.7 Plan of Development for the City of Norwich (1989)

The Road System section of this plan describes the street patterns, street functions and classifications, street jurisdictions, crashes, and public transportation. It describes the road system as "eccentric" and one of the most complicated in Connecticut. The lack of good east-west connections from one side of the city to the other is mentioned. The plan refers back to the Route 2 expressway proposed extension that was defeated by the city as a major controversy with the state, and the lack of this route/construction remains a major problem for the city as it dumps traffic into Norwich at the end of the existing expressway. In addition, people cannot go directly northbound on I-395 from

westbound Route 2, and you cannot go westbound on Route 2 from southbound I-395 – city streets must be used to go in one of these directions. Yantic Road and Yantic Lane are poorly designed as they are not separated from Route 32. The plan also notes interest in an interchange of I-395 at Lawler Lane (potentially to reduce some congestion at the Occum interchange) but FHWA guidelines prohibit it due to spacing with Occum interchange.

The plan lists arterials and collectors within the city. Route 82 between I-395 and downtown was recently widened to be a four-lane undivided highway, which has increased capacity but has also increased speeds and crashes and promoted strip development along the road. The new Yantic River bridge included with the Route 82 improvements is 3 lanes westbound, but people still have to use the W. Main Street bridge. The plan considers this a "major deficiency" in the plan for something that was "once a good idea." Viaduct Road was constructed to bypass the downtown area and is to be replaced within 15 years of the date of this plan. A plan for the Route 2A bypass from the Mohegan-Pequot Bridge to meet up with Route 2 is noted to have been dropped by CTDOT except for some minor improvements. According to this plan, at the time, the state had control or maintenance over 20% of streets/roads in Norwich (including expressways) – sometimes coming via City petition because of high traffic volumes and regional connections. However, it claims that Norwich would still be an "industrial backwater" without I-395 and Route 2. Route 82 is noted as the most dangerous street in the city with the most crashes at the time.

Finally, this plan is the first to go into detail about public transportation and the Southeast Area Transit District (SEAT). Downtown is used as a crossing point or transfer point for the bus routes.

2.9.8 Norwich Plan of Conservation and Development (2002)

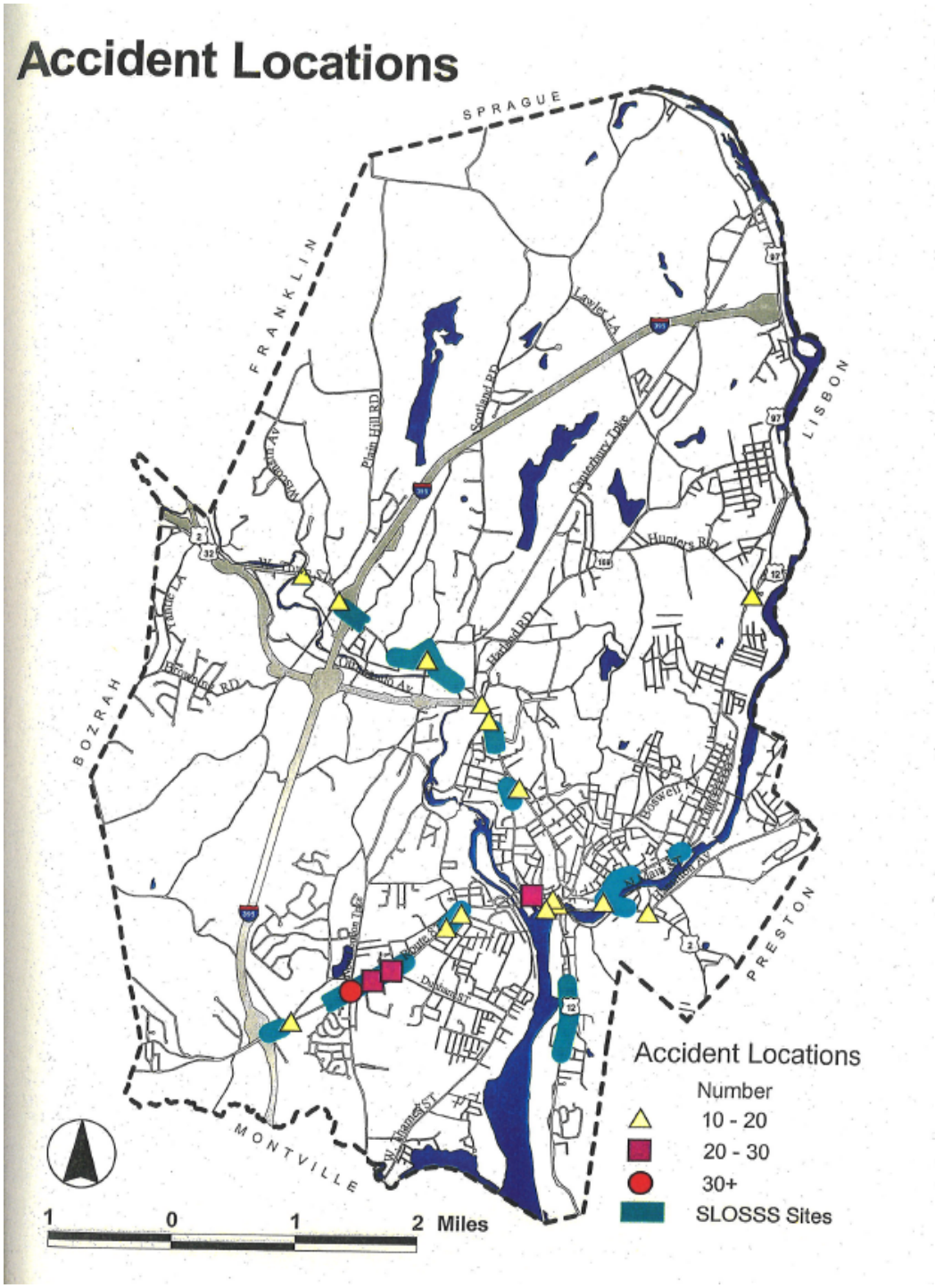
This includes a review of the Transportation section of this plan. The "Major Strategies" listed in the introduction to this section of the plan are:

- Complete the Route 2 & I-395 interchange. This plan makes similar notes as the previous Plan of Development about the problems of this interchange, and notes that at the time SCCOG thought reconstructing this interchange was a key improvement priority. It also noted that Route 2 was never built as conceived, since the expressway ends right at Washington Street in Norwich.
- Reconsider Washington Street improvements near Route 2.
- Improve traffic flow in the Route 82 corridor. There are issues with the lack of turn lanes and too many signals, as well as signals without turn lanes and too many curb cuts.
- Construct new roads to further business development.
- Plan for improved pedestrian and bicycle facilities.

The plan notes opposition to developing turn lanes on Route 32 by the Backus Hospital. At this time, CTDOT was proposing a Route 2A expressway over the Thames River bridge, near Mohegan Sun; it appears some of the expressway was built, at least on the Mohegan Sun side of the river. This version of the master plan makes some splits in functional class of the roadways, dividing into principal and minor arterial. Route 82 continues to have the most crashes within the city, between downtown and I-395. Here is also the first mention of potential access management for Route 82 – a corridor study was conducted by CTDOT for this purpose, to reduce crashes. Bicycle routes are proposed and appear to be mainly for recreational use and circuitous in this plan; this was originally from SCCOG.

Only bike routes are suggested. This is also the first mention of removing traffic from Chelsea Harbor Drive to create a riverfront park area, but it notes that Water Street would need to be made two-way and a traffic analysis would need to be completed.

Figure 33 Crash Locations in the City of Norwich, 2002



Source: Norwich Plan of Conservation and Development, 2002

2.9.9 Action Plan for the Revitalization of Downtown Norwich (2004)

This plan was developed by the Connecticut Main Street Center. It recognizes Norwich as a unique place with unique architecture, but it has been destroyed bypass-through traffic and heavy automobile traffic. There is a negative view of downtown by residents, which is evident in previous plans and surveys discussed in this section. It says that neighborhood areas have not been too destroyed for parking lots and modern buildings and argues that social issues are in part due to the bad designs and ideas that have created a people-less place. Bad design and parking garages and lots create bigger problems, and the one-way street pairs do not work on the streets of Norwich that are not a grid. Downtown is not considered a place but a pass-through for traffic. Recommendations from the end of the report include:

- Make it easier and safer for pedestrians to get around.
- Fix the one-way street system that confuses people and put in wayfinding signage after this has been done.
- Include public art (to assist pedestrians and drivers in learning where they are).
- Display history and meaning of sites around downtown.
- Slow down traffic through downtown.

2.9.10 Norwich Plan of Conservation and Development – Strategic Element (2013)

This includes the section addressing Transportation and Mobility Needs. It suggests providing a balanced transportation system for all modes – drivers, transit, walking, and bicycling. The plan also refers to Complete Streets and Public Act 09-154, "An Act Improving Bicycle and Pedestrian Access", a state law passed by the Connecticut General Assembly in 2009. Public Act 09-154 states that accommodations for all users shall be a routine part of the planning, design, construction, and operating activities of all highways, and it applies to state and municipal projects. Specific goals in the Norwich 2013 POCD related to transportation include:

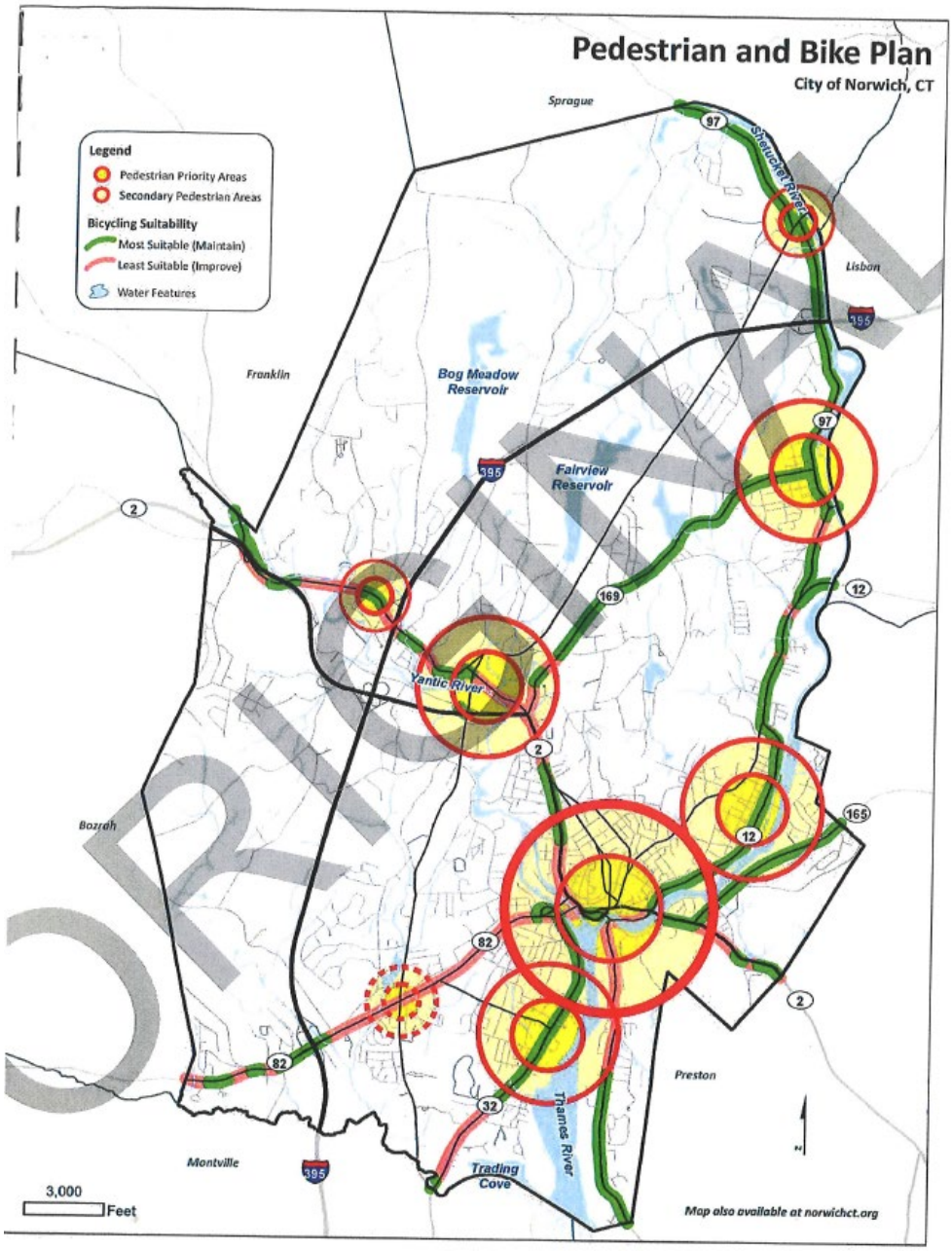
- Establish roadway connections – pedestrian/road connection from Backus Hospital and New London Turnpike
- Also, add a pedestrian and road connection between Three Rivers Community College, Uncas-on-Thames Campus, and Route 32 (including Norman Road)
- It continues to call for a full interchange at Route 2 & I-395.
- It recommends making safety/road improvements to Route 82
- For downtown, it suggests "get people to parking quickly, provide a safe clean environment for parkers, and provide a walkable and attractive streetscape."

In terms of pedestrian and bicycle provisions, it suggests increasing opportunities for these modes, and to identify priority pedestrian areas, bike routes, and try to become a Bicycle Friendly Community. A map is included that has general areas of pedestrian and bicycle priority areas,

including downtown and the village areas, and shows the most and least suitable roads for biking (see Figure 34).

For public transportation, the goals are to maintain and expand SEAT service, support paratransit, explore providing water transit, and support water access improvements. Transit accessible areas are all around downtown and along transit routes. Downtown streets are also listed as being minor arterials instead of major arterials.

Figure 34 Pedestrian and Bike Plan Map for Norwich, 2013



Source: Norwich Plan of Conservation and Development, 2013

2.9.11 Norwich Main Street Road Safety Audit (2016)

The City of Norwich worked with CTDOT to conduct a Road Safety Audit (RSA) on W. Main Street and the surrounding downtown area to improve safety for pedestrians and cyclists. The study area also included Main Street and Water Street from the Transportation Center to Park Street. There were a significant number of crashes from 2012-2014 in this area: 104 crashes total, including 7 pedestrian crashes and 21 parking-related crashes. The pre-audit notes discuss how the downtown area has changed since Foxwoods opened. The City wants casino traffic to go around downtown and not through downtown. In addition:

- There is no route from the downtown area to the transportation center or marina that is both convenient and safe for people walking.
- There are no defined stops for SEAT bus routes – anyone can flag down a bus along the route.
- People would rather take the bus from the Transportation Center to downtown instead of walking.
- There is a desire to calm traffic through downtown.
- Intent to create a citywide bike plan.

Additional relevant notes from the RSA are:

- Long crosswalks at Courthouse Square and Washington Square
- Drivers not yielding to pedestrians
- Transportation Center garage is "lightly used"
- Lighting is an issue, not enough of it or blocked by trees/obstructions
- Desire to close Chelsea Harbor Drive in some capacity
- Excess of parking garages
- Pedestrians feel unsafe at bridges

Longer term objectives include studying circulation patterns, considering a roundabout at Main Street & Franklin Street (which was completed in 2021), and updating pedestrian facilities.

2.9.12 CTDOT Active Transportation Plan (2018)

The CTDOT Active Transportation Plan includes maps of priority streets for priority implementation of bicycle facilities. In the downtown Norwich area, these include Route 2 through the entire study area as part of the state on-road bike planning network, and Courthouse Square/Broadway going north past City Hall as a priority route that is municipally-maintained. The Route 2 section is considered part of Tier II for implementation at the state level (Tier II-1 to Tier II-5 and Tier II-6 to Tier II-8).

2.9.13 Norwich Complete Streets Policy (2022)

The City adopted a Complete Streets Policy in 2022, with an applicability statement "that all city owned transportation facilities in the public right of way including, but not limited to, streets, bridges, and all other connecting pathways shall be designed, constructed, operated and maintained to support the concept of Complete Streets so that users of all ages and abilities can travel safely and

independently". The policy includes exceptions and is relevant to City streets only; however, the policy requires the City to work with CTDOT and SCCOG on implementing complete streets improvements along State routes.

In addition, CTDOT has a new completes street design criteria for projects as noted in Section 2.9.16 below and will be incorporated in future recommendations for the project study area.

2.9.14 SCCOG Metropolitan Transportation Plan (2023)

The SCCOG Metropolitan Transportation Plan (MTP) presents the goals of the regional transportation system and local priorities for transportation projects. Norwich is noted as being below its historical population, indicating latent potential for infill growth; SCCOG supports revitalizing urban centers with multi-modal options. It describes the challenge of through-traffic on Route 2 and the demand created by the region's two casinos, Mohegan Sun, and Foxwoods. It suggests re-routing traffic south on I-395 to Route 2A, but there is a bottleneck in the village of Poquetanuck, in Preston. CTDOT has studied this issue, which would require expanding the Mohegan-Pequot Bridge and building a limited-access bypass of Route 2A, but this has historically been opposed by the Town of Preston and is not supported by current traffic levels.

Route 82 in Norwich is listed as a high priority project. However, unlike previous plans, the improvements to the interchange of Route 2 and I-395 does not appear on the list of priority projects.

2.9.15 Norwich Plan of Conservation and Development (2023)

The most recent Plan of Conservation and Development for the City of Norwich (also known as Envision 06360) notes that "Transportation options for all system users—people who walk, bike, drive, or use public transit—is a key goal of Envision 06360." The "Connect" transportation/infrastructure planning theme mentions the City's Complete Streets policy, and Transit-oriented development projects. The "Live" goal also looks to have "vibrant nodes and corridors."

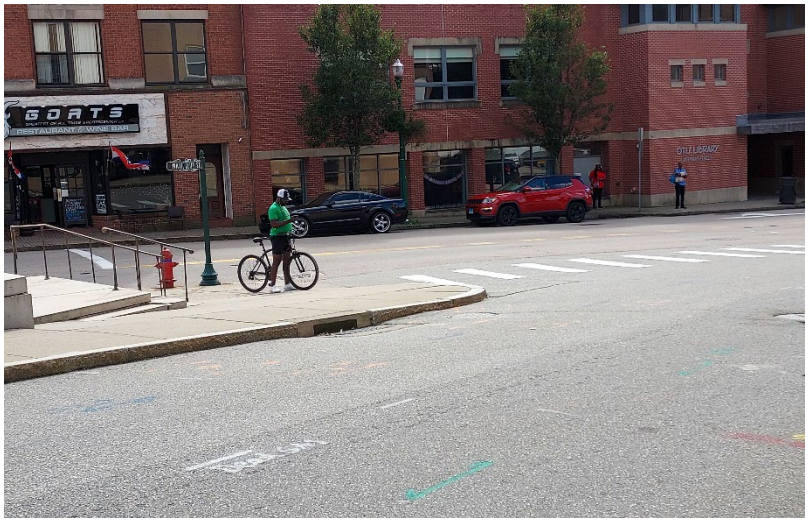
2.9.16 CTDOT Complete Streets Design Criteria to Improve Roadway Safety and Enhance Mobility (August 24, 2023)

The Connecticut Department of Transportation (CTDOT) has implemented new Complete Streets design criteria to be incorporated into all projects. The Complete Streets design criteria is an expansion of CTDOT's Complete Street Policy, ensuring that every project includes a focus on pedestrian and bicyclist facilities and public transportation operations to create stronger intermodal transportation networks and improve safety.

2.9.17 Eastern Connecticut Corridor Rail and Transit Feasibility Study (2023)

This study, which is currently in draft form, was directed to CTDOT by the Connecticut General Assembly to study the feasibility of extending the Shore Line East rail service to the state of Rhode Island, establishing a new passenger rail service from the City of New London to the City of Norwich, establishing a new passenger train station in the Town of Groton and the Borough of Stonington,

and extending ground transportation systems in the eastern region of the state and providing interconnection between such systems and rail lines. The Study reviews existing conditions in the study area, particularly with regard to existing rail service and existing economic characteristics, and public outreach conducted, before going into the preliminary feasibility assessment. As part of the assessment of extending rail service between New London and Norwich, the study reviews two tracks along the east and west banks of the Thames River that currently accommodate limited freight service. Additionally, the Study looked at two potential rail station locations in the downtown Norwich area, one serving a "Norwich West" routing and one serving a "Norwich East" routing. The potential site location for the Norwich West routing is on North Thames Street, between W. Main Street and West Side Boulevard, adjacent to the Yantic River across from Hollyhock Island. The Study (Appendix F) notes that "Proximity to the Norwich Transportation Center and Parking Garage provides an opportunity to support a multimodal connectivity as a hub for passenger rail traffic and commuting between Norwich, New London, and beyond." The Norwich East routing station location would be at the historic Norwich Train Station on Main Street (10 Railroad Avenue). The Study notes the significant potential of the site, given its central location in downtown Norwich and proximity to transit, businesses, state routes, and existing pedestrian infrastructure. However, the Study recommends moving forward with rail service on the west side of the Thames River between New London and Norwich (known as the Palmer Line), due to operational issues with crossing the Thames River Bridge between New London and Groton. Therefore, the potential location of the train station on the west side of Norwich's downtown would be the most likely site for new passenger rail service that comes out of the Eastern CT Corridor Rail & Transit Feasibility Study.



3

Future Conditions

This section of the Chelsea Harbor/Downtown Norwich Mobility Study summarizes the tasks associated with the assessment of future conditions within the study area. The future conditions were based upon post-COVID pandemic traffic volumes, base year 2023.

The assessment of future conditions includes a review of planned future development, traffic growth forecasts, and the potential for increased bicycle, pedestrian, and public transit trips.

3.1.1 Methodology

An important component of this study involved forecasting travel demands and land use changes. Doing so ensures that the studied alternatives and the recommended transportation infrastructure investments are feasible, anticipate future needs, and provide long-term benefits for the City of Norwich. To estimate future conditions in the Chelsea Harbor Drive/Downtown Norwich area, a 20-year planning horizon was studied incorporating all potential transportation and development activity that may be realized by the year 2043. Based upon these projections, the future conditions were studied to understand the No-Build scenario, the baseline traffic conditions before recommendations are made. In the Alternatives Analysis memorandum, potential recommendations will be reviewed to understand conditions under a Build Condition where recommendations are implemented.

The 2043 No-Build Condition models future transportation conditions including regional traffic growth, planned geometric and operational transportation projects identified by the Connecticut Department of Transportation (CTDOT), and planned development projects in the downtown area. The proposed transportation improvement alternatives that are described in later sections of this document are not included in the 2043 No-Build Condition. The resulting comparison of Existing Conditions to the 2043 No-Build Condition is a measure of the ability of the existing transportation system to handle future travel demands.

The 2043 Build Condition, discussed in the Alternatives Analysis memorandum, includes the future transportation and development characteristics described in the No-Build Condition as well as the transportation improvement alternatives recommended in this mobility study. The purpose of the transportation improvement alternatives is to provide for consideration conceptual transportation solutions at locations in the downtown area with existing safety or operational deficiencies as noted by the City of Norwich, SCCOG, the public, and the traffic operations analyses herein. Subsequent sections of this mobility study describe the transportation improvement alternatives in detail. The resulting comparison of the future conditions is a measure of the effectiveness of transportation improvements if implemented.

3.2 2043 No-Build Condition

The No-Build Condition was developed using information provided by CTDOT and the City of Norwich. Ultimately, this information was used to estimate traffic operations in the downtown area in 2043 without any of the transportation improvement alternatives proposed in the Alternatives Analysis.

3.2.1 2043 Traffic Volumes

Traffic volumes along a corridor or within a downtown change over time according to driving demand, which is influenced by anticipated land development, economic activity, broader regional driving trends, and land use characteristics. New developments typically attract new driving trips, even in dense urban locations with existing land use characteristics like downtown Norwich. However, there are efforts being made by the City of Norwich and developers towards providing better accommodation for a mixture of different travel modes, including bicycling, walking, and public transportation. Some developments are even limiting the number of on-site parking spaces in their construction in anticipation of a demographic of people that do not own cars, use car share, and/or get around via biking, walking, and public transit – in which case they would not need as much parking for automobiles as is often proposed. Later sections of this document discuss these efforts in more detail to support access and demand for non-car transportation modes.

Future traffic volumes are typically estimated by growing existing traffic volume data by a percentage reflecting historical, area-specific traffic trends compounded over the length of the planning horizon. CTDOT calculated and provided 2043 peak hour traffic volumes in the study area by growing the 2023 traffic volumes previously described. The 2043 traffic volumes reflect approximately 10% growth from 2023 volumes, or about 0.5% per year, representing a highly conservative estimate of future traffic volumes. In other words, this percentage is the largest amount of traffic growth that should be expected based on current information. Predicting this level of traffic growth will help

SCCOG and the City of Norwich make appropriate decisions to address likely deficiencies in the transportation network before they arise. The 2043 peak hour traffic volume networks with volume information provided by CTDOT are included in the Appendix.

3.2.2 Planned and Future Development Projects

As an older urban center, downtown Norwich is effectively built-out. Opportunities for development are usually redevelopment of existing structures, including vacant and unoccupied buildings, or infill development on vacant land of previous building sites where a building was torn down and never replaced. There is significant local interest in redeveloping parcels downtown, particularly underutilized or vacant buildings that create significant gaps in the urban landscape and may become blighted and run-down. As noted in the Existing Conditions Report (Section 2.8.4), new housing and commercial space are reclaiming previously vacant historic structures to bring vitality back to downtown. There are also other developments underway, such as a major redevelopment of the wastewater treatment plant on Hollyhock Island.

The following list of development locations was included in the Existing Conditions Report, and has been updated with new information, if available at the time of writing, on development details and project timeframes:

- 77-91 Main Street: 42 housing units with mixed-use on the first floor are planned and under construction; apartments are currently being advertised for rent.
- 201 Main Street: 17 housing units and one or two street-level commercial spaces are planned by Heritage Housing for the former Reid and Hughes department store building.[1] It is unclear when the redevelopment will be completed.
- 337-341 Main Street (including adjacent parcels of 351-353 Main Street and 355 Main Street): the vacant downtown YMCA property will be redeveloped with eight apartments, restaurant space, three 1,200 square-foot retail spaces and office space for Mattern Construction, Inc., which owns the property. According to reports, the restaurant will be completed in fall 2024, the apartments will be completed soon afterward, and the commercials spaces should be leased by fall 2025. [2]
- 352 Main Street: the old Elks Lodge, across from the vacant YMCA that is under redevelopment, recently reopened as the Hotel Callista, a boutique hotel with 24 rooms. Parts of the hotel are still under construction and may take another year to complete.[3]
- 16 Cedar Street: the site of a historic jail (the New London County Jail), which was torn down in the 1950s. The developer has proposed 26 housing units here, though there is potential for as many as 36 units. Affordable housing is expected with the development. Due to its location and the local history around the Jail Hill neighborhood, an

[1] https://www.theday.com/local-news/20240127/three-long-awaited-norwich-projects-receive-approvals-updates/

[2] Ibid.

[3] https://www.theday.com/local-news/20240122/hotel-callista-opening-in-former-norwich-elks-club/

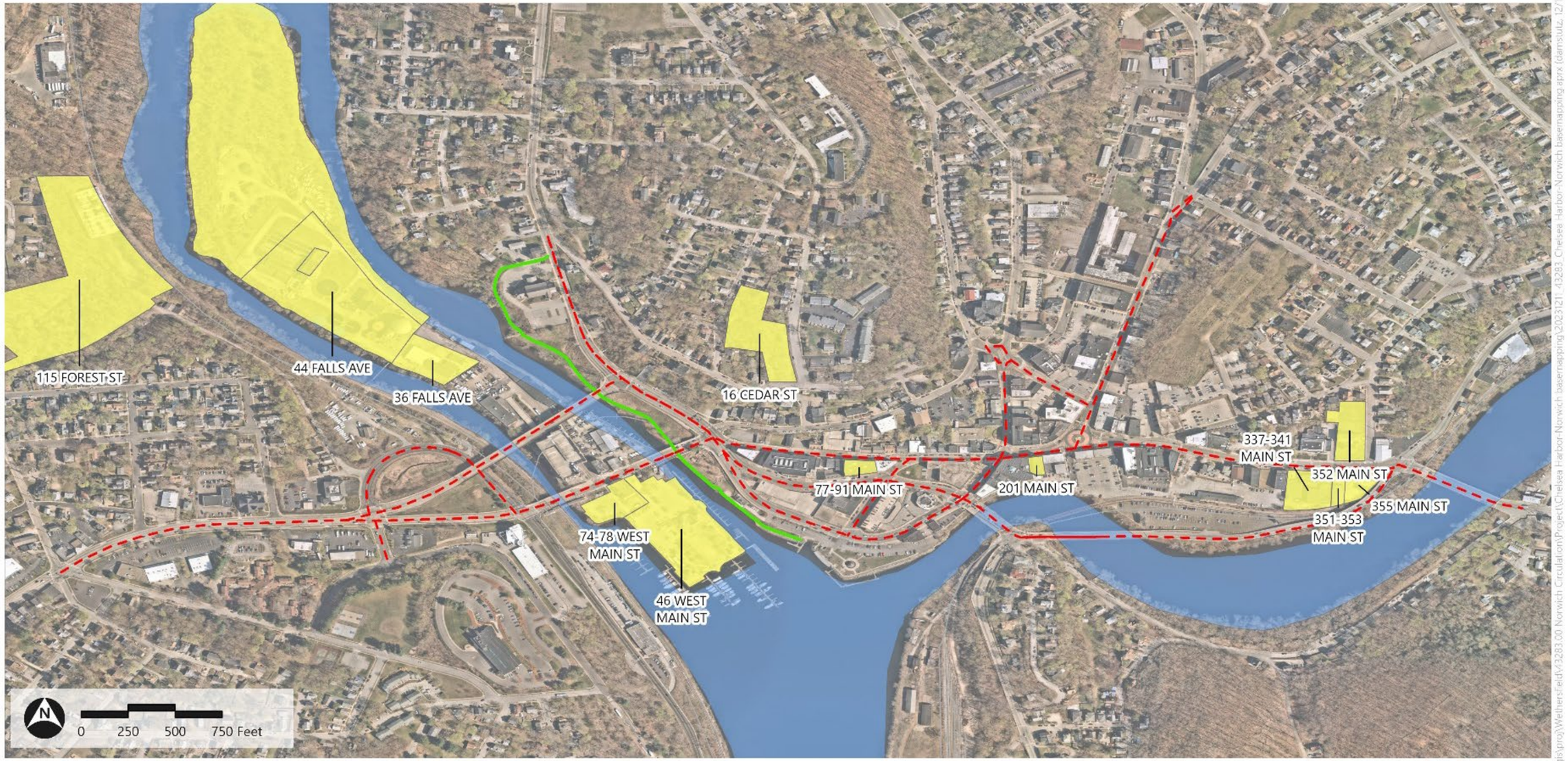
archaeological survey may be required.[4] A timeframe for the project development is not known as of this writing.

- 46 West Main Street/74-78 West Main Street: this is the address of the Norwich Marina, which has recently been sold to a new developer and is planned to reopen in 2024, including a new restaurant.
- 36 Falls Ave/44 Falls Ave: the current wastewater treatment plant on Hollyhock Island is being replaced with a modern facility costing $200 million and will take about 5 years to complete.
- 115 Forest Street: a cannabis cultivation plant has received zoning approval to set up in this former industrial building along the west bank of the Yantic River.

See Figure 35, which was included in the Existing Conditions Report, for a map of these development projects and their locations downtown.

[4] https://www.theday.com/local-news/20230604/apartment-building-proposed-for-19th-century-jail-site-in-norwich/

Figure 35 Current and Future Development Project Locations in Study Area



Overall, almost 100 units of new housing could be realized from the above development projects over the next few years, bringing new residents and activity to the downtown. Redevelopment of the former YMCA and Elks Lodge properties will bring interest back to the east end of downtown, while the sale and proposed revamp of the Norwich Marina will provide an additional destination for visitors. In the consideration of future traffic volumes, it was important to study these parcels and understand the potential traffic impacts that are expected to result from these and any other parcels identified for future development.

The annual traffic growth forecast provided by CTDOT is based on a regional traffic model that takes into account expected land developments, population and economic trends, historical traffic growth, and other key data to develop the forecast. Developments such as the ones listed in the previous paragraph are part of the expected growth in the regional model. The only vehicle trips from a new development that are not likely included in the forecast is the Norwich Marina, which was sold to a new developer in fall 2024, during the development of the Existing Conditions Report. The new developer has expressed interest in revitalizing the Marina and already has plans to reopen a restaurant at the Marina in spring 2024. There is also a building on the Marina property that could potentially be utilized as a hotel.

To understand the possible impact of the Marina developments, vehicle trips that could be generated by the new Marina restaurant and a potential hotel were approximated using the *Institute of Transportation Engineers Trip Generation Manual, 11th Edition*. The restaurant was assumed to be a 2,000 square foot sit-down, high turnover restaurant, while the hotel was assumed to have a 60-room capacity. The trips estimated were then distributed through the street network to understand their impact on future traffic operations. However, the number of trips estimated through this process and network distribution were found to be very low and would make no impact to traffic operations in the study area. As a result, no changes were made to the CTDOT forecasted trip numbers.

Given this information, based on the development projects in the Existing Conditions Report, their type, expected impact, and location, as well as the population growth trends (as noted in Section 2.8.2), all new vehicle trips originating and accessing these development properties would be accounted for by the CTDOT forecast, and thus included in the 0.5% annual traffic growth.

3.2.3 Future Roadway Projects

Based on discussions with CTDOT, SCCOG, and the City of Norwich, the most significant transportation improvement currently planned near the study area in the foreseeable future is the Route 82 improvement project the begins on the western edge of the study area and continues west to I-395. This project includes extensive access management improvements and several roundabouts at intersections to reduce traffic speed and create a safer corridor. Aside from this project and expected maintenance of pavement conditions with typical milling and overlay of downtown Norwich roadways by CTDOT and the City, no other major projects are known at this time that would affect the No-Build Conditions. In addition, it can be expected that CTDOT may replace traffic control signal equipment at various locations during the No-Build period, however those improvements are considered to be typical maintenance type improvements. Therefore, the 2043 No-Build condition

was assumed to maintain existing roadway conditions within the central downtown Norwich area except for the Route 82 changes at the very western edge of downtown.

3.2.4 2043 No-Build Traffic Operations

Capacity analyses were performed to evaluate traffic operations at the study intersections during the weekday morning, weekday evening, and Saturday midday peak traffic periods under the 2043 No-Build scenario. These analyses were performed by inputting the 2043 peak hour traffic volumes provided by CTDOT into the existing conditions Synchro model discussed in the previous chapter to forecast future traffic operating conditions in 2043 if no transportation improvements or signal timing modifications are implemented. As noted in Section 3.2.2, additional traffic from proposed and potential Norwich Marina developments was included in the forecast.

The capacity analysis documented in the Existing Conditions identified two intersections within the study area that operate with an overall LOS D, E or F during the peak periods under existing conditions: Route 2 (Water Street) at Viaduct Road/Laurel Hill Road/Summer Street/Talman Street, and Route 2 (Main Street) at Route 12 (Viaduct Road & N. Main Street). The Viaduct Road/Laurel Hill Road/Summer Street/Talman Street intersection operates overall at LOS F during all peak hours, while the Route 12 (Viaduct Road & N. Main Street) intersection operates at LOS D in the morning peak, LOS F in the midday peak, and at LOS E in the evening peak hour.

The approximately 10-percent traffic growth forecast under the 2043 No-Build condition, in addition to the Norwich Marina trips, is expected to further exacerbate existing capacity issues at certain intersections within the downtown area. Delays and vehicle queues are not expected to change significantly at most study intersections, while the two intersections that currently have major capacity issues will remain congested and continue to deteriorate. Under the 2043 No Build condition, Route 2 (Water Street) at Viaduct Road/Laurel Hill Road/Summer Street/Talman Street will continue to operate at LOS F in all conditions, with worsening capacity issues and delays, and Route 2 (Main Street) at Route 12 (Viaduct Road & N. Main Street) will also experience worsening conditions with the morning peak hour staying at LOS D, the midday peak hour at LOS F, and the evening peak hour worsening from LOS E to LOS F. Main Street at Broadway and Courthouse Square will drop from LOS B at all peak hours to LOS C at all peak hours, the only other intersection with a significant change to its overall LOS.

A detailed summary of the capacity analysis results, including LOS, delays, and vehicle queue lengths by lane group, is included in Table 14.

Table 14 Signalized Intersection Capacity Analysis Summary – 2043 Conditions

Location	Mov't	Morning Peak Hour					Midday Peak Hour					Evening Peak Hour				
		v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
Route 82 at West Side Blvd. & N. Thames St/ N. High St.	EB T/R	0.44	17	B	89	230	0.49	17	B	107	313	0.63	21	C	152	#438
	WB L	0.49	50	D	58	101	0.32	45	D	38	80	0.58	47	D	72	110
	WB T	0.33	8	A	47	201	0.34	8	A	50	227	0.52	10	A	86	303
	WB R	0.17	7	A	0	31	0.09	6	A	0	32	0.15	7	A	0	21
	NB L/T/R	0.04	43	D	0	0	0.04	43	D	0	0	0.07	42	D	0	26
	SB L/T/R	0.21	44	D	14	46	0.03	43	D	0	0	0.13	42	D	10	23
	Overall	**0.36**	**15**	**B**			**0.36**	**15**	**B**			**0.48**	**17**	**B**		
Route 82 at N. Thames St / Thames St.	EB L/T	0.27	11	B	39	138	0.36	11	B	53	195	0.52	16	B	67	#395
	EB R	0.06	14	B	0	37	0.05	14	B	0	32	0.06	21	C	0	m34
	NB T	0.10	32	C	19	37	0.14	35	C	25	49	0.14	30	C	32	58
	NB R	0.18	33	C	0	38	0.16	35	D	0	53	0.16	30	C	0	53
	SB L	0.08	32	C	11	29	0.06	34	C	7	18	0.05	29	C	7	15
	SB T	0.67	42	D	136	192	0.64	43	D	110	135	0.71	41	D	161	156
	Overall	**0.35**	**23**	**C**			**0.40**	**21**	**C**			**0.52**	**24**	**C**		
Route 2 at West Side Blvd.	SE T/R	0.71	34	C	115	178	0.51	29	C	73	128	0.61	31	C	89	131
	NW L	0.38	13	B	71	198	0.43	13	B	87	236	0.54	14	B	118	#337
	NW T	0.34	4	A	0	166	0.34	4	A	0	169	0.41	5	A	0	214
	Overall	**0.45**	**19**	**B**			**0.43**	**16**	**B**			**0.53**	**18**	**B**		
Route 2 (Water St) at Route 82 & Church St. & Main St.	WB L/R	0.55	34	C	23	67	0.54	34	C	30	95	0.62	38	D	36	#124
	WB R	0.58	36	D	23	70	0.57	35	D	31	#105	0.65	41	D	36	#132
	NB T/R	0.63	22	C	97	#256	0.65	23	C	106	#255	0.71	27	C	100	#257
	SB L/T	0.58	21	C	73	147	0.34	20	C	46	124	0.36	23	C	43	122
	NE L	0.35	21	C	44	150	0.33	21	C	48	141	0.53	28	C	69	#225
	NE T/R	0.52	25	C	53	#249	0.83	40	D	123	#428	0.83	43	D	104	#425
	NE R	0.22	20	B	0	74	0.31	21	C	0	74	0.29	24	C	0	92
	Overall	**0.54**	**22**	**C**			**0.67**	**26**	**C**			**0.64**	**30**	**C**		
Chelsea Harbor Dr. at Market Street	EB L/T/R	0.20	1	A	23	36	0.24	2	A	33	52	0.26	2	A	37	58
	NB T/R	0.12	37	D	5	26	0.12	36	D	5	30	0.10	36	D	5	26
	SB L/T	0.26	38	D	10	32	0.38	39	D	16	41	0.41	39	D	18	45
	Overall	**0.20**	**3**	**A**			**0.25**	**4**	**A**			**0.27**	**4**	**A**		
Route 2 (Water St) at Courthouse Sq. & Chelsea Harbor	NW T/R	0.36	8	A	32	211	0.39	8	A	37	191	0.44	10	A	54	231
	NE L/T	0.24	22	C	12	45	0.32	22	C	18	66	0.47	22	C	38	98
	NE R	0.45	4	A	0	30	0.49	4	A	0	43	0.66	6	A	0	20
	Overall	**0.42**	**8**	**A**			**0.46**	**8**	**A**			**0.61**	**10**	**B**		

Source: VHB, Inc. using Synchro 11 software.

Table 14 Signalized Intersection Capacity Analysis Summary – 2043 Conditions (Continued)

Location	Mov't	Morning Peak Hour					Midday Peak Hour					Evening Peak Hour				
		v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
Main St at Broadway & Courthouse Sq.	WB T	0.44	18	B	128	201	0.46	19	B	140	#274	0.45	20	B	134	#286
	NB L	0.01	34	C	0	0	0.01	34	C	0	0	0.02	34	C	0	0
	NB R	0.12	9	A	0	36	0.14	9	A	0	38	0.22	10	A	0	31
	SB L	0.51	33	C	65	105	0.44	31	C	58	96	0.50	32	C	72	119
	SB R	0.43	32	C	48	84	0.53	33	C	65	106	0.56	33	C	73	122
	Overall	**0.36**	**21**	**C**			**0.38**	**20**	**C**			**0.39**	**20**	**C**		
Route 2 at Viaduct Rd./Laurel Hill Rd/Summer St/Talman St	WB L	1.17	>120	F	~226	#345	0.79	44	D	117	#192	0.88	56	E	134	#266
	WB R	0.60	19	B	66	122	0.68	22	C	79	#188	0.62	19	B	71	#208
	NB L/T/R	0.42	43	D	5	11	0.49	41	D	11	16	0.61	67	E	7	19
	SE L/T	1.08	97	F	162	#438	>1.20	>120	F	252	#696	>1.20	>120	F	~361	#835
	SE R	0.44	16	B	57	164	0.22	14	B	26	97	0.33	14	B	41	139
	NW L/T/R	0.42	41	D	10	8	0.30	42	D	3	13	0.52	49	D	6	10
	NE L/R	>1.20	>120	F	~229	#247	0.98	75	E	99	#183	>1.20	>120	F	~178	#273
	Overall	**1.17**	**>120**	**F**			**1.06**	**104**	**F**			**>1.20**	**>120**	**F**		
Franklin St at Boswell St/Oak St	WB L/R	0.51	32	C	7	43	0.46	30	C	16	50	0.44	32	C	14	58
	NB T	0.24	19	B	17	74	0.30	24	C	28	97	0.34	23	C	40	130
	NB R	0.15	6	A	9	65	0.21	8	A	32	114	0.32	9	A	54	174
	SB L	0.21	24	C	5	34	0.30	28	C	10	46	0.32	28	C	11	50
	SB T	0.19	12	B	12	78	0.17	16	B	17	69	0.16	14	B	18	72
	SW L/R	0.49	19	B	32	125	0.35	19	B	46	131	0.47	22	C	54	152
	Overall	**0.36**	**16**	**B**			**0.31**	**18**	**B**			**0.38**	**17**	**B**		
Route 2 at Route 12 (Viaduct Rd & N. Main St)	EB L	0.18	29	C	12	43	0.24	29	C	18	65	0.49	30	C	31	96
	EB T/R	0.64	40	D	104	212	0.64	41	D	101	#262	0.69	42	D	117	#308
	WB L	0.97	67	E	145	#388	0.84	42	D	121	#346	1.03	86	F	148	#429
	WB T/R	0.70	36	D	169	#453	0.74	40	D	158	#469	1.06	98	F	~276	#677
	NB L/T/R	1.05	93	F	223	#646	>1.20	>120	F	~455	#914	>1.20	>120	F	~445	#995
	SB L	0.46	23	C	39	124	0.40	22	C	29	106	0.41	23	C	31	96
	SB T/R	0.67	24	C	181	471	0.49	20	B	118	354	0.59	22	C	159	382
	Overall	**0.95**	**50**	**D**			**1.03**	**112**	**F**			**1.11**	**109**	**F**		

Source: VHB, using Synchro 11 software

3.2.5 Traffic Signal Adjustments

The analysis of traffic operations for the 2043 No-Build scenario as described in Section 3.2.4 was conducted under the assumption that no changes would be made to traffic signals for optimization. However, it is likely that over the years there will be adjustments made to the signals to attempt to optimize them to improve the operations at intersections, with or without any major changes or improvements to the transportation network. As part of the review of the 2043 No-Build scenario, potential traffic signal adjustments were modeled for the two intersections with the lowest LOS grades (Route 2 (Water Street) at Viaduct Road/Laurel Hill Road/Summer Street/Talman Street, and Route 2 (Main Street) at Route 12 (Viaduct Road & N. Main Street) to determine if there are ways to improve signal operations without major changes.

While it is possible to improve overall traffic conditions for both intersections by adjusting signal timings, overall LOS and LOS for most of the approaches to the intersections are still poor. The LOS at Route 2 (Water Street) at Viaduct Road/Laurel Hill Road/Summer Street/Talman Street remains at an F condition, although delays and the volume to capacity (v/c) ratio is reduced. Where previously there were delays predicted of 120 seconds or longer, delays could be reduced to 85 second for the intersection as a whole – still considered an LOS F. Volume to capacity ratios are lowered from over 1.2 to around 1.07. Delays on the different approaches remain mostly the same in this situation. For the Route 2 (Main Street) at Route 12 (Viaduct Road & N. Main Street) intersection, optimization can improve the overall intersection LOS from F to E, with delays being reduced from 109 second to 69 seconds and v/c ratios dropping from 1.11 to 0.94. However, this does require increasing delays and reducing LOS on some of the approaches to rebalance the signal timing at the intersection.

Optimization can make some improvements for the most challenging intersections in downtown Norwich, but it can only make modest changes in their operation. Alternatives will be reviewed to determine what other changes could be made to improve operations at these intersections.

3.3 Bicycle, Pedestrian, and Transit Potential

Downtown Norwich was originally constructed in a dense, walkable development pattern that made it easy for people to walk from their home to local businesses, their work, or to school. As noted in the Existing Conditions Report, much of this development pattern and urban form remains, despite the destruction of parts of it due to urban renewal and the construction of high-speed roads to move cars through the city as quickly as possible, as well as car-centered development that sprung up in the 20th century. As a result, the great majority of trips made through the city center are via car or truck. Data collected for this study shows that only about 2-3% of trips in downtown are done by bicycling and walking. There is room for improvement to encourage and support these trips. Norwich retains significant potential to be a better place for people to walk, bicycle, and use transit for everyday trips.

To tap into the potential for more bicycling, walking, and transit trips, these modes must be made attractive, with a special focus on safety, comfort, and ease of use. The Existing Conditions Report noted that there are no dedicated bicycle facilities in downtown, except for some scattered bicycle

racks and the Heritage Trail, which is oriented towards walking trips. Pedestrians often have difficult conditions for getting around, which long crosswalks and narrow sidewalks that may have few streetscape amenities and little shade. Transit issues were also reported in the Existing Conditions Report. Overall, safety is key priority for this study, especially for pedestrians given they are overrepresented in injury crashes based on the review of crashes from the last five years.

For this section, potential future opportunities for bicycle, pedestrian, trail, and transit improvements will be discussed in a general nature. Specific recommendations for each area will be included in the Alternatives Analysis memorandum.

3.3.1 Pedestrian

The development of a walkable and pedestrian-friendly downtown is a critical piece of creating a vibrant area where visitors can park once and walk around comfortably, and residents can safely make trips for errands, work, school, entertainment, etc. Safe walking areas are also a key part of making public transportation more accessible and viable, as most transit trips start as walking trips.

Deficiencies in pedestrian facilities were noted above – narrow sidewalks in some areas, long or difficult crossings, and lack of streetscape amenities such as street trees. To address crossing issues, crossings much be made shorter to reduce pedestrian exposure to car traffic in the road, which can be accomplished through curb extensions and intersections redesigns that reduce crossing times and address curb ramps so that pedestrians with mobility impairments can also be served well. Given the concentration of social services in the downtown, there are likely to be more pedestrians with mobility impairments that would benefit from increased accessibility. Uncontrolled crossings also need to be addressed, especially in the areas where high speed and high-volume car traffic make it incredibly difficult for pedestrians to find an appropriate gap to cross the street or have drivers yield to pedestrians. The crosswalks to cross W. Main Street at Falls Ave and crossing Water Street at Market Street are examples of crosswalks that have these characteristics.

Narrow and uncomfortable sidewalks – particularly along Chelsea Harbor Drive, Washington Street, W. Main Street, and Route 82 – lack shade trees to protect pedestrians from sun and weather and are either built to an outdated standard or are too narrow to allow pedestrians to comfortably pass each other. There may also be a lack of a buffer between the sidewalk and the road, which carries fast-moving traffic, or the buffer is small and unattractive. Widening sidewalks or installing street trees may require removing road space or parking areas. Part of the analysis of alternatives includes reviewing potential areas for road diets to add space for bicycle and pedestrian facilities or converting road space to biking and walking space. These changes will make it much easier for pedestrians to get around and support an attractive downtown that will improve economic development.

3.3.2 Bicycling

Bicycling is a healthy and economical mode of transportation that also allows for longer trips than by walking and can help extend trips made on public transportation. People riding bicycles are still vulnerable users however and are exposed to traffic more often than people walking. High speed and high-volume traffic is challenging for bicyclists, especially those that are less experienced and have less tolerance for uncomfortable situations.

Much of the existing bicycle traffic occurs on Main Street in downtown Norwich. Its lower traffic speeds and volumes are more conducive to bicycle users, who can go about the same speed of traffic and find it easier to get to places in a denser urban environment. Despite some of the steep topography in the downtown area and in the nearby neighborhoods, the lower speeds and traffic, along with densely connected neighborhood streets that allow for alternate routes, make bicycling an important potential transportation mode in the study area and beyond. Although the neighborhoods immediately adjacent to downtown, on the north sides of the Yantic and Shetucket Rivers, are accessible by bicycle, it is more difficult to get to the neighborhoods on the other sides of the rivers, limiting their transportation options to the downtown. Making the river bridges and connection points bicycle-friendly should be a priority for future improvements.

Other improvements to create bicycle facilities and lower car traffic speeds would also be beneficial to encouraging bicycle travel. If dedicated bicycle facilities can not be developed, shared bicycle and pedestrian facilities such as trails or sidepaths would assist with filling gaps and providing a comfortable place off the roadway for bicyclists to travel.

3.3.3 Trails

The Heritage Way Trail runs from Howard T. Brown Park to the west and north along the east side of the Yantic River approximately 1/3 of a mile before ending at 88 Washington Street, near the intersection with School Street. This trail is an important part of the bicycle and pedestrian network, but it currently has limited connectivity and so does not contribute much to the mobility of users in the downtown area. However, there are additional portions of the trail along the river to the north of where this section stops, that connect to the neighborhoods along Maple Grove Ave, Goldberg Ave, Sturtevant Ave, Tyler Ave, and Watercress Ave. The trail eventually connects to Yantic Street and an overlook of the Uncas Leap at Yantic Falls, which includes a pedestrian bridge over the Yantic River to reach Monroe Street and Asylum Street on the opposite side.

The Norwich Heritage Society provides a map to show users the trail along the river; however, it is unclear how well the trail is marked for users who are navigating through the neighborhoods to get to the next sections. Additionally, the trails are oriented to local history and recreation, not as an alternate route for people biking and walking to access downtown. There is potential for linking this trail more comprehensively into the biking and walking network as well as creating better wayfinding through the neighborhood it travels through.

To the east and south, trail access is constrained by the crossings over the rivers, as noted under the biking and walking sections. There is also limited property to work with, as many of the roads have been placed along the edge of the rivers, with any land along the edge steeply sloping down to the water. On the land side of the roads, steep topography and narrow local streets creates challenges for trails, as the mountainous terrain has limited housing development as well. Existing railroad infrastructure creates additional difficulties as much of it lies on the bottom of the steep slopes, just above the water. It is unlikely that the railroad right of ways will be available for trail conversion as they are actively being considered for passenger rail traffic as discussed in the Eastern Connecticut Corridor Rail and Transit Feasibility Study. Therefore, any further trail improvements may need to come on-road or leverage the existing road infrastructure to be built along the road right of way.

3.3.4 Public Transportation

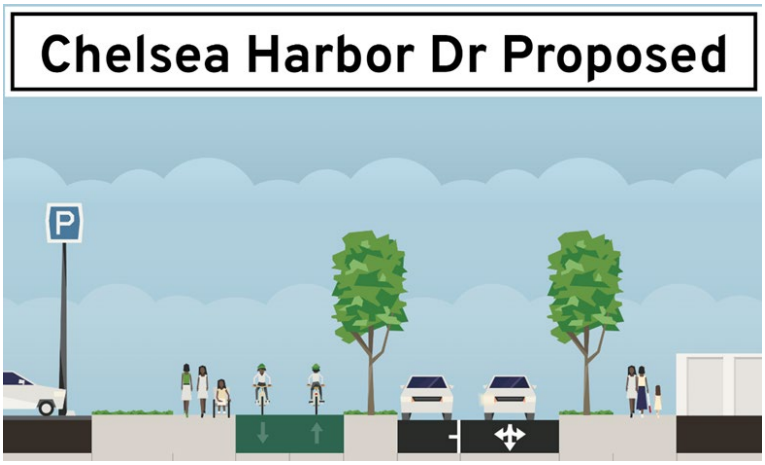
The Southeast Area Transit District (SEAT) provides the primary public transportation service in the Norwich area. This is a critical service for lower-income residents and people who cannot afford to own a car to travel within Norwich as well as outside of Norwich for jobs, errands, and everyday trips. SEAT routes run from Norwich to the Mohegan Sun casino, New London, Groton, East Lyme, and Waterford in the south, and to Lisbon and Griswold in the northeast. Routes also run to the Foxwoods casino in the east. Given the density of Norwich, particularly downtown, public transportation potential is high for serving these areas as public transit can compete more favorably against single-occupancy vehicles in dense, congested areas. However, these routes run on 60- or 120-minute timetables, requiring users to plan ahead for their trips. If they miss a bus, they must wait an hour for the next one, likely making them late for work or needing to get a taxi or rideshare to get to their destination if it is simply too far to walk or bicycle. This low frequency makes it challenging for people to use the service who have more convenient options to available, or if they already have access to a private vehicle.

Besides issues of frequency, comfort and user experience are important to make the service easy to use and understand. As a flag-down service, riders can board or exit the bus at virtually any point, as long as they are on the same side of the road as the bus. The Existing Conditions Report noted areas where there appear to be stops for the buses, making it unclear if these are regular stops where people often wait or get dropped off. In addition, three bus shelters were noted, although at least two of them are not being used, which can confuse a potential bus rider when they may expect to pick up a bus which has been rerouted or no longer stops at that shelter. Lack of bus information signage means that to ride the bus you need to know which side of the road to be on and what the bus schedule is. These create additional hurdles for someone to choose to ride the bus when they must have already ridden the bus or must research bus information well in advance.

Another issue is that many of the routes divert to circle into a neighborhood or business park adjacent to its main route or go on one road in one direction and use a different road on the return direction. The route diversions can be important to serve key populations and provide coverage to certain neighborhoods that are transit-dependent. Unfortunately, they also increase the travel time of the service to make these diversions and most users likely do not need to access those particular neighborhoods or businesses. In addition, using different roadways for inbound and outbound trips again provides coverage for an area, but makes the route more confusing for users and makes it difficult for users to get back to where they started from if, for example, they are trying to return from a shopping trip to their home. Straightening out routes and having them travel on the same roads provides consistency for users and better travel times for the buses, even potentially making it possible to add more service. The one-way streets downtown contribute to the complications of making a logical public transit system, but the challenges of the bus routes go beyond the confines of the Norwich downtown.

Finally, SEAT identified certain issues they have with downtown, including having difficulty exiting the Transportation Center from Falls Ave to W. Main Street, due to high speeds and volumes on W. Main Street, and flooding issues at the Center which sometimes force them to pick up and drop off bus riders in the shoulder on W. Side Boulevard. Access to the main part of downtown from the Transportation Center for bus riders can also be challenging due to the distance to walk and the

need to cross roads with high volume and high speed traffic on W. Main Street, Washington Street, and Chelsea Harbor Drive.



4

Analysis of Recommended Alternatives

The recommended transportation improvements presented herein were developed for locations identified during discussions with SCCOG and the City of Norwich; Transportation Advisory Committee meetings; problem areas discovered through the existing and future conditions review; public information meetings and public comments; and City Council comments from meeting presentations. These recommendations were verified with traffic operations analyses by VHB to mitigate known mobility, safety, and operational issues. The concepts were further vetted during the two Technical Advisory Committee meetings in spring 2024, at the June 2024 public information meeting, and with municipal, regional, and state agencies. The recommended alternatives include both short-term and long-term improvements, and certain improvements could be completed independently of one another. The short-term improvements are intended to address existing deficiencies, and consist of lower-cost options with limited design and permitting efforts that can be completed in a shorter timeframe (1-5 years). The long-term improvements are more costly than the short-term improvements, and they require more substantial design, permitting, and construction efforts that would require a longer timeframe (5+ years) to complete. The report also documents alternative options for the West Main Street and Westside Boulevard bridges on the west side of Downtown Norwich, which while not selected as recommended options, could be further studied and possibly implemented by the City and CTDOT should the preferred option not prove satisfactory.

4.1 Transportation Improvements Vision

The Transportation Improvement Alternatives that are recommended in this report were guided by several principles identified from the project scope of work, stated goals of the City of Norwich and SCCOG, and the public survey and public comments. The Transportation Improvements Vision principles are:

- Complete Streets
- Improve safety for all
- Create more bicycle and pedestrian space, better crossings
- Improve access to the waterfront and Howard T. Brown Park
- Lower traffic speeds while keeping traffic flowing
- Improve operations at the worst intersections
- Make circulation around downtown easier for all

4.2 Transportation Improvement Alternatives

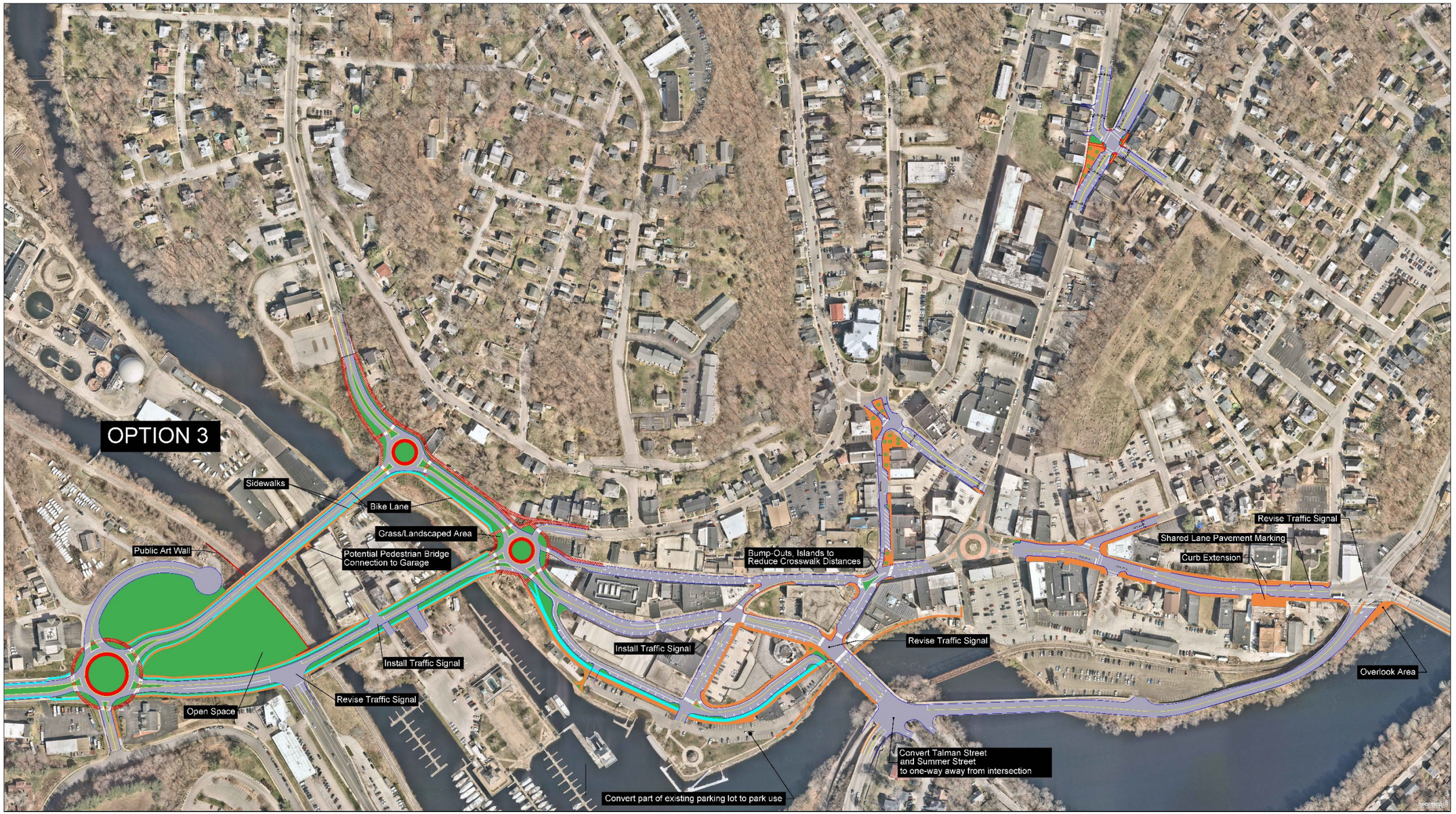
The deficiencies identified along the corridor and the corresponding recommended improvement alternatives are described in the following section. An overall map of the study area depicting the location of the recommended improvements is shown on Figure 36. All Concept Improvement Plans can also be found in the Appendix.

The Project Alternatives have been split into four geographic areas around Downtown:

- Downtown East
  - Along Main Street east of Franklin Square to the Shetucket River
- Downtown North
  - Franklin Street north of Bath Street
- Downtown Central
  - Encompassing Downtown between Washington Square and Franklin Square
- Downtown West
  - West of Washington Square to the intersection of W. Main Street and N. Thames Street

A full list of Concept Alternatives, with project numbers, can be found in Table 15.

Figure 36 Chelsea Harbor/Downtown Norwich Overall Recommended Improvement Alternatives



Source: VHB

Table 15 List of Recommended Concept Alternatives for Downtown Norwich

Recommended Projects					
Project Area	**Concept Option**	**Grouping**	**Project Location**	**Project Type**	**Project Details**
Downtown East	DE-1A	N/A	Main Street between Franklin Square and Viaduct Road	Complete Streets Improvements	Curb Extensions, shared-lane markings, tighten up Cliff Street intersection, create crossing island
Downtown East	DE-2A	N/A	Main Street at Viaduct Road/N. Main Street/Route 2 & 12	Intersection	Widen Viaduct Road for right-turn lane, pedestrian overlook
Downtown North	DN-1	N/A	Franklin Street/Oak Street/Boswell Avenue	Intersection	Reconfigure intersection, curb extensions, convert to all way STOP
Downtown Central	DC-1	N/A	Union Street/Broadway/Bath Street	Complete Streets & Circulation Improvements	Curb Extensions, shared-lane markings, circulation changes
Downtown Central	DC-2	N/A	Broadway/Main Street/Courthouse Square	Intersection	Curb extensions, crossing island, circulation changes
Downtown Central	DC-3	Downtown Central Circulation Changes	Chelsea Harbor Drive	Corridor Complete Streets Improvements	Reduce lanes, circulation changes, separated bike lane, widen sidewalks, streetscape upgrades, convert Market St intersection to all-way Stop
Downtown Central	DC-4		Water Street	Circulation Changes	Downtown two-way conversion - convert Water Street to two-way
Downtown Central	DC-5		Water Street at Courthouse Square	Intersection	Revise signal, remove Chelsea Harbor Drive from intersection, curb extensions
Downtown Central	DC-6		Water Street at Market Street	Intersection	New traffic signal
Downtown Central	DC-7		Water Street at Viaduct Road/Laurel Hill Ave	Intersection	Revise/new signal, Summer Street and Talman Street become one-way away
Downtown Central	DC-8		Washington Square	Intersection	Install Roundabout
Downtown West	DW-1	N/A	West Main Street at N. Thames Street/Westside Boulevard	Intersection	Install Roundabout
Downtown West	DW-Bridge3-1	Bridge Option 3	Washington Street at Westside Boulevard	Intersection	Install Roundabout
Downtown West	DW-Bridge3-2		Westside Boulevard	Corridor Complete Streets Improvements	Convert bridge to two-way; add sidewalks and bike lanes, pedestrian connection between Transportation Center Garage and Westside Boulevard
Downtown West	DW-Bridge3-3		West Main Street	Corridor Complete Streets Improvements	Convert to two-way, install bike lanes

4.2.1 Downtown Norwich – East of Franklin Square

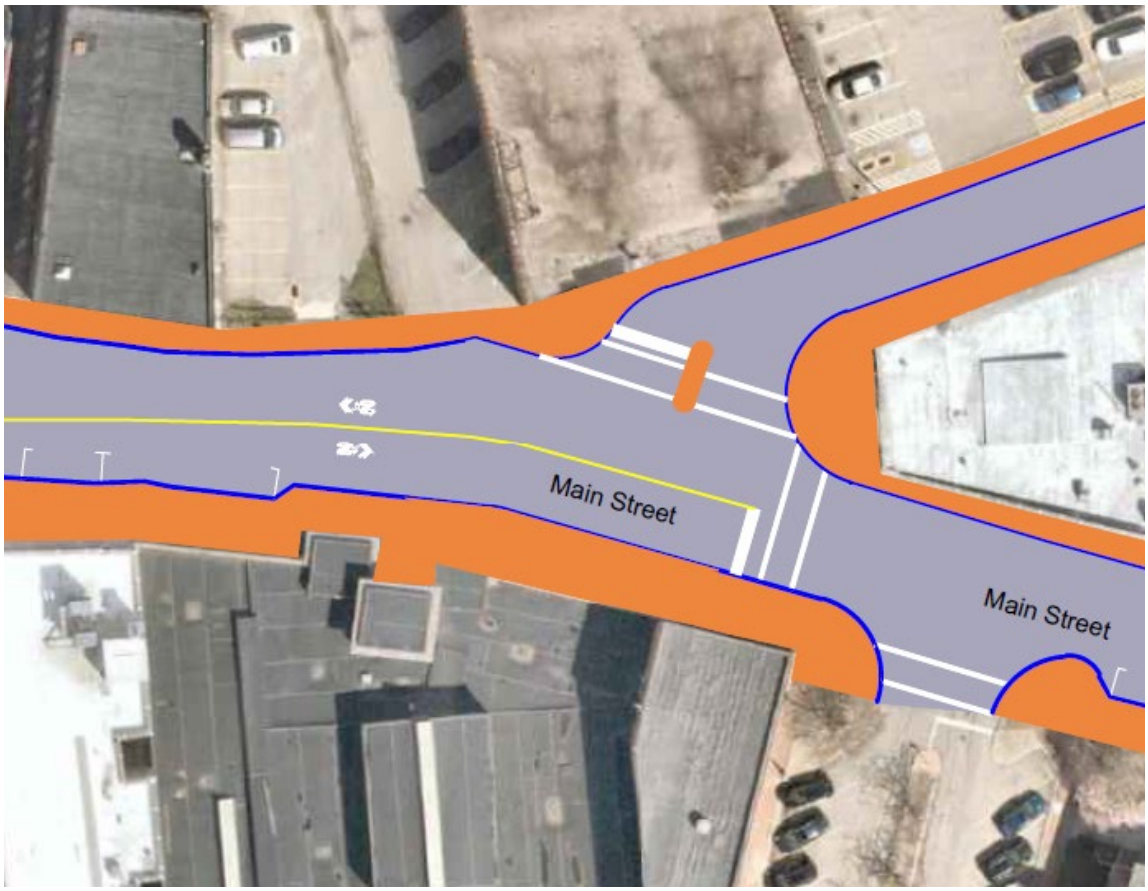
4.2.1.1 Main Street Between Franklin Square and Viaduct Road

This stretch of Main Street was identified as having pedestrian concerns due to drivers not yielding to pedestrians in crosswalks. This was also identified as the preferred route for bicyclists through Downtown by residents and the TAC. There are also skewed intersections that make crossings longer for pedestrians and sightline issues for drivers.

Pedestrian Improvements

- Proposed short-term improvements (DE-1A):
  - Curb Extensions: Public comment raised concerns about pedestrian conditions on this section of Main Street, especially at the crosswalk at the Post Office a 340 Main Street. Lack of yielding at this crosswalk was raised as concern. Install curb extensions at key crosswalk locations, including at the Post Office crosswalk and the Cliff Street/Railroad Ave crosswalk. These will help with pedestrian visibility, traffic calming, and reducing the exposure of pedestrians while crossing the street.
  - Main Street at Cliff Street: Narrow the intersection of Cliff Street at Main Street on the west side to require drivers to make a tighter right turn onto Main Street. Install an at grade, accessible median refuge island for pedestrians to shorten the crosswalk and lessen their exposure to vehicle traffic. This intersection would remain a right turn only from Cliff Street to Main Street. See Figure 37.

Figure 37 Main Street at Cliff Street Improvements



Source: VHB

Bicycling Improvements

Main Street is a lower-traffic east-west street with lower speeds (compared to Viaduct Road) providing access to the Otis Library, restaurants, retail, banks, and other businesses, which make it a desirable bicycle route. It connects to the bike route that will be established further west in downtown. However, it is not wide enough stripe bicycle lanes currently without impacting on-street parking.

- Proposed short-term improvements (DE-1A): Install shared-lane markings (sharrows) for bicycle traffic.
- Longer-term potential improvement (DE-1B): to create a more robust bicycling network, remove parking on one side of the street to install separated bike lanes or a multiuse path. This may require curb relocations unless the separated bike lane is street-level. Approximately sixteen parking spaces on one side of the street would be impacted by this, if pursued.

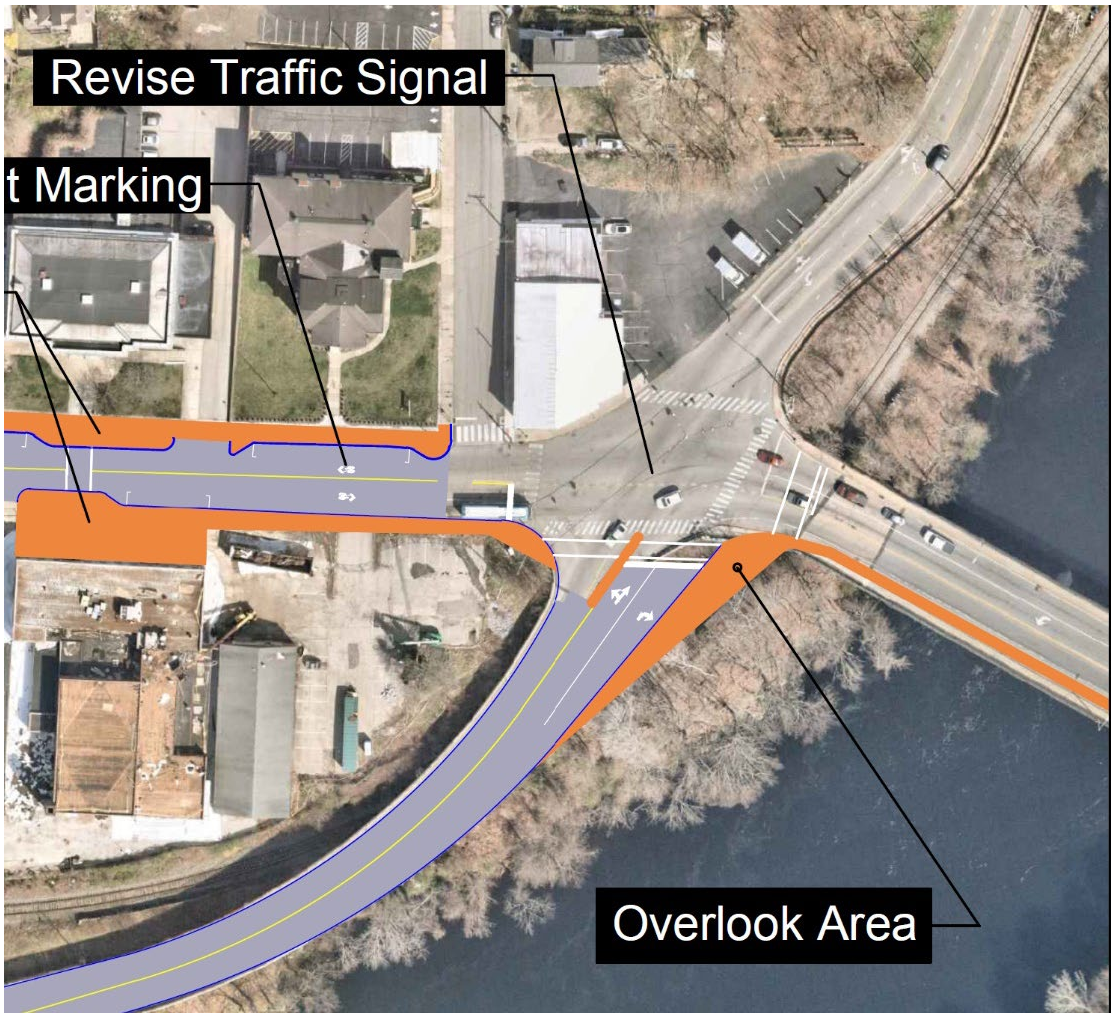
4.2.1.2 Main Street at Viaduct Road/N. Main Street/Route 2 & 12

The January 2024 Existing Conditions Report identified operational issues with this intersection, with congestion and queuing on Viaduct Road northbound and other congestion issues.

- Long-term improvement Option1 (DE-2A): Widen the Viaduct Road bridge to develop a new right turn lane northbound onto Main Street, where there is a significant traffic movement of people along Route 2 continuing east along Route 2 towards Preston and the Foxwoods Casino. An overlook of the Shetucket River could also be created in this alternative. See Figure 38.
- Long-term improvement Option 2 (DE-2B): Install a roundabout at the intersection, including the Park Street approach that is currently set apart just to the west of the existing intersection.

  See Figure 39 for example of possible roundabout location. Preliminary analysis shows that benefits could be achieved for traffic operations and safety from installation of a roundabout. However, a roundabout would have significant impacts to the property on the northwest side of the intersection, including the removal of a commercial building.

Figure 38 Main Street at Viaduct Road – Long-Term Option 1



Source: VHB

Figure 39 Main Street at Viaduct Road – Long-Term Option 2

Source: VHB

4.2.2 Downtown North - Franklin Street at Boswell Avenue/Oak Street

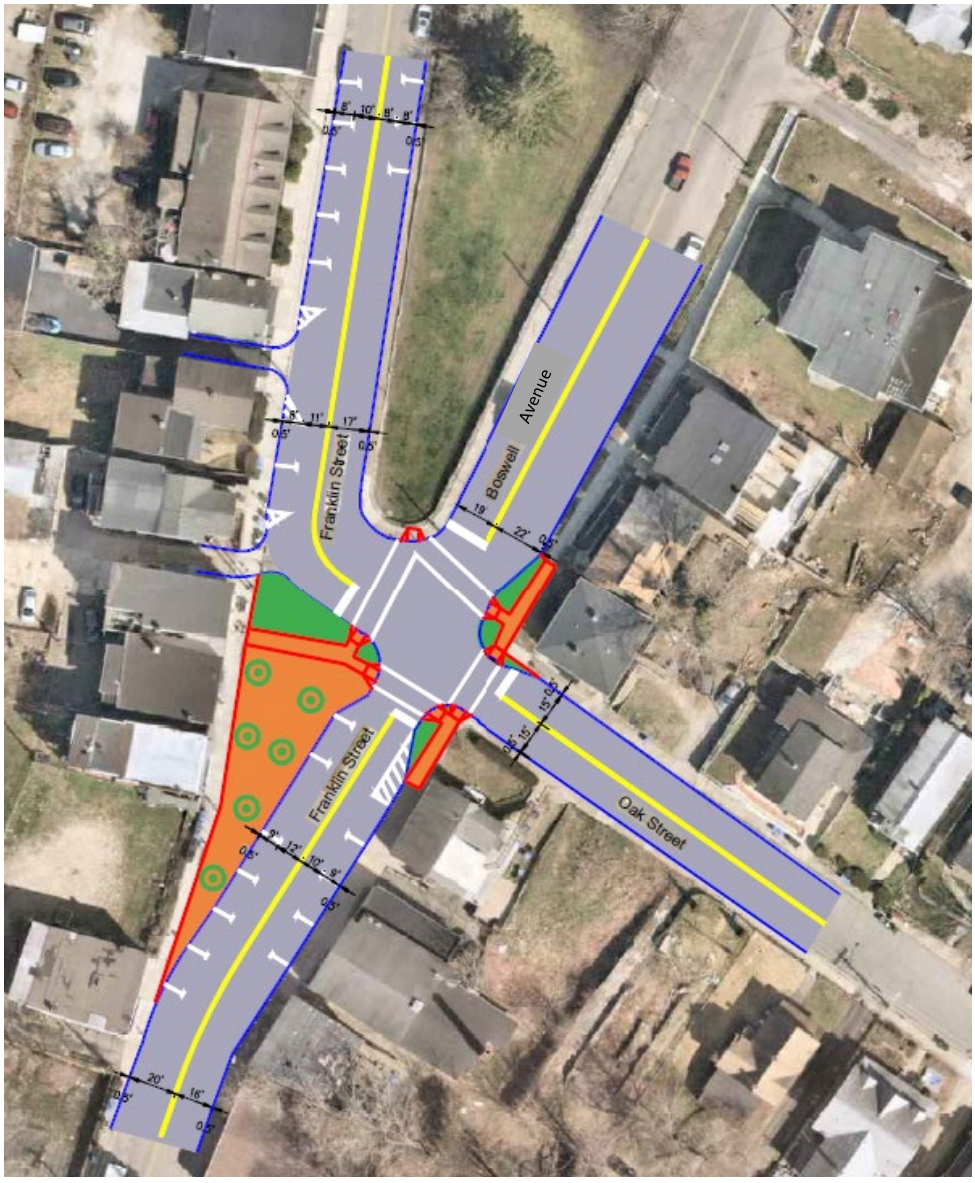
This intersection currently functions with a traffic signal and a splitter island where it breaks off from Franklin Street onto Boswell Avenue. Operations are confusing with a partial one-way section of Franklin Street approaching the signal and turn restrictions at different points in the intersection. The City has noted that the traffic signal equipment is malfunctioning and needs to be replaced, but they would prefer to remove the signal equipment entirely.

- The proposed short-term improvement (DN-1) is to remove one of the redundant legs of the intersection on the west side and bring southbound Franklin Street to a traditional four-way intersection with Boswell Avenue and Oak Street. The intersection would then be converted to four-way STOP control. The redundant street space would be converted to a vegetated and pedestrian plaza area with street trees. There would also be curb extensions on the northeast and southeast ends of the intersection to reduce pedestrian crossing distances. On-street parking

would move to the west side of Franklin Street (where there used to be open street space).

- See Figure 40 for a detailed concept diagram of the changes.

Figure 40 Franklin Street at Boswell Avenue/Oak Street Improvements



Source: VHB

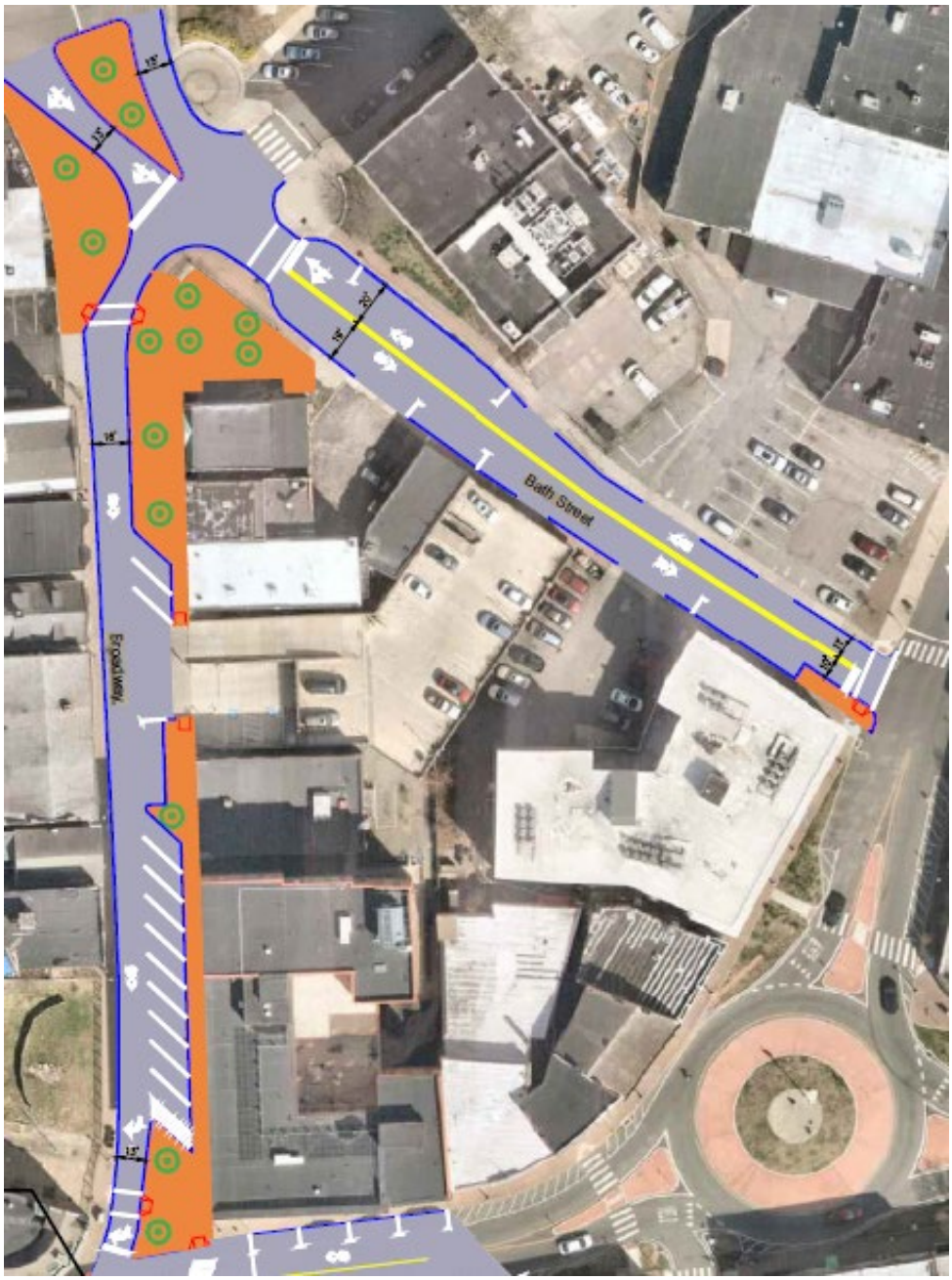
4.2.3 Downtown Near City Hall – Broadway, Bath Street, and Main Street

4.2.3.1 Union Street/Broadway/Chestnut Street/Bath Street

This intersection is directly in front of Norwich City Hall and includes approaches of one-way intersections into a confusing pattern for travelers. Traffic signal equipment at Bath Street and Chestnut Street operates in flash mode and is not fully actuated. A large center peanut-shaped island channelizes traffic and restricts movements. The one-way operations of the approach and exit streets make it difficult to navigate the area without prior experience.

- The proposed short-term improvement (DC-1) makes several changes, including:
  - Reduce the number of southbound lanes on Broadway between Bath Street and Main Street from two to one.
  - Widen curb extensions on Broadway and create angled parking instead of parallel parking.
  - Convert Bath Street to two-way operation between Chestnut Street and Franklin Street. This requires making all on-street parking on Bath Street into parallel parking.
  - Revise the intersection to direct Union Street traffic into a more typical three-way intersection with Bath Street and Chestnut Street and make a STOP-controlled intersection, removing the existing traffic signal equipment.
  - Install shared-lane markings for bicycling on Bath Street and Broadway.
  - Install street trees where appropriate.
- There should be either very minimal or no net loss of parking between Bath Street and Broadway from these changes.
- The City of Norwich has already made some changes here, specifically the pedestrian plaza area and curb extension on the east side of Broadway near Bath Street.

Figure 41 Union/Broadway/Chestnut/Bath Street Improvements



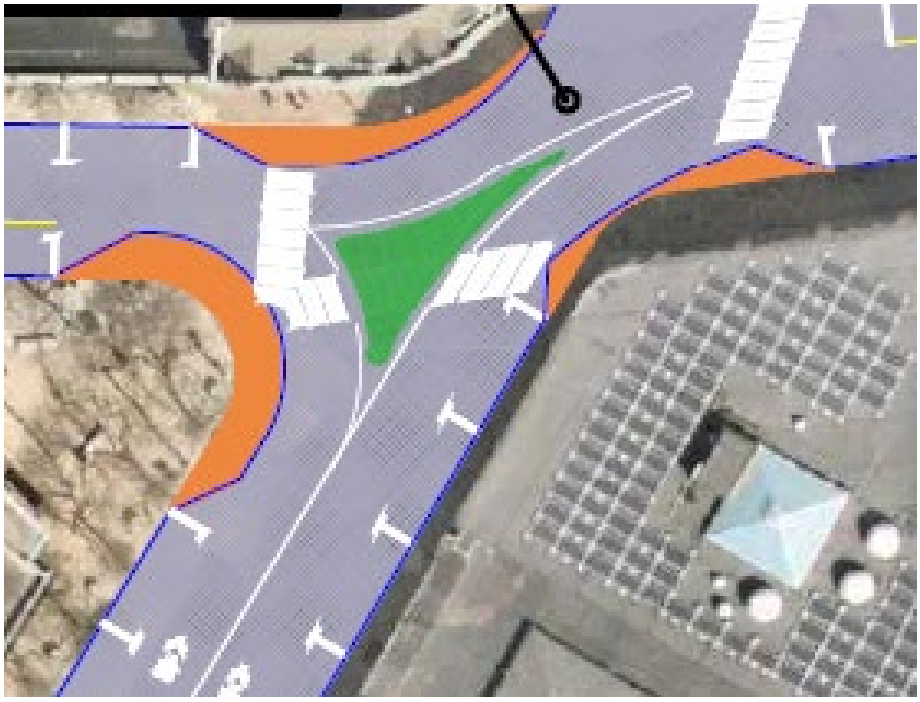
Source: VHB

4.2.3.2 Broadway/Main Street/Courthouse Square

This offset intersection has two one-way approaches (Broadway and Courthouse Square), a two-way approach on the eastern leg of Main Street and is one-way away from the intersection on the western leg of Main Street. Crosswalks for pedestrians are long and operations can be confusing.

- The proposed short-term improvements (DC-2) are the following:
  - Combined with the narrowing of the southbound Broadway approach to a single lane, Broadway will be right turn only onto Main Street westbound. This will remove a conflict from the intersection. Drivers looking to go east would need to turn onto Bath Street to the north (which would be two-way with the previous recommended changes).
  - Currently, there is a painted median island in the middle of the intersection. This would be constructed into a triangular-shaped concrete median island to provide more protection for pedestrians and restrict traffic movements.
  - Curb extensions at the northwest, southwest, and southeast corners to reduce pedestrian crossing distances.
  - These changes would allow for the removal of the traffic signal at this intersection and replaced with STOP control, if desired by the City.

Figure 42 Main Street/Courthouse Square Improvements



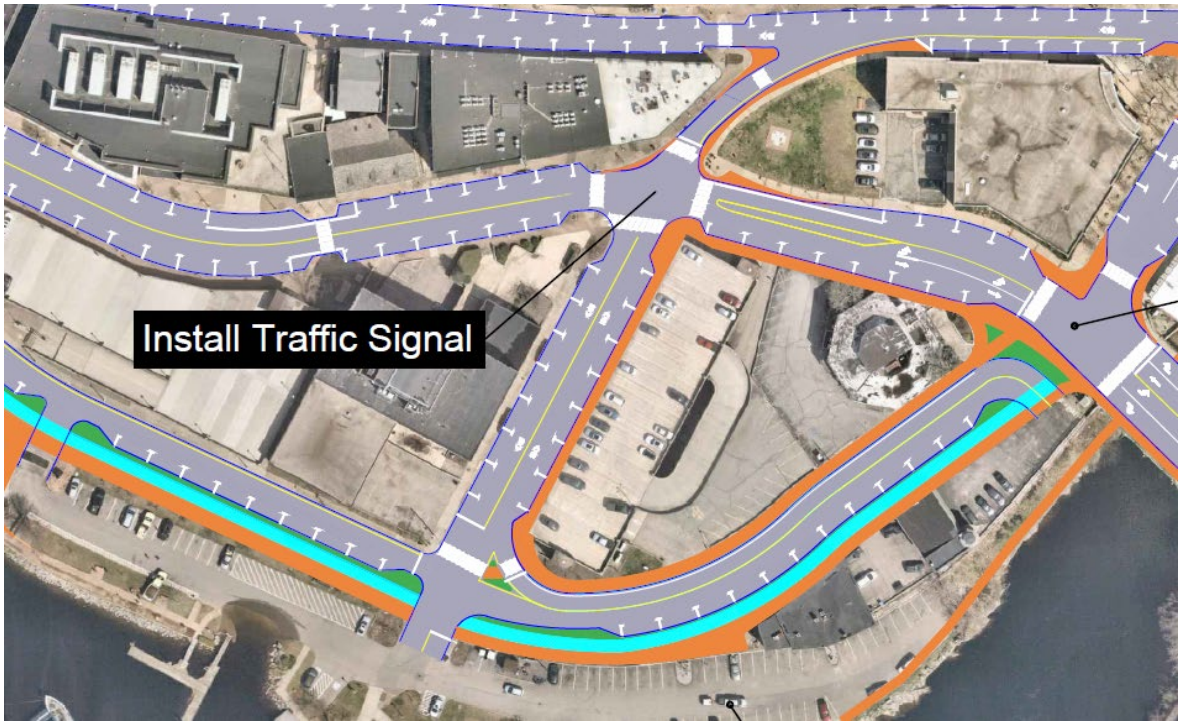
Source: VHB

4.2.4 Downtown Norwich Central – Water Street and Chelsea Harbor Drive

The current traffic circulation has Chelsea Harbor Drive carrying Route 2 as a one-way, three-lane roadway eastbound from Washington Square to Water Street/Courthouse Square, and Water Street as the other part of the one-way pair carrying Route 2 with two lanes going westbound between

Courthouse Square and Washington Square. Main Street is one-way westbound from Courthouse Square to Washington Square as well. The intersection of Water Street at Viaduct Road/Laurel Hill Ave is a point of major congestion and delay in the downtown, and eastbound queues backup across the bridge and around the corner onto Chelsea Harbor Drive.

Figure 43 Chelsea Harbor Drive/Water Street Circulation Changes



Source: VHB

4.2.4.1 Chelsea Harbor Drive and Water Street

These two roadways carry Route 2 through downtown Norwich as one-way pairs. The proposed changes are to move Route 2 onto Water Street only and convert Water Street to two-way operation. This allows Chelsea Harbor Drive to be converted to a local street next to the Howard T. Brown Park and waterfront and install bicycle facilities and better pedestrian facilities through this corridor. In addition, Chelsea Harbor Drive would no longer connect directly to Water Street or Courthouse Square for drivers (pedestrians and cyclists could still pass through). These concept alternatives are shown on Table 15 as DC-3, DC-4, DC-5, DC-6, and DC-7.

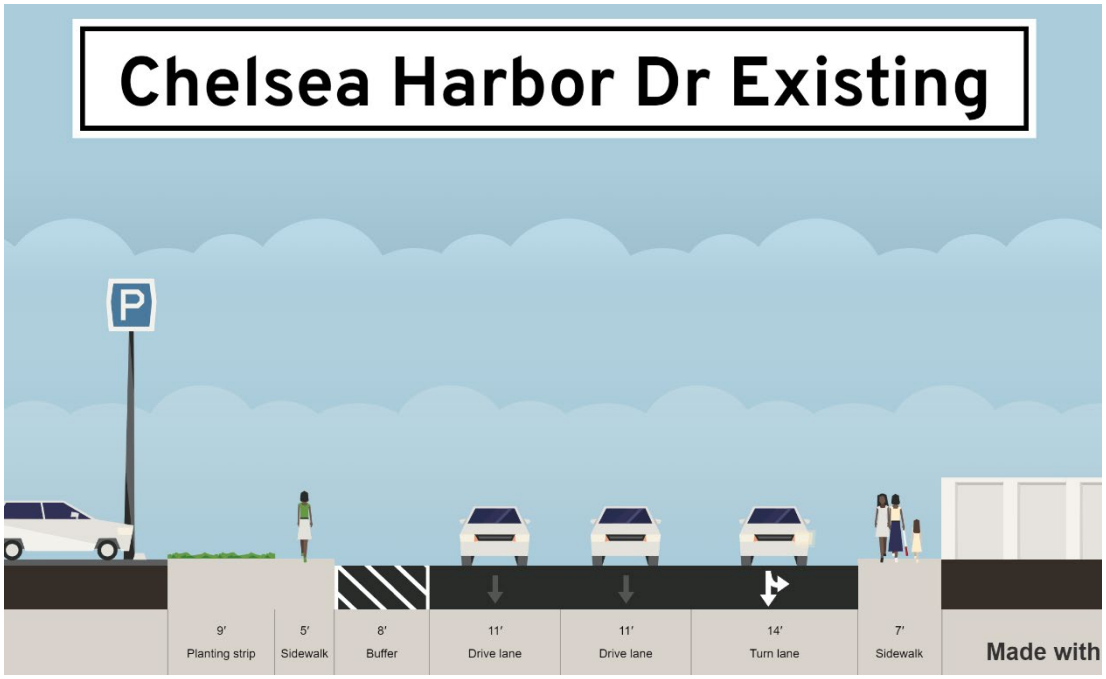
Chelsea Harbor Drive

Specific changes to Chelsea Harbor Drive (DC-3) include:

- Reduce travel lanes from three to one between Water Street/Washington Square and Market Street. This section would also be one-way towards Market Street.

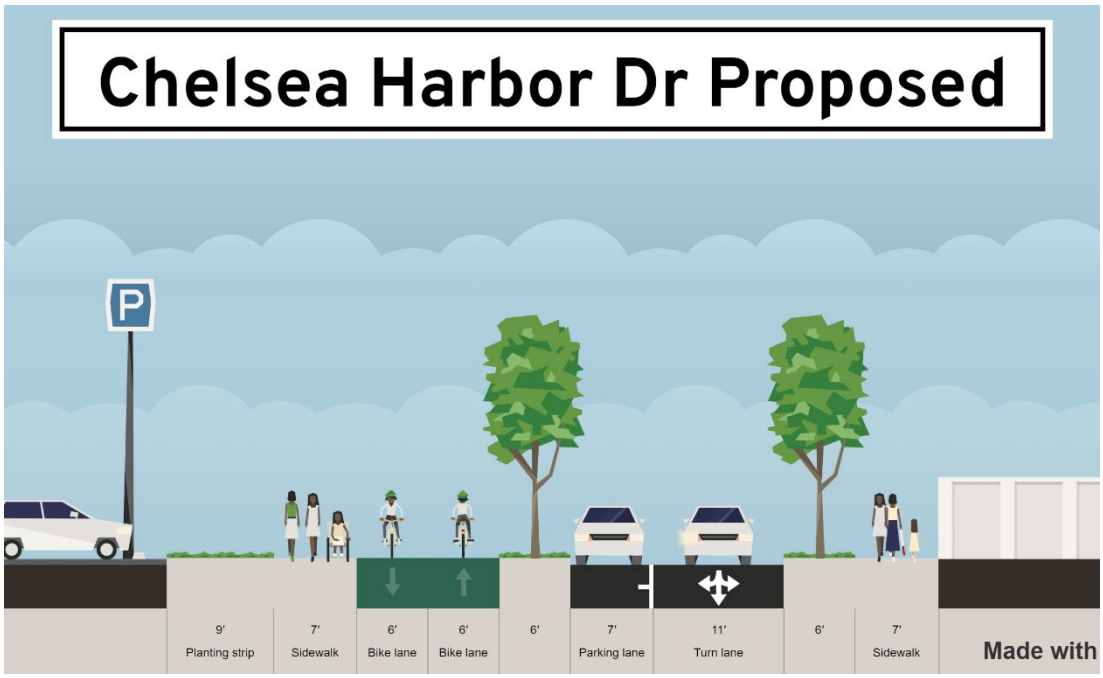
- Make Chelsea Harbor Drive two-way between Market Street and where it dead ends at Water Street. A turnaround would be placed at the end of Chelsea Harbor Drive, and connections to the parking garages and businesses along the road would be retained.
- On-street parking would be included on the river side of the street in this concept.
- Widened sidewalks for pedestrians would be included on the river/park side, and the reduction in travel lanes would allow for planting street trees, installation of benches, and other streetscaping elements to create a more comfortable pedestrian environment.
- Reduction in travel lanes would also allow for the installation of a two-way separated bicycle facility on the river/park side of the roadway, which will be a key segment of the bicycle network for downtown Norwich.
- An additional pedestrian connection to Howard T. Brown Park and the Heritage Trail would be included closer to Washington Square.
- The traffic signal at Chelsea Harbor Drive and Market Street could be removed and replaced with STOP control for the intersection.
- See Figures 44 & 45 for the existing section and potential future section of Chelsea Harbor Drive in this alternative.

Figure 44 Chelsea Harbor Drive Existing Cross-Section



Source: VHB

Figure 45 Chelsea Harbor Drive Proposed Cross-Section



Source: VHB

Water Street

Water Street would continue to carry Route 2 traffic in this concept (DC-4). Additional changes are:

- The road would be converted from two lanes one-way westbound to two-way traffic with one lane in each direction between Washington Square and Courthouse Square.
- On-street parking on both sides of the street would remain.
- A left turn lane from eastbound Water Street to northbound Courthouse Square would be added at this intersection (DC-5).
- A new traffic signal would be installed at the intersection of Water Street and Market Street (DC-6). The purpose of this signal is to allow safe crossing of the intersection by pedestrians and for left turns from Market Street onto Water Street from the Howard T. Brown Park approach and the approach from Main Street. Review of the capacity analysis for this new signal shows that some congestion would result from the new signal. However, it is important to allow turns onto Water Street from Market Street to improve circulation around downtown, and nearby businesses were supportive of the concept when it was discussed with them during public outreach.
- The traffic signal at the intersection of Water Street and Courthouse Square will be revised for simpler operation since Chelsea Harbor Drive will no longer be part of the signal operation (DC-5). Curb extensions at this intersection can also be installed

to shorten the pedestrian crossings, particularly on the northwest and northeast sides of the intersection.

4.2.4.2 Water Street at Viaduct Road/Laurel Hill Ave

Changes to Chelsea Harbor Drive and Water Street will help to improve operations at this intersection. If traffic queues occur, they will back up down Water Street as opposed to around the corner along Chelsea Harbor Drive. However, the main issue at this intersection is the multiple approaches which require separate signal phases; there are six approaches in the existing condition. The changes proposed (DC-7) are:

- To simplify the operations at the intersection, at least two of the approaches from the minor streets should be removed. This can be accomplished by changing the streets into one-way operation away from the intersection. Talman Street and Summer Street are recommended to be changed to one-way away from this intersection. This will reduce conflicts at the intersection while removing them from the signal phasing and allowing the intersection to operate as a more typical three-way intersection.

New Wharf Road also comes into the intersection from the west, but there is currently no alternative entrance or exit to the site it serves, so it is not recommended to convert this to one-way unless alternative access is secured.

Figure 46 Water Street at Viaduct Road/Laurel Hill Ave Improvements

Source: VHB

4.2.5 Washington Square and West Downtown Norwich

The west side of downtown includes Washington Street and Washington Square, the Westside Boulevard Bridge, W. Main Street and its bridges, and N. Thames Street, N. High Street, and Falls Ave. Currently, Westside Boulevard is one-way westbound between Washington Street and W. Main Street, and W. Main Street is one-way eastbound between N. High Street/Westside Boulevard and Washinton Street. All other streets are two-way.

Three options for making changes to traffic circulation and improving bicycle/pedestrian conditions in the area were developed. They were originally separated into Option 1, 2, and 3, with each option having different changes to the circulation of the Westside Boulevard and W. Main Street bridges. Option 1 was developed by VHB and brought to the Transportation Advisory Committee as part of the preliminary recommendations. Options 2 and 3 were suggested by the TAC to provide additional options for the City to consider.

Option 3 is recommended in this study as the option for the City of Norwich to carry forward to implementation. As noted in the following sections, Option 3 does not preclude the City pursuing Options 1 or 2 in the future and can be seen as part of a phased approach to the other two options.

Note that in all three options a roundabout is recommended at Washington Square (DC-8), although the conceptual design is different in each of the options.

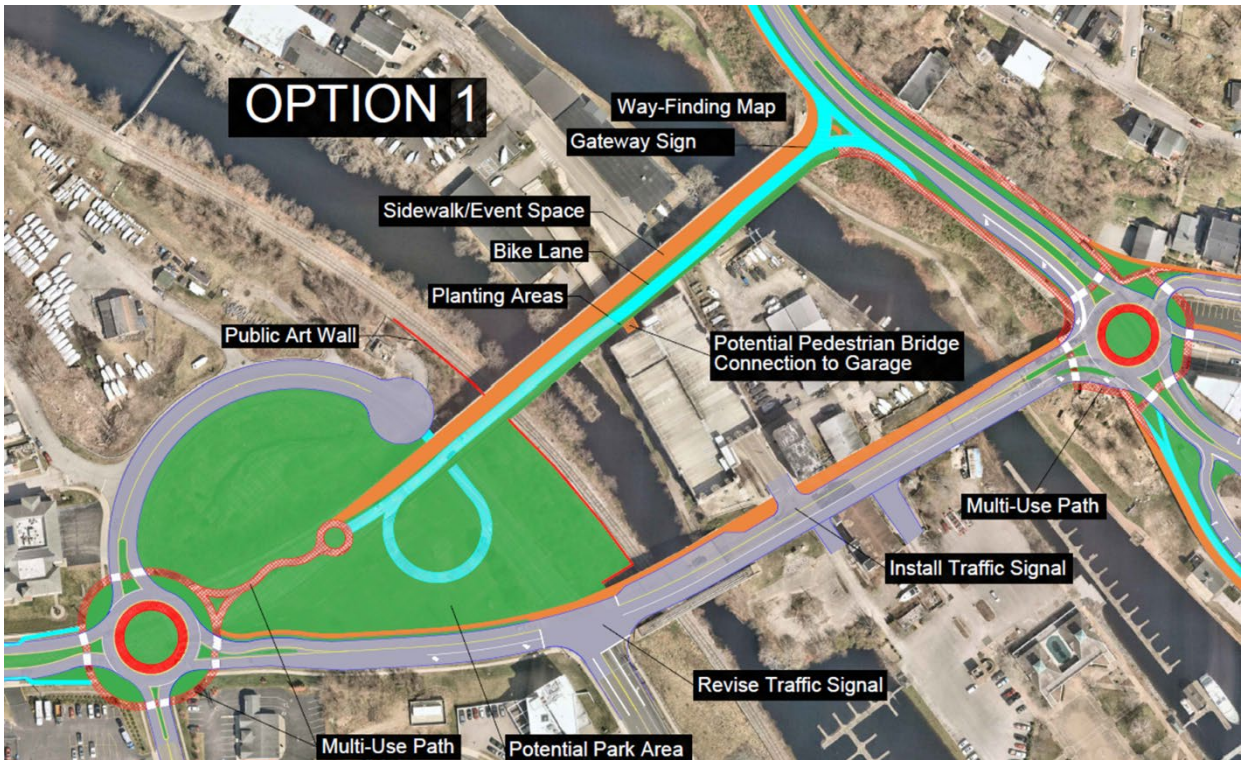
4.2.5.1 Option 1: Bridge of Roses

The following changes would be made in this option:

- The Westside Boulevard Bridge is converted to pedestrian/bicycle bridge. A widened sidewalk and separated bicycle facility would be included, as well as potential for street vendors and food trucks. At the east end of the project, there would not be a road intersection with Washington Street anymore, and that signal would be removed. There would also not be a vehicular connection to W. Main Street on the west side of the bridge. On the west side of the bridge, this option would unlock the green space west of the railroad line and provide more open space and park opportunities for the city. There is also the possibility of planting areas, wayfinding maps, public art, and other public amenities. This could be the city's "Bridge of Roses."
- Washington Square (Washington Street/Main Street/Water Street/Chelsea Harbor Drive) is converted from a signalized intersection to a roundabout. While the intersection currently works from a capacity standpoint, there are many crashes here, and a roundabout would improve safety. Turn lanes are included from W. Main Street onto Water Street, and Washington Street to W. Main Street, to bypass most of the roundabout, as these would be the dominant movements for drivers.
- Reduce the number of lanes of traffic on Washington Street since the intersection with Westside Boulevard would no longer be needed. This will allow for open space and/or better bike and pedestrian infrastructure. It would remain two-way.

- N. Thames Street would dead end in a turnaround north of the Westside Boulevard Bridge and not connect to the W. Main Street intersection with Thames Street/Route 32. The intersection of W. Main Street and Thames Street would be converted to a "T" or three-way intersection.
- W. Main Street would be converted to two-way traffic. There would be two lanes headed eastbound and one lane headed westbound. This would allow for better access to the marine boating business, Transportation Center, and Norwich Marina.
- A second roundabout would be created at the intersection of W. Main Street and N. Thames Street and N. High Street. This would be a four-leg roundabout because Westside Boulevard would no longer connect with a vehicular approach.
- It would be possible to connect the Transportation Center garage to the Westside Boulevard Bridge through an independent structure so visitors could park at the garage and access the pedestrian bridge via a walkway between them.
- A new traffic signal would be installed at W. Main Street and Falls Ave. This would facilitate SEAT buses turning out of the Transportation Center/Falls Ave and a safer pedestrian crossing. It would also allow for better access into and out of the marina.

Figure 47 Downtown West Option 1: Bridge of Roses



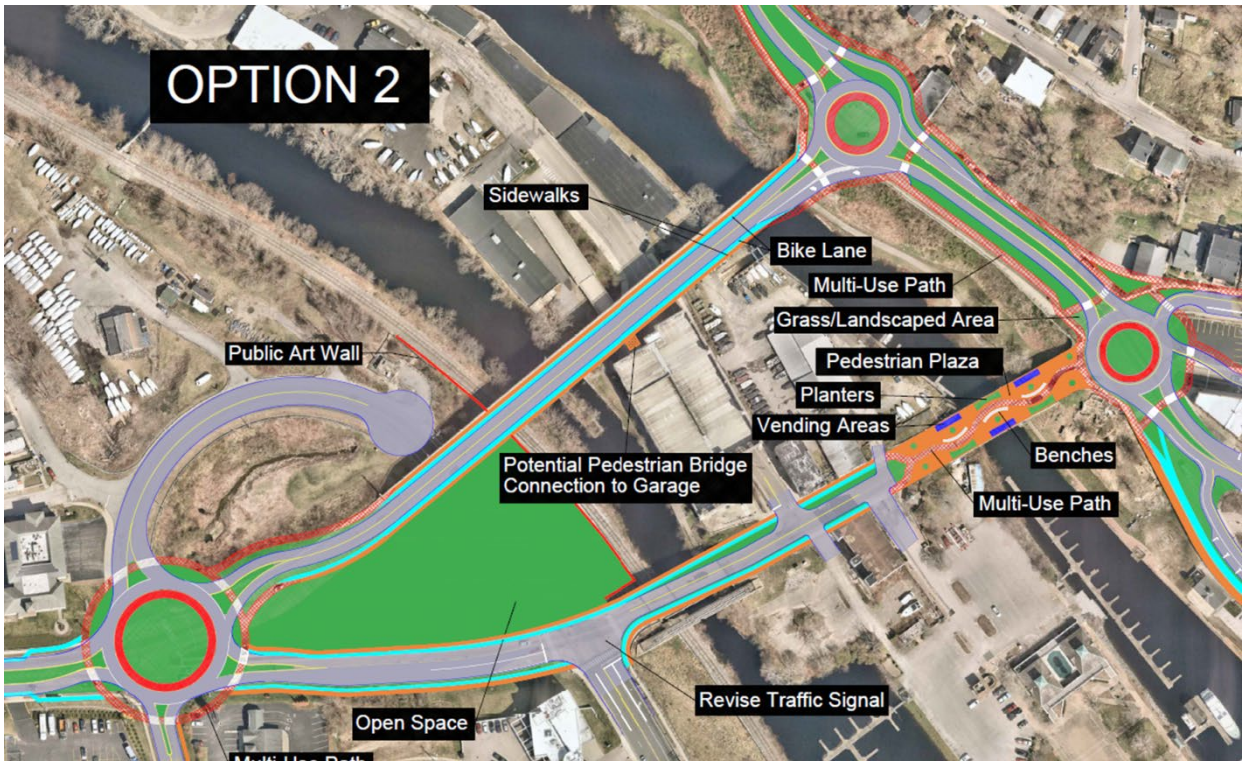
Source: VHB

4.2.5.2 Option 2: W. Main Street Pedestrian Plaza

The following changes would be made in this option:

- Part of W. Main Street between the marina and Washington Street would be converted to a pedestrian plaza with a multi-use path. There could be vending areas, seating and planting areas, and other amenities, although it would be smaller than the Westside Boulevard pedestrian bridge concept. W. Main Street would no longer connect to Washington Street.
- Washington Square (Washington Street/Main Street/Water Street/Chelsea Harbor Drive) is converted from a signalized intersection to a roundabout. Turn lanes would no longer be needed at this roundabout (compared to Option 1) because drivers would not be able to turn onto W. Main Street. This makes the roundabout operations simpler.
- Install a second roundabout at the intersection of Washington Street and Westside Boulevard. This roundabout would need only three approaches and would improve safety at this intersection.
- Reduce the number of lanes of traffic on Washington Street since the roundabouts would allow for traffic to flow more smoothly and not require multiple left turn lanes. This will allow for open space and/or better bike and pedestrian infrastructure. It would remain two-way, as in Option 1.
- Westside Boulevard would be converted to two-way traffic with one lane in each direction, bike lanes, and new sidewalk on the east side.
- As in Option 1, N. Thames Street would dead end in a turnaround north of the Westside Boulevard Bridge and not connect to the W. Main Street intersection with Thames Street/Route 32. The intersection of W. Main Street and Thames Street would be converted to a "T" or three-way intersection.
- A third roundabout would be created at the intersection of W. Main Street, Westside Boulevard, N. Thames Street and N. High Street. This would be a five-leg roundabout to accommodate all movements.
- W. Main Street would be converted to two-way traffic from N. High Street east to where it would dead end at the Norwich Marina just past Falls Ave. There would be one lane of traffic in each direction.

Figure 48 Downtown West Option 2: W. Main Street Pedestrian Plaza



Source: VHB

4.2.5.3 Option 3: Both Bridges Become Two-Way *(Recommended Option)*

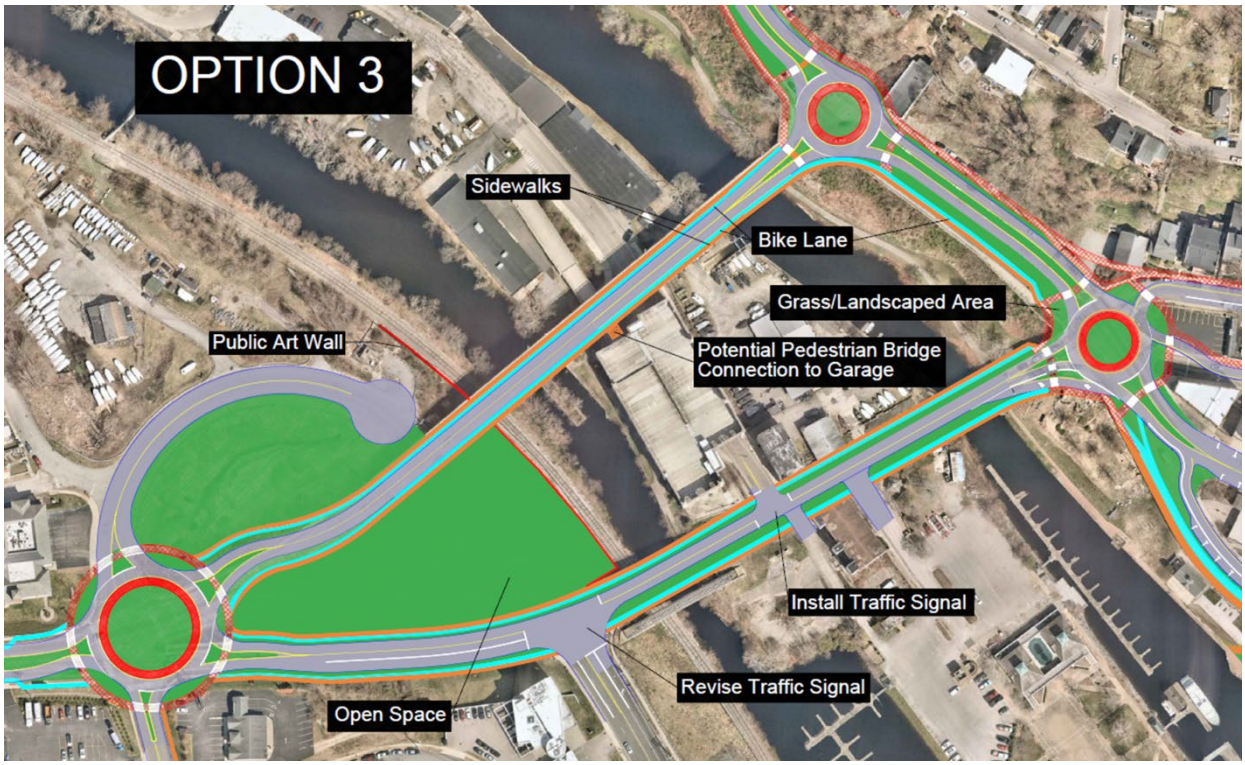
The following changes would be made in this option:

- Both the Westside Boulevard Bridge and W. Main Street would be converted to two-way roads. Westside Boulevard would have one lane in each direction, bike lanes, and new sidewalk on the east side. W. Main Street would have one lane westbound and one lane eastbound until Washington Street, when a second lane will be needed for a right turn lane.
- As in Options 1 and 2, Washington Square (Washington Street/Main Street/Water Street/Chelsea Harbor Drive) is converted from a signalized intersection to a roundabout. Only one turn lane would be needed at this roundabout (compared to Option 1) because drivers would be able to go down Westside Boulevard or W. Main Street to go south/west. This allows the roundabout to function more effectively.
- Like Option 2, install a second roundabout at the intersection of Washington Street and Westside Boulevard. This roundabout would need only three approaches and would improve safety at this intersection.
- Reduce the number of lanes of traffic on Washington Street since the roundabouts would allow for traffic to flow more smoothly and not require multiple left turn

lanes. This will allow for open space and/or better bike and pedestrian infrastructure. It would remain two-way, as in Options 1 and 2.

- As in Options 1 and 2, N. Thames Street would dead end in a turnaround north of the Westside Boulevard Bridge and not connect to the W. Main Street intersection with Thames Street/Route 32. The intersection of W. Main Street and Thames Street would be converted to a "T" or three-way intersection.
- A third roundabout would be created at the intersection of W. Main Street, Westside Boulevard, N. Thames Street and N. High Street. This would be a five-leg roundabout to accommodate all movements.
- A new traffic signal would be installed at W. Main Street and Falls Ave. This would facilitate SEAT buses turning out of the Transportation Center/Falls Ave and a safer pedestrian crossing. It would also allow for better access into and out of the marina.

Figure 49 Downtown West Option 3: Both Bridges Two-Way



Source: VHB

4.2.5.4 Discussion of Three Options

The three options provided for the Westside Boulevard Bridge and W. Main Street Bridge were discussed in detail with the Transportation Advisory Committee and brought before the Norwich City Council for their questions and comments. Comments were also received from the public at the

Public Information Meeting on June 5, 2024. As part of the discussion with the TAC, the Southeastern Connecticut Council of Governments put together pros and cons for each of the options to determine which one should be recommended in the final plan. The pros and cons are detailed below:

Option 1 Pros:

- Creates new linear park/public space "Bridge of Roses" with enhanced bike/ped facilities.
- Provides two-way circulation on West Main St. from N. Thames St. to Washington Square.
- Assumed reduction in speeding on West Main St. due to lane reductions and two-way traffic thereby improving safety.
- Eliminates need for roundabout/traffic signal at Washington St. intersection.
- Provides potential pedestrian connection from Westside Blvd. to Transportation Center.
- Allows for new park/open space/transit-oriented development east of N. Thames St.
- Eliminates N. Thames St. loop road providing direct access from Rt. 82 to Route 32.

Option 1 Cons:

- Removal of auto traffic would most likely result in State turning bridge over to City, requiring City to assume the cost of maintenance, as well as cost of coordinating activities in this public space.
- Removal of State route designation would remove this stretch of road from Federal Aid Highway system.
- Views from Bridge of Roses would be of sewer treatment plant and parking structure.
- Would require documentation that placing all traffic on West Main St. can be accommodated.
- Includes installation (cost) of new traffic signal at West Main St./Falls Ave.

Option 2 Pros:

- Creates pedestrian plaza on West Main St. east of Thayer's Marine, improving the bike/ped connection between the Transportation Center and downtown.
- Assumed reduction in speeding on both roads due to lane reductions and two-way traffic thereby improving safety.
- Allows for new park/open space/transit-oriented development east of N. Thames St.

- Bus traffic flow at Falls Ave. improved without need for new traffic signal.
- Eliminates N. Thames St. loop road providing direct access from Rt. 82 to Route 32.

Option 2 Cons:

- Need to create some sort of turnaround that is not on private property that can accommodate both delivery trucks and emergency vehicles where West Main St. is dead ended at pedestrian plaza.
- Two property owners (Thayer's Marine and America's Wharf Marina) may oppose the closing of West Main St. to auto traffic east of their businesses.
- Addition of a second sidewalk on Westside Blvd. subject to dead loading capacity of bridge.
- Requires City maintenance of and coordination of activities on new pedestrian plaza.

Option 3 Pros:

- Eliminates one-way circulation system on both Westside Blvd. and West Main St.
- Assumed reduction in speeding on both roads due to lane reductions and two-way traffic thereby improving safety.
- Reduction in number of lanes should allow for sidewalks and bike facilities on both sides of both bridges.
- Allows for new park/open space/transit-oriented development east of N. Thames St.
- Eliminates N. Thames St. loop road providing direct access from Rt. 82 to Route 32.

Option 3 Cons:

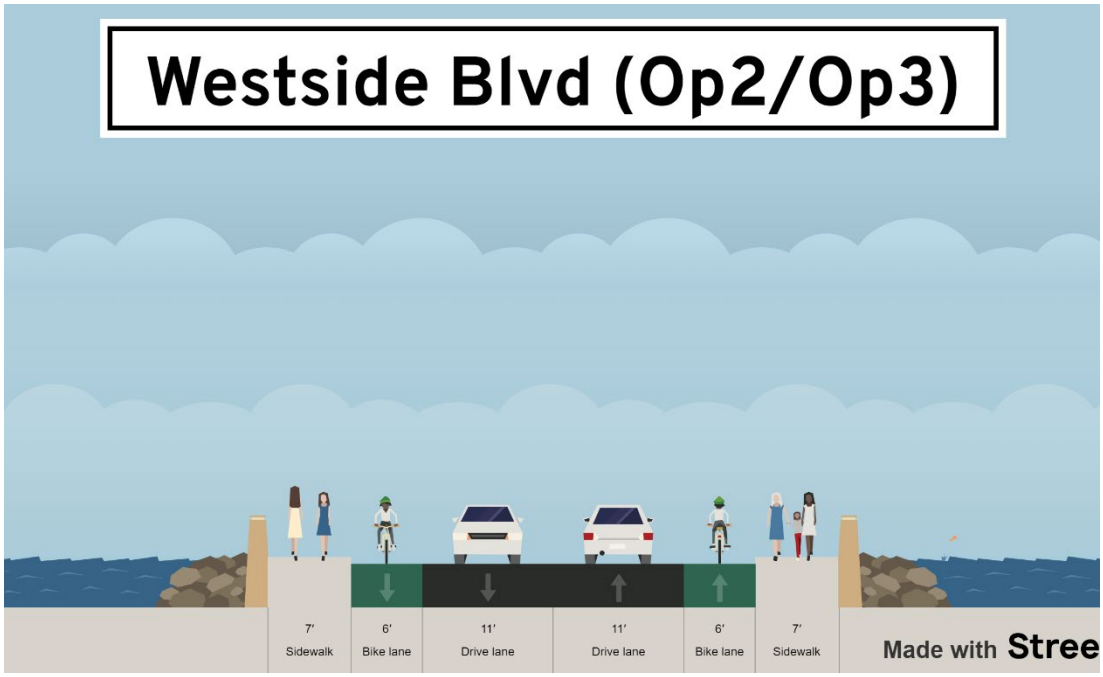
- Addition of a second sidewalk on Westside Blvd. subject to dead loading capacity of bridge.
- Includes installation (cost) of new traffic signal at West Main St./Falls Ave.

In consideration of the comments from the TAC, the City Council, and the public, **the recommended option for this section of downtown is Option 3,** where both bridges are converted to two-way traffic and roundabouts are included at the intersections of Washington Square, Washington Street and Westside Boulevard, and at Westside Boulevard and W. Main Street/N. Thames Street.

Option 3 provides better bicycle and pedestrian mobility on both bridges and access to the Norwich Marina and Transportation Center. See Figures 50 & 51 for proposed cross-sections on the bridges in Option 3. It also disperses traffic between the two bridges such that drivers going towards or coming from downtown are more likely to use W. Main Street, while drivers coming from the north on Washington Street who are planning to go west on Route 82 can use Westside Boulevard and avoid the roundabout and traffic at Washington Square. Option 3 also does not preclude the City of Norwich from pursuing Options 1 or 2 in the future. In fact, it allows the City to take a phased

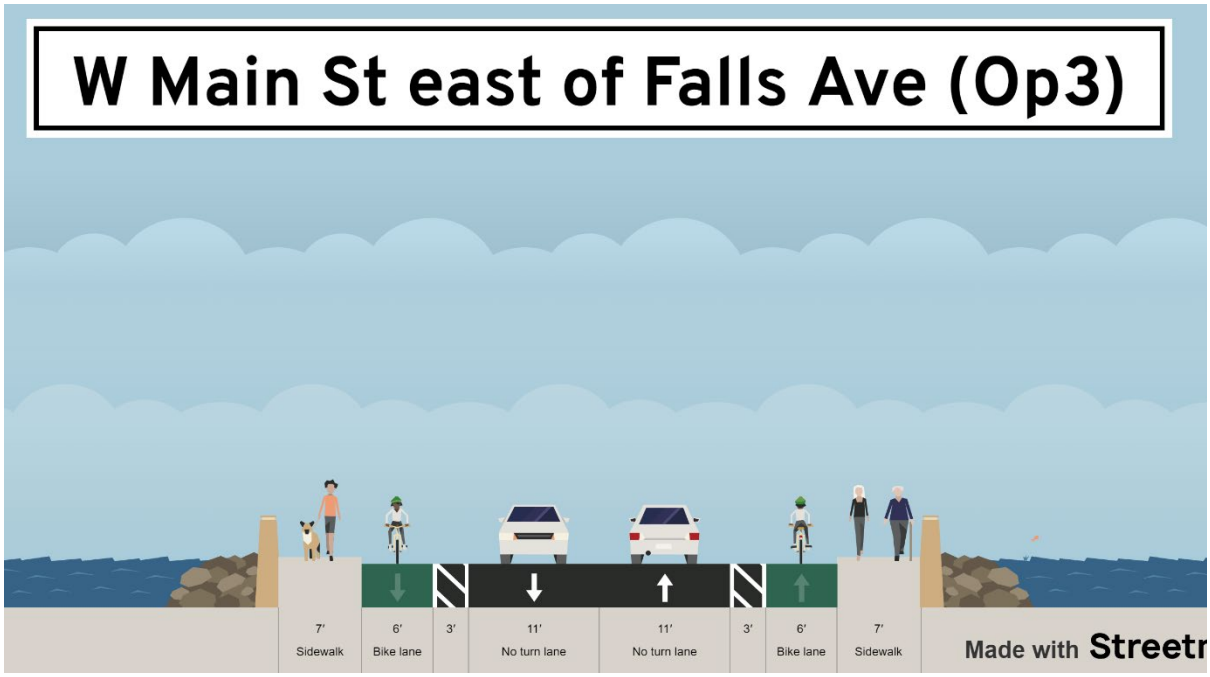
approach to these options and potentially evaluate them out on a temporary basis before fully committing to the Bridge of Roses in Option 1 or the pedestrian plaza in Option 2. It also allows time for drivers to acclimate to the traffic circulation changes proposed throughout the entire downtown which will need to be phased over many years and projects.

Figure 50 Westside Boulevard Proposed Cross-Section (Options 2 & 3)



Source: VHB

Figure 51 W. Main Street Proposed Cross-Section (Option 3)



Source: VHB

4.2.5.5 Proposed Connection Between Transportation Center Garage and Westside Boulevard

All bridge options propose an alternative to make a pedestrian bridge connection from the Transportation Center to CTDOT Bridge No. 05348. Bridge No. 05348 currently carries West Side Boulevard (Routes 82 westbound and 32 southbound) over Route 646 and the Yantic River.

The superstructure for Bridge No. 05348 is continuous and composed of three steel tub girders supporting a composite reinforced concrete bridge deck. The bridge was constructed in 1984 and is owned and maintained by CTDOT. The existing superstructure does not meet minimum load rating requirements for AASHTO LRFD HL-93 design live loading, however, under the Option 1 alternative (Pedestrian Bridge), the live loading would be precluded from the structure, and it is therefore assumed that the existing structure has adequate load rating capacity for pedestrian loading as per AASHTO. The composition of the existing bridge superstructure, with closed trapezoidal steel tub girders, is not conducive to supporting proposed kicker beams from the pedestrian bridge in a direct structural connection. Therefore, the proposed pedestrian bridge connection will be an independent structure.

Modifications to the existing bridge would include partial demolition of the existing parapet and minor modifications to the existing deck to form an interface joint between the existing bridge and proposed pedestrian bridge connection. The proposed joint between the existing bridge and proposed pedestrian connection should include a seal and not consist of an open joint system.

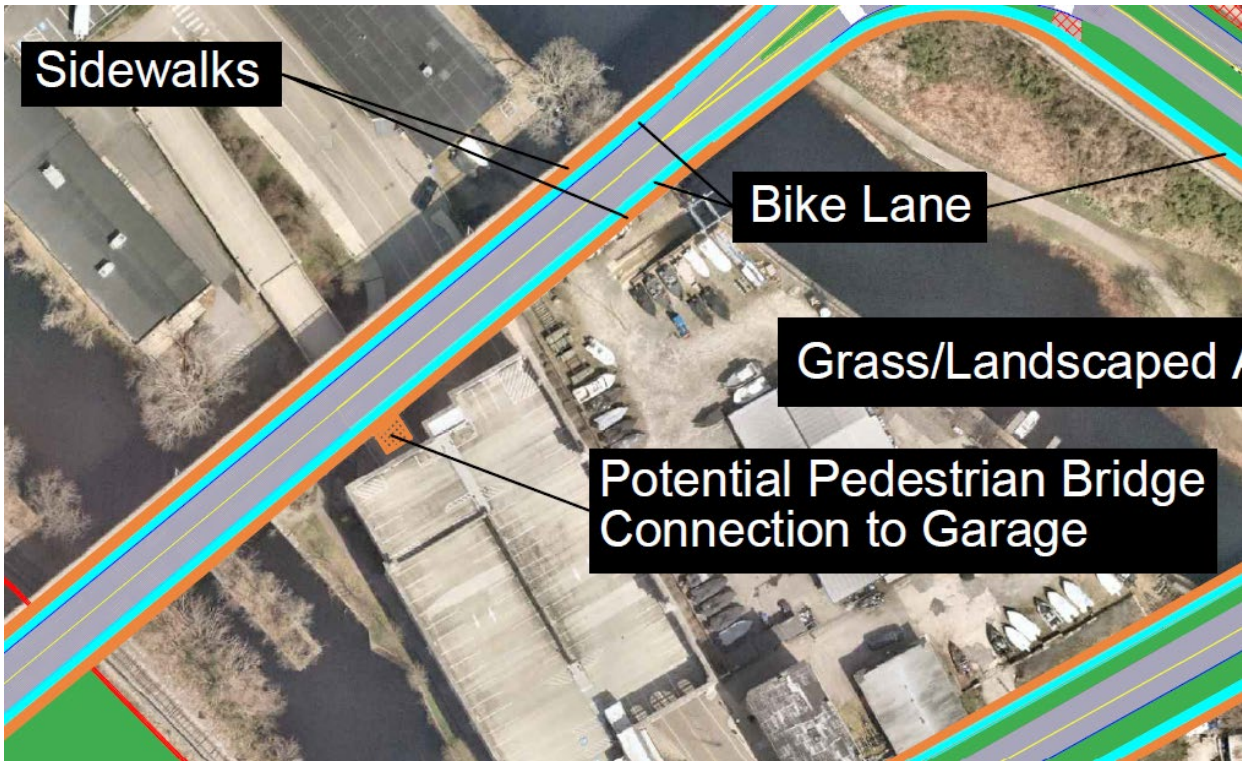
The proposed pedestrian connection would consist of a short span of approximately 25 feet that is pinned or fixed to the existing Transportation Center's main load carrying frame. It is assumed that the existing transportation center's main load carrying frame structure can adequately support a proposed pedestrian bridge connection to the existing adjacent bridge. At the interface with the existing bridge, the proposed pedestrian connection superstructure would need to be supported by a pier or bent frame.

This alternative will require additional design engineering to ascertain its full feasibility. This work will include the following elements:

- Load rating the existing bridge structure as a pedestrian bridge.
- Preliminary conceptual design of the proposed pedestrian bridge crossing span.
- Load rating of the existing transportation center to support a pedestrian bridge connection.
- Geometric design investigation to ascertain grade separation between existing bridge and transportation center at the proposed pedestrian bridge connection.
- Coordination with CTDOT to authorize the decommissioning of the existing bridge asset which may include transfer of ownership of the structure to the City (in Bridge Option 1 only).

If transfer of ownership is not required, CTDOT may require additional preservation repairs be made to the existing bridge as part of the proposed project which may incur additional project costs.

Figure 52 Potential Connection to the Transportation Center Garage



Source: VHB

4.3 Downtown Norwich No-Build Recommendations

The preceding alternatives in Section 4.2 of this report included project recommendations at specific locations in Downtown Norwich, with the Downtown West Option 3 as the preferred option for the bridges on the west side of Downtown. As part of this study, it was also important to investigate the low-cost/no-cost actions that the City of Norwich could take to improve traffic flow and safety in the downtown area outside of the specific, major changes recommended in the alternatives discussion. This section goes over broad low-cost improvements within the downtown area that should be done even if the recommended alternatives are not pursued. Some may require further concept development and design but are generally much less costly and complicated.

Although these are recommended as the "No-Build" improvements, they should also be implemented in the Build scenario to complement the recommended alternatives in Section 4.2.

4.3.1 Sidewalk Gaps and Maintenance

The Existing Conditions Report reviewed pedestrian infrastructure in the downtown, particularly sidewalk conditions and curb ramps. Sidewalk gaps were also identified, although overall downtown

has a very complete sidewalk network. The recommendations in this section are for overall sidewalk improvements in the downtown:

- Continue to maintain sidewalks for ADA access and compliance, and to provide a comfortable walking surface for all pedestrians.
- Upgrade non-compliant curb ramps in downtown to be ADA-compliant. Many curb ramps around City Hall and Courthouse Square were observed to be non-compliant, which would be some of the most heavy-traveled by pedestrians. Curb ramps should be upgraded during associated transportation projects and include new curb ramps at corners where needed.
- While most of the downtown has sidewalks, sidewalks were missing on the south side of the Westside Boulevard Bridge and parts of Viaduct Road. New sidewalks on Westside Boulevard are recommended with the bridge options discussed in the Build Section 4.2.5; however, they should be included in any significant replacement or reconstruction of the bridge that occurs in a No Build scenario. New sidewalks on Viaduct Road are recommended at the Main Street/Viaduct Road intersection as part of that bridge widening alternatives (DE-2A and DE-2B). Sidewalks at this location and other parts of Viaduct Road are recommended in a No-Build scenario but would be contingent on widening the bridge structure. Therefore, sidewalks should be included on both sides of the viaduct when the structure is replaced or has major construction done on it.
- During outreach to the community, public concerns were raised about the need to keep sidewalks clean and clear of debris, trash, and obstructions (such as trash bins) that impact accessibility and downtown aesthetics. Based on the outreach, there is a need for the City work with adjacent property owners to address these issues in a comprehensive manner.

4.3.2 Downtown Bicycle Routing & Facilities

The Existing Conditions Report noted that there are currently limited bicycling facilities in the downtown area. The recommendations discussed in the Build concept plans create bicycling facilities within the downtown area in the form of separated bicycle lanes and multi-use paths on Chelsea Harbor Drive, Washington Street Westside Boulevard, W. Main Street, Main Street, and at the roundabouts. Shared roadways are also recommended in the bicycling network with other improvements in the Build condition where a separated facility cannot be accommodated due to on-street parking, right-of-way limitations, or other factors. These alternatives will make improvements to roadways on the CTDOT On Road Bicycle Planning Network, which includes Washington Street and Chelsea Harbor Drive.

Absent these improvements, the No Build scenario recommends marking shared roadways around Downtown Norwich, particularly the narrower, low-speed and low-volume streets. Where possible, lanes could be narrowed to create bicycle lanes without moving curb lines. It is likely that CTDOT will update some of the state roadways in the future to better accommodate bicyclists as they implement the CT Active Transportation Plan over time, and in response to their recent Complete Streets Policy Directive.

This plan also recommends improvements to bicycle parking in downtown to support bicycle users, through a bicycle parking program and other efforts to create bicycle parking as new development and redevelopment occur. Bicycle parking will allow for storage areas for bicycles as more people use bicycling as transportation and will help organize the streetscape to accommodate new bicyclists.

4.3.3 Public Transportation

Public bus transportation in Downtown Norwich is provided primarily by the Southeast Area Transit District (SEAT), which has eight routes that traverse downtown. The Windham Regional Transit District (WRTD) also has one route that travels through Norwich from Willimantic. The Transportation Center on Hollyhock Island is the main transportation hub for bus services.

Several public transportation recommendations were developed based on TAC discussions, public comments, and the findings in the Existing Conditions and Future Conditions Reports. These recommendations are important for SCCOG and the City of Norwich to pursue in both the Build and No-Build scenarios to improve public transportation in the downtown.

- Improve frequency of public transit to make it more useable for riders, moving from 60-minute headways to 30-minute headways.
- Utilize existing transit shelters that are along the bus routes and/or construct new shelters at key locations which have higher ridership.
- Streamline transit routes to provide better consistency for users and more efficient operations.
- Connect the Transportation Center garage to Westside Boulevard via a new bridge for pedestrians (see Section 4.2.5). Due to occasional flooding at the Transportation Center, buses sometimes need to load and unload on the Westside Boulevard Bridge. This connection would make it easier for pedestrians to reach the buses and go through the Transportation Center to get to downtown.

Figure 53 SEAT Bus Service at Transportation Center

Source: VHB

Note that several recommendations in Section 4.2.5 would also make access improvements to Falls Ave and the Transportation Center by implementing two-way traffic flow to W. Main Street and installing a traffic signal at Falls Ave and W. Main Street to make it easier for bus drivers to exit the Transportation Center (except in Option 2 where a traffic signal would not be needed). These would not be implemented in the No-Build condition.

4.3.4 Multi-use Trails

The Heritage Way Trail is the only multi-use path currently in Downtown Norwich. The recommendations in the alternatives concept plans include multi-use paths around the proposed roundabouts and in the options for the Bridge of Roses and the W. Main Street Pedestrian Plaza. Chelsea Harbor Drive could also include a wide sidewalk but can have a bicycle path separated from pedestrians as well. The following multi-use path recommendations should be considered for the Build and No-Build scenarios:

- Extend and connect the Heritage Trail to the northwest to Uncas's Leap at Yantic Falls. Parts of this route already exist but can be better connected to each other through the neighborhoods and along the Yantic River.

- Construct a trail east of the Howard T. Brown parking lot under the Water Street bridge and to the parking lot at City Landing. This is currently an underutilized shelf above the Shetucket River and behind properties along Chelsea Harbor Drive and Courthouse Square. This would provide an additional bicycle/pedestrian route option and a short scenic section along the river.
- Create a trail connection along the south side of the Main Street bridge over the Shetucket River on the east side of Downtown Norwich to provide better pedestrian and bicycle access between downtown and the neighborhoods to the east.

Figure 54 Heritage Trail along Yantic River at Howard T. Brown Park (W. Main Street Bridge in background)

Source: VHB

4.3.5 Downtown Parking

On- and off-street parking were reviewed as part of the Existing Conditions Report for this study. On-street parking was found to have a wide variety of different regulations around downtown, with competing hours and time of day restrictions, while other sections did not appear to have any

restrictions at all. Off-street parking consists of parking garages and lots, with the largest public garages at the Transportation Center, the Main Street garage, and the Market Street garage. However, many of the garages are confusing to find, hard to navigate inside, and have maintenance issues associated with them. They are also poorly utilized compared to on-street parking.

Based on this information, the following recommendations for downtown parking in the No-Build condition are:

- Improve navigation and on-street wayfinding for parking garages. The Main Street garage in particular is hard to find with poor signage at its entrance. Online mapping could also be improved with more information on available parking, such as number of parking spaces, accessible features, and location of public parking within the garage.
- Improve parking garage maintenance, including cleaning and repair of broken doors and other features. Except for the Transportation Center, the garages were uninviting and did not feel safe or comfortable to use. These are critical parking resources that should be leveraged to create a welcoming environment for visitors.
- Rearrange locations of reserved spaces in the public garages. In the current setup, especially for the Main Street and Market Street garages, it was difficult to determine where the public parking was, especially since the reserved parking was all on the ground floor. This discourages public use of the garages.
- Consolidate and streamline on-street parking regulations so they are simpler to understand and provide more uniform coverage of downtown. This includes clarifying parking hours of operation from street to street and providing clear regulations where none appear to exist.
- Create loading zones for commercial deliveries where businesses do not have any off-street loading spaces, such as along Main Street.

4.3.6 Traffic Operations Improvements

Capacity analyses were conducted for each signalized intersection evaluated in Downtown Norwich. The intersections were assessed to determine if they would benefit from optimizing signal timings. Over time, it is expected that the existing traffic signals will need to be maintained and replaced by either the City of Norwich or CTDOT. Replacing the signals is a key opportunity to retime them so they are working as efficiently as possible. Regular maintenance of signs and markings is also important to keeping traffic moving efficiently and safely.

Traffic operations recommendations for the No-Build are:

- Optimize signal timing splits at signalized intersections to reduce delays and queueing and improve progression along coordinated systems.
- Update traffic signage as needed to be in compliance with current standards and to confirm they are still applicable to their context. New signs should follow the most recent version of the Manual on Uniform Traffic Control Devices (MUTCD) and be replaced at regular intervals.

- Maintain pavement markings in Downtown Norwich to keep traffic flowing smoothly and predictably. During regular pavement maintenance where possible, narrow lane widths to reduce traffic speeds and create separate space for bicycle lanes or paved shoulders.

4.4 Transportation Alternatives Capacity Analysis

Capacity analyses were conducted during the weekday morning, weekday evening, and Saturday mid-day peak traffic periods to evaluate the benefits of the recommended transportation improvement alternatives. These analyses were performed by modifying the Synchro models of the 2043 No-Build condition to include the recommended signal timing optimization and transportation improvement alternatives.

The movement-level and overall intersection LOS at each intersection during the weekday morning and evening peak traffic periods under 2043 Build conditions for the recommended alternatives is shown in Table 16. A detailed summary of the capacity analysis results that include the Option 1 and Option 2 Bridge Alternatives, including LOS, delays, and vehicle queue lengths by lane group, is included in the Appendix.

Table 16 - Intersection Capacity Analysis Summary – Option 3

Location	Peak Hour	Mov't	2023 Existing Conditions					2043 No-Build Conditions					2043 Build Conditions				
			v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
Route 82 at West Side Blvd. & N. Thames St/N. High St.	AM	EB T/R	0.4	16	B	77	203	0.44	17	B	89	230	0.5	9	A	-	75
		WB L	0.43	48	D	50	91	0.49	50	D	58	101	-	-	-	-	-
		WB T	0.3	7	A	42	180	0.33	8	A	47	201	0.42	8	A	-	50
		WB R	0.15	7	A	0	31	0.17	7	A	0	31	-	-	-	-	-
		NB L/T/R	0.04	43	D	0	0	0.04	43	D	0	0	0.09	7	A	-	0
		SB L/T/R	0.21	44	D	14	46	0.21	44	D	14	46	0.04	8	A	-	0
		SW	-	-	-	-	-	-	-	-	-	-	0.64	15	B	-	125
		Overall	**0.33**	**15**	**B**			**0.36**	**15**	**B**			**-**	**-**	**-**		
	PM	EB T/R	0.58	20	C	132	#362	0.63	21	C	152	#438	0.88	25	C	-	325
		WB L	0.52	44	D	64	100	0.58	47	D	72	110	-	-	-	-	-
		WB T	0.47	9	A	76	270	0.52	10	A	86	303	0.54	10	A	-	10
		WB R	0.13	7	A	0	21	0.15	7	A	0	21	-	-	-	-	-
		NB L/T/R	0.06	42	D	0	17	0.07	42	D	0	26	0.24	13	B	-	13
		SB L/T/R	0.13	42	D	10	23	0.13	42	D	10	23	0.04	9	A	-	9
		SW	-	-	-	-	-	-	-	-	-	-	0.6	16	C	-	16
		Overall	**0.44**	**17**	**B**			**0.48**	**17**	**B**			**-**	**-**	**-**		
	Sat	EB T/R	0.44	17	B	94	279	0.49	17	B	107	313	0.68	13	B	-	150
		WB L	0.26	44	D	31	69	0.32	45	D	38	80	-	-	-	-	-
		WB T	0.31	8	A	45	207	0.34	8	A	50	227	0.56	11	B	-	100
		WB R	0.09	6	A	0	31	0.09	6	A	0	32	-	-	-	-	-
		NB L/T/R	0.04	43	D	0	0	0.04	43	D	0	0	0.11	8	A	-	0
		SB L/T/R	0.03	43	D	0	0	0.03	43	D	0	0	0.04	7	A	-	0
		SW	-	-	-	-	-	-	-	-	-	-	0.35	10	A	-	50
		Overall	**0.33**	**15**	**B**			**0.36**	**15**	**B**			**-**	**-**	**-**		
	AM	EB L/T	0.24	9	A	36	119	0.27	11	B	39	138	0.15	4	A	-	50
		EB R	0.05	11	B	0	30	0.06	14	B	0	37	0.16	4	A	-	17
		WB L/T	-	-	-	-	-	-	-	-	-	-	0.39	5	A	-	161
		NB T	0.1	33	C	20	38	0.1	32	C	19	37	0.16	37	D	-	50
		NB R	0.17	34	C	0	39	0.18	33	C	0	38	0.2	37	D	-	47
		SB L	0.09	33	C	12	29	0.08	32	C	11	29	-	-	-	-	-

Location	Peak Hour	Mov't	2023 Existing Conditions					2043 No-Build Conditions					2043 Build Conditions				
			v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
		SB T	0.66	42	D	124	178	0.67	42	D	136	192	-	-	-	-	-
		Overall	**0.32**	**23**	**C**			**0.35**	**23**	**C**			**-**	**-**	**-**		
	PM	EB L/T	0.46	15	B	60	222	0.52	16	B	67	#395	0.52	5	A	-	260
		EB R	0.06	20	B	0	m34	0.06	21	C	0	m34	0.19	3	A	-	19
		WB L/T	-	-	-	-	-	-	-	-	-	-	0.52	4	A	-	125
Route 82 at N. Thames St/ Thames St.		NB T	0.13	32	C	28	53	0.14	30	C	32	58	0.03	41	D	-	13
		NB R	0.14	32	C	0	53	0.16	30	C	0	53	0.44	44	D	-	109
		SB L	0.05	31	C	7	16	0.05	29	C	7	15	-	-	-	-	-
		SB T	0.7	42	D	146	146	0.71	41	D	161	156	-	-	-	-	-
		Overall	**0.47**	**23**	**C**			**0.52**	**24**	**C**			**-**	**-**	**-**		
	Sat	EB L/T	0.32	10	A	48	170	0.36	11	B	53	195	0.34	5	A	-	119
		EB R	0.04	13	B	0	30	0.05	14	B	0	32	0.17	4	A	-	17
		WB L/T	-	-	-	-	-	-	-	-	-	-	0.51	2	A	-	23
		NB T	0.15	36	D	25	50	0.14	35	C	25	49	0.15	37	D	-	51
		NB R	0.15	36	D	0	52	0.16	35	D	0	53	0.19	37	D	-	65
		SB L	0.06	35	D	7	18	0.06	34	C	7	18	-	-	-	-	-
		SB T	0.62	43	D	103	128	0.64	43	D	110	135	-	-	-	-	-
		Overall	**0.36**	**21**	**C**			**0.4**	**21**	**C**			**-**	**-**	**-**		
	AM	SE T/R	0.62	31	C	94	152	0.71	34	C	115	178	0.66	13	B	-	125
		NW L	0.34	12	B	63	177	0.38	13	B	71	198	-	-	-	-	-
		NW T	0.31	4	A	0	148	0.34	4	A	0	166	0.5	8	A	-	75
		NE	-	-	-	-	-	-	-	-	-	-	0.22	7	A	-	25
		Overall	**0.4**	**18**	**B**			**0.45**	**19**	**B**			-	-	-		
	PM	SE T/R	0.51	29	C	66	105	0.61	31	C	89	131	0.4	7	A	-	50
		NW L	0.49	14	B	104	#278	0.54	14	B	118	#337	-	-	-	-	-
Route 2 at West Side Blvd		NW T	0.38	4	A	0	191	0.41	5	A	0	214	0.49	9	A	-	75
		NE	-	-	-	-	-	-	-	-	-	-	0.12	4	A	-	0
		Overall	**0.47**	**17**	**B**			**0.53**	**18**	**B**			-	-	-		
	Sat	SE T/R	0.46	28	C	64	114	0.51	29	C	73	128	0.5	9	A	-	75
		NW L	0.39	13	B	77	212	0.43	13	B	87	236	-	-	-	-	-
		NW T	0.3	4	A	0	146	0.34	4	A	0	169	0.57	10	A	-	100

Location	Peak Hour	Mov't	2023 Existing Conditions					2043 No-Build Conditions					2043 Build Conditions				
			v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
		NE	-	-	-	-	-	-	-	-	-	-	0.24	7	A	-	25
		Overall	**0.39**	**16**	**B**			**0.43**	**16**	**B**			-	-	-		
	AM	EB L/T	-	-	-	-	-	-	-	-	-	-	0.11	6	A	-	0
		EB R	-	-	-	-	-	-	-	-	-	-	0.43	10	A	-	50
		WB L/R	0.49	32	C	20	61	0.55	34	C	23	67	0.31	13	B	-	25
		WB R	0.53	33	C	21	65	0.58	36	D	23	70	-	-	-	-	-
		NB T/R	0.6	21	C	86	215	0.63	22	C	97	#256	0.75	16	C	-	200
		SB L/T	0.54	21	C	65	134	0.58	21	C	73	147	0.55	15	B	-	75
		SB R	-	-	-	-	-	-	-	-	-	-	0.05	6	A	-	0
		NE L	0.32	20	C	41	140	0.35	21	C	44	150	-	-	-	-	-
		NE T/R	0.45	23	C	45	#208	0.52	25	C	53	#249	-	-	-	-	-
		NE R	0.2	19	B	0	70	0.22	20	B	0	74	-	-	-	-	-
		Overall	**0.49**	**22**	**C**			**0.54**	**22**	**C**			**-**	**-**	**-**		
	PM	EB L/T	-	-	-	-	-	-	-	-	-	-	0.28	7	A	-	25
		EB R	-	-	-	-	-	-	-	-	-	-	0.42	9	A	-	50
		WB L/R	0.74	51	D	33	#112	0.62	38	D	36	#124	0.37	16	C	-	50
Route 2 (Water St) at Route 82 & Church St. & Main St.		WB R	0.79	62	E	35	#126	0.65	41	D	36	#132	-	-	-	-	-
		NB T/R	0.69	26	C	99	#257	0.71	27	C	100	#257	0.88	28	D	-	300
		SB L/T	0.33	22	C	40	114	0.36	23	C	43	122	0.51	12	B	-	75
		SB R	-	-	-	-	-	-	-	-	-	-	0.47	11	B	-	75
		NE L	0.46	26	C	61	192	0.53	28	C	69	#225	-	-	-	-	-
		NE T/R	0.7	34	C	86	#367	0.83	43	D	104	#425	-	-	-	-	-
		NE R	0.27	23	C	0	86	0.29	24	C	0	92	-	-	-	-	-
		Overall	**0.61**	**29**	**C**			**0.64**	**30**	**C**			**-**	**-**	**-**		
	Sat	EB L/T	-	-	-	-	-	-	-	-	-	-	0.1	5	A	-	0
		EB R	-	-	-	-	-	-	-	-	-	-	0.62	13	B	-	125
		WB L/R	0.51	32	C	28	90	0.54	34	C	30	95	0.41	15	B	-	50
		WB R	0.53	33	C	28	94	0.57	35	D	31	#105	-	-	-	-	-
		NB T/R	0.6	22	C	92	212	0.65	23	C	106	#255	0.77	16	C	-	200
		SB L/T	0.33	20	C	43	115	0.34	20	C	46	124	0.35	9	A	-	50
		SB R	-	-	-	-	-	-	-	-	-	-	0.18	7	A	-	25
		NE L	0.3	21	C	43	131	0.33	21	C	48	141	-	-	-	-	-
		NE T/R	0.74	32	C	102	#377	0.83	40	D	123	#428	-	-	-	-	-

Location	Peak Hour	Mov't	2023 Existing Conditions					2043 No-Build Conditions					2043 Build Conditions				
			v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
		NE R	0.28	20	C	0	71	0.31	21	C	0	74	-	-	-	-	-
		Overall	**0.6**	**24**	**C**			**0.67**	**26**	**C**			**-**	**-**	**-**		
Chelsea Harbor Dr at Market St	AM	EB L/T/R	0.18	1	A	21	34	0.2	1	A	23	36	0.03	8	A	-	3
		WB R	-	-	-	-	-	-	-	-	-	-	0.02	7	A	-	0
		NB T/R	0.12	37	D	5	26	0.12	37	D	5	26	0.02	8	A	-	3
		SB L/T	0.26	38	D	10	32	0.26	38	D	10	32	0.03	8	A	-	3
		Overall	**0.19**	**3**	**A**			**0.2**	**3**	**A**			**-**	**-**	**-**		
	PM	EB L/T/R	0.23	2	A	33	53	0.26	2	A	37	58	0.05	8	A	-	5
		WB R	-	-	-	-	-	-	-	-	-	-	0.01	7	A	-	0
		NB T/R	0.1	36	D	5	26	0.1	36	D	5	26	0.01	8	A	-	0
		SB L/T	0.41	39	D	18	45	0.41	39	D	18	45	0.01	8	A	-	0
		Overall	**0.25**	**4**	**A**			**0.27**	**4**	**A**			**-**	**-**	**-**		
	Sat	EB L/T/R	0.22	2	A	29	47	0.24	2	A	33	52	0.04	8	A	-	3
		WB R	-	-	-	-	-	-	-	-	-	-	0.01	7	A	-	0
		NB T/R	0.12	36	D	5	30	0.12	36	D	5	30	0.01	8	A	-	0
		SB L/T	0.38	39	D	16	41	0.38	39	D	16	41	0.01	8	A	-	0
		Overall	**0.23**	**4**	**A**			**0.25**	**4**	**A**			**-**	**-**	**-**		
Route 2 (Water St) at Courthouse Sq. & Chelsea Harbor Dr	AM	NW T/R	0.33	7	A	27	184	0.36	8	A	32	211	0.28	2	A	15	m47
		SE L	-	-	-	-	-	-	-	-	-	-	0.25	2	A	0	21
		SE T	-	-	-	-	-	-	-	-	-	-	0.39	1	A	0	68
		NE L/T	0.22	22	C	10	42	0.24	22	C	12	45	-	-	-	-	-
		NE R	0.42	4	A	0	30	0.45	4	A	0	30	-	-	-	-	-
		Overall	**0.39**	**8**	**A**			**0.42**	**8**	**A**			**0.37**	**1**	**A**		
	PM	NW T/R	0.39	9	A	43	207	0.44	10	A	54	231	0.41	10	B	37	256
		SE L	-	-	-	-	-	-	-	-	-	-	0.33	3	A	0	80
		SE T	-	-	-	-	-	-	-	-	-	-	0.44	2	A	0	263
		NE L/T	0.44	22	C	32	87	0.47	22	C	38	98	-	-	-	-	-
		NE R	0.6	5	A	0	21	0.66	6	A	0	20	-	-	-	-	-
		Overall	**0.56**	**9**	**A**			**0.61**	**10**	**B**			**0.46**	**6**	**A**		
	Sat	NW T/R	0.35	8	A	32	170	0.39	8	A	33	52	0.38	7	A	33	166

Location	Peak Hour	Mov't	2023 Existing Conditions					2043 No-Build Conditions					2043 Build Conditions				
			v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
		SE L	-	-	-	-	-	-	-	-	-	-	0.35	4	A	0	74
		SE T	-	-	-	-	-	-	-	-	-	-	0.67	12	B	75	#564
		NE L/T	0.29	22	C	16	60	0.32	22	D	6	30	-	-	-	-	-
		NE R	0.45	4	A	0	41	0.49	4	D	16	41	-	-	-	-	-
		Overall	**0.42**	**8**	**A**			**0.46**	**8**	**A**			**0.57**	**9**	**A**		
	AM	WB T	0.39	17	B	115	183	0.44	18	B	128	201	0.5	14	B	-	70
		NB L	0.01	34	C	0	0	0.01	34	C	0	0	0.04	10	A	-	3
		NB R	0.11	8	A	0	34	0.12	9	A	0	36	0.29	11	B	-	30
		SB L	0.49	31	C	60	99	0.51	33	C	65	105	0.25	12	B	-	25
		SB R	0.4	31	C	43	77	0.43	32	C	48	84	0.15	9	A	-	13
		Overall	**0.32**	**20**	**B**			**0.36**	**21**	**F**			-	-	-		
Main St at Broadway & Courthouse Sq.	PM	WB T	0.43	18	B	132	#276	0.45	20	B	134	#286	0.6	17	C	-	100
		NB L	0.02	34	C	0	0	0.02	34	C	0	0	0.07	10	A	-	5
		NB R	0.2	9	A	0	30	0.22	10	A	0	31	0.46	13	B	-	60
		SB L	0.49	32	C	67	113	0.5	32	C	72	119	0.29	13	B	-	30
		SB R	0.55	33	C	68	116	0.56	33	C	73	122	0.23	10	A	-	23
		Overall	**0.37**	**20**	**B**			**0.39**	**20**	**C**			-	-	-		
	Sat	WB T	0.39	17	B	120	218	0.46	19	B	140	#274	0.57	15	B	-	90
		NB L	0.01	34	C	0	0	0.01	34	C	0	0	0.02	10	A	-	3
		NB R	0.13	8	A	0	36	0.14	9	A	0	38	0.33	11	B	-	38
		SB L	0.48	33	C	59	99	0.44	31	C	58	96	0.24	12	B	-	23
		SB R	0.48	33	C	54	92	0.53	33	C	65	106	0.21	10	A	-	20
		Overall	**0.32**	**19**	**B**			**0.38**	**20**	**C**			-	-	-		
	AM	WB L	1.06	100	F	~188	#305	1.17	>120	F	~226	#345	0.58	19	B	156	287
		WB R	0.55	18	B	58	108	0.6	19	B	66	122	0.53	21	C	185	336
		NB L/T/R	0.42	43	D	5	11	0.42	43	D	5	11	-	-	-	-	-
		SE L/T	1.01	79	E	150	#411	1.08	97	F	162	#438	0.65	32	C	260	356
		SE R	0.41	16	B	51	150	0.44	16	B	57	164	0.28	10	B	74	78
		NW L/T/R	0.42	41	D	10	8	0.42	41	D	10	8	-	-	-	-	-
		NE L/R	>1.20	>120	F	~191	#213	>1.20	>120	F	~229	#247	0.9	64	E	263	302

Location	Peak Hour	Mov't	2023 Existing Conditions					2043 No-Build Conditions					2043 Build Conditions				
			v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
		NE R	-	-	-	-	-	-	-	-	-	-	0.63	42	D	161	200
		Overall	**1.07**	**104**	**F**			**1.17**	**>120**	**F**			**0.68**	**31**	**C**		
Route 2 at Viaduct Rd/ Laurel Hill Rd/Summer St/Talman St	PM	WB L	0.83	49	D	122	#240	0.88	56	E	134	#266	0.4	14	B	60	147
		WB R	0.56	18	B	62	#136	0.62	19	B	71	#208	0.49	17	B	111	258
		NB L/T/R	0.61	67	E	7	19	0.61	67	E	7	19	-	-	-	-	-
		SE L/T	>1.20	>120	F	307	#758	>1.20	>120	F	~361	#835	0.74	30	C	210	#455
		SE R	0.29	14	B	36	125	0.33	14	B	41	139	0.17	8	A	12	48
		NW L/T/R	0.52	49	D	6	10	0.52	49	D	6	10	-	-	-	-	-
		NE L/R	>1.20	>120	F	~155	#247	>1.20	>120	F	~178	#273	0.8	46	D	136	#304
		NE R	-	-	-	-	-	-	-	-	-	-	0.8	47	D	130	#296
		Overall	**1.2**	**>120**	**F**			**>1.20**	**>120**	**F**			**0.67**	**28**	**C**		
	Sat	WB L	0.82	47	D	117	#192	0.79	44	D	117	#192	0.33	10	A	47	126
		WB R	0.63	20	B	70	127	0.68	22	C	79	#188	0.51	13	B	118	279
		NB L/T/R	0.49	41	D	11	16	0.49	41	D	11	16	-	-	-	-	-
		SE L/T	>1.20	>120	F	226	#647	>1.20	>120	F	252	#696	0.74	28	C	231	#527
		SE R	0.2	13	B	24	91	0.22	14	B	26	97	0.15	7	A	17	44
		NW L/T/R	0.3	42	D	3	13	0.3	42	D	3	13	-	-	-	-	-
		NE L/R	0.89	56	E	89	#162	0.98	75	E	99	#183	0.75	46	D	113	#224
		NE R	-	-	-	-	-	-	-	-	-	-	0.62	39	D	87	#166
		Overall	**1**	**82**	**F**			**1.06**	**104**	**F**			**0.69**	**23**	**C**		
	AM	WBT L/T/R	-	-	-	-	-	-	-	-	-	-	0.05	8.1	A	-	5
		WB L/R	0.5	31	C	7	42	0.51	32	C	7	43	-	-	-	-	-
		NBT L/T/R	-	-	-	-	-	-	-	-	-	-	0.219	9.1	A	-	20
		NB T	0.2	18	B	15	65	0.24	19	B	17	74	-	-	-	-	-
		NB R	0.14	6	A	8	59	0.15	6	A	9	65	-	-	-	-	-
		SBT L/T/R	-	-	-	-	-	-	-	-	-	-	0.248	9.2	A	-	25
		SB L	0.21	24	C	5	33	0.21	24	C	5	34	-	-	-	-	-
		SB T	0.17	12	B	10	70	0.19	12	B	12	78	-	-	-	-	-
		SW L/T/R	-	-	-	-	-	-	-	-	-	-	0.167	8.4	A	-	15

Location	Peak Hour	Mov't	2023 Existing Conditions					2043 No-Build Conditions					2043 Build Conditions				
			v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
		SW L/R	0.48	19	B	29	116	0.49	19	B	32	125	-	-	-	-	-
		Overall	**0.33**	**16**	**B**			**0.36**	**16**	**B**				**8.9**	**A**		
	PM	WBT L/T/R	-	-	-	-	-	-	-	-	-	-	0.066	8.2	A	-	5
		WB L/R	0.44	31	C	14	57	0.44	32	C	14	58	-	-	-	-	-
		NBT L/T/R	-	-	-	-	-	-	-	-	-	-	0.29	9.6	A	-	30
		NB T	0.32	22	**C**	35	118	0.34	23	C	40	130	-	-	-	-	-
		NB R	0.3	9	**A**	49	160	0.32	9	A	54	174	-	-	-	-	-
Franklin St at Boswell St/Oak St*		SBT L/T/R	-	-	-	-	-	-	-	-	-	-	0.238	9.1	A	-	23
		SB L	0.32	27	**C**	11	49	0.32	28	C	11	50	-	-	-	-	-
		SB T	0.14	13	**B**	15	63	0.16	14	B	18	72	-	-	-	-	-
		SW L/T/R	-	-	-	-	-	-	-	-	-	-	0.165	8.5	A	-	15
		SW L/R	0.46	22	**C**	49	141	0.47	22	C	54	152	-	-	-	-	-
		Overall	**0.36**	**17**	**B**			**0.38**	**17**	**B**				**9.1**	**A**		
		WBT L/T/R	-	-	-	-	-	-	-	-	-	-	0.074	7.9	A	-	5
	Sat	WB L/R	0.44	29	C	15	47	0.46	30	C	16	50	-	-	-	-	-
		NBT L/T/R	-	-	-	-	-	-	-	-	-	-	0.203	8.7	A	-	20
		NB T	0.28	23	C	24	86	0.3	24	C	28	97	-	-	-	-	-
		NB R	0.2	8	A	30	109	0.21	8	A	32	114	-	-	-	-	-
		SBT L/T/R	-	-	-	-	-	-	-	-	-	-	0.215	8.7	A	-	20
		SB L	0.29	27	C	9	44	0.3	28	C	10	46	-	-	-	-	-
		SB T	0.15	16	B	14	60	0.17	16	B	17	69	-	-	-	-	-
		SW L/T/R	-	-	-	-	-	-	-	-	-	-	0.142	8.1	A	-	13
		SW L/R	0.32	18	B	38	111	0.35	19	B	46	131	-	-	-	-	-
		Overall	**0.29**	**17**	**B**			**0.31**	**18**	**B**				**8.5**	**A**		
	AM	EB L	0.16	29	C	12	43	0.18	29	C	12	43	0.2	36	D	22	60
		EB T/R	0.61	39	D	97	200	0.64	40	D	104	212	0.84	63	E	234	#429
		WB L	0.86	44	D	128	#315	0.97	67	E	145	#388	0.93	57	E	166	#450
		WB T/R	0.64	34	C	149	#392	0.7	36	D	169	#453	0.52	34	C	188	375
		NB L/T/R	0.96	69	E	196	#587	1.05	93	F	223	#646	0.76	54	D	171	#395
		NB R	-	-	-	-	-	-	-	-	-	-	0.5	42	D	76	220

Location	Peak Hour	Mov't	2023 Existing Conditions					2043 No-Build Conditions					2043 Build Conditions				
			v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
Route 2 at Route 12 Route 12 (Viaduct Rd & N. Main St)		SB L	0.4	22	C	35	115	0.46	23	C	39	124	0.46	34	C	65	150
		SB T/R	0.6	22	C	154	416	0.67	24	C	181	471	0.79	43	D	302	577
		Overall	**0.86**	**40**	**D**			**0.95**	**50**	**D**			**0.84**	**47**	**D**		
	PM	EB L	0.43	29	C	27	86	0.49	30	C	31	96	0.42	37	D	27	98
		EB T/R	0.71	43	D	121	#325	0.69	42	D	117	#308	0.66	49	D	124	#355
		WB L	0.94	61	E	130	#374	1.03	86	F	148	#429	0.8	36	D	150	#410
		WB T/R	0.9	57	E	211	#574	1.06	98	F	~276	#677	0.82	46	D	251	#661
		NB L/T/R	>1.20	>120	F	~373	#872	>1.20	>120	F	~445	#995	0.79	47	D	217	468
		NB R	-	-	-	-	-	-	-	-	-	-	0.3	33	C	34	132
		SB L	0.36	23	C	29	86	0.41	23	C	31	96	0.5	30	C	41	103
		SB T/R	0.52	21	C	138	324	0.59	22	C	159	382	0.68	33	C	212	420
		Overall	**0.99**	**78**	**E**			**1.11**	**109**	**F**			**0.76**	**40**	**D**		
	Sat	EB L	0.22	29	C	18	65	0.24	29	C	18	65	0.2	33	C	15	74
		EB T/R	0.61	39	D	94	#231	0.64	41	D	101	#262	0.63	44	D	102	#358
		WB L	0.76	34	C	110	#291	0.84	42	D	121	#346	0.73	31	C	110	#522
		WB T/R	0.66	36	D	138	#406	0.74	40	D	158	#469	0.6	34	C	146	#500
		NB L/T/R	>1.20	>120	F	~384	#816	>1.20	>120	F	~455	#914	0.75	41	D	169	342
		NB R	-	-	-	-	-	-	-	-	-	-	0.64	36	D	89	223
		SB L	0.37	22	C	26	98	0.4	22	C	29	106	0.42	26	C	36	106
		SB T/R	0.45	19	B	104	320	0.49	20	B	118	354	0.55	27	C	143	354
		Overall	**0.94**	**89**	**F**			**1.03**	**112**	**F**			**0.69**	**34**	**C**		
Water St & Market St	AM	EBT	-	-	-	-	-	-	-	-	-	-	0.47	4	A	107	256
		WBT	-	-	-	-	-	-	-	-	-	-	0.40	1	A	1	57
		NET	-	-	-	-	-	-	-	-	-	-	0.74	84	F	27	68
		SWT	-	-	-	-	-	-	-	-	-	-	0.77	53	D	24	111
		Overall	-	-	-	-	-	-	-	-	-	-	**0.49**	**14**	**B**		
	PM	EBT	-	-	-	-	-	-	-	-	-	-	0.53	4	A	121	278
		WBT	-	-	-	-	-	-	-	-	-	-	0.39	3	A	73	167
		NET	-	-	-	-	-	-	-	-	-	-	0.77	88	F	26	#77
		SWT	-	-	-	-	-	-	-	-	-	-	0.71	54	D	16	91
		Overall	-	-	-	-	-	-	-	-	-	-	**0.54**	**12**	**B**		

Location	Peak Hour	Mov't	2023 Existing Conditions					2043 No-Build Conditions					2043 Build Conditions				
			v/c[1]	Del[2]	LOS[3]	Q50[4]	Q95[5]	v/c	Del	LOS	Q50	Q95	v/c	Del	LOS	Q50	Q95
	Sat	EBT	-	-	-	-	-	-	-	-	-	-	0.55	4	A	127	287
		WBT	-	-	-	-	-	-	-	-	-	-	0.38	3	A	67	153
		NET	-	-	-	-	-	-	-	-	-	-	0.70	67	E	17	#61
		SWT	-	-	-	-	-	-	-	-	-	-	0.73	53	D	0	62
		Overall	-	-	-	-	-	-	-	-	-	-	**0.55**	**14**	**B**		
W Main St & Falls Ave	AM	EBT	-	-	-	-	-	-	-	-	-	-	0.34	2	A	45	64
		WBT	-	-	-	-	-	-	-	-	-	-	0.29	2	A	40	77
		SBL	-	-	-	-	-	-	-	-	-	-	0.28	47	D	3	34
		Overall	-	-	-	-	-	-	-	-	-	-	**0.34**	**3**	**A**		
	PM	EBT	-	-	-	-	-	-	-	-	-	-	0.69	4	A	98	215
		WBT	-	-	-	-	-	-	-	-	-	-	0.39	2	A	62	118
		SBL	-	-	-	-	-	-	-	-	-	-	0.28	47	D	3	34
		Overall	-	-	-	-	-	-	-	-	-	-	**0.69**	**4**	**A**		
	Sat	EBT	-	-	-	-	-	-	-	-	-	-	0.62	8	A	167	265
		WBT	-	-	-	-	-	-	-	-	-	-	0.46	7	A	140	203
		SBL	-	-	-	-	-	-	-	-	-	-	0.12	34	C	3	30
		Overall	-	-	-	-	-	-	-	-	-	-	**0.50**	**8**	**A**		

Source: VHB, Inc. using Synchro 11 software.

1 volume-to-capacity ratio

2 delay, in seconds

3 level of service

4 50th percentile queue length, in feet

5 95th percentile queue length, in feet

EB = Eastbound; WB = Westbound; NB = Northbound; SB = Southbound; R = right; T = through, L= left

95th% volume exceeds capacity, queue may be longer

~ Volume exceeds capacity, queue is theoretically infinite

m Volume for 95th percentile queue is metered by upstream signal

*indicates in the build condition the intersection changes from signalized to unsignalized

Shaded cells indicate LOS E or F conditions

4.5 Alternatives Safety Analysis

Safety was a critical factor in understanding the effectiveness of the transportation alternatives for Downtown Norwich. As part of the development of the alternatives, the improvements were vetted with crash predictive methodologies in accordance with the Highway Safety Manual (HSM) to show how crash modification factors (CMFs) can be utilized to show reduction in crashes for the various improvements.

The Federal Highway Administration notes that Crash Modification Factors are used to compute the expected number of crashes after implementing a countermeasure on a road or at an intersection. Examples of countermeasures include installing a traffic signal, increasing the width of edgelines, and installing a median barrier. CMFs with a value less than 1.0 indicate an expected decrease in crashes. CMFs greater than 1.0 indicate an expected increase in crashes.

Table 17 shows the Recommended Projects and the CMFs that can be applied to them based on the types of improvement treatments that are recommended. The Table includes a description of the treatment reviewed, the CMF value for that treatment, the types of crashes affected (pedestrian crashes or all crashes), and a link to the reference table and study at FHWA's Crash Modification Factors Clearinghouse website. Note that the CMFs shown are only for certain treatments within each concept option. This is to identify the treatment that provides the key crash reduction factor and has an available CMF that matches the treatment. Since many of the recommended alternatives are unique to Norwich, some concepts do not have CMFs that are applicable to them (these are designated with "N/A" in the Table).

It should be noted that the recommended alternatives include the conversion of one-way streets to two-way streets, four locations of which are recommended (Water Street, Westside Boulevard, W. Main Street, and part of Chelsea Harbor Drive). Although there are no appropriate CMFs available that document crash reduction from these kinds of changes, other evidence suggests safety benefits can be gained from the conversion to a two-way street. A study referenced in an article from the Congress on New Urbanism (CNU) in 2019 notes that traffic collisions dropped 49% after Louisville, Kentucky, converted one-way streets to two-way. This article is referenced in Table 17.

Other qualitative benefits of converting streets from one-way to two-way include:

- More direct/less circuitous localized motorist (and bicyclist) routing.
- Slower automobile traffic, resulting in safer streets for everyone including motorists.
- Reduced potential for multiple-threat pedestrian conflicts when converting same-direction multiple-vehicle-lane streets to be one through-lane each direction.
- Simplifies on-street parking by eliminating left-hand side parallel parking.
- More comfortable and livable built environment for non-motorists.
- Potential to convert some signalized intersections to Stop control, thus saving on long-term maintenance costs.
- Simplifies transit routing and allows for inbound and outbound bus stops to be on the same street.

- Economic benefits to storefronts by being visible from two approaching directions instead of one.
- Likely less total aggregate travel-time for all street users and less Vehicle Miles Traveled (VMT).

Table 17 - Safety Analysis Summary – Recommended & Alternative Projects

Recommended Projects

Project Area	Concept Option	Project Location	Project Details	Treatment 1	CMF	Crashes Affected	Reference	Treatment 2	CMF	Crashes Affected	Reference
Downtown East	DE-1A	Main Street between Franklin Square and Viaduct Road	Curb Extensions, shared-lane markings, tighten up Cliff Street intersection, create crossing island	Median with Marked Crosswalk at Cliff Street	0.54	Pedestrian Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=175	Reduce Skew at Cliff Street	0.7	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=10070
Downtown East	DE-2A	Main Street at Viaduct Road/N. Main Street/Route 2 & 12	Widen Viaduct Road for right-turn lane, pedestrian overlook	Right Turn Lane	0.86	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=285				
Downtown North	DN-1	Franklin Street/Oak Street/Boswell Street	Reconfigure intersection, curb extensions, convert to all way STOP	Reduce Skew at Franklin Street	0.7	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=10070				
Downtown Central	DC-1	Union Street/Broadway/Bath Street	Curb Extensions, shared-lane markings, circulation changes	N/A							
Downtown Central	DC-2	Broadway/Main Street/Courthouse Square	Curb extensions, crossing island, circulation changes	Crossing Island	0.742	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=8800				
Downtown Central	DC-3	Chelsea Harbor Drive	Reduce lanes, circulation changes, separated bike lane, widen sidewalks, streetscape upgrades, convert Market St intersection to all-way Stop	Shared Use Path	0.75	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=9250	Road Diet	0.71	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/study_detail.php?stid=23
Downtown Central	DC-4	Water Street	Downtown two-way conversion - convert Water Street to two-way	Two-Way Conversion	N/A	Louisville Example: 49% Reduction	https://www.cnu.org/publicsquare/2019/07/09/cities-benefit-one-way-two-way-conversions				
Downtown Central	DC-5	Water Street at Courthouse Square	Revise signal, remove Chelsea Harbor Drive from intersection, curb extensions	N/A							
Downtown Central	DC-6	Water Street at Market Street	New traffic signal	New Signal	0.84	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/study_detail.php?stid=507				
Downtown Central	DC-7	Water Street at Viaduct Road/Laurel Hill Ave	Revise/new signal, Summer Street and Talman Street become one-way away	N/A							
Downtown Central	DC-8	Washington Square	Install Roundabout	Roundabout	0.623	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=10082				
Downtown West	DW-1	West Main Street at N. Thames Street/Westside Boulevard	Install Roundabout	Roundabout	0.623	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=10082				
Downtown West	DW-Bridge3-1	Washington Street at Westside Boulevard	Install Roundabout	Roundabout	0.623	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=10082				
Downtown West	DW-Bridge3-2	Westside Boulevard	Convert bridge to two-way; add sidewalks and bike lanes, pedestrian connection between Transportation Center Garage and Westside Boulevard	Two-Way Conversion	N/A	Louisville Example: 49% Reduction	https://www.cnu.org/publicsquare/2019/07/09/cities-benefit-one-way-two-way-conversions	Add Bike Lanes	0.74	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=10741
Downtown West	DW-Bridge3-3	West Main Street	Convert to two-way, install bike lanes	Two-Way Conversion	N/A	Louisville Example: 49% Reduction	https://www.cnu.org/publicsquare/2019/07/09/cities-benefit-one-way-two-way-conversions				

Alternative Projects

Project Area	Concept Option	Project Location	Project Details	Treatment 1	CMF	Crashes Affected	Reference	Treatment 2	CMF	Crashes Affected	Reference
Downtown East	DE-1B	Main Street between Franklin Square and Viaduct Road	Same as DE-1A but with Separated Bicycle Lanes	Shared Use Path	0.75	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=9250				
Downtown East	DE-2B	Main Street at Viaduct Road/N. Main Street/Route 2 & 12	Install Roundabout	Roundabout	0.623	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=10082				
Downtown West	DW-Bridge1-1	Westside Boulevard	Bridge of Roses - convert to pedestrian/bike bridge; pedestrian connection between Transportation Center Garage and Westside Boulevard	N/A							
Downtown West	DW-Bridge1-2	West Main Street	Convert to two-way (no bike lanes)	Two-Way Conversion	N/A	Louisville Example: 49% Reduction	https://www.cnu.org/publicsquare/2019/07/09/cities-benefit-one-way-two-way-conversions				
Downtown West	DW-Bridge1-3	Transportation Center Garage	Pedestrian connection between Transportation Center Garage and Westside Boulevard	N/A							
Downtown West	DW-Bridge2-1	Washington Street at Westside Boulevard	Install Roundabout	Roundabout	0.623	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=10082				
Downtown West	DW-Bridge2-2	Westside Boulevard	Convert bridge to two-way; add sidewalks and bike lanes; pedestrian connection between Transportation Center Garage and Westside Boulevard	Two-Way Conversion	N/A	Louisville Example: 49% Reduction	https://www.cnu.org/publicsquare/2019/07/09/cities-benefit-one-way-two-way-conversions	Add Bike Lanes	0.74	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=10741
Downtown West	DW-Bridge2-3	West Main Street between Washington Square and Falls Ave	Convert to pedestrian plaza with multi-use path	Shared Use Path	0.75	All Crashes	https://cmfclearinghouse.fhwa.dot.gov/detail.php?facid=9250				
Downtown West	DW-Bridge2-4	West Main Street	Convert to two-way, install bike lanes	Two-Way Conversion	N/A	Louisville Example: 49% Reduction	https://www.cnu.org/publicsquare/2019/07/09/cities-benefit-one-way-two-way-conversions				

4.6 Phasing Approach and Order of Magnitude Cost Estimates

The Alternatives recommended in this document consist of many different types of improvements throughout Downtown Norwich. However, they lend themselves to a phased implementation and certain improvements can be made independently of others. Section 4.6.1 discusses the phasing approach that should be taken for project implementation.

As part of this study, order of magnitude cost estimates were developed for the alternatives to understand the likely construction costs for each set of projects. These order of magnitude cost estimates are meant to assist SCCOG and the City of Norwich with budgeting, securing funding, and making more detailed plans for the recommended improvements in this document. They are broad estimates that describe the level funding needed now and in the future to pay for a variety of items conceived in the concept alternatives including streetscapes, concrete work, traffic signal upgrades, bridge widening, pavement markings, etc. As order of magnitude estimates, they are not based on detailed material quantities. The cost estimates are discussed in more detail in Section 4.6.2.

Table 18 provides a summary of the recommended projects, their phasing (in Short and Long Term) and their planning level costs. Table 19 shows the alternative options for the Downtown Norwich projects with the same information. These are other potential projects that are in addition to or take the place of specific recommended projects and are included here for reference and to understand the relative costs between the different project alternatives.

Table 18 Recommended Projects Phasing and Order of Magnitude Costs

Project Area	Concept Option	Grouping	Project Location	Project Type	Project Details	Proposed Phasing	Order of Magnitude Cost
Downtown East	DE-1A	N/A	Main Street between Franklin Square and Viaduct Road	Complete Streets Improvements	Curb Extensions, shared-lane markings, tighten up Cliff Street intersection, create crossing island	Short Term	$2 million
Downtown East	DE-2A	N/A	Main Street at Viaduct Road/N. Main Street/Route 2 & 12	Intersection	Widen Viaduct Road for right-turn lane, pedestrian overlook	Long Term	$5 million
Downtown North	DN-1	N/A	Franklin Street/Oak Street/Boswell Avenue	Intersection	Reconfigure intersection, curb extensions, convert to all way STOP	Short Term	$1 million
Downtown Central	DC-1	N/A	Union Street/Broadway/Bath Street	Complete Streets & Circulation Improvements	Curb Extensions, shared-lane markings, circulation changes	Short Term	$1 million
Downtown Central	DC-2	N/A	Broadway/Main Street/Courthouse Square	Intersection	Curb extensions, crossing island, circulation changes	Short Term	$500,000
Downtown Central	DC-3	Downtown Central Circulation Changes	Chelsea Harbor Drive	Corridor Complete Streets Improvements	Reduce lanes, circulation changes, separated bike lane, widen sidewalks, streetscape upgrades, convert Market St intersection to all-way Stop	Long Term	$3 million
Downtown Central	DC-4		Water Street	Circulation Changes	Downtown two-way conversion - convert Water Street to two-way	Long Term	$1 million
Downtown Central	DC-5		Water Street at Courthouse Square	Intersection	Revise signal, remove Chelsea Harbor Drive from intersection, curb extensions	Long Term	$1 million
Downtown Central	DC-6		Water Street at Market Street	Intersection	New traffic signal	Long Term	$700,000
Downtown Central	DC-7		Water Street at Viaduct Road/Laurel Hill Ave	Intersection	Revise/new signal, Summer Street and Talman Street become one-way away	Long Term	$1 million
Downtown Central	DC-8		Washington Square	Intersection	Install Roundabout	Long Term	$5 million
Downtown West	DW-1	N/A	West Main Street at N. Thames Street/Westside Boulevard	Intersection	Install Roundabout	Long Term	$6 million
Downtown West	DW-Bridge3-1	Bridge Option 3	Washington Street at Westside Boulevard	Intersection	Install Roundabout	Long Term	$4 million
Downtown West	DW-Bridge3-2		Westside Boulevard	Corridor Complete Streets Improvements	Convert bridge to two-way; add sidewalks and bike lanes, pedestrian connection between Transportation Center Garage and Westside Boulevard	Long Term	$2 million
Downtown West	DW-Bridge3-3		West Main Street	Corridor Complete Streets Improvements	Convert to two-way, install bike lanes	Long Term	$3 million

Table 19 Alternative Projects With Phasing and Order of Magnitude Costs

Project Area	Concept Option	Grouping	Project Location	Project Type	Project Details	Proposed Phasing	Order of Magnitude Cost
Downtown East	DE-1B	N/A	Main Street between Franklin Square and Viaduct Road	Complete Streets Improvements	Same as DE-1A but with Separated Bicycle Lanes	Long Term	$3 million
Downtown East	DE-2B	N/A	Main Street at Viaduct Road/N. Main Street/Route 2 & 12	Intersection	Install Roundabout	Long Term	$5 million
Downtown West	DW-Bridge1-1	Bridge Option 1	Westside Boulevard	Corridor Complete Streets Improvements	Bridge of Roses - convert to pedestrian/bike bridge; pedestrian connection between Transportation Center Garage and Westside Boulevard	Long Term	$2 million
Downtown West	DW-Bridge1-2		West Main Street	Circulation Changes	Convert to two-way (no bike lanes)	Long Term	$2 million
Downtown West	DW-Bridge1-3		Transportation Center Garage	Pedestrian Improvements	Pedestrian connection between Transportation Center Garage and Westside Boulevard	Long Term	$1 million
Downtown West	DW-Bridge2-1	Bridge Option 2	Washington Street at Westside Boulevard	Intersection	Install Roundabout	Long Term	$4 million
Downtown West	DW-Bridge2-2		Westside Boulevard	Corridor Complete Streets Improvements	Convert bridge to two-way; add sidewalks and bike lanes; pedestrian connection between Transportation Center Garage and Westside Boulevard	Long Term	$2 million
Downtown West	DW-Bridge2-3		West Main Street between Washington Square and Falls Ave	Corridor Complete Streets Improvements	Convert to pedestrian plaza with multi-use path	Long Term	$3 million
Downtown West	DW-Bridge2-4		West Main Street	Corridor Complete Streets Improvements	Convert to two-way, install bike lanes	Long Term	$1 million

4.6.1 Recommended Alternatives Phasing Approach

In general, this plan recommends implementing certain improvements in the Downtown East, North, and Central in the short term (within 1-5 years). The primary circulation changes in Downtown Central, as well as the changes to the bridges in Downtown West may be implemented in the longer term (5+ years), due to their more complex design, permitting, and construction.

4.6.1.1 Downtown East Phasing

For the Downtown East area, the Complete Streets improvements on Main Street (Concept DE-1A) can be completed in the short term independent of other projects. The alternate concept for this section of Main Street (DE-1B), which incorporates separated bike lanes into the roadway instead of shared lanes for bicycling, would have a longer-term project timeframe.

Improvements to Main Street at Viaduct Road/N. Main Street/Route 2 & 12 would necessarily be longer term due to the higher cost and challenges with either widening the viaduct for a right turn lane (DE-2A) or installing a roundabout at the intersection (DE-2B).

4.6.1.2 Downtown North Phasing

The main project in the north end of Downtown is at the intersection of Franklin Street Oak Street/Boswell Avenue. Because this project is more isolated from the other downtown projects, it can be implemented independently from the others and at any time. Its lower cost also makes it simpler to implement than the other projects, particularly compared to the circulation changes in Downtown Central and West.

4.6.1.3 Downtown Central Phasing

The projects closest to Norwich City Hall, DC-1 and DC-2, are lower-cost and could be implemented immediately. They do not have a significant impact on the other improvements in Downtown Central that are needed to make the substantial circulation changes envisioned in this plan. These should be pursued as projects in the near term.

The longer-term improvements are grouped under Downtown Circulation Changes in Table 18 and include concepts DC-3 through DC-8 (Chelsea Harbor Drive, Water Street, Water Street at Courthouse Square, Water Street at Market Street, Water Street at Viaduct Road/Laurel Hill Ave, and Washington Square). These changes would all need to be implemented together to have them function in a coordinated fashion. Of note, the Washington Square roundabout needs to be included with these changes as well as the conversion of Chelsea Harbor Drive to a local street.

For the longer-term improvements phase, this plan also recommends a trial or demonstration project for the Water Street conversion from one-way to two-way, which would last over the course of at least several weeks. This could be accomplished with the use of temporary materials such as traffic cones, temporary signal equipment, and temporary changes to signal timing. This trial demonstration would need to be coordinated with CTDOT and City of Norwich emergency services, including Police and Fire. Evaluating this two-way conversion in this way will provide the

City of Norwich and CTDOT the ability to confirm that the changes will be successful and inform the final design for the two-way conversion.

4.6.1.4 Downtown West Phasing

Three options were explored for the Downtown West alternatives, with Option 3 being selected as the recommended alternative (DW-Bridge3-1, DW-Bridge3-2, and DW-Bridge3-3). The roundabout at the far western end of the study area, at W. Main Street and N. Thames Street, can be implemented immediately, but is classified here as a long-term project due to its cost and amount of time for design that will be needed. Adding Complete Streets improvements to the bridges in Option 3 will also take time to design, as well as the additional roundabout at Washington Street and Westside Boulevard.

As noted earlier in this plan, once improvements are made to the bridges as part of Option 3, Options 1 and 2 can be further explored through testing (such as closing a bridge for a festival or event) and other trials to see what will work best for the City of Norwich.

4.6.2 Order of Magnitude Costs

As shown in Tables 18 and 19, order of magnitude costs were developed for the different alternatives recommended for downtown. They are for construction only and do not include engineering, potential right-of-way or property acquisition, or permitting, which would add more cost to the projects. These cost estimates are based off the concept-level detail provided and were compared to recent projects of comparable size and scope, such as the Route 82 corridor project just west of this study which includes installing roundabouts along the corridor. They are not based on detailed material quantities which would be developed during a design project. The cost estimates are meant to provide SCCOG and the City of Norwich with a base construction cost that can inform their decisions about future funding and budgeting. Additional concept development and design will need to be completed to refine these cost estimates.

Implementation of the recommended alternatives for all of downtown, including Option 3 for the bridges in Downtown West, is estimated to cost approximately $36 million. This is for construction only and funding will need to be identified for design, permitting, and potential right-of-way acquisition. These costs are also based on current cost numbers and additional funding for construction would be needed to account for annual inflation, as many of the recommended projects have long term timeframes and may not be constructed for at least five years.

Order of magnitude costs for the four geographic areas are shown in Table 20:

Table 20 Breakdown of Costs for Recommended Downtown Norwich Alternatives

Order of Magnitude Costs	
Downtown East:	$7 million
Downtown North:	$1 million
Downtown Central:	$13.2 million
Downtown West (Roundabout at Westside Blvd and West Main Street and Bridge Option 3):	$15 million
Grand Total:	**$36.2 million**

Table 19 also shows order of magnitude costs for the other Downtown Norwich alternatives for reference.

Additionally, the Downtown West Bridge Options have slightly different costs. Each bridge option includes roundabouts at Washington Square and Westside Boulevard/W. Main Street but has different costs depending on what changes are made to the bridges. The three bridge option costs are compared in Table 21.

Table 21 Cost Comparison for Downtown West Bridge Options

Order of Magnitude Costs	
Bridge Option 1:	$5 million
Bridge Option 2:	$10 million
Bridge Option 3:	$9 million

4.7 Transportation Funding Sources

The purpose of this section is to identify funding opportunities for planning and predevelopment activities, focusing on federal and state planning and infrastructure grants.

Grant opportunities are summarized with information on the maximum award amount, the match requirement (if any), eligible projects and applicants, and timeline for applications or frequency of solicitation. They are split into two categories, federal grants and state grants.

4.7.1 Category 1: Federal Grants

4.7.1.1 USDOT Reconnecting Communities & Neighborhoods Program – Community Planning Grants

- **Award Maximum:** $2 Million
- **Match Requirement:** 20% non-federal match
- **Eligible Projects:** Those that address a highway or other transportation facility that creates a barrier to community connectivity (including barriers to mobility, access, or economic development). Transportation facilities can include limited access highways, principal arterials, viaducts, transit rail lines, gas pipelines, and airports. This provides funds for planning activities to support future construction projects and allow for innovative community planning to address localized transportation challenges.
- **Eligible Applicants**: State governments, local governments, Metropolitan Planning Organizations (Southern Connecticut Council of Governments), non-profit organizations, tribal governments
- **Timeline:** Notice of Funding Opportunity is now available, with applications due September 30, 2024. Notice roughly 4-6 months after application based on recent trends from USDOT for other grant opportunities.
- **Mobility Study Project Applicability:** Potential for addressing certain Downtown circulation changes and bridge changes in options DC-3 through DC-8, and DW-Bridge3-1 through DW-Bridge3-3.

4.7.1.2 USDOT Reconnecting Communities & Neighborhoods Program (RCP) – Capital Construction

- **Award Maximum:** TBD for FY 2026, FY 2023 – Minimum $5 Million; No Maximum
- **Match Requirement:** 50% non-federal match for projects funding through RCP Funds; other federal funds may be used to bring the total Federal share up to a maximum of 80% of the total cost of the project.
- **Eligible Projects:** To fund both reconnecting-focused projects and smaller projects focused on reducing environmental harm and improving access in disadvantaged communities. Projects may address the removal of a dividing facility, enhance community connectivity, or improve access by building or improving Complete Streets.

- **Eligible Applicants**: the owner(s) of the eligible facility proposed in the project for which all necessary feasibility studies and other planning activities have been completed, or eligible Community Planning Grant applicants may submit the application in partnership with the facility owner to conduct the proposed project.
- **Timeline:** Notice of Funding Opportunity is now available, with applications due September 30, 2024. Notice roughly 4-6 months after application based on recent trends from USDOT for other grant opportunities.
- **Mobility Study Project Applicability:** Potential for addressing certain Downtown circulation changes and bridge changes in options DC-3 through DC-8, and DW-Bridge3-1 through DW-Bridge3-3.

4.7.1.3 USDOT Rebuilding American Infrastructure with Sustainability & Equity (RAISE) Grant Program—Planning Grant

- **Award Maximum:** $25 Million
- **Match Requirement:** 20% non-federal match. Match requirement waived for rural communities, Historically Disadvantaged Communities (HDCs), and Areas of Persistent Poverty (APPs).
- **Eligible Projects:** Highway or bridge projects eligible under Title 23, U.S.C; Public Transportation Projects under chapter 53 of Title 49 U.S.C., port infrastructure investments, intermodal projects whose individual components would otherwise be eligible projects, any other surface transportation project that the Secretary considers to be necessary to advance the goals of the program, including public road and non-motorized projects not otherwise eligible under Title 23, U.S.C., and surface transportation components of mobility on-demand projects that expand access and reduce transportation cost burden.
- **Eligible Applicants**: State governments, local governments, tribal governments, public agencies, or publicly chartered authority established by one or more states, a special purpose district with a transportation function (e.g., port authority), multi-jurisdictional group of entities that would otherwise be separately eligible.
- **Timeline:** Applications for FY2025 grants are due January 13, 2025. Notice roughly 4-6 months after application, based on recent trends from USDOT for other grant opportunities.
- **Mobility Study Project Applicability:** Potential for funding most of the Downtown Central and Downtown West project areas, which are estimated to cost about $28 million together (DC-3 through DC-8, DW-1, and DW-Bridge3-1 through DW-Bridge3-3).

4.7.1.4 USDOT Rebuilding American Infrastructure with Sustainability & Equity (RAISE) Grant Program- Capital Grant

- **Award Maximum:** $25 Million

- **Match Requirement:** 20% non-federal match. Match requirement waived for rural communities, Historically Disadvantaged Communities (HDCs), and Areas of Persistent Poverty (APPs).
- **Eligible Projects:** Highway or bridge projects eligible under Title 23, U.S.C; Public Transportation Projects under chapter 53 of Title 49 U.S.C., port infrastructure investments, intermodal projects whose individual components would otherwise be eligible projects, any other surface transportation project that the Secretary considers to be necessary to advance the goals of the program, including public road and non-motorized projects not otherwise eligible under Title 23, U.S.C., and surface transportation components of mobility on-demand projects that expand access and reduce transportation cost burden.
- **Eligible Applicants**: State governments, local governments, tribal governments, public agencies, or publicly chartered authority established by one or more states, a special purpose district with a transportation function (e.g., port authority), multi-jurisdictional group of entities that would otherwise be separately eligible.
- **Timeline:** Applications for FY2026 grants are due January 13, 2026. Notice roughly 4-6 months after application, based on recent trends from USDOT for other grant opportunities.
- **Mobility Study Project Applicability:** Potential for funding most of the Downtown Central and Downtown West project areas, which are estimated to cost about $28 million together (DC-3 through DC-8, DW-1, and DW-Bridge3-1 through DW-Bridge3-3).

4.7.1.5 Active Transportation Infrastructure Investment Program (ATIIP)

- **Award Maximum:** $12 Million
- **Match Requirement:** 20% non-federal match, but communities contributing a higher match will be scored more favorable during merit criteria review.
- **Eligible Applicants:** States, local or regional government organizations, including a Metropolitan Planning Organization (MPO), multi-county special districts, multi-state groups of governments, a public agency or publicly chartered authority established by one or more states, Indian Tribes.
- **Eligible Projects:** Planning and construction projects for active transportation facilities located within active transportation networks or active transportation spines.
- **Timeline:** Applications for FY2024 were due June 17, 2024. Additional funding may be available later.
- **Mobility Study Project Applicability:** Potential for funding certain projects with larger active transportation components, such as Main Street between Franklin Square and Viaduct Road (DE-1A), Chelsea Harbor Drive (DC-3), and Westside Boulevard and West Main Street (DW-Bridge3-2 and DW-Bridge3-3).

4.7.1.6 Federal Bridge Improvement Program-Construction

- **Award Maximum:** up to $80 Million
- **Match Requirement:** 20% non-federal match.
- **Eligible Applicants:** States, local government units, Federally recognized tribes, planning and project organizations, U.S. territories, special purpose districts or authorities with a transportation function (such as a port authority), Federal land management areas, multi-state, or multi-jurisdictional groups of eligible entities.
- **Eligible Projects:** Bridge replacement, rehabilitation, preservation, and protection projects with total costs up to $100 Million.
- **Timeline:** Applications for FY2025 and FY2026 are being accepted on a rolling basis. FY2025 applications are due November 1, 2024.
- **Mobility Study Project Applicability:** Potential for funding projects with related bridge components, including Main Street at Viaduct Road/N. Main Street/Route 2 & 12 (DE-2A) and Westside Boulevard and West Main Street (DW-Bridge3-2 and DW-Bridge3-3).

4.7.1.7 Congestion, Mitigation, and Air Quality Improvement Program (CMAQ)

- **Award Maximum:** $4 Million
- **Match Requirement:** 20% non-federal match, but some projects may qualify for 100% federal funding.
- **Eligible Applicants:** States, local or regional government organizations, including a Metropolitan Planning Organization (MPO), multi-county special districts, multi-state groups of governments, a public agency or publicly chartered authority established by one or more states, Indian Tribes.
- **Eligible Projects:** Funds a wide range of projects that addresses traffic congestion and air quality, including transit facility improvements, bicycle paths, and alternative-fuel vehicle purchases.
- **Timeline:** Solicitation every 3-4 years.
- **Mobility Study Project Applicability:** Potential for funding many different types of projects, including Water Street at Courthouse Square (DC-5), Water Street at Viaduct Road/Laurel Hill Ave (DC-7), and projects with larger active transportation components, such as Main Street between Franklin Square and Viaduct Road (DE-1A), Chelsea Harbor Drive (DC-3), and Westside Boulevard and West Main Street (DW-Bridge3-2 and DW-Bridge3-3).

4.7.1.8 Transportation Alternatives (TA) Set-Aside Program

- **Award Maximum:** $4 Million
- **Match Requirement:** 20% non-federal match.
- **Eligible Applicants:** Local governments, regional transportation authorities, transit agencies, natural resource or public land agencies, school districts, and nonprofit entities.

- **Eligible Projects:** Primarily intended for bicycle and pedestrian projects, including on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation and enhanced mobility, community improvement activities, multi-use trail projects, and Safe Routes to Schools projects.
- **Timeline:** Solicitation every 4-5 years.
- **Mobility Study Project Applicability:** Potential for funding certain projects with larger active transportation components, such as Main Street between Franklin Square and Viaduct Road (DE-1A), Chelsea Harbor Drive (DC-3), and Westside Boulevard and West Main Street (DW-Bridge3-2 and DW-Bridge3-3).

4.7.2 Category 2: State Grants

4.7.2.1 Local Transportation Capital Improvement Program (LoTCIP)

- **Award Maximum:** $4 Million
- **Match Requirement:** None.
- **Eligible Applicants:** Local governments.
- **Eligible Projects:** Provides money to municipalities for transportation capital improvement projects. Eligible projects include roadway and bridge reconstruction, pavement rehabilitation, sidewalks, and multi-use trails. All projects must be located on Federally eligible roadways (except for multi-use trails).
- **Timeline:** Solicitation every two years.
- **Mobility Study Project Applicability:** Likely able to fund most projects in the Mobility Study except for those that are not on Federally eligible roadways.

4.7.2.2 Local Bridge Program (State)

- **Award Maximum:** Minimum $500,000; No Maximum
- **Match Requirement:** State-funded.
- **Eligible Applicants:** Local municipalities.
- **Eligible Projects:** Projects may include bridge reconstruction, rehabilitation, modifications, or improvements such as widening, complete replacement, or complete removal.
- **Timeline:** Annual solicitation.
- **Mobility Study Project Applicability:** Potential for funding projects with related bridge components, including Main Street at Viaduct Road/N. Main Street/Route 2 & 12 (DE-2A) and Westside Boulevard and West Main Street (DW-Bridge3-2 and DW-Bridge3-3).

4.7.2.3 Community Connectivity Program

- **Award Maximum:** $800,000

- **Match Requirement:** None, but the funding for infrastructure improvements can be used only for construction.
- **Eligible Applicants:** Local municipalities.
- **Eligible Projects:** Provides assistance for conducting Road Safety Audits of priority pedestrian and bicycle corridors and intersections, as well as funding for capital improvements that improve bicycle and pedestrian safety.
- **Timeline:** Solicitation every two years.
- **Mobility Study Project Applicability:** Smaller projects within the Mobility Study, such as Franklin Street/Oak Street/Boswell Ave (DN-1), Union Street/Broadway/Bath Street (DC-1), and Broadway/Main Street/Courthouse Square (DC-2).

4.8 Improvement Alternatives Public Engagement

The recommended improvements will make significant changes to the transportation network in Downtown Norwich. As such, public engagement concerning possible improvements was crucial to gaining input and feedback from the public, City staff, and elected officials. Media attention was also important to help spread the word about the changes under consideration to people who may not learn about it otherwise. The dedicated study website allowed for posting the downtown concept plans as well as meeting notes and announcements about public engagement opportunities.

To review the potential Transportation Improvement Alternatives there were several meetings and presentations to refine the concepts and get buy-in from the City of Norwich. Two Transportation Advisory Committee (TAC) meetings in spring were held to discuss the alternatives, two presentations to the Norwich City Council were made to explain the alternatives, the second public meeting went over them in detail, and a pop-up event included walking around downtown and talking to residents and businesses about the proposed changes.

4.8.1 Transportation Advisory Committee Meetings

The project study team met with the TAC at two meetings, on March 4, 2024, and June 10, 2024, to discuss the transportation alternatives. These meetings were held in Norwich City Hall Room 335 and were conducted as hybrid meetings, with attendance mainly in person but allowing for members to participate virtually as well.

During the TAC meetings, the study team discussed the alternatives with TAC members in detail and made notes on where adjustments should be made to the alternatives based on their feedback. These meetings were especially valuable to the study team and built support for the alternatives from agency staff. The March 4 meeting resulted in the three potential options for the Downtown West area after various suggestions were made by the TAC members. The second TAC meeting on June 10 went over the public meeting from the week before, which presented the alternatives to the public. The TAC members provided comments on additional refinement of the alternatives to the study team and helped to finalize the recommended option for the Downtown West.

All meeting materials and notes are provided in the Appendix.

4.8.2 City Council Meetings and June Public Information Meeting

The study team presented the proposed alternatives at two City Council Information Sessions which were open to the public. They took place on March 18, 2024, and July 15, 2024. These were important presentations to answer Councilor questions and gain their thoughts and opinions about potential alternatives. At both sessions, the Norwich City Council had questions about the proposed alternatives but indicated their overall support for the direction of the concepts and the Mobility Study.

The second public meeting of the study was held in person at the Norwich City Hall in Room 335 on June 5, 2024. At this meeting, the recommended alternatives for Downtown were presented to the public or the first time. Attendees at the meeting reacted positively to the proposed

alternatives, and supportive public comments were received via email in the days following the public meeting during the open public comment period.

Public Information Meeting documents with more information are included in the Appendix.

4.8.3 Additional Outreach for the Transportation Alternatives

Additional public outreach about the recommended transportation alternatives included the following:

- **May 7, 2024 – Downtown Norwich pop-up and walk around.** The study team had a pop-up tent at the Howard T. Brown Park to share information with the public and had teams of people walking around to businesses downtown to let them know about the improvement alternatives and the public meeting on June 5.
- **June 11 and 12, 2024 – Tactical Urbanism project.** The study team participated in a tactical urbanism demonstration on Main Street at Cliff Street across from the Otis Library. This included painting designs in the crosswalk to beautify the area and bring attention to the crosswalk for pedestrians and drivers. Study team members were also able to talk about the proposed alternatives with the public.
- **Norwich 360** – the Norwich Community Development Corporation made the proposed alternatives available to the public on their Norwich 360 website and promoted the June 5 Public Information Meeting.
- **Chelsea Harbor/Downtown Norwich Mobility Study website** – the alternatives were posted to the dedicated website for the Mobility Study, including promotion of the June 5 public meeting and the tactical urbanism demonstration.

4.9 Summary & Conclusion

The improvement alternatives detailed in the preceding sections, intended to address deficiencies detailed in the Existing Conditions Report, have been thoroughly vetted with the project stakeholders, Transportation Advisory Committee and verified with supporting design concepts and analyses for 2043 Future Conditions. These improvements will make significant circulation changes to Downtown Norwich and the Complete Streets approach will create comfortable and connected facilities for all users. The selection of Option 3 as the recommended option does not prevent the City in the future of re-evaluating Options 1 or 2 should Option 3 not result in the traffic circulation and safety improvements forecast in this study. Other downtown-wide changes and improvements for sidewalks, bicycling, transit, multi-use trails, and downtown parking will make a downtown that is safe and accessible for all users.