NEW HAVEN FREIGHT STUDY

June 28, 2019

Final Report

Prepared for:

City of New Haven & South Central Regional Council of Governments

Prepared By:

WSP

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Acronyms

CTDOT ..... Connecticut Department of Transportation
DDOT ..... District of Columbia Department of Transportation
FHWA ..... Federal Highway Administration
GDP ..... Gross domestic product
NPMRDS ..... National Performance Management Research Data Set
PW ..... Providence and Worcester
CSO ..... Connecticut Southern Railroad
FRA ..... Federal Railroad Administration
NHHS ..... New Haven–Hartford–Springfield Line

1. Introduction and Purpose

Study Purpose and Sponsors

The purpose of this study follows:

1. Investigate opportunities to grow the intermodal/logistics sector in New Haven and thereby add associated jobs to the economy.
2. Support freight-dependent businesses by recommending transportation improvements that will enhance transportation efficiency and make New Haven businesses more competitive.
3. Identify potential measures to minimize conflicts between freight movements and other activities in New Haven to improve community livability and quality of life.

The study focuses specifically on the city of New Haven, but the findings will also be relevant to New Haven County. The study is sponsored by the following:

- City of New Haven
- South Central Regional Council of Governments (SCRCOG) which serves as the federally-designated metropolitan planning organization for the New Haven metropolitan area
- New Haven Port Authority, which was created by the New Haven Board of Aldermen in February of 2003 per Connecticut state law to oversee the New Haven port district

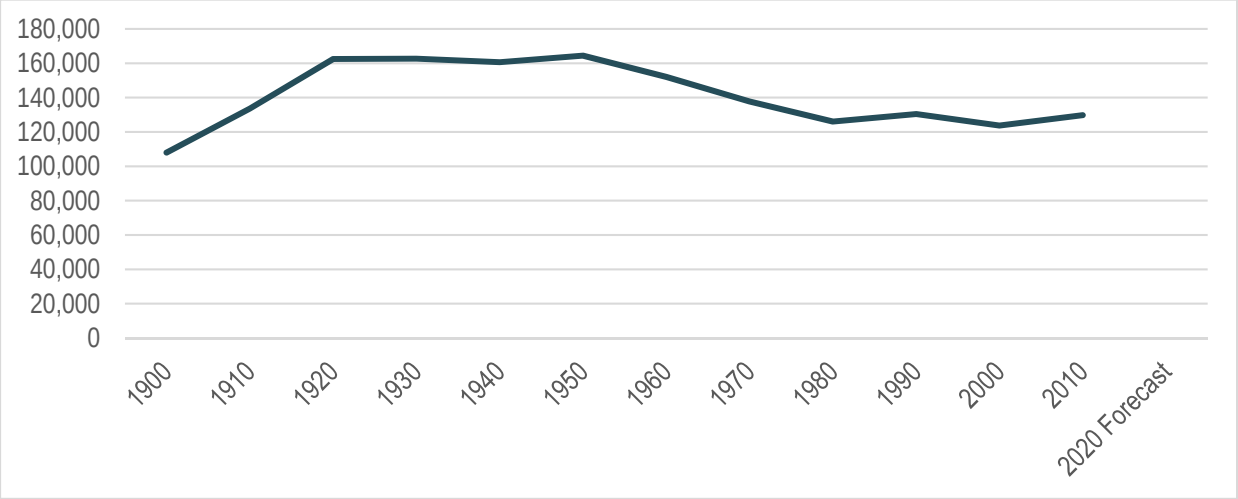
Funding for this study was obtained through the Connecticut Department of Transportation.

2. Current Conditions

2.1 POPULATION AND ECONOMIC CONTEXT

New Haven's economy has changed significantly over the city's history, and this history impacts the city's urban landscape of today. New Haven's population in 2017 was 20 percent lower than its peak in 1950 but 6 percent higher than New Haven's population nadir in 2000 (Figure 2-1). As such, New Haven's population density declined from over 8,000 people per square mile in 1960 to around 6,500 per square mile in 2000[1] and 7,000 per square mile in 2019. Given declines in population density and changes to New Haven's economy, not all land within the city is fully utilized. Furthermore, even at peak population density, significant portions of New Haven's land area was devoted to lower density uses, such as transportation infrastructure and industry.

Figure 2-1. Population, City of New Haven

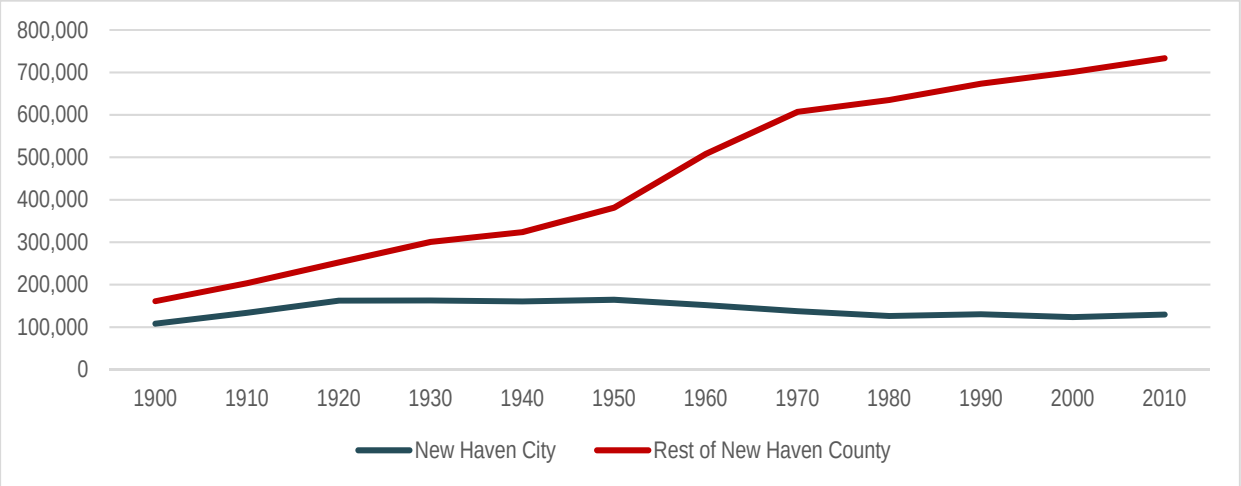


Source: U.S. Census Bureau, Connecticut State Data Center

New Haven lost population during the latter half of the 20th century at least in part due to dispersal of population to the suburbs. As shown in Figure 2-2, the population of New Haven County outside of the city grew dramatically at the same time the city of New Haven's population declined or was flat. While the city of New Haven's population density is less than it was in 1950, it is still the most densely populated municipality within New Haven County.

[1] City of New Haven, *Demographics*.

Figure 2-2. Population, City of New Haven and Rest of New Haven County

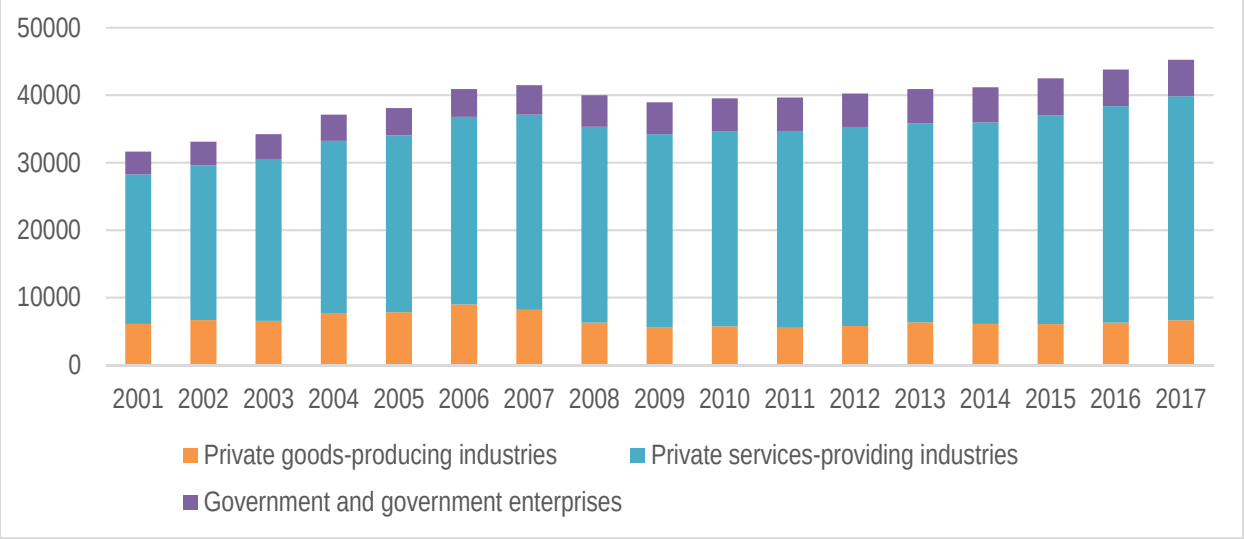


Source: U.S. Census Bureau, Connecticut State Data Center

According to the 1960 census, manufacturing was by far the largest source of employment at the time in New Haven, providing nearly a third of the city's employment. By contrast, data from the Connecticut Department of Labor suggests that as of 2019, manufacturing accounts for about 7 percent of local jobs. In general, New Haven's economy has shifted toward the service sector. This shift is also apparent in more recent trends.

Figure 2-3 shows trends in New Haven County's economy by goods-producing industries (manufacturing, construction, mining, agriculture, forestry, fishing/hunting), services industries, and the public sector. The private service-providing sector share of New Haven County's gross domestic product (GDP) increased from 70 percent in 2001 to 73 percent in 2017.

Figure 2-3. New Haven County Gross Domestic Product by Sector (Million Current Dollars)

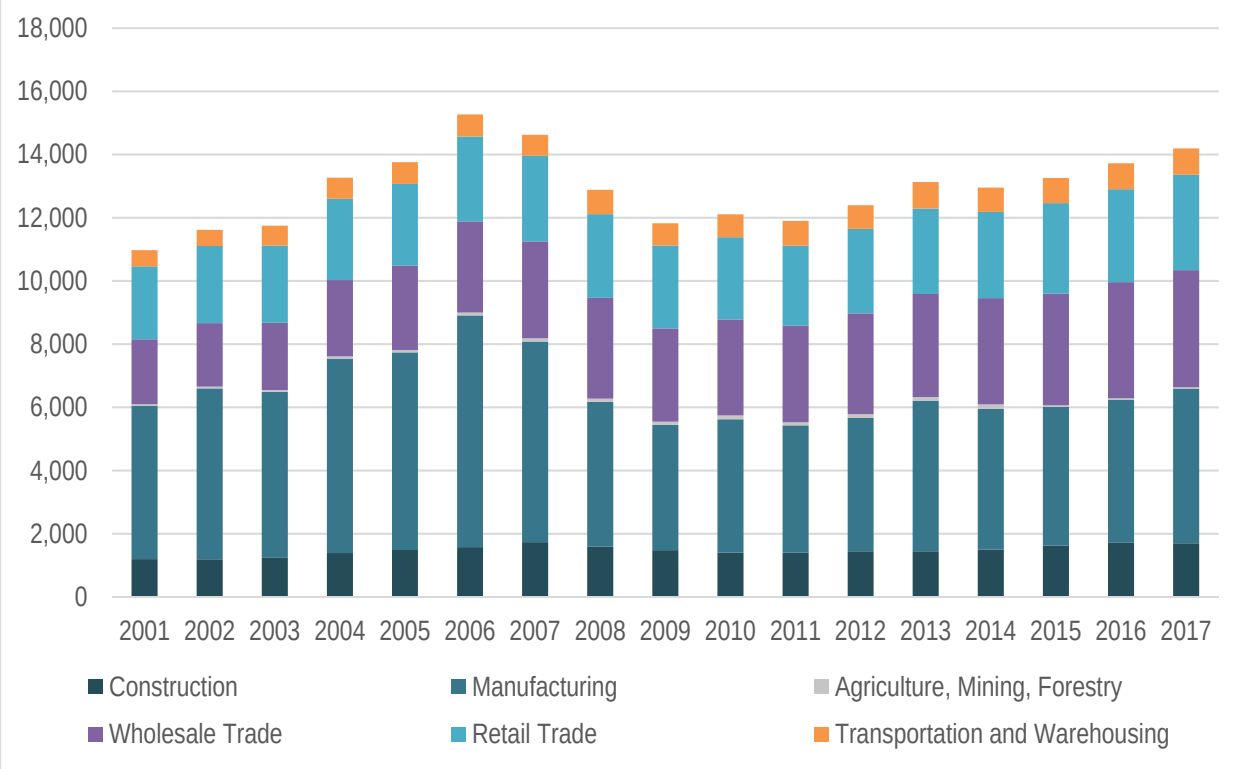


Source: U.S. Bureau of Economic Analysis

2.2 IMPORTANCE OF FREIGHT AND LOGISTICS TO NEW HAVEN

While New Haven's economy has shifted toward services, the ability to efficiently move goods remains vital to New Haven's economy. All sectors of the New Haven economy in some way rely on the movement of freight (for example, health care facilities cannot function without medical supplies), but those sectors shown in Figure 2-4 are particularly reliant on a well-functioning freight and logistics network. These sectors collectively represent 31 percent or nearly a third of New Haven County's GDP. New Haven's manufacturing sector may be less prominent than it once was, but it is still significant at 11 percent of New Haven County's GDP. Through 2006, New Haven's manufacturing sector was growing rapidly. Since the Great Recession ended in 2009, the manufacturing sector has not fully recovered but could be a growth area again. The head of the New Haven Manufacturers Association expects manufacturing to add a significant number of jobs in New Haven County ion the coming years. The cost and reliability of receiving inbound raw materials and of shipping outbound products are key to the success of manufacturing companies.

Figure 2-4. New Haven County Gross Domestic Product for Freight-Dependent Sectors (million current dollars)



Source: U.S. Bureau of Economic Analysis

These freight-dependent sectors are major job providers, employing an estimated 17,900 people in 2019 or 29 percent of New Haven employment (Table 2-1).

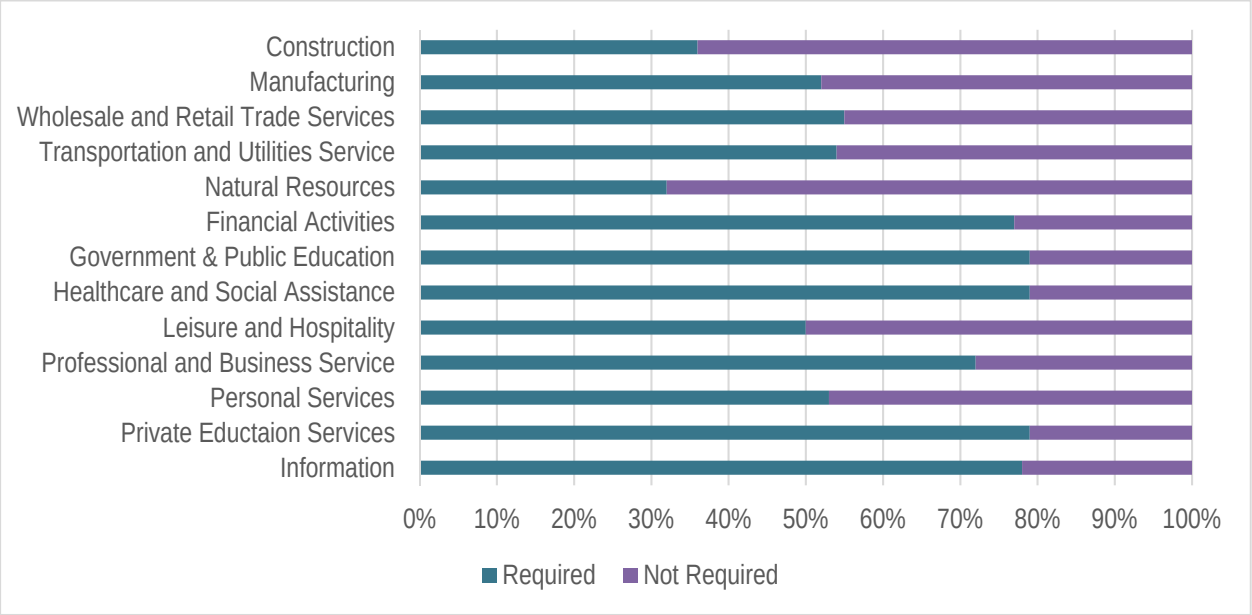
Table 2-1. Estimated 2019 New Haven City Employment by Freight-Dependent Sector

Sector	Employment
Construction	2,500
Manufacturing	4,300
Wholesale Trade	2,300
Retail Trade	7,100
Transportation and Warehousing	1,700
TOTAL	17,900

Source: Estimated using U.S. Census County Business Patterns, Connecticut Department of Labor

Freight-dependent businesses also support economic inclusion, providing jobs that do not necessarily require education beyond a high school diploma, as shown in Figure 2-5.

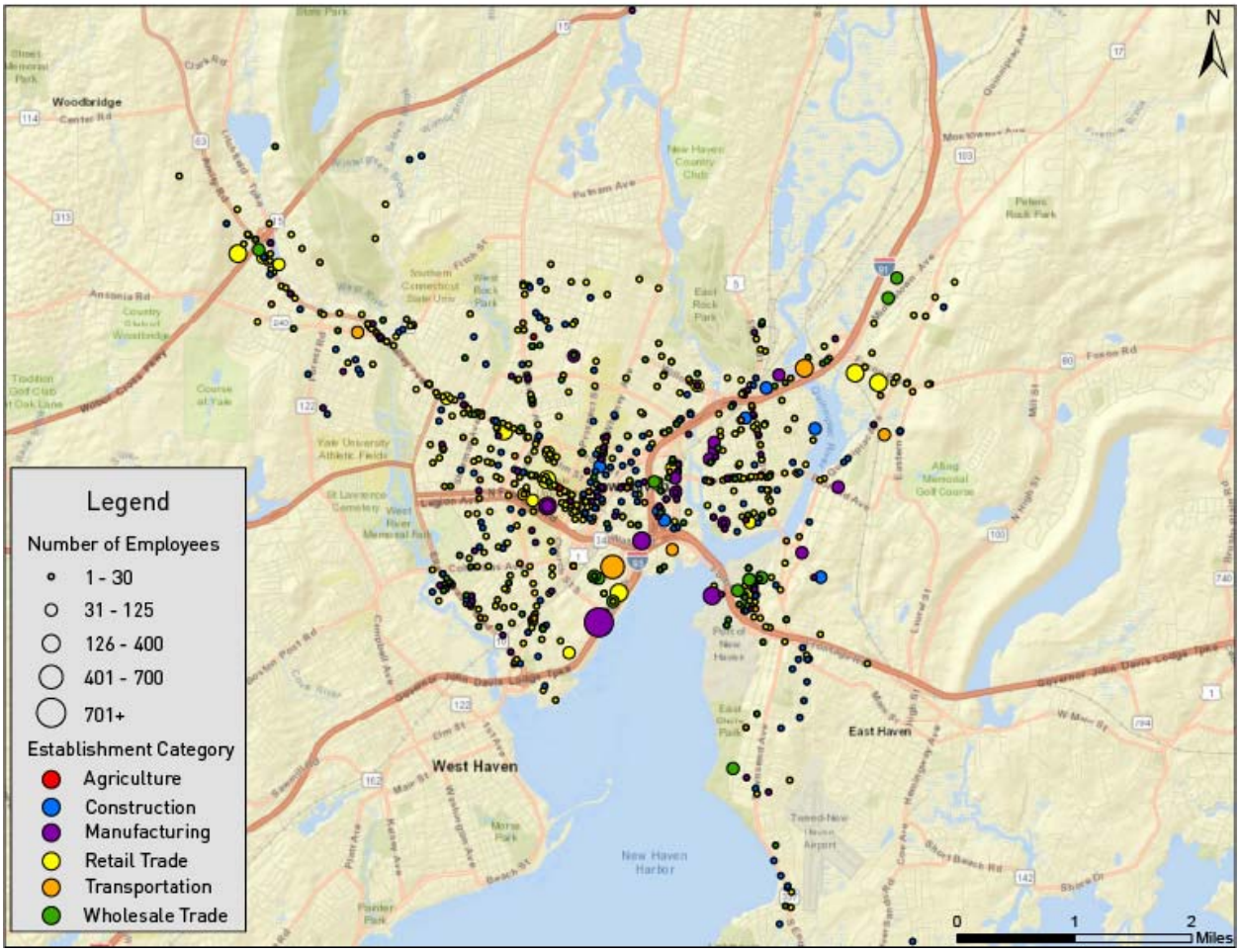
Figure 2-5. 2010 Education Distribution of Jobs by Sector in the U.S. – Percentage of Jobs that Require Postsecondary Education and Those That Do Not



Source: Georgetown University Public Policy Institute

The importance of freight transportation to New Haven's economy is apparent from the clustering of New Haven's freight-dependent businesses close to the city's transportation corridors, as shown in Figure 2-6.

Figure 2-6. Location and Employment of New Haven Freight-Dependent Establishments



Source: WSP Mapping of InfoUSA Establishment Data

2.3 FREIGHT PROFILE OF THE CITY OF NEW HAVEN

An analysis was performed of the U.S. Federal Highway Administration's (FHWA) Freight Analysis Framework-4 (FAF-4), which is a database of freight transportation activity in 2012. While FAF-4 data only depict freight flows to the larger region that encompasses Fairfield, New Haven, and Litchfield Counties, it can be further disaggregated to finer geography using employment and population data. The analysis herein allocated freight to zip codes within the city of New Haven. Outbound shipments of oil and gas products have been excluded from this analysis because they primarily consist of goods received at the port and then are shipped elsewhere in the region. For certain other commodities such as waste/scrap, no geographic adjustment has been made, because the port traffic was not entirely captured by the FAF-4 database to start with.

As shown in Table 2-2, the results suggest that in 2012 1.8 million tons of freight were shipped from New Haven, and 5 million tons were shipped to New Haven. By tonnage, the highest volume commodities inbound and outbound were gravel, stone, and other mineral products, which were 60 percent of outbound

products and 40 percent of inbound products. FAF-4 estimates that freight volumes will increase by 75 percent for outbound shipments and 50 percent for inbound shipments between 2012 and 2045.

Table 2-2. Tonnage to/from City of New Haven (excluding Port Traffic)

Commodity Category	OUTBOUND TONS				INBOUND TONS			
	2012	2045	% Increase	% Increase/Yr	2012	2045	% Increase	% Increase/Yr
Gravel, stone, other mineral products	1,103,000	1,967,000	78%	1.8%	2,031,000	3,213,000	58%	1.4%
Gas, and oils	0	0	—	—	1,768,000	2,108,000	19%	0.5%
Waste/scrap	173,000	192,000	11%	0.3%	345,000	609,000	76%	1.7%
Food and agriculture	80,000	141,000	75%	1.7%	237,000	452,000	90%	2.0%
Other consumer products	148,000	194,000	31%	0.8%	247,000	434,000	76%	1.7%
Logs and wood products	24,000	34,000	41%	1.1%	122,000	194,000	58%	1.4%
Machinery, electronics, transportation equipment	18,000	35,000	90%	2.0%	65,000	166,000	156%	2.9%
Chemicals	19,000	31,000	65%	1.5%	66,000	142,000	115%	2.3%
Paper products	21,000	28,000	33%	0.9%	78,000	104,000	34%	0.9%
Metal products	16,000	27,000	69%	1.6%	27,000	46,000	72%	1.7%
Plastics/rubber	240,000	579,000	141%	2.7%	15,000	29,000	90%	2.0%
TOTAL	1,843,000	3,228,000	75%	1.7%	5,003,000	7,497,000	50%	1.2%

Source: WSP Analysis of Freight Analysis Framework

Another analysis which disaggregated the FAF-4 database to the county level found that most freight to/from New Haven County originates or terminates within Connecticut. The second most frequent origin or destination is the New York metropolitan area.

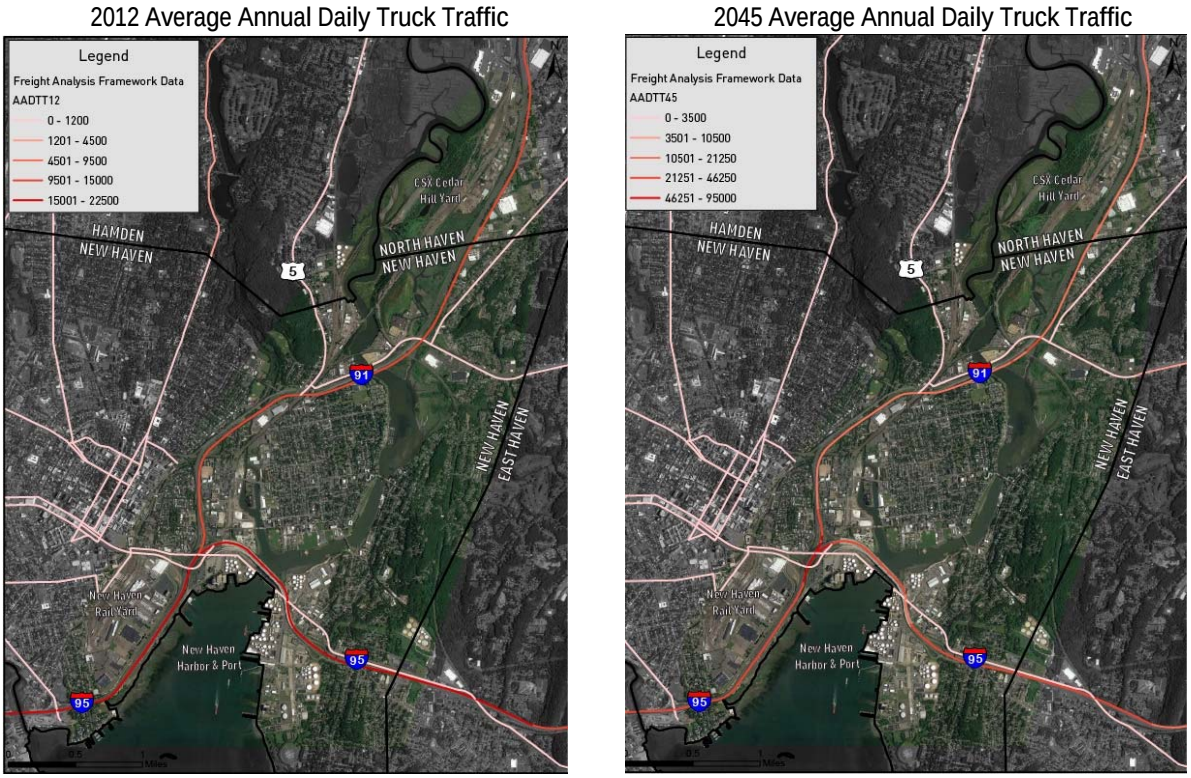
Table 2-3. Percentage of 2012 Freight Tonnage to/from New Haven County by County of Origin/Destination

Destination County	Percentage of Tons	Origin County	Percentage of Tons
Fairfield, CT	30.0%	New Haven, CT	26.0%
New Haven, CT	15.6%	Fairfield, CT	19.8%
Hartford, CT	13.9%	Litchfield, CT	17.7%
Middlesex, CT	3.2%	Hartford, CT	7.0%
Litchfield, CT	3.0%	Middlesex, CT	2.8%
Other	34.3%	Other	26.6%
TOTAL	100.0%	TOTAL	100.0%

Source: WSP Analysis of Freight Analysis Framework

While the FAF-4 forecast predicts significant growth in freight to/from New Haven, it predicts a faster rate of growth for freight passing through New Haven. Figure 2-7 displays 2012 and forecast 2045 average daily truck traffic for highways in the New Haven area. As can be seen, FAF-4 projects the volume of trucks to more than double on many of these roadways between 2012 and 2045.

Figure 2-7. 2012 and Forecast 2045 Average Daily Truck Traffic on National Highway Planning Network in New Haven

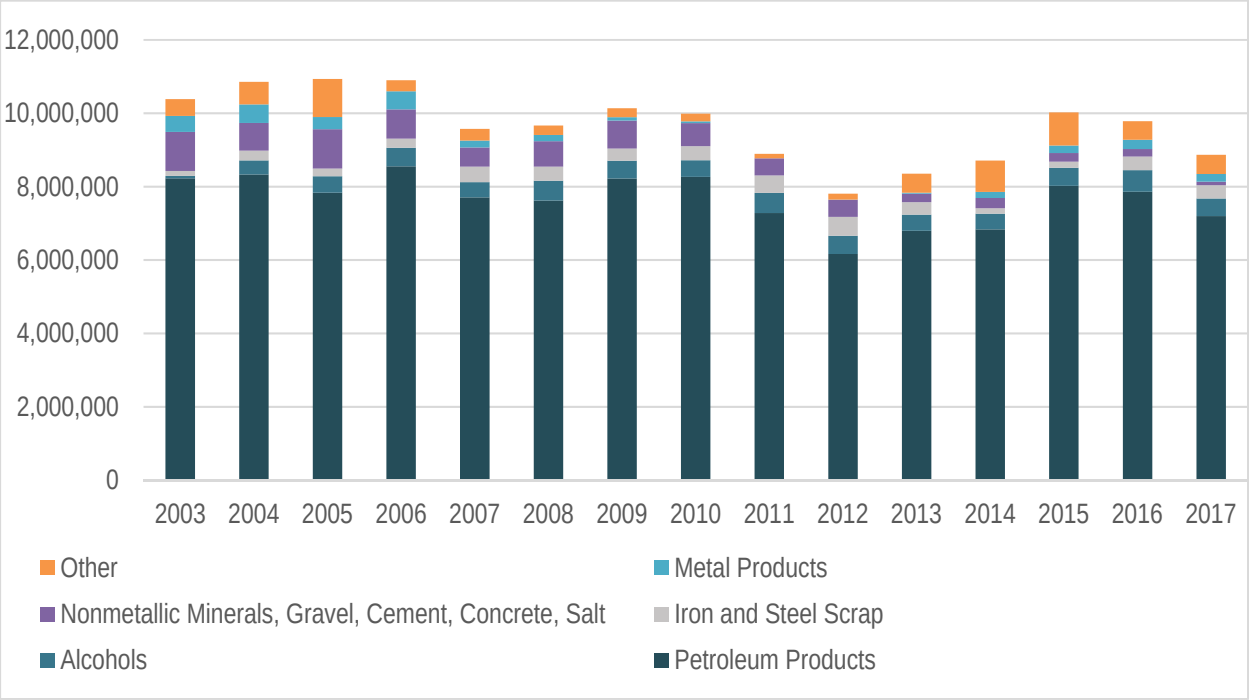


Source: WSP Analysis of Freight Analysis Framework Network File

As the 2017 *Connecticut Statewide Freight Plan* noted, freight rail had a relatively small modal share in Connecticut, carrying only 1.5 percent of freight tons in 2014. This contrasts to 11 percent of freight tons that were carried by rail nationwide, in addition to 3 percent that were carried by multiple modes, much of which were truck/rail moves. Also according to the *Connecticut Statewide Freight Plan*, New Haven County had a relatively high usage of freight rail for Connecticut, accounting for 43 percent of Connecticut outbound freight rail tonnage and 46 percent of inbound tonnage. Most outbound tonnage from New Haven County consisted of nonmetallic minerals or waste/scrap. Ohio was the primary destination for waste/scrap, while New York state was the primary destination of nonmetallic minerals. Over three-quarters of inbound tonnage was primary metal products, much of which was shipped from South Carolina. While rail had a higher modal share in New Haven County than elsewhere in Connecticut, rail still carried less than 3 percent of the tonnage of goods shipped to or from New Haven County.

In New England, the Port of New Haven is the largest port and the second largest by tonnage behind Boston. Petroleum products and alcohols were 86 percent of the cargo handled in 2017 according to U.S. Army Corps of Engineers statistics. Metal products, iron and steel scrap, and nonmetallic minerals are also important commodities. As shown in Figure 2-8, port volumes have varied from year to year but have generally been between 8 and 11 million tons since 2001.

Figure 2-8. Tonnage Handled at the Port of New Haven



Source: U.S. Army Corps of Engineers Waterborne Commerce Statistics

The sources and destinations of commodities handled at the Port of New Haven vary from year to year, depending upon U.S. and international commodity markets. In 2017, most petroleum products were from domestic sources, while scrap metal shipments were from foreign and domestic markets. In other years, a higher share of petroleum products and scrap metal was traded with international markets rather than domestic markets (Table 2-4).

A recent study by the U.S. Army Corps of Engineers predicted that the Port of New Haven's level of foreign trade would increase by 73 percent between 2016 and 2053. The forecast is based on projected increases in the volumes of commodities that the port currently handles, rather than the port handling a different commodity mix in the future (Table 2-5).

Table 2-4. 2017 Distribution of Port of New Haven Freight by Tonnage and Direction

Commodity Category	Domestic and Foreign	Domestic				Foreign		
Commodity	All Traffic Directions	All Traffic Directions	Domestic Intraport	Domestic Receipts	Domestic Shipments	All Traffic Directions	Foreign Receipts	Foreign Shipments
Gasoline	4,056,998	2,813,647	14,031	2,731,037	68,579	1,243,351	1,243,351	0
Distillate Oils	2,882,668	2,576,084	143,032	2,299,905	133,147	306,584	306,584	0
Alcohols	477,834	477,834	0	467,410	10,424	0	0	0
Salt	392,837	0	0	0	0	392,837	392,837	0
Iron & Steel Scrap	362,447	189,583	0	0	189,583	172,864	0	172,864
Kerosene	256,452	251,879	0	241,931	9,948	4,573	4,573	0
Metal Products	210,039	5,770	0	5,770	0	204,269	204,269	0
Other Petroleum Products	117,835	40,992	0	40,992	0	76,843	76,843	0
Sand, Gravel, Cement, Concrete	96,124	96,124	0	91,124	5,000	0	0	0
Other	15,040	4,021	0	4,021	0	11,019	11,019	0
TOTAL	8,868,274	6,455,934	157,063	5,882,190	416,681	2,412,340	2,239,476	172,864

Source: U.S. Army Corps of Engineers Waterborne Commerce Statistics

Table 2-5. Port of New Haven Foreign Trade Forecast (Metric Tons)

Commodity	2016	2023	2033	2043	2053	CAGR 2016–2053
Petroleum Product Imports	1,521,1665	1,665,406	1,895,023	2,156,299	2,453,598	1.3%
Scrap Metal Exports	197,816	227,228	276,990	337,649	411,593	2.0%
Salt Imports	238,123	284,992	368,389	476,190	615,537	2.6%
Primary Manufactured Goods Imports	228,766	255,651	299,630	351,174	411,584	1.6%
Miscellaneous Imports	162,703	162,703	162,703	162,703	162,703	0.0%
TOTAL	2,348,845	2,296,981	3,002,735	3,484,015	4,055,015	1.5%

Source: U.S. Army Corps of Engineers, New Haven Harbor Connecticut Navigation Improvement Project

2.4 LAND USE IN NEW HAVEN

Freight needs within New Haven vary by land use. The transportation network in those areas zoned industrial would ideally provide shippers with good access by large truck vehicles (e.g., tractor/semi-trailer with 53-foot trailer) and where possible, other modes of transportation such as rail and/or maritime. As shown in Figure 2-9, areas zoned industrial include the New Haven Port District at the head of New Haven Harbor, the area along Mill River, and the areas adjacent to the Quinnipiac River, primarily north of where I-95 crosses the Quinnipiac. The transportation network in low-density areas zoned business/commercial should also offer easy access by large trucks, while high-density business/commercial areas should allow access at minimum by smaller pickup and delivery vehicles. As seen, areas zoned business/commercial are primarily located in New Haven's downtown and along New Haven's key transportation arteries.

As shown in Figure 2-10, most of the areas zoned industrial in New Haven are within the 100-year flood zone. In the future, these areas could become more vulnerable if sea levels were to rise and storms were to become more severe due to global warming.

In some areas, no buffer exists between residential communities and areas zoned industrial. For example, areas along Chapel Street in Fair Haven are zoned industrial to the south and are residential to the north of Chapel Street. Similarly, houses on Fulton Street east of the port district back onto an industrial area.

Figure 2-9. New Haven Zoning Map

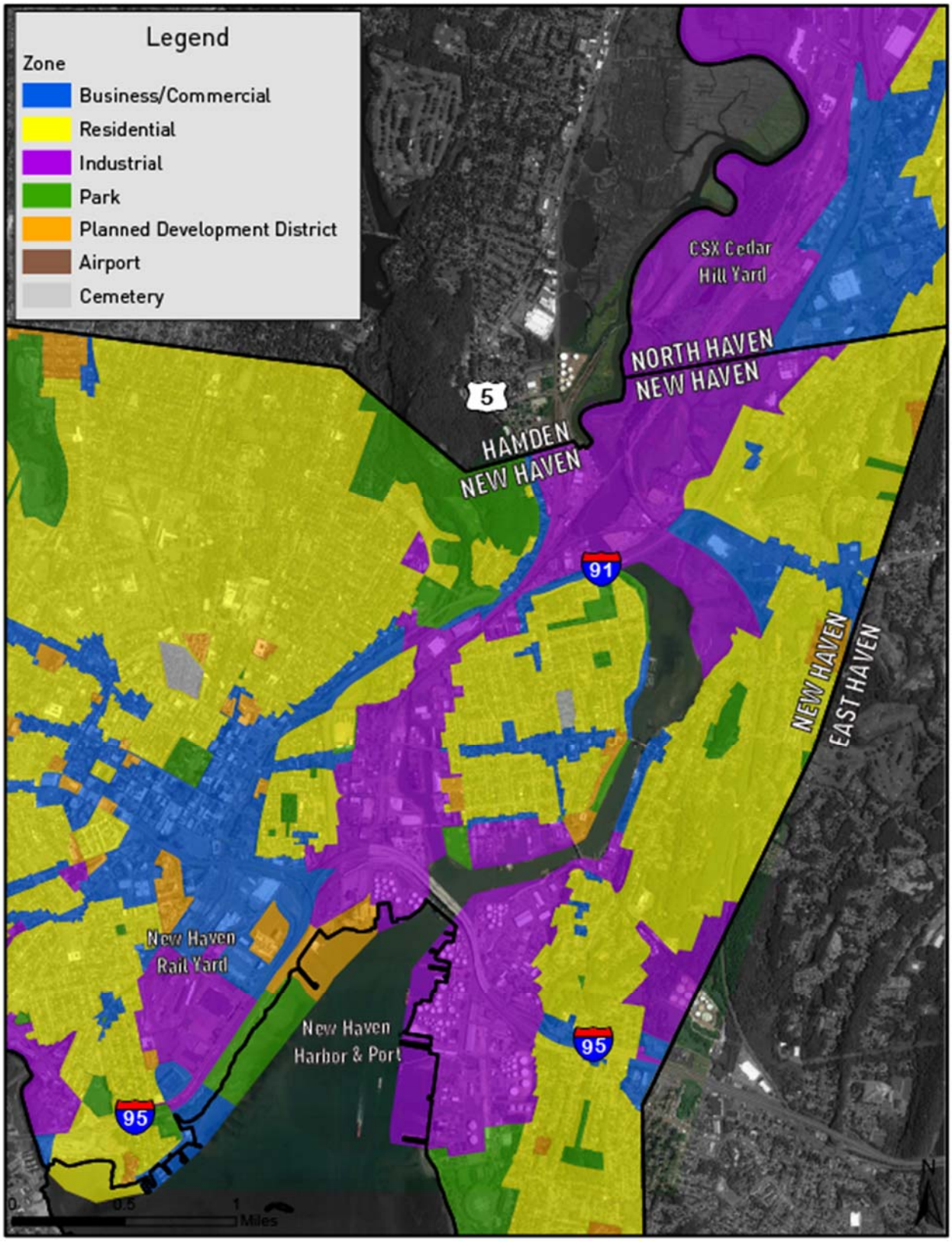
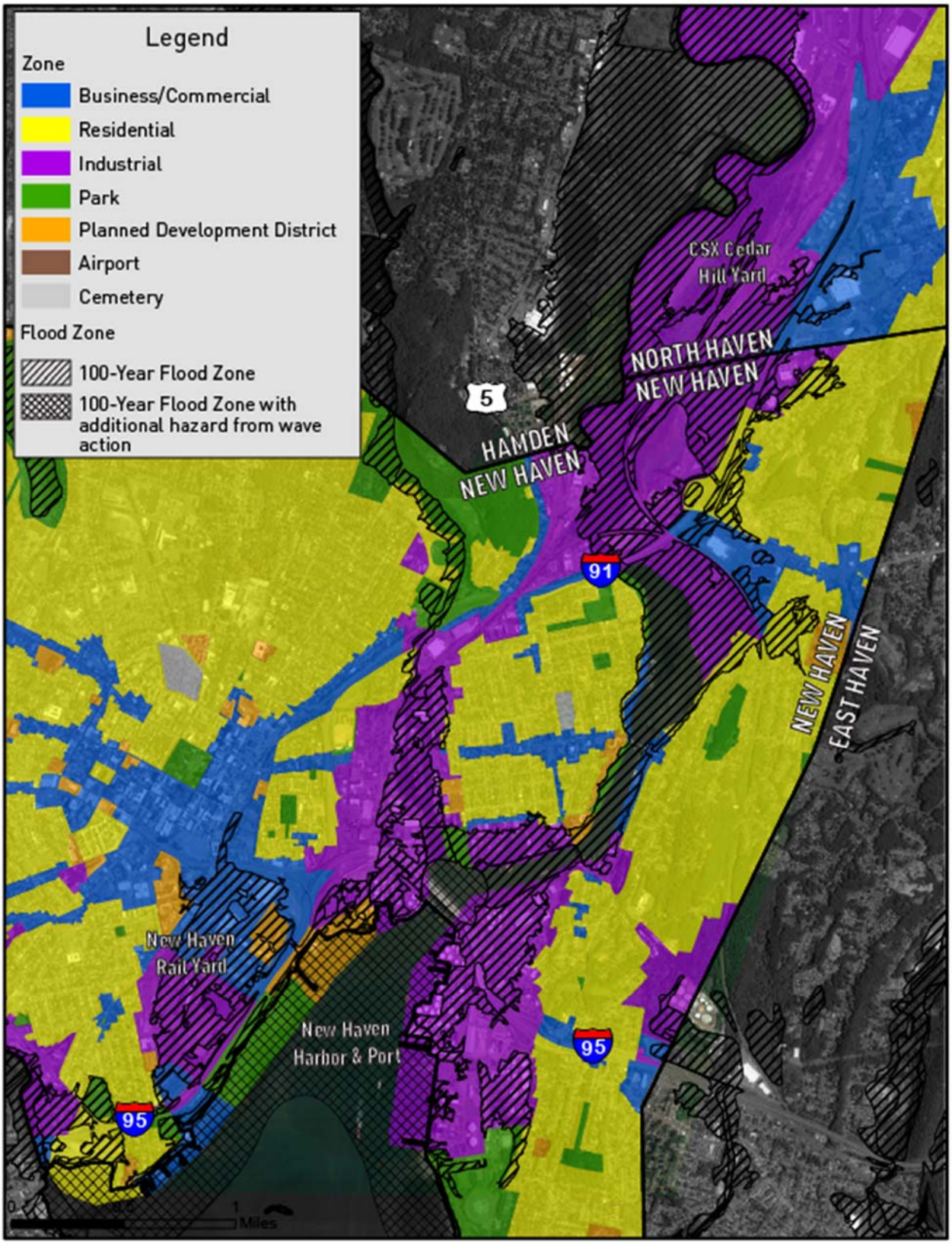


Figure 2-10. New Haven Zoning and 100-Year Flood Zone



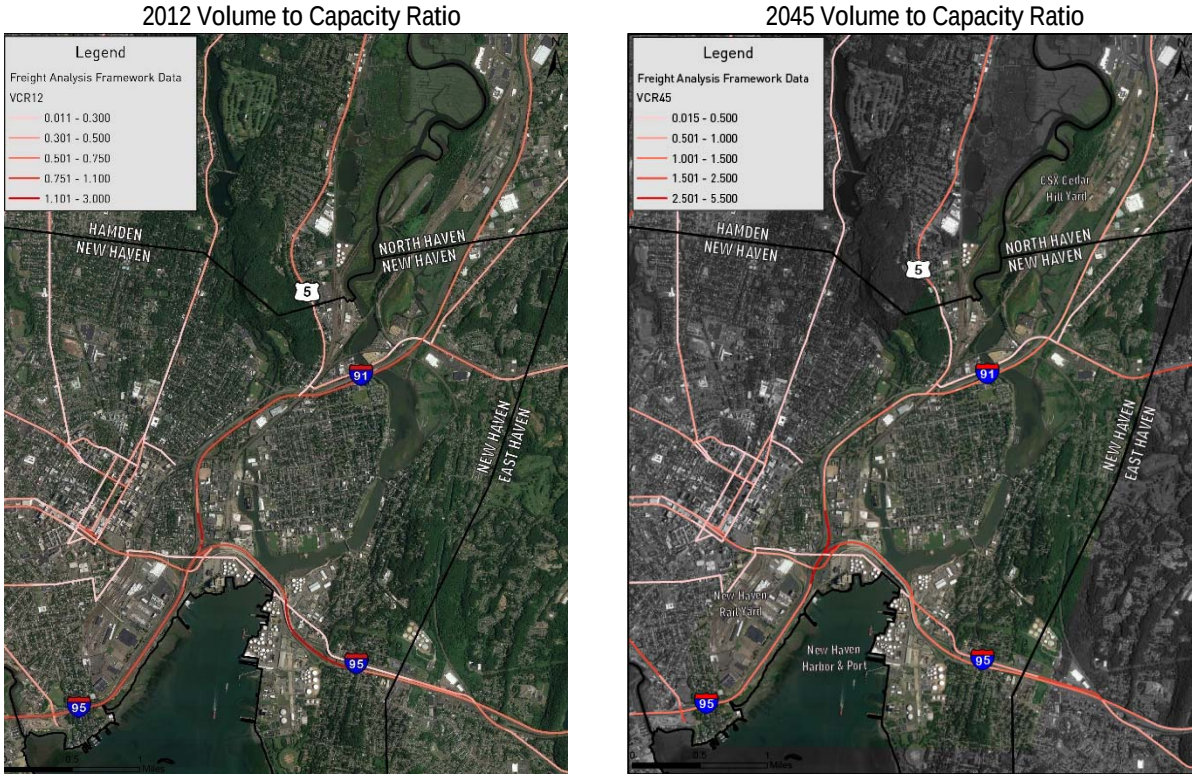
2.5 FREIGHT MODAL PROFILES OF THE CITY OF NEW HAVEN

2.5.1 Highway

Interstate Highway System

Several transportation providers interviewed for this study mentioned that New Haven's location at the junction of I-95 and I-91 benefits transportation providers and New Haven logistics companies. On the other hand, New Haven is also ranked number 56 on the American Transportation Research Institute's list of truck bottlenecks nationwide. Figure 2-11 displays volume to capacity ratio of highways in New Haven. The 2012 VCR map suggests that traffic volumes on New Haven's highways are already over capacity during peak periods. Assuming no capacity is added, VCR for 2045 suggests that congestion would become worse. New Haven is also affected by New York area congestion given significant trade between New Haven and other areas of the New York Combined Metropolitan Statistical Area.

Figure 2-11. Past and Forecast Volume to Capacity Ratios



Source: WSP Analysis of Freight Analysis Framework Network File

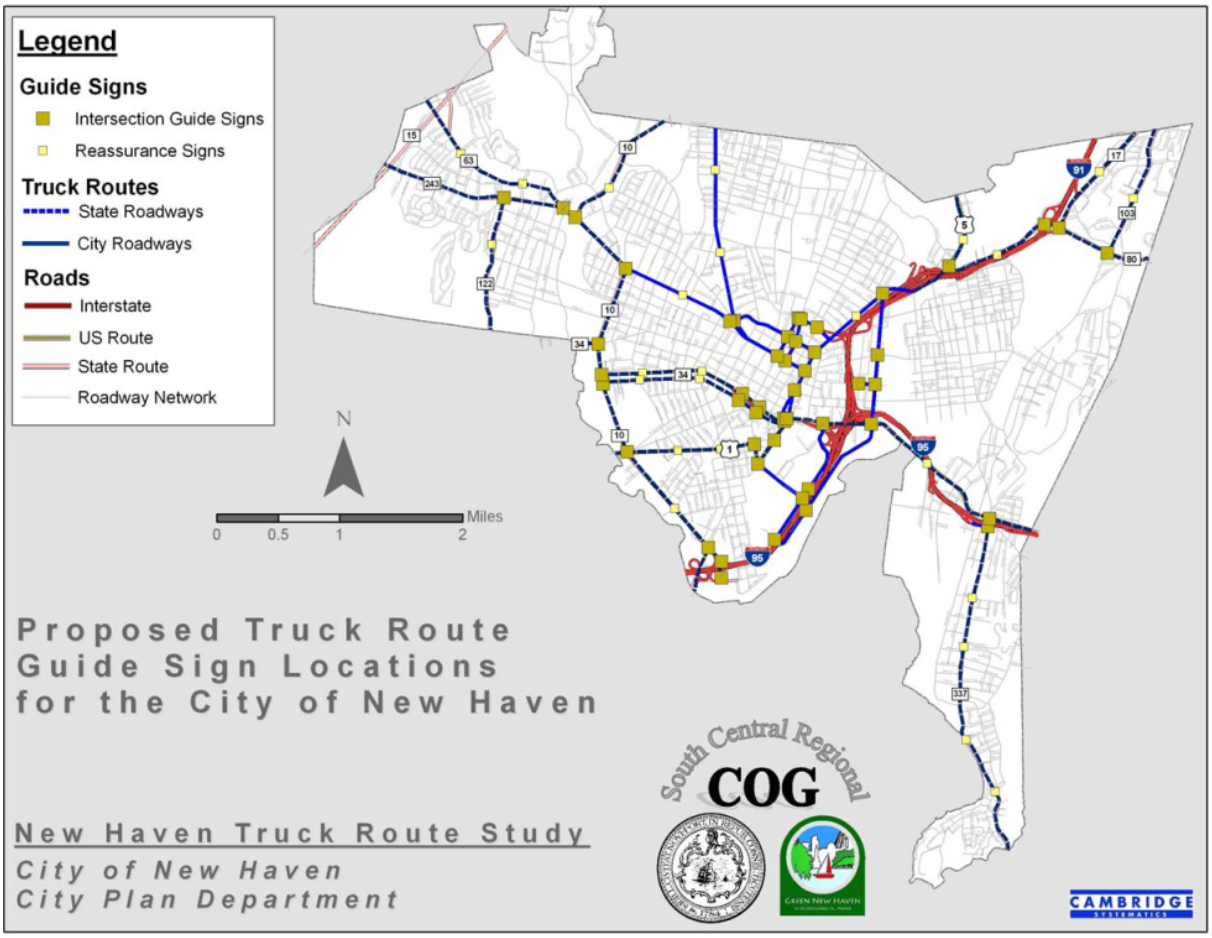
Truck Routing

Over the years, New Haven has investigated approaches to managing trucks that enter the city. In 2007, the City of New Haven and South Central Regional Council of Governments commissioned the *New Haven Truck Route Study*, which recommended measures to encourage trucks to use appropriate routes when traveling through or within New Haven. The study provided recommendations regarding the following:

- A truck route network and city ordinances that define truck routing regulations
- A signage program to indicate where truck routes exist and areas where trucks are not allowed to enter
- Measures to conduct outreach and education to inform stakeholders and allow stakeholders to contribute to the development and implementation of truck management techniques

Figure 2-12 displays proposed truck routes and signage. These initiatives have not been implemented.

Figure 2-12. Proposed Truck Routes from the New Haven Truck Route Study



Source: New Haven Truck Route Study

New Haven's most significant recent truck routing measure was to route trucks away from downtown by establishing signs on I-95 that direct trucks to access Route 34 by Route 10 (Ella T. Grasso Boulevard) west of downtown New Haven instead of Martin Luther King Boulevard, which passes through downtown.

Truck Access to Industrial Areas

A particular geographic focus of this study is the industrial areas that include the port district, the area on either side of Mill River, and the area along the Quinnipiac River north of Middletown Avenue. Truck access to the port was improved with a new interchange that was built in conjunction with the construction of the new Pearl Harbor Memorial Bridge. Truck access to other industrial areas is generally reasonable, but in some cases, trucks could choose routings that cause them to pass through residential neighborhoods. As an example, the industrial area at the southern tip of Fair Haven could be accessed either from the west on Chapel Street or from the east on Ferry Street. The Ferry Street route passes through a residential neighborhood while the Chapel Street approach would not necessarily pass through any residential area.

Several impediments to accessing these industrial areas were identified during the preparation of this study:

- **Flooding at Middletown Avenue.** As mentioned previously, many of the areas zoned industrial in New Haven are in low-lying areas and are prone to flooding. Middletown Avenue is particularly problematic with flooding reported to occur every few weeks. This makes it impossible for businesses in the area to access their facilities.
- **Northeast Corridor Overpasses.** The Amtrak Northeast Corridor passes over James Street and Humphrey Street. The Humphrey Street Bridge has a clearance of 12 feet 3 inches, while the James Street Bridge has a clearance of 12 feet 1 inch. Given that the standard tractor/semi-trailer dry van requires 14 feet, these bridges are inadequate to accommodate trucks. The low clearance on the James Street Bridge is particularly problematic given that this is the most direct route to Fair Haven and the Mill River area from Exit 5 on northbound I-91 (Figure 2-13). The New Haven traffic department reports receiving frequent complaints from businesses in the area about trucks that stop before the bridge and then turn around on these businesses' properties.

Figure 2-13. James Street Overpass

Pavement Condition

The condition of pavement in some areas was cited as a concern. As an example, Connecticut Avenue in the port district is in poor condition and would require $2 million – 3 million to repair. The pavement is failing, which creates safety risks and can damage to equipment and cargo. Pavement conditions at the approaches to the port are generally poor.

Truck Deliveries in the New Haven Urban Core

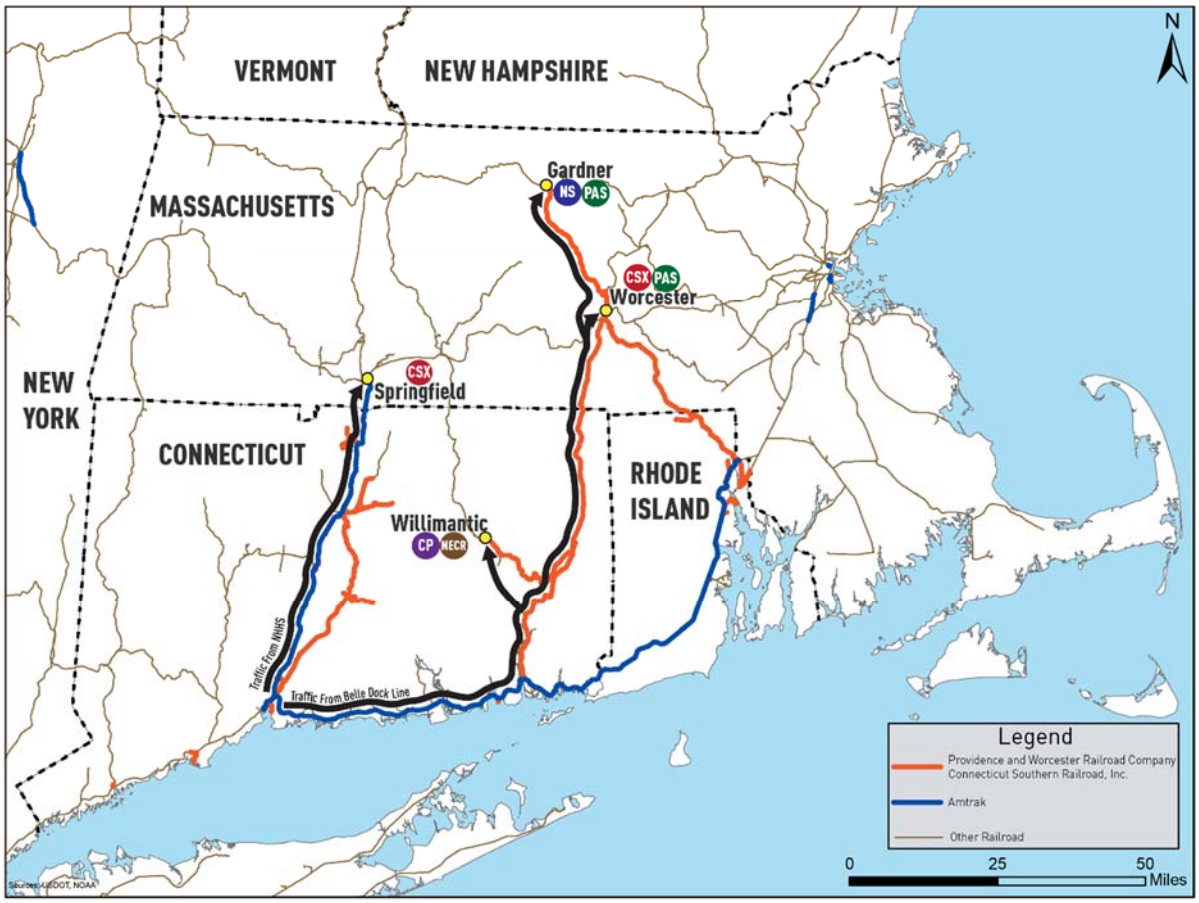
The New Haven Traffic Department reports significant problems with truck deliveries to New Haven's urban core. Most blocks within downtown New Haven are not well equipped with alleyways and loading facilities on the inside of blocks. Several buildings are accessed by tunnels, but for most locations, trucks must be loaded or unloaded curbside. There are two primary issues:

- Large 53-foot tractors/semi-trailers deliver to downtown New Haven. The roadway network of downtown New Haven is not set up to accommodate these trucks. To load/unload, they must occupy a large curbside area and occupy numerous parking spaces. In many cases, trucks unload, using conveyor belts that block sidewalks.
- Trucks often double park and block lanes of traffic. Trucks must often double park because non-commercial vehicles occupy their loading zone, which has a cascading impact on nearby traffic. Companies request loading zones, yet New Haven has not performed an analysis to ensure that zones are optimally located. Spots are designated as loading zones between 8 AM and 4 PM.

2.5.2 Rail

The Providence and Worcester Railroad (PW) provides rail service to/from New Haven rail facilities south of the Northeast Corridor on the Belle Dock Branch. Freight to/from New Haven on the PW is routed east along the Northeast Corridor through New London. The PW interchanges traffic with the Canadian Pacific Railway and the New England Central Railroad at Willimantic, while PW traffic with CSX is interchanged at Worcester, Massachusetts, and traffic with the Norfolk Southern Railway or Pan Am Southern is interchanged at Gardner, Massachusetts. Rail service to/from New Haven rail facilities north of the Northeast Corridor is switched into the CSX North Yard in North Haven and then delivered to the Connecticut Southern Railroad (CSO). CSO traffic is routed northward on the New Haven – Hartford – Springfield Line (NHHS) where it interchanges with CSX at Springfield, Massachusetts. PW and CSO are owned by the same parent company, Genesee & Wyoming, Inc. The routing of New Haven rail freight is shown in Figure 2-14.

Figure 2-14. Routing of New Haven Rail Freight



The freight rail network serving New Haven is subject to several limitations:

- **Inability to Accommodate 286,000 Pound Railcars.** The CSO relies on the Amtrak-owned NHHS, which cannot accommodate industry-standard 286,000 pound railcars but is instead limited to 263,000 pound railcars. The most significant impediment is Amtrak's Connecticut River Bridge near the Connecticut/Massachusetts border, which is rated to 263,000 pounds. Amtrak's Hartford Viaduct is also limited to 263,000 pounds. The inability to handle heavier rail cars places shippers that use this line at a disadvantage. The rates that shippers pay per railcar are often the same regardless of railcar size. Because 263,000-pound railcars typically hold around 10 percent less freight than 286,000-pound railcars, shippers pay the same amount but are restricted to ship less per railcar. The limitation affects not only the portion of the rail move on the local railroad's line but also the entire rail move. Thus, the NHHS becomes a bottleneck. The problem will worsen as smaller capacity railcars are retired, and shippers must pay extra for high-capacity railcars that cannot be fully loaded due to weight restrictions.
- **Clearance Restrictions.** Clearance over the PW between New Haven and New London is restricted by overhead catenary wires and bridges, so that this line could not be used by certain types of railcars such as multi-level automotive cars and double-stack intermodal cars.

- **Usage of Rail Lines whose Primary Purpose is Passenger Rail.** Amtrak owns the Northeast Corridor east of New Haven and the NHHS within Connecticut. Most trains that use these rail lines carry passengers. On each line, freight operations are restricted to specific times of the day when they do not interfere with passenger trains. During the preparation of the 2017 *Connecticut Statewide Freight Plan,* freight rail operators expressed concern about future access windows for rail freight on the NHHS. There also have been substantial customer complaints regarding access windows on the NHHS and the Northeast Corridor. One stakeholder mentioned that higher per carload charges on Amtrak lines limit generation of new business.
- **Connecticut as a Rail Cul-de-Sac.** To access areas of the country outside of the Northeast, New Haven freight traffic must move northward to/from Massachusetts for interchanges with rail carriers that will reach other regions. This situation arises from the fact that the nearest freight rail crossing over the Hudson River connecting Connecticut with New York is 140 miles north of New York City at Selkirk, New York. There are several implications to New Haven. Freight facilities that would typically locate on busy rail mainlines (such as intermodal terminals) would be less likely to locate in the New Haven area, a rail terminus 61 miles from the nearest mainline that passes through Springfield, Massachusetts. The lack of western rail connections also makes rail service to/from New Haven more circuitous, requiring more mileage than would otherwise be the case. Rail service across the U.S. is often circuitous, and in many cases a direct routing is not the most efficient from a rail operations perspective. However, indirect rail traffic routing through Selkirk may limit opportunities for some short-haul rail services, such as between New Haven and northern New Jersey.
- **Flooding.** The area under Chapel Street through which the Belle Dock rail line passes is at a low elevation and is prone to flooding (Figure 2-15). According to one stakeholder, if it rains an inch or more, the track could be closed for 48 hours. Flooding from a heavy rain can cause the line to shut for a week. Occasional closing of the rail line reduces the ability of port tenants to provide reliable transportation service. According to individuals familiar with the area, a pump was available to clear water from the area but is no longer functional.

Figure 2-15. Flooding under Chapel Street

- **Rail Infrastructure at the Port.** Rail service to the Port of New Haven was suspended for 10 years during the construction of the Pearl Harbor Memorial Bridge. Rail service is now provided by a rail line that parallels Waterfront Street with a spur that enters the New Haven Terminal property (leased by Gateway Terminals). The spur into the Gateway Terminal provides capacity to load/unload several railcars at a time. Because the spur terminates close to the wall of a warehouse, railcars toward the end of the spur can be accessed only from one side.

2.5.3 Maritime

New Haven Port Facilities

The Port of New Haven includes 12 berths with over 6,000 feet of quay length. Table 2-6 summarizes New Haven port terminals. Freight terminals within the Port of New Haven are privately owned and operated.

Table 2-6. Port of New Haven Freight Terminals

Facility	Location	Berth Characteristics (feet)		Primary Cargoes
		Depth	Length	
Gateway Terminal*	400 Waterfront Street	35	1,500	Scrap metal, sand, salt, steel, stone, petroleum products
Gulf Terminal	500 Waterfront Street	35	735	Petroleum products
Magellan Terminal	280 Waterfront Street	36	730	Petroleum products and ethanol
	85 East Street**	30 (heavy oil wharf) 36 (light oil pier)	480 (heavy oil wharf) 700 (light oil pier)	Asphalt and other petroleum products, biodiesel
	134 Forbes Avenue	16	200	Petroleum products and ethanol
New Haven Terminal***	100 Waterfront Street	35 – 39	1,340 at 35-foot depth 700 at 39-foot depth	General cargo, petroleum products, petrochemicals, chemicals, copper, zinc, lumber, steel and waste paper
Motiva Enterprises	481 East Shore Parkway	N/A	N/A	Gasoline, diesel fuel, jet fuel, ethanol
Clean Harbors	120 Forbes Avenue	15	300	Petroleum products
PSEG Harbor Station	1 Waterfront Street	25	400	Occasional fuel oil receipt

*Operates on 8 acres within the port district and has 50 acres of storage outside the port district. Operates transload facility on East Street.
**Not within the port district.
***Leases part of facility to Gateway Terminal and to Green Fuels, a manufacturer of biodiesel made from natural feedstock.

The New Haven Port District covers 366 acres, 116 of which are currently being used for port-related purposes. Land use and availability is an important issue at the Port of New Haven since the port is effectively "hemmed in" so that significant expansion of the port's footprint would be difficult. The port's footprint limits potential roles. The port had traditionally focused on bulk and break bulk cargoes, and it would be difficult for the port to shift to certain other cargo types that require large land areas for material

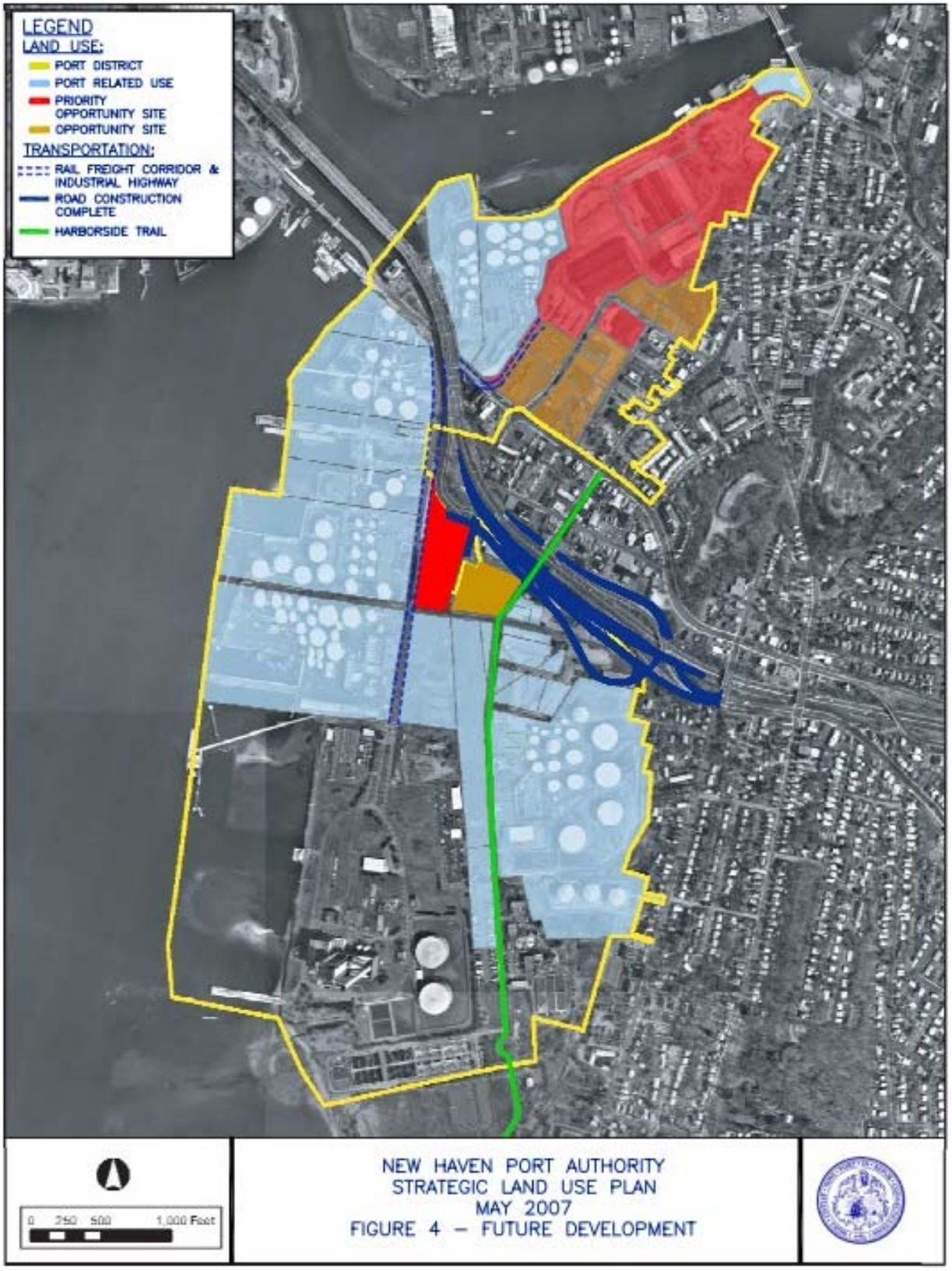
storage and handling. In 2007 the City of New Haven and the New Haven Port Authority commissioned a land use study[2] that recommended the following for expanded land use:

- Complete transfer of East Shore Parkway to the New Haven Port Authority and work with terminal operators and tenants to improve use of the property.
- Optimize development of North Yard area and work closely with property owners to provide efficient modal connections and port-related land use.
- Identify off-site opportunities for port-related distribution and warehousing, working with municipalities and service provider to facilitate acquisition and development.
- Identify, on a continuing basis, opportunities to relocate non-port-related operations either within or outside of the District.
- Establish a pre-development/opportunity program to seek out property within the port district when it becomes available for sale, foreclosure, etc.
- Acquire residual state right-of-way when released following the completion of the Pearl Harbor Memorial Bridge project.
- Establish a port-zoning district to facilitate the expansion of port-related land uses within the District.

The New Haven Port Authority has been working on implementing a number of these initiatives. Figure 2-16 displays the New Haven Port District, land currently used for port-related purposes, and opportunity sites, which do not currently have port-related uses but could be repurposed for port-related activities.

[2] Parsons Brinckerhoff, Inc., *Port of New Haven Strategic Land Use Plan,* May 2007.

Figure 2-16. Port District and Identified Opportunity Sites

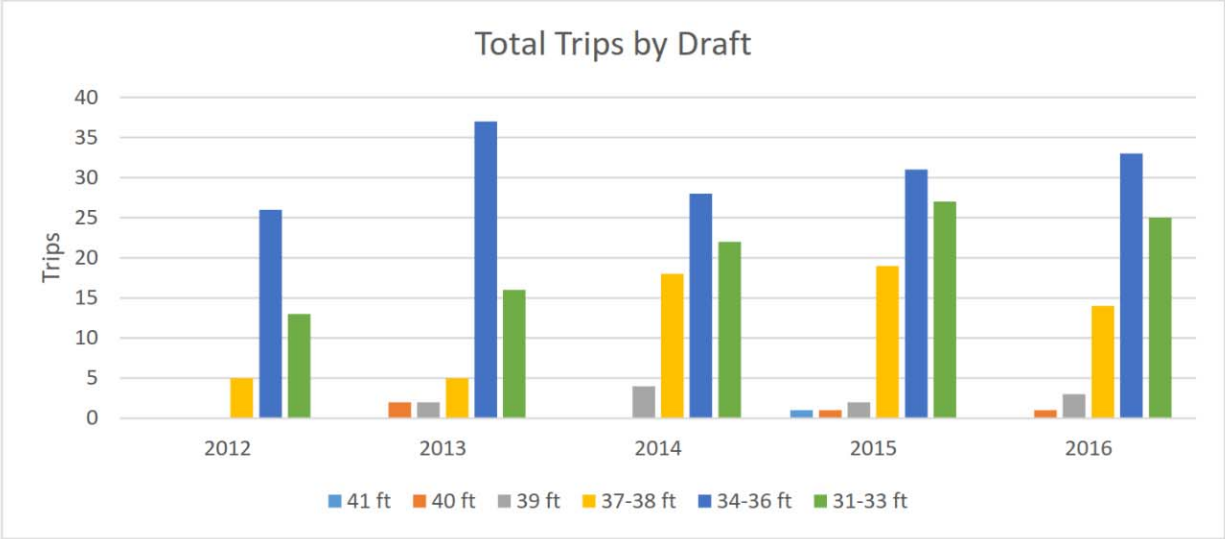


Source: Port of New Haven Strategic Land Use Plan

New Haven Channel

The main channel depth of the Port of New Haven is 35 feet mean low tide. Because vessels require 4 feet of water depth below the vessel (i.e., the vessel's draft), any vessel that draws more than 31 feet must wait for high tide before using the New Haven channel. Tides are 6 feet at New Haven, and larger vessels sometimes lighter in Long Island Sound when the vessel could not enter the 35-foot channel even at high tide. By lightering, vessels offload some of their cargoes to barges before proceeding into the harbor. The partially offloaded vessel draws less (is less deep in the water) and can deliver cargoes along with the barges to the harbor terminals, although this adds to time and expense. Currently, almost all traffic moves within a few hours of high tide because few vessels that call on New Haven draw 31 feet or less as shown in Figure 2-17. It is likely that in the future, fewer small vessels will be built. If the channel is not deepened, shippers and receivers will be required to use larger vessels even though they cannot fill these vessels due to channel restrictions.

Figure 2-17. Total Trips to New Haven by Vessel Draft



Source: U.S. Army Corps of Engineers, New Haven Harbor Connecticut Navigation Improvement Project

In December 2015, the U.S. Army Corps of Engineers signed a cost-sharing agreement with the New Haven Port Authority to start a multi-year feasibility study to determine if deepening the New Haven Harbor is both economically beneficial and environmentally acceptable. A draft feasibility study and environmental impact study was completed in 2018, which recommended a plan to dredge the harbor to a 40-foot depth. The Average Annual Equivalent Cost of the project was estimated to be $4.3 million and the Average Annual Equivalent Benefit was estimated to be $7.0 million for a benefit/cost ratio of 1.6. The U.S. Army Corps of Engineers New England District recommended authorizing the project with a federal share of $49.4 million and a non-federal share of $16.4 million for the project construction cost. The non-federal share would need to come from the state or the port. In addition to the construction cost, federal and non-federal funding sources would share various incremental costs and fees.

In addition to the main New Haven harbor channel, the Quinnipiac River is dredged to 18 feet to the Ferry Street Bridge.

2.5.4 Pipeline

The Buckeye Pipeline provides a key connection that supports the Port of New Haven's handling of petroleum products. The 100-mile pipeline carries refined petroleum products from New Haven through central Connecticut and into Massachusetts as shown in Figure 2-18.

Figure 2-18. Buckeye Pipeline

Source: Buckeye Partners, L.P.

2.5.5 Aviation

In 2018, 5,419 pounds of freight were shipped from New Haven Tweed Airport and 1,525 pounds of freight were shipped to New Haven Tweed Airport.[3] All shipments were belly cargo, meaning that they were carried in the hold of passenger planes. Shippers interviewed for this study primarily rely on the John F. Kennedy International Airport in Queens, New York, for international air shipments but also rely on Bradley International Airport in Windsor Locks, Connecticut, for domestic air shipments.

[3] U.S. Bureau of Transportation Statistics, Air Carrier Statistics database (T-100 data bank)

3. Issues, Opportunities, Proposed Improvements

New Haven issues, opportunities, and proposed improvements fit into several categories:

- Rail access to/from the Port of New Haven
- Measures to address the port's space limitations
- Other rail issues/opportunities
- Economic development opportunities
- Access to New York gateways
- Opportunities to improve freight movements and minimize conflicts with other activities in downtown New Haven
- New Haven market position

Each is discussed in the following sections.

3.1 RAIL ACCESS TO/FROM PORT OF NEW HAVEN

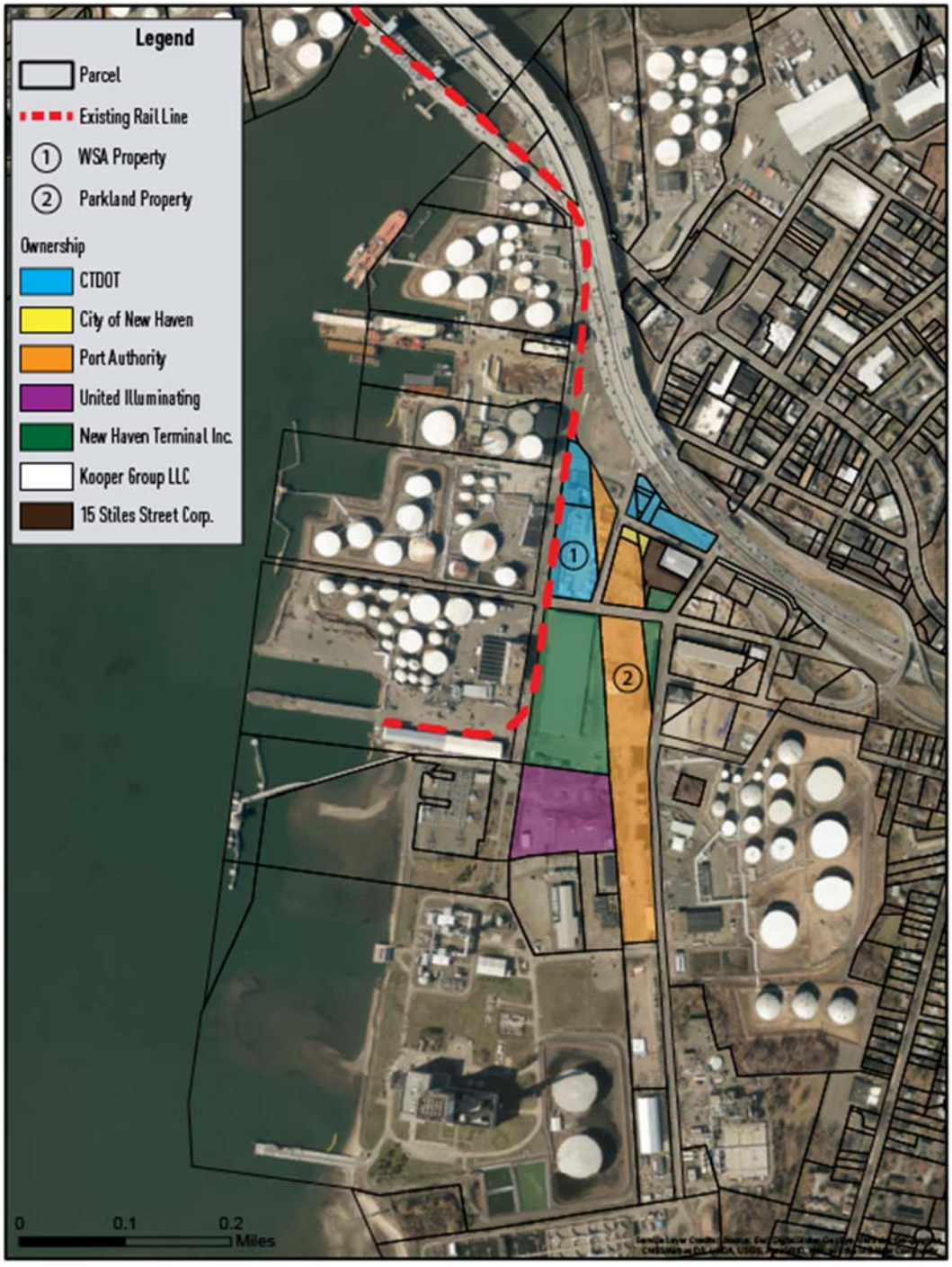
As discussed previously, the Belle Dock line, which provides access to the Port of New Haven, is prone to flooding. A logical first alternative would be to explore whether a pump could be installed or rehabilitated that could pump the area dry when needed. If such a solution is not feasible or is inadequate, the track would need to be raised. However, the areas that flood lie below the Chapel Street overpass, and if the track were raised, the vertical clearance would be inadequate. The Chapel Street overpass would then need to be reconstructed as well.

Also noted previously is a need to increase the size and extent of the rail network in the New Haven port district. The current rail spur at the New Haven Terminal (leased by Gateway Terminal) can only accommodate several railcars at a time. Terminal operators have indicated that they would use more rail if they had more track space. A new rail spur should be capable of accommodating larger cuts of cars and ideally unit trains (trains that travel from origin to destination with all cars moving as one unit, which is cost efficient).

A new rail spur could open a number of opportunities. Ethanol often moves by rail in unit trains or large cuts of cars. Unit trains of ethanol could be shipped to the Port of New Haven. Additional steel shipments could be received at the port. A new rail spur could be more efficient than the current operation for steel, since steel

could be unloaded on both sides of railcars. Gateway Terminal operates another rail yard just north of Chapel Street by Mill River, but the yard often fills up, and the company cannot accept additional cars. The new rail spur would add capacity. The new spur also would be available to multiple users, so that additional companies that do not currently ship by rail could use the spur. The most logical location for a new spur would be the Parkland property, which is a long, thin strip of land owned by the Port Authority. This location and other relevant nearby parcels are shown in Figure 3-1.

Figure 3-1. Parkland Property



Several obstacles will need to be overcome before a rail spur could be built on the Parkland property:

- **Utilities**. Underground utilities cross the Parkland property that would need to be protected from the weight of railcars and locomotives on a rail spur. Among them are fuel lines between the marine terminal

and storage facilities and a sewer line to the East Shore Water Pollution Abatement Facility. Building the supports to protect these utilities could add to the cost of constructing a new rail spur.

- **Access to the Parkland Property**. Since the existing rail into the port district is adjacent to Waterfront Street, a new rail line would need to cross eastward to the Parkland property. Figure 3-2 shows some preliminary alternative concepts. The orange line is the existing rail line. Under the alignment that follows the blue line, a new spur would be constructed over the WSA property, which is used by the Connecticut Department of Transportation (CTDOT) for material storage. This property had been owned by the New Haven Port Authority but was taken by CTDOT during the Pearl Harbor Memorial Bridge construction. CTDOT has not expressed a willingness to relinquish the property. The new rail connection would also need to cross Alabama Street, requiring a new highway/rail grade crossing. States try to reduce the number of public crossings rather than add crossings. Permission would need to be granted to install a new crossing, which may not necessarily be forthcoming.

  Another alternative is in red (Figure 3-2) and would cross south of New Haven Terminal's warehouse. The geometry of this alternative would be 21+/- degree curves (radius of 275 feet); it would not be as favorable as that of the blue alternative but would be in line with the curve serving the track to the wharf. The line would cross property owned by United Illuminating Company, which would need to either provide an easement or relinquish the property.

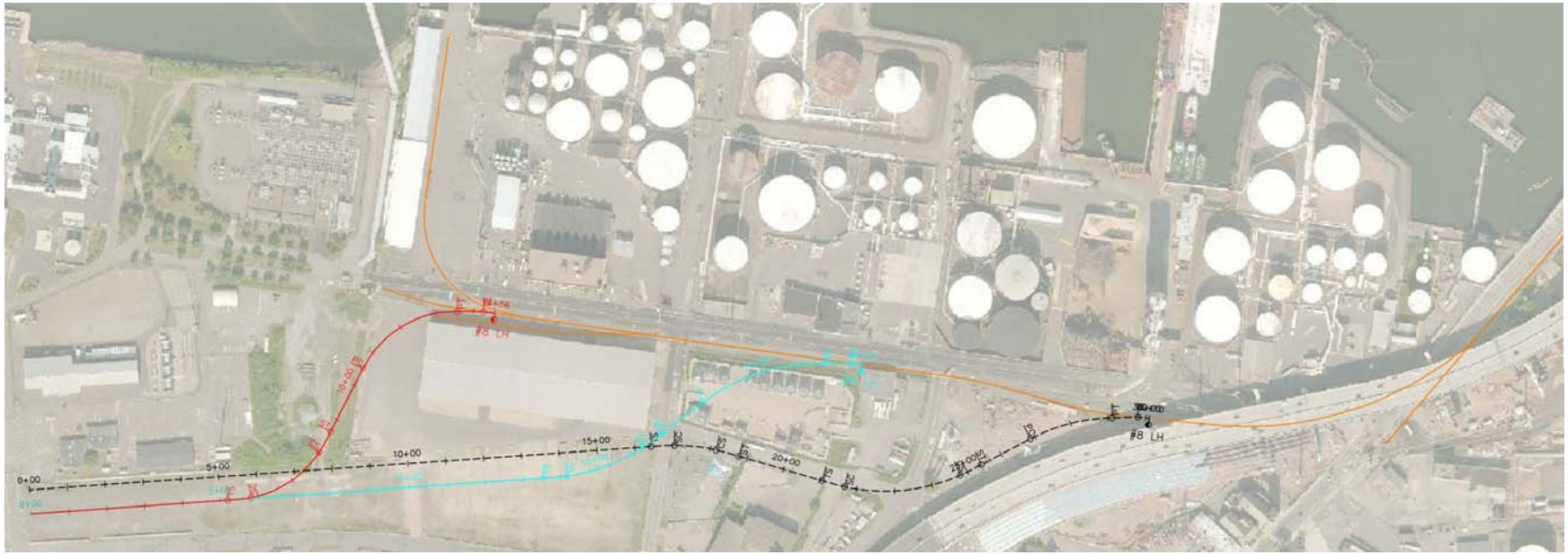
  Another alternative (black dashed line) would avoid the WSA property but would require two new grade crossings. It would utilize the west side of the Parkland property, which might be more consistent with utilization of the site, allowing for additional tracks along the entire length of the site if that is desirable.

  These alternatives are preliminary and do not take into account utilities, interference with property usage, and other issues.

Other businesses within the port district are also interested in rail access. American Green Fuels manufactures biodiesel on the New Haven Terminal property. The company uses the existing rail spur to receive feedstuffs for its operation, but does not have access to enough railcar spots to ship as much inbound by rail as the company would prefer. Ideally, the company would have its own spur with five car spots parallel to the existing spur.

A trucking company owns a 19-acre site where a steel plant was once located north of Wheeler Street on the Quinnipiac River. The site is now used for warehousing and as a staging/parking area for multiple trucking companies. A rail spur to the property could be built, which could be used for transload by companies on the property or could be used by a municipal solid waste transfer facility adjacent to the property. An existing rail spur would need to be extended on Forbes Avenue. Another property would need to be acquired and a building would need to be demolished before this rail spur could be built.

Figure 3-2. Alternatives to Access the Parkland Property



3.2 MEASURES TO ADDRESS THE PORT'S SPACE LIMITATIONS

The 19-acre site north of Wheeler Street previously mentioned was identified as a priority opportunity site in the 2007 *Port of New Haven Strategic Land Use Plan*. Four of those acres are available for maritime-related activities along the shore of the Quinnipiac River. The property's owner has commissioned engineering design work to develop a barge marine facility. Three hundred feet of bulkhead would be built. One of the trestles previously used in the construction of the Pearl Harbor Memorial Bridge has been purchased and would be repurposed to serve as a pier. Permitting has been completed for the bulkhead, so the project is relatively shovel-ready. To make the project worthwhile, a user of the new facility would need to be found.

Another idea put forward both in the 2007 *Port of New Haven Strategic Land Use Plan* and by stakeholders for the current study would be to augment the port with off-site locations. These could be used solely for storage or could provide a combination of truck/rail transload and storage to support activities within the port district. Potential off-site locations could include areas around the former Cedar Hill yards at the New Haven/North Haven border. Arrangements would require cooperation between private terminal operators and private property owners/lessors in the area.

3.3 OTHER RAIL ISSUES/OPPORTUNITIES

Stakeholder identified the inability of the NHHS line to accommodate 286,000-pound railcars as an important issue. While not physically in New Haven, the Amtrak Connecticut River bridge in Windsor Locks and the Hartford Viaduct affect New Haven shippers. Freight advocates in New Haven should join other shippers along the NHHS corridor to advocate for these to be considered rail priorities in the state, and to advocate for a plan to fund the upgrade/replacement of these assets.

New Haven is home to several significant truck/rail transload operations including Gateway Terminal, Palumbo Trucking, and Anastasio Trucking. The potential for transload does not appear to be fully exhausted. For example, the Palumbo Trucking operation at Forbes Avenue receives cement by railcar and distributes this cement locally to batching plants, cement bagging, and cement product manufacturers. The company could handle more business with more capacity. The largest truck/rail transload commodities handled by Gateway Terminal and Anastasio Trucking are steel billets for the Nucor plant in North Haven, and for building suppliers and manufacturers in the area. A wide variety of additional commodities are handled as well, including inbound lumber, outbound scrap and construction/demolition waste. Collectively, transload operators handle over 10,000 carloads per year and help to remove trucks from Connecticut's highways. It would be beneficial to work with railroads and private operators to explore additional opportunities for transload in the area.

A representative of Genesee & Wyoming, Inc. suggested that one of the largest rail opportunities in the area may be the shipment of municipal solid waste. Although shipping garbage by rail may not seem to many like a compelling rail initiative, it is preferable to the alternative, which is to ship the same garbage over highways by truck.

New Haven is directly served by the NHHS line, the Belle Dock line, and the Northeast Corridor but is also affected by the general condition of the rail network in Connecticut. During the creation of the 2017 *Connecticut Statewide Freight Plan,* rail operators complained about the cost and inconvenience of accessing the

NHHS and were concerned about future access given planned increases in passenger rail services. One potential long-term solution could be for parallel freight lines to provide a freight corridor. Currently, the Middletown Secondary, the Middletown Cluster, the Wethersfield Secondary, and the Manchester Secondary freight lines are not in a condition to fulfill this role. The Middletown Secondary freight line is maintained in a state of good repair between North Haven and the Tilcon quarry in Durham/Wallingford, but much of the track north of Tilcon is rated Federal Railroad Administration (FRA) Excepted, meaning that the track is excepted from federal requirements, and is restricted to 10-mile-per-hour operations and in its ability to handle hazardous materials. A representative of Genesee & Wyoming, Inc. mentioned that certain sections of the Middletown Cluster freight line have been upgraded to FRA Track Class 1. Long-term, these lines could be considered to serve as an alternate freight corridor. One barrier could be resistance from communities along the lines that have become accustomed to their inactivity.

While funding for freight rail improvements could be approved by the state's legislature, Connecticut lacks a program dedicated to freight rail. This is in contrast to neighboring states such as New York, which has the Passenger and Freight Rail Assistance Program, or Massachusetts, which has the Industrial Rail Access Program. It would be easier to accomplish rail improvements if a consistent state rail funding source existed. Many states have programs that fund/finance rail-related economic development projects like rail spurs to businesses, multimodal facilities, or short- line rehabilitation projects like tie replacement/rail upgrade. These programs are often a mixture of funding and financing where the state receives annual requests for grant funding but also makes zero or low-interest loans available upon request. Other states that own their rail lines maintain consistent capital programs to steadily maintain and/or improve the lines.

3.4 ECONOMIC DEVELOPMENT OPPORTUNITIES

One component of the New Haven Freight Study is to consider the requirements of the logistics service industry and the types of freight-related establishments that could locate in New Haven.

3.4.1 Types of Freight Facilities

A starting matter is to define what is meant by freight establishments. A report completed in 2011 for the Transportation Research Board[4] used the following categories of freight facilities:

- **Distribution centers** (DCs) are large specialized facilities where products are held and assembled into deliveries to retailers, wholesalers, or directly to consumers. In some cases, DCs may be involved with final stage manufacturing, such as final packaging and labeling. The most common design of a DC would be a large building with doors on one side for inbound shipments from suppliers, racks in the middle of the building for storage, and doors on the other side of the building for outbound shipments to stores/consumers/wholesalers.
- **Warehouses** are are focused on storage of goods or merchandise rather than a distribution function. They may be multiuse facilities owned by a third party and leased by customers. New Haven is home to a number of warehouses, such as those off of Wheeler Street.

[4] National Cooperative Freight Research Program (NCFRP) Report 13: Freight Facility Location Selection: A Guidebook for Public Officials, 2001.

- **Cross-docks** handle staging like a DC, but items are not stored. Rather, items are prepared for shipment to another location or for retail stores. Cross-docking can create a pivot point for changing the specific destination of goods in transit.
- **Intermodal terminals** facilitate the transfer of marine, truck, or air containers/trailers between modes. Physical features may include rail sorting yards, container moving equipment, container and chassis storage facilities, warehouse and cross-dock facilities.
- **Transload terminals** involve the transfer of non-containerized cargoes between modes. New Haven is home to a number of transload terminals, including those at the port, as well as truck/rail transload facilities operated by Gateway Terminals, Palumbo Trucking, and Anastasio Trucking.
- **Hub terminals** are carrier-operated facilities used for re-sorting and re-consolidation of inbound into outbound load sets for continuation in intercity linehaul service. For less-than-truckload truck operators, these are cross-dock operations, whereas for small package trucking and mail, conveyor machinery is used for transfer.
- **City terminals** are carrier-operated facilities used for intramodal sorting and consolidation of load sets between intercity shipments and pickup and delivery.

Since NCFRP 13, a number of changes have occurred in logistics and supply chain, notably the continued growth in online retailing. This has led many to distinguish a specific type of DC from others, a fulfillment center, which is where an online retailer or a third-party logistics provider fulfills electronic commerce orders. Fulfillment centers are more labor intensive than DCs because of the small order sizes they handle, although automation is heavily utilized as well.

Due to growing pressures on online retailers to respond to customers quickly and at times provide same-day service, some companies are considering urban infill options to provide last-mile service to customers. These can be non-traditional fulfillment facilities in non-traditional locations. For example, the first multi-story distribution facility in the U.S. opened in 2018 in Seattle. This facility owned by Prologis, Inc. fits into an area under 14 acres where normally a facility of its size would require 47 acres, and it is just five miles from the central business district. Multi-story facilities are expensive to construct, but they offer condensed footprints in areas with small parcels and high land costs, making close-in locations viable.

3.4.2 Benefits of Freight Facilities

A logical second question after "What are the Types of Freight Facilities?" would be the benefit to New Haven of siting a logistics facility within the city. A shortcoming of logistics facilities is the level of employment per acre, which is typically less than that of other land uses such as manufacturing or commercial/office space. Table 3-1 provides an example from southern California. Although from a different part of the country, employment densities would not be expected to be too different from the Northeast.

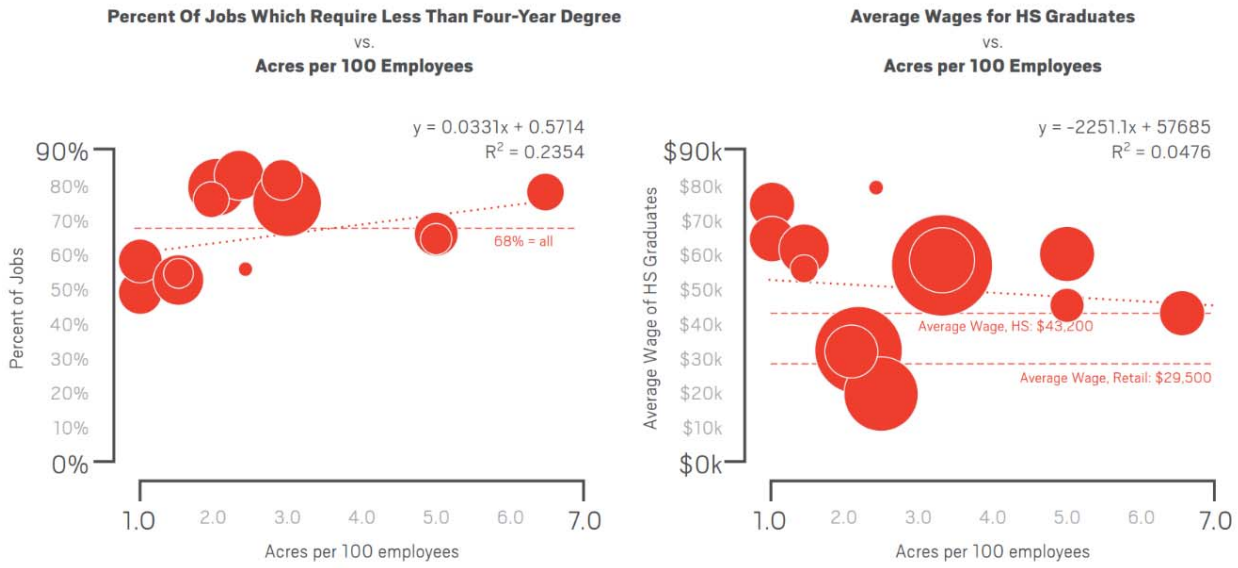
Table 3-1. Southern California Estimation of Employees per Acre and Square Feet per Employee

Land Use Category	Employees per Acre	Square Feet/Employee
Regional Retail	14.99	1,023
Other Retail/Svc	13.49	585
Low-Rise Office	22.91	466
High-Rise Office	116.32	300
Hotel/Motel	11.04	1,804
R&D/Flex Space	18.13	527
Light Manufacturing	11.63	924
Heavy Manufacturing	17.05	--
Warehouse	10.63	1,225
Government Offices	16.23	672

Source: Employment Density Study for Southern California Association of Governments, 2001.

On the other hand, if parcels are vacant, underutilized, or would otherwise have low-density land uses, the opportunity cost of siting a facility with low employment density would be minimal. Freight facilities offer other benefits. Like other freight-dependent businesses, freight facilities support economic inclusion. Figure 3-3 displays economic sectors by land use, educational requirements, and average wages. It shows that a number of sectors that provide well-paying jobs for people with a university degree have low job densities as measured by acres per 100 employees.

Figure 3-3. Economic Inclusion and Land Use



Source: Mass Economics

Proximity to freight facilities also lowers costs for businesses and consumers. For example, when companies are located close to intermodal terminals, they pay less in drayage (truck transportation to and from intermodal terminals) than if they are located farther from intermodal terminals. Shippers like to locate near transportation hubs.

3.4.3 Criteria for Location Selection

The NCFRP 13 report pointed out that the top criteria for companies siting freight facilities are the ability to access key markets or customers and the interaction with the transportation network, followed by labor and workforce as shown in Table 3-2. Factors over which public officials have control are generally a less important set of factors, including permitting and regulations, the tax environment, incentives and other forms of assistance.

Table 3-2. Criteria for Locating Logistics Facilities

Location Criteria	DC/Warehouse / Cross-Dock	Intermodal Terminal	Transload Terminal	Hub Terminal	City Terminal
Ability to Access Key Markets and Customers	●	●	●	◓	●
Interaction with Transportation Network	●	●	●	●	●
Labor and Workforce	◓	◓	◓	◓	◓
Total Cost Environment	◓	◓	◓	●	◓
Availability and Cost of Suitable Facilities	○	○	◓	◓	●
Utilities	○	○	○	○	○
Permitting and Regulation	○	◓	◓	○	○
Tax Environment	○	○	○	○	○
Public Sector Assistance and Incentives	○	○	○	○	○
Climate and Natural Hazards	○	○	○	◓	○

Key: Priority of Criteria	○ Lesser Factor	◓ Important Factor	● Primary Factor

Source: NCFRP 13

A subsequent study for the Michigan Economic Development Corporation in 2014 was more specific about the requirements for warehouses and distribution center site locations, depending upon whether they serve retail customers, industrial customers or are a modal hub as shown in Table 3-3.

Table 3-3. Industry Location Requirements – Distribution Sector

Warehouse/Distribution:	Industrial	Retail	Hub Terminal
Example	Auto parts	Clothing	Truck terminal
Size (Contiguous, Developable Acres)	Minimum 25	Minimum 15	Minimum 15 for medium 25 for hub or large ltl.
Security	Manageable at site	Manageable at site	Manageable at site
Population W/in 1 hour drive	>20,000	(Regional construct)	>200,000
Public Transit	Accessible	Accessible	Accessible
Skills	As defined by the specific industry	Basic logistics, material handling, technician	Basic logistics, Driver,material handling, technician
Other Economic Network	Proximity to end markets	Proximity to regional or national markets	Ability to serve immediate region
Highway Access	Interstate, state highway or major arterial within 5 miles	Interstate, state highway or major arterial within 5 miles	Interstate, state highway or major arterial within 1 mile or less
Intermodal Rail Access	Within 100 miles	Within 100 miles	As defined by mode
Rail Siding	Preferable	Not required	As defined by mode
Air Access	Cargo Express	Express	Variable
Express	Express	Variable	Variable
Port Access	N/AP	N/AP	Variable
International Access	Global connection	Global connection	Global connection
Water Flow (GPD)	11,500	5,000	10,000
Sewer Flow (GPD)	11,500	5,000	10,000
Electricity	0.5 MW	Depends on specific functions. At least 1.0 MW	Depends on specific functions. At least 1.0 MW
Telecom	Fiber-telecomm highly preferred	Fiber-telecomm highly preferred	Fiber-telecomm highly preferred

Source: WSP USA, Inc. for the Michigan Economic Development Corporation

3.4.4 Freight Facility Location Selection Process

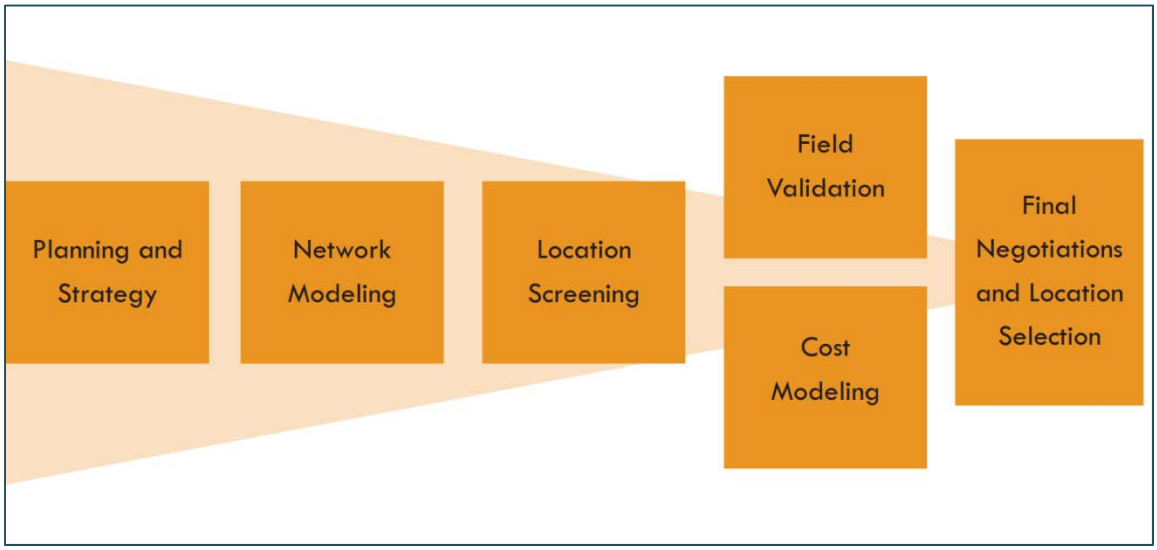
NCFRP 13 made several points regarding the freight facility location process that are worth keeping in mind:

- Freight facilities will only consider locations that fulfill the objective to move goods in the most efficient manner possible. This trumps all other considerations.
- Rarely are location decisions based on personal relationship, government incentives, or regional promotions. These are only considered after the location meets the required criteria for the business to be successful.
- Local officials can make their communities more attractive for freight facilities by providing a hospitable environment with appropriate zoning, compatible land use, infrastructure, and community support.
- Proximity and/or access to markets is the most important driving factor to determine the region or community where a freight facility will locate.

- Freight locations are rarely determined by a "build it and they will come" approach by the public sector, but having the necessary support infrastructure in place can be a great incentive.

Typically, location selection processing moves from broad to specific. Through network modeling and other selection criteria, companies gain a sense of the general area where they would like to locate a freight facility. Once a community or region is placed on the short list, the location planning team further evaluates specific sites or facilities. Companies will consider a great property at a good price, but only if the site satisfies other strategic criteria. Figure 3-4 summarizes the process.

Figure 3-4. Freight Facility Stages of Site Selection



Source: NCFRP 13

3.4.5 New Haven Strengths, Weaknesses, Opportunities and Threats for Freight Facilities

When considering New Haven for potential freight facilities, it is useful to note some strengths, weaknesses, opportunities and threats that New Haven provides in regards to its logistics assets and ability to attract freight facilities.

Strength: Location. New Haven occupies a central location in the crowded Northeast region, part way between the New York City and Boston metropolitan areas and as the southern terminus of the I-91 Knowledge Corridor. The city's location at the junction of I-91 and I-95 is an advantage. This makes New Haven a logical potential location to distribute goods to customers in the Northeast.

New Haven's proximity to New York is an advantage. The Port of New York/New Jersey is the nation's largest container port after the Ports of Los Angeles and Long Beach. Access to the nation's second largest container port provides shippers with a broader range of service offerings than would be available to areas served by smaller container ports. John F. Kennedy International Airport is one of the nation's largest cargo airports, similarly providing a wide range of cargo schedules and service offerings. Shipping goods to New York also provides a useful back haul to New York-based transportation companies.

Strength: Bulk and Break Bulk Handling Capabilities. Within New Haven are transportation providers and infrastructure that specialize in the handling of bulk/break-bulk commodities[5]. These include port terminal operators, trucking companies, and transload operators. Commodities handled include petroleum products, steel, scrap metal, cement, and other products. These operations can be expected to continue into the future and point to areas of potential growth. Some of the demand for bulk/break-bulk goods is driven by the general needs of the area's population. Examples include building supplies such as lumber and cement. Other commodities are more specific to certain shippers and industries. As an example, a significant number of steel billets to the Nucor Wallingford plant are handled at the Cedar Hill yards in New Haven/North Haven.

Weakness: Limited Available Land. As shown in Table 3-3, the best locations for certain types of distribution facilities are flat parcels of at least 15 acres. Figure 3-5 displays parcels in areas of New Haven zoned industrial, labeling the acreage of all parcels larger than 5 acres. As shown, few parcels are above 15 acres, and many of those either have preexisting structures and businesses or are odd shapes. As shown on Figure 2-10, most of the industrial areas of New Haven are within flood zones. In this, New Haven is typical of coastal northeastern cities from New York to Boston. While locations within flood zones do not always represent "deal breakers," if confronted with two identical parcels—one within a flood zone and one not—a business would logically choose the location outside of the flood zone. Another weakness is that some industrial areas such as at the port are hemmed in by competing land uses bordering the industrial areas.

One other issue is potential environmental contamination. Figure 3-6 displays the same information as Figure 3-5 but also indicates whether sites are contaminated or potentially contaminated as defined by the Connecticut Department of Energy & Environmental Protection. For some of the sites, little information is known about the environmental condition. Similar to locations within the flood zone, environmental contamination does not necessarily represent a "deal breaker" for logistics businesses. Many of the logistics activities in New Haven occur within sites identified in Figure 3-6 as contaminated or potentially contaminated. However, given the choice between two otherwise equivalent locations—one potentially contaminated and another that is definitely not contaminated—businesses would logically choose the definitely uncontaminated location.

Weakness: Limitations to Rail Service. As mentioned previously, several factors limit rail service to/from New Haven. These include flooding on the Belle Dock line, lack of 286,000-pound capacity on the NHHS line, clearance restrictions, reliance on Amtrak-owned lines, lack of connections across the Hudson River, and inadequate rail infrastructure at the port. While rail operators in New Haven have been able to overcome these weaknesses, they limit the types of rail service available to New Haven shippers. For example, New Haven could be a logical location for an inland port for container traffic from the Port of New York/New Jersey. But container rail service would be highly circuitous, routing through Selkirk, New York, and Springfield, Massachusetts. Similarly, rail could provide a larger role at the Port of New Haven but is currently limited by infrastructure.

Opportunity: Grow Bulk and Breakbulk Freight. Traditionally, the Port of New Haven has specialized in bulk/break-bulk cargoes in part because these cargoes can be handled in the limited space available.

[5] Bulk commodities are shipped in liquid or granular form and are unpackaged in large quantities. Break bulk is neither bulk nor containerized cargo. Break bulk cargo is loaded individually.

Discussions with transportation providers suggest that additional opportunities remain, particularly for truck/rail transload.

Figure 3-5. Parcels in New Haven Areas Zoned Industrial

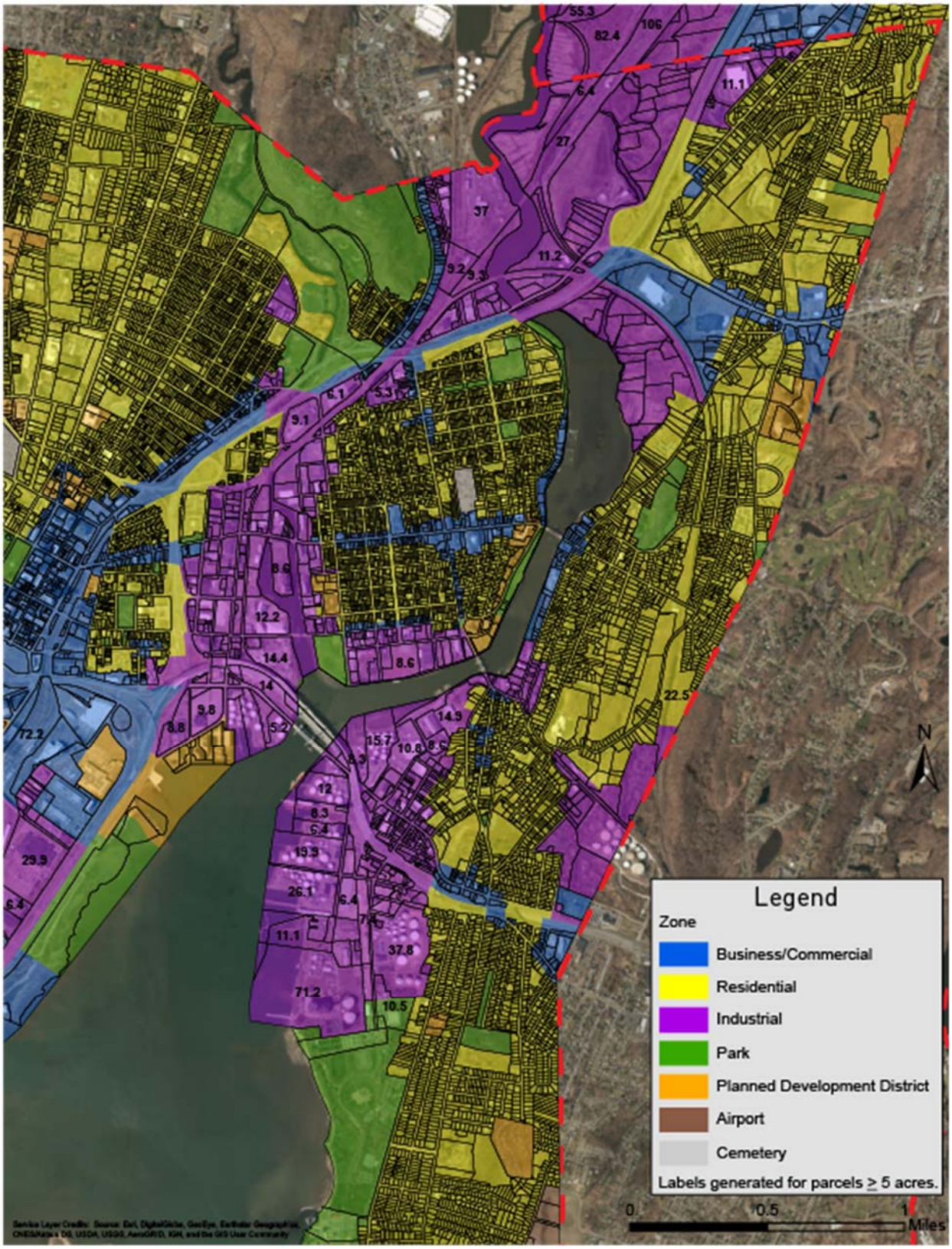
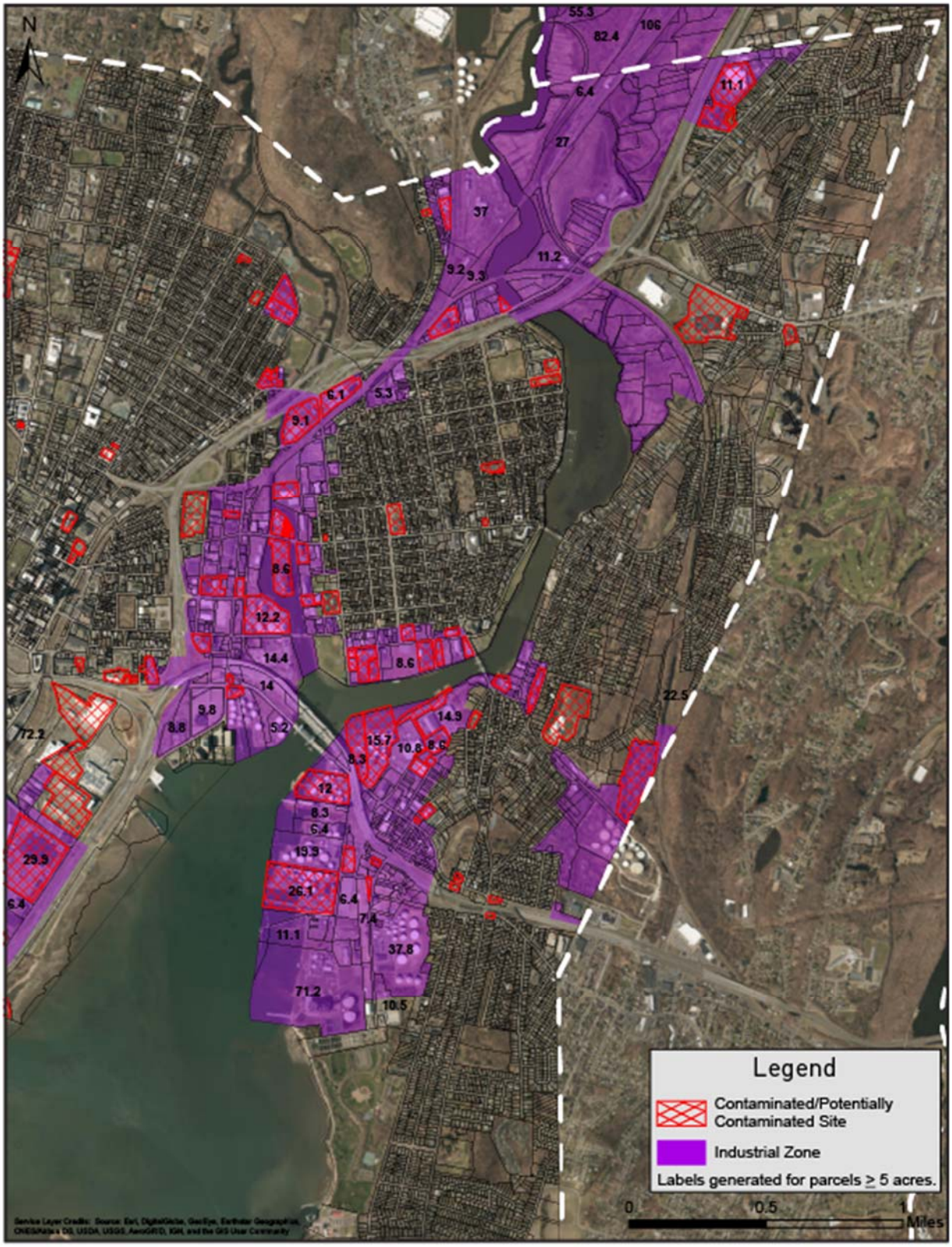


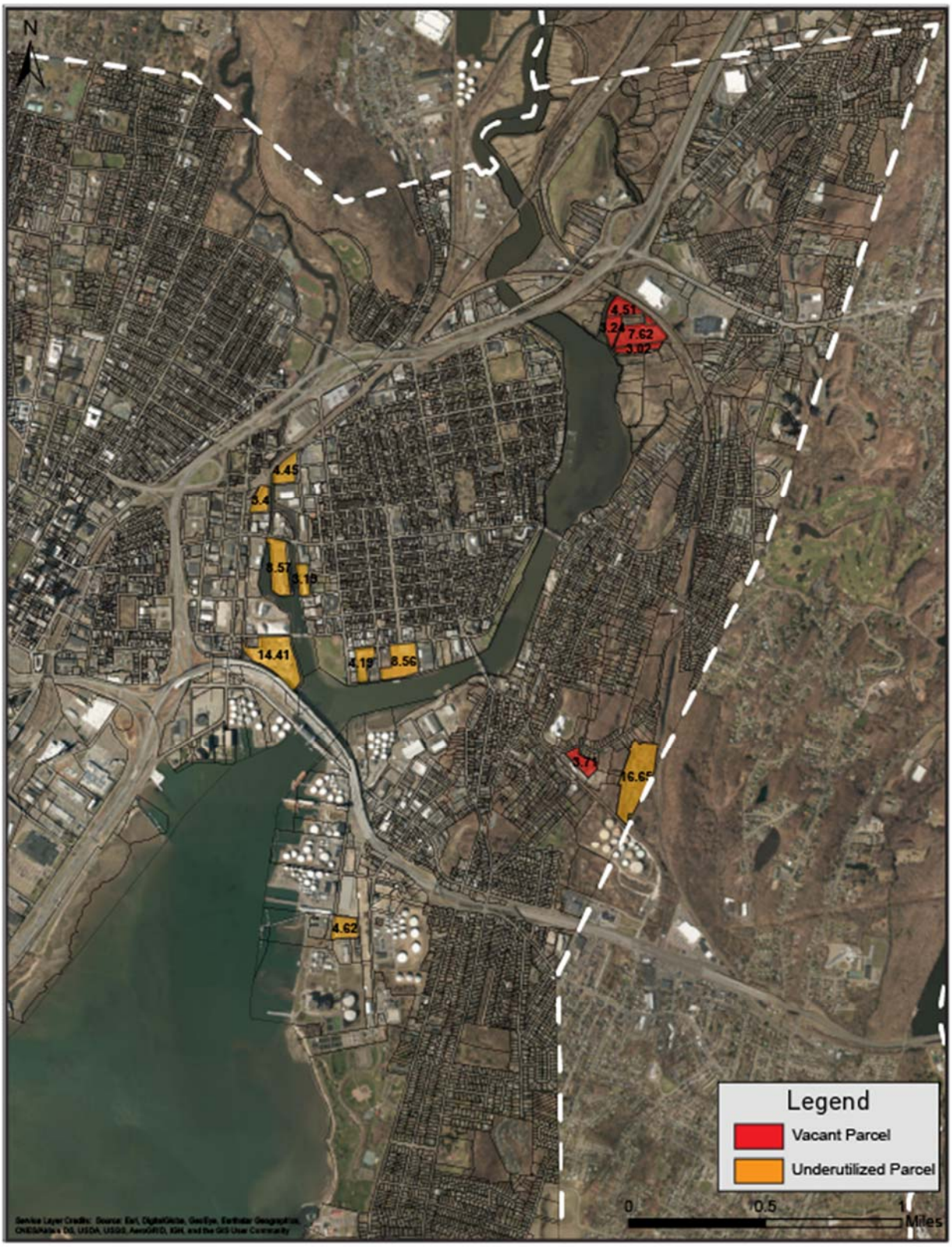
Figure 3-6. Parcels in New Haven Areas Zoned Industrial and Identification Sites with Contamination or Potential Contamination



Opportunity: Infill Distribution and other Niche Facilities. While traditional warehouses and distribution centers occupy larger footprints than what is available in New Haven, as discussed previously, online retailers have been establishing infill facilities that occupy smaller footprints than traditional distribution facilities. A number of specialty facilities could also be opportunities, such as for produce or food-related items such as cold storage facilities, some cross-dock facilities, and additional bulk/break-bulk transload facilities. An analysis has been performed to identify parcels that could be developed with a niche facility as shown in Figure 3-7. These parcels meet the following criteria:

- Are located in an area zoned industrial
- Are at least three acres
- Are not a park or owned by a land trust
- Do not obviously consist primarily of wetlands
- Are not already used for logistics purposes (including port facilities, existing transload facilities)
- Are vacant or underutilized. Underutilized parcels are those with an appraised building value of less than $50,000 per acre.

Figure 3-7. Vacant/Underutilized Parcels in Areas Zoned Industrial with 3+ Acres



Opportunity: Greater Value Added for Port and Transload Commodities. Materials such as petroleum products and steel flow through the port and transload facilities with minimal value added occurring in New Haven. Opportunities could exist for more value-added activities to take place in New Haven. One example of this happening is American Green Fuels, which manufactures biodiesel from used cooking oil.

Threat: Growing Congestion on the I-95 Corridor. As mentioned previously, New Haven's connections to New York City's economy and freight assets are a strength. However, congestion has increased on the I-95 corridor and will continue to increase, potentially making it more difficult for New Haven shippers to access John F. Kennedy International Airport, the Port of New York/New Jersey, and New York City markets.

Threat: Tolls. Several transportation providers were concerned about the impact of tolls on their businesses, particularly if those tolls do not translate to better transportation capacity.

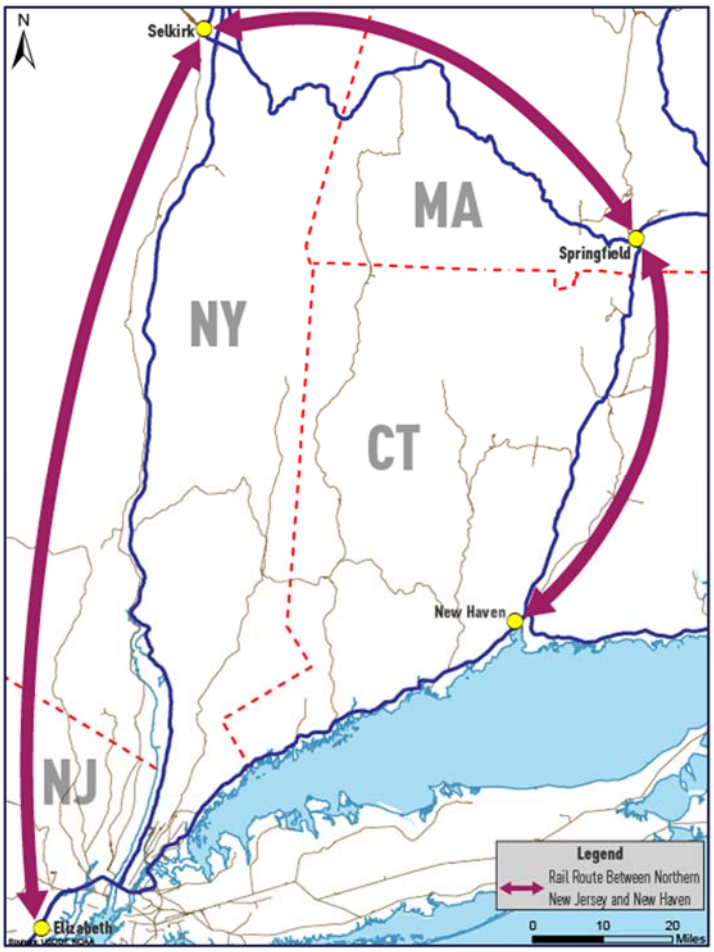
3.5 ACCESS TO NEW YORK GATEWAYS

As noted above, a threat to New Haven's logistics system is the increasing congestion on the I-95 corridor. Over the years, modal alternatives have been explored as potential ways to avoid congestion on I-95 and remove trucks from the corridor.

Feasibility studies have assessed the possibility of a container barge feeder service between the Port of New York/New Jersey and New Haven. Such a service remains a possibility, but challenges persist for a service to be successful. As an example, according to one trucking company, steamship lines charge demurrage if ocean containers picked up at the Port of New York/New Jersey are not brought back to the port within four days. Given the longer transit times and less frequent service, a shipper using containers on barge service would not be able to receive a container, unload it in Connecticut, and ship the empty container back to New Jersey within four days. They would be charged demurrage unless they could renegotiate their contracts. One possibility could be to use the container on barge service to ship lower-value goods that are not as time-sensitive. The containers could be loaded more heavily for barge service than would be possible over the road, thus saving shippers money by enabling them to load more in each container. Commodities and markets appropriate for such a service would need to be identified.

Another idea proposed during this study was to set up an intermodal service between the Port of New York/New Jersey and New Haven. As mentioned previously, freight rail routing between northern New Jersey and New Haven is circuitous because no rail crossing of the Hudson River exists south of Selkirk, New York, which is close to Albany. Routing is shown in Figure 3-8.

Figure 3-8. Freight Rail Routing between Northern New Jersey and New Haven



New York New Jersey Rail provides a float barge service between New Jersey and Brooklyn, New York (Figure 3-9). This service could theoretically provide an additional connection between New Haven and the Port of New York/New Jersey whereby freight would be shipped on float barges across the Hudson River to the New York & Atlantic Railway and then to Fresh Pond Junction, New York. From Fresh Pond Junction, the Providence and Worcester Railroad could bring freight over the Northeast Corridor to New Haven. Whether the economics of such a service would be competitive is uncertain.

Figure 3-9. New York New Jersey Rail Service

Source: New York New Jersey Rail

Another possibility to explore is to help Connecticut trucking companies move containers to/from Port of New York/New Jersey off peak and thereby avoid congestion on I-95. This could consist of a parking lot that could be used by multiple companies. Company drivers would move containers between the Port of New York/New Jersey marine terminals and the nearby parking lot during congested business hours. Different drivers would haul the containers between the parking lot and Connecticut at night when I-95 is less congested.

3.6 OPPORTUNITIES TO IMPROVE SHIPMENTS FREIGHT SHIPMENTS TO DOWNTOWN NEW HAVEN

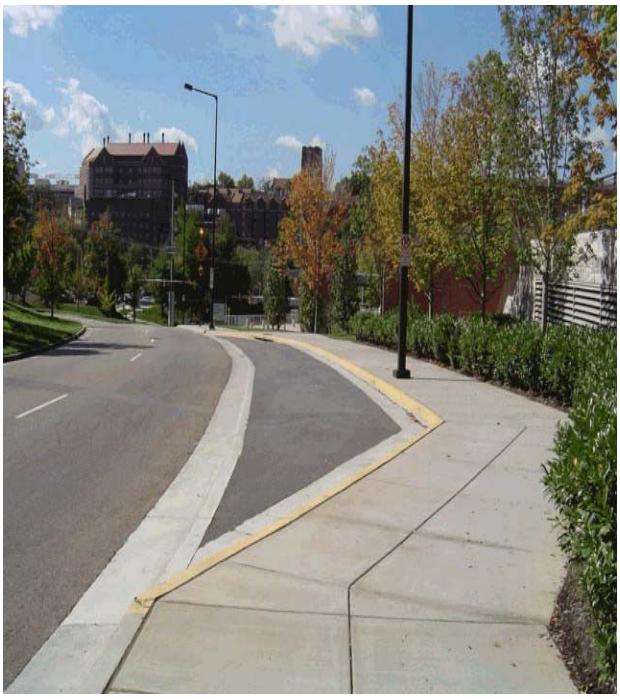
Several issues affect the movement of freight in downtown New Haven:

- Since few off street loading areas are available, companies must rely on loading zones on the street. However, passenger vehicles often park in the loading zones so that freight vehicles are forced to double park.
- Tractors/semi-trailers that are 53 feet long make deliveries in downtown, although the streets were not made to accommodate these trucks, and their unloading blocks sidewalks.

New Haven is hardly alone in these difficulties. A literature review on the subject and discussions with officials from other cities reveal that providing and enforcing loading zones is often an issue. Due to the growth in online shopping, the problem has grown worse with more illegal parking associated with parcel deliveries. From 2006 to 2009, parking fines in Toronto increased by 70 percent, with UPS, FedEx, and Purolator alone paying $2.5 million in fines in 2009.[6] Observations in Chicago showed that trucks parked illegally over 28 percent of the time, a much higher rate than passenger vehicles.[7]

Some cities have been experimenting with on-street cut outs to make loading zones safer and reduce interference with traffic. An example is shown in Figure 3-10.

Figure 3-10. Example of Loading Zone Curb Cut Out



Source: Arun Chatterjee, University of Tennessee

6 M. Nourinejad, A. Wenneman, K.N. Habib, M. Roorda, "Truck parking in urban areas: Application of choice modelling within traffic microsimulation," *Transportation Research Part A*, 64, 54 – 64, 2014.

7 K. Kawamura, P.S. Sriraj, "Building Freight Friendly Environment," *Transportation Research Procedia,* 12, 119 – 131.

Cut-outs require adequate space and retrofitting streets and sidewalks, which may limit their practicality in New Haven. Generally, on-street loading zones are best located at the end of blocks in the direction of travel or next to alley entrances. This allows delivery trucks to not be blocked by passenger vehicles. Location near alley entrances also enables easier access to multiple buildings and access to back doors in alleys. The District of Columbia Department of Transportation (DDOT) found that moving loading zones to the approach ends of blocks rather than mid-block dramatically increased commercial vehicle usage of loading zones. DDOT also increased the size of loading zones in busy areas from 50 to 100 feet, so that two delivery vehicles could use the loading zone at once. Because delivery vehicles often use hand trucks and dollies, mid-street curb cuts can ease movement of heavy items or loaded carts between delivery vehicles and buildings. DDOT relied on physical observation to inform its actions.

Studies suggest that the average minimum number of loading zones should be at least one usable loading zone per block.[8] New Haven's loading zones are metered from 8 AM to 4 PM. The establishment of loading zones balances the needs for on-street parking and the needs for last-mile freight deliveries. Cambridge, Massachusetts, balances these needs through "targeted loading zones," which are loading zones during certain parts of the day (typically morning) in order to serve the needs of retailers and restaurants. These zones are then used as metered parking during other times of the day. These types of multi-use zones are one possibility for New Haven to consider.

New Haven's approach to establishing loading zones is reactive in that businesses apply to establish loading zones. DDOT follows a similar approach whereby businesses request loading zones. However, DDOT has also developed an analytical tool to determine if a particular block should have a loading zone. This tool considers existing loading zones, off-street loading areas, high freight generation businesses, zoning, and existing curbside use. One challenge of this approach is to ensure that any modeling accounts for the unique characteristics of each block.

New Haven is considering changing its marking of loading zones. The U.S. Department of Transportation advises clear marking of all on-street loading zones with distinctive curbside signs and paint on the street – yellow line and 45-degree "zebra" striping.[9] Some states provide uniform curb markings. As an example, the California Vehicle Code specifies the following:

- A red curb means no stopping, standing, or parking (except buses)
- A yellow curb means loading or unloading passengers or freight for restricted time periods
- A green curb means time limited parking, etc.

Some municipalities are considering the types of vehicles that can use loading zones, because the distinction between a commercial and private vehicle has begun to blur (one example would be an Uber Eats delivery). Seattle designates multiple types of loading zones, including truck-only loading zones, commercial vehicle loading zones, and passenger loading zones. Some cities allow commercial/service vehicles to purchase a "meter bag" to allow use of a metered parking space and create a temporary, short-term loading zone.

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8 Volpe National Transportation Systems Center, District Department of Transportation, *District of Columbia Motor Carrier Management and Threat Assessment Study,* 2004. This study was conducted before e-commerce became a major force in urban deliveries, suggesting contemporary needs may be greater.

9 U.S. Department of Transportation, *Characteristics of Urban Freight Systems*, Report #DOT-T-96-22.

Similar to New Haven, other cities wrestle with loading zone enforcement. Some have increased enforcement with more frequent ticketing of passenger vehicles in loading zones, which has been found to be effective—although it is uncertain how long-term the initiatives have been, or whether they have represented a temporary surge in enforcement. One problem is the ability to enforce loading zone regulations when passenger vehicles pay a meter. For example, in Washington, DC, judges often rule against parking violations when the vehicle owner paid a meter, even though that passenger vehicle was in a truck-only loading zone.

Cities have been experimenting with the pricing of loading zones. As an example, New York City discourages vehicles from remaining in loading zones for excessive periods of time by increasing the cost per hour the longer a vehicle remains in a loading zone. The cost of the meter increases by $1 per hour each hour up to three hours.

New Haven has considered plans to discourage large tractor/semi-trailers from delivering in the downtown by establishing a consolidation center on Ella T. Grasso Boulevard. Urban consolidation centers are a niche solution and should not be considered for citywide application. While reducing the number of delivery vehicles is attractive, commercial realities such as customer relationships, service commitments, and brand fulfillment work against it, and costs are higher. For this reason, the track record of consolidation centers is poor. Examples of niche applications that do work are consolidations for individual businesses within industry groups, typically handled by the private sector through third-party logistics providers (3PLs).

3.7 NEW HAVEN MARKET POSITION

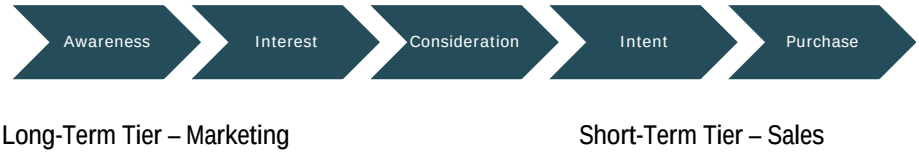
Given New Haven's significant freight assets, one question is how to market New Haven as a location for logistics activities: What promotional activities would effectively create an awareness and positive view about New Haven as a place for logistics businesses to locate and for shippers to receive, transfer, or distribute freight? Currently, no single organization has the responsibility for promoting New Haven as a location for logistics. The New Haven Port Authority conducts stakeholder outreach, but it does not actively market the port. This lack of marketing results from the structure of the port, where terminals are owned and operated by private companies (by contrast, in a landlord/tenant port a portion of the port authority's lease fees are often devoted to marketing the port). The Connecticut Port Authority could have a role in marketing New Haven's port assets, given its mission to "…grow Connecticut's economy and create jobs by strategically investing in the state's three deep water ports and small harbors." Marketing freight and logistics capabilities often requires a specialized knowledge base. For example, the Economic Development Corporation of New Haven has indicated that freight and logistics is beyond the organization's economic development activities. Most likely, efforts to promote New Haven as a logistics center would occur as a cooperative effort by the New Haven Port Authority and the City of New Haven Economic Development Administration.

Several considerations will be important when considering a marketing effort:

- **The goals of the effort**. On the one hand, promotional efforts may be aimed at supporting existing logistics businesses such as freight terminal operators and transload operators, who could support and grow with additional volume; on the other hand, the purpose could be to attract new logistics facilities to New Haven. The purpose would most likely be a mixture of both.

- **The role of the public sector in the effort.** Currently, the responsibility to market New Haven's freight assets lies with the private sector—the transportation providers including trucking companies, terminal operators, and railroads. If the public sector were to take on a role, this role would need to complement private-sector efforts in as efficient a manner as possible. Generally, marketing approaches fall into tiers, depending on whether the efforts are for short-term or long-term results. Long-term efforts focus on the early stages of decision-making for logistics providers and their customers as shown in Figure 3-11. The goal of the long-term tier is to raise awareness and establish a favorable impression of New Haven as a location for logistics. Typical activities in this tier would be to develop messaging and branding, to advertise in trade publications, to network through meetings, conferences, and various organizations, to prepare presentations and outreach meetings, to send mailings or email blasts, and to develop messaging on social media. Short-term activities are more sales-oriented, to convince companies to either use the services of existing transportation/logistics providers or to locate in New Haven. The public sector's role will most likely focus on the long-term tier (i.e., raising awareness and creating a favorable impression, so that New Haven is considered when prospective companies move into short-term examination of individual sites). The exception is in cases where a specific parcel could be used for a logistics function and the public sector helps to prepare that parcel to make it shovel-ready, or provides due diligence on the parcel so that a potential developer knows exactly what the parcel does and does not have to offer.

Figure 3-11. Purchase Process



- **The identity of the target market.** Marketing efforts are most effective and efficient if they communicate with (and to the extent possible, only with) the relevant market. This leads to the question as to the appropriate market to target. As discussed in Section 3.4.5, given the limitations of parcel sizes, additional logistics firms that would move into the city of New Haven would either focus on bulk/break-bulk distribution or would be specialty facilities like infill distribution facilities or niche facilities. Like existing transportation and logistics providers in New Haven, new facilities would serve a regional or local market that could cover either New England, the northern portion of the New York metropolitan area, Connecticut, or the area specifically around New Haven. Therefore, the most efficient marketing efforts will focus specifically within the region rather than seek a national audience.

  Opportunities exist for greater awareness of capabilities at the port and within New Haven in general. For example, a representative of a company that manufactures metal products was interviewed for this study and was unaware that metals are transloaded from rail to truck in New Haven. Given limitations of time and budget, activities to promote logistics in New Haven will likely be modest and use existing resources such as the City of New Haven's and the Port of New Haven's websites. Additional promotional efforts could focus on networking or advertisement through regional/local organizations such as trade groups and shipper organizations. For example, there exists a manufacturing association for greater New Haven, a steel fabricator association for New England, a rail shipper association for the Northeast, and a New England chapter of the Council of Supply Chain Management Professionals. Each could be an avenue through which to spread information about New Haven's logistics capabilities.

4. Recommendations

Based on the findings of this study, potential infrastructure and policy initiatives become apparent. For some of the issues and opportunities that face freight and logistics in New Haven, the path to resolving these issues or opportunities is apparent; these are short-term needs. For other issues and opportunities, solutions will need to be explored and developed over time; these are long-term needs.

Table 4-1. Short-Term Infrastructure Recommendations

Need/Opportunity	Recommended Action
Flooding on the Belle Dock line limits rail access to the port district	Work with Genesee & Wyoming to explore solutions to flooding, including potential reactivation of pump.
Potential for increased rail access to port district by a new spur on the Parkland Property	Develop a plan and design rail access onto the Parkland property.
Opportunity for additional rail access to American Green Fuels	Explore alternatives for an additional track into the New Haven Terminal facility.
Low clearances on rail overpasses of Humphrey and James Streets makes truck access inconvenient and results in trucks often turning around on private property	Increase clearances, most likely by lowering roadways.
Connecticut Avenue is in a poor state of repair	Rebuild Connecticut Avenue.
Middletown Avenue frequently floods near the intersection with Front Street, making it difficult for companies to access their businesses	Develop an infrastructure solution that reduces the frequency of flooding on Middletown Avenue.
Opportunity to increase transload activity at facility on Water Street	Explore expansion if possible of facility.
Passenger cars often park in downtown loading zones	Improve enforcement and marking of loading zones (which could include curb striping).

Table 4-2. Short-Term Policy Recommendations

Need/Opportunity	Recommended Action
Opportunity to better communicate New Haven's logistics capabilities	▪ Develop content for the New Haven Port Authority and/or New Haven Economic Development Agency website to better communicate New Haven's logistics capabilities. ▪ Network with local/regional industry groups to understand needs and inform relevant industry leaders of New Haven's capabilities.
Trucks must drive through residential areas to access industrial areas. In some cases, the potential for conflicts between trucks, passenger vehicles, bicycles and pedestrians in industrial areas. This can limit the ability to attract/establish logistics facilities in those areas.	▪ If areas are zoned industrial, support industrial uses in those areas. ▪ Establish reasonable and clearly marked truck routes that move trucks into and out of industrial areas without interfering with residential neighborhoods. ▪ Route bike paths and walkways in such a way that do not interfere with industrial activities. ▪ Establish buffer areas between industrial and residential land uses.
Opportunity to increase port capacity through off-site locations	▪ Work with CSX and other property owners to determine if areas in the Cedar Hill yards area could help to augment the port's capacity and capabilities.
Opportunity appears to exist for additional truck/rail transload	▪ Work with railroads, property owners, trucking companies to explore additional transload opportunities.
Windsor Locks Bridge and Hartford Viaduct reduce the capacity of railcars that can access NHHS line	▪ Advocate for the state to seek federal grant funding to replace the Windsor Locks Bridge and for the state or other party(ies) to provide matching for the federal grant. ▪ Work with Amtrak and state officials to determine if the capacity of the Hartford Viaduct could be increased while state continues to consider options for the I-84 Hartford Project.
Delivery companies may not necessarily use loading zones in downtown New Haven if they are not convenient	▪ Ensure that loading zones are on the approach end of blocks where possible.
Given the growth of Uber Eats and other delivery services, the definition of a delivery vehicle has changed	▪ Analyze new loading zone systems that allow non-truck users to gain permits or passes, including enforceability and effect on productivity of traditional freight vehicles.

Table 4-3. Long-Term Recommendations

Need/Opportunity	Recommended Action
Expanding maritime access to New Haven could reduce highway congestion and reduce externalities associated with highway usage in general.	▪ Engineering studies have been completed for a new berth at a 19-acre site on the Quinnipiac River. The public sector could have a role in finding a user for the berth. ▪ Once a user is found, the public sector could help to secure funding if the project is considered to generate adequate public benefits.
The 19-acre site mentioned above could benefit from rail access.	▪ Rail access would need to justify the cost and potential disruptions caused by extending rail to the site. This is a project to consider if the public benefits of the project are found to warrant its completion.
New Haven depends heavily on I-95 to access markets and international gateways in the New York metropolitan area. I-95 is highly congested and will only become more congested.	▪ No single solution currently presents itself, but this is a long-term issue that will warrant continued exploration. ▪ Connected and automated/autonomous vehicles eventually may transform the picture; rail and maritime options should continue to be explored as technology and needs evolve. ▪ Initiatives to enable/promote off peak operations should also be explored.
New Haven shippers depend on rail lines whose primary purpose is passenger transportation. While capacity is made available for freight operations, operations could be more convenient and potentially less costly if freight to/from New Haven relied on lines whose primary purpose was to carry freight.	▪ Explore options to upgrade rail corridors parallel to NHHS to allow for through freight movements. ▪ Advocate for CTDOT to adopt a short-line rehabilitation/industrial access improvement program as in neighboring states.
As shown in Figure 2-10, many of the areas zoned industrial are within the 100-year flood zone. As with other establishments, logistics companies would prefer to minimize risks associated with flooding.	▪ Develop a plan to promote resiliency analogous to that recently performed by New York City.* ▪ Pursue federal funding for resiliency programs analogous to Resilient Bridgeport.**
As shown in Figure 3-6, a number of areas zoned industrial are contaminated or potentially contaminated. As with other establishments, logistics companies would prefer to minimize risk of liability associated with contaminated properties.	▪ Continue to support efforts to remediate contaminated or potentially contaminated sites.
There may be an opportunity to better integrate the port and transload facilities into New Haven's economy, to provide more value-added to the goods that flow through the port and transload facilities.	▪ Explore opportunities to attract businesses that would add value to goods moving through the port and transload facilities.

* New York City Planning, Coastal Climate Resiliency, *Resilient Industry Mitigation and Preparedness in the City's Industrial Floodplain, https://www1.nyc.gov/assets/planning/download/pdf/plans-studies/resilient-industry/resilient-industry-full-report.pdf*.

** *https://resilientbridgeport.com/*

For many of the recommendations above to be completed, the City of New Haven, the New Haven Port Authority, and South Central Regional Council of Governments would need to secure funding (grants) or financing (loans). For projects that benefit specific private-sector users, these could be completed as public/private partnerships where both the public and private sectors provide part of the funding or the financing. Some of these projects could be eligible for federal discretionary grant programs such as multimodal programs like Better Utilizing Investments to Leverage Investments or Infrastructure for Rebuilding America, or modal-specific programs such as through the FRA or the Maritime Administration. Grant applications are often most competitive if they include matching grants at least near 50 percent. Matching funds would be provided by state/local governments or by the private sector.