Wall Street Station Feasibility Study

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Disclaimer: *The information provided in this document, including demographic, employment, and travel information, reflects data collected prior to the outbreak of the COVID-19 pandemic. While there may ultimately be some future impacts due to the pandemic, the analysis for siting and construction of a new Wall Street rail station is based on a long-term vision that presumes a full rebound from short-term impacts.*

1 Executive Summary

This report presents the results of the Connecticut State Legislature's mandated study to evaluate the viability of a new passenger rail station in the City of Norwalk. This planning feasibility study, conducted by the Connecticut Department of Transportation (CTDOT) evaluated the potential to re-establish a rail station along the Danbury Line (DBL) in Norwalk's downtown, in the vicinity of Wall Street. After completing upgrades to modernize the Danbury Line, including a signalization system, CTDOT worked with the City of Norwalk on this study to examine potentially restoring a rail stop in the Wall Street area. The Wall Street area had rail service from 1860 until around the 1930's when the station stop was closed and service converted to bus.

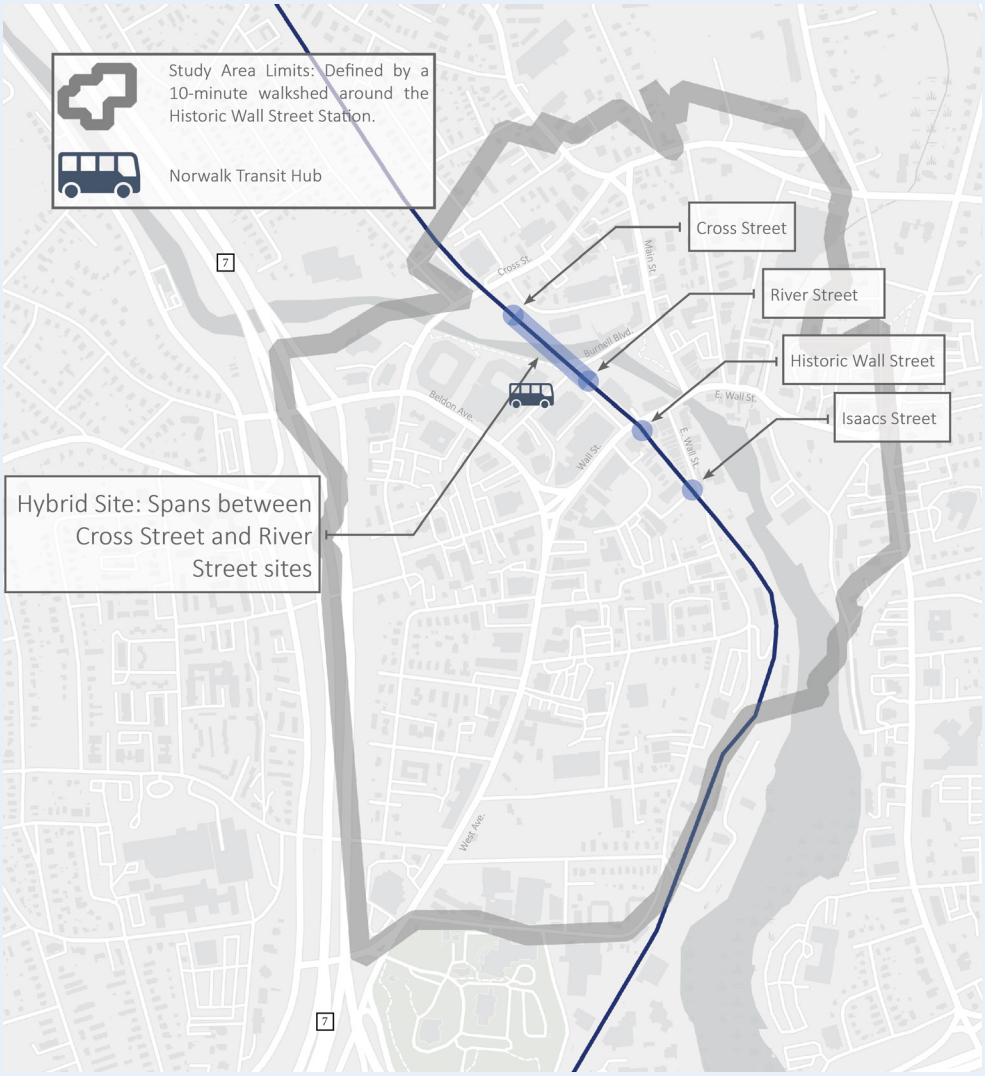


Figure ES1. Wall Street Station 10-Minute Walkshed

The study area consists of a 10-minute walkshed centered on the rail tunnel adjacent to River Street.

This assessment addressed the physical constraints of each potential site and the surrounding areas, the potential impacts to existing and future rail operations, as well as market and demographic considerations.

Within the study area four station sites were originally identified: Cross Street, 18 River Street, 47 Wall Street, and 17 Isaacs Street. During the study process a fifth station site was identified which combines the Cross Street and River Street sites together.

The study involved various **assessments** for consideration, including high level engineering assessments and cost estimates. The results of this study include several key findings, listed below, that point to poor overall viability for siting a station in the Wall Street area: :

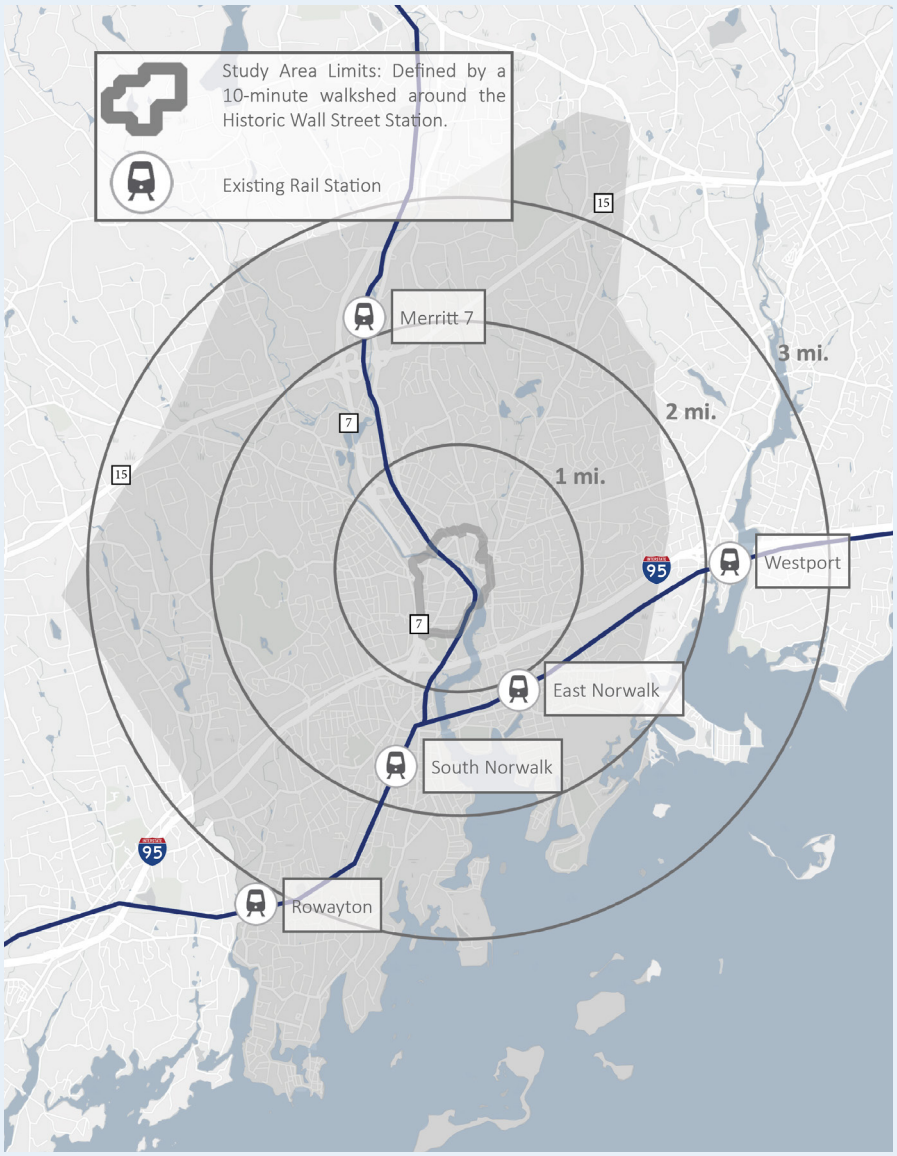


Figure ES2. Regional Rail Context

- **Significant Site Constraints** – All four original sites do not meet the minimum engineering standards to be built. Most sites would not be feasible due to numerous physical site constraints, mainly the existing tunnel under Wall Street as well as not meeting standards for platform size, and the likely need for property takings. The hybrid Cross Street to River Street site is the only site that is feasible in terms of construction.
- **Ridership Impacts** – Norwalk currently has four train stations (East Norwalk, South Norwalk, Merritt 7, and Rowayton). East and South Norwalk Stations are located just over 1 mile from the study area and Merritt 7 and Westport Stations are just 2 miles from the study area. While the ridership analysis shows ridership growth at a potential Wall Street station, due to the proximity of these surrounding stations, it is likely that the projected ridership for a Wall Street station does not consist of new riders, rather a shift of existing users along the Danbury Line. This study did not assess the ridership at East and South Norwalk Stations along the New Haven Main Line, therefore further analysis would be needed to assess these ridership shifts in more detail.
- **Rail Service Limitations** – The Danbury Line service analysis conducted as part of this study shows there could be capacity for a new Wall Street station. However, existing headways of 40+ minutes in the peak would be increased by 4-8 minutes by adding a station. Given the service limitations of the Danbury

Microtransit is a type of on-demand service which providesshort trips within a designated area.

Figure ES3. Historic Wall Street Station

Line, as an alternative, there is potential to achieve more frequent shuttle service between the existing rail stations and surrounding area using existing transit options, considering the location of Norwalk's Intermodal Center and **microtransit** service.

- **Cost Estimates** – The cost analysis completed for this study shows an estimate of roughly $60 million to construct a Wall Street station to current standards. The high cost to add a station, given the service constraints of the Danbury Line, suggests a more thorough assessment of transit alternatives is merited. A smaller investment into existing transit/microtransit systems could likely create a focused and highly effective shuttle service within the study area that links to the main line and points north of Danbury. The frequency of service and the flexibility of routing that can be accomplished with bus-transit solutions can be provided at a fraction of the cost of a train station.
- **Economic Development Potential** — A transit-oriented development (TOD) assessment conducted within the study area revealed potential for transit-supportive development. As discussed, this increase in development could be served by more robust and focused transit services.

Based on the analysis in this study, **a station stop near Wall Street is not recommended** at this time. The analysis shows that **due to a combination of physical, operational, and cost factors, none of the station alternatives evaluated are considered viable**. For the reasons outlined above, **priority should be given to optimize and expand existing transit services** within the study area.

2 Introduction

This Wall Street Station Feasibility Study document is a preliminary assessment of the viability of a new rail station within the proposed study area (defined below). This report is intended to evaluate and refine the list of potential locations for a new Wall Street Station. The assessment addresses the physical constraints of each potential site and the surrounding areas, the potential impacts to existing and future rail operations, and market and demographic considerations. The goal of the study was to provide recommendations as to which site, if any, warrants further review. The study area consists of a 10-minute **walkshed** centered on the rail tunnel adjacent to River Street (see **Figure 1** below).

Potential station sites within this 10-minute walkshed were identified to address environmental factors, zoning and land use, and cultural/historic barriers that would directly impact the placement of a station at each of the four locations. The four (4) locations identified with the assistance of the City of Norwalk are: Cross Street, 18 River Street, 47 Wall Street, and 17 Isaacs Street (shown in **Figure 1**).

Walkshed is a term used to describe the land area that is reachable on foot within a defined range of a specified location.

The Danbury Line (DBL) is one of Metro North Railroad's (MNR) three branches off the New Haven Main Line; the other two are the New Canaan Line (NCL) and the Waterbury Line (WBL). Passenger rail service on the Danbury Line dates back to 1852, and in 1860 a station on Wall Street in Norwalk was constructed by the Danbury and Norwalk Railroad at 47 Wall Street (Figure 2). Passengers could board trains to South Norwalk to travel to New York City and could also travel northbound to Danbury. Ownership of the line passed to the New York, New Haven and Hartford Railroad (NYNH&H) in the 1890s. Passenger rail service continued serving the Wall Street station into the 1930s, but was discontinued by the end of the decade, likely due to the operation of new bus service in 1935 and the station's declining ridership. In 1969 the NYNH&H Railroad went bankrupt and merged into Penn Central Transportation. However, the new entity declared bankruptcy one year later. In 1976 Conrail was formed to operate the service, but by 1983 Conrail operations had become financially unviable. Ownership of the rail line passed to the state of Connecticut. With the passage of the Northeast Rail Service Act in 1981, the Metropolitan Transportation Authority (MTA) formed the Metro-North Commuter Railroad (now Metro-North Railroad, MNR) which currently operates the Danbury service for the Connecticut Department of Transportation (CTDOT).

CTDOT has implemented several upgrades to the Danbury Line over the past two decades, including station improvements and the addition of a new signal system in 2011. CTDOT is now investigating the feasibility of reestablishing a rail station in the downtown section of Norwalk, Connecticut. Establishing a station here would renew direct rail service to the residents and businesses of downtown Norwalk. More broadly, reestablishing a Wall Street Station could build upon existing transit to further create a walkable, dense, and vibrant community that is well connected to its urban and suburban neighbors. If housing prices continue to rise in lower Fairfield County, younger residents and business owners will look further west and north in search of more affordable options that still provide a convenient connection to New York City and lower Fairfield County.

For the purposes of this study, the following CTDOT guidelines were adhered to: 1) The station should include platforms on both sides of the track that measure at least 200 feet long; 2) The station site should have the ability to accommodate at least 200 parking spaces for the exclusive use of rail users; 3) The facility will provide an ADA compliant means of accessing the platforms.

Each site was assessed based on the following categories:

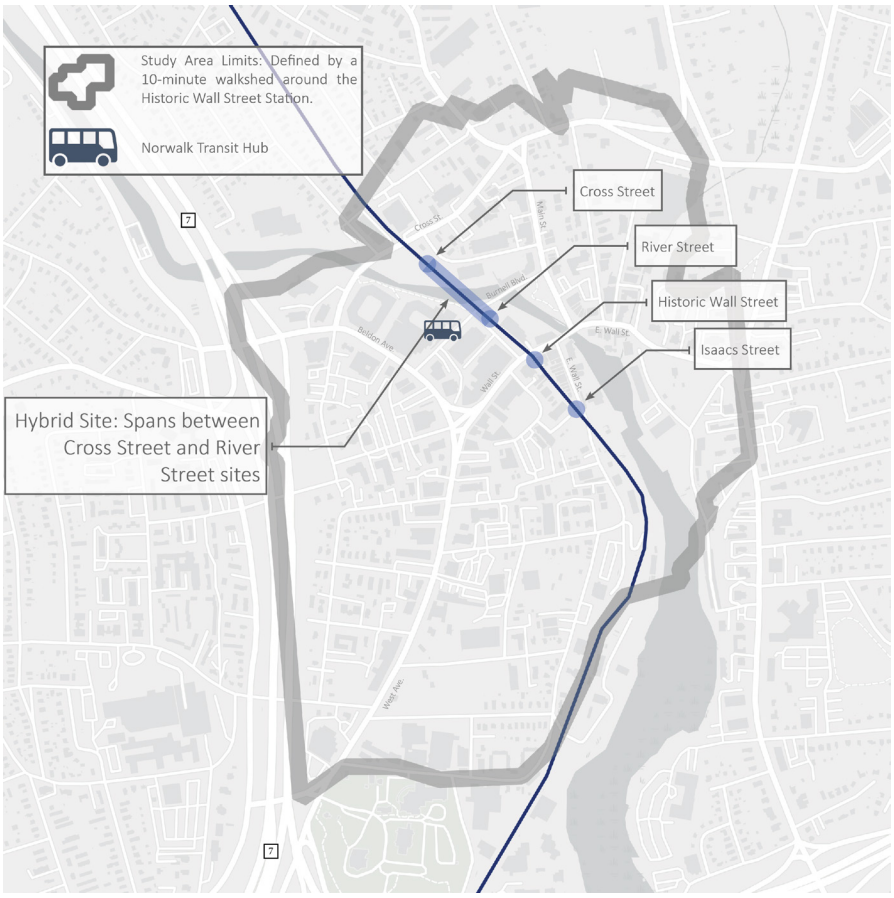


Figure 1. Wall Street Station 10-Minute Walkshed

- Compatibility with surrounding land uses
- Environmental factors
- Physical site constraints
- Operations feasibility
- Transit supportive land uses
- Market considerations
- Development potential

Demographic data included in this assessment is provided at the block group level and was collected from any block group that is wholly or partially within the defined study area. The demographic profile presented in context across the entire study area with analysis of site-specific implications. The demographic section addresses:

Block Groups are a census defined boundary for aggregating and analyzing data.

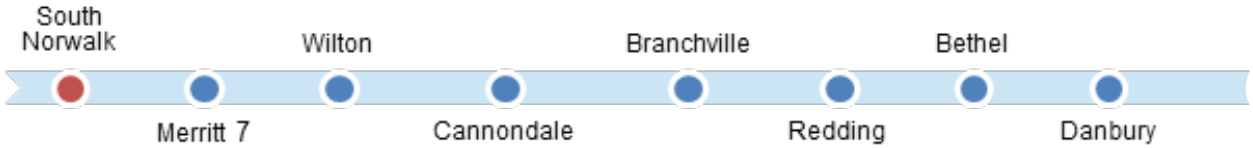
- Population density
- Median housing value
- Household income
- Employment destinations
- Environmental justice/vulnerable populations

The assessment also includes insights gathered through field visits that were used to build upon the data derived from the Connecticut Department of Energy and Environmental Protection (DEEP), the American Community Survey (ACS), Connecticut Environmental Conditions Online (CT ECO), the City of Norwalk, the Western Connecticut Council of Governments, and the Longitudinal Employer-Household Dynamics Survey, as well as to validate conditions assessed through GIS analysis.

3 Transportation Conditions

A feasibility analysis for siting a new rail station requires a thorough understanding of the existing transportation system in the study area. The following section summarizes the existing transportation assets and services which operate in Norwalk's downtown and the level/type of service they provide within the community and throughout the region. Key takeaways from these assessments are summarized in Section 3.5.

3.1 Rail Service



The Danbury Line (DBL) is a 24.2-mile-long branch of the New Haven Line (NHL) with seven existing stations, not including its terminus in South Norwalk on the NHL. The line operates predominantly as a commuter line serving lower Fairfield County and New York City, with the highest ridership during its AM and PM peak periods. The location of the potential Wall Street Station is approximately 1.47 miles north of the branch line's junction with the main line and 2.2 miles south of the Merritt 7 Station, which is located at mile post (MP) 3.69. In addition to the Merritt 7 Station, the City of Norwalk is currently served by three stops along the New Haven Line: East Norwalk, South Norwalk, and Rowayton, for a total of four stations. All DBL trains serve the South Norwalk Station located at MP 41.02 on the main line, 1.73 miles southwest of the study area.

The DBL passenger schedule consists of 28 weekday trains between Danbury and South Norwalk, an increase from 22 weekday trains in 2009. This increase can be attributed to the addition of a **signalization** system and the installation of Centralized Traffic Control (CTC). There are 14 northbound and 14 southbound trains, Monday through Friday. In most cases, service to New York City's Grand Central Terminal (GCT) requires a transfer at South Norwalk Station to connecting New Haven Main Line trains. However, there are four inbound AM inbound trains and four outbound PM trains which provide one-seat service to/from GCT. This service is operated using dual-mode locomotives, with the four AM peak through trains having the highest ridership across all DBL trains.

Signalization is used to coordinate rail traffic by indicating whether the train has the ability to proceed and is a critical safety factor along single-track alignments

While the through trains have the highest ridership, passenger counts conducted in the fall of 2016 indicated that 60 percent of passengers board from the mainline stations of South Norwalk and Rowayton. A one-seat-ride from a potential new Wall Street Station would have an impact on the travel time of the existing through trains due to an additional station stop that adds approximately one minute for dwell time, as well as additional time for acceleration and deceleration of the train.

AM Peak for the New Haven Line and its branches is defined as trains arriving at GCT between 6:00AM and 10:00AM

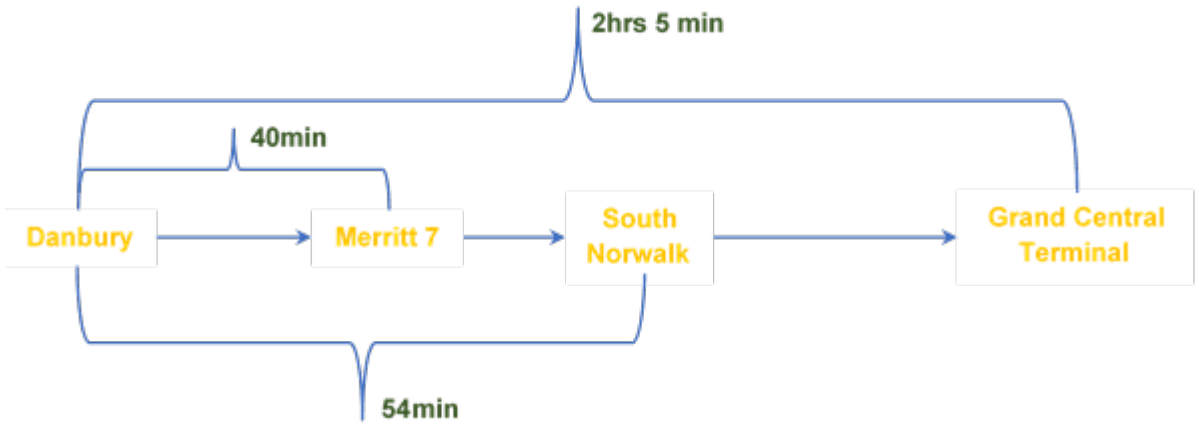


Figure 2. DBL Southbound Travel Times

or departing from GCT between 6:00AM and 9:00AM. There are five southbound AM peak trains and two northbound. The PM Peak is defined as trains that depart GCT between 4:00PM and 8:00PM; there are five trains which meet this definition. Headways for inbound peak trains are between 30 and 60 minutes and 60-minutes for the outbound peak trains. **Headways** during off-peak hours increase significantly and range between 90 and 120 minutes.

Headway refers to the arrival/ departure intervals between rail trips.

The DBL has benefitted from investment which improved the line's infrastructure, facilities, and systems. This work included signalization and the construction of an additional passing siding in 2014 at a cost of $72 million that allowed for additional trips and increased service reliability. The following year, the line saw 9.4% growth in ridership. Over the past decade there has also been significant investment made in station infrastructure which improved platforms and parking facilities. The Merritt 7 Station, just north of the potential Wall Street site, received significant investment for the construction of a new high-level platform and a pedestrian bridge to allow for easier access to the Merritt 7 office complex and housing on the east side of the tracks. The station improvements, scheduled for completion in fall of 2022, complement the high employment density of the office park and surrounding area. Additional work is being completed near the DBL's junction with the main line at the Danbury Dock Yard to improve operations and rail service.

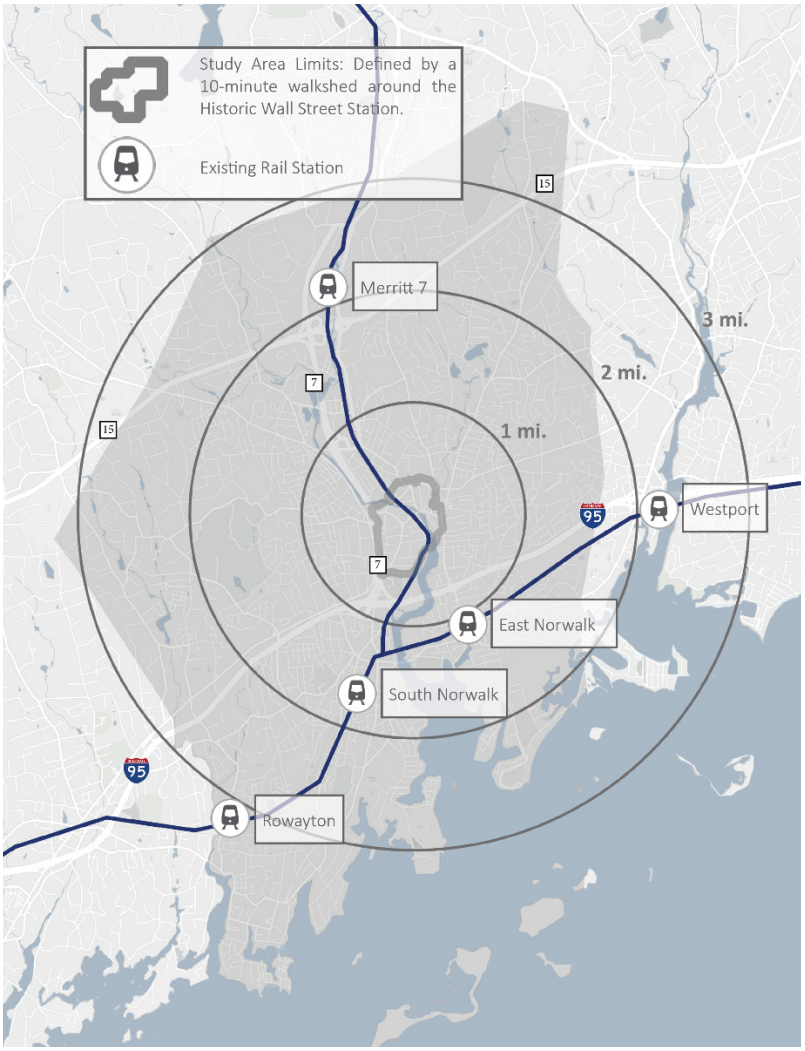


Figure 3. Regional Rail Context

While the branch line provides for **one-seat service** into GCT and ease of transfer at South Norwalk, the line is limited by its single-track alignment. Additionally, the DBL and Waterbury Line are not electrified, and therefore share a limited set of diesel-hauled equipment (excluding the dual-mode locomotives used for through service). The small fleet size - three train sets - limits the ability to add service because adjustments to one schedule will impact the other.

One-Seat Service, While most trips from the DBL require a transfer to an NHL train, a one-seat ride requires NO transfer to get to GCT.

In the event of equipment mechanical issues, planned outages, or issues on either the Danbury or Waterbury Lines, busing is instituted along the corridors to replace the train service. Both lines have experienced intermittent outages that have required busing. For the Danbury Line, this includes April 2019, when some trips were bused due to problems with a new grade crossing system; September 2019, when weekday off-peak trips were bused to allow for infrastructure improvements; and May 2020, when all trips were bused in response to the COVID-19 pandemic and to allow for additional track work.

3.1.1 General Operational Impacts from a New Station

The Danbury Line operates over a single main track for 24.2 miles. It has three short passing sidings between the Wall Street area and Danbury. Trains traveling in opposite directions must utilize these sidings in order to pass by each other. The single-track alignment requires a precise operation to avoid delays and to maintain reasonable travel times, as long waits at passing sidings greatly lengthen overall travel times. Therefore, the train schedules are carefully arranged to time the train "meets" at the siding locations to minimize wait times. Passing sidings along the DBL are located in the vicinity of Bethel, Branchville, and Wilton. Deviations from these times for just one or two trains could impact the entire schedule. Figure 5 provides a graphical space/time diagram (string chart) showing the existing weekday Danbury Branch schedule as a reference. Time is measured on the X Axis; distance is recorded on the Y axis.

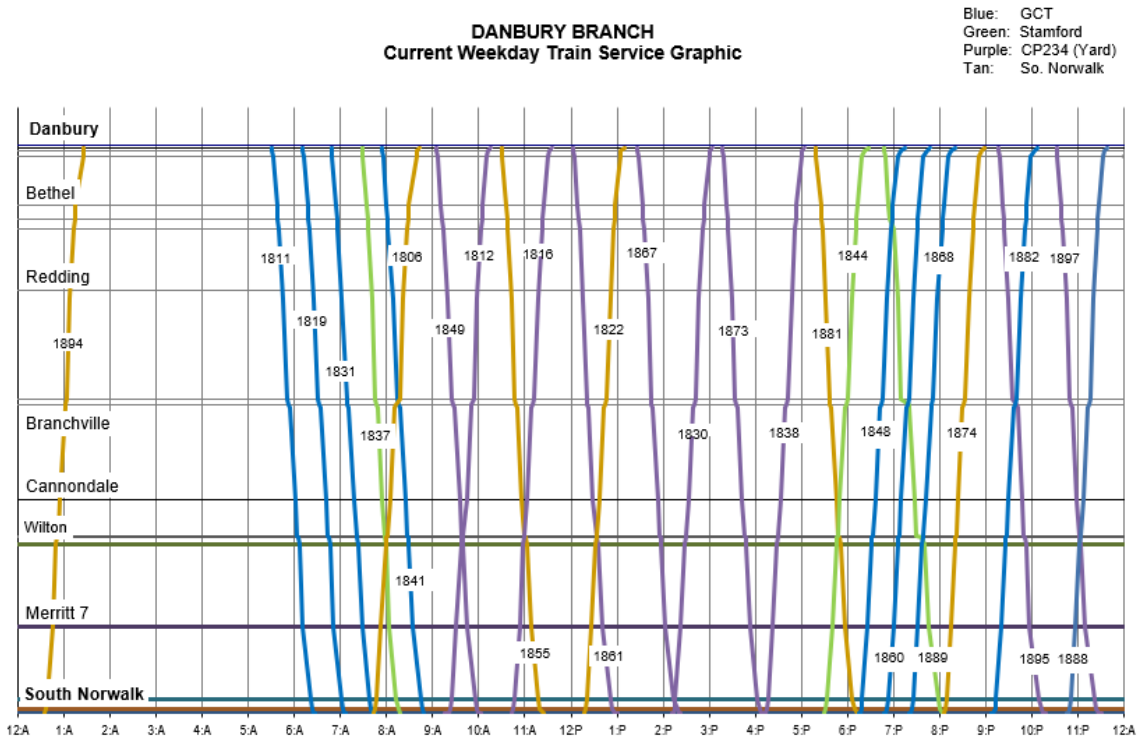


Figure 4. Danbury Line Weekday Service (Source: 2019 Metro-North Schedule)

Adding a new station will alter the running "slots" the trains occupy in the current schedule. Adding time after the potential Wall Street stop to northbound trains and revising the southbound schedule to run earlier would be required in order to hold the scheduled arrival times at the junction with the New Haven Line in South Norwalk. The net effect from these changes would likely be a lengthening of the time required for trains to wait at the passing sidings, in some cases by as much as 4-8 minutes if the overall schedule cannot be adjusted. The lengthened running times would also reduce the amount of already limited time the train has to reverse direction or "turn" at Danbury. Train crews need sufficient time to perform mandated safety checks before each run and safely orient the train back toward South Norwalk. The schedule may be impacted in order to maintain time for the safety checks

An additional siding could reduce the delay-producing factors associated with additional service established in conjunction with a new Wall Street station. A review of historical siding locations indicates approximately seven additional sidings were in use at one time in the same territory. The majority supported the many industries that lined the railroad in the South Norwalk area at the time, but their presence is a sign the right-of-way was physically wide enough to provide for a second track. However, a more comprehensive survey of the locations, schedule, and operations is necessary to obtain a more definitive set of infrastructure needs associated with advancing a station plan and schedule.

As evaluated in previous studies[1], a double-ended passing siding, approximately 1,400 ft long, could potentially be located on the west side of the right-of-way just north of Merritt 7 to avoid impact to existing developed properties abutting the rail line. The siding would be interlocked and equipped with powered switches and signals at each end. Figure 6 shows the potential location of the passing siding.

Alighting, the act of exiting a form of transportation such as a bus or train.

The placement of the locomotive within the trainset/consist (i.e., at the front or the rear) is critical to ensure the operational feasibility of any site and was considered for sites reviewed in this report. The diesel locomotive cannot be stopped inside the Wall Street Tunnel while boarding and **alighting**. Since the assumption for this study was that no specific locomotive location could be guaranteed, for any site to be feasible it would need to allow the full consist to stop outside of the tunnel regardless of locomotive location.

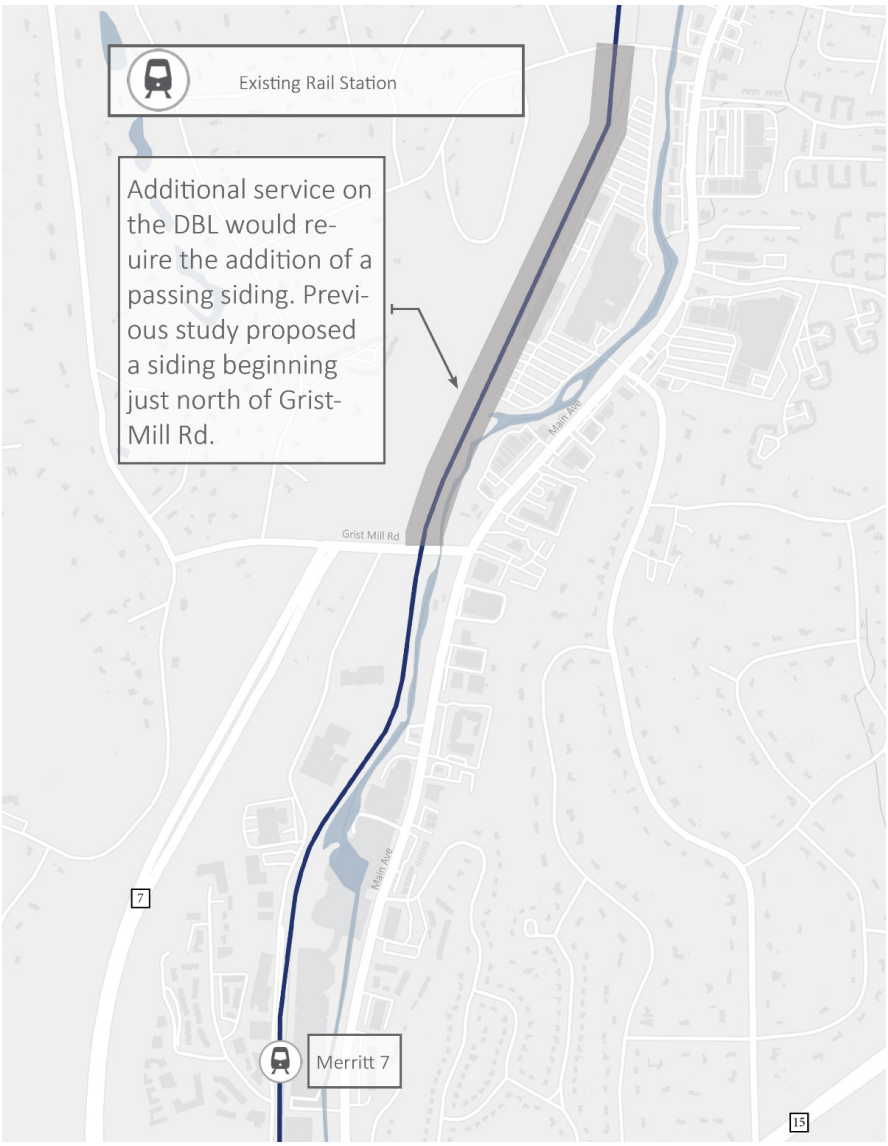


Figure 5. Potential Location for a new passing siding north of Merritt 7 (Source: USGS)

1 *Cf. 2018 Danbury Branch Line Evaluation Study prepared by AECOM for CTDOT*

3.2 Rail Ridership

A rail ridership analysis was completed for the Danbury Line to understand the impacts of a potential Wall Street Station. The ridership analysis was completed by CTDOT using the Tranplan model. A full build scenario of future development from the City of Norwalk was used in determining projected growth in the model. Based on an analysis completed, a Wall Street station would draw some new riders but would also pull existing ridership from Merritt 7. Table 2 below shows ridership projections for a potential Wall Street station.

	2020 Projections		2035 Projections		2050 Projections	
Total Daily Weekday Trips	On	Off	On	Off	On	Off
Wall Street Station	73	169	153	444	259	592
Danbury Line	1608	1557	2136	2167	2781	2764
Percent of Wall Street	5%	11%	7%	20%	9%	21%

Table 1. Rail Ridership Analysis

3.3 Public Transit

Public Transit in the study area consists of 15 routes operated by Norwalk Transit, Housatonic Area Regional Transit District (HART), CTtransit-Stamford, and Greater Bridgeport Transit (GBT). The Norwalk Transit District (NTD) operates base weekday service ("WHEELS"), evening, and Sunday routes (called "shuttles"), commuter rail shuttles, and regional interagency "Link" services. Base routes operate on weekdays until 7:35 PM and on Saturdays until 6:35 PM. Two shuttle routes operate during evenings and on Sundays to serve the most popular destinations. There are 8 base fixed routes operating on weekdays and seven on Saturdays. All of these routes serve the WHEELS Hub in downtown Norwalk, one street over from Wall Street (Figure 7). The system operates using a pulse system with 20-minute headways

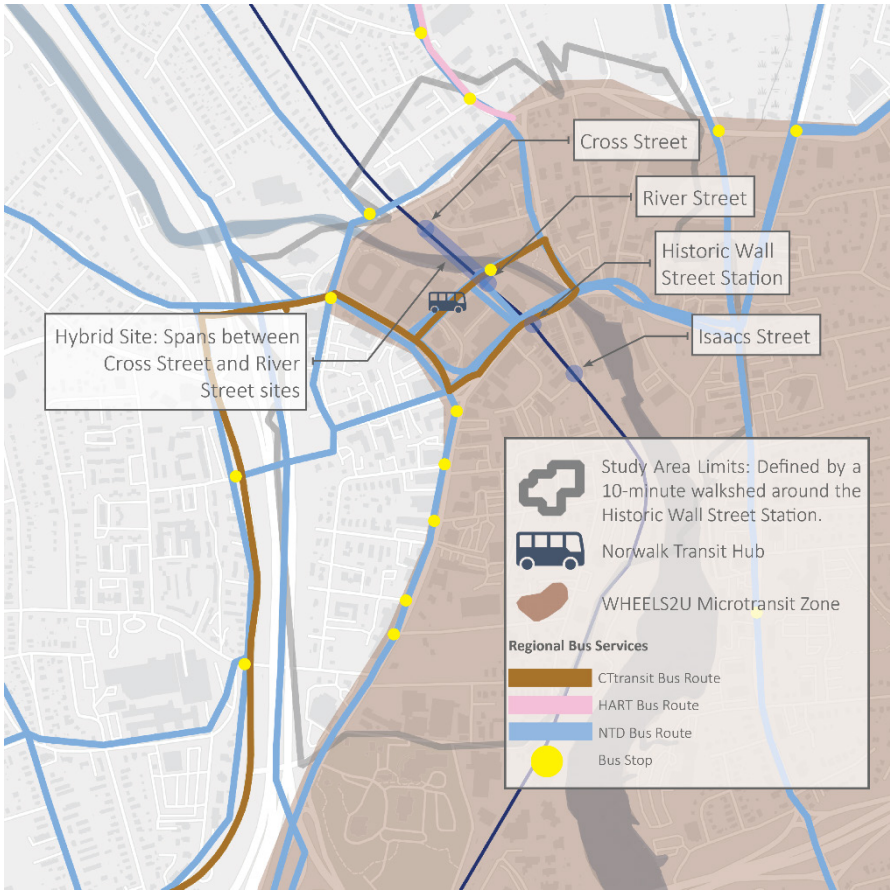


Figure 6. Proximal Transit Services

Operator	Route	Service span	Headway	Stops in Study Area	Serves Train Station
NTD GBT MTD	Coastal Link	M - F: 5:55 AM - 10:37 PM Sat.: 5:55 AM - 9:36 PM Sun.:	M - F: 30 Min Sat.: 30 Min Sun.:	2	Fairfield; Bridgeport; Stratford; Milford
Norwalk Transit District	Route 1	M - F: 5:40 AM - 7:35 PM Sat.: --- Sun.: ---	M - F: 20 Min Sat.: --- Sun.: ---	3	---
	Route 3	M - F: 5:40 AM - 7:35 PM Sat.: 6:20 AM - 6:55 PM Sun.: ---	M - F: 20 Min Sat.: 40 Min Sun.: ---	7	Merritt 7
	Route 4	M - F: 6:04 AM 7:15 PM Sat.: --- Sun.: ---	M - F: 60 Min Sat.: --- Sun.: ---	5	Ridgefield
	Route 7	M - F: 5:48 AM - 7:11 PM Sat.: 5:48 AM - 7:11 PM Sun.: ---	M - F: 60 Min Sat.: 60 Min Sun.: ---	2	East Norwalk
	Route 9	M - F: 5:55 AM - 7:15 PM Sat.: 5:55 AM - 6:55 PM Sun.: ---	M - F: 20 Min Sat.: 40 Min Sun.: ---	1	South Norwalk
	Route 10	M - F: 5:51 AM - 7:35 PM Sat.: 6:31 AM - 6:55 PM Sun.: ---	M - F: 20 Min Sat.: 40 Min Sun.: ---	7	South Norwalk
	Route 11	M - F: 5:40 AM - 8:15 PM Sat.: 6:17 AM - 7:35 PM Sun.: ---	M - F: 20 Min Sat.: 40 Min Sun.: ---	2	South Norwalk; East Norwalk
	Route 13	M - F: 5:51 AM - 7:35 PM Sat.: 6:31 AM - 5:55 PM Sun.: ---	M - F: 20 Min Sat.: 40 Min Sun.: ---	4	---
	Conn Ave	M - F: 7:20 PM - 10:32 PM Sat.: 6:37 PM - 9:32 PM Sun.: 8:40 AM - 7:25 PM	M - F: 60 Min Sat.: 60 Min Sun.: 80 Min	4	South Norwalk
	Main Ave	M - F: 7:20 PM - 10:32 PM Sat.: 6:32 PM - 9:32 PM Sun.: 8:40 AM - 7:16 PM	M - F: 60 Min Sat.: 60 Min Sun.: 80 Min	4	South Norwalk
	Belden Commuter Shuttle	Weekday Only 6:45 AM - 9:30 AM 3:08 PM - 6:31 PM	30 Min	1	South Norwalk
	Highland Ave Express Shuttle	Weekday Only 6:20 AM - 9:35 AM 1:40 PM - 7:09 PM	40 Min	1	South Norwalk
HART	7 Link	Weekday Only 6:35 AM - 10:30 AM 3:30 PM - 6: 25 PM	2 AM trips 2 PM trips	1	Branchville; Wilton; Merritt 7
CT*transit*	341	M - F: 4:55 AM - 12:30 AM Sat.: 5:40 AM - 10:48 PM Sun.: 6:40 AM - 8:45 PM	M - F: 15 Min Peak / 30 Off-Peak Sat.: 30 Min Sun.: 40 Min	8	Stamford; Darien

Table 2. Transit Options in Study Area

departing the hub at 0:00 0:20 and 0:40. WHEELS operates five commuter routes, but only two provide service within the study area. Routes 9, 10, 11, and both of the "shuttles" serve the South Norwalk railroad station on the New Haven Line, the southern terminus of the Danbury Line. Route 3 serves the Merritt 7 station, and Route 4 serves the Ridgefield station. Other routes serve Rowayton and East Norwalk railroad stations, but these stations are located on the New Haven Line and are not part of the Danbury Line.

Regional bus service includes CTtransit Route 341, the Coastal Link and the 7 Link. The Stamford Division of CTtransit operates Route 341 from downtown Stamford to the WHEELS Hub, serving Norwalk Community College and New Haven Line stations in Darien and Stamford. HART operates the 7 Link route which provides peak hour service to major destinations along US 7 in Danbury, Ridgefield, Wilton, and Norwalk and stops at the Merritt 7, Wilton, and Branchville stations. The Coastal Link is a joint venture between NTD, GBTA, and Milford Transit District to provide service along US 1 between the WHEELS Hub in downtown Norwalk and the CT Post Mall in Milford. The route serves numerous retail and employment destinations along the dense US 1 corridor, as well as the Railroad stations in Fairfield, Bridgeport, Stratford, and Milford (on the New Haven Line). Table 1 on the following page summarizes all transit services operating in the vicinity of the study area.

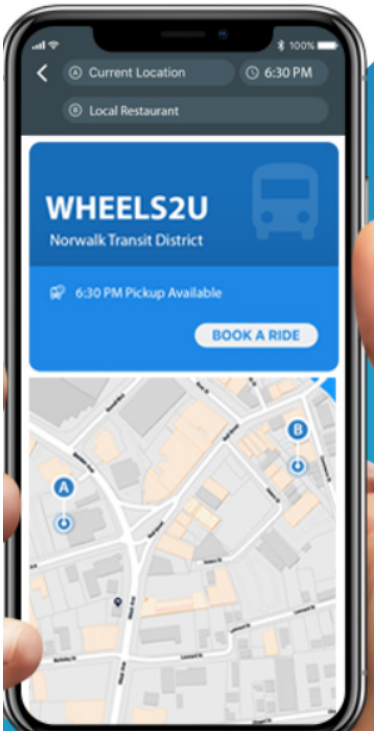


Figure 7. WHEELS2U App

Wheels2U started as a pilot program in September of 2018 and was the first on-demand Microtransit service in Connecticut. Microtransit is a form of on-demand transportation that utilizes technology to allow for flexible routing and scheduling of vehicles. Using a smartphone App called Microtransit by Transloc, individuals can request a pick-up/drop-off anywhere within the designated zones and track vehicle arrival. It is a shared rider service, and other passengers may be picked up along the trip. The original service area included downtown Norwalk and several major destinations, but the six-month pilot program was extended in March 2019 for another six months and Merritt 7 was added.

During the pilot program phase, service was free and due to its success, it was rolled out permanently on a larger scale. Beyond the pilot program, fares were charged and can be purchased through the phone app similar to Uber and Lyft. The program is a partnership between the City of Norwalk, Norwalk Transit District, CTDOT, and the Norwalk Redevelopment Authority to improve transportation services in the urban core of Norwalk. It utilizes the Norwalk Transit District's paratransit fleet, as fewer vehicles are needed during the off-peak hours for paratransit service. This current service provides valuable access and flexibility within the downtown core of Norwalk and should be maintained to help support TOD growth.

3.4 Roadway Network

The study team conducted an evaluation of existing transportation conditions based on the roadway network, traffic volumes, traffic safety considerations, parking, connecting services, and active transportation. The following sub-sections outline baseline conditions.

3.4.1 Roadway Network and Existing Traffic Volumes

The Wall Street study area can be accessed from Route 7 and US 1 (Van Buren Avenue) from the west, East Avenue to the east, and US 1 (Cross Street) from the north. Interstate 95 (I-95) located approximately one mile to the south, and the Merritt Parkway (Route 15), located approximately two miles to the north, provide regional access to surrounding communities in Fairfield County.

Wall Street and Cross Street are important to the local roadway network since they contain bridges crossing the Norwalk River. South of Wall Street, the nearest local road bridge over the river is at Washington Street (Route 136), approximately 1.3 miles south. As a result, east-west traffic is consolidated through both the Wall Street and Cross Street corridors.

Existing traffic patterns within the study area were reviewed to provide context and outline possible benefits/effects of a new rail station. This section summarizes baseline traffic volumes for the following corridors and roadways within the study area:

- West Avenue/Belden Avenue (shown in blue)
- Wall Street (shown in orange)
- East Wall Street (shown in purple)

These corridors are illustrated below in Figure 8 Each of these corridors is heavily traveled and is integral to the local roadway system.

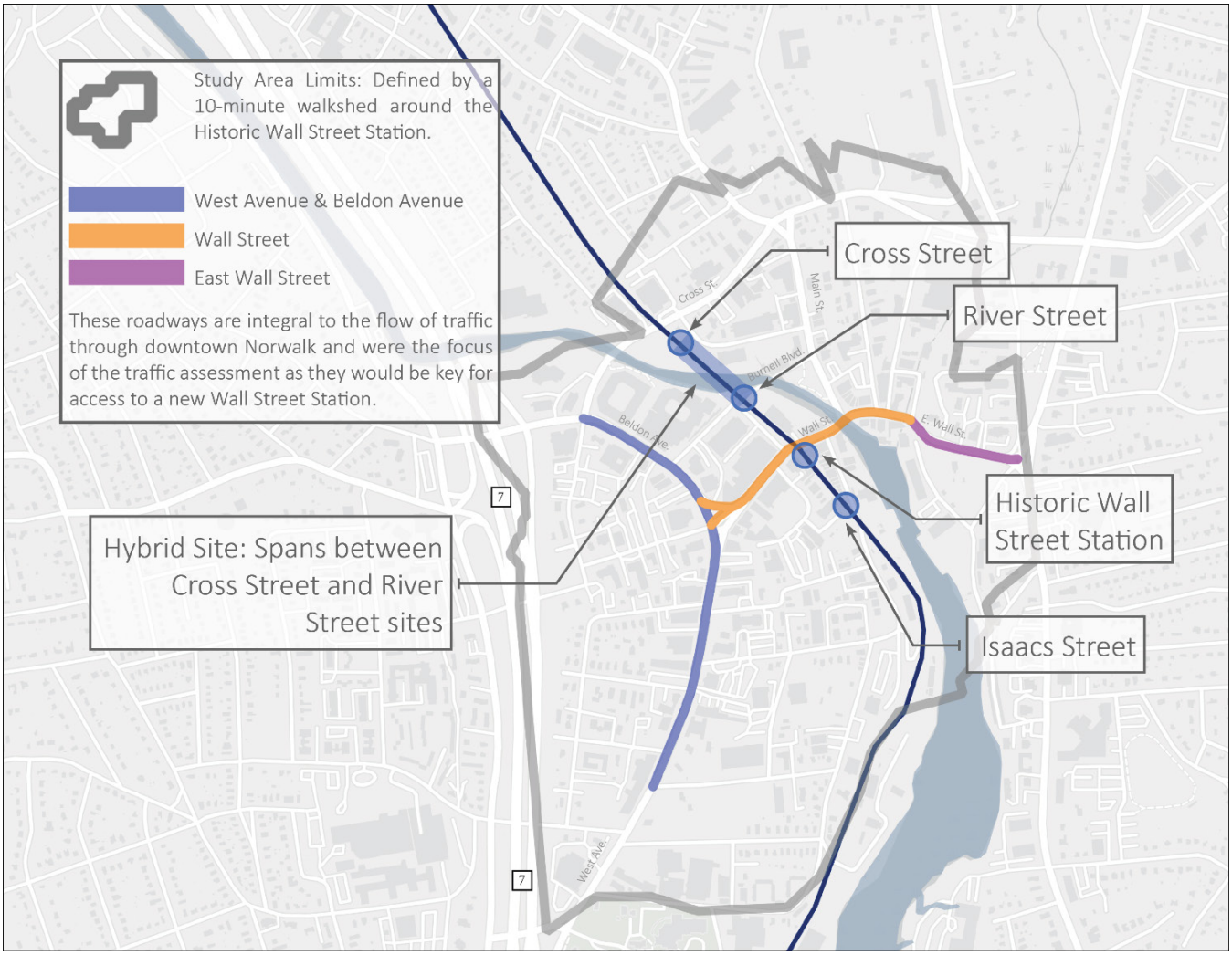


Figure 8. Proximal Road Network

Daily traffic volumes were obtained through the CTDOT Traffic Monitoring website for study area roadways. Daily and hourly roadway segment count data was available for the years 2014 and 2017. The count data indicates that the weekday morning peak hour is typically between 8:00 AM and 9:00 AM and the weekday evening peak hour is typically between 5:00 PM and 6:00 PM. The roadway volumes are summarized in Table 3.

Location	Data Year	Weekday ADT[a]	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
			Volume	K Factor[b]	Directional Distribution	Volume	K Factor	Directional Distribution
West Avenue, North of Berkley Street	2017	13,206	936	7%	63% SB	1,134	9%	52% SB
Wall Street, West of Commerce Street	2014	12,298	847	7%	61% WB	1,118	9%	58% EB
East Wall Street, West of Park Street	2014	10,743	871	8%	62% WB	960	9%	63% EB

Source: Connecticut Department of Transportation Traffic Monitoring Website

a Average Daily Traffic (ADT) volume expressed in vehicles per day

b Represents the percent of daily traffic that occurs during the peak hour

c Directional distribution of peak hour traffic

Table 3. Existing Traffic Volume Summary

West Avenue, which turns into Belden Avenue after its junction with Wall Street, is a four-lane (two lanes in each direction) roadway, providing access to local roadways and other **principal arterials**. West Avenue offers sidewalks on both sides of the roadway and provides marked crossings at each intersection. Parking is allowed on West Avenue in designated areas which are intermittent along the roadway. As shown in Table 4, on a typical weekday, approximately 13,200 vehicles travel along West Avenue daily with approximately 930-1,100 vehicles during the peak hours. The weekday morning and evening peak hours account for approximately seven percent and nine percent of weekday daily traffic flow, respectively. Traffic flow is greater in the southbound direction for both weekday morning peak hours.

Principal Arterials are considered major roadways that are capable of carrying significant volumes through urban and suburban areas.

Wall Street, which turns into East Wall Street at the Brook Street intersections, is a two-lane (one lane in each direction) roadway providing access to residential areas via local roadways and other principal arterials, along with connections to downtown Norwalk. Segments of Wall Street have a larger cross-section to allow for turning lanes. Wall Street offers sidewalks on both sides of the roadway and provides marked crossings at each intersection. Parking is allowed on Wall Street in designated areas which are intermittent along the roadway. As shown in Table 4, Wall Street carries approximately 12,300 vehicles a day and approximately 850-1,100 vehicles during the peak hours. The weekday morning and evening peak hours account for approximately seven percent and nine percent of weekday daily traffic flow, respectively. Traffic flow is greater in the westbound direction for the weekday morning peak hour and eastbound direction for the weekday evening peak hour.

East Wall Street is a two-lane (one lane in each direction) roadway providing access to local roadways and other principal arterials, along with connecting Wall Street to East Avenue. East Wall Street offers sidewalks on both sides of the roadway. Parking is allowed on East Wall Street in designated areas which are intermittent along the roadway. Additionally, there is a separated bicycle lane on the south side of the roadway. As shown in Table 4, East Wall Street carries approximately 10,700 vehicles a day and approximately 870-960 vehicles during the peak hours. The weekday morning and evening peak hours account for approximately eight percent and nine percent of weekday daily traffic flow, respectively. Traffic flow is greater in the westbound direction for the weekday morning peak hour and eastbound direction for the weekday evening peak hour.

While operational analyses were not conducted as part of this study, the collected traffic volumes indicate that a

new traffic generator in this area would place additional stress on the roadway network. An in-depth traffic impact study would be necessary to assess the roadway or signal system improvements required to facilitate an increase of traffic. That study would identify existing deficiencies and potential improvements to the roadway system within the study area.

3.4.2 Crash Data Analysis

Crash data for the study area was obtained from the Connecticut Crash Data Repository for the three-year period of 2017 through 2019 to help identify possible deficiencies or conflict areas within a given area. A new rail station within the study area would likely lead to increased pedestrian and bike traffic in addition to vehicles. Identifying areas with a high recent history of crashes helps determine areas for specific attention as station access is contemplated and designed. Figure 10, below, illustrates crashes by location and provides tables on crash severity and type. A summary of the vehicular crash data is presented below the map.

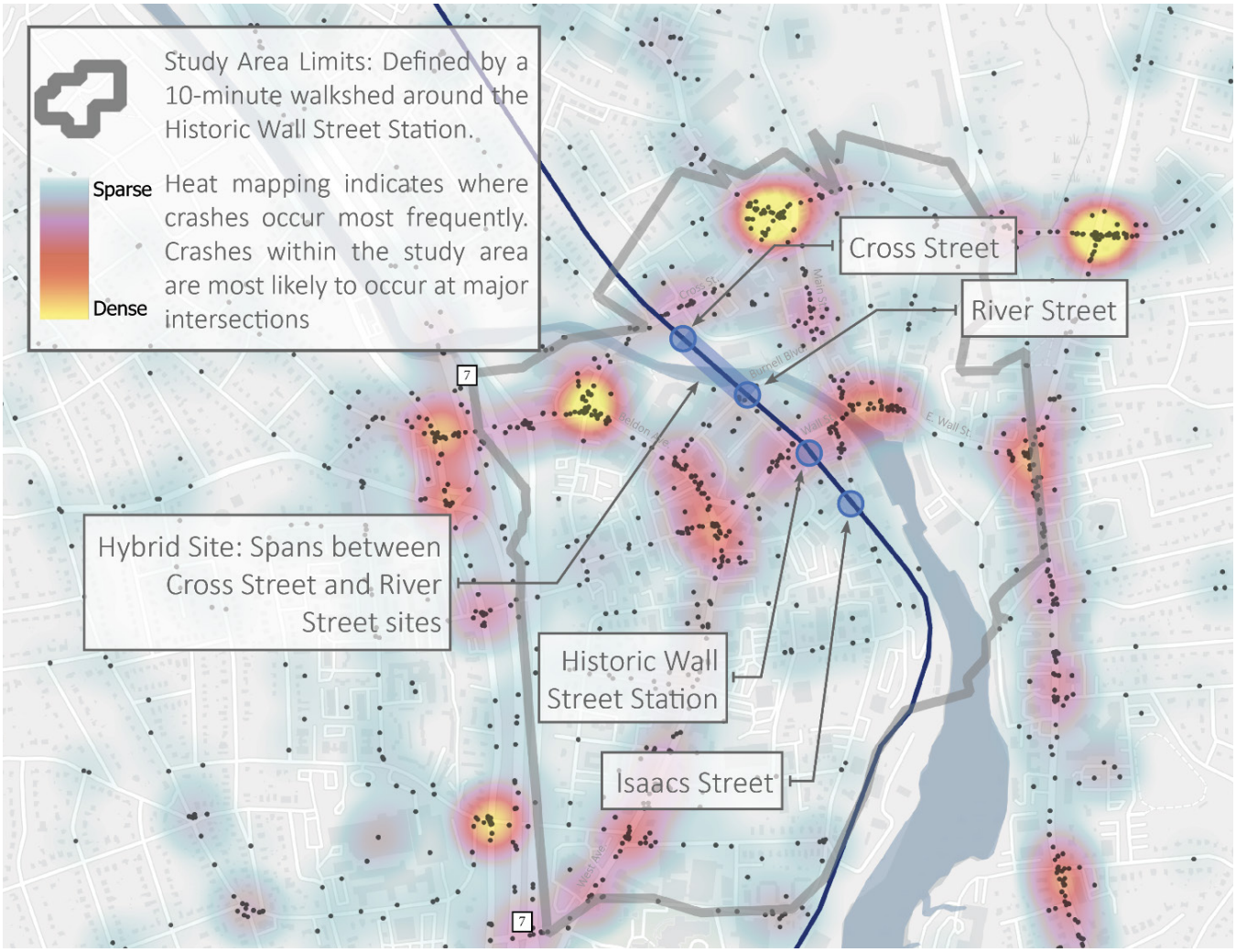


Figure 9. Crash Heat-Mapping (above); Crash Severity (lower left); Collision Type (lower right)

Severity Type	Number of Crashes	
Fatal Injury	0	0%
Non-Fatal Injury	95	15%
Property Damage only (non-injury)	527	85%
Unknown/Not Reported	0	0%
Total	*622*	*100%*

Manner of Collision	Number of Crashes	
Angle	67	11%
Head-on	18	3%
Rear-end	183	29%
Rear-to-rear	11	2%
Rear to side	15	2%
Sideswipe, Opposite direction	13	2%
Sideswipe, same direction	110	18%
Other/Unknown/Not Reported	205	33%
Total	*622*	*100%*

A total of 622 crashes were recorded throughout the study area for the three-year period. For reported crash types, most crashes in the study area were identified as rear-end collisions resulting in non-fatal injuries or property damage only. No fatal crashes occurred within the study area. The high volume of rear-end crashes and sideswipe, same direction crashes could be caused by congestion, awkward lane configuration, inadequate intersection and stopping sight distances, or inadequate yellow and red times at signalized intersections. A more detailed crash analysis would need to be conducted to determine crash causality and an appropriate strategy to mitigate crashes in the future. The upcoming Wall Street Corridor Study will likely review and publish additional details related to roadway safety in the study area.

3.4.3 Parking Availability

A parking assessment was conducted as part of the existing conditions evaluation. CTDOT's rail station standards include a requirement for at least **200 dedicated spaces** (eventually) of parking available to rail users. Beyond this requirement, it is important to consider the broader context of parking availability within the Wall Street Station study area. The assessment was informed primarily by the City of Norwalk's 2020 Parking Plan. In addition to this plan, data from LAZ Parking (LAZ) was utilized, as they operate most of the public parking lots within the study area. LAZ provided pre-COVID and current utilization rates of the parking lots identified as part of this study: the Wall Street Lot, Yankee Doodle Garage, and Main Street Lot.

Within the study area there is on-street and off-street parking. West Avenue, Wall Street, and East Wall Street offer on-street two-hour metered parking in designated areas which are intermittent along the roadway. In the surrounding area, additional on-street parking is offered on River Street and Burnell Boulevard.

200 Dedicated Spaces: Parking is important for a commuter station to ensure that there is sufficient capacity to meet daily demand.

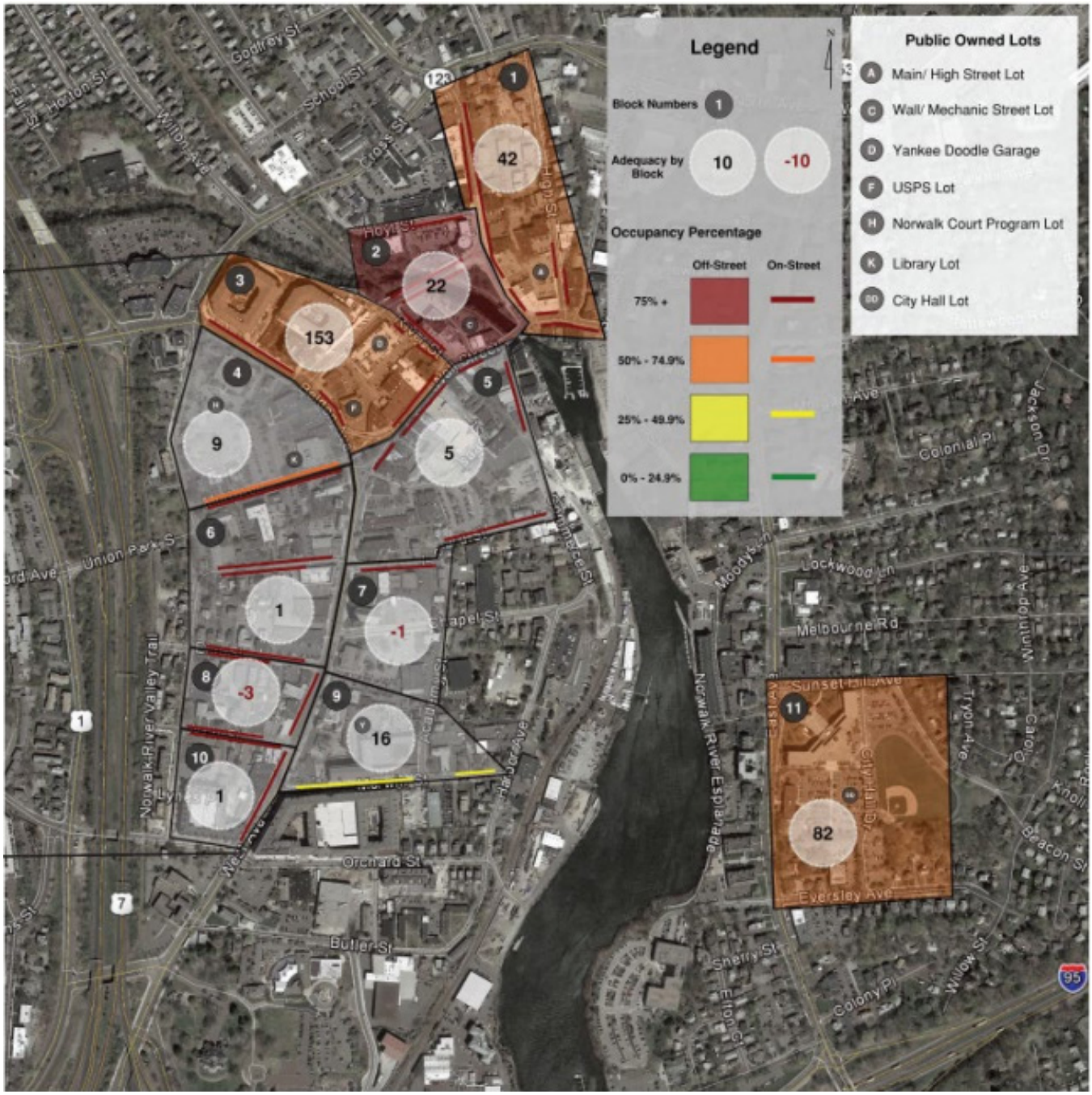


Figure 10. Parking Occupancy (Source: Norwalk 2020 Parking Plan)

Wall Street Lot

According to the City's parking plan, weekday parking near Wall Street is heavily occupied. At the time of the plan, the Wall Street Lot, located in Block 2 in Figure 11, had occupancy rates of nearly 70% during daytime hours, increasing to 84% during evening hours. The Wall Street Lot is primarily used for business parking for the many stores, restaurants, and offices in the area. With fewer than 70 parking spaces in this lot it, is not likely suitable for dedicated rail parking. LAZ's data, shown in Table 5 and Table 6, support the overall utilization percentages from the City's parking plan.

	8am	10am	12pm	2pm	4pm	6pm	8pm	10pm
Thursday, May 27, 2021	26%	19%	6%	6%	15%	9%	6%	8%
Friday, May 28, 2021	24%	9%	6%	13%	10%	5%	18%	30%
Saturday, May 29, 2021	23%	16%	8%	16%	34%	28%	33%	34%
Sunday, May 30, 2021	84%	78%	73%	79%	83%	81%	85%	78%
Monday, May 31, 2021	Closed							
Tuesday, June 01, 2021	44%	36%	35%	39%	43%	51%	71%	76%
Wednesday, June 02, 2021	70%	51%	49%	48%	46%	60%	66%	81%
Thursday, June 03, 2021	49%	35%	43%	44%	49%	59%	79%	81%
Friday, June 04, 2021	65%	43%	39%	26%	35%	40%	50%	54%
Saturday, June 05, 2021	63%	55%	53%	51%	53%	59%	59%	61%
Sunday, June 06, 2021	81%	74%	76%	84%	81%	73%	64%	69%
Monday, June 07, 2021	76%	60%	59%	66%	51%	48%	55%	81%
Tuesday, June 08, 2021	76%	68%	64%	63%	63%	74%	76%	81%
Wednesday, June 09, 2021	78%	66%	46%	25%	25%	54%	60%	74%
Thursday, June 10, 2021	64%	59%	49%	44%	40%	43%	69%	84%
Friday, June 11, 2021	75%	63%	55%	31%	70%	39%	55%	73%

Table 4. Wall Street Parking Lot - Percentage of Parking Spots Available

	9am	11am	1pm	3pm	5pm	7pm	9pm
Thursday, December 14, 2017	72%	71%	40%	35%	55%	87%	90%
Friday, December 15, 2017	74%	32%	23%	22%	41%	78%	85%
Saturday, December 16, 2017	71%	49%	13%	N/A	37%	76%	85%
Sunday, December 17, 2017	76%	35%	17%	13%	45%	56%	84%
Monday, December 18, 2017	77%	61%	15%	10%	28%	59%	67%
Tuesday, December 19, 2017	No count						
Wednesday, December 20,	No count						
Thursday, December 21, 2017	71%	62%	44%	46%	44%	78%	85%
Friday, December 22, 2017	71%	40%	15%	22%	39%	79%	84%
Saturday, December 23, 2017	77%	55%	38%	18%	37%	73%	85%
Sunday, December 24, 2017	76%	32%	23%	17%	45%	78%	83%

Table 5. Wall Street Parking Lot - Percentage of Parking Spots Available (Pre-COVID)

Yankee Doodle Garage

Block 3, which includes the Yankee Doodle Garage, had lower occupancy rates, particularly during the midday. These occupancy rates indicate there is capacity for additional usage near Wall Street. Further, the parking plan indicates that Yankee Doodle Garage can support new growth and could remove car storage as area demand increases (currently the garage is being used to store vehicles for a nearby auto dealership). According to the plan, Yankee Doodle Garage always had over 100 unused spaces. The plan states that Wall Street Place has potential for providing additional public parking. LAZ's data, shown in Table 7 and Table 8, supports the overall utilization percentages from the City's parking plan and shows room to handle future growth.

	8am	10am	12pm	2pm	4pm	6pm	8pm	10pm
Thursday, May 27, 2021	40%	39%	37%	37%	41%	44%	48%	50%
Friday, May 28, 2021	50%	40%	40%	41%	44%	46%	52%	59%
Saturday, May 29, 2021	50%	49%	42%	56%	62%	59%	63%	64%
Sunday, May 30, 2021	57%	48%	50%	51%	57%	58%	57%	70%
Monday, May 31, 2021	closed							
Tuesday, June 01, 2021	72%	67%	70%	70%	77%	75%	80%	80%
Wednesday, June 02, 2021	61%	58%	56%	54%	60%	72%	66%	73%
Thursday, June 03, 2021	53%	57%	58%	60%	61%	66%	71%	73%
Friday, June 04, 2021	58%	57%	56%	59%	58%	68%	69%	70%
Saturday, June 05, 2021	65%	65%	63%	63%	56%	58%	58%	58%
Sunday, June 06, 2021	54%	52%	64%	69%	67%	65%	66%	67%
Monday, June 07, 2021	60%	58%	56%	56%	54%	55%	58%	67%
Tuesday, June 08, 2021	56%	57%	54%	53%	60%	63%	70%	71%
Wednesday, June 09, 2021	54%	51%	53%	54%	56%	68%	70%	72%
Thursday, June 10, 2021	62%	58%	58%	57%	56%	67%	69%	71%
Friday, June 11, 2021	59%	52%	53%	56%	59%	65%	65%	68%

Table 6. Yankee Doodle Garage - Percent of Available Parking Spots

	7am	9am	11am	1pm	3pm	5pm
Monday, August 13, 2018	42%	29%	26%	25%	22%	30%
Tuesday, August 14, 2018	37%	24%	21%	22%	21%	28%
Wednesday, August 15, 2018	41%	22%	22%	21%	24%	25%
Thursday, August 16, 2018	41%	23%	24%	21%	22%	28%
Friday, August 17, 2018	40%	29%	26%	27%	24%	24%

Table 7. Yankee Doodle Garage – Percentage of Parking Spots Available (Pre-COVID)

Main Street Lot

Prior to COVID, Block 1 (which includes the Main Street Lot) had relatively low occupancy rates, particularly during the morning. Occupancy rates in 2021 suggest continued excess capacity, though there are times when lots are nearly full. Despite relatively low occupancy rates, the small overall capacity of the lots (fewer than 100 cars) suggests little potential to meet significant new parking demand. LAZ's data in Table 9 and Table 10 show the utilization in 2017 as compared to 2021.

	8am	10am	12pm	2pm	4pm	6pm	8pm	10pm
Thursday, May 27, 2021	47%	46%	33%	36%	46%	43%	47%	34%
Friday, May 28, 2021	38%	37%	28%	22%	20%	23%	14%	34%
Saturday, May 29, 2021	41%	36%	43%	36%	30%	20%	21%	21%
Sunday, May 30, 2021	59%	51%	55%	60%	64%	75%	78%	71%
Monday, May 31, 2021	Closed							
Tuesday, June 01, 2021	45%	48%	31%	33%	36%	45%	48%	54%
Wednesday, June 02, 2021	48%	32%	23%	29%	43%	37%	49%	43%
Thursday, June 03, 2021	41%	28%	31%	36%	33%	20%	15%	18%
Friday, June 04, 2021	49%	37%	29%	41%	44%	37%	29%	13%
Saturday, June 05, 2021	71%	62%	53%	46%	48%	44%	34%	25%
Sunday, June 06, 2021	59%	51%	55%	74%	66%	62%	52%	59%
Monday, June 07, 2021	34%	29%	29%	33%	34%	77%	82%	89%
Tuesday, June 08, 2021	44%	36%	33%	57%	46%	54%	62%	74%
Wednesday, June 09, 2021	40%	34%	23%	30%	34%	29%	41%	46%
Thursday, June 10, 2021	47%	45%	48%	46%	46%	21%	25%	24%
Friday, June 11, 2021	46%	36%	29%	40%	46%	28%	14%	14%

Table 8. Main Street Parking Lot - Percentage of Parking Spots Available

	9am	11am	1pm	3pm	5pm	7pm	9pm
Thursday, December 14, 2017	80%	N/A	N/A	53%	61%	81%	80%
Friday, December 15, 2017	88%	70%	46%	42%	40%	51%	73%
Saturday, December 16, 2017	83%	67%	49%	N/A	41%	59%	68%
Sunday, December 17, 2017	87%	76%	48%	43%	64%	46%	77%
Monday, December 18, 2017	83%	77%	42%	27%	38%	38%	46%
Tuesday, December 19, 2017	No Count						
Wednesday, December 20,	No Count						
Thursday, December 21, 2017	79%	71%	64%	54%	50%	71%	73%
Friday, December 22, 2017	80%	74%	53%	49%	46%	67%	79%
Saturday, December 23, 2017	83%	73%	59%	48%	50%	49%	57%
Sunday, December 24, 2017	78%	62%	43%	38%	56%	44%	42%

Table 9. Main Street Parking Lot - Percentage of Parking Spots Available (Pre-COVID)

3.4.4 Connecting Services

The study area has numerous connecting transportation services to corridor communities. These services include paratransit, taxi, and Transportation Network Companies (TNCs), such as Uber and Lyft. Intercity bus connections (e.g., Greyhound) do not currently exist within the study area.

Norwalk Transit District provides complementary ADA paratransit service in Norwalk and is under contract with CTtransit to provide it for the Stamford division. Paratransit service operates during fixed route service hours and will pick up and drop off passengers within a ¾-mile radius of fixed route local bus services in Norwalk. ADA paratransit in Norwalk is also provided by HART within ¾ of a mile of the Link 7 Route.

There are several taxi companies operating in the study area including:

- Norwalk Taxi
- Yellow Cab
- Saugatuck Taxi Service

The fares for the taxi companies vary, but on average a trip from Downtown Norwalk (Wall Street area) to the South Norwalk Train Station is $10.

TNCs use online platforms to connect passengers with drivers for a fee. Uber and Lyft operate under this framework. An Uber trip between the study area and the south Norwalk Train station ranges between $9.24 and $12.62 (price varies for vehicle size). A trip using Lyft is approximately $8.99 to $12.59 (price varies for vehicle size).

Car sharing programs in the United States have become increasingly popular in cities and allow users to rent a car for short periods of times. There are currently no car sharing services near the Wall Street Station area; the closest location is a Zipcar hub on the Fairfield University campus.

3.4.5 Pedestrian and Bicycle

Pedestrian and bicycle access to the study area are important considerations. The 2013 South Western Regional Planning Agency's (SWRPA) Bicycle and Pedestrian Plan cited a 2009 survey of mode of access for Metro-North stations and found that 35% of 150 average weekday boardings walked to the Merritt 7 station on the DBL. The East Norwalk Station on the main line had a greater number of weekday boardings (591) of which 28% of riders arrived on foot. Given the population density, urbanized nature of the study area, and presence of sidewalks, it is possible that a new Wall Street Station could meet or exceed these thresholds.

Other than a bike lane on Belden Avenue, dedicated on-road bicycle infrastructure is limited within the study area. However, Norwalk and the study area are served by two multi-use trails, the Norwalk River Valley Trail (NRVT) and the Harbor Loop Trail (HLT) branch. The NRVT runs parallel to US Route 7 from Mathews Park to Union Park, approximately ½ mile from the existing Wall Street Station. A segment of the trail from Union Park to New Canaan Avenue is currently under construction. The Harbor Loop Trail branches from the Norwalk River Valley Trail near Belden Avenue, circling around the existing Wall Street Station toward Mill Hill Park and southwards along the eastern bank of the Norwalk River. Much of the HLT near the study area is still in the planning stages, however two separate segments of off-road trail have been constructed with on-road connections planned. Once completed, these two networks could provide significant north/south access to the downtown area and the proposed station stops.

The City of Norwalk has initiated several efforts to improve multimodal connectivity within the downtown area and between neighborhoods, including the completion of a citywide master plan (Norwalk Tomorrow) as well as a plan for the Wall Street area (Wall Street-West Avenue Neighborhood Plan). The goal is to create a more fluent and connected network for all modes, especially bicycle and pedestrian connections. The evaluation efforts conducted support efforts to bolster multimodal connectivity, including improvements to infrastructure supporting bicycle, pedestrian, transit, microtransit and other alternate modes. A sustainable approach to expanding economic development in the Wall Street area would be enhanced by more robust multimodal infrastructure.

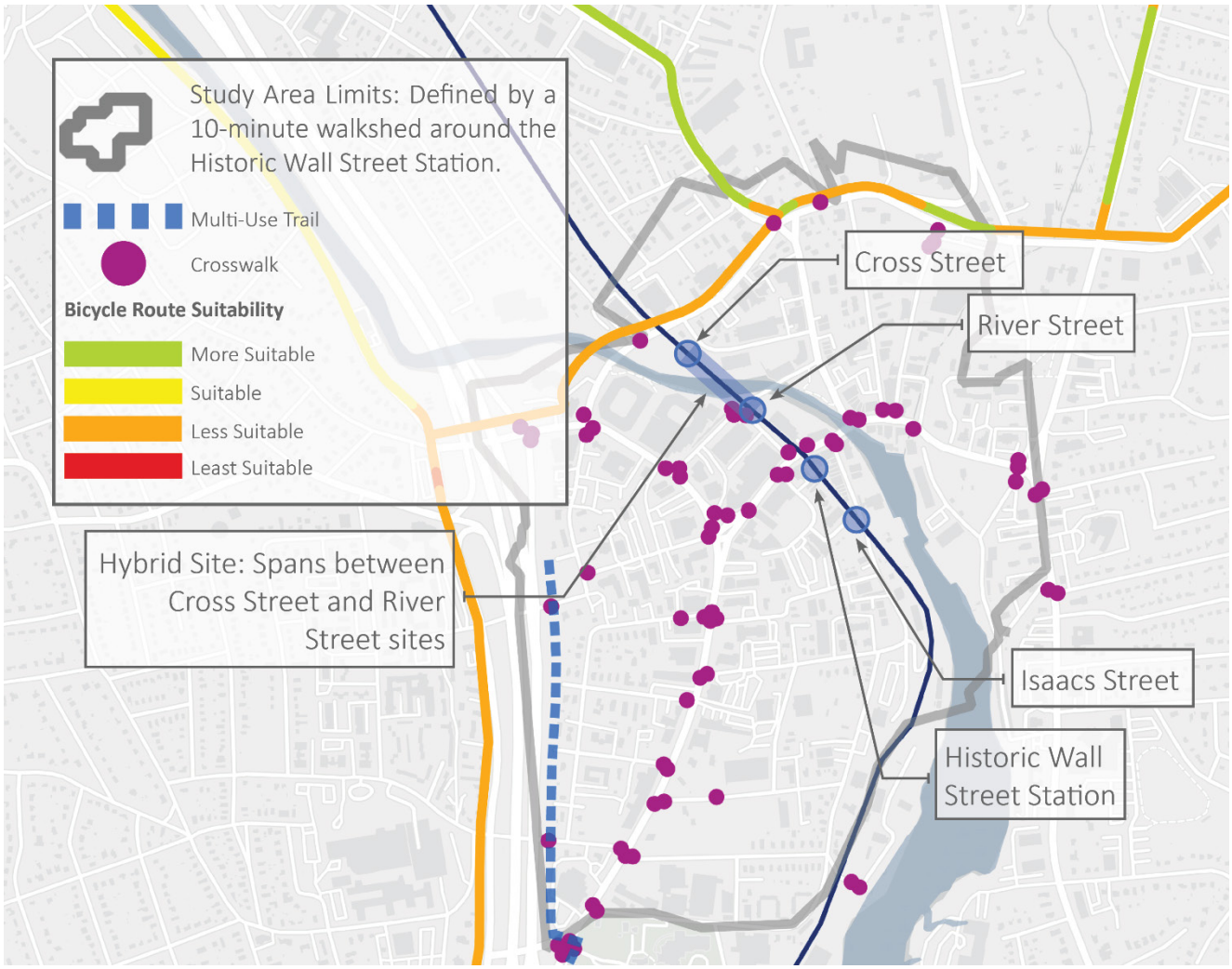


Figure 11. Pedestrian and Bicycle Facilities

3.5 Existing Transportation Conditions Key Takeaways

A Wall Street Station previously existed

Rail infrastructure improvements have taken place to increase branch efficiency and reliability

Robust bus transit and Microtransit options exist within the study area

Four train stations currently exist in Norwalk (Merritt 7, Rowayton, South Norwalk, and East Norwalk)

Current parking demand could allow for future growth of the downtown area, but dedicated station parking would be needed

Based on ridership projections a Wall Street Station would not substantially affect traffic conditions, though some streets are almost at capacity and could have increased congestion as a result

4 General Environmental Conditions

Some natural characteristics of the study area reveal potential environmental limitations to the site alternatives proposed in this study. The potential station locations are within 100 feet of the Norwalk River and the elevation is close to sea level. This proximity to the river requires planning for a resilient station that is designed to limit impacts from storm surge, flooding, and long-term sea level rise. This study assessed at a high level geology and surficial materials, storm surge and flooding, wetlands, water quality, National Diversity Database (NDDB) areas, topography, conserved land, and historic places. A complete map set for the environmental conditions assessment is provided in the appendix. Key takeaways from these assessments are summarized in Section 4.9.

4.1 Geology and Surficial Materials

The bedrock geology within the study area consists of primarily Trap Falls Formation Ordovician. The Trap Falls Formation is a silvery, partly rusty, well layered schist, composed of quartz, sodic plagioclase, biotite, muscovite, and garnet, interlayered with two-mica gneiss and granulite, and with amphibolite Ordovician, a white/light-grey/buff/pink granite gneiss. Surficial materials in the study area consist of sand and gravel, till and artificial fill. The artificial fill is located along the banks of the Norwalk River south of the Wall Street Bridge. No significant geology and surface materials issues were identified for any of the potential sites.

Figure 12. Norwalk River

4.2 Storm Surge Inundation and Flooding

Most of the Norwalk River shoreline south of the Wall Street bridge is prone to flooding and storm surge inundation, and the area encompassing the rail lines west of the Norwalk River is particularly prone to flooding. This is due to lower elevations and the use of fill material to build ground. One-hundred-year flood zones exist around the banks of the Norwalk River. The rail line south of Commercial Street is generally within the 100-year flood zone. The 500-year flood zone encompasses the area around Cross Street and up through Betts Pond Brook. Near Route 1, Betts Pond Brook has been heavily channelized over time because of all the surrounding development. Flooding risks are apparent within the study area, most notably between the Cross Street and River Street station sites. A more thorough investigation would be needed to know the specific impacts if siting a station moves forward.

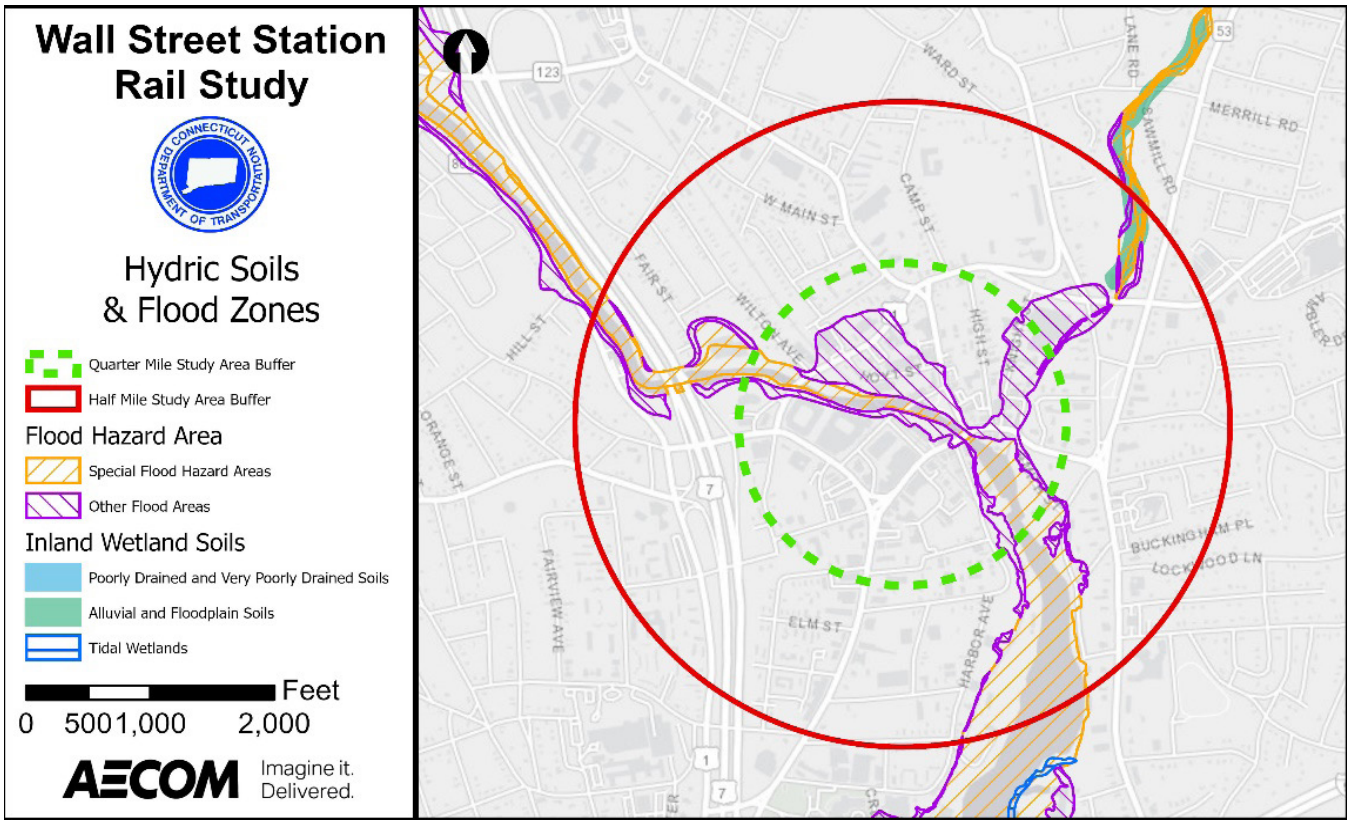


Figure 13. Hydric Soils and Flood Zones

4.3 Wetlands

Outside of the Norwalk River there are very little wetland soils. The only instances of such soils are alluvial and floodplain soils around Betts Pond Brook in the northeast section of the study area. Tidal wetlands in the Norwalk River do not reach the study area. There are no foreseen impacts to wetlands for any potential station sites.

4.4 Water Quality

Most of the surface water in the study area is not considered suitable for human consumption, making impacts to water quality less of a concern. Just south of the Wall Street Bridge lies the transition mark from salt to fresh water. Impacts to ground water quality are less of a concern for most of the southern part of the study area, where much of the area is designated for industrial process and cooling waters. The ground water to the northwest is designated as "May be Impaired", meaning that the quality of the ground water does not meet the assigned standards for consumption1F . The only potential drinking water supply lies to the northeast of the study area; however, it is not an area that currently contributes to a public supply well.

4.5 Natural Diversity Database (NDDB)

One area, to the northwest, contains a Natural Diversity Database (NDDB) area which must be acknowledged by any investigation into a potential Wall Street rail station. An NDDB area is an area considered to be a known location of a state-listed species or host to significant natural communities. State-listed species are species that are listed as Endangered, Threatened, or of Special Concern under the Connecticut Endangered Species Act. Significant Natural Communities generally include known or probable habitat for state-listed species and/or areas of unique habitat.

4.6 Topography

Topography varies throughout the study area, although most of the land is generally close (less than 100 feet) to sea level. Topographic concerns principally relate to the rail bed alignment which generally runs at less than ten feet above sea level. Topography particularly becomes a challenge for station site alternatives located further south where the rail line passes beneath Wall Street once the train crosses the Norwalk River heading south. With a dense urban setting, buildings are pressed directly up against the rail Right of Way (ROW) or built directly over the rail line. These grade changes add design challenges to siting a station.

4.7 Conserved Land

For this study, conserved land is any land, publicly or privately held, that is protected from development and generally publicly accessible. This includes, but may not be limited to, municipal parks or open spaces, state parks or forests, playing fields, and private open spaces or national wildlife refuges. Throughout the study area there are various municipal open spaces, no federal or state opens spaces and one 6F land2F . Conserved land does not appear to have any direct impact to the potential station site locations.

4.8 Historical

The portion of rail line adjacent to the study area and many of the surrounding buildings are part of the Wall Street Historic District, a site on the National Register of Historic Places. A potential Wall Street station would likely be impacted by the historic district. Historical impacts, physical and/or visual, would vary from site to site. A more detailed analysis and coordination with State Historic Preservation Office (SHPO) would need to take place if siting a station moves forward.

4.9 Environmental Conditions Key Takeaways

- All sites may require SHPO coordination
- Cross Street and River Street locations could be affected by flooding

5 Demographic Conditions

While the environmental data defines the physical constraints or opportunities for the proposed alternatives, the demographics of the study area contextualize the need by residents and the potential benefits for businesses that a new Wall Street Station may provide. Unlike many of the station stops along the DBL the potential Wall Street stop benefits from its location in a dense downtown core with both commercial amenities and residential units. Additionally, unlike other portions of Norwalk, the Wall Street station area provides more affordable housing opportunities and easier access to transit and other amenities. The following section draws on data from the 2017 American Community Survey (ACS), LODES OnTheMap, and ESRI Business Analyst Online, an updated dataset as of September 2021 to account for COVID-19 impacts. Key takeaways from these assessments are summarized in Section 5.8.

5.1 Population and Population Density

A more densely populated area will better complement transit. Population density within the study area is high due to its urban nature with over 9,600 people living per square mile. Notably, the population living within the study area has doubled between 2010 and 2021, resulting in an increase of population density from 4,800 people per square mile. Outside of the city center and study area the population density begins to drop-off as the land use patterns become more suburban and multifamily homes transition to single-family.

The study area's population remained stable between 2000 and 2010 with approximately 1,900 people. However, the introduction of new renter-occupied units allowed the study area's population to double, growing to more than 3,800 people as of 2021. Household data indicates that 91% of all new housing units delivered within the study area between 2010 and 2020 were renter-occupied units.

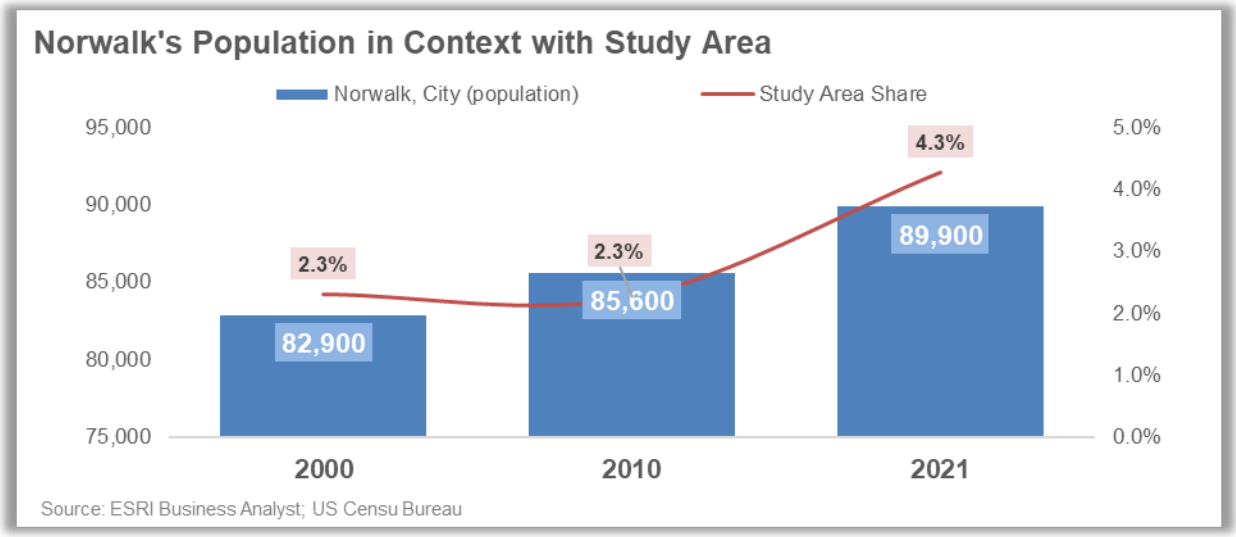


Figure 14. Norwalk Population in Context with Study Area

Population growth within the study area has been led by those born outside of Connecticut. The study area contains a higher share than the city average of residents born in another state within the northeast, the south, or foreign born.

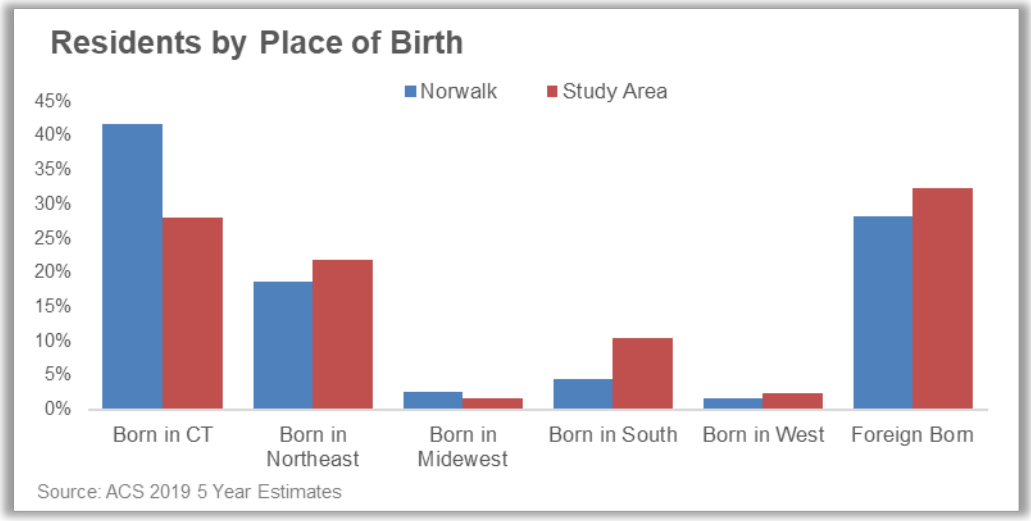


Figure 15. Residents by Place of Birth

Norwalk is a growing community of more than 88,000 people. Like other cities in Fairfield County, however, the population growth in Norwalk has been modest in recent decades. While the population of Norwalk is relatively younger than the rest of the state, it is getting older, with a median age of 40 in 2021 compared to 38 in 2010. The population has been growing more diverse since 2000, with greater numbers of people identifying as Hispanic/Latino (of any race) and Asian. Educational attainment remains relatively high in Norwalk, with 41% of the population aged 25 and older holding a bachelor's degree or higher, compared to 38% statewide, but lower than Fairfield County at large (46%).

Looking at the entire Danbury Line corridor, the two most populous municipalities along the rail line are Danbury and Norwalk, which make up over half of the corridor's population (Figure 16). Norwalk makes up the largest proportion of the corridor at 31%. It also has the highest population density within the corridor at 3,871 people per square mile.

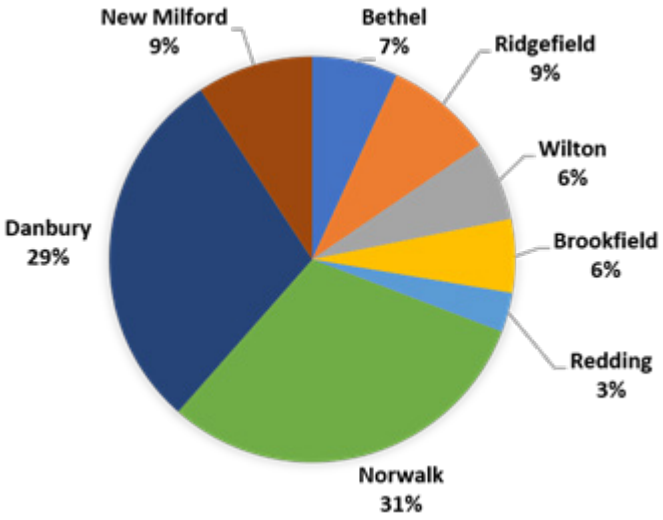


Figure 16. Danbury Line Corridor Population by Municipality

5.2 Median Housing Value & Housing Characteristics

Norwalk's greatest period of population growth occurred between 1940 and 1970 which is also when Norwalk's suburban neighborhoods were built out. The median age of housing in Norwalk is approximately 60 years. The population of Norwalk began growing again after 2000, and particularly after 2010, spurring multifamily development in the urban centers, South Norwalk and Norwalk Center, as well as new office complexes in the Merritt 7 area.

Norwalk was significantly affected by the Great Recession from 2007–2009. Real estate values that had plummeted have slowly returned, as can be observed in Figure 17 which shows Zillow's Home Value Index for Norwalk. Housing

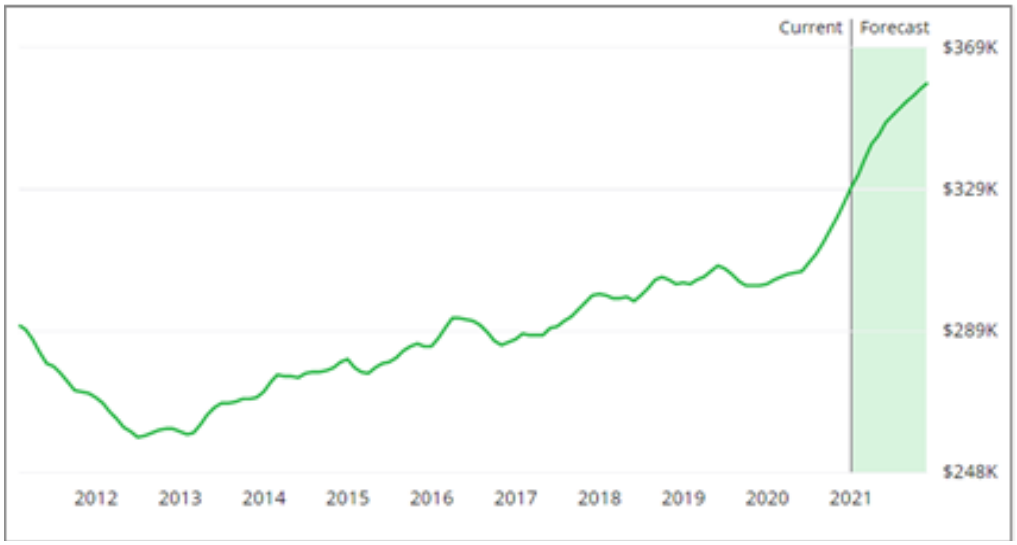


Figure 17. Zillow Home Value Index - Norwalk, CT

values within the study area are significantly lower than those of the more residential neighborhoods to the east and northeast but have rebounded past their lows during the Great Recession.

Median housing values are lowest in the center of Norwalk, corresponding with higher population densities and an increased share of renter-occupied units compared to owner-occupied units. Median housing values in the city range from a high of $467,000 to a low of $175,000, with a median value of $221,000 within the study area. Homes in the surrounding communities outside of Norwalk have higher home values as the land use patterns transition from urban to more suburban, with the average median home valued at $500,000 to over $2,000,000 in some areas.

Norwalk is also host to a significant number of rental units, an inventory that continues to grow. Since 2010, the City of Norwalk has added almost 2,200 new housing units with almost 100% of those units being renter-occupied as opposed to owner-occupied. The number of owner-occupied units within the city declined over the same period. New multifamily housing delivered within the study area has allowed it to capture a larger share of citywide inventory, increasing from a 5% share in 2010 to a 10% share in 2021. The study area's share of owner-occupied units has remained consistent at 1% between 2010 and 2020, while the number of vacant units has increased by 2% (or 70 units) over the same period.

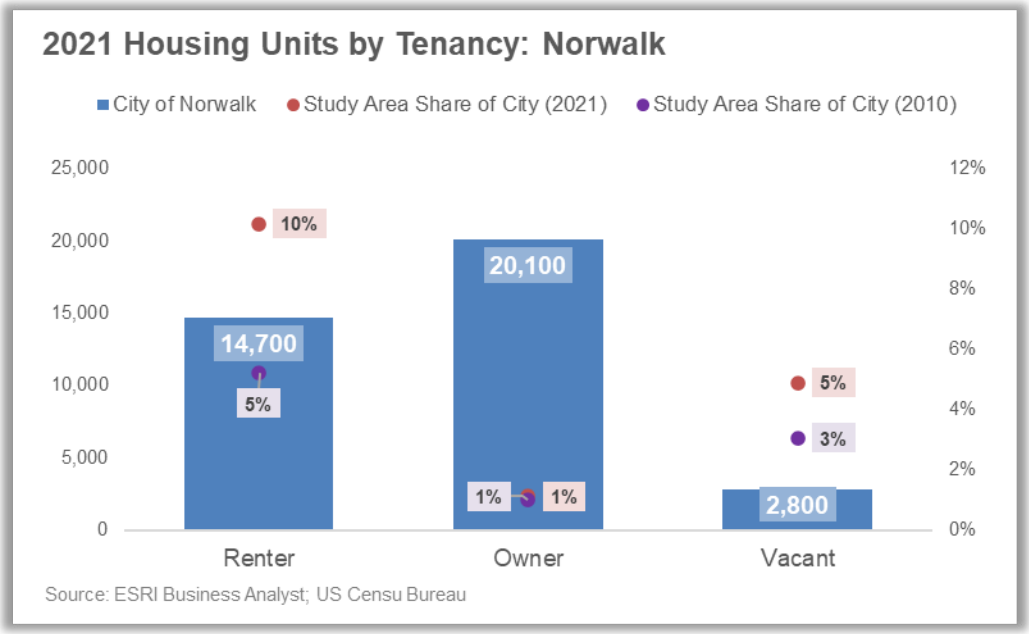


Figure 18. Housing Units by Tenancy: Norwalk

5.3 Median Household Income

Within the study area, median income is largely less than $100,000, with pockets between West Avenue and the Norwalk River and north of Route 1 less than $50,000. Median household incomes in the study area range from a high of $112,000 to a low of $36,000. This data is derived from the ACS 5yr Estimate data tables and is presented in 2017 inflation adjusted dollars.

5.4 Race and Ethnic Origin

Norwalk has become more ethnically diverse between 2010 and 2021 with the share of population that is "white alone" decreasing in both the city and study area. The study area has a higher share of its population that is "black alone" or "some other race alone" compared to the city.

2021 Race & Ethnicity	Norwalk	Study Area		Norwalk	Study Area
Total Population	***89,902***	***3,835***		***4,299***	***1,903***
White Alone	62%	42%		-6%	-7%
Black Alone	16%	26%		2%	2%
American Indian Alone	1%	2%		0%	0%
Asian Alone	6%	4%		1%	0%
Pacific Islander Alone	0%	0%		0%	0%
Some Other Race Alone	12%	22%		3%	4%
Two or More Races	3%	5%		1%	0%
White Alone	56,099	1,615		(2,710)	674
Black Alone	14,744	978		2,588	518
American Indian Alone	450	61		107	36
Asian Alone	5,214	142		1,105	74
Pacific Islander Alone	90	4		4	(0)
Some Other Race Alone	10,339	828		2,634	490
Two or More Races	3,057	207		660	110

*Δ represents the difference between reported 2010 figures and 2021 figures
Source: ESRI BAO, US Census Bureau

Table 10. Race & Ethnicity

5.5 Environmental Justice Communities

Environmental Justice (EJ) is defined by the Environmental Protection Agency (EPA) as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." "Environmental Justice Community" is a term used to describe a population that is disadvantaged when compared with the mean population; there is no one criteria to identify an environmental justice community. They are typically identified using indicators such as low income and minority populations; however, screening can further include linguistic characteristics, access to transportation, as well as other factors that may place a group at a disadvantage when compared with the surrounding population.

This study used methodology previously approved and used by the CTDOT in past Environmental Impact Analyses. These thresholds borrow practices from the Department of Health and Human Services (DHHS) and the South-Central Regional Council of Governments (SCRCOG) Environmental Justice Briefing Package, Transportation Planning: 2003-2004 Goals and Outreach document. This combined methodology uses thresholds for income and percent minority population (specifically defined as non-white) to define who and who are not part of an Environmental Justice Community

To evaluate income two thresholds were used. The first threshold is defined by the percent of the population, at the block group level, with incomes less than or equal to 150% of the federal poverty line (FPL). The second threshold is defined by the percent of population with incomes less than or equal to the FPL. Populations with 11.85% or more that met each threshold were considered EJ populations. The federal poverty line is defined by a base value (b) of $12,060 with an incremental value (i) of $4,180 added for each additional household member.

$$FPL = [(x \text{ household members}) - 1] * i + b$$

Equation 1. Federal Poverty Line

The defined FPL for the study area was ≈ $18,965.4 and the defined 150% FPL was ≈ $28,448. Within the study area five block groups (out of 11 total) had populations with 11.85% or greater at or below FPL. All but two of the block groups had 11.85% or greater at or below 150% FPL.

Minority populations were defined as those whose race is categorized as anything other than white/non-Hispanic. Census Block groups whose populations consisted of 25.9% or greater non-white were considered to constitute a minority population and considered to be an EJ population. The threshold of 25.9% is borrowed from methodology previously accepted by CTDOT and developed by South Central Regional Council of Governments through their Environmental Justice Briefing Package, Transportation Planning: 2003-2004 Goals and Outreach document. Within the study area all but one block group constitute a minority EJ population.

A major goal of any planning process is to ensure equity, which is especially critical when considering public transportation systems. While not categorically true, it is generally true that environmental justice populations have lower than mean access to personal transportation and more often rely on alternative modes such as public transportation. More research should be conducted on the needs and employment trends of the study area's environmental justice populations. CTDOT needs to remain cognizant of the impact that a potential station could have on these communities. Proximity of a station to Environmental Justice Communities is generally considered good, however negatively impacting these populations through land-takings or other means that would serve to further disadvantage them should be avoided.

5.6 Unemployment

Unemployment in Norwalk is similar to state and national averages. The results come from the Bureau of Labor Statistics (BLS) as of July 2021. The BLS reports an overall unemployment rate of 6% percent for Norwalk as of July 2021. This figure has recovered from a 12% city-wide unemployment rate in the beginning of the COVID-19 Pandemic but is still higher than the 3% reported prior to the pandemic. Overall, unemployment within Norwalk has trended in line with, but marginally below, unemployment trends observed across the state.

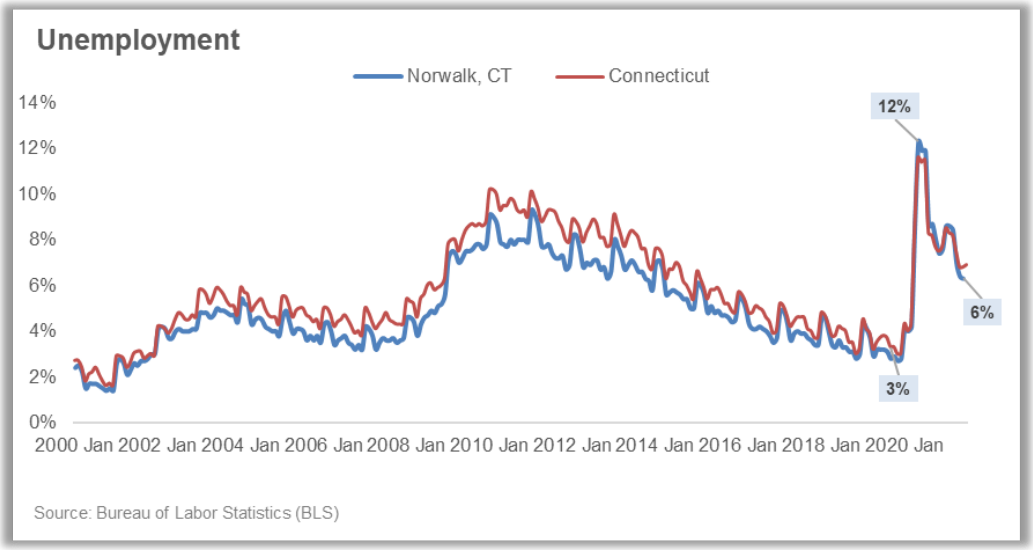


Figure 19. Unemployment Rates

5.7 Employment Destination Mapping

When planning for a rail station, it is important to prioritize communities that have the density for ease of **first and last mile connections**. For a transit system to function, its riders must be able to get to their final destination conveniently and safely. While first mile connections can include personal vehicles, last mile connections typically require an alternate mode. This can include a local transit system, pedestrian infrastructure, some form of bike share program or other means. Acceptable walking distances for first and last mile commute are generally between ¼ mile and one mile, and the acceptable biking distance is typically one mile. Identifying work locations for people who within live within the study area, as well as home locations for people who work within the study area, is important for understanding commuting patterns and mode choice.

First and last mile connections encompass the journey between the trip origin and a station, and a station and the final destination.

Station areas with higher population densities, fixed route bus service, and robust pedestrian or cycling infrastructure typically generate more ridership than those with more dispersed job centers or that lack a multi-modal transportation network. The following figures were derived using the US Census Bureau's **OnTheMap** Longitudinal Employer-Household Dynamics (LEHD) data. This information was used to assess where residents within the study area commute for work, and where those who work within the study area live. The data is derived from 2018 LEHD Origin Destination Employments Statistics (LODES)

OnTheMap is a Census data visualization product used for analyzing employment trends, including home origin/work destinations based on 'study area'.

Notably, those that live within the study area work in census tracts to the north, east and west of the potential station. The highest concentration of workers living within the study area work north along the Danbury Branch Line and in proximity to the Merritt 7 station. In addition, many of the residents of the station area work in or around Downtown Stamford.

Interestingly, those that work in the study area live in a more compact geography mostly unique to the Norwalk city limits. The highest concentration of workers within the study area live within the census tracts that border it.

This LEHD data suggests that those living within the study area are more likely to use transit to get to their place of work compared to those living outside of it. This bodes well for the prospect of delivering more multifamily housing within the study area as the market has already embraced transit as a mode to and from places of work.

Figure 20 presents the census tracts where the highest concentration of study area residents are currently employed. It is estimated that 3,045 people work in the study area. Of those working in the study area (Figure 21), only 52 or (1.7%) also live in the study area. This means that 98.3% percent of individuals who work in the study area commute from outside of it. With this substantial number of people commuting, commuting options are important to the community.

Supplemental employment data was derived from Economic Modeling Specialist Incorporated (EMSI). This data indicates that the Study Area has benefited from a substantial increase in jobs within Healthcare Support which grew from 240 jobs in 2010 to 603 jobs in 2021. The other largest employment occupations within the study area include Office & Administrative Support (480 jobs), Sales & Related Occupations (330 jobs), and Healthcare Practitioners and Technical occupations (250 jobs). As of 2021, EMSI reported that approximately 10% of city-wide jobs were located within the study area.

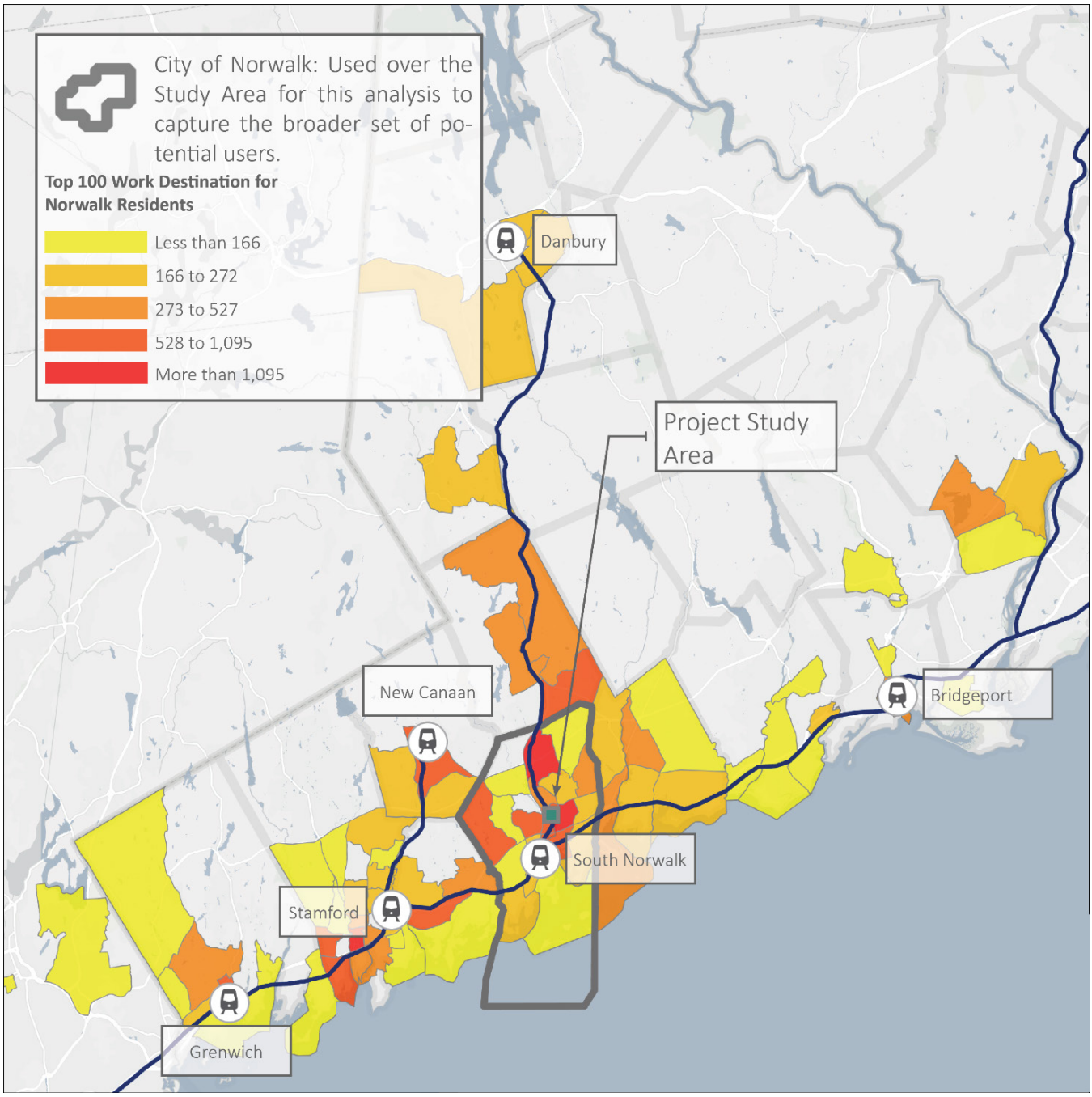


Figure 20. Work Location of Study Area Residents

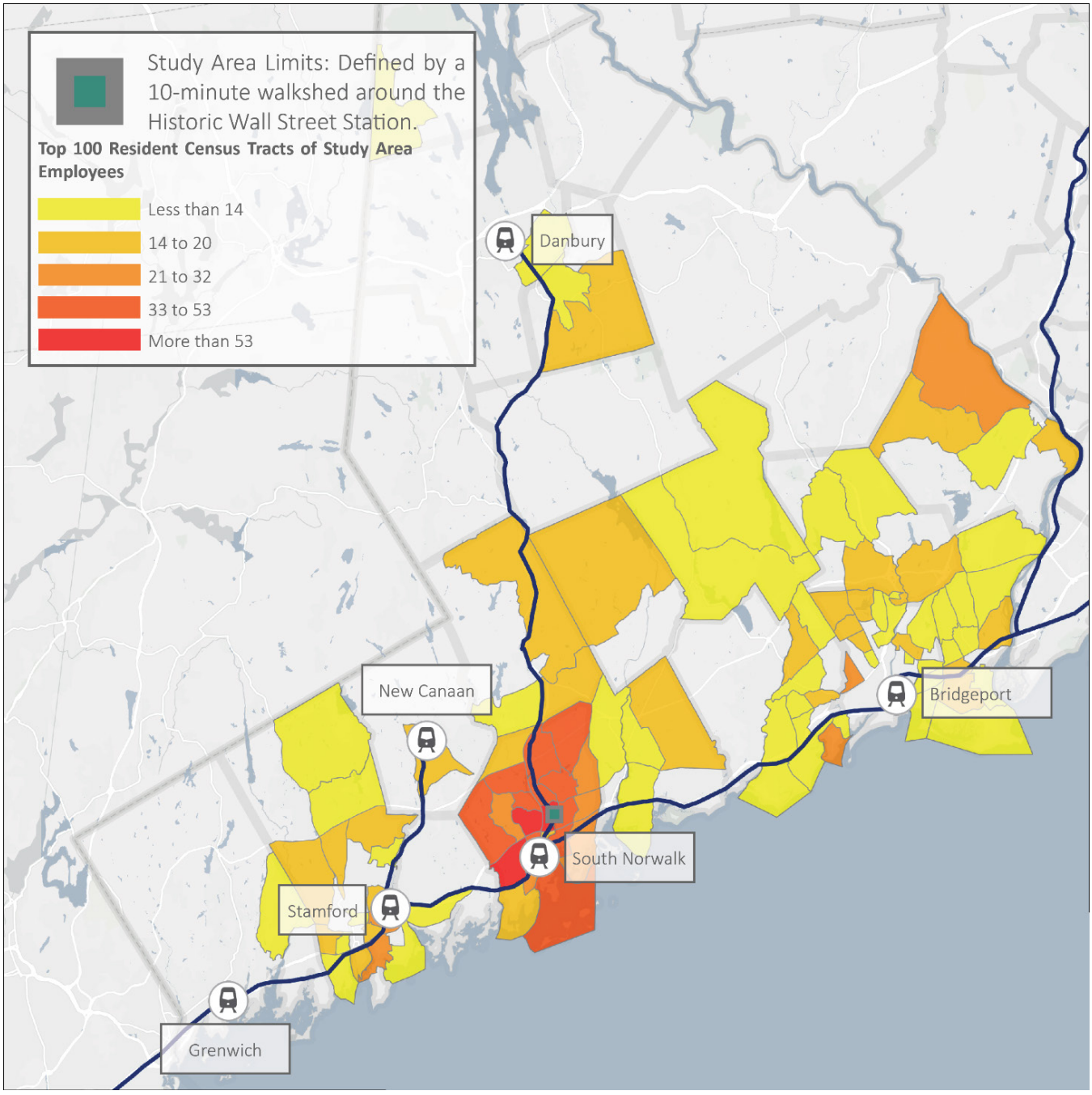


Figure 21. Home Location of Study Area Workers

5.8 Demographic Conditions Key Takaways

- Norwalks population is growing
- Most of the population in the study area and travelling to the study area need to commute in order to get to work

6 TOD Market Assessment

Denser mixed-use development within walking distance of a new station would make for a better overall station area. In its most recent Plan of Conservation and Development (POCD), the City emphasizes the need to work towards increasing the density of development in its downtown and encourage multimodal infrastructure to better support pedestrian, bike, and transit trips. The following sections build on the data gathered in Chapter 5 to provide context as to how demographics affect TOD potential and market conditions that could support a potential Wall Street Station. Key takeaways from these assessments are summarized in Section 6.5.

6.1 Land Use

Land use within the study area is a mix of commercial, industrial, and residential institutional/governmental land uses. Commercial land uses are found within the core of the study area and along Routes 1 and West Avenue. Residential land uses are located on the periphery of the study area. Industrial land uses are located primarily along the Norwalk River. In general, the surrounding land uses are supportive of **Transit-Oriented Development** (TOD) opportunities.

Transit-Oriented Development refers to a style of urban development which prioritizes dense, walkable, mixed-use and transit-centric patterns.

6.2 Zoning

Zoning within the study area is a mix of commercial, industrial, and residential. In the vicinity of Belden Avenue and Wall Street is the Central Business Design District. The west bank of the Norwalk River, south of the Wall Street bridge, is zoned industrial. East Avenue has a special zoning district called the East Avenue Village District. The northern section of the study area has several different zoning types including three residential zones, three business districts, and industrial zones. The western section of the study area is primarily zoned residential. In 2019, the City of Norwalk completed the Wall Street-West Avenue Neighborhood Plan which looked at zoning and created a redevelopment plan for the City's downtown area. The redevelopment area includes the potential station locations under consideration in this study.

Figure 22. Commercial Center

Figure 23. Industrial Zone

Figure 24. New Residential

TThe immediate areas surrounding the station alternatives within the study area contain portions of a variety of different Zone Districts (Figure 25):

- AAA: AAA Residence
- B2: Business No. 2
- C: C Residence
- D: D Residence
- EVD: East Avenue Village District
- CBDA: Central Business District – Subarea A
- CBDB: Central Business District –Subarea B
- CBDC: Central Business District –Subarea C
- I1: Industrial No. 1
- NB: Neighborhood Business

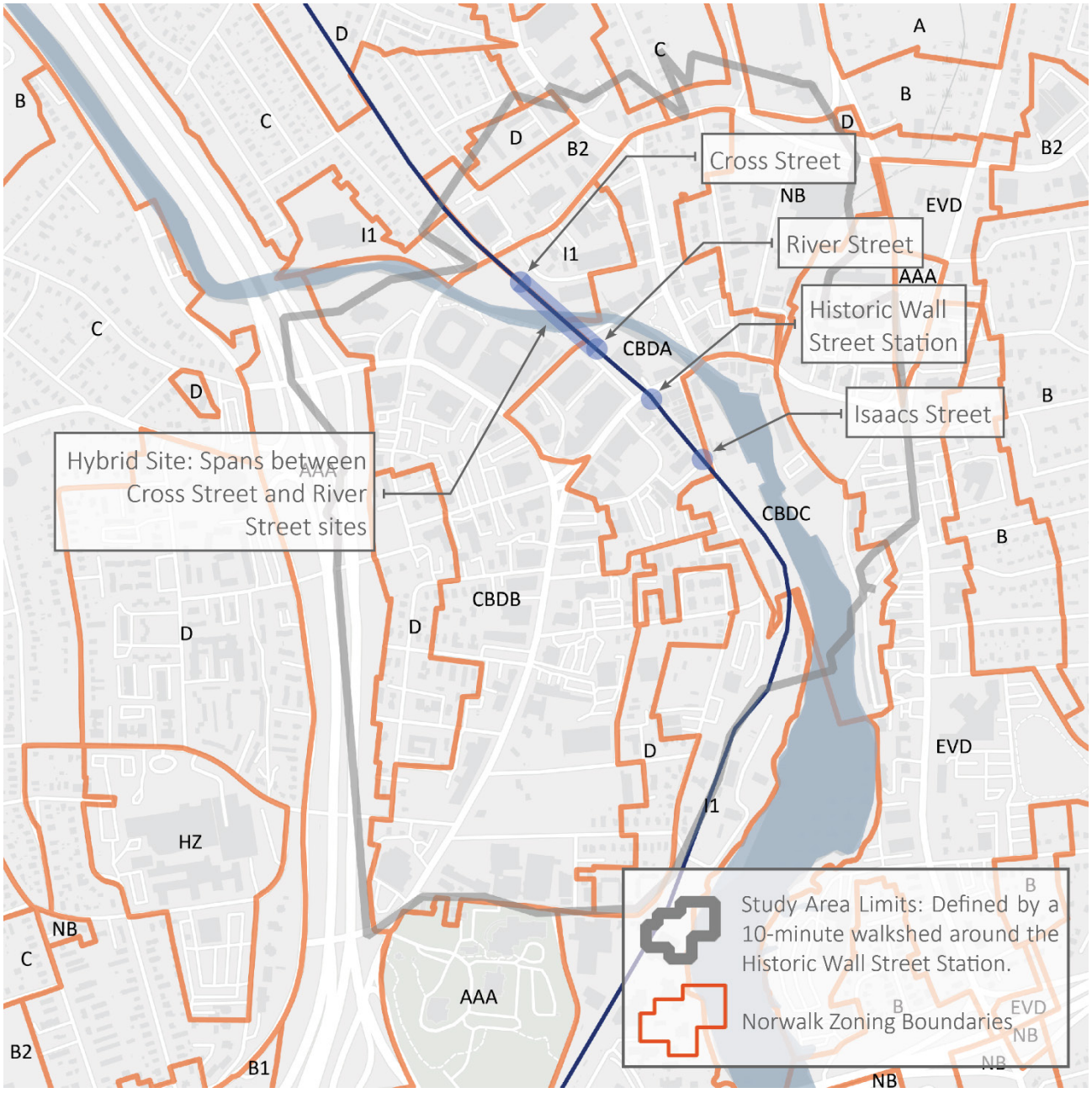


Figure 25. Norwalk Zoning

6.3 Local Economy

Norwalk has the second-largest office market in Fairfield County after Stamford, but both municipalities struggle with high office and commercial space vacancy rates limited to flat growth since the Great Recession. Norwalk has a very small manufacturing sector, but a relatively high concentration of wholesale trade compared to the metro area and state. Information and finance, insurance, and real estate (FIRE) saw the greatest job gains in Norwalk during 2002-2018, while manufacturing saw the biggest job decline, losing almost 4,000 jobs. Norwalk has a diverse economy not dominated by a single sector, providing resilience through downturns. Major employers, such as the Western Connecticut Health Network, provide a steady employment base. Despite this, office market growth is limited due to a large amount of existing space and shrinking employer requirements. The industrial market has potential due to Norwalk's access to I-95 and rail, but outdated space and zoning limitations constrain growth.

6.4 Transit Oriented Real Estate Development

6.4.1 Residential Trends

A 2010 Danbury Line TOD study observed that Norwalk has many characteristics that indicate a strong potential for TOD. Norwalk has a greater percentage of renters (41.9%) compared to the State (34.97%). Additionally, a large share of units are multi-family units, with 46% of the housing units built in 2008 being two+ units. There has been increased development within the study area leading to the construction of more than 1,000 new multi-family units, with an additional 106 under construction at the time of this report. New multifamily properties within the study area include:

- The Confluence at Norwalk, built in 2011, 0.1% current vacancy, 311 total units, the property sold for $103,250,000 in 2021 at a 4.9% cap rate, and sale price of $332,000 per unit.
- The Waypointe, built in 2014, 3.6% current vacancy, 464 total units, the property sold for $157,000,000 in 2020 at a 5.3% cap rate, and sale price of $223,000 per unit.
- 30 Orchard Street, built in 2016, 1.9% current vacancy, 69 total units, the property sold for $23,630,000 in 2021, and sale price of $342,000 per unit.
- The Berkeley and Quincy Lofts, built in 2016, 4.6% current vacancy, 198 total units, the property sold for $69,500,000 in 2021 at a 4.9% cap rate, and sale price of $351,000 per unit.
- Wall Street Place is under development and it would include 106 total units.

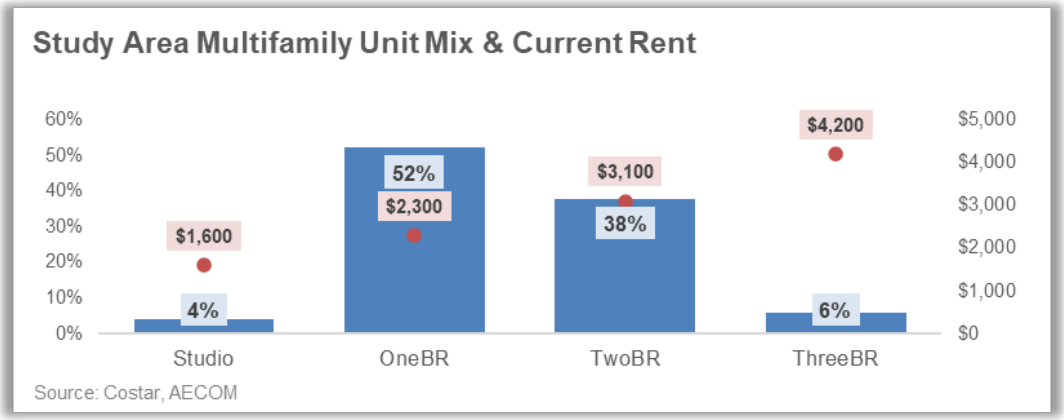


Figure 26. Study Area Multifamily Unit Mix & Current Rent

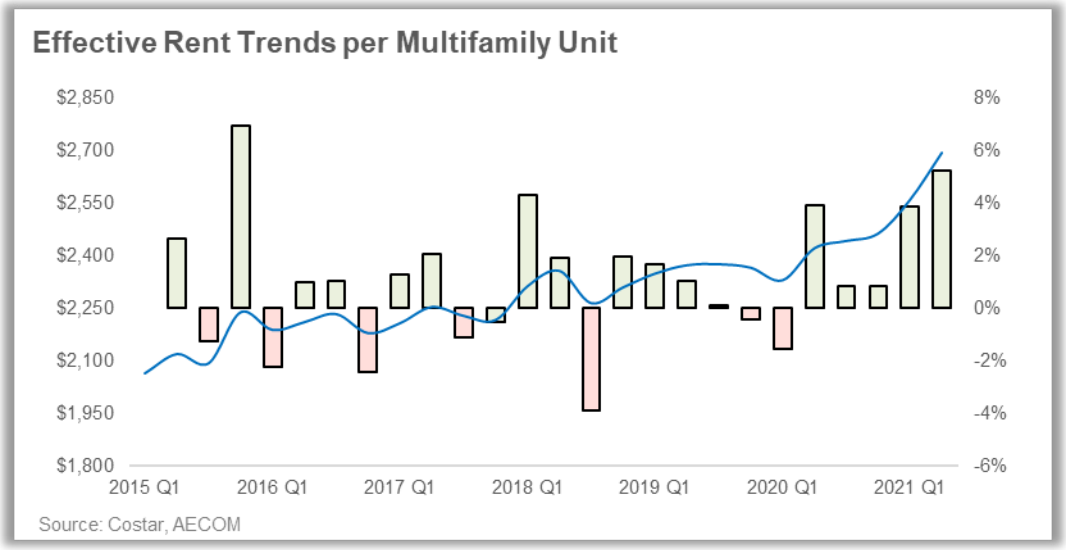


Figure 27. Effective Rent Trends per Multifamily Unit

TThe multifamily market appears strong as all developments constructed since 2010 have either been leased or sold, with an average price of $312,000 per unit. In addition, multifamily rents within the market have risen by 4.1% annually since 2015, or from $2,065 per unit to $2,693 per unit. This rise in pricing is likely associated with increased demand and the introduction of new multifamily developments with more modern finishes and amenities. Notably, multifamily rents within the study area were stagnant at the onset of the COVID-19 Pandemic but have since risen each quarter dating back to Q1 2020.

The unit mix of multifamily housing within the study area is also important to consider. Most of the units, or 90% of multifamily units, are one- or two-bedrooms. These are the most common unit types for young professionals that live alone or with a single roommate.

The study area does not include many single-family homes and instead includes an abundance of multifamily, rental housing. As such, this analysis looked at single-family transactions (using data from Zillow) in four areas surrounding the study area.

The homes to the east of the study area had a median sale value of $500,000 in the trailing two years (2020/2021). On average, homes that sold in this area were about 2,100 square feet with an inferred underlying

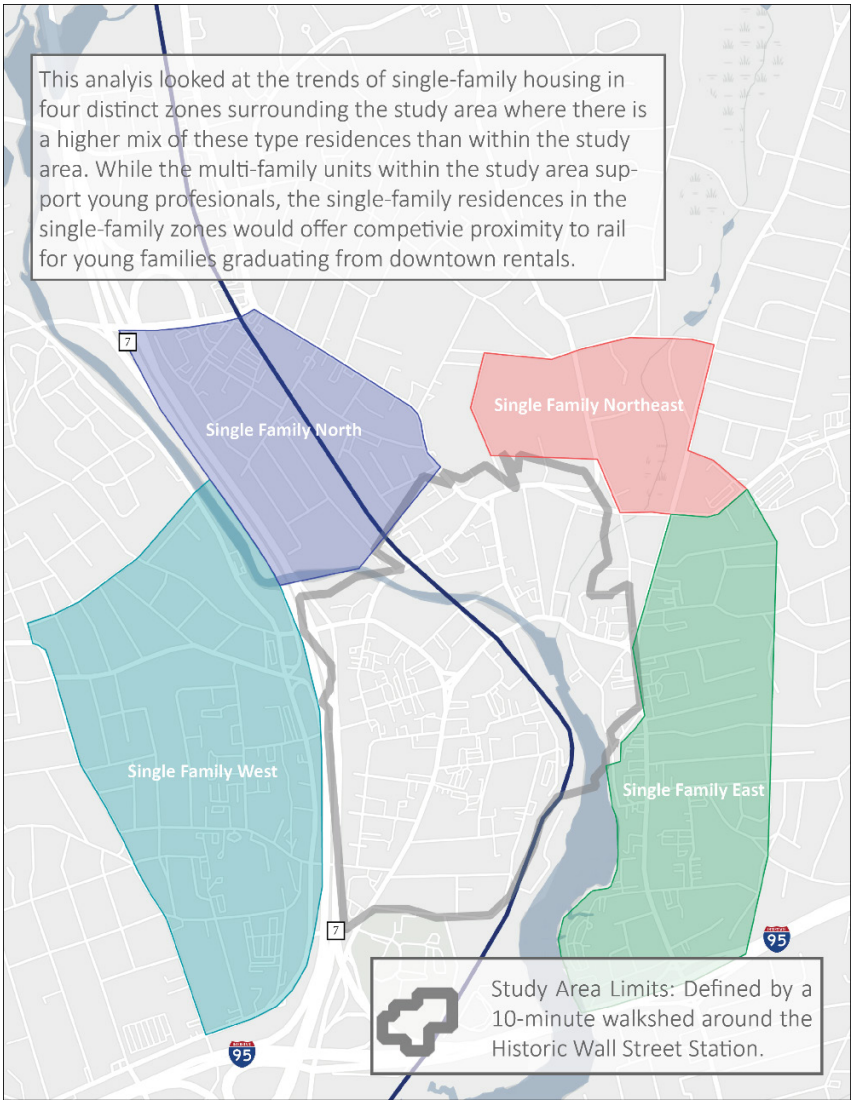


Figure 28. Single Family Home Values

land value of $13 per square foot. Similar to single-family housing in surrounding areas, the homes sold had a median year built of 1940 with few properties that were complete tear downs and rebuilds.

The homes to the northeast of the study area had a median sale value of $560,000 in the trailing two years (2020/2021). Homes in this area were the largest among all the others analyzed at approximately 3,000 square feet. As the homes and lots are larger here, the inferred land value is the lowest at $7 per square foot. Single-family homes in this area were built in the 1940s and 1950s. No properties sold in the last four years had been built in the last 30 years.

The homes to the north of the study area had a median sale value of $330,000 in the trailing two years (2020/2021) which was the lowest value among the areas analyzed. On average, homes that sold in this area were about 1,400 square feet with an inferred underlying land value of $12 per square foot. Homes in this area sit on the smallest lots that are on average, 0.1 acres. These factors have led to the most affordable homes in proximity of the study area. Additionally, homes in this area had a median year built in the 1920s.

The homes to the west of the study area had a median sale value of $430,000 in the trailing two years (2020/2021). On average, homes that sold in this area were about 1,600 square feet with an inferred underlying land value of $17 per square foot, the highest among all the areas. Homes in this area sit on relatively small lots, 0.15 acres. Homes in this area were built in the 1950s on average. Additionally, this area was the only single-family subarea to see modest activity in terms of tear down and rebuild.

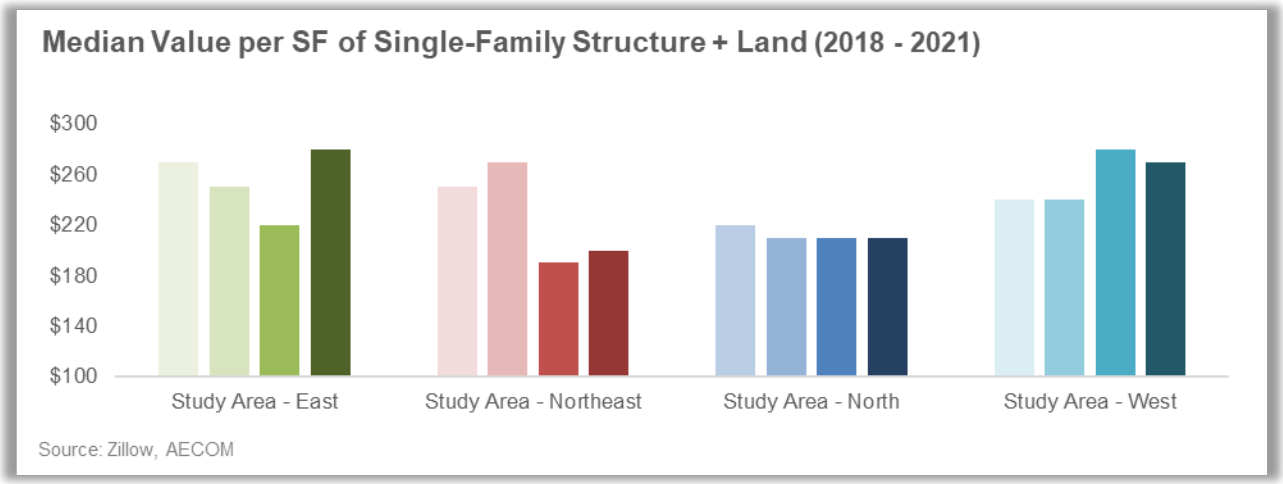


Figure 29. Median Value per Square Foot of Single-Family Structure & Land

6.4.2 Retail and Commercial Trends

Currently, the study area hosts 1.2 million square feet of retail inventory which has remained stable since 2014. In addition, Net Net Net (NNN) retail rents have remained stable at around $27 per square foot between 2016 and 2021, after experiencing a period of growth between 2013 and 2016. During this period retail rents grew by 45%, likely the result of new inventory within the marketplace inclusive of the new multifamily developments.

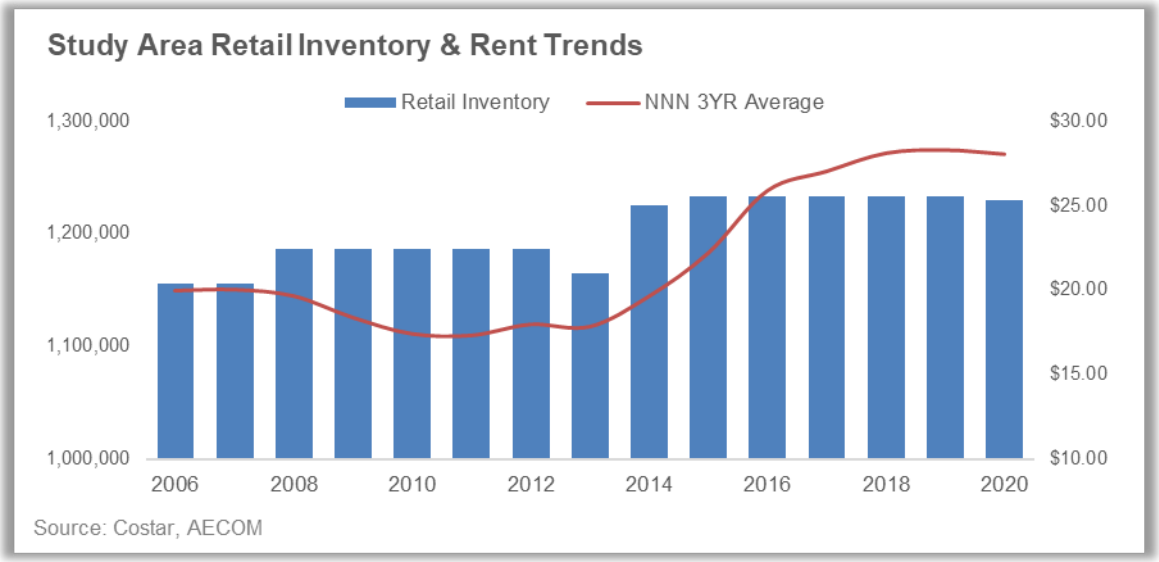


Figure 30. Study Area Retail Inventory & Rent Trends

The study area is void of any true **Class A office inventory**, or office space that has been delivered within the last development cycle, and has the floorplates and the amenities desired by the modern workforce. As such, a majority of the office space in the study area is Class B or C space and is why the gross rents have remained at between $20 and $25 per square foot since prior to the Great Recession in 2008. The largest office building within the study area is the 120,000 square-foot Riverview East building which serves as medical office space according to Costar. Notably, a significant portion of the office space is used for medical purposes and validates the employment data which indicated that jobs in Healthcare Support grew from 240 jobs in 2010 to 603 jobs in 2021.

Class A Office Space is a classification that indicates high quality and professionally managed space that affords tenants proximity to resources or other major commercial space, and significant amenities.

6.4.3 Land Value Patterns

In addition to the inventory and rents associated with housing and commercial real estate within the study area, this assessment also details the underlying land value of given property types and contextualizes TOD multifamily housing property with those projects recently delivered at the Norwalk South station. In general, the market has a clear disparity in terms of property value and one that follows similar land value patterns across other TOD facilities. Commercial property is valued at a premium, or $95 per square foot. Residential multifamily land is valued at between $50 and $55 per square foot and properties at both the Norwalk South and study area have transacted for comparable prices. Single-family land is valued at between $12 and $17 per square foot with a clear premium on housing located west of Route 7.

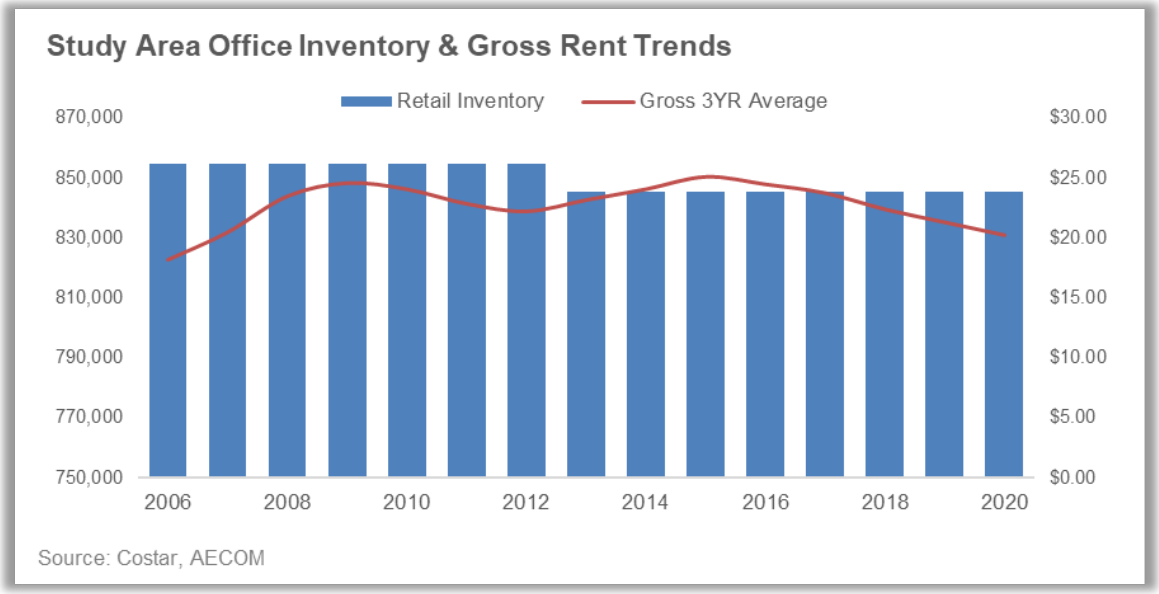


Figure 31. Study Area Office Inventory & Gross Rent Trends

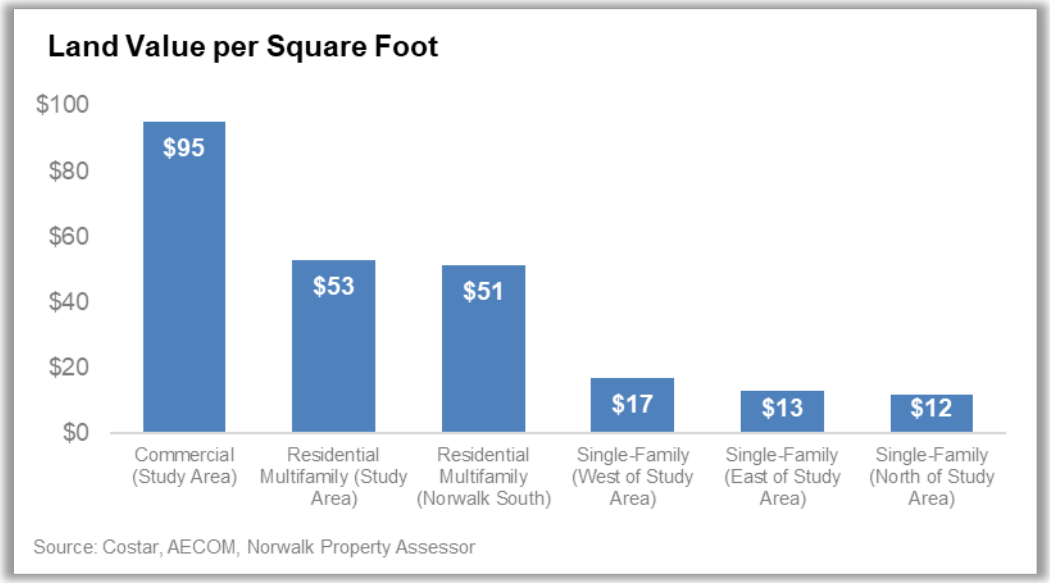


Figure 32. Land Value per Square Foot

6.5 Key Takeaways from Demographic & TOD Analysis

This section provides a summary of the key takeaways that emerged through the assessment of the key market and TOD indicators discussed above:

1. The market is indicating that there is strong demand for further multifamily development within the study area. Market factors that point toward further demand include low vacancy among new multifamily properties, significant market activity in terms of lease up and subsequent sale of multifamily properties and steadily increasing rents – especially emerging out of the COVID-19 Pandemic.
2. While the existing stock of single-family homes are more affordable than much of lower Fairfield County, the existing homes are smaller, cover less of the lot and are substantially older than modern homes. This suggests that there is opportunity for infill development and tear down and rebuild of single-family properties as transaction prices continue to accelerate.
3. There is a significant premium on commercial land relative to residential land. However, there is a modest

premium on multifamily land over single-family land. This exposes a value proposition for multifamily developers to assemble single-family properties in an effort to build multifamily housing. However, there is a limited inventory of land within the study area and the complexities of land assembly, especially across multiple owners, will be a challenge.

4. Those living within the study area have shown a willingness to utilize transit to get to their place of work, especially those working in Stamford or north in proximity of the Merritt 7 Station. These underlying trends bode well for the delivery of more multifamily housing within the study area.
5. Population growth has been led by foreign born residents as well as those relocating from other states within the northeast and the south. This also bodes well for the demand of more multifamily residential properties as these developments are the most likely landing spot for new residents as they begin to learn a new area. Renter-occupied housing often serves as the intermediary between relocation and home ownership.

7 Site Alternatives Analysis

The following sections provide summaries of the site alternative assessments that were conducted as part of this study. Each site was assessed building on information presented in Chapters 2 through 5 to determine its suitability relative to the other alternatives. The suitability factors how well the physical and environmental attributes of a site can meet operational requirements. Additional detail for each site can be reviewed in Appendix A. Following each site description, a favorability graphic is provided to indicate the general suitability of the site as a potential Wall Street station. Key takeaways from these assessments are summarized in Section 7.6.

The design of the station must adhere to ADA Accessibility Guidelines (ADAAG), NFPA 130, 2018 MNR Station Guidelines and CTDOT guidelines and policies with regards to accessibility. The full site alternatives analysis is included as an appendix to this document.

7.1 Cross Street Site

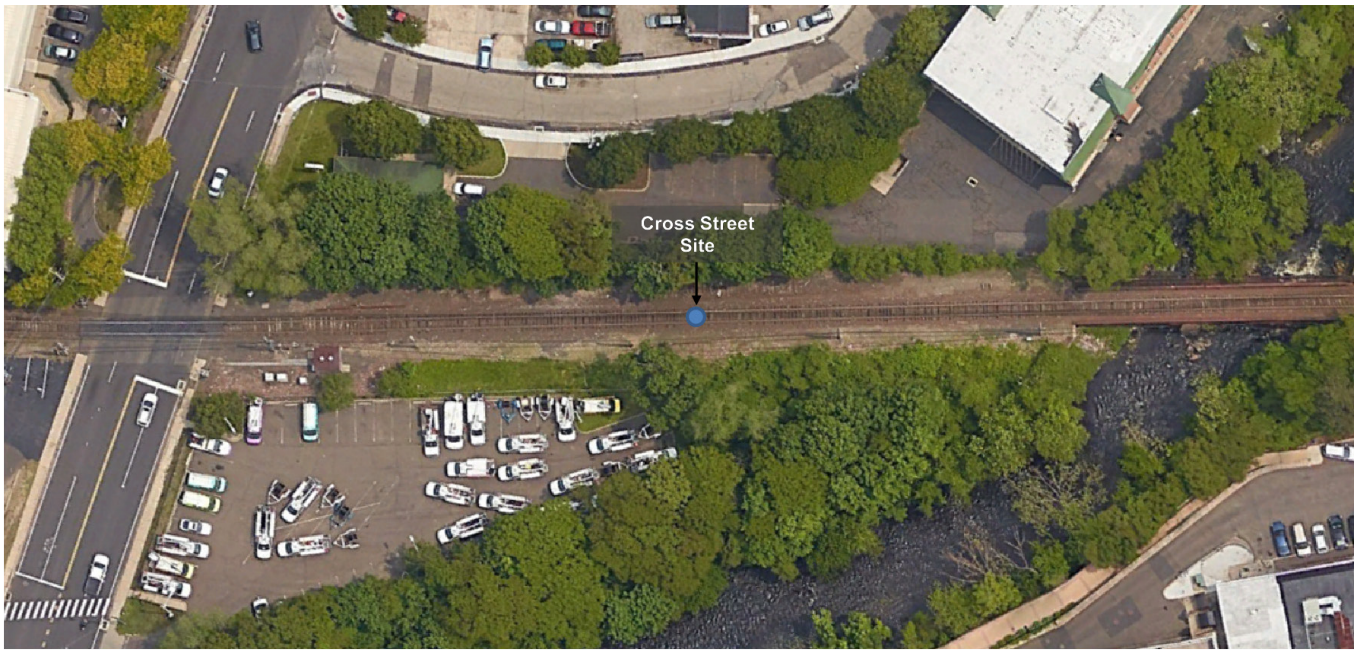


Figure 33. Cross Street Site

The Cross Street site is the furthest north of the four alternatives, located just south of the at-grade crossing at Cross Street. Due to the presence of a curve beginning just south of the grade crossing, a platform at this location would be limited to 300 feet and would preferably be located on the west side of the tracks adjacent to the parking area. This platform would only accommodate a 3-coach consist (aka train set), which is significantly shorter than the 6-7 coach trainset currently in operation on the line. Because of this, the train would have to make a multiple stop maneuver to ensure that all coaches can board and alight at the shortened platform, which would result in additional dwell time and add to the overall running time of the service.

This site benefits from its proximity to downtown Norwalk and the Transit Hub, which would connect rail users to local and regional transit infrastructure and allow for first- and last-mile connections. The station area is also adjacent to commercial and residential parcels, including a newer mixed-use development on the other side of the river. The type of density and presence of underutilized land surrounding this site would make the station a reasonable catalyst for additional TOD-style developments. Additionally, the site is well connected to existing pedestrian infrastructure including sidewalks and crosswalks. While there are no dedicated bicycle facilities servicing the site, it may be feasible to develop bike lanes within the existing roadway rights-of-way.

This site is not vulnerable to inundation from storm surge events, but portions of the site are within a 1% chance annual flood zone. The primary affected area is the southern portion of the parking lot and rail alignment directly abutting the river.

Figure 34. Cross Street Conceptual Site Favorability
(Graphic indicates the general station viability)

7.2 River Street Site

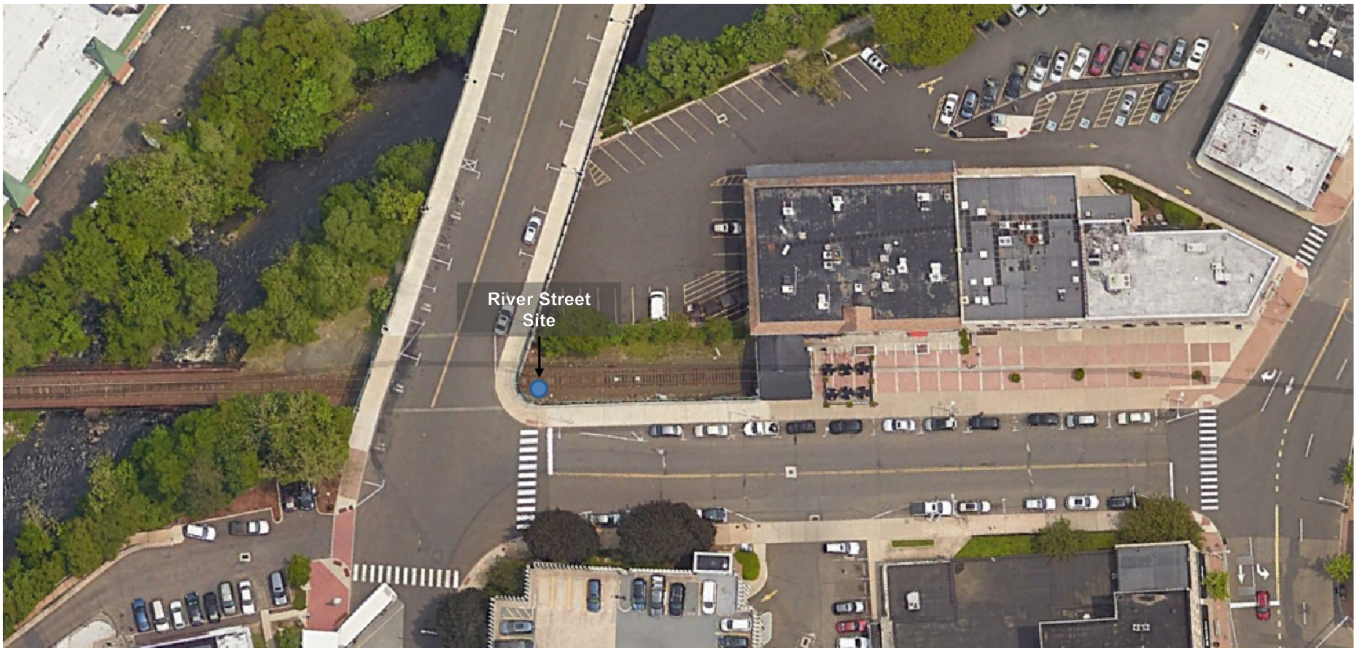


Figure 35. River Street Site

The River Street Site is located on the west side of the Norwalk River, south of Burnell Boulevard. A platform would be preferably located on the east side of the tracks to avoid negatively impacting the existing bridge structure and retaining wall. Due to this site's proximity to the tunnel and the river, a platform at this location would be limited to 190 feet and would allow for just 2 coaches to board and alight at a time. Similar to the Cross Street site, a consist stopping at this location would have to perform a multiple stop maneuver to ensure that each coach could board and alight, adding dwell time and running time to service on the line. This location has limitations on the location of the locomotive position as it cannot idle in the tunnel due to the exhaust fumes, which makes logistics of train operation difficult.

However, this site benefits from its proximity to downtown Norwalk and the Transit Hub which would readily connect rail users to local and regional bus service, allowing for first- and last-mile connections. The station area is also adjacent to commercial and residential parcels, including a newer mixed-use development just north of the site. The density and presence of underutilized land around the site would make the station a reasonable catalyst for additional TOD-style developments. Additionally, the site is well connected to existing pedestrian infrastructure and additional connections could be made to allow for the direct access to the station from Burnell Boulevard. While there are no dedicated bicycle facilities servicing the site, it is likely feasible to develop bike lanes within the existing roadway rights-of-way.

The track and parking area at this location is prone to inundation from storm surge events (Category 4 and higher) but is not within a flood zone associated with a severe rain event.

Figure 36. River Street Conceptual Site Favorability
(Graphic indicates the general station viability)

7.3 Isaacs Street Site

Figure 37. Isaacs Street Site

This site is located between the south portal of the Wall Street Tunnel and the at-grade crossing at Commerce Street. A significant curve just south of the tunnel entrance and the Commerce Street grade crossing constrain the site and limit the platform length to three coaches. Similar to the Cross Street site, a consist stopping at this location would have to perform a multiple stop maneuver to ensure that all coaches can board and alight, adding dwell time and running time to service on the line. Access to the platform would be developed through a new plaza located near the Commerce Street at-grade crossing. This site does not offer immediate access to an available parking lot. Potential sites for parking may be considered south of the station along Commerce Street or at the parking garage north of the site.

While this site is less proximal to downtown, the site remains easily walkable from downtown and the Transit Hub. The site is closest to Norwalk's industrial waterfront which includes a mix of commercial, industrial, and some residential properties. Despite lower density development directly surrounding this site, the presence of underdeveloped land provides an opportunity for future TOD build-out.

Portions of the rail alignment are vulnerable to inundation from storm surges category 3 or higher, but the site is not vulnerable to flooding from severe rain events. However, portions of the rail alignment just to the south of the site are vulnerable to storm surge inundation category 2 or higher and are within a .2% annual chance flood hazard area.

Figure 38. Isaacs Street Conceptual Site Favorability
(Graphic indicates the general station viability)

7.4 Wall Street – Historic Site

Figure 39. Wall Street — Historic Site

This site is located between the south portal of Wall St Tunnel and Commerce Street's at-grade crossing. This site differs from Isaacs Street in that the station access would correspond with the historic Wall Street station, which included a station house over the tunnel (now a tattoo shop), at 47 Wall Street. Access to this site could be possible through the former station head house and adjacent properties at 47 and 49 Wall Street, which are located above the tunnel. However, to avoid impacting existing businesses, the footprint for this access would be limited to an entrance stairway, elevator, and a pedestrian pathway to the platform. Similar to the Isaacs Street site, the platform length would be limited to 275-ft, allowing for only three coaches to berth. Similarly, a consist stopping at this location would have to perform a multiple stop maneuver to ensure that each coach can board and alight, adding dwell time and running time to service on the line.

This site benefits from its proximity to downtown Norwalk and the Transit Hub, which would connect rail users to local and regional transit services, allowing for first- and last-mile connections. There is a strong mix of commercial properties from the station access point as well as nearby new residential and mixed-use development. Additionally, the site is well connected to existing pedestrian infrastructure and additional connections could be made to allow for the direct access to the station from Burnell Boulevard. While there are no dedicated bicycle facilities servicing the site, it is likely feasible to develop bike lanes within the existing roadway rights of way.

This site is not within a 1% or 0.2 % annual chance flood event zone, however portions of the rail alignment just to the south of the station area are within the 0.2% (also known as a 500-year flood event). Additionally, portions of the rail alignment at this site are vulnerable to inundation from storm surges category 3 or higher.

Figure 40. Wall Street Conceptual Site Favorability (Graphic indicates the general station viability)

7.5 River Street to Cross Street (Combined Site)

Figure 41. River Street to Cross Street (Combined Site)

As an alternative to the sites discussed above, to allow for a full 7-car consist there is a fifth option for a platform that spans the Norwalk River. The platform would begin approximately 75 feet north of the Wall Street Tunnel portal and span north across the river to create a 530-foot platform. This is the only alternative that would allow for a full-length consist (7-car train) to berth at the platform, eliminating added dwell time associated with multiple stops at the station. However, because of the additional platform infrastructure required, it would also have the highest construction costs. Unlike the Cross Street alternative presented above, this alternative would require the platform to be constructed on the east side of the tracks to avoid interfering with the Burnell Boulevard Bridge retaining wall and superstructure.

This site is close to downtown Norwalk and the Transit Hub which would allow transfers to local and regional bus transit infrastructure. Additionally, the site is well connected to existing pedestrian infrastructure and would allow for access from both Cross Street and River Street, with the possibility of access from Burnell Boulevard as well. While there are no dedicated bicycle facilities servicing the site, it is likely feasible to develop bike lanes within the existing roadway rights of way. There is a mix of commercial and residential properties surrounding properties from the station access point as well as proximal new residential and mixed-use development.

Portions of this site are within 1% annual chance flood occurrence area. However, with the platform located on the east side of the tracks, much less of the alternative's footprint would be impacted by a severe rain event. Given the station's location over the Norwalk River, additional environmental review would be required.

Figure 42. River Street to Cross Street Combined Site
(Graphic indicates the general station viability)

7.6 Site Evaluation Key Takeaways

Only one of the sites identified within the study area presents sufficient length to allow for a full 7-coach long trainset needed to meet operational criteria, provided the physical and geometrical constraints on this section of the DBL. All the other sites would experience operational limitations in the number of coaches being able to stop at the platform simultaneously, and in most cases pedestrian access to platform level from the adjacent streets likely requires significant property acquisitions or construction of infrastructure.

Only the partial or total reconstruction of the rail bridge over the Norwalk River would provide sufficient length for the construction of a 7-coach long platform, including a section of the platform over the river. The River to Cross Street option would avoid impacts on the Wall Street tunnel and its surroundings and provide enhanced connections to both Burnell Boulevard and Cross Street. This alternative would also be clear of the **Wall Street tunnel operations complexities** and should not, except under extraordinary circumstances, **block the Cross Street grade crossing** for long time periods. The feasibility of this option remains to be fully vetted from the perspective of construction sequencing and the impacts on existing rail operations, environmental regulations, and permitting.

For operational and safety reasons, locomotives/ trainsets are not permitted to stop in the Wall Street tunnel or block a grade crossing.

The Table below summarizes the main physical, functional, and operational features of each potential station site:

Station Sites	Physical and Functional Characteristics	Operational Characteristics
Cross Street Site	Site long enough to accommodate a 3-car length platform only Possibility to create a parking lot	Impact on the nearby grade crossing Double-stopping needed to accommodate a 6-car train
River Street Site	Site long enough to accommodate a 2-car length platform only Potential access to nearby transit hub and parking facilities	Triple-stopping needed to accommodate a 6-car train Location of the locomotive at the front or rear of the train constrained by fume exhaust hazard within the Wall Street Tunnel
Isaacs Street Site	Site long enough to accommodate a 3-car length platform only Potential access to Wall Street Substantial property acquisitions No parking lot in the vicinity	Nearby grade crossing to remain closed while train is at station Double-stopping needed to accommodate a 6-car train Location of the locomotive at the front or rear of the train constrained by fume exhaust hazard within the Wall Street Tunnel
Wall Street Site	Site long enough to accommodate a 3-car length platform only Potential access to Wall Street Substantial property acquisitions Retaining wall work / underpinning work	Nearby grade crossing to remain closed while train is at station Double-stopping needed to accommodate a 6-car train Location of the locomotive at the front or rear of the train constrained by fume exhaust hazard within the Wall Street Tunnel

Station Sites	Physical and Functional Characteristics	Operational Characteristics
River Street to Cross Street Site	Site long enough to accommodate a 6-car length platform Potential pedestrian access at Cross Street and Burnell Boulevard Potential access to nearby transit hub and parking facilities Possibility to create a parking lot at Cross Street Requires modification/reconstruction of rail bridge	No significant operational constraints Impact on nearby grade crossing

Table 11. Station Summary (Physical, Functional, Operational)

8 Future Condition Traffic Evaluation

In order to assess the impact of a new station on the local roadway network, a traffic impact evaluation was undertaken for the preferred station alternative (River Street to Cross Street). This potential station location is within close proximity to the Norwalk Transit Wheels Hub and would result in similar travel patterns on study area roadways. The traffic evaluation utilized data on existing traffic patterns, growth factors to estimate opening year 2035 and design year 2050, roadway vehicle volumes, boarding and alighting forecasts provided by CTDOT, and mode share data from the Danbury Line Improvement Program AA/DEIS report's Rail Passenger Survey Report. These data sources helped determine the level of impact the preferred station alternative would incur on the study area roadways.

Location	Daily Vehicle Trips to/from Proposed Wall Street Station	Weekday Morning Peak Hour			Weekday Morning Peak Hour		
		2035 Future Volume	Transit Related Trip	Build Future Volume	2035 Future Volume	Transit Related Trip	Build Future Volume
West Avenue, North of Berkley Street	635	1,009	44	1,053	1,222	44	1,266
Wall Street, West of Commerce Street	635	913	44	957	1,205	44	1,249
East Wall Street, West of Park Street	635	939	44	983	1,035	44	1,079

Table 12. Future Roadway Volumes – Opening Year 2035

Location	Daily Vehicle Trips to/from Proposed Wall Street Station	Weekday Morning Peak Hour			Weekday Morning Peak Hour		
		2050 Future Volume	Transit Related Trip	Build Future Volume	2050 Future Volume	Transit Related Trip	Build Future Volume
West Avenue, North of Berkley Street	905	1,087	82	1,169	1,317	82	1,399
Wall Street, West of Commerce Street	905	984	82	1,066	1,298	82	1,380
East Wall Street, West of Park Street	905	1,012	82	1,094	1,115	82	1,197

Table 13. Future Roadway Volumes – Design Year 2050

A conservative approach was taken for the traffic evaluation by assuming all vehicle-related trips (parking, pick-up/drop-off, and carpooling) would occur independently on each segment as opposed to all trips be divided amongst the segments. Also, pick-up/drop-off trips were doubled to account for the trips to and from the site during the peak hour. The peak hour trips were estimated using the home-base work trip from the ridership data. Based on the estimated future volumes, West Avenue should have the ability to accommodate station-related trips. Wall Street and East Wall Street are nearing capacity and mitigation measures may need to be considered to accommodate station-related trips. Additionally, a more comprehensive analysis should be conducted to determine roadway-specific impacts for an extended study area that includes critical intersections. The more detailed analysis should include critical intersection operations and would determine potential roadway and intersection mitigation improvements.

9 Cost Estimates

Capital cost estimates have been calculated for each potential site using a planning-level conceptual capital cost model developed specifically for this project. The model is based on the Federal Transit Administration (FTA) Standard Cost Category (SCC) Workbook format for New Starts Capital Projects (June 2019 revision), modified for the "top-down" parametric estimating approach. The cost estimate process follows the FTA SCC Work Breakdown Structure (WBS) Line Items to determine total project cost in 2020 dollars. Key takeaways from these assessments are summarized in Section 9.1.

The FTA SCC is a spreadsheet format of summing costs up to a total, broken down by construction categories, a subtotal of construction costs, programmatic costs (such as engineering, etc.) and contingencies. It is a standard tool used in all major capital investment projects for which a federal grant is sought. For this estimating effort, the FTA SCC WBS was modified to show only those SCC line items that are applicable to the project:

- 10 Guideway and Track elements
- 20 Stations
- 40 Sitework and special conditions
- 50 Systems (Train Control and Signals, Traction Power, Communication)
- 60 Right-of-way, Land, existing improvements
- 80 Professional Services

Cost estimates were developed for the project based on high-level concept designs as presented in the conceptual engineering report, and equally high-level quantity and unit price (e.g., feet of platform) estimates. The unit prices were developed based on existing projects in Connecticut and in the Metropolitan New York Region and consider the specific rates of the region.

Table 14 below provides a summary of the capital cost estimate to create a new station in Norwalk for the five site alternatives. It presents the base cost estimate per main item, for the new infrastructure, and professional services. The unallocated contingency is estimated between 30 to 40% of the construction cost; the total project cost shown in Table 14 reflects this range.

Table 15 below provides a summary of the capital cost estimate to create a new passing siding north of Merritt 7, to increase service on the DBL, and to potentially enhance the aesthetics of the new station. As for the station cost, the unallocated contingency is estimated between 30 to 40% of the construction cost; the total project cost shown in Table 15 reflects this range.

9.1 Cost Estimates Key Takeaways

- The only operationally viable alternative (Cross Street to River Street) represents the costliest alternative due to the additional engineering and infrastructure required for a platform suspended over the river.
- A passing siding would be required with any of the proposed alternatives, but the cost is consistent.

NORWALK WALL STREET STATION COST ESTIMATE						
	Item Description	2020 $ with Allocated Contingency				
		Cross Street	River Street	Isaacs Street	Wall Street	Cross St to River St
10	Guideway and Track Elements	$530,000	$430,000	$380,000	$380,000	$7,550,000
20	Stations, Stops, Terminal, Intermodal	$2,810,000	$5,270,000	$2,430,000	$5,020,000	$8,420,000
40	Site Work & Special Conditions	$7,610,000	$10,130,000	$10,810,000	$13,470,000	$8,670,000
50	Systems	$2,900,000	$2,250,000	$2,480,000	$2,900,000	$3,850,000
	Sub-Total Construction Cost (10-50)	$13,850,000	$18,080,000	$16,100,000	$21,770,000	$28,490,000
60	ROW, Land, Existing Improvements	$1,770,000	$0	$5,150,000	$2,890,000	$0
80	Professional Services	$5,260,000	$6,900,000	$6,130,000	$8,260,000	$10,820,000
	Sub-Total Non-Construction Costs (60-80)	$7,030,000	$6,900,000	$11,280,000	$11,150,000	$10,820,000
	Sub-Total Project Cost	$20,880,000	$24,980,000	$27,380,000	$32,920,000	$39,310,000
90	Unallocated Contingency	$3,150,000 to $4,190,000	$4,010,000 to $5,340,000	$3,610,000 to $4,810,000	$4,840,000 to $6,450,000	$6,360,000 to $8,470,000
	TOTAL PROJECT COST Rounded up to the nearest Million	$24,000,000 to $25,000,000	$29,000,000 to $31,000,000	$31,000,000 to $33,000,000	$38,000,000 to $40,000,000	$46,000,000 to $48,000,000

PASSING SIDING COST ESTIMATE		
	TOTAL PROJECT COST Rounded up to the nearest Million	$12,000,000 to $13,000,000

NORWALK AND PASSING SIDING COST ESTIMATE						
	TOTAL PROJECT COST Rounded up to the nearest Million	$36,000,000 to $38,000,000	$41,000,000 to $44,000,000	$43,000,000 to $46,000,000	$50,000,000 to $53,000,000	$58,000,000 to $61,000,000

Table 14. Total Infrastructure Cost for the Creation of a New Station in Norwalk, CT

PASSING SIDING COST ESTIMATE		
	Item Description	2020 $ with Allocated Contingency
10	Guideway and Track Elements	$1,780,000
40	Site Work & Special Conditions	$1,050,000
50	Systems	$4,420,000
	Sub-Total Construction Cost (10-50)	**$7,250,000**
80	Professional Services	$2,750,000
	Sub-Total Project Cost	**$10,000,000**
90	Unallocated Contingency	$1,780,000 to $2,370,000
	TOTAL PROJECT COST Rounded up to the nearest Million	**$12,000,000 to $13,000,000**

Table 15. Total Infrastructure Cost for the Creation of a Passing Siding North of Norwalk, CT

10 Conclusion

The results of the assessments made within this report are presented below in Table 17 and portray a low, fair, high qualitative scoring by indicator across the five alternatives investigated. The scoring provided here is premised on the data from the site alternative analyses presented above, GIS mapping, site visits, engineering assessment, and high-level cost estimates. **All four original sites do not meet current engineering building standards**. Most sites would not be feasible based on numerous physical site constraints, mainly the existing tunnel under Wall Street, as well as not meeting standards for platform size and the likely need for property takings.

While Cross Street has slightly more potential than the other three sites, it still falls short due to operational constraints. Cross Street traffic operations would be impacted with gate downtime in order to load and unload passengers from all passenger cars due to short platform lengths. Of all the sites investigated, **the River Street to Cross Street hybrid site is the only one that has viability from an engineering and operations standpoint**, despite environmental and permitting concerns, primarily that the platform be constructed over the Norwalk River.

		Rail Station Suitability		Low	Fair	High
Site Assessment Category	**Sub Category**	**Cross Street**	**River Street**	**Isaacs Street**	**Wall Street**	**River Street to Cross Street**
Commuter potential	New riders vs. transfers					
Economic Development	Major employers in the area					
	High residential density in the area					
	Existing development plans					
	Zoning					
	Land use (under utilized/vacant)					
Existing multimodal access in area	Existing pedestrian network					
	Existing bicycle network					
	Local Transit network					
Rail Operations	Service					
	Operations					
	Proximity to existing rail stations					
Rail Design Complexity	Infrastructure					
	6 passenger coaches (580ft)					
	Ability for 200 minimum parking spaces					
	7' side clearance					
	ADA accessible platforms					
	530' minimum platform length					
	12' side platform					
	High level platform					
	0% to .05% grade requirement					
	NFPA compliant					
Environmental	Flooding and storm surge inundation					
	Impact to drinking water resources					
	Impact to wetlands					
	Impact to protected species					
	Impact to parks					
	Impact to historical resources					

Table 16. Site Evaluation Results

Looking at Norwalk on a macro scale, **the city currently has four rail stations, substantial access to transit, and a microtransit system**. The transit hub of the city is situated in the downtown on the north end of River Street. Given the high cost to construct a station and service constraints of the Danbury Line, **an investment to bolster existing transit/microtransit systems would likely create a focused and highly effective shuttle service within the study area and better establish links to the main line and points north to Danbury**.

Given the current transit access, specifically rail, within Norwalk, there will unlikely be an influx of new rail riders if a Wall Street station was to be built. The ridership analysis shows ridership growing at a potential station, but due to the proximity to the surrounding stations, it is likely that the projected ridership for a Wall Street Station is not new riders, rather a shift of existing users.

Based on the analysis performed in this study, a station stop around Wall Street is not recommended at this time. This analysis shows that due to a combination of physical, operational, and cost, none of the station alternatives evaluated are considered viable. For the reasons outlined above, priorities should be to optimize and expand existing transit services within the study area.

CT*rail* Strategies

Wall Street Station Feasibility Study
Norwalk, CT

Appendix A

CT rail

Wall Street Station Rail Study

Employment Destination

Legend

- Rail Line
- Study Area
- CT Rail Station
- Study Boundary - Catchment Area

Place of Work for Residents Within Study Boundary

- 26 - 100
- 101 - 250
- 251 - 500
- 501 - 1000
- 1001 +

Residence of Study Area Employees

- 48 - 64
- 65 - 79
- 80 - 122
- 123 - 398
- 399 - 903

Feet
0 5,000 10,000 20,000 30,000 40,000 50,000

DATA Source: LEHD OnTheMap 2015 Primary Employment Destination Data by County Subdivision

Date: 8/28/2020

AECOM Imagine it. Delivered.

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Wall Street Station Rail Study

Conserved Lands

Legend

- Station Alternatives
- Rail Line
- Study Area

Conserved Lands

- 6F Land
- Municipal Open Space

Feet

0 150 300 600 900 1,200 1,500

DATA SOURCE: DEEP Federally Protected Open Space
CT ECO 2016 Orthophotography

Date: 9/22/2020

AECOM Imagine it. Delivered.

Wall Street Station Rail Study

Land Use

Cross Street, Norwalk, CT

18 River Street, Norwalk, CT

47 Wall Street, Norwalk, CT

17 Isaacs Street, Norwalk, CT

CBDA

CBDB

CBDC

Main Street

High Street

Park Street

East Avenue

Cross Street

Belden Avenue

Burnell Boulevard

Wall Street

Norwalk River

53

1

7

Legend

- Station Alternatives
- Rail Line
- Study Area

Zoning

- CBDA
- CBDB
- CBDC

Norwalk Land Use

- Agricultural
- Commercial
- Industrial
- Institutional/Governmental
- Mixed
- Other/Vacant
- Park/Conservation/Recreation
- Residential
- Transportation/Utilities/Communication
- Water

0 150 300 600 900 1,200 1,500 Feet

DATA SOURCE: WestCOG Transit Data Set; WestCOG Street Data Set; CT ECO 2016 Orthphotography

Date: 8/28/2020

AECOM Imagine it. Delivered.

Wall Street Station Rail Study

Meidan Household Income

Legend

- Station Alternatives
- Rail Line
- Study Area

Median Household Income

- $0.00 - $70,000.00
- $70,000.01 - $105,000.00
- $105,000.01 - $140,000.00
- $140,000.01 - $175,000.00
- $175,000.01 - $245,000.00

Feet
0 150 300 600 900 1,200 1,500

DATA SOURCE: ACS_17 5yr_Census Data_ B19013; Blockgroupct_37800_0000_2010_s100_census_1_shp

Date: 9/22/2020

AECOM Imagine it. Delivered.

Wall Street Station Rail Study

Natural Diversity Database Areas

Legend

- Station Alternatives
- Rail Line
- Study Area
- Natural Diversity Database Area

Feet

0 150 300 600 900 1,200 1,500

DATA SOURCE: DEEP Natural Diversity Database Area Layer; DEEP Critical Habitat Layer; DEEP Inland Wetland Soils Layer; CT ECO 2016 Orthphotography

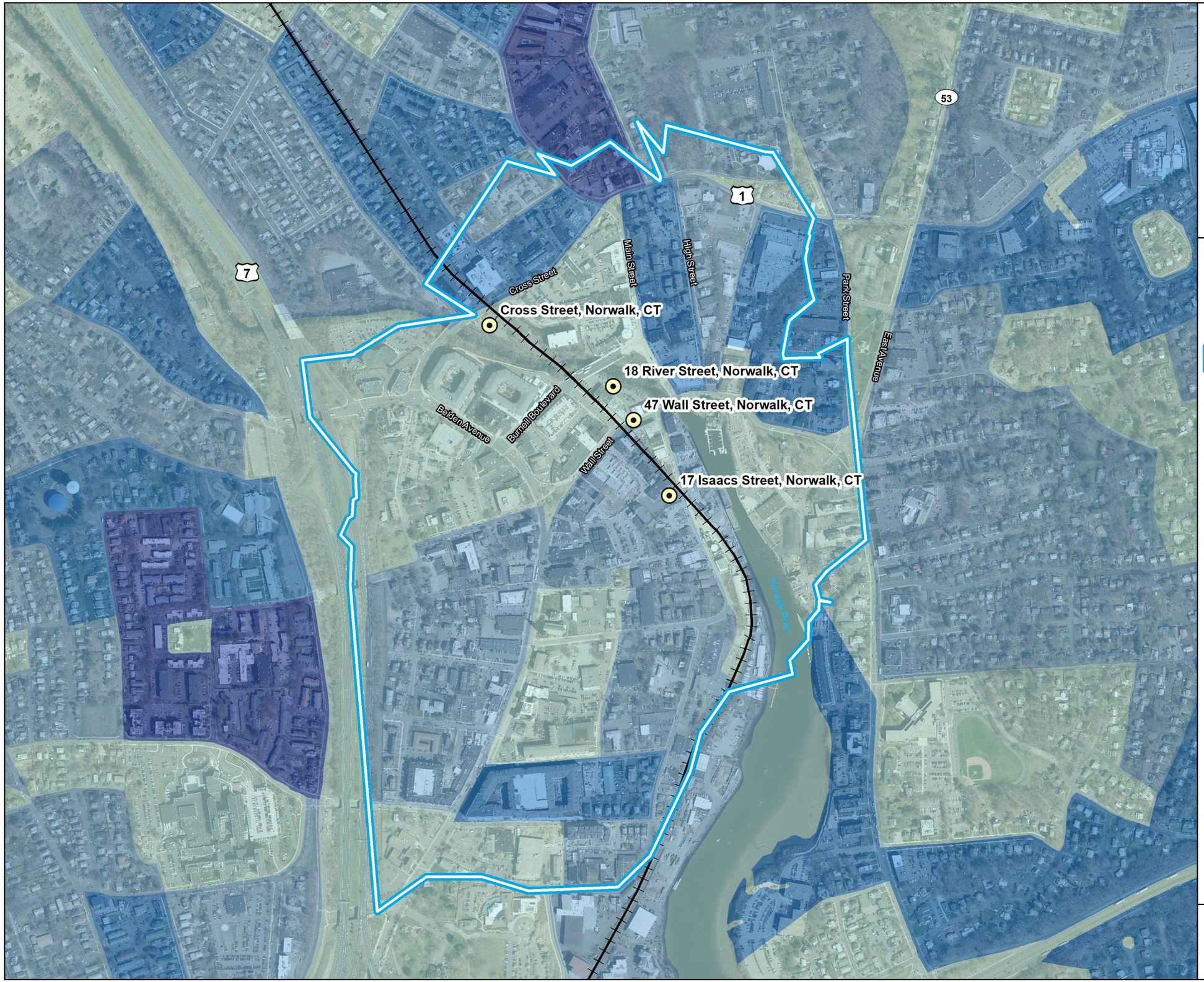
Date: 8/21/2020

AECOM Imagine it. Delivered.

Wall Street Station Rail Study

CONNECTICUT DEPARTMENT OF TRANSPORTATION

Population Density



Legend

- Station Alternatives
- Rail Line
- Study Area

Population / Sq.Mi

- 0 - 53
- 54 - 161
- 162 - 347
- 348 - 765
- 766 - 2404

0 150 300 600 900 1,200 1,500 Feet

DATA SOURCE: ACS_17 5yr_Census Data_ B19001; ACS_17 5yr_Census Data_ B02001 Blockgroupct_37800_0000_2010_ s100_census_1_shp

Date: 9/21/2020

AECOM Imagine it. Delivered.

Wall Street Station Rail Study

CONNECTICUT DEPARTMENT OF TRANSPORTATION

Population Density

Legend

- Station Alternatives
- Rail Line
- Study Area

Population / Sq.Mi

- 0 - 950
- 951 - 1200
- 1201 - 1500
- 1501 - 1750
- 1751 - 3000

Feet

0 150 300 600 900 1,200 1,500

DATA SOURCE: ACS_17 5yr_Census Data_ B19001;
ACS_17 5yr_Census Data_ B02001
Blockgroupct_37800_0000_2010_
s100_census_1_shp

Date: 9/22/2020

AECOM Imagine it. Delivered.

Wall Street Station Rail Study

Surficial Materials

Cross Street, Norwalk, CT

18 River Street, Norwalk, CT

47 Wall Street, Norwalk, CT

17 Isaacs Street, Norwalk, CT

Cross Street
Main Street
High Street
Park Street
East Avenue
Belden Avenue
Burnell Boulevard
Wall Street
Norwalk River

1
7
53

Legend

- Station Alternatives
- Rail Line
- Study Area

Surficial Materials

- Artificial Fill
- Sand and Gravel
- Till
- Thick Till

0 140 280 560 840 1,120 1,400 Feet

DATA SOURCE: DEEP Surficial Material Layer; CT ECO 2016 Orthphotography

Date: 9/22/2020

AECOM Imagine it. Delivered.

Wall Street Station Rail Study

Public Transit

Legend

- Station Alternative
- Rail Line
- Study Area
- CTTransit Bus Route
- Hart Bus Route
- NTD Bus Route
- Bus Stop
- WHEELS2U Microtransit Zone

Feet

0 150 300 600 900 1,200 1,500

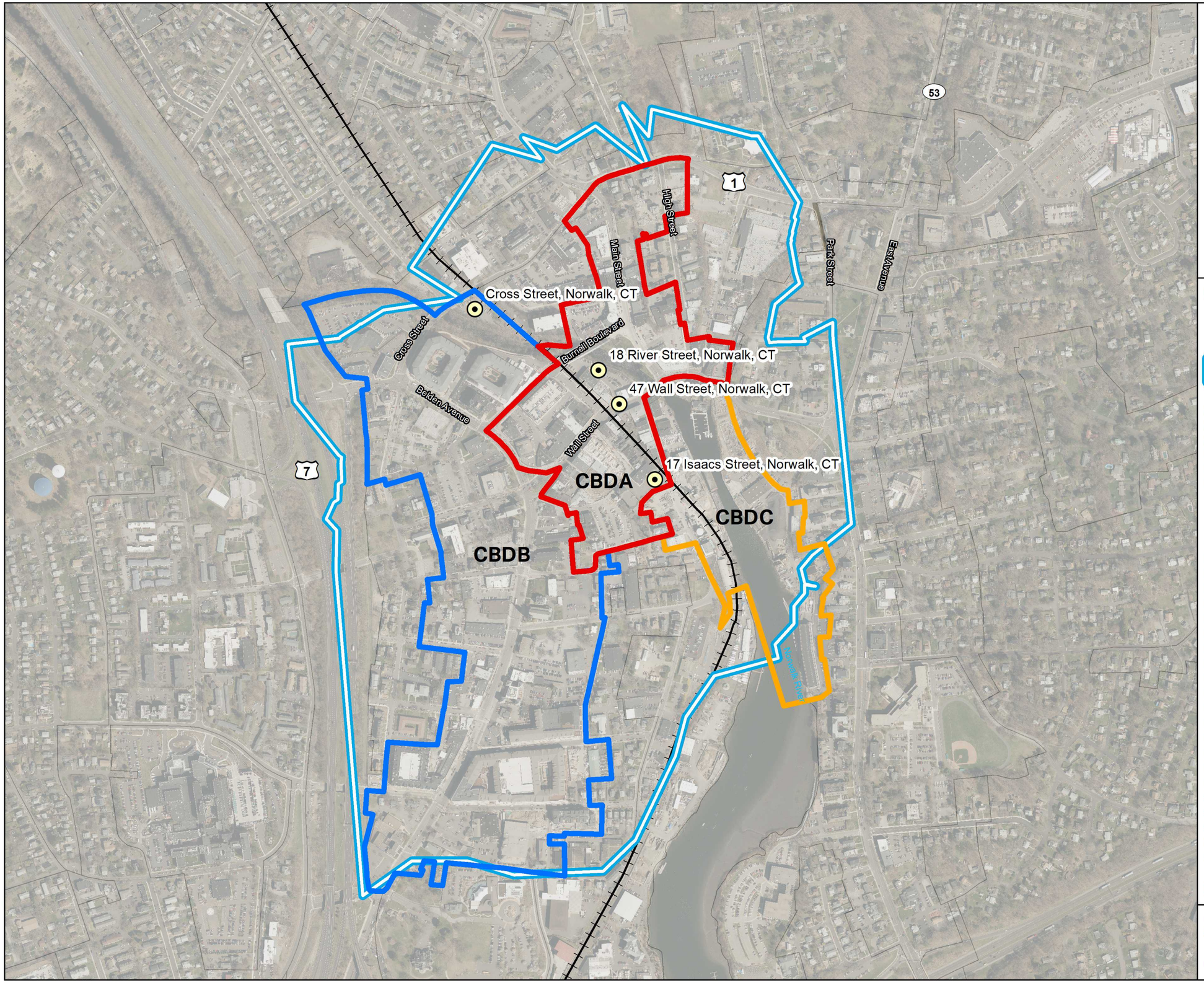
DATA SOURCE: WestCOG Transit Data Set; CT ECO 2016 Orthphotography

Date: 9/1/2020

AECOM Imagine it. Delivered.

Wall Street Station Rail Study

Study Area Zoning
(was updated June 2019 to consolidate CBD Districts need updated data)



Legend

- Station
- Rail Line
- Study Area

Zoning

- CBDA
- CBDB
- CBDC

A - A Residence
AA - AA Residence
AAA - AAA Residence
B - B Residence
B1 - Business No. 1
B2 - Business No. 2
C - C Residence
CBDA - Central Business Design District - Subarea A
CBDB - Central Business Design District - Subarea B
CDBC - Central Business Design District - Subarea C
D - D Residence
EO - Executive Office
EVD - East Avenue Village District
I1 - Industrial No. 1
IC - Island Conservation
LI2 - Light Industrial No. 2
MC - Marine Commercial
NB - Neighborhood Business
RD - Research and Development
RI - Restricted Industrial
RPDA - Reed Putnam Design District - Subarea A
RPDB - Reed Putnam Design District - Subarea B
RPDC - Reed Putnam Design District - Subarea C
RPDD - Reed Putnam Design District - Subarea D
RPDE - Reed Putnam Design District - Subarea E
RVD - Rowayton Avenue Village District
SNBD - South Norwalk Business District
SSDD - Sono Station Design District
SVD - Silvermine Tavern Village District
WSDD - Washington Street Design District
GHVD - Golden Hill Village District

0 150 300 600 900 1,200 1,500 Feet

DATA SOURCE: WestCOG Transit Data Set; WestCOG Street Data Set; CT ECO 2016 Orthphotography

Date: 8/28/2020

AECOM Imagine it. Delivered.

CT*rail* Strategies
Phase 5

Wall Street Station Feasibility Study
Norwalk, CT

Appendix B

CONNECTICUT DEPARTMENT OF TRANSPORTATION

CT rail

CT*rail* Strategies

Wall Street Station Feasibility Study
Norwalk, CT

Site Evaluation and Conceptual Engineering Analysis

CONNECTICUT DEPARTMENT OF TRANSPORTATION

CT rail

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Table of Contents

1. Introduction

AECOM has been engaged by the Connecticut Department of Transportation (CTDOT) to study the feasibility of locating a new rail station in the City of Norwalk in the vicinity of Wall Street on the Danbury Branch Line (DBL).

This report presents the conceptual engineering analysis of five sites for a new station with a single platform and pedestrian access, between Commerce Street and Cross Street in Norwalk. All sites present physical and geometrical constraints, which limit the length of the platform under the nominal 6-car length projected on the DBL. Furthermore, pedestrian access and parking capacities vary between the sites, with the Commerce Street site showing the most challenges due to its urban surrounding, and the Cross Street site showing more ample space to consider for parking and drop-off/pick-up capabilities.

2. Existing Conditions

The Study area is centered on the section of the DBL between the at-grade crossings at Commerce Street and Cross Street as depicted in Figure 1.

Figure 1: Study Area (source: USGS; "P" symbols represent both public and private parking)

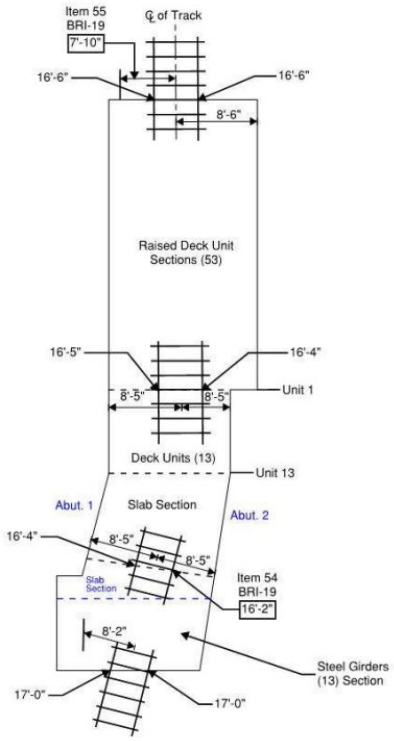
2.1. Railroad

Along this section the DBL is a single track with no other rail features (passing sidings, crossovers, etc.). The main physical features from south to north include an at-grade crossing at Commerce Street, a 350-ft tunnel under Wall Street, an overhead bridge supporting Burnell Blvd, a 130-ft under-grade through-plate girder railroad bridge over the Norwalk River, and an at-grade crossing at Cross Street. The track geometry consists of a series of two tangents connected with a curve at the south portal of the tunnel and ends with a curve starting before Cross St and continuing north.

The vertical profile of the line shows a level to slightly positive grade from Commerce Street to the Wall Street tunnel, followed by a 1.37% positive grade throughout the rest of the section. For reference, the maximum grade allowable on Metro-North Railroad (MNR) tracks is set at 1.50%.

The tunnel under Wall Street consists of three separate structural systems delineated by the roadway above: a steel multi-girder section south of Wall Street, concrete slabs and prestressed concrete units under Wall Street, and precast concrete units north of the street. The clearance from the centerline of the track to the foundation face of the adjacent buildings varies between 8'-5" and 8'-6" and is insufficient for the insertion of a lateral platform. Furthermore, the section north of Wall Street shows active water leakage and efflorescence from the street above which would need to be repaired to provide a more engaging environment for an active passenger station.

Figure 2 below depicts the juxtaposed systems and the vertical and horizontal clearances along the tunnel:



Note: The diagram is oriented to the north.

North Section of the Tunnel

North Portal

Figure 2: Wall Street Tunnel - Clearance Diagram and photos (source: Connecticut DOT 2018 Routine Inspection Report, Bridge No. 04048)

2.2. Topography and Flood Zones

Topographic maps show a steep slope from the Norwalk River along Wall Street to a flatter area west of River Street, which can be seen below in Figure 3. The railroad passes under the hill through the Wall Street tunnel and continues along an existing retaining wall supporting River Street above on its west side, and Mechanic Street parking lot at the same elevation on its east side, before reaching the Norwalk River. Burnell Boulevard crosses over the line with a multiple span bridge, one pier and the south abutment of the bridge located on each side of the track. North of the river, the railroad traverses a generally level surface with no major difference of elevation between the track and its immediate surroundings.

Figure 3: Topography of the Area (source: USGS)

The Study area includes several flood zones, with the rail line crossing them primarily north of the Norwalk River and East of Commerce Street, as shown on Figure 4 below. Any station work located in the vicinity of the Norwalk River and between the River and Cross Street, or any work on the rail bridge over the River should be designed in a way that takes the flood zones into account and does not alter the River's existing hydraulic grade line.

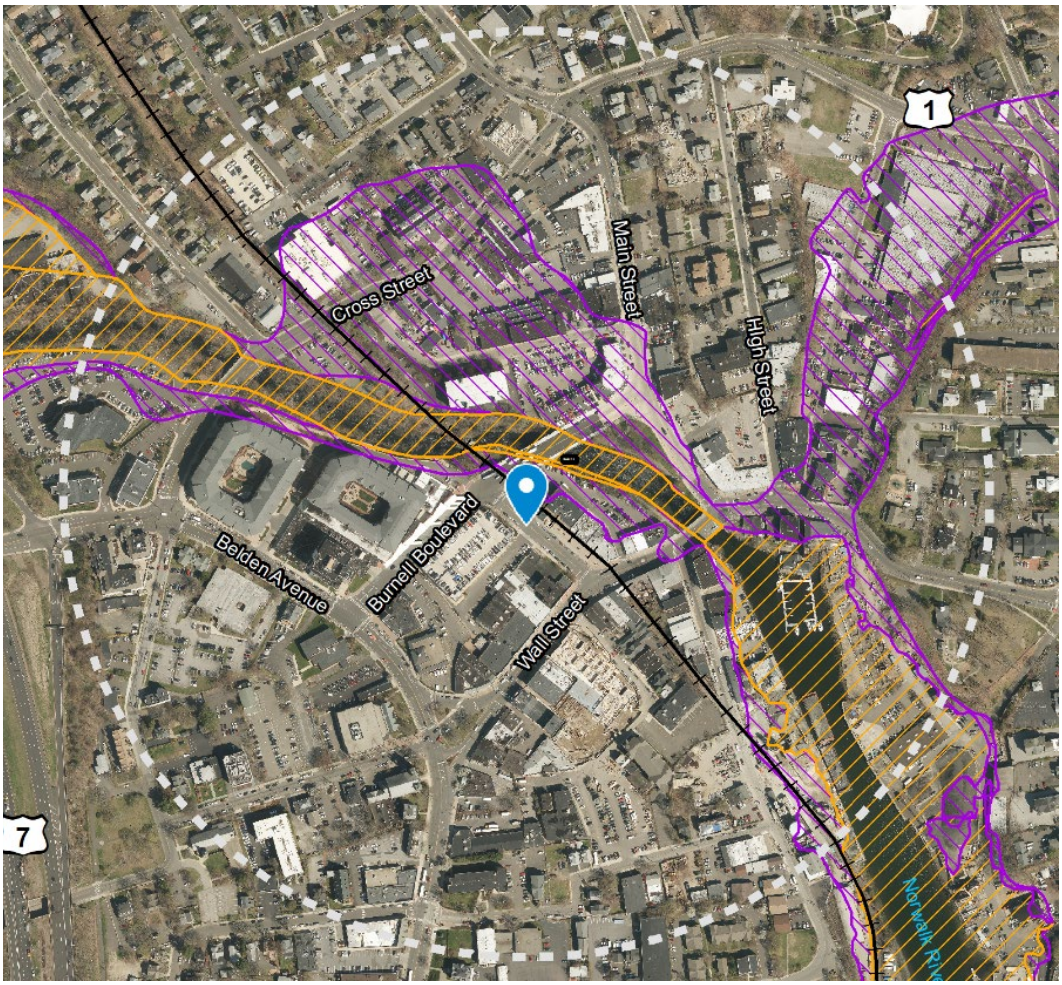
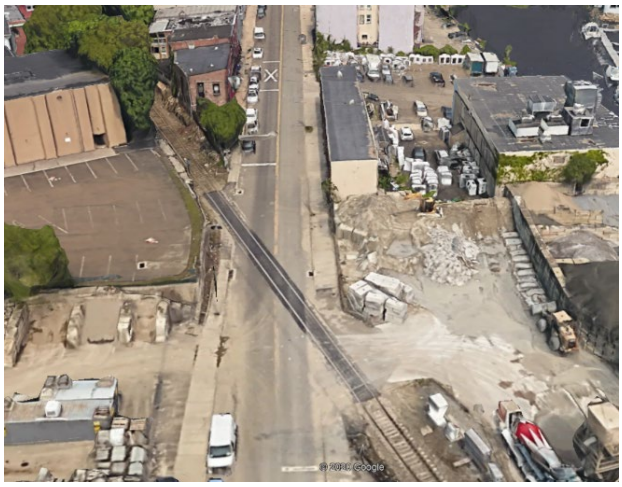


Figure 4: Flood Zones in the Study Area (Source: DEEP. Special Flood Hazard shown in orange; other flood zones shown in purple)

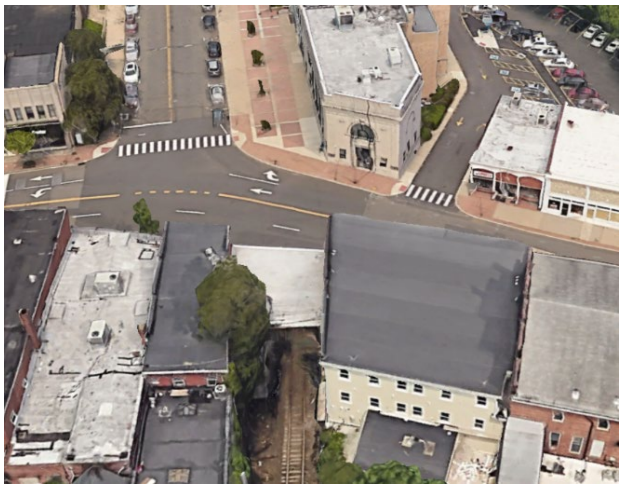
2.3. Land Use

The south end of the Study area around the Commerce Street grade crossing includes mostly industrial land use, with residential and commercial land uses north of the crossing along Commerce Street. The railroad then continues under the Wall Street business district and runs along a parking lot at Mechanic Street. Land uses west of the line on Burnell Boulevard include commercial and office areas, as well as the Norwalk Transit hub and Norwalk Parking Authority parking garage.

North of the river, the railroad is surrounded by a private parking lot and commercial activities. Views of these various areas can be seen below in Figure 5.



Commerce St Area



Wall St Tunnel – South Portal

Intersection of Burnell Blvd and River St

Cross St Area

Figure 5: Views of the DBL at different locations within the Study area (source: Google Earth)

3. Main Conceptual Design Criteria for the Insertion of the New Station and Service Operations

The design of the station would be controlled by ADA Accessibility Guidelines (ADAAG), NFPA 130, 2018 MNR Station Guidelines and CTDOT guidelines and policies with regards to accessibility. The Study is based on the following criteria regarding the dimensions of the platform and its potential locations along the DBL:

- Typical Diesel MNR consist of 1 Diesel-Electric BL20GH locomotive, 5 Shoreliner coaches and 1 Shoreliner cab car for a total of 6 passenger coaches. Typical width of 10 feet, and length of 580 feet;
- Side clearance from track centerline: 7 ft minimum to any side obstructions;
- The platform shall be fully accessible from/to a train stopping at the station and allow passengers to use all train doors at once in order to abide by **CTDOT's commitment for a fully accessible railroad**. A platform shorter than the train berthing at it would not allow all doors of the train to be accessible, and would force

passengers with disability to board and alight at specific doors and able-bodied passengers to move through the cars to alight the train at the few open doors. This situation would contradict CTDOT and MNR standards for a modern operation and for the greatest achievable level of comfort for all passengers.

- Platform length: as described in the 2018 MNR Station guidelines with 530 ft minimum for 6 coaches with an additional 20 ft for maneuverability. This length is being applied to the proposed platform extension at Merritt 7 on the DBL, and was implemented at Berlin Station on the New Haven Line in 2018. A 6-car platform is requested to allow for the regular trains running on the DBL to fully berth at the station. Using shorter trains specifically for the purpose of stopping at the new station fully berthed would require the implementation of a new dedicated shuttle service terminating at South Norwalk, with the acquisition of additional rolling stock. This option is not being evaluated as part this Study[1].
- Platform width: 12 ft for a side platform;
- Platform height: 4'-4" from top of rail (high level) to allow for full level boarding along the train;
- Platform access compliant to ADA Accessibility Guidelines (ADAAG), with the inclusion of either ramps or elevators at each pedestrian access point to the high level platform;
- Platform to be located on tangent track or, if deemed necessary, along curves with degree of curvature up to 1 degree 40 minutes. Platforms cannot be located on curves with higher curvature and the extremity of the platform must then be located 45 ft from the curve as an absolute minimum;
- Platform to be preferably located on tangent 0% grade, with a preferred maximum grade of 0.50%, and an absolute maximum grade of 1.50%, with ADA requirements checked;
- Platform shall comply with NFPA 130 Standard for fixed guideway transit and passenger rail systems. In particular means of egress shall be installed every 100ft or less, and the common path of travel from the ends of the platforms shall not exceed 85ft.

Refer to the conceptual design criteria for a full list of criteria and assumptions.

Locomotive positioning noted below for the sites evaluated is for ideal operating conditions. However, the position of the locomotive may vary and as such there may be instances (in the various concepts described below) where a locomotive engine may be running/idling inside the Wall Street tunnel. This situation has the potential to present an occupational safety issue for the train engineer working in the locomotive and for passengers sitting in cars that have air circulation system intakes in proximity to the locomotive.

4. Site Evaluation

4.1. Sites considered

Five sites have been considered for this Study, including:

- The Cross Street Site: Area located between Cross Street at-grade crossing and Norwalk River Bridge;

[1] Refer to the Danbury Branch Line Evaluation Study prepared by AECOM for CTDOT in 2018 for an analysis of potential service and operational improvements on the DBL, including a commuter shuttle between South Norwalk and Merritt 7.

- The River Street Site: Area located south of Norwalk River Bridge, including the possibility to extend the station within the Wall St tunnel;
- The Isaacs Street Site: Area located between the south portal of the Wall St Tunnel and Commerce Street at-grade crossing.
- The Wall Street Historical Site
- River Street to Cross Street Site

Refer to Secton 7 for illustration.

4.2. Cross Street Site

The site is limited by the presence of a 2 degree 30 minutes curve beginning approximately 50 ft south of the at-grade crossing, and the extremity of the rail bridge over the Norwalk River. With the curve being too sharp to accommodate a platform, the available length of tangent track for the platform is therefore restricted to 300 ft, slightly over the 275 ft needed for a 3-coaches consist. Operation at the station would therefore require a reduction in the number of coaches being able to berth at the platform to 3 at the same time and would therefore not comply with the operation of the 6 to 7-car through trains found in the current weekday Danbury Branch schedule. These trains would be required to make a time-consuming and operationally disruptive double stop in order to provide level access to each coach. Passenger service and comfort would also be diminished in that case. Having only one half of the train open to the platform and asking passengers to move to the open doors when they physically can, or for passengers with disabilities to board specific cars at their origin station in order to be able to alight at the new station, as seen at several existing stations, would not be compliant with CTDOT's commitment to fully accessible trains and the achievement of the greatest possible level of service to the passengers. **The very limited length of the platform and its consequences on operation does not permit to conclude on the feasibility of this site.**

The 1.37% grade along this section of the track remains an impediment to the construction of a platform with optimal conditions for passengers on the platform Although within the limits of an accessible route per ADA standards, the running slope would be over the generally accepted standard of 0 to 0.5%. Additional ADA access points may be needed to reduce the accessible route length to a level area. However, it should not present significant operational impacts as the types of locomotive used by MNR on the line would be able to operate up the grade with relatively light passenger trains without much difficulty.

Platform location is preferably on the west side of the track to take advantage of the adjacent private parking lot as a potential area for a pedestrian plaza and entrance from Cross Street, and potentially a small-sized parking lot or drop-off/pick-up area. The plaza would accommodate all ticketing services and amenities needed to facilitate the customer's experience. Real Estate purchase or easement would probably be required to build the parking lot and drop-off/pick-up area. The Cross Street site can be seen below in Figure 6.

From an operation standpoint, the locomotive could either be pushing in the direction of Danbury as long as any part of the consist does not dwell on the at-grade crossing while stopping at the station; or pulling as long as the locomotive idles between the platform and the grade crossing without blocking it.

For better operability and minimal gate down time of the at-grade crossing, an additional study of the crossing would be needed in subsequent design phases, including a diagnostics analysis conducted by CTDOT to determine the most appropriate type of crossing protection to apply. For southbound trains short enough to clear the crossing, the gates may be able to open after the train passes, even while still stopped at the station. Northbound

operations are anticipated to be more complex and would necessitate a modification of the control system at the grade crossing to limit the gate "down" time while the train is stopped at the station.

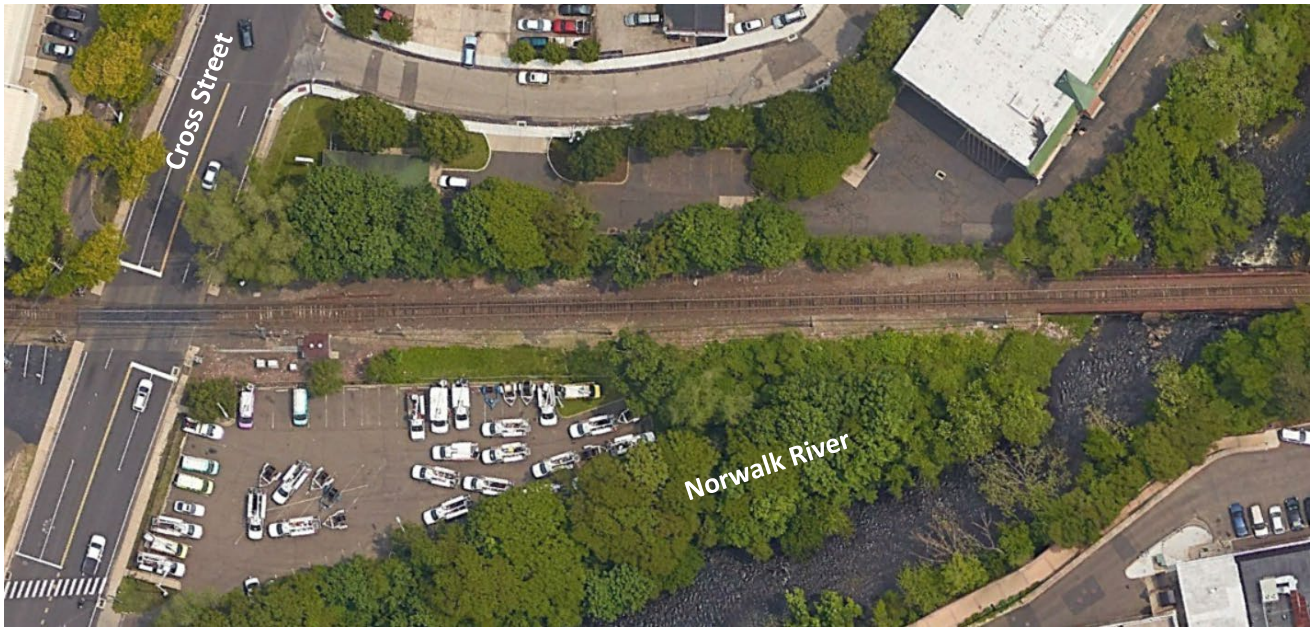


Figure 6: Cross Street Site (source: Google Earth)

4.3. River Street Site

On this site the station is located south of the Norwalk River between the bridge and the Wall St Tunnel. The River Street site can be seen below in Figure 7.

The track is surrounded on the west side by the existing retaining wall supporting River Street and on the east side by the pier of the overhead bridge supporting Burnell Boulevard located 20 ft away from the track center. Therefore, given the sufficient clearance along the face of the pier for a 12-ft wide platform, the platform would preferably be located on the east side of the track to avoid impacting the retaining wall/bridge abutment. Furthermore, a location east of the track would allow for a direct access to the municipal parking lot on Mechanic Street, through stairs and ramps.

The available length of tangent track outside of the tunnel is limited to approximately 200 ft, allowing for a 190-ft, 2-coach platform. Existing horizontal clearance within the tunnel does not allow for extending the platform inside the tunnel. In this option, operation at the station would require to reduce the number of coaches being able to berth at the platform to 2 at the same time using the same double or even triple stop operation described for the Cross Street site. Similarly, **the limited length of the platform and its consequences on operation does not permit to conclude on the feasibility of this site.**

Similarly to the site at Cross Street, this station would be located on a 1.37% track grade, which is above the preferable 0.50% grade limit for a station. Additional ADA access points may be needed to reduce the accessible route length to a level area.

A plaza area could be created in the existing Mechanic St. parking lot to provide a pedestrian entrance with ticketing services and customer amenities. Access to the platform from Burnell Boulevard is also possible with the creation of a new overpass, and a new stair and elevator tower on the east side of the track. This entrance

would facilitate transfers with bus service at the nearby transit hub and would provide a convenient access to the public parking garage, both located on Burnell Boulevard.

On this site trains with locomotives either coming to a stop within the tunnel or accelerating through it as the train departs the station could result in a substantial volume of exhaust produced by the locomotive within the narrow confines of the tunnel which would be passed through by the passenger cars. Therefore for this site to be acceptable the locomotive would need to pull the consist in the direction of Danbury so the locomotive would not idle in the tunnel. Symmetrically, southbound trains would need to have their locomotive pushing. A detailed operation analysis is required to determine the effects of the locomotive location in the consist on the operation along the line, and on the train turns at the terminus more specifically.

Similarly to other sites, for better operability and reduced gate down times, control systems at the at-grade crossings at Cross Street and Commerce Street may have to be modified. Additional study of the crossings will be needed in subsequent design phases to determine the most appropriate type of crossing protection to apply.

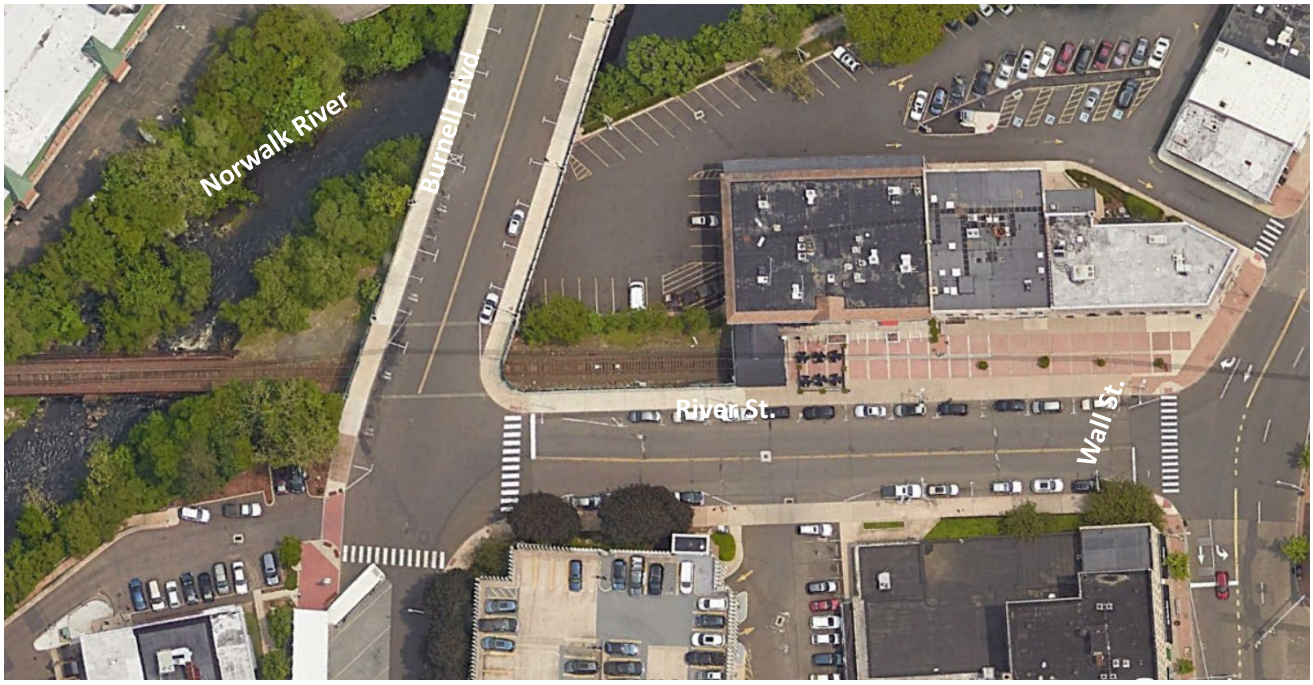


Figure 7: River Street Site (source: Google Earth)

4.4. Isaacs Street Site

This site is located between the south portal of Wall St Tunnel and the at-grade crossing at Commerce Street, on the east side of the track, and can be seen below in Figure 8.

The site is constrained between a 5 degree 15 minutes curve starting 20 ft south of the tunnel portal, which is too sharp to accommodate a platform, and the grade crossing. Therefore, the available length for a platform is limited to a 275-ft, 3-car length. Similar to the other sites, operational restrictions will thus have to be put in place, with reducing the number of coaches being able to berth to 3 at the same time and applying a double stop maneuver. **Because of the reduced platform length, the feasibility of this site still needs to be verified from an operational standpoint.**

Refer to Secton 7 for the location of the curve, the tunnel portal and the grade crossing.

A potential access to the platform is through a new plaza located at the intersection of the railroad with Commerce Street. This new plaza would accommodate ticketing services and customer's amenities, along with stairs and a ramp to access the high level platform. Another access point from Wall Street through a new entrance with a stair and elevator shaft may also be possible with additional property acquisition along Wall Street and Commerce Street.

This site does not offer immediate access to an available parking lot. Potential sites for a parking lot may be considered south of the station along Commerce Street.

This layout would require the acquisition of residential and commercial properties outside the railroad right-of-way, located along Commerce Street, some of them potentially listed on state or national register, or eligible. The specific extent of the acquisitions would be determined in subsequent design phases. Refer to Secton 7 for a visualization of the effects of the platform and pedestrian plazas on the surrounding buildings.

At this location the locomotive would preferably be in a pushing configuration towards Danbury in order to prevent the locomotive from idling in the tunnel and accumulating diesel fumes in the closed space. As a consequence, given the train would idle on the at-grade crossing while stopping at the station, the at-grade crossing would be maintained closed for the entire stopping duration. A train with a locomotive leading on the north end would, depending on its length, be subject to the same conditions described for the Burnell Blvd. site and would raise the same concerns of fume exhaust within the tunnel for a prolonged time.

Depending on the speed and the length of the approach circuits of the at-grade crossing at Cross Street, its control system may also have to be modified. A detailed analysis is required to provide a specific plan of operation.

Figure 8: Isaacs Street Site (source: Google Earth)

4.5. Wall Street – Historical Site

This site is located between the south portal of Wall St Tunnel and Commerce Street's at-grade crossing, on the west side of the track. This location corresponds to the former site of the Wall Street station, which included a station head house over the tunnel, at 47 Wall Street.

Similar to the Commerce Street site, the platform length would be limited to a 275-ft, 3-carlength, with consideration to be given to only 3 coaches allowed to berth at the platform at the same time. **Similar to the previous sites, the feasibility of the double stop procedure given its impact on the schedule still needs to be demonstrated.**

At this location, an access point from the former station head house and adjacent properties at 47 and 49 Wall Street above the tunnel may be possible, with the creation of an entrance, a stairway and elevator shaft, including an elevator machine room, and a pedestrian pathway to the platform at track level. The footprint of the abandoned rail tower located at the tunnel portal could possibly be reused for the creation of the entrance. Another access point to the platform would be possible through a new plaza located at the intersection of the railroad with Commerce Street. This new plaza would accommodate ticketing services and customer's amenities, along with stairs and a ramp to access the high level platform.

The construction of the platform and the access points would require the demolition of the existing retaining wall along the track and its reconstruction approximately 15 ft from the track center. Underpinning may be considered to minimize the impacts on the properties adjacent to the right-of-way.

This site does not offer immediate access to an available parking lot. Potential sites for a parking lot may be considered south of the station along Commerce Street.

This layout would require the acquisition of residential and commercial properties outside the right-of-way along Wall Street and Isaacs Street, some of them potentially with historic value. The extent of the acquisitions will be determined in subsequent design phases Refer to Secton 7 for a visualization of the effects of the platform and pedestrian plazas on the surrounding buildings.

At this location the locomotive would preferably be in a pushing configuration towards Danbury in order to prevent the locomotive from idling in the tunnel and diesel fumes from accumulating in the closed space. As a consequence, given the train would idle on the at-grade crossing while stopping at the station, the at-grade crossing would be maintained closed for the entire stopping duration.

Depending on the speed and the length of the approach circuits of the at-grade crossing at Cross Street, its control system may also have to be modified. A detailed analysis is required to provide a specific plan of operation.

4.6. River Street to Cross Street

As an alternative to the sites discussed above and to allow for a full 6-carlength platform, considerations were given to a platform crossing over the Norwalk River on the existing 130-ft bridge. In this option, the platform begins approximately 75 feet north of Wall Street Tunnel's portal and ends north of the river with a length of 530 ft. 7-car trains could also berth at the platform, although with the doors of the first and last cars not all accessible.

To avoid the Burnell Boulevard Bridge abutment and to provide direct access to the parking lot at Mechanic Street, the platform would be located preferably on the east side of the track. A new entrance from Cross Street would be created at the north end of the platform, including a pedestrian plaza with ticketing services and amenities. Opportunities for additional parking spaces may be found on the west side of the track within the

existing private parking lot. A connection to the platform through an overpass equipped with elevators would be required.

Similar to the sites at Cross Street and River Street, this station would be located on a 1.37% track grade. Additional ADA access points may be required to reduce the accessible route length to a level area.

This option combines the advantages of the River Street and Cross Street sites, with potential access points from Mechanic Street, Burnell Boulevard and pedestrian connections to the transit hub and parking garage, and Cross Street.

This option would require the reconstruction of parts of or the entirety of the Norwalk River bridge, with a widened deck accommodating the platform in lieu of the existing catwalk on the east side of the deck. The full extent of the reconstruction would be determined in subsequent design phases and may include foundation reinforcement and abutment reconstruction. The platform will be designed to fully comply with life safety standard NFPA 130 and will likely be required to have accessible means of egress on both sides of the bridge. An environmental and permitting analysis will also be needed to validate the concept. Construction sequencing will need to be carefully vetted in order to assess the impacts of the bridge's replacement on the existing passenger and freight operation. Substructure work may potentially require long-duration track outages.

From an operation standpoint, this option offers a berthing capacity for a full 6-coach consist, therefore requiring no specific operation limitation in terms of consist length. The locomotive could either pull or push the consist in the direction of Danbury as the distance between the platform and the north portal of the tunnel can be increased so the locomotive does not idle in the tunnel. For northbound trains, it is estimated the platform could be positioned sufficiently south to avoid blocking the Cross St. grade crossing while the train is in the station.

Similar to other sites, for better operability and reduced gate down times, control systems at the at-grade crossings at Cross Street and Commerce Street may have to be modified.

5. General Operational Impacts from a New Station

The Danbury Branch operates over a single main track for 24 miles. It has three, short passing sidings between the Wall St. area and Danbury. Trains traveling in opposite directions must utilize these sidings and main track in order to pass by each other. The single track operation requires a precise operation to avoid delays to one or both trains and to maintain reasonable travel times. Long waits at passing sidings greatly lengthen overall travel times. Therefore, the train schedules are carefully arranged to time the train 'meets" at the siding locations to minimize wait times. Deviations from these times for just one or two trains could impact the entire schedule. Figure 9 provides a graphical space/time diagram (string chart) showing the existing weekday Danbury Branch schedule as a reference. Time is measured on the X Axis; Distance is recorded on the Y Axis.

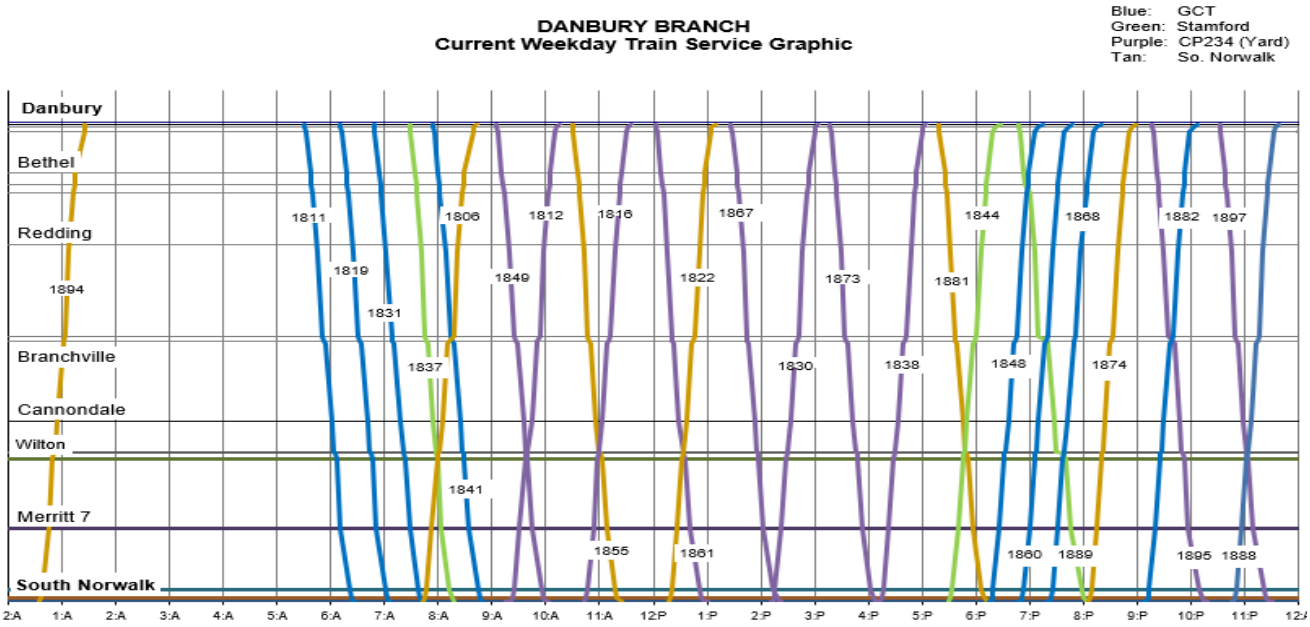


Figure 9: Danbury Branch Weekday Service (Source: 2019 Metro-North Schedule)

Adding a new station stop will alter the running "slots" the trains occupy in the current schedule by adding time after the stop to northbound trains and revising the southbound schedule to run earlier, as necessary, in order to hold the scheduled arrival times at the junction with the New Haven Line in South Norwalk The net effect from these changes could be a lengthening of the time required for trains to wait at the passing sidings, in some cases by as much as 4-8 minutes if the overall schedule cannot be adjusted. The lengthened running times will also reduce the amount of, already limited, time the train has to reverse direction or "turn" at Danbury, as train crews need sufficient time to perform mandated safety checks before each run and reliably originate the train back towards South Norwalk. The schedule may be impacted to maintain time for the safety checks. Additional passing sidings could reduce the delay-producing factors discussed above. A review of historical siding locations indicates approximately seven additional sidings were in use at one time in the same territory. The majority supported the many industries that lined the railroad in the South Norwalk area, but their presence is a sign the right-of-way was physically wide enough to provide for a second track. A more comprehensive survey of the locations, schedule and operations is necessary to obtain a more-definitive set of infrastructure needs associated with the advancing of the station plan.

As mentioned for several of the candidate station sites studied, the effects of the location of the locomotive within the consist (at the front or the rear) to ensure the feasibility of the site will also need to be identified from an operational standpoint. The operational constraint of having the locomotive at a specific location of the consist may require additional infrastructure upgrades along the line or at Danbury. A detailed operations analysis is needed to answer the operational issues described above.

In addition to the infrastructure strictly required for the creation of the new stations, other infrastructure improvements may enhance the attractiveness of the new station. For example, restoring an electric service with an increased frequency along the line and sufficient stops at the new station would likely attract additional passengers at the new station and improve the cost-benefit ratio of the station. However, the service increase

would require an additional passing siding just north of Merritt 7 Station. Evaluated in previous studies[2], this double-ended passing siding would be 1,400 ft long approximately and would potentially be located on the west side of the right-of-way to avoid the impact on the adjacent activities along the line. The siding would be interlocked and equipped with powered switches and signals at each end. Figure 10 below shows the potential location of the passing siding.

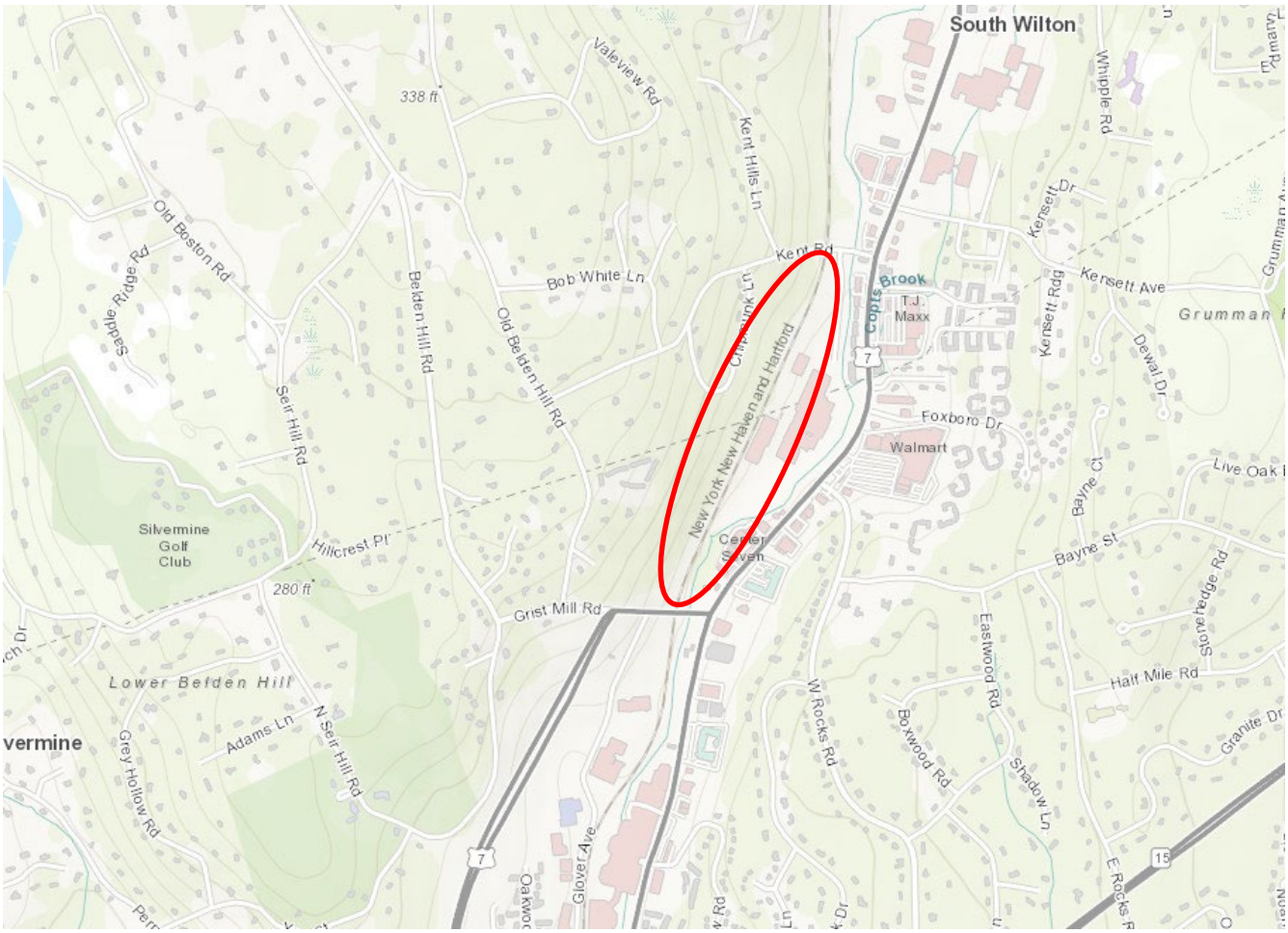


Figure 10: Potential Location for a new passing siding north of Merritt 7 (source:USGS)

6. Conclusion

Only the combination of two of the sites identified within the Study area present sufficient length to allow for a full 6-coach long consist needed to meet operational criteria, provided the physical and geometrical constraints on this section of the DBL. All of the other sites require operational limitations in the numbers of coaches being

[2] Cf. 2018 Danbury Branch Line Evaluation Study prepared by AECOM for CTDOT

able to berth at the platform simultaneously, and in most cases pedestrian access from the adjacent streets requires significant property acquisitions or construction of vertical shafts for pedestrian access.

Only the partial or total reconstruction of the rail bridge over Norwalk River would provide sufficient length for the construction of a 6-coach long platform, including a section of the platform over the river. The River to Cross Street option would avoid impacts on the Wall Street tunnel and its surroundings, and would provide enhanced connections to both Burnell Boulevard and its associated activities, and Cross Street. This solution would also be clear of the Wall St. tunnel-operations complexities and should not, except under extraordinary circumstances, block the Cross St. grade crossing for long time periods. The feasibility of this option remains to be vetted from the perspective of construction sequencing and the impacts on existing rail operation, environmental regulations and permitting.

From an operational perspective the creation of an additional stop along the single-track DBL would require modifying the schedule and/or the locations where trains running in opposite directions meet, with potentially additional passing sidings to be built along the line and additional turning time at Danbury.

The Table below summarizes the main physical, functional and operational features of each station site:

Station Sites	Physical and Functional Characteristics	Operational Characteristics
Cross Street Site	Site long enough to accommodate a 3 carlength platform only Possibility to create a parking lot through property acquisitions	Impact on the nearby grade crossing Double-stopping needed to accommodate a 6-car train, feasibility to be confirmed
River Street Site	Site long enough to accommodate a 2 carlength platform only Potential access to nearby transit hub and parking facilities	Triple-stopping needed to accommodate a 6-car train, feasibility to be confirmed Location of the locomotive at the front or rear of the train constrained by fume exhaust hazard within the Wall Street Tunnel
Isaacs Street Site	Site long enough to accommodate a 3 carlength platform only Potential access to Wall Street Substantial property acquisitions No parking lot in the vicinity	Nearby grade crossing to be maintained closed while train is at station Double-stopping needed to accommodate a 6-car train, feasibility to be confirmed Location of the locomotive at the front or rear of the train constrained by fume exhaust hazard within the Wall Street Tunnel

Station Sites	Physical and Functional Characteristics	Operational Characteristics
Wall Street Site	Site long enough to accommodate a 3 carlength platform only Potential access to Wall Street Substantial property acquisitions Retaining wall work / underpinning work	Nearby grade crossing to be maintained closed while train is at station Double-stopping needed to accommodate a 6-car train, feasibility to be confirmed Location of the locomotive at the front or rear of the train constrained by fume exhaust hazard within the Wall Street Tunnel
River Street to Cross Street Site	Site long enough to accommodate a 6 carlength platform Potential pedestrian access at Cross Street and Burnell Boulevard Potential access to nearby transit hub and parking facilities Possibility to create a parking lot at Cross Street through property acquisitions Requires modification/reconstruction of rail bridge	No significant operational constraints Impact on nearby grade crossing 7-car trains may berth at the platform given the first and last doors stay closed.

7. Station Layout Conceptual Plans

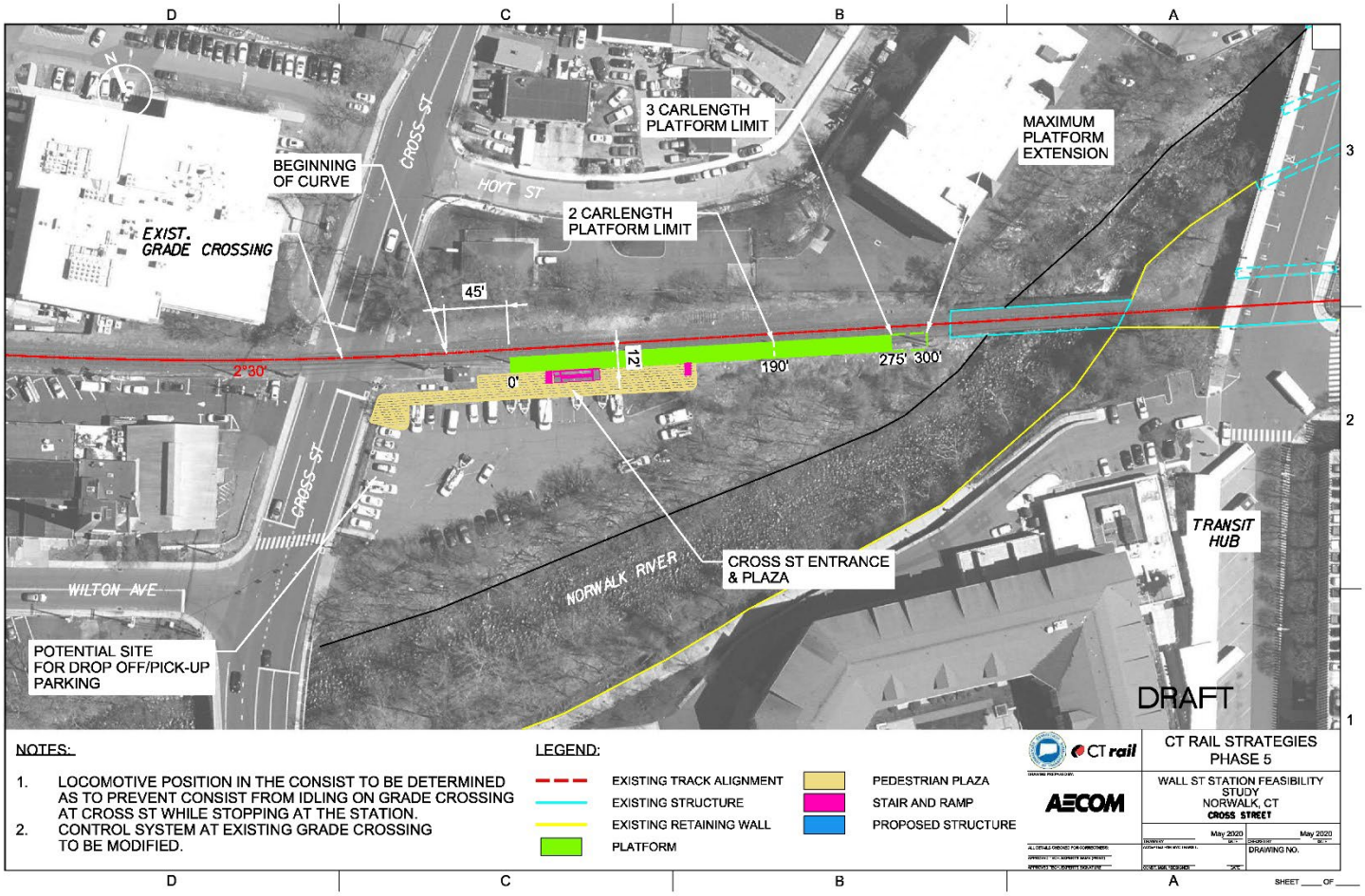


Figure 11 Cross Street Design

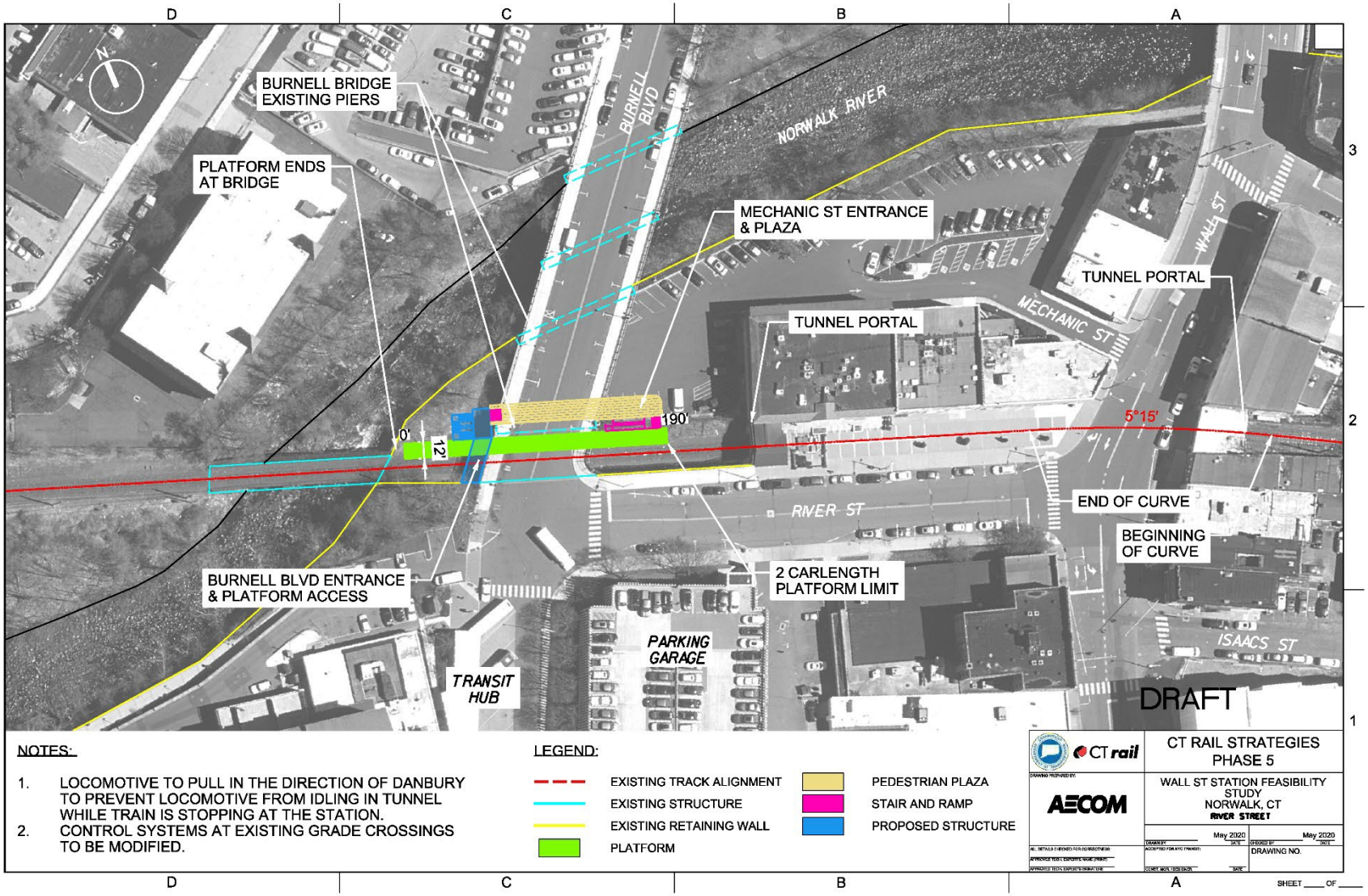


Figure 12 River Street Design

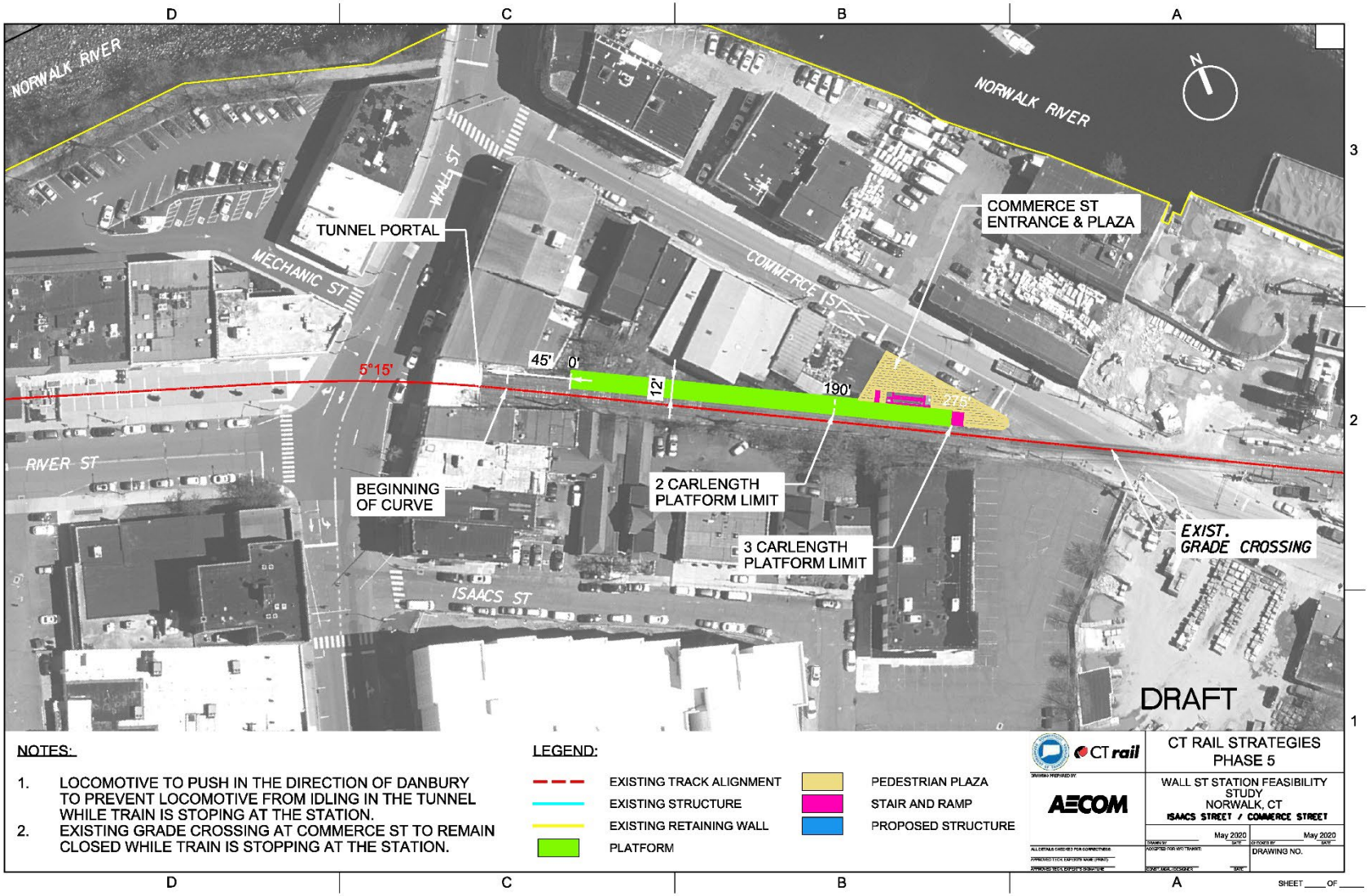


Figure 13 Isaacs Street Design

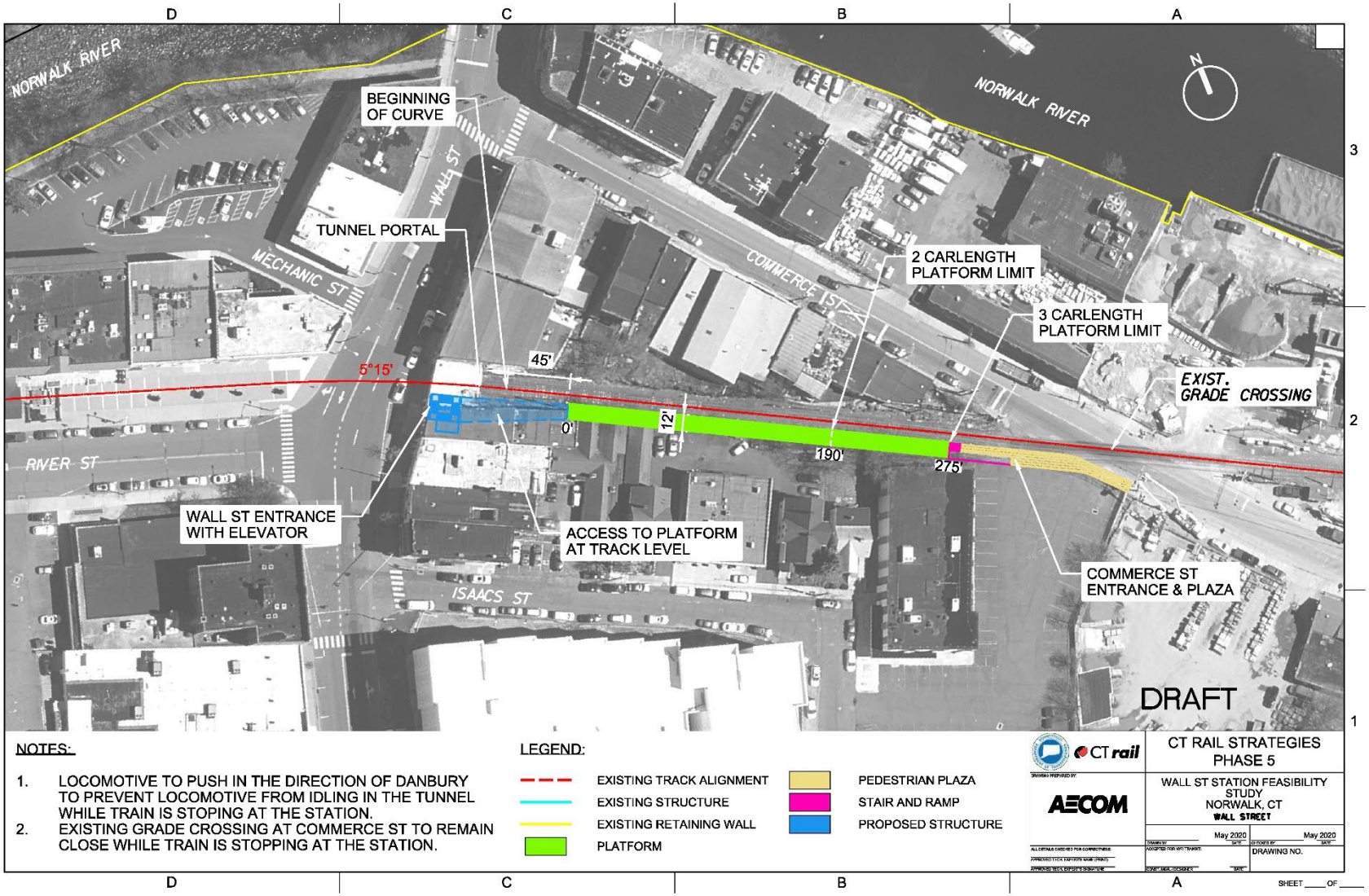


Figure 14 Wall Street Design

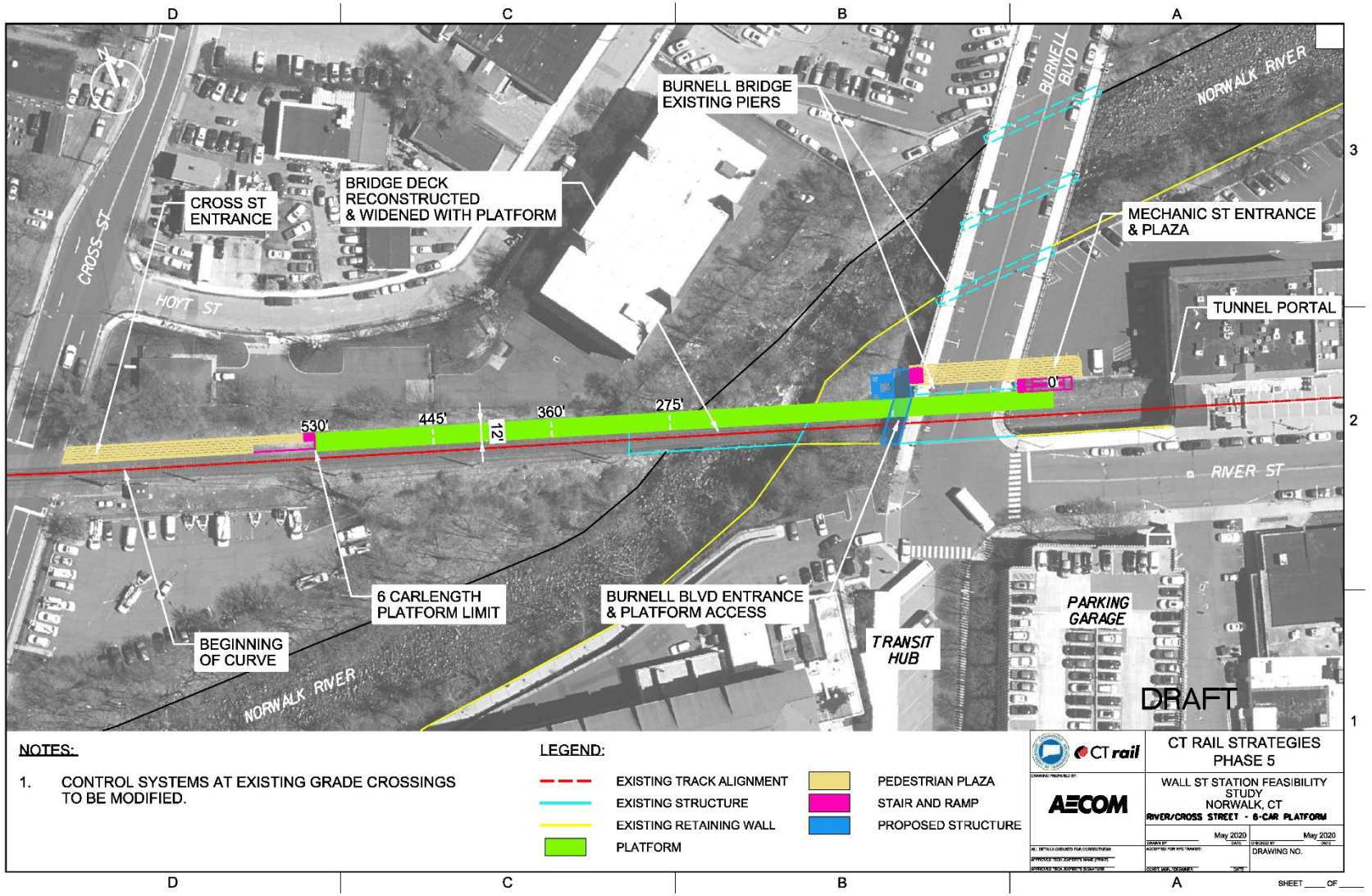


Figure 15 River/Cross Street Design