RESILIENT BRIDGEPORT

National Disaster Resilience and Rebuild by Design Projects

Bridgeport, Connecticut

Final Environmental Impact Statement/ Environmental Impact Evaluation APPENDICES

August 2019

Prepared for

CONNECTICUT Department of Housing

Prepared by

wsp

APPENDIX D
Environmental Site Assessments

Task 110 Corridor Land Use Evaluation for the National Disaster Resilience Project

RESILIENCY PROJECT

Connecticut Department of Housing
Bridgeport, Connecticut

FINAL

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1.0 INTRODUCTION

WSP USA (WSP) has completed a Task 110 Corridor Land Use Evaluation for the National Disaster Resilience (NDR) project located in the South End area of Bridgeport, Connecticut (Figure 1). The objective of the Corridor Land Use Evaluation is to assess the relative environmental risk associated with current and former land use in the study area and to determine the potential need for further evaluation.

1.1 Project Description

In 2014, the U.S. Department of Housing and Urban Development (HUD) selected the City of Bridgeport and a multidisciplinary design team to prepare an integrated resilience framework for Bridgeport for the federal Rebuild by Design Competition. A HUD grant, which was received by the State of Connecticut, is being used to develop a plan for reducing flood risk and improving resilience for the South End and Black Rock Harbor areas, and to build a pilot project in the South End that serves as a catalyst for full implementation of broader flood protection and resilience strategies. This Task 110 Corridor Land Use Evaluation focuses on the pilot study area in the South End (Figure 2), which contemplates the installation of a sea wall in this area. Three potential alignments of the sea wall are being considered, and the Task 110 study area focuses on the properties adjacent to three potential sea wall alignments (Figure 2).

1.2 Scope of Services

The scope of work included: a survey of the study area, identification of the current land uses within the study area, a search of federal and state regulatory databases, a review of aerial photographs, topographic maps, and Sanborn fire insurance maps. Future land uses or situations within the study area are outside the scope of work. The following report summarizes present and former land use information to provide a professional opinion regarding the relative environmental risk associated with each parcel abutting the various alignments.

All proposed alignments for the sea wall are located within areas that likely contain urban fill that typically are comprised of constituents of concern (COCs) at concentrations near or above the Connecticut Department of Energy and Environmental Protection (CTDEEP) Remediation Standard Regulation (RSR) soil criteria. In addition, the environmental media within the alignments may also have been impacted by operations occurring on the parcels in the immediate vicinity of the alignments. This evaluation will provide baseline data to develop a scope necessary to assess environmental media in the various proposed alignments.

2.0 PHYSICAL SETTING

2.1 Regional Physiology

The study area is located on the U.S. Geological Survey (USGS) Bridgeport, Connecticut quadrangle. The elevation of the Site is approximately 20 feet above mean sea level (ft amsl) on the western portion of the study area, and 10 ft asml along the northwestern portion of the study area. The elevation slopes downward to sea level at the Bridgeport Harbor located on the east and south side of the study area.

2.2 Geologic Conditions

The property is located within the Southwest Coastal Major Drainage Basin. The surficial materials at the Site are mapped primarily as sand overlying fines with thin till in the west. A large portion of the eastern side of the study area is also mapped as Artificial fill (Stone, et al., 1985). Artificial fill includes any materials, natural or manmade, that have been artificially placed. Bedrock beneath the Site is mapped as the Derby Hill Member of the Orange Formation (Crowley, 1968), a thin-bedded, fine- to medium-grained schist and gneiss interlayered with a medium- to coarse-grained gneiss.

2.3 Hydrologic Characteristics and Known Uses

The nearest surface water is the Bridgeport Harbor to the east and south, which abuts the study area. The Bridgeport Harbor is mapped as a Class SB surface water (CTDEEP, 2015). A Class SB designation indicates a best usage for habitat for marine fish and other aquatic life and wildlife, commercial shellfish harvesting, recreation, industrial water supply, and navigation.

Groundwater at the study area is classified by the CTDEEP as "GB". A "GB" classification applies to groundwater within highly urbanized areas or areas of intense industrial activity and where public water-supply service is available rather than private water-supply wells. Groundwater with a GB classification may be impaired and the State's goal is to prevent further degradation of the aquifer.

Based on local topography, groundwater at the site is presumed to flow generally to the south and east. Once groundwater exits the Site, it is presumed to discharge to the Bridgeport Harbor. Groundwater flow would be influenced by the tides. Depth to groundwater is anticipated to be shallowest near the shoreline, and increase in depth as the elevation of land increases westward away from the shoreline.

3.0 LAND USE EVALUATION

3.1 Initial Site Survey

An initial survey of the study area was conducted on June 7, 2018 by Patrick Staub of WSP and June 27, 2018 by Timothy McBride of WSP. The initial survey involved a visual assessment of the study area from publicly accessible thoroughfares. Several properties in the eastern portion of the study area were not directly accessible at the time of the survey. Construction activity associated with what appeared to be active redevelopment of the 60 Main Street complex prevented access to nearly all of Henry Street (except the area adjacent to parcel Map ID 27). Separate road construction activity prevented access to all of Russell Street. Atlantic Street was inaccessible east of the intersection with Russell Street due to security measures surrounding the PSEG power plant and the Bridgeport Energy parcel (parcel Map IDs 40 and 12, respectively). Likewise, the entirety of the PSEG power plant parcel was inaccessible, preventing direct visual access to the majority of the Eastern and Central Alignments.

During the initial site survey, no chemical storage or indications of releases of hazardous substances were noted in the area west of Main Street. In the eastern portion of the study area, large quantities of petroleum (in est. 500,000 to 5,000,000-gallon silos) and coal (in an approximately 5-acre pile) were visible from public streets and from publicly available satellite imagery, presumably associated with power generation on these parcels. Because of the lack of access to these areas, specific identification of the storage of other chemical substances was not directly observed, though it is reasonable to infer additional

chemical use and storage based on the current use of the parcels as power generation and associated facilities.

As it is located in a highly urbanized area, a significant portion of the study area is comprised of buildings or other impermeable surface cover. No significant staining of pavement was noted in areas visible during the initial site survey. A slight solvent odor in the ambient air was noted during the initial site survey on June 7 while walking along Singer Avenue; it was unclear whether the odor was emanating from the eastern or western side of the street. Bare patches in grassy areas were noted throughout the study area, though these were likely the result of neglected maintenance rather than an indication of a release to the environment. No other stressed vegetation was observed in the study area. The inspection also identified that, as proposed, the Central Alignment may be located through a portion of the existing former Remington Products factory and loading dock area (parcel Map ID 10). A photographic log of observations made during the initial site survey is provided in Appendix I.

3.2 Current Land Use

The study area (Figure 2) consists of 73 individual parcels totaling approximately 107-acres. The current land use of parcels within the study area was determined based on information gathered during the initial site survey and from municipal land records.

Land use within the study area consists of heavy industrial, light industrial, commercial, educational, residential, and recreational, as well as vacant parcels. A total of 73 parcels are located within the study area, though in many cases multiple adjacent parcels are part of the same development, or owned by the same entity. A list of the parcels contained within the study area and their current land use designation and ownership is provided in Table 1. Locations of the individual parcels are shown on Figure 2.

3.3 Historical Land Use

Bridgeport has history rich in industry, dating back to the 19th century. The study area has been home to a variety of industries including clothing manufacturing, rail and sea shipping, electrical manufacturing, and power generation. These industrial activities have been focused primarily in the eastern portion of the study area. Seaside Park, which lies in the south-central portion of the study area and extends well beyond the study area limits, was established in the late 19th century. The remainder of the study area is composed primarily of the University of Bridgeport and residential homes. Historical land use within the study area was compiled from aerial photographs, United States Geological Survey (USGS) topographic maps, Sanborn Fire Insurance Maps, the City of Bridgeport Tax Assessor's records, and Sanborn Fire Insurance Maps.

3.3.1 Aerial Photographs

Aerial photographs of the study area were reviewed for the years 1934, 1951, 1965, 1970, 1985, 1995, and 2006. These aerial images illustrate the development of the eastern portion of the study area and corresponding progression of the shoreline. The 1934 and 1951 images indicate the shoreline was much further west than it is today, with a railyard and harbor along the coast. Industrial development, including the former Remington Products factory, is also visible in the southeastern portion of the study area, with

the western portion of the study area appearing to be either undeveloped or residential. The development of Seaside Park, located in the south-central portion of the study area and expanding beyond the limits of the study area, predates the first available aerial photograph and is observed in all reviewed aerial photographs, separating the industrial harbor in the east from the more residential area to the west. A power plant is first visible along the eastern edge of the study area in the 1965 aerial image with expansions appearing in the 1970 image. Industrial development extended eastward and is at its approximate current extent in the 1995 and 2006 aerial images. It should be noted that there is no railyard evident in these later images.

In addition to the development of the eastern shoreline, the development of the University of Bridgeport in the southwestern portion of the project area is first visible in the 1951 aerial image. The University Campus expanded northward and eastward through the 1965 aerial image, reaching its approximate current extent by the 1970 image. Concurrent with the expansion of the University of Bridgeport is the loss of residential housing, as this land was purchased and developed for other uses by the University.

Filling of the eastern and southern portions of the study area are first evident in the 1965 image. The filling appears to be completed in the 1970 image, and matches the current shoreline configuration.

Reviewed aerial photographs are provided in Appendix II.

3.3.2 Topographic Maps

WSP reviewed USGS topographic maps from 1889, 1943, 1951, 1960, 1970, and 1984. Copies of the maps are included in Appendix III. Reviewed maps illustrate the changing shoreline over time. Topographic maps from 1889 and 1943 indicate the shoreline was considerably further west than today, with the eastern portion of the study area under water. The shoreline configuration begins to change gradually in the 1951 topographic map, with development progressively moving eastward and approximately matching the current shoreline in 1970. Along with the changing shoreline, additional development in the study area is identified in the 1951 topographic maps, including the University of Bridgeport in the west as well as the railyard and the former Remington Products factory along the eastern shoreline. The power plant along the shoreline is first visible in 1960 with the expansions visible on the 1970 topographic map. Seaside Park is identified in all reviewed topographic maps. The railyard located in the eastern portion of the site is visible in the 1951, 1960, and 1970 topographic maps.

3.3.3 Tax Assessor Records

WSP reviewed records from the City of Bridgeport Tax Assessor's Office for the 73 parcels within the study area. Tax cards are available in Appendix IV and were used to identify current ownership and land use designation of the parcels. In some cases, historical ownership was also available from these records. Information obtained from the tax assessor's office is summarized in Table 1. Below is a summary of parcels where historical use may have included the use and/or storage of petroleum or other hazardous products.

Map ID 1-2 – From at least 1968 until 2002, these parcels were owned by a bag and canvas manufacturer who maintained a factory on the property.

Map ID 3-11: Records for these properties identify ownership by Remington Products Company from at least 1992 to 2006.

Map ID 12: Records indicate this property is designated as a public utility and is owned by Bridgeport Energy LLC.

Map ID 15: Records for this property identify United Illuminating as an owner in 1996.

Map ID 40-41: Records identify PSEG Power Connecticut as the owner of these properties beginning in 2003.

Map ID 49-50: Records identify United Illuminating Company as the current owner of these properties.

3.3.4 Sanborn Fire Maps

Sanborn Fire Maps were reviewed and portions of the study area were identified in the years 1884, 1889, 1904, 1913, and 1939 and are available in Appendix V. Below is a summary of parcels where historical use may have included the use and/or storage of petroleum or other hazardous products.

Map ID 1-2: Sanborn maps indicate these properties contained a bag and canvas manufacturer beginning in at least 1939.

Map ID 3-11 – Portions of this parcel were identified in the 1913 Sanborn map indicate historical use of this parcel included the Bridgeport Sewer Basin in the northern portion and as part of the rail yard that occupied the 1 Atlantic Avenue parcel to the east. Additionally, the southern portion of the parcel was identified in the 1939 Sanborn map and contained a Remington Products factory and a printing company, which consisted of various warehouses, machine shops, auto shops, and coal storage facilities.

Map ID 40: Railroad related structures are identified on the western portion of this property beginning in 1884 with the harbor located to the east. Railroad activities are identified on this parcel on all reviewed Sanborn maps and include a coal storage shed, a mechanic shop, and an oil storage area. Sanborn maps from 1884 and 1889 also identify a furniture manufacturing company on the northeastern area of the parcel.

Map ID 41: The 1913 Sanborn map identifies multiple storage boxes on the northern portion of the parcel. The use of these storage containers is not specified.

Map ID 21: The 1939 Sanborn map identifies a warehouse on this parcel which included an oxygen storage area and an acetylene storage area.

Map ID 50: The 1939 Sanborn map indicated that a portion of this parcel was used for storage of plumbing and heating supplies.

Map ID 51 and 64-66: Multiple auto houses or garages were identified on the 1913 Sanborn map in the general area of these parcels.

4.0 ENVIRONMENTAL RECORDS REVIEW

Federal, state and tribal environmental databases were reviewed for parcels within the study area in an effort to identify potential hazards. A search of U.S. Environmental Protection Agency (U.S. EPA) and Connecticut Department of Energy and Environmental Protection (CTDEEP) databases was completed by an independent firm, Environmental Data Resources Inc. (EDR).

The databases reviewed include:

- National Priorities List (NPL), Proposed NPL and Delisted NPL database
- Federal Superfund Liens (NPL LIENS)
- Federal Facility Site Information Listing (FEDERAL FACILITY)
- Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) and CERCLIS - No Further Remedial Action Planned (CERCLIS-NFRAP) database of potentially hazardous waste sites.
- Resource Conservation and Recovery Act Hazardous Waste Treatment, Storage or Disposal Facility (RCRA-TSD).
- Corrective Action Reports (CORRACTS) for Hazardous Waste handlers.
- RCRA Large, Small and Conditionally Exempt Small Quantity Generators (RCRA-LQG, RCRA-SQG & RCRA-CESQG) of Hazardous Waste
- Federal Institutional Control/Engineering Control Registries (US ENG CONTROLS & US INST CONTROL)
- Federal Emergency Response Notification System list (ERNS)
- Facility Index System/Facility Registry System (FINDS)
- State Hazardous Waste Sites (SHWS) database of hazardous waste disposal sites.
- Site Discovery and Assessment Database (SDADB) database of facilities suspected of hazardous waste disposal.
- State Solid Waste Facility/Landfills (SWF/LF) database of solid waste disposal facilities, landfills and transfer stations.
- State Leaking Underground Storage Tank (LUST) and Leaking Underground Storage Tanks on Indian Land (INDIAN LUST) databases.
- Connecticut Leachate and Wastewater Discharge Sites (LWDS) includes discharges, waste disposal sites and spills historically mapped by the Connecticut Department of Environmental Protection.
- State Registered Underground Storage Tanks (USTs)
- State Registered Aboveground Storage Tank (AST) database of bulk petroleum facilities that receive petroleum by marine vessels. Underground Storage Tanks on Indian Land (INDIAN UST) and Underground Storage Tank Listing (FEMA UST).
- ELUR Sites (AUL) database of state and tribal institutional control and engineering control registries.
- State Voluntary Cleanup Program Sites (VCP) and voluntary cleanup sites on Indian land (INDIAN VCP).
- Brownfield Sites

A full list of databases included in the EDR report are available in Appendix VI. Twenty-two (22) parcels within the study area were identified in these databases, including CT MANIFEST, CT SPILLS, CT UST, and RCRA NonGen/NLR. Appearance in these databases suggests a property is at risk of environmental contamination. Properties identified in the EDR report are summarized in Table 1.

5.0 EVALUATION AND SUMMARY

Current land use, historical land use, and environmental records were used to determine the relative risk of environmental contamination associated with each parcel within the study area (Table 1 and shown on Figure 2). Parcels where records identified no environmental concerns, such as residential properties, were designated low risk. A moderate risk designation was assigned to those parcels where records suggest the potential use or storage of potential contaminants, but where there is no indication of a release or direct environmental impact. A high-risk designation was assigned to parcels with records of contaminant release or where such a release is likely based on current or past land use.

While parcels are designated as a low, moderate and high risk designations, the likelihood exists that urban fill is present in surficial materials throughout the subject areas, and contain COCs at concentrations which are near or above soil criteria DD identified in the CTDEEP RSRs. Typical COCs identified in urban fill in Bridgeport include metals, polynuclear aromatic hydrocarbons (PAHs) and petroleum hydrocarbons. In addition, if part of the alignment were constructed through an existing building, a hazardous building materials inspection would be required to determine appropriate disposal of the building material (i.e. asbestos, lead-based paint, PCBs).

Within the study area, (27) parcels were designated low risk, (23) moderate risk, and (23) high risk. The relative risk designation of each parcel is identified in Table 1 and Figure 2. Table 1 also includes COCs potentially associated with each of the parcels. As noted above, because of the potential of urban fill underlying the study area, all parcels would include metals, PAHs and petroleum hydrocarbons as COCs. Low risk parcels account for the smallest portion of the study area and consist primarily of residential or commercial parcels located along Main Street. Moderate risk parcels are concentrated primarily west of Main Street. High risk parcels are concentrated east of Main Street and account for largest portion of the study area. However, each of the three proposed Alignments intersect a significant number of high risk parcels.

6.0 CONCLUSIONS

Based upon the information gathered during the Corridor Land Use Evaluation, it is recommended that a Task 210 – Subsurface Site Investigation be performed in all areas of anticipated intrusive construction activities and/or right-of-way activities. Because of the likely presence of urban fill, WSP recommends that the investigation include low to high risk parcels, with a greater density of sampling occurring in the right-of-way's adjacent to the moderate to high risk parcels identified in this report.

7.0 LIMITATIONS

The purpose of this Corridor Land Use Evaluation is to identify potential impacts to the environment status of the physical conditions (i.e., soil, ground water, structure, etc.) in the study area, due

to the use, storage or disposal of hazardous or toxic materials or wastes. As such, any other property conditions or characteristics are not addressed in the scope of work for this report. The scope of work does not include, nor should the report be considered as, an audit of compliance with environmental permits, management practices, or federal, state or local laws and regulations, even though in the course of work such information may be obtained and noted in the report.

The conclusions stated above have been developed from what is considered to be a reasonable investigation based on the present and past land use of the study area. The conclusions, to some degree, are based upon information provided by others as referenced or noted in the report. Reasonable efforts have been made to confirm the information with other sources; however, WSP is not responsible for missing or incomplete information if such information is not available at the source or provided at WSP's request, or if such information cannot be obtained within the time constraints of the work or within a level of effort reasonable for the work being completed.

The conclusions and/or recommendations are applicable to areas of the study area that were accessible at the time of inspection and represent the conditions observed in those areas. Areas that were hidden, covered or otherwise inaccessible to inspection are not covered by the conclusions and recommendations. The conclusions and recommendations are based in part on conditions observed within the study area at the time of the inspection. The conclusions do not include subsequent changes to or use of properties, which could alter the environmental status from its present condition.

WSP asserts that the data are complete and appropriate at the time and for the work conducted, but is not responsible for the use of the information for purposes for which it was not intended.

cmm
December 19, 2018
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TABLE

TABLE 1
RESILIENCY PROJECT
BRIDGEPORT, CONNECTICUT

Summary of Corridor Land Use Evaluation

Map ID	Address	Current Owner	Current Land Use Designation	Previous Owners	EDR Database Review	COCs	Risk
1	388 MAIN ST	388 MAIN STREET LLC	Industrial	Josephson Bag & Canvas Company	EDR Historical Cleaner	ETPH, PAHs, Metals, VOCs	High
2	394 MAIN ST		Industrial	Josephson Bag & Canvas Company		ETPH, PAHs, Metals, VOCs	
3	37 HENRY ST #41	60 MAIN STREET LLC ET AL	Industrial	Adelman Hiram et al. Remington Products Company	CT MANIFEST, CT SDADB, RCRA NonGen/NLR, ICIS, US AIRS, FINDS, ECHO, CT CPCS, RI MANIFEST, NY MANIFEST, CT NPDES, CT BROWNFIELDS, CT ENF	ETPH, PAHs, Metals, PCBs,VOCs	High
4	51 HENRY ST		Industrial			ETPH, PAHs, Metals, PCBs,VOCs	
5	57 HENRY ST #65		Industrial			ETPH, PAHs, Metals, PCBs,VOCs	
6	97 HENRY ST		Industrial			ETPH, PAHs, Metals, PCBs,VOCs	
7	12 MAIN ST		Industrial			ETPH, PAHs, Metals, PCBs,VOCs	
8	50 MAIN ST.		Industrial			ETPH, PAHs, Metals, PCBs,VOCs	
9	110 MAIN ST		Industrial			ETPH, PAHs, Metals, PCBs,VOCs	
10	76 MAIN ST		Industrial	H & B CT LLC Adelman Hiram et al. Remington Products Company		ETPH, PAHs, Metals, PCBs,VOCs	
11	122 MAIN ST		Commercial	Adelman Hiram et al. Remington Products Company		ETPH, PAHs, Metals, PCBs,VOCs	
12	10 ATLANTIC ST	BRIDGEPORT ENERGY LLC	Pub Util	Main Atlantic Associates	CT SDADB, CT PROPERTY, CT CPCS, CT SPILLS, CT MANIFEST	ETPH, PAHs, Metals	High
13	149 MAIN ST #153	BRIDGEPORT OCEAN VIEW LLC	Residential	Taffee Place LLC Seaside Waterview LLC	--	ETPH, PAHs, Metals	Low
14	30 UNIVERSITY AV		Commercial	Taffee Place LLC Seaside Waterview LLC		ETPH, PAHs, Metals	Low
15	330 WATER ST	BRIDGEPORT PORT AUTHORITY	Industrial	United Illuminating City of Bridgeport	--	ETPH, PAHs, Metals	High
16	154 MAIN ST #156	BUSH CHRYSTAL	Residential	--	--	ETPH, PAHs, Metals	Low
17	350 WALDEMERE AV	CITY OF BRIDGEPORT PARK DEPT	Tax Exempt	--	CT LWDS	ETPH, PAHs, Metals	Moderate
18	211 MAIN ST #213	CONNECTICUT LIGHT & POWER	Vacant Land	--	--	ETPH, PAHs, Metals	Low
19	264 BROAD ST	DE TUYA III OSCAR C	Residential	--	--	ETPH, PAHs, Metals	Low
20	181 MAIN ST	DEWITT-SMITH WILLIAM S & JANET	Residential	--	--	ETPH, PAHs, Metals	Low
21	376 MAIN ST	ESM HOLDINGS LLC	Industrial	PJ Murphy Mov & Stor Co	CT LWDS	ETPH, PAHs, Metals	High
22	28 WHITING ST #30		Industrial	--	--	ETPH, PAHs, Metals	Moderate
23	183 MAIN ST	HOUSING AUTHORITY OF CITY OF BRIDGEPORT	Residential	--	--	ETPH, PAHs, Metals	Low
24	258 BROAD ST	HYER CHARLES W	Residential	--	--	ETPH, PAHs, Metals	Low
25	418 MAIN ST	KIEFER MAIN INCORPORATED	Commercial	--	--	ETPH, PAHs, Metals	Low
26	203 MAIN ST	KONG SIMON TATCHEE	Residential	Secretary of Housing and Urban	--	ETPH, PAHs, Metals	Low
27	160 MAIN ST #162	MALINOWSKI JOANN L	Commercial	--	--	ETPH, PAHs, Metals	Low
28	146 MAIN ST #148	MARTIN ROBERT F & FLORENCE	Residential	--	--	ETPH, PAHs, Metals	Low
29	354 MAIN ST	MARY & ELIZA FREEMAN CNTR FOR HISTORY &	Commercial	City of Bridgeport	--	ETPH, PAHs, Metals	Low
30	360 MAIN ST #366		Residential	ABCD Inc	--	ETPH, PAHs, Metals	Low
31	107 HENRY ST #109	MASON CHARLES J & JOSEPH L	Industrial	--	--	ETPH, PAHs, Metals	High
32	113 HENRY ST	MASON JOSEPH L JR & LOUISE	Vacant Land	--	--	ETPH, PAHs, Metals	Low

TABLE 1
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Map ID	Address	Current Owner	Current Land Use Designation	Previous Owners	EDR Database Review	COCs	Risk
33	21 HENRY ST	MAUZERALL MICHAEL	Industrial	--	--	ETPH, PAHs, Metals	High
34	27 HENRY ST		Industrial	--	--	ETPH, PAHs, Metals	High
35	30 KIEFER ST	O'HARA'S LLC	Industrial	Cavalleri Marie R	--	ETPH, PAHs, Metals	High
36	38 KIEFER ST		Commercial		--	ETPH, PAHs, Metals	Moderate
37	54 KIEFER ST		Industrial		--	ETPH, PAHs, Metals	High
38	340 MAIN ST #350	PARKSIDE PROPERTIES LLC	Commercial	Polanco Rene & Margarita Mechanics & Farmers Savings Burr Jonathan	--	ETPH, PAHs, Metals	Low
39	268 BROAD ST	PLOTKIN NATHANIEL W	Residential	--	--	ETPH, PAHs, Metals	Low
40	1 ATLANTIC ST	PSEG POWER CONNECTICUT LLC	Pub Util	--	CT SPILLS, CT NPDES, CT ASBESTOS, ERNS, CT CPCS, CT AST, CT PROPERTY, TSCA, CT UST, ICIS, MLTS, FINDS, ECHO, US AIRS, SEMS-ARCHIVE, CORRACTS, RCRA-TSDF, RCRA-SQG	ETPH, PAHs, Metals, PCBs, VOCs	High
41	280 MAIN ST		Commercial	United Illuminating Company Main Atlantic Associates	--	ETPH, PAHs, Metals, PCBs	
42	TONGUE POINT LIGHT	FEDERAL GOVERNMENT	National Register of Historic Places	--	--	ETPH, PAHs, Metals, PCBs	Moderate
43	256 BROAD ST	SILJKOVIC SABAN	Residential	Alleyne Wayne A Sanjo Realy LLC Celli Joseph et al Meyers Richard J A/K/A	--	ETPH, PAHs, Metals	Low
44	167 MAIN ST	SEASIDE WATERVIEW LLC	Vacant Land	Lacont Laurence J Laconte Clara	--	ETPH, PAHs, Metals	Low
45	262 BROAD ST	STEPANOVA TATYANA	Residential	--	--	ETPH, PAHs, Metals	Low
46	270 BROAD ST		Residential	--	--	ETPH, PAHs, Metals	Low
47	195 MAIN ST #199	TENG WAN LING ETAL	Residential	St Raymond Stephen C St Raymond Raymond Murphy William S Murphy Vernon S Est	--	ETPH, PAHs, Metals	Low
48	274 BROAD ST	TEO PUAY LAM ET AL	Residential	Davis Thomas S Davis Carolyn H Estate	--	ETPH, PAHs, Metals	Low
49	282 BROAD ST #288	THE CONNECTICUT LIGHT & POWER	Vacant Land	Davis Carloyn H Trustee et al Davis Carolyn Murphy William S & Murphy Vernon S Est	--	ETPH, PAHs, Metals, PCBs	Low
50	3 ATLANTIC ST	UNITED ILLUMINATING COMPANY	Industrial	--	--	ETPH, PAHs, Metals, PCBs, VOCs	High
51	120 HENRY ST		Pub Util	PSEG Power Development LLC United Illuminating Co	NY MANIFEST, CT SPILLS, CT MANIFEST	ETPH, PAHs, Metals, PCBs, VOCs	High

TABLE 1
RESILIENCY PROJECT
BRIDGEPORT, CONNECTICUT

Summary of Corridor Land Use Evaluation

Map ID	Address	Current Owner	Current Land Use Designation	Previous Owners	EDR Database Review	COCs	Risk
52	115 BROAD ST	UNIVERSITY OF BRIDGEPORT	Single Fam	Lee Jung Sook Noh	--	ETPH, PAHs, Metals	Moderate
53	136 LAFAYETTE ST #170		Tax Exempt	--	CT UST	ETPH, PAHs, Metals,VOCs	
54	239 LAFAYETTE ST		Commercial	--	--	ETPH, PAHs, Metals	
55	245 LAFAYETTE ST #247		Tax Exempt	--	CT UST	ETPH, PAHs, Metals,VOCs	
56	253 LAFAYETTE ST #255		2 Family	--	--	ETPH, PAHs, Metals	
57	262 LAFAYETTE ST #264		Commercial	--	--	ETPH, PAHs, Metals	
58	269 LAFAYETTE ST		Tax Exempt	--	--	ETPH, PAHs, Metals	
59	274 LAFAYETTE ST		Commercial	--	--	ETPH, PAHs, Metals	
60	320 LINDEN AV		Tax Exempt	--	--	ETPH, PAHs, Metals	
61	68 UNIVERSITY AV		Tax Exempt	--	CT UST	ETPH, PAHs, Metals,VOCs	
62	114 UNIVERSITY AV		Commercial	--	--	ETPH, PAHs, Metals	
63	128 UNIVERSITY AV		Commercial	--	--	ETPH, PAHs, Metals	
64	152 UNIVERSITY AV		Tax Exempt	--	--	ETPH, PAHs, Metals	
65	169 UNIVERSITY AV		Tax Exempt	--	CT UST	ETPH, PAHs, Metals,VOCs	
66	174 UNIVERSITY AV		Tax Exempt	--	--	ETPH, PAHs, Metals	
67	225 UNIVERSITY AV		Tax Exempt	--	--	ETPH, PAHs, Metals	
68	244 UNIVERSITY AV		Tax Exempt	--	CT UST	ETPH, PAHs, Metals,VOCs	
69	(UB Football Field)		--	--	--	ETPH, PAHs, Metals	
70	420 MAIN ST #422	VUKAJ ALEKSANDER	Commercial	--	--	ETPH, PAHs, Metals	Low
71	271 BROAD ST	ZAMBON KARL L & KATHARINA T	Residential	Wells Fargo Bank NA Choi Chung Woo Yasutake Yohio Paul et al	--	ETPH, PAHs, Metals	Moderate
72	189 MAIN ST #191	ZAMBON MICHAEL ET AL	Residential	Song Zhitao	--	ETPH, PAHs, Metals	Low
73	(Henry/Russell/Atlantic)	--	--	--	CT UST	ETPH, PAHs, Metals, PCBs, VOCs	Moderate

COC: Contaminant of concern

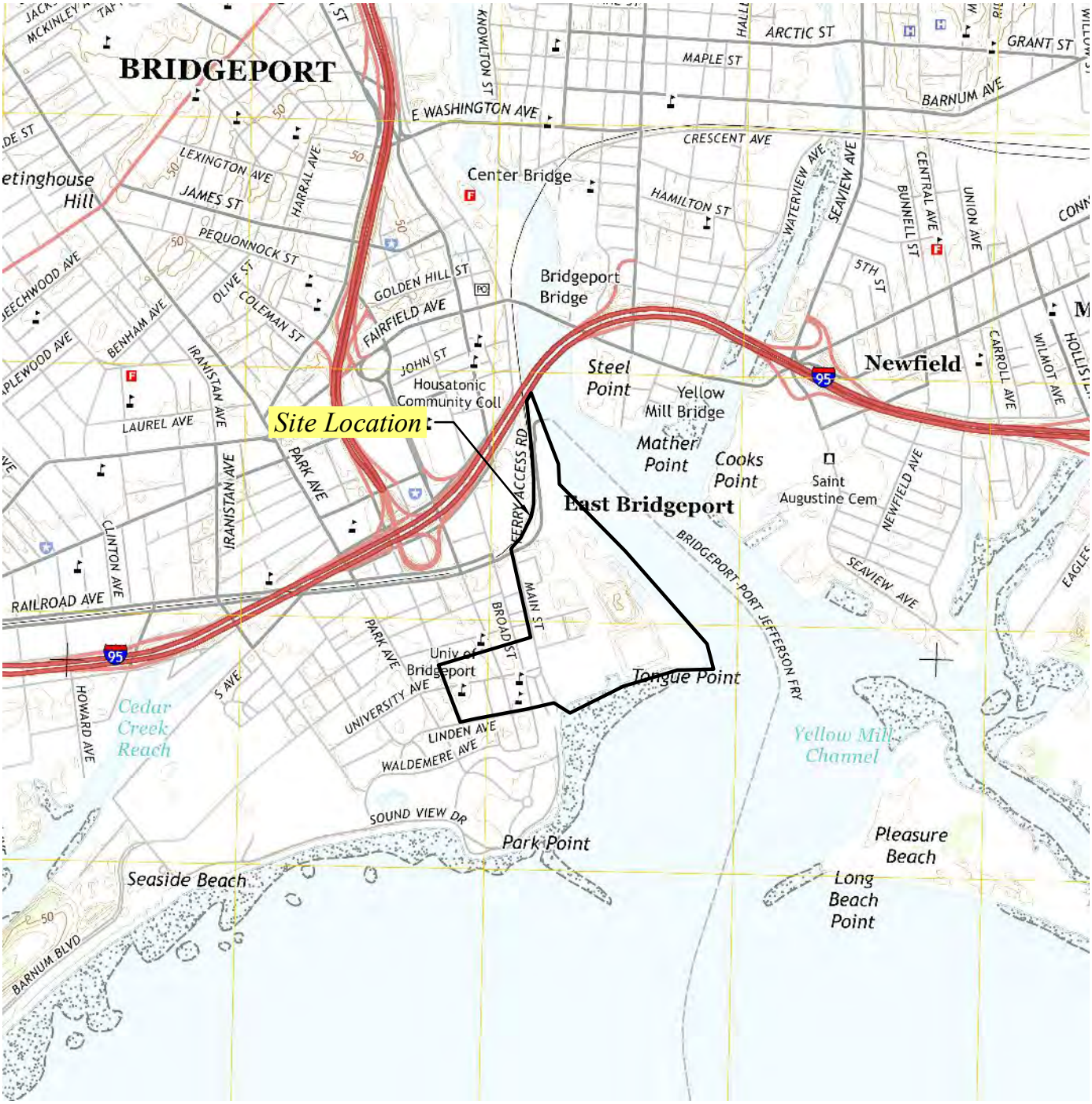
ETPH: Extractable total petroleum hydrocarbons

PAHs: Polynuclear aromatic hydrocarbons

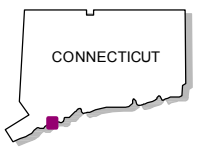
PCBs: Polychlorinated biphenyls

VOCs: Volatile organic compounds

FIGURES



SOURCE: USGS TOPOGRAPHIC QUADRANGLE BRIDGEPORT, CONNECTICUT (2015).



QUADRANGLE LOCATION

0 2000

SCALE IN FEET

RESILIENCY PROJECT
BRIDGEPORT, CONNECTICUT

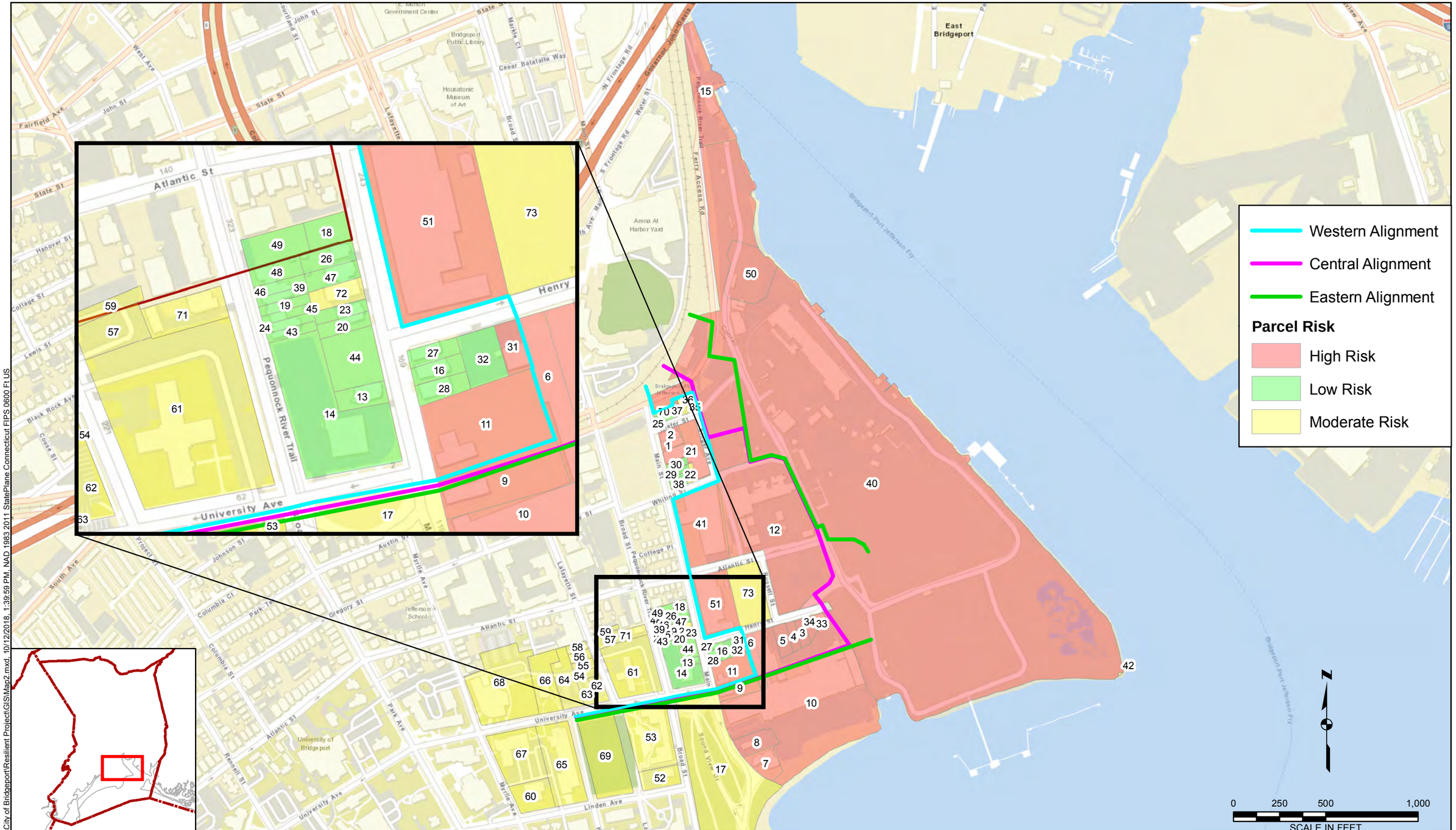
SITE LOCATION MAP

DATE	REVISED

PREPARED BY:

WSP USA
4 Research Drive
Suite 204
Shelton, Connecticut 06484
(203) 929-8555

DRAWN:	RAC	CHECKED:	SQ	DATE:	06/28/18	FIGURE:	1



Drawn: 10/12/2018

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

WSP Office: Shelton, CT | Source: K:\Jobs\City of Bridgeport\Resilient Project\GIS\Map2.mxd, 10/12/2018, 1:39:59 PM, NAD 1983 2011 StatePlane Connecticut FIPS 0600 Ft US

THE ORIGINAL VERSION OF THIS DRAWING IS IN COLOR. BLACK AND WHITE COPIES MAY NOT ACCURATELY DEPICT CERTAIN INFORMATION.

NOTICE: THIS DRAWING HAS BEEN PREPARED UNDER THE DIRECTION OF A PROFESSIONAL. DO NOT ALTER THIS DOCUMENT IN ANY WAY WITHOUT THE WRITTEN CONSENT OF WSP USA INC.

WSP USA Inc.
4 RESEARCH DRIVE
SUITE 204
SHELTON, CT 06484
TEL: (203) 929-8555

RESILIENCY PROJECT
BRIDGEPORT, CONNECTICUT

PREPARED FOR

The City of Bridgeport

FIGURE 2

PARCEL RISK ASSESSMENT
OCTOBER 2018

APPENDIX I

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
1	June 7, 2018

University of Bridgeport campus near southernmost terminus of proposed alignments

Photo No.	**Date**
2	June 7, 2018

University of Bridgeport campus – University avenue

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT** **BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
3	June 7, 2018

University of Bridgeport campus residence hall

Photo No.	**Date**
4	June 7, 2018

Derelict building at 30 University Avenue

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT** **BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
5	June 7, 2018

Construction activity at the 60 Main Street site

Photo No.	**Date**
6	June 7, 2018

View north on Main Street, from entrance of 60 Main Site

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT** **BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
7	June 7, 2018

Several residential/mixed use buildings located at the corner of Henry and Main Streets

Photo No.	**Date**
8	June 7, 2018

Residences and a UI facility on Main Street, facing North

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT** **BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
9	June 7, 2018

280 Main Street from Main and Atlantic Streets

Photo No.	**Date**
10	June 7, 2018

Unpaved parking area located at the corner of Russell and Henry Streets

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT** **BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
11	June 7, 2018

10 Atlantic Street

Photo No.	**Date**
12	June 7, 2018

Light industrial style building at the corner of Main St and Cottage Pl

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT** **BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
13	June 7, 2018

Loading docks at 280 Main Street and mixed use building located at Whiting and Main Streets

Photo No.	**Date**
14	June 7, 2018

Rear of PJ Murphy Self Storage (376 Main Street) and view north on Singer Avenue

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	RESILIENCY PROJECT BRIDGEPORT, CONNECTICUT	52829NDR 6.08.02

Photo No.	Date
15	June 7, 2018

Rear loading docks at PJ Murphy Self Storage

Photo No.	Date
16	June 7, 2018

1 Atlantic Avenue viewed from Singer Avenue

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
17	June 7, 2018

Commercial property storing excavators and triaxle dump trucks on Kiefer Street

Photo No.	**Date**
18	June 7, 2018

View west on Kiefer Street

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	RESILIENCY PROJECT BRIDGEPORT, CONNECTICUT	52829NDR 6.08.02

Photo No.	Date
19	June 7, 2018

WM Evans Painting, LLC located at the corner of Kiefer/Main

Photo No.	Date
20	June 7, 2018

Vacant lot located at the corner of Ferry Access Road and Main Street

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	RESILIENCY PROJECT BRIDGEPORT, CONNECTICUT	52829NDR 6.08.02

Photo No.	Date
21	June 27, 2018

Bridgeport Harbor Generating Station

Photo No.	Date
22	June 27, 2018

Commercial Property on Singer Street

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT** **BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
23	June 27, 2018

Commercial Property on Singer Street

Photo No.	**Date**
24	June 27, 2018

Storage facility at corner of Whiting Street and Main Street

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	RESILIENCY PROJECT BRIDGEPORT, CONNECTICUT	52829NDR 6.08.02

Photo No.	Date
25	June 27, 2018

Several residential buildings on Main Street

Photo No.	Date
26	June 27, 2018

Commercial Property at 280 Main Street

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	RESILIENCY PROJECT BRIDGEPORT, CONNECTICUT	52829NDR 6.08.02

Photo No.	Date
27	June 27, 2018

Bridgeport Energy LLC on Atlantic Street

Photo No.	Date
28	June 27, 2018

Commercial Buildings on Main Street

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT** **BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
29	June 27, 2018

Commercial Buildings at 340 Main Street

Photo No.	**Date**
30	June 27, 2018

Construction along Russell Street

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	RESILIENCY PROJECT BRIDGEPORT, CONNECTICUT	52829NDR 6.08.02

Photo No.	Date
31	June 27, 2018

Construction along Henry Street

Photo No.	Date
32	June 27, 2018

Construction along Henry Street

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT** **BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
33	June 27, 2018

Residential Property along Henry Street

Photo No.	**Date**
34	June 27, 2018

Construction site along Main Street

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	RESILIENCY PROJECT BRIDGEPORT, CONNECTICUT	52829NDR 6.08.02

Photo No.	Date
35	June 27, 2018

University of Bridgeport property along Myrtle Ave

Photo No.	Date
36	June 27, 2018

Residential Properties along Lafayette Street

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	RESILIENCY PROJECT BRIDGEPORT, CONNECTICUT	52829NDR 6.08.02

Photo No.	Date
37	June 27, 2018

Parking lot for a commercial building at University of Bridgeport

Photo No.	Date
38	June 27, 2018

Commercial buildings associated with University of Bridgeport

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	RESILIENCY PROJECT BRIDGEPORT, CONNECTICUT	52829NDR 6.08.02

Photo No.	Date
39	June 27, 2018

Administrative buildings associated with University of Bridgeport

Photo No.	Date
40	June 27, 2018

Administrative buildings associated with University of Bridgeport

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	RESILIENCY PROJECT BRIDGEPORT, CONNECTICUT	52829NDR 6.08.02

Photo No.	Date
41	June 27, 2018

Administrative buildings associated with University of Bridgeport

Photo No.	Date
42	June 27, 2018

Park between Main Street and Harbor

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT** **BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
43	June 27, 2018

Park between Main Street and Harbor

Photo No.	**Date**
44	June 27, 2018

Construction between Park and Harbor

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT** **BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
45	June 27, 2018

Residential building at corner of Linden Ave and Broad Street

Photo No.	**Date**
46	June 27, 2018

Administrative Buildings for the University of Bridgeport

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	RESILIENCY PROJECT BRIDGEPORT, CONNECTICUT	52829NDR 6.08.02

Photo No.	Date
47	June 27, 2018

Construction between Park and Harbor

Photo No.	Date
48	June 27, 2018

Atlantic Street entrance to PSEG Power Property

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT** **BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
49	June 27, 2018

Ferry Access Road Entrance to PSEG Power Property

Photo No.	**Date**
50	June 27, 2018

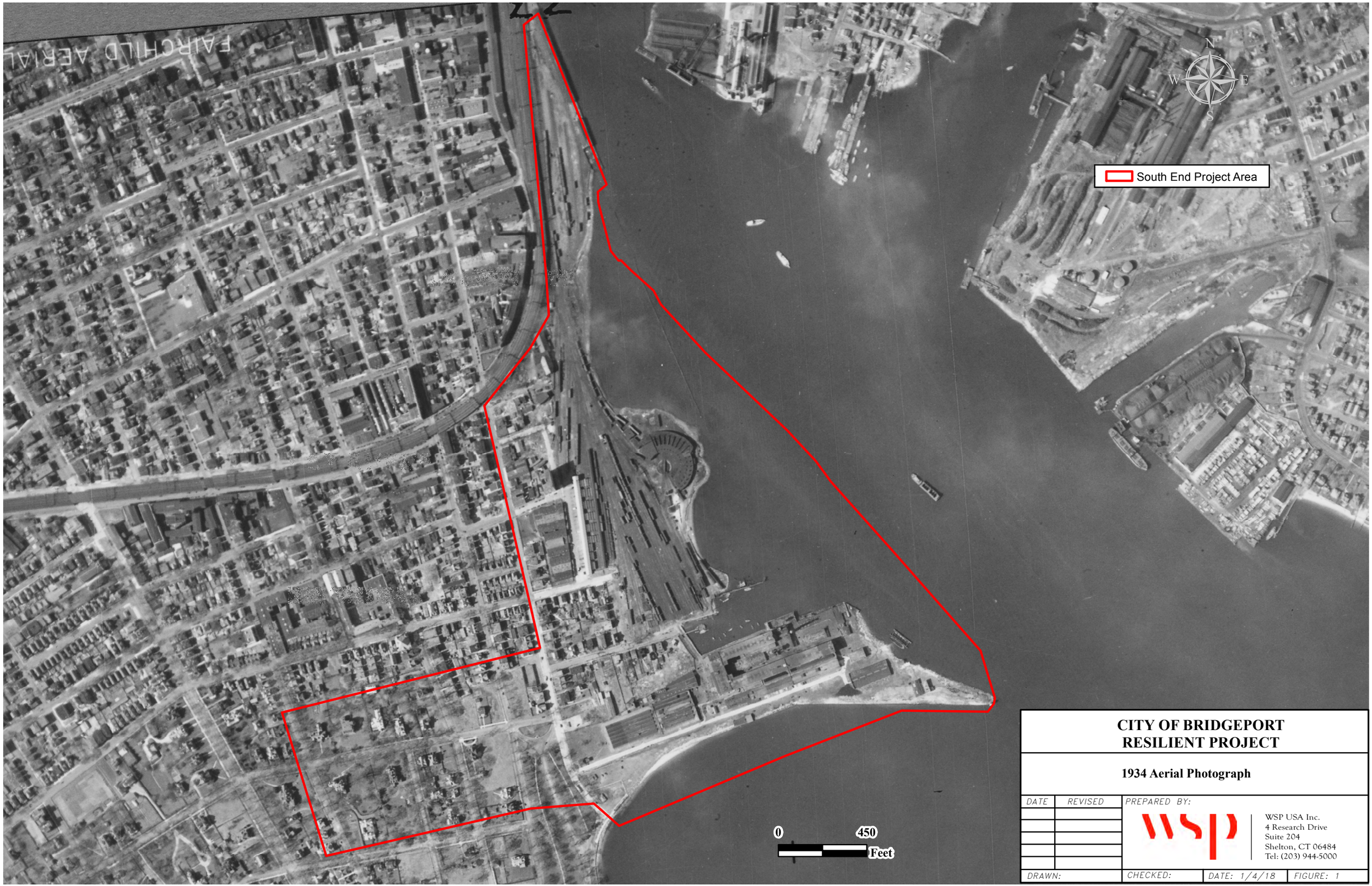
Industrial building located at 280 Main Street

PHOTOGRAPHIC LOG		
CITY OF BRIDGEPORT	**RESILIENCY PROJECT** **BRIDGEPORT, CONNECTICUT**	**52829NDR 6.08.02**

Photo No.	**Date**
51	June 27, 2018

View from Atlantic Avenue of 120 Henry Street.

APPENDIX II



CITY OF BRIDGEPORT
RESILIENT PROJECT

1934 Aerial Photograph

DATE	REVISED

PREPARED BY:

WSP USA Inc.
4 Research Drive
Suite 204
Shelton, CT 06484
Tel: (203) 944-5000

DRAWN: | CHECKED: | DATE: 1/4/18 | FIGURE: 1

CITY OF BRIDGEPORT
RESILIENT PROJECT

1951 Aerial Photograph

DATE	REVISED

PREPARED BY:

WSP USA Inc.
4 Research Drive
Suite 204
Shelton, CT 06484
Tel: (203) 944-5000

DRAWN:	CHECKED:	DATE: 1/4/18	FIGURE: 2

CITY OF BRIDGEPORT
RESILIENT PROJECT

1965 Aerial Photograph

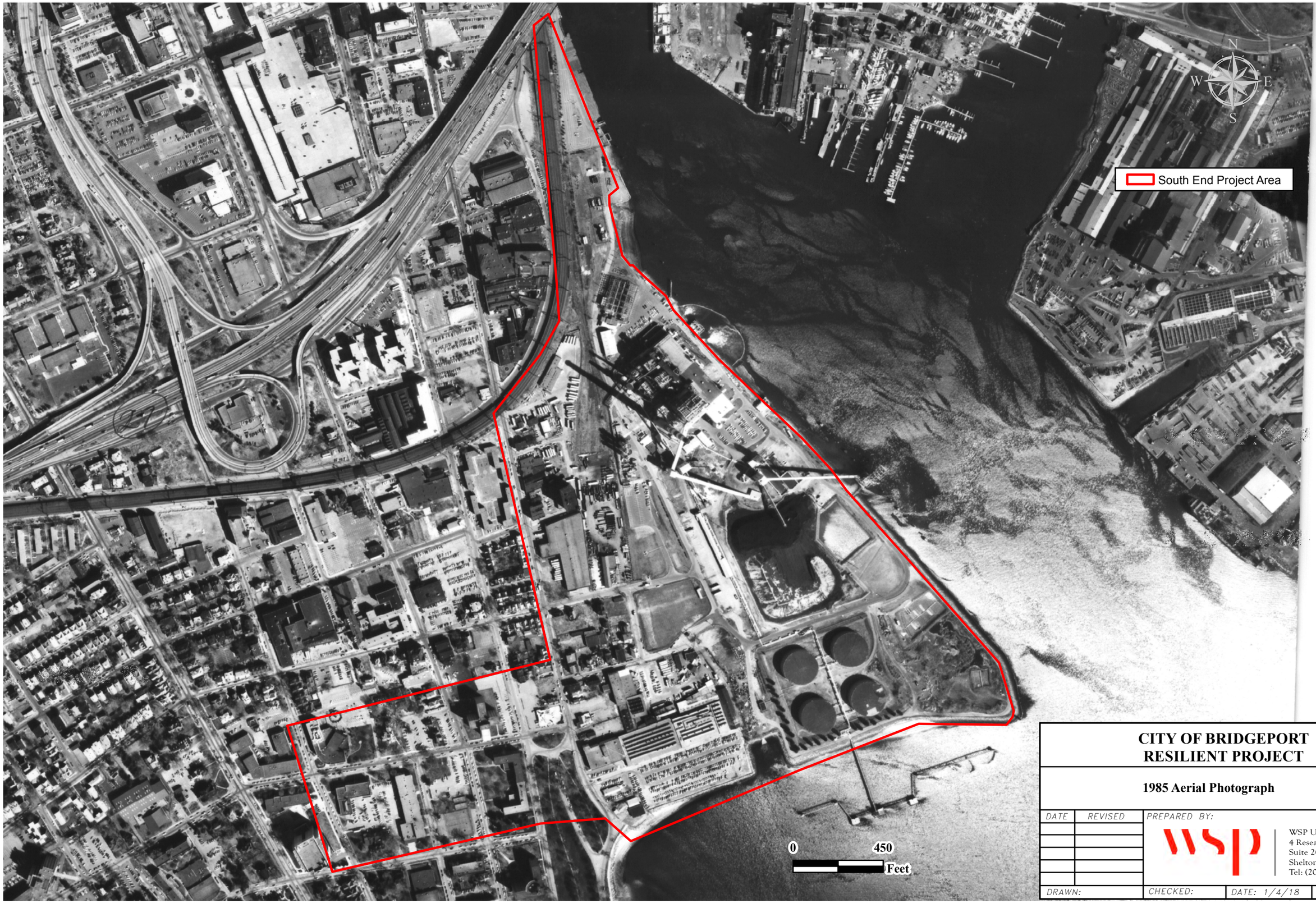
DATE	REVISED	PREPARED BY:
		WSP USA Inc. 4 Research Drive Suite 204 Shelton, CT 06484 Tel: (203) 944-5000

DRAWN:	CHECKED:	DATE: 1/4/18	FIGURE: 3

CITY OF BRIDGEPORT
RESILIENT PROJECT

1970 Aerial Photograph

DATE	REVISED	PREPARED BY:
		WSP USA Inc. 4 Research Drive Suite 204 Shelton, CT 06484 Tel: (203) 944-5000
DRAWN:	CHECKED:	DATE: 1/4/18 — FIGURE: 4



CITY OF BRIDGEPORT
RESILIENT PROJECT

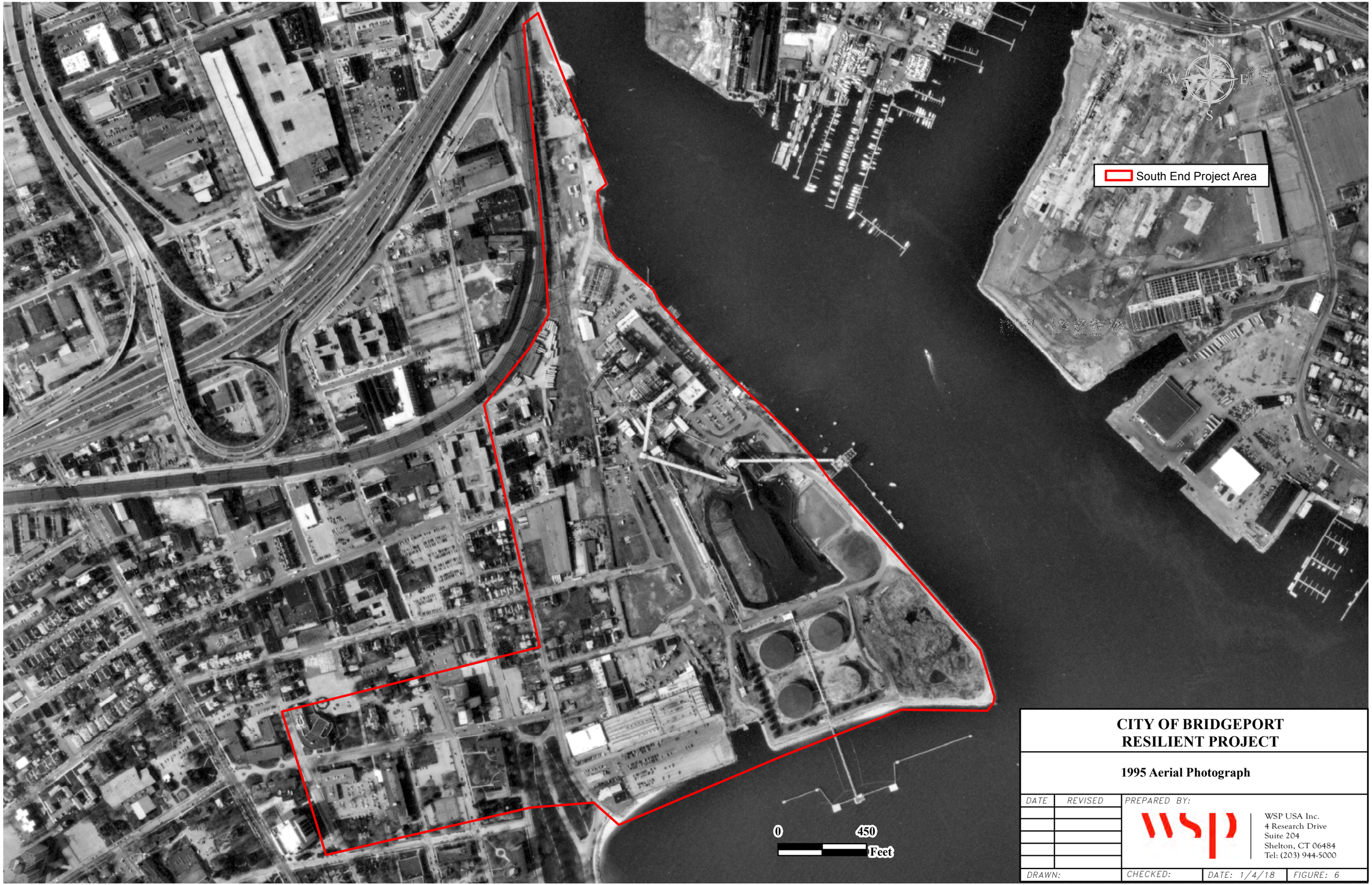
1985 Aerial Photograph

DATE	REVISED

PREPARED BY:

WSP USA Inc.
4 Research Drive
Suite 204
Shelton, CT 06484
Tel: (203) 944-5000

DRAWN:	CHECKED:	DATE: 1/4/18	FIGURE: 5



CITY OF BRIDGEPORT
RESILIENT PROJECT

1995 Aerial Photograph

DATE	REVISED	PREPARED BY:
		WSP USA Inc. 4 Research Drive Suite 204 Shelton, CT 06484 Tel: (203) 944-5000
DRAWN:	CHECKED:	DATE: 1/4/18 — FIGURE: 6

CITY OF BRIDGEPORT
RESILIENT PROJECT

2006 Aerial Photograph

DATE	REVISED	PREPARED BY:
		WSP USA Inc. 4 Research Drive Suite 204 Shelton, CT 06484 Tel: (203) 944-5000

DRAWN:	CHECKED:	DATE: 1/4/18	FIGURE: 7

APPENDIX III

U.S. GEOLOGICAL SURVEY
J.W. POWELL,
DIRECTOR.

№ 33
CONNECTICUT
BRIDGEPORT SHEET
(Derby)

STATE OF CONNECTICUT
WM H. BREWER.
JAMES H. CHAPIN. } COMMISSIONERS
JOHN W. BACON.

73°15' 41°15' 10' 5' 73° 41°15'

Trumbull
Nichols Farms
Baldwin
Fowlers Island
Wepawaug River
Indian River
RAILROAD
Horse Tavern Reservoir
Ox Stream Reservoir
Island Brook Reservoir
Stratford Hill
Popes Flat
Long Island
Milford
Success Hill
Beardsley Park
North Bridgeport
Naugatuck Junction
Welches Point
Pond Point
Berkshire Mill Pond
Stillman Pond
Pembroke Lake
East Bridgeport
Stratford
Meadows End
Charles Island
Nells Island
BRIDGEPORT
Moody's Mill Pond
East End
Milford Point
BEACON
Pleasure Beach
Seaside Park
THE GUT
LIGHT
Stratford Point
Black Rock
Cedar Creek
Ash Creek
Long Beach
Point no Point
Fayerweather Island
Grover Hill
BLACK ROCK HARBOR
Fairfield Beach
(Norwalk)

BOUNDARY LINE
CONNECTICUT
NEW YORK

Henry Gannett. Chief Topographer.
Marcus Baker. Topographer in charge.
Triangulation by the U.S. Coast and Geodetic Survey.
Topography by E.B. Clark.
Surveyed in 1889.

Scale 1/62,500
0 1/2 1 2 3 4 5 Miles

Contour Interval 20 feet
Datum is mean Sea level

CONNECTICUT-NEW YORK

BRIDGEPORT QUADRANGLE

GRID ZONE "A"

WAR DEPARTMENT
CORPS OF ENGINEERS, U. S. ARMY

CONNECTICUT-NEW YORK

BRIDGEPORT QUADRANGLE

GRID ZONE "A"

FIRST EDITION - AMS 1

(POUGHKEEPSIE) (LITCHFIELD) (FARMINGTON)

73°30' SHERMAN 6 MI. — 400000 Conn. — U S HY NO 7 2.4 MI. — LANESVILLE 2.4 MI. — BRIDGEWATER 2 MI. — 20' — STATE HY NO 67 0.7 MI. — STATE HWY NO 172 1.5 MI. — 0° — WHITE OAKS 0.5 MI. — MIDDLEBURY 2.9 MI. — 10' — STATE HY. NO 135 0.6 MI. — UNION CITY 0.1 MI. — 73°00'

15° 14° 13° 12° 11° 10°

73°30' — 960000 — 20' 970 — (ISLIP) — P — 10' — 990 — 520000 Conn. — 73°00' 1000

(NEW YORK) (RIVERHEAD)

First Edition (AMS 1) 1943.
Prepared under the direction of the Chief of Engineers, U.S. Army,
By Army Map Service, San Antonio Branch, 1943,
And Works Projects Administration, O.P. 165-2-00-3, Detroit, Michigan.
Compiled from U.S.G.S. Quadrangles, 1889-90
Corps of Engineers, Tactical Maps, 1915, and County Highway Maps, 1938.
Woodland taken from Photo Indexes, 1940.
Polyconic Projection, North American Datum, 1927.

Scale: 1:125000

1 ½ 0 1 2 3 4 5 6 7 8 Miles

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 Yards

CONTOUR INTERVAL 50 FEET—DATUM IS MEAN SEA LEVEL

TEN THOUSAND YARD GRID COMPUTED FROM "GRID SYSTEM FOR PROGRESSIVE MAPS IN THE U. S." ZONE A. U. S. C. & G. S. SPECIAL PUBLICATION NO. 59

THE LAST THREE DIGITS OF THE GRID NUMBERS ARE OMITTED

CONNECTICUT STATE GRID IS INDICATED BY DOTTED TICKS OUTSIDE THE NEAT LINE AT 20,000 FOOT INTERVALS

NOTE: OFFICERS USING THIS MAP WILL MARK HEREON CORRECTIONS AND ADDITIONS WHICH COME TO THEIR ATTENTION AND MAIL DIRECT TO "THE CHIEF OF ENGINEERS, WASHINGTON, D. C."

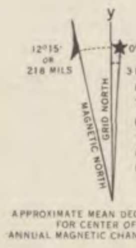
ROAD CLASSIFICATION 1943

Dependable hard-surface, heavy-duty road. — Loose-surface graded, dry weather road. — U. S. Route 110

Secondary, hard-surface, all-weather road. — Dirt Road — State Route 34

More than two lanes indicated by note along road with tick at point of change. 3 LANE | 4 LANE

Woodland information for cross-hatched area only



Use diagram only to obtain numerical values. To determine magnetic north line, connect the pivot point "P" on the south edge of the map with the value of the angle between GRID NORTH and MAGNETIC NORTH, as plotted on the degree scale at the north edge of the map.

APPROXIMATE MEAN DECLINATION 1943 FOR CENTER OF SHEET
ANNUAL MAGNETIC CHANGE 1' INCREASE

ARMY MAP SERVICE, U. S. ARMY, WASHINGTON, D. C. 108129
1943

6 / 44 SX

ROBERT P. APMANN

BRIDGEPORT, CONN.- N.Y.
N4100-W7300/30

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF CONNECTICUT
HIGHWAY DEPARTMENT

BRIDGEPORT QUADRANGLE

CONNECTICUT-FAIRFIELD CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
NW/4 BRIDGEPORT 15' QUADRANGLE

(BOTSFORD) (ANSONIA) (MONROE) (WESTPORT) (MILFORD) (SHERWOOD POINT)

73°15' 12'30" 10' 490 000 FEET 73°07'30"
41°15' 150 000 FEET 12'30" 10' 110 000 FEET 41°07'30"

NEWTOWN 13 MI.
STEPNEY DEPOT 3.9 MI.
0.8 MI. TO CONN. 25
SHELTON 6.9 MI.
HUNTINGTON 3.4 MI.
0.9 MI. TO CONN. 8
WATERBURY 24 MI.
SHELTON 5.6 MI.
GEORGE WASHINGTON BRIDGE, N.Y. 53 MI.
0.4 MI. TO CONN. 59
1.9 MI. TO CONN. 110
HARTFORD 46 MI.
UPPER STEPNEY 8.8 MI.
0.5 MI. TO CONN. 15
2.4 MI. TO CONN. 15
SHELTON 7.9 MI.
0.4 MI. TO U.S. 1
MILFORD 4.4 MI.
NEW HAVEN 14 MI.
DANBURY 23 MI.
2 MI. TO CONN. 15
NORWALK 9.7 MI.
WESTPORT 6.1 MI.

EASTON
Chestnut Hill
Long Hill
Ehrsham Pond
Canoe Brook Lake
Trumbull
Brinsmade Cem
Center Sch
Poquonock
Riverside Cem
Long Hill Cem
Frog Pond
Nichols Farm Cem
Nichols (BM 257)
Beaver Dam Lake
Pumpkin Ground
Cooks Pond
Ox Hill
Mill River
Lake Forest
Woodrow Wilson Sch
Ninety Acres Park
Fairchild Wheeler Park
Ireland Brook Lagoon
Englewood Hospital
Stratfield
Childrens Home
Toilsome Hill
Madison Sch
St Vincents Hospital
Seeleys Pond
Park Cemetery
Lincoln Sch
Melville Village
Read Sch
Shelton Sch
Columbus Sch
Nathan Hale Sch
County Jail
Beechwood Park
Brooklawn Country Club
Webster Sch
Golden Hill
Courthouse
Post Office
City Hall
Maplewood Jr High Sch
Mc Kinley Sch
Tunxis Hill Park
Old Stratfield Cem
Washington Sch
Tunxis Hill
Bryant Sch
Bassick High School
Mount Grove Cemetery
Lovejoy Cem
Holland Hill Sch
Whittier Sch
Longfellow Sch
Gas
Oil
Sewage Disposal
St Anns Sch
Black Rock
Black Rock Sch
Burr Creek
Cedar Creek
Ash Creek
Grover Hill
Fairfield
Jennings Beach
Shoal Pt
Fairfield Beach
Penfield Reef
Fayerweather Island
Light
Black Rock Harbor
Bunnells Pond
Success Lake
Success Hill
Second Hill
Hooker Sch
Hallen Sch
Ireland Brook
Television Relay Sta
Hill-Side Home
Bullard-Haven Sch
Beardsley Sch
Stillman Pond
Lakeview Cem
Seaside Park
Mill Hill
Harding High Sch
Garfield Sch
East Bridgeport
St Augustine Cem
Hall Sch
Bridgeport Hospital
East End Freight Yards
Bruce Pond
Waltersville Sch
Newfield
Lincoln Sch
Mc Kinley Sch
Sherman Sch
Steel Pt
Cooks Pt
Radio Tower (WNAB)
Tongue Pt
Radio Tower (WLIZ)
Light
Pleasure Beach
Radio Towers (WICC)
Great Meadows
Lewis Gut
Long Beach
Lordship
Point No Point
Eli Whitney Sch
Sunnyside Hospital
Stonybrook Sch
Garden Sch
Brewster Pond
Long Brook Park
Nichols Sch
Stratford
Union Cem
High Sch
Post Office
Franklin Sch
Center Sch
Academy Hill
Selby Pond
Birdseye Sch
Sedgwick Sch
Housatonic River
Frash Pond
Sewage Disposal
Johnsons Ct
Oil
BRIDGEPORT MUNICIPAL AIRPORT
BRIDGEPORT HARBOR
LONG ISLAND SOUND

INTERIOR-GEOLOGICAL SURVEY, WASHINGTON, D. C.-1953

Mapped, edited, and published by the Geological Survey

Control by USC&GS, USGS, USCE, and Connecticut Geodetic Survey

Topography from aerial photographs by multiplex methods
Aerial photographs taken 1949. Field check 1951
Hydrography from USC&GS charts

Polyconic projection. 1927 North American datum
10,000-foot grid based on Connecticut coordinate system

Red tint indicates areas in which only landmark buildings are shown

12° MAGNETIC NORTH TRUE NORTH
APPROXIMATE MEAN DECLINATION, 1951

SCALE 1:31680

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS 7 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

FOR SALE BY U. S. GEOLOGICAL SURVEY, WASHINGTON 25, D. C.
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

CONNECTICUT
QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy-duty 4 LANE | 6 LANE Light-duty
Medium-duty 4 LANE | 6 LANE Unimproved dirt
U. S. Route State Route

BRIDGEPORT, CONN.
NW/4 BRIDGEPORT 15' QUADRANGLE
N4107.5—W7307.5/7.5

1951

10

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF CONNECTICUT
HIGHWAY DEPARTMENT

BRIDGEPORT QUADRANGLE
CONNECTICUT–FAIRFIELD CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

(BOTSFORD) (LONG HILL) (ANSONIA) (SHERWOOD POINT) (WESTPORT) (MILFORD)

73°15′ 41°15′ 647000m.E. 4567000m.N. NEWTOWN 13 MI. STEPNEY DEPOT 3.9 MI. 0.8 MI. TO CONN. 25 12′30″ HUNTINGTON 3.4 MI. 10′ 0.9 MI. TO CONN. 8 WATERBURY 24 MI. SHELTON 5.6 MI. 490 000 FEET 73°07′30″ 41°15′ 150 000 FEET

GEORGE WASHINGTON BRIDGE, N.Y. 53 MI. 0.4 MI. TO INTERCHANGE 45
UPPER STEPNEY 8.8 MI. 0.5 MI. TO CONN. 15
DANBURY 23 MI. 2 MI. TO CONN. 15
NORWALK 8 MI. 1 MI. TO INTERCHANGE 21
NORWALK 9.7 MI. WESTPORT 6.1 MI.
1.2 MI. TO INTERCHANGE 53 HARTFORD 46 MI.
2.4 MI. TO CONN. 15 SHELTON 7.9 MI.
0.2 MI. TO INTERCHANGE 33 MILFORD 4.4 MI. NEW HAVEN 14 MI.

12′30″ 10′ 110 000 FEET 4555000m.N. 41°07′30″ 73°15′ 470 000 FEET 12′30″ 10′ 41°07′30″ 657000m.E. 73°07′30″

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1963

Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, USCE, and Connecticut Geodetic Survey

Topography by photogrammetric methods from aerial photographs taken 1949. Field checked 1951. Revised 1960

Selected hydrographic data compiled from USC&GS Chart 220 (1959)
This information is not intended for navigational purposes

Polyconic projection. 1927 North American datum
10,000-foot grid based on Connecticut coordinate system
1000-meter Universal Transverse Mercator grid ticks,
zone 18, shown in blue

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked

Red tint indicates areas in which only landmark buildings are shown

12½° MAGNETIC NORTH TRUE NORTH
APPROXIMATE MEAN DECLINATION, 1960

SCALE 1:24000
1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 6.8 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, WASHINGTON 25, D. C.
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

CONNECTICUT
QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
Interstate Route U. S. Route State Route

BRIDGEPORT, CONN.
N4107.5—W7307.5/7.5

1960

10

6366 IV SE
(BOTSFORD)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF CONNECTICUT
HIGHWAY DEPARTMENT

BRIDGEPORT QUADRANGLE
CONNECTICUT–FAIRFIELD CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

6366 I SE
(ANSONIA)

73°15′ 41°15′ 647000m.E. 648 649 UPPER STEPNEY 6 MI. 650 12′30″ 651 6366 I SW (LONG HILL) 653 10′ HUNTINGTON 3.4 MI. DERBY 6 MI. 490 000 FEET 656 73°07′30″ 41°15′

41°07′30″ 73°15′ 648 649 470 000 FEET 650 12′30″ 651 652 653 10′ 654 655 INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1972 656 657000m.E. 73°07′30″ 41°07′30″

(SHERWOOD POINT)
6366 III SE

Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, USCE, and Connecticut Geodetic Survey

Topography by photogrammetric methods from aerial photographs taken 1949. Field checked 1951. Revised from aerial photographs taken 1969. Field checked 1970

Selected hydrographic data compiled from USC&GS Chart 220 (1969)
This information is not intended for navigational purposes

Polyconic projection. 1927 North American datum
10,000-foot grid based on Connecticut coordinate system
1000-meter Universal Transverse Mercator grid ticks, zone 18, shown in blue

Red tint indicates areas in which only landmark buildings are shown

MN GN
12½° 222 MILS
1°12′ 21 MILS

UTM GRID AND 1970 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 6.8 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, WASHINGTON, D. C. 20242
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

CONNECTICUT
QUADRANGLE LOCATION

ROAD CLASSIFICATION

Primary highway, hard surface	Light-duty road, hard or improved surface
Secondary highway, hard surface	Unimproved road

Interstate Route U. S. Route State Route

BRIDGEPORT, CONN.
N4107.5—W7307.5/7.5

1970

AMS 6366 II NW—SERIES V816

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

STATE OF CONNECTICUT
HIGHWAY DEPARTMENT

BRIDGEPORT QUADRANGLE
CONNECTICUT—FAIRFIELD CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

6366 IV SE (BOTSFORD) · 6366 I SW (LONG HILL) · 6366 I SE (ANSONIA)

73°15′ 41°15′ · 12′30″ · 10′ · 73°07′30″ 41°15′

UPPER STEPNEY 6 MI. · HUNTINGTON 3.4 MI. DERBY 6 MI. · 490 000 FEET

41°07′30″ 73°15′ · 470 000 FEET · 12′30″ · 10′ · 41°07′30″ 73°07′30″

6366 III SE (SHERWOOD POINT) · 6366 III NE (WESTPORT) · 6366 II NE (MILFORD)

Mapped, edited, and published by the Geological Survey

Control by USGS, NOS/NOAA, USCE, and Connecticut Geodetic Survey

Topography by photogrammetric methods from aerial photographs taken 1949. Field checked 1951. Revised from aerial photographs taken 1969. Field checked 1970

Selected hydrographic data compiled from NOS chart 220 (1969)
This information is not intended for navigational purposes

Polyconic projection. 10,000-foot grid ticks based on Connecticut coordinate system
1000-meter Universal Transverse Mercator grid ticks, zone 18, shown in blue
1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 6 meters south and 37 meters west as shown by dashed corner ticks

Red tint indicates areas in which only landmark buildings are shown

There may be private inholdings within the boundaries of the National or State reservations shown on this map

MN GN 13½° 240 MILS 1°12′ 121 MILS

UTM GRID AND 1984 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Revisions shown in purple and woodland compiled in cooperation with State of Connecticut agencies from aerial photographs taken 1982 and other sources
This information not field checked. Map edited 1984

Purple tint indicates extension of urban areas

SCALE 1:24 000

1 ½ 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 6.8 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

CONNECTICUT
QUADRANGLE LOCATION

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1984

ROAD CLASSIFICATION

Primary highway, hard surface · Light-duty road, hard or improved surface
Secondary highway, hard surface · Unimproved road
Interstate Route · U. S. Route · State Route

BRIDGEPORT, CONN.
41073-B2-TF-024

1970
PHOTOREVISED 1984
DMA 6366 II NW—SERIES V816

Phase I Environmental Site Assessment Update for the RBD Pilot Area

PHASE I ENVIRONMENTAL SITE ASSESSMENT UPDATE

RBD PILOT AREA

CONNECTICUT DEPARTMENT OF HOUSING/BRIDGEPORT, CT

DRAFT

PROJECT NO.: 52829NDR
DATE: DECEMBER 2018

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1.0 SUMMARY

WSP USA (WSP) completed a Phase I Environmental Site Assessment (ESA) Update for the property identified as the Rebuild by Design (RBD) Pilot Area in Bridgeport, Connecticut (the "Site"). This Phase I ESA was conducted in general conformance with the American Society for Testing Materials (ASTM) Standard E 1527-13. The purpose of this Phase I ESA update was to investigate and identify land uses that may have the potential to impact the environmental conditions at the Site.

The Site consists of approximately 4.44 acres of land. Approximately 3.29 acres of the Site is part of the western parcel, known as Block 1 of the Marina Village Housing Complex. The southern portions of four, two-story brick apartment buildings extend onto the Site. Adjacent areas to the northeast and south, also within the complex and part of the Site are vacant. The vacant areas are an active construction site, as former Marina Village Housing Complex apartment buildings have been recently demolished. The remaining 1.15 acres of the Site include portions of adjacent concrete sidewalks and paved roadways along South Street, Iranistan Avenue, Ridge Avenue, Columbia Street and Johnson Street. Currently, the four Site apartment buildings appear to be occupied by tenants. The Site buildings are heated by natural gas and serviced by municipal sewer services.

The Site is located in an area identified by the Connecticut Department of Energy and Environmental Protection (CTDEEP) as Class "GB", indicating that the groundwater is presumed to be unsuitable for direct human consumption without pretreatment. Public water service is available at the Site and surrounding properties. Based on topography at the Site and surrounding area, groundwater flow is presumed to flow to the west. Previous environmental reports inferred groundwater flow in a westerly direction. Observed groundwater from monitoring wells installed in the vicinity of the Site were reported at depths of approximately 8 and 9 ft bg (feet below grade).

Historical resources indicate the Site, aside from the roadway portions which appear to have remained constant, was originally occupied by several residential dwellings prior to the construction of the Marina Village Housing Complex in the late-1940s to 1950. However, early Sanborn Fire Insurance Maps indicate a thin strip of the Site, the approximate northern perimeter parallel to Ridge Avenue, may have been occupied by buildings associated with former foundry operations of the Bridgeport Malleable Iron Works/Eastern Malleable Iron Company. Site operations associated with the metal foundry reportedly included the manufacturing of malleable and grey iron castings. Additionally, coal was utilized to fuel the foundry operations which were listed as annealing, trimming, core making, tumbling and molding. As such, historical material use likely involved use of coal, metals, oils and solvents.

Previous environmental investigations have been completed for the entire Marina Village Housing Complex in preparation for redevelopment of the neighborhood. Results of these investigations identified recognized environmental concerns (RECs) across the complex, generally as result of historical manufacturing and industrial operations conducted by Bridgeport Malleable Iron Works/Eastern Malleable Iron Works, Hotchkiss Sons Manufacturers Curry Combs & Company and Reliable Steel Drum Corporation, as well as tanks associated with former Site heating systems and a #2 fuel oil release at the complex. A total of nine RECs were identified as follows: 1) historical foundry operations; 2) historical metal pickling operations; 3) historical manufacturing operations; 4) historical japanning operations; 5) historical steel drum reconditioning; 6) historical coal storage; 7) historical urban fill; 8) #2 fuel oil release; and 9) underground storage tanks.

Two previous subsurface investigations completed across the entire housing complex, and included the advancement of 20 soil borings, the installation of 7 monitoring wells, and the sampling and collection of 20 soil samples and 7 groundwater samples. Two monitoring wells and one soil boring were completed near the Site boundary, however, without a survey of the area, it appears that only one monitoring well maybe located within the RBD Pilot Area. Urban fill materials and elevated concentrations of polyaromatic hydrocarbons (PAHs) and select total and leachable metals were detected in the nearby soil samples. Elevated PAHs and select metals were also

identified in the two nearby groundwater samples above CTDEEP Remediation Standard Regulation (RSR) groundwater criteria. Remedial efforts completed in 2016 by Freeman Companies included the excavation, removal and offsite transport and disposal of over 4,235 tons of impacted soils on Block 2/eastern parcel of the Marina Village Housing Complex. Impacted soils included elevated concentrations of PAHs, extractable total petroleum hydrocarbons (ETPH), arsenic and polychlorinated biphenyls (PCBs) above CTDEEP RSR soil criteria. The remedial excavation was complete offsite to the northeast of the Site.

The Site appears to be identified in researched environmental databases, including the Voluntary Cleanup Program, and Asbestos and National Pollutant Discharge Elimination Database as a result of recent redevelopment and construction activities at the Site. Several area properties were identified on the ASTM database, which could have an impact on the environmental quality of the Site; however, most were located in an area where a potential offsite release would not be expected to have a significant impact on the Site. One possible exception is 401 Park Avenue, located approximately 487 feet east/northeast of the Site. This Site was identified on the Connecticut Leaking Underground Storage Tank database with releases of motor fuel, gasoline and waste oil from an underground storage tank. The LUST status is listed as complete and the database indicates soil was excavated and monitoring wells were sampled however additional details were not provided.

Previous environmental investigations completed for the Marina Village Housing Complex indicated a release of #2 fuel oil was reported in December 1999 in the basement of Community Building located adjacent to the north of the Site. Eighteen (18) inches of #2 fuel oil (estimated as 4,500-gallons) was observed covering the 400-square foot basement floor. Two days later when the spill was reported, only 4 inches of oil covered the basement floor. The release was attributed to the boiler room associated tanks for the complex. No additional documentation of any cleanup, tank removals or remediation has been located, and based on its proximity to the Site, it may have impacted the environmental quality of the Site.

Section 22a-134 of the Connecticut General Statutes (CGS), known as the Connecticut Transfer Act, requires environmental investigation and potentially remediation of hazardous waste "establishments" after a qualifying "transfer of establishment". Based on the information obtained in the course of this investigation, the RBD Pilot Area does not appear to qualify as an "establishment" based upon its use as a dry cleaner, furniture stripper or vehicle body repair facility. Additionally, no documentation of any hazardous wastes was located for the Site.

This assessment has revealed evidence of recognized environmental condition (RECs) in connection with the Site as follows:

1. Historic Urban Fill: Previous subsurface investigations of the Marina Village Housing Complex have identified urban fill containing asphalt, concrete, red brick, coal, ash, etc. from previous industrial and manufacturing site operations including the demolition of associated former factory structures. These materials were observed in shallow soils up to approximately 12 ft bg in areas investigated across the Marina Village Housing Complex and were identified in soil samples collected on or directly adjacent to the Site. Laboratory results of the urban fill materials identified elevated concentrations including PAHs and select total and leachable metals above CTDEEP RSR soil criteria. Similarly, these constituents of concern were also detected in groundwater samples collected from monitoring wells installed across the complex.
2. Several residential dwellings were formerly located along the north side of Ridge Avenue at the Site prior to the construction of the Marina Village Housing Complex. Based on the age of these structures, it is likely potential fuel oil USTs associated with former heating systems of the residences were utilized and may still be in place.

3. Previous investigations of the Site vicinity identified a spill report for a #2 fuel oil release within the basement of the Marina Village Housing Complex Community building which is located adjacent to the north of the Site. On December 7, 1999 18 inches of #2 fuel oil was observed covering the 400-square foot basement and estimated to be a 4,500-gallon spill. However, the release was reported on December 9, 1999, and at that time only 4 inches of oil remained on the floor. The spill status is reported as closed, however no additional information was located in the file search. Based on the quantity and proximity of the release, it may have impacted the soil and groundwater at the Site.

Without a survey of the Site boundaries previous soil boring/monitoring well locations, and approximate boundaries of former industrial/manufacturing occupants, it is unclear if site operations associated with former industrial processes with Bridgeport Malleable Iron Works/Eastern Malleable Iron Works were conducted at the RBD Pilot Area. Regardless, site operations including a historic foundry and metal pickling operations are also considered RECs for the Site based on the long history of site usage and the proximity to the Site. These former operations involved the use of petroleum products/oils, solvents, heavy metals and hazardous materials from the metal foundry, manufacturing and metal pickling operations, including coal ash, other foundry by-products.

2.0 INTRODUCTION

WSP USA (WSP) has completed a Phase I Environmental Site Assessment (ESA) for the property identified as the Rebuild by Design (RBD) Pilot Area in Bridgeport, Connecticut. This Phase I ESA was conducted in general conformance with the American Society for Testing Materials (ASTM) Standard E 1527, "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment".

2.1 Purpose

Connecticut Department of Housing requested that WSP conduct a Phase I ESA update to evaluate the current environmental condition of the Site. The purpose of this Phase I ESA update was to investigate and identify current and past uses of the Site and the practices that may have led to situations referred to as recognized environmental conditions (REC). REC means the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater or surface water of the property. The term is not intended to include de minimis conditions that generally do not represent a material risk of harm and that generally would not be the subject of an enforcement action. Historical recognized environmental conditions (HREC), a term defined as closed releases that have been cleaned up to the satisfaction of the applicable regulatory authority or an unrestricted use criteria and controlled recognized environmental conditions (CREC) defined as a closed release that has been cleaned up but not to unrestricted use criteria such as industrial or commercial standards. Finally, significant data gaps are identified and commented upon when they affect the ability of the environmental professional to identify RECs.

2.2 Scope-of-Services

The scope of work included: a Site inspection, identification of the current land uses on the Site and adjacent properties, a search of federal and state regulatory databases, a review of aerial photographs, city directories, and Sanborn fire insurance maps; and inquiries of persons knowledgeable of the property and local agencies, including the Fire Marshal and Health Department. Future land uses or situations on either the Site or adjacent properties are outside the scope of work.

2.3 Significant Assumption

Based on topography of the Site and surrounding area, it is assumed the groundwater flow for the Site is generally to the west. Additionally, information provided by others is assumed to be fair and accurate.

2.4 User Reliance

This Phase I ESA update was conducted for the use and reliance by the Connecticut Department of Housing. No use of the information contained in this report by others is permissible without receiving prior written authorization to do so from WSP.

3.0 SITE DESCRIPTION

3.1 Location and Legal Description

The Site generally consists of the southern portion of the 400 Iranistan Avenue parcel (the western parcel or Block 1 of the Marina Village Housing Complex) and adjacent sections of South Street, Iranistan Avenue, Columbia and Johnson Streets in Bridgeport, Connecticut (Figure 1). In total, the Site consists of approximately 4.4 acres of land of which 3.29-acres are within the 400 Iranistan Avenue parcel. The remaining approximate 1.15 acres consist of adjacent paved sections of the abovementioned roadways. The portion of the Site that lies within the 400 Iranistan Avenue parcel is listed on the Bridgeport Tax Assessor's property records as Map 21, Block 401, Lot 1. The remainder of the Site consists of portions of city streets and avenues which are not included in tax assessor property records. A copy of an online map that include the Site and the property tax cards for the Site, including the entire Block 1 of the Marina Village Housing Complex are attached as Appendix I.

3.2 Current Use of Property

The Site consists of approximately 4.4-acres of land, which is currently occupied by the southern portions of four residential apartment buildings totaling approximately 21,492 square feet. A summary of the Site parcel information is presented in the following table.

Address	Description	Construction Date
400 Iranistan Avenue	Bldg 18 (5,508 square foot 2-story building)	1950
	Bldg 19 (5,238 square foot 2-story building)	1950
	Bldg 20 (5,238 square foot 2-story building)	1950
	Bldg 21 (5,508 square foot 2-story building)	1950

The Site buildings are residential. The western portion/Block 1 of the Marina Village Housing Complex formerly consisted of 26 apartment buildings and 1 community building/boiler room. Since 2016, 10 of the apartment buildings have been demolished (#22 to 31) and the majority of these former building footprints appear to be within the boundaries of the Site RBD Pilot Area. A Site Map depicting the relative locations of pertinent Site features is presented as Figure 2.

3.3 Site Vicinity General Characteristics

The Site is zoned R-C indicating a multi-family residential zone. The general vicinity of the Site is developed with residential uses or vacant land that was previously occupied by residential buildings. The Site area is served by public water and sewer services.

3.4 Description of Structures, Roads & Other Improvements on the Site

The Site buildings consist of two-story brick buildings reportedly constructed with crawl space basements. The areas surrounding the buildings are grassed/landscaped areas with concrete sidewalks. Vacant land, which is an active construction site, is located adjacent to the south and northeast of the Site buildings. This portion of the property is surrounded by chain-link fencing with locked gates. Former Marina Village Housing Complex residential apartment buildings have been demolished and the ground cover consists of soil and rubble piles. The remaining portions of the Site include concrete sidewalks along the adjacent streets and/or portions of paved roads including South Street, Iranistan Avenue, Ridge Avenue, Columbia Street and Johnson Street.

3.5 Current Uses of the Adjoining Properties

The Site abuts by the additional Marina Village Housing Complex apartment buildings to the north with South Avenue beyond; by residential properties to the east; by Ridge Avenue to the south with residential properties beyond and by residential properties to the west.

4.0 USER PROVIDED INFORMATION

WSP requested information from Connecticut Department of Housing, the User, including items identified within the User Questionnaire as specified in ASTM E1527-13. Information provided by the User is included in the section below.

4.1 Title Records

Chain of Title research documents were not provided.

4.2 Environmental Liens or Activity and Use Limitations

Information identifying the presence of environmental liens or activity and use limitations was not provided. We note that limited title research completed at the Bridgeport Town Clerk's office did not identify any evidence of environmental liens or activity and use limitations (Section 5.2.1). Furthermore, such instruments were not identified within the environmental database research (Section 5.4) or by regulatory agency file reviews (Section 5.5).

4.3 Specialized Knowledge

Connecticut Department of Housing does not have any specialized knowledge or experience related to the property or nearby properties.

4.4 Commonly Known or Reasonably Ascertainable Information

Connecticut Department of Housing was not aware of any commonly known or reasonably ascertainable information, which would assist the environmental professional in identifying conditions indicative of a release or threatened release of hazardous or toxic substances except as presented in previous environmental reports (Section 5.3).

4.5 Valuation Reduction for Environmental Issues

Connecticut Department of Housing did not provide information that would indicate that the property value was reduced for environmental issues.

4.6 Reason for Phase I ESA

This Phase I ESA update was completed to determine current or past uses may have impaired soil and/or groundwater on the Site.

5.0 RECORDS REVIEW

5.1 Physical Setting Sources

5.1.1 Regional Physiology

The Site is located on the U.S. Geological Survey (USGS), Bridgeport, Connecticut topographical quadrangle. Topography at the Site generally slopes down to the south and southwest from an approximate elevation of 15 feet above mean sea level (ft amsl) along Johnson Avenue to approximately 6 ft amsl at the northern corner of Iranistan and Ridge Avenues. Locally, the area topography is similar to the Site topography and slopes gently to the southwest.

5.1.2 Geologic Conditions

The surficial geology at the Site is mapped on the Surficial Material Map of Connecticut (1992) as two units. The majority of the Site is mapped as sands overlying finer materials. A small portion of the western end of the Site is mapped as artificial fill which indicates the area was filled with material from an unknown source. Previous subsurface investigations completed in the vicinity of the Site encountered fill materials (including concrete, brick and ash) over sand and silty soils. Fill materials were noted in soils located between the Site and South Avenue to the north at depths ranging up to 6 ft with deeper fill materials, including an old building foundation in the vicinity of the Marina Village Community building.

The Bedrock Geologic Map of Connecticut (1985) does not provide a determination of the bedrock underlying the Site. Surrounding bedrock types are metamorphic in nature.

5.1.3 Hydrologic Characteristics and Known Uses

The Site is located in an area identified by the Connecticut Department of Energy and Environmental Protection (CTDEEP) as Class "GB" indicating that the groundwater is presumed to be unsuitable for direct human consumption without pretreatment. Based on the topography at the Site and surrounding area, groundwater flow is presumed to flow to the west. Groundwater was observed in the vicinity of the Site in previous investigations at depths approximately 8 to 9 ft bg.

The closest water body is the Cedar Creek, which is located approximately 350 feet west of the Site. The water body is mapped as Class SC/SB (CTDEEP, 2006). This designation indicates that it is known or presumed to not meet the water quality criteria for one or more of the designated uses, which may include habitat for marine fish, other aquatic lift and wildlife; commercial shellfish harvesting; recreation; industrial water supply and navigation.

The State of Connecticut Department of Public Health (DPH) GIS mapping does not identify any regulated public water supply sources, reservoirs or watershed areas within one-half mile radius of the Site. The DPH mapping indicates that public water service is available to the Site and surrounding area by the Aquarion Water Company.

The CTDEEP Aquifer Protection Program web-based mapping does not identify aquifer protection areas in Bridgeport.

5.2 HISTORICAL USE INFORMATION

5.2.1 Aerial Photographs

WSP reviewed aerial photographs of the Site at online resources for the years 1934, 1951, 1965, 1970, 1985, 1996 and 2004. The following is a summary of the aerial photographs.

The 1934 aerial photograph is difficult to distinguish however several small structures appear visible adjacent to the north of Ridge Avenue. Larger rectangular buildings are depicted to the north of the Site. The 1951 and subsequent photographs illustrate the Site parcel and areas beyond as developed with the Marina Village Housing Complex. Adjacent roadways including South Street, Iranistan and Ridge Avenues, Columbia and Johnson Streets appear similar as they do today.

5.2.2 City Directories

WSP reviewed City Directories at the State Library in Hartford, Connecticut to supplement our understanding of historical Site occupancy. Bridgeport Directories were reviewed as approximately 10-year intervals for the available years spanning 1961 through 2018. WSP reviewed addresses for the Marina Village Housing Complex which were listed on Iranistan Avenue, Ridge Avenue, Columbia and Johnson Streets. Residential listings were identified for the occupied apartments located at the Site. A copy of the reviewed city directories are included in Appendix II.

5.2.3 Historical Topographic Maps

WSP reviewed historical topographic maps for the years 1951, 1960, 1970 and 1984 on on-line resources. Each of the reviewed topographic maps illustrate the Site and vicinity as shaded pink indicating a heavy developed area with only landmarks shown. Interstate 95 is illustrated to the north and the University of Bridgeport is shown to the southeast of the Site.

5.2.4 Sanborn Fire Insurance Maps

Sanborn Fire Insurance Maps included coverage for the Site vicinity for the years 1884, 1889, 1898, 1913, 1939, 1950 and 1972. The 1884 Sanborn map did not provide coverage for the Site, however areas to the west along South Avenue were illustrated with several buildings associated with Hotchkiss Sons Mfrs. Curry Combs & Co. and Bridgeport Malleable Iron Works. By the 1889 Sanborn, Bridgeport Malleable Iron Works appears to have expanded to the southeast, and beyond several residential dwellings are depicted at the northwest corner of Columbia Street and Ridge Avenue. The 1898 Sanborn appears similar to the 1889 Sanborn with additional building development at Bridgeport Malleable. Additional residential dwellings are visible to the southwest corner of Columbia Street and Ridge Avenue intersection. By the 1913 Sanborn residential dwellings are depicted to the north of Ridge Avenue between Iranistan Avenue and Columbia Street and north of Johnson Street at the eastern

end of the Site. Additionally, the Sanborn map appears to show Johnson Street, Columbia Street, Ridge Avenue, Iranistan Avenue and South Avenue in similar configurations as they are today. By the 1939 Sanborn, residential dwellings are shown at the northwest corner of Ridge Avenue and Columbia Street to approximately halfway down Ridge Avenue. Residential dwellings are also shown along the north side of Johnson Avenue. Areas west and north of the Site appear vacant as the former industrial buildings have been razed. The 1950 and 1972 Sanborn map illustrate a total of 27 buildings at the western, Block 1 parcel of the Marina Village Housing Complex. Twenty-six (26) of the buildings are two-story brick apartment buildings and one building is labeled as Community Hall with an associated boiler room and office.

5.2.5 Municipal Sources

The City of Bridgeport's Assessor records indicate the Site buildings were constructed in 1950.

5.3 Previous Environmental Investigations

WSP was provided with several previous environmental reports that were prepared for the Marina Village Housing Complex. These reports included the following:

1. September 2013 Phase I Environmental Assessment of Marina Village, 400 Iranistan Avenue in Bridgeport, Connecticut by Fuss & O'Neill (p. 13)
2. May 2015 Environmental Evaluation and Materials Management Report, Marina Village Housing Complex, Bridgeport, Connecticut by Freeman Companies, LLC. (p. 766)
3. June 2016 Environmental Evaluation and Materials Management Report, Marina Village Housing Complex, Bridgeport, Connecticut by Freeman Companies, LLC. (p. 945)
4. August 2016 Close-Out Report, Marina Village Redevelopment – Phase I, Bridgeport, Connecticut by Freeman Companies, LLC (p. 1062)
5. November 7, 2016 Phase I Environmental Site Assessment Update of Marina Village Housing Complex in Bridgeport, Connecticut by Freeman Companies, LLC.

Copies of these reports are included electronically on the flash drive included as Appendix III. Details from these reports are distributed throughout this report and a summary of the key findings of the various investigations follows.

<u>Fuss & O'Neill 2013 Phase I ESA</u>

Fuss & O'Neill (F & O) completed a Phase I ESA for the Marina Village Housing Complex which consists of thirty-nine buildings, a 389 unit apartment complex with a community/maintenance building with a former heating plant. The complex includes two parcels bound by Iranistan Avenue to the west, South Avenue to the northwest, Railroad Avenue to the north, Park Avenue to the east, Johnson Street to the southeast and Ridge Avenue to the south. Columbia Street bisects the village complex. F&O indicates the buildings were constructed in the late-1940s to 1950. The Site buildings were reportedly heated by steam from a central boiler room located in the Community Building located at the north end of the western parcel along South Street. F&O indicated the switch

from steam to natural gas was sometime in the 1990s, likely around the time the oil tanks were removed from the Community Building basement in 1999. These oil tanks fueled a former oil-fired boiler system.

F&O indicated a leaking underground storage tank (LUST) was reported on December 9, 1999 at 733 South Avenue, the Marina Village Community building located along South Street at the northern end of the parcel (west of Columbia Street). A total of eighteen inches of #2 fuel oil from an underground tank failure covered the floor of a 400-square foot room on December 7, 1999. By December 9, 1999 four inches of oil covered the floor, however it was unclear as to where/why the thickness of oil had decreased, how many associated tanks were buried outside, and the quantities of these supposed tanks. F&O indicated the EDR report noted that the local fire department, fire marshal and CTDEEP (formerly the Connecticut Department of Environmental Protection (CTDEP)) were notified, however no other pertinent information was located. F&O concluded that the oil release was likely from an aboveground storage tank in the basement rather than underground storage tanks following their site inspection.

F&O did not identify any activities that would qualify the Marina Village parcel as an "establishment" however they recommended the use of legal counsel to determine the regulatory status with respect to the Connecticut Transfer Act. F&O identified nine RECs, including: 1) historical foundry operations; 2) historical metal pickling operations; 3) historical manufacturing operations; 4) historical japanning operations; 5) historical steel drum reconditioning; 6) historical coal storage; 7) historical urban fill; 8) #2 fuel oil release and 9) underground storage tanks.

Freeman Companies May 2015 Environmental Evaluation and Materials Management Report

Freeman Companies (Freeman) completed a subsurface investigation of the eastern parcel (east of Columbia Street), known as Block 2 of the Marina Village housing complex based on the long history of industrial activities and manufacturing operations at the property identified in the 2013 F&O Phase I ESA. Bridgeport Malleable Iron Works (a/k/a Eastern Malleable Iron Company) manufactured malleable and grey iron castings. This property is the northeastern abutting property. Site operations included annealing, trimming, core making, tumbling, grinding, rolling and molding. Additional former occupants included the Hotchkiss Sons' Manufacturers Curry Combs & Company which included japanning, tempering and scouring various metals and the former Reliable Steel Drum Corporation reconditioned steel drums.

Freeman completed a total of ten soil borings (B-1 to B-10) across the eastern parcel. These borings were advanced up to 20 feet below grade. Materials encountered included fill (containing concrete, brick, asphalt, glass, brick and unknown white and black materials) up to ten feet below grade over sandy and silty soils. Groundwater was measured from approximately 6 to 11 feet below grade. One soil sample from each boring was collected from a discrete two foot interval (ranging between 2 and 12 feet below grade) and analyzed for volatile organic compounds (VOCs) by EPA Method 8260, extractable total petroleum hydrocarbons by Connecticut methodologies (CT ETPH), polyaromatic hydrocarbons (PAHs) by EPA Method 8270, polychlorinated biphenyls (PCBs) by EPA Method 8082, Total CT listed metals and/or selected leachable CT metals using the synthetic precipitation leaching procedures (SPLP). Concentrations of PAHs and ETPH were reported above CTDEEP Remediation Standard Regulations (RSR) soil criteria in the fill materials detected in borings B5 and B7. Total arsenic was also detected in these two soil samples, and in boring B8, above CTDEEP RSR soil criteria. PCBs were detected in boring B7 above CTDEEP RSR soil criteria. Additional select total metals were detected in each of the soil samples, however none were above CTDEEP RSR soil criteria. These locations are generally centrally located at the northern end of the parcel.

Three monitoring wells were completed (MW-1 to MW-3) at Block 2 and groundwater samples were collected for analyses for VOCs, PAHs and CT listed total metals. Freeman indicated that VOCs were not detected in any of the wells above the CTDEEP RSR Residential Volatilization Criteria. Concentrations of PAHs were

identified in wells MW-2 and MW-3 above the Surface Water Protection Criteria (SWPC) and total metals were reported above the SWPC in wells MW-1 and MW-3.

Based on their investigation, Freeman identified three distinct soil types and included recommendations for soil management and remediation. In general, they concluded the contaminated soils detected from borings B5 and B7 should be excavated and transported offsite for proper disposal. Freeman recommended further analytical testing during future demolition activities to define, delineate and characterize site soils, and the report included an estimate of 2,000 to 5,000 tons of material that may need to be transported offsite for disposal.

Freeman Companies June 2016 Environmental Evaluation and Materials Management Report

Freeman completed a subsurface investigation of the western parcel (a/k/a Block 1) of the Marina Village Housing Complex that included the advancement of ten soil borings, completion of four groundwater monitoring wells and the sampling and collection of ten soil and four groundwater samples. The soil borings and wells were installed to the north/northwest of the Site (Figure 2). Select soil samples were analyzed for VOCs, ETPH, PAHs, PCBs and total and leachable RSR listed metals whereas groundwater samples were analyzed for VOCs, PAHs and total RSR listed metals. Soils encountered included "urban fill" which contained asphalt, concrete, red brick, coal and ash over sand and silty soils. One soil sample from each of the ten locations was collected from depths ranging from 2 to 8 feet below grade. Laboratory results identified PAHs and ETPH at concentrations above CTDEEP RSR soil criteria in borings SB-1 and SB-4. PAHs were also reported above CTDEEP RSR soil criteria in soil from boring MW-2. These three soil samples were collected from the northern portion of the parcel, in the vicinity of the South Avenue and Columbia Street intersection. Other detections including naphthalene and select total and leachable metals were detected in other soil samples at the parcel, however reported below CTDEEP RSR soil criteria. VOCs were not detected above CTDEEP RSR groundwater criteria in the groundwater samples collected from the four site wells. PAHs and select total metals were identified above the SWPC in wells MW-3 and MW-4; select total metals were also reported above the SWPC in well MW-1.

Freeman Companies Close-Out Report August 2016

Based on the May 2015 subsurface investigation of the eastern parcel of the Marina Village Housing Complex, also known as Block 2, Freeman monitored the excavation, removal and offsite disposal of contaminated soil and fill materials. Freeman indicated three types of soil/fill materials were removed from the parcel including ash filled areas, demolition debris and soils impacted with PAHs and PCBs. In total, approximately 4,235 tons of material was excavated, removed and transported offsite to the Chicopee Landfill in Chicopee, Massachusetts (~732 tons) and the Coventry Landfill in Coventry Rhode Island (~3,503 tons) for reuse. The remedial excavation is generally located across the central portion of the eastern parcel.

The impacted materials were reportedly the result of historical site operations from the Eastern Malleable Iron Company which included fill materials and ash. Freeman reported these materials were removed to depths of native sand encountered below. Freeman indicated closure soil samples were collected from the bottom of the remedial excavation areas for analyses of PAHs. PAHs were not detected in the analyzed closure samples.

Lastly, Freeman described reusing the urban fill materials as part of the redevelopment. Freeman indicated urban fill material that contains soil demolition debris, asphalt, brick, concrete, glass, ceramics, wood ash, coal and or coal ash with typical low level concentrations of PAHs and metals will be reused under new building foundations, below 2 feet of clean fill or below paved parking areas with three-inches of asphalt.

Freeman Companies November 2016 Phase I ESA

Freeman Companies (Freeman) completed a Phase I ESA update (of the 2013 F&O Phase I) for the entire Marina Village Housing Complex. Freeman indicated the Site is located at 400 Iranistan Avenue in Bridgeport, Connecticut and includes two adjacent parcels of land that total 15.9 acres. The Site is bound to the north by South Street and Railroad Avenue, Park Street to the east, Johnson Street and Ridge Avenue to the south and Iranistan Avenue to the west. Columbia Street is located between the two Site lots. Freeman indicated the Site has a long history of industrial and manufacturing operations prior to the construction of the Marina Village in the late-1940s. Nine RECs, the same identified in the 2013 F&O Phase I ESA were listed and include: 1) historical foundry operations; 2) historical metal pickling operations; 3) historical manufacturing operations; 4) historical japanning operations; 5) historical steel drum reconditioning; 6) historical coal storage; 7) historical urban fill; 8) #2 fuel oil release; and 9) underground storage tanks.

This 2016 ESA update also summarized the previous 2015 and 2016 Freeman investigations and remedial efforts conducted at the Site.

5.4 Standard Environmental Record Sources

Federal, state and tribal environmental databases were reviewed for the Site in an effort to determine the regulatory status of the Site and to establish the location of surrounding properties with environmental records. A search of U.S. Environmental Protection Agency (U.S. EPA) and Connecticut Department of Energy and Environmental Protection (CTDEEP) databases was completed by an independent firm, Environmental Data Resources Inc. (EDR).

Based on the topography of the area and the inferred groundwater flow direction, releases within approximately 500 feet to the east of the Site were considered to have the potential to impact the environmental condition of the Site. The facilities identified by the EDR database search were evaluated to determine if they are within this potential area of concern. Search Radii, Geographic Information Systems (GIS) maps of the appropriate databases, and a copy of the database report are included in Appendix IV.

5.4.1 Federal Environmental Record Sources

Information from ASTM E 1527-13 specified Federal databases for the Site area as provided by EDR was reviewed by WSP. The databases reviewed, and the approximate search distances used are presented in the table below.

Federal Database	Radius Searched
National Priorities List (NPL), Proposed NPL and Delisted NPL database.	1 mile
Federal Superfund Liens (NPL LIENS)	Target Property (TP)
Federal Facility Site Information Listing (FEDERAL FACILITY)	1 mile
Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) and CERCLIS - No Further Remedial Action Planned (CERCLIS-NFRAP) database of potentially hazardous waste sites.	0.5-mile
Resource Conservation and Recovery Act Hazardous Waste Treatment, Storage or Disposal Facility (RCRA-TSD).	0.5-mile
Corrective Action Reports (CORRACTS) for Hazardous Waste handlers.	1 mile
RCRA Large, Small and Conditionally Exempt Small Quantity Generators (RCRA-LQG, RCRA-SQG & RCRA-CESQG) of Hazardous Waste	0.25-mile
Federal Institutional Control/Engineering Control Registries (US ENG CONTROLS & US INST CONTROL)	0.5-mile
Federal Emergency Response Notification System list (ERNS)	TP
Facility Index System/Facility Registry System (FINDS)	TP

The Site was not identified in the Federal environmental databases.

Several properties within the ASTM search distances were listed in federal agency databases facilities within the EDR report; however, none were located in an area where a potential off-site release would be expected to have a significant impact on the environmental condition of the Site.

5.4.2 State and Tribal Environmental Record Sources

Information from ASTM E 1527-13 specified State and Tribal databases for the Site area as provided by EDR was reviewed by WSP. The databases reviewed, and the approximate search distances used are presented in the table below.

State Database	Radius Searched
State Hazardous Waste Sites (SHWS) database of hazardous waste disposal sites.	1 mile
Site Discovery and Assessment Database (SDADB) database of facilities suspected of hazardous waste disposal.	0.5-mile
State Solid Waste Facility/Landfills (SWF/LF) database of solid waste disposal facilities, landfills and transfer stations.	0.5-mile
State Leaking Underground Storage Tank (LUST) and Leaking Underground Storage Tanks on Indian Land (INDIAN LUST) databases.	0.5-mile

State Database	Radius Searched
Connecticut Leachate and Wastewater Discharge Sites (LWDS) includes discharges, waste disposal sites and spills historically mapped by the Connecticut Department of Environmental Protection.	1 mile
State Registered Underground Storage Tanks (USTs)	0.25-mile
State Registered Aboveground Storage Tank (AST) database of bulk petroleum facilities that receive petroleum by marine vessels. Underground Storage Tanks on Indian Land (INDIAN UST) and Underground Storage Tank Listing (FEMA UST).	0.25-mile
ELUR Sites (AUL) database of state and tribal institutional control and engineering control registries.	0.5-mile
State Voluntary Cleanup Program Sites (VCP) and voluntary cleanup sites on Indian land (INDIAN VCP).	0.5-mile
Brownfield Sites	0.5-mile

The Site was listed in one of the State environmental databases. Bridgeport Community Renewal Associates LLP c/o JHM FIN of 400 Iranistan Avenue Bldg 28 was listed in the State Voluntary Cleanup Program Sites (VCP) database. The certifying party is listed as the Housing Authority of the City of Bridgeport and the database indicates the property entered the program in July 2018. No other pertinent information was provided.

Several properties within the ASTM search distances were listed in the State agency database facilities within the EDR report; however, most were located in an area where a potential off-site release would not be expected to have a significant impact on the Site. One possible exception includes the parcel listed as the White Property of 401 Park Avenue located approximately 487 feet east/northeast of the Site. The White Property is identified in the CT UST and LUST databases. A total of five former underground storage tanks (USTs) are associated with the property and include one 4,000-gallon tank, three 3,000-gallon tanks and one 550-gallon used oil tank. The contents of the larger USTs were not reported however all five tanks were listed as installed circa 1950 and permanently removed from the ground (dates not reported). The LUST database indicates an incident was reported on July 22, 2010. The database indicates release(s) include motor fuel, gasoline and waste oil. The LUST status is listed as complete and the database indicates soil was excavated and monitoring wells were sampled however additional details were not provided.

5.4.3 Additional Environmental Record Sources

The CTDEEP maintains a database of Hazardous Waste Manifests that have been returned to the State following the shipment of a hazardous waste. The database spans from 1984 through 2008 and 2012 through 2014 and reportedly includes hazardous waste disposal from registered U.S. EPA generators and waste shipped under temporary one-time identification numbers. The CTDEEP indicates that manifest data prior to 1984, between 2008 and 2012 and after 2014 are currently unavailable. No hazardous waste shipments were located for the Site in the file search.

The CTDEEP Oil & Chemical Spills (OCS) database includes releases which were reported to the CTDEEP between 1990 and the present. No spill files were located for the Site in the file search.

Additional database records were provided in the EDR report, presented in Appendix IV. WSP reviewed these non-ASTM scope databases for listings for the Site. The Site, listed as Bridgeport Community Renewal Associates LLP c/o JHM FIN located at 400 Iranistan Avenue, Bldg 28 was listed in the Asbestos and NPDES databases. The property was listed in the Asbestos database on August 18, 2016. The listing indicates asbestos was removed by October 19, 2016 by A. Vets Demo LLC and transported offsite by Red. No additional information was given. The National Pollutant Elimination System (NPDES) database identifies an active permit for the "portion of the former Marina Village development" was issued by the CTDEEP. The general permit for stormwater construction activities (#GSN003365) was issued on October 9, 2018 and expires on September 30, 2019.

5.5 Regulatory Agency File Review

The following sections summarize relevant information obtained from State and Municipal Regulatory Agency files.

5.5.1 City of Bridgeport Assessor's Office

WSP reviewed records at the City of Bridgeport Tax Assessor's Office. Relevant information is included in the appropriate sections of the report. The City of Bridgeport Assessor's cards are not currently up to date. Each of the property cards located for Block 1 of the Marina Village Housing Complex, which includes a portion of the Site are included in Appendix I. No property cards were identified for Buildings 5 and 29. Building 29 was located within the Site boundaries prior to its recent demolition. Additionally, some of the attached cards do not indicate former Site buildings have been demolished (Buildings 22 to 31). Copies of the Assessor's cards and a portion of an online map for the Site are included in Appendix I.

5.5.2 City of Bridgeport Building Department

The Bridgeport Building Department identified ten demolition permits for ten former apartment buildings located within or partially within the Site. These permits were dated between October 2016 and September 2018 for buildings along Ridge Avenue (former buildings 26 to 31) and the corner of Columbia Street and Ridge Avenue (former Buildings 22 to 25).

5.5.3 City of Bridgeport Fire Marshal

WSP requested copies of files for the Site from the City of Bridgeport Fire Marshal's office. A response has not yet been received from the Fire Marshal, however pertinent information will be sent as an addendum letter to this report.

5.5.4 City of Bridgeport Health Department

WSP requested copies of files for the Site from the City of Bridgeport Health Department office. A response has not yet been received from the Health Department, however pertinent information will be sent as an addendum letter to this report.

5.5.5 Connecticut Department of Energy and Environmental Protection (CTDEEP)

WSP reviewed available public files for the Site at the CTDEEP public file room. A request was made for files associated with the Site addresses with Remediation, Oil and Chemical Spills Reports, Oil and Chemical Spills Correspondences, Solid Waste, Hazardous Waste, Underground Storage Tanks, Tank Closure Report and Sub-Surface Disposal Permits. No files were located for the Site.

6.0 SITE RECONNAISSANCE

6.1 Methodology and Limiting Conditions

A drive-by Site inspection was completed by Melanie Sheperd of WSP in December 2018. The inspection was completed to obtain information regarding RECs and to evaluate potential environmental concerns on or adjacent to the Site. Interior inspections of the existing Site buildings were not completed. Photographs from the drive-by inspection are included in Appendix V.

6.2 Exterior Observations

The majority of the Site exterior consists of paved roadways (South Street, Iranistan and Ridge Avenues and Johnson and Columbia Streets) and a vacant construction site inaccessible within locked chain-link fencing located north of Ridge Avenue and west of Columbia Street. The remaining southern end of the Site is developed with four, two-story residential brick buildings, part of the remaining Marina Village Housing Complex. A southern portion of these buildings are located within the Site and the structures are known as buildings 21, 20, 19 and 18 (from east to west). Each of these buildings appear to have tenants. Grassed and landscaped areas and concrete sidewalks are located surrounding the apartment buildings.

6.3 Interior Observations

As stated earlier, the interior portions of the four residential apartment buildings that extend to the Site were not observed during the time of the Site inspection.

6.4 Hazardous Substances or Petroleum Products

Hazardous substances and petroleum products were not observed during the time of the drive-by inspection. However, track-mounted excavators were parked within chain-link fenced areas just northwest of Ridge Avenue. The diesel-fuel powered heavy machinery is associated with the recent demolition of the former Marina Village apartment buildings. Evidence of a significant release in the vicinity of the construction machinery was not noted; however, past investigations has identified constituents of concern (COCs) above CTDEEP RSR soil criteria on abutting properties.

6.5 Aboveground and Underground Storage Tanks

At least two excavators with diesel fuel tanks were located in the construction site portion of the Site during the time of the drive-by inspection. Evidence of a release from the machinery was not observed.

No documentation of any current or historic aboveground or underground storage tanks was located in the file review for the Site. Previous environmental reports indicated the Site buildings, including the other Marina Village Housing Complex buildings were heated by steam until natural gas was connected sometime in the 1990s.

F&O indicated oil tanks were removed from the Community building basement in 1999 and these tanks reportedly fueled the former boiler steam heating system. Also, as stated previously in Section 5.3, a release of #2 fuel oil was reported on December 7, 1999 that described 18-inches of oil covering the basement floor of the Community Building as a result from an underground tank failure. Local fire department, fire marshal and DEP were notified and two days later approximately 4-inches of #2 oil was reportedly covering the floor. No other documentation of this incident was identified by others or during our file research. The source of the #2 fuel oil, the amount released, the associated cleanup activities are all unknown. However, F&O concluded the oil release was likely from aboveground tank(s) in the basement rather than underground tank(s) following an inspection of the building exterior. It is noteworthy to mention the Community building is located offsite but adjacent to the north of the Site.

Based on the age of the Site buildings and the uncertainty of former heating system(s) of the Marina Village apartment buildings, it is possible that historic oil-fired systems with associated heating oil underground storage tanks (USTs) were utilized.

7.0 INTERVIEWS

WSP interviewed several employees of the City of Bridgeport for our Phase I ESA update. Our interviews were generally conducted to obtain knowledge of current and former Site operations, petroleum storage practices and usage, and usage and management of hazardous materials at the Site. Information gathered during interviews is generally incorporated throughout this report.

8.0 FINDINGS

The findings below are based on the work conducted as part of this assessment:

- The Site consists of a southern portion of the Block 1 parcel associated with the Marina Village Housing Complex and adjacent concrete sidewalks and sections of paved roadways along South Street, Iranistan Avenue, Ridge Avenue, Columbia and Johnson Streets. The Site, known as the RBD Pilot Area is encompasses approximately 4.44-acres. The paved roadway areas and adjacent sidewalks total approximately 1.15-acres and the remaining approximate 3.29-acres are part of the Marina Village Block 1 apartment complex. Southern ends of four Marina Village Housing Complex buildings (18-21) are located at the southern end of the Site. These buildings consist of two-story brick structures reportedly constructed on crawl space basement areas. Grassed/landscapes and concrete sidewalks are located surrounding the Site buildings. To the south and northeast of the Site buildings, the rest of the complex area is vacant and an active construction site as former apartment buildings have been recently demolished.
- The Site is located in an area identified by the CTDEEP as Class "GB", indicating that the groundwater is presumed to be unsuitable for direct human consumption without pretreatment. Public water service is available at the Site and surrounding properties. Based on topography at the Site and surrounding area, groundwater flow is presumed to flow to the west. Previous environmental investigations identified groundwater approximately 8 to 9 feet below grade at areas adjacent to the northwest of the Site.
- Historical resources indicate the Site, aside from the roadway portions which appear to have remained constant, was mainly occupied by residential dwellings prior to the construction of the Marina Village Housing Complex in the late-1940s to 1950. However, early Sanborn Fire Insurance Maps indicate a thin strip of the Site, the approximate northern perimeter of the Site parallel to Ridge Avenue may have been occupied by foundry buildings associated with Bridgeport Malleable Iron Works/Eastern Malleable Iron Company. Site operations associated with the metal foundry reportedly included the manufacturing of malleable and grey iron castings. Additionally, coal was utilized to fuel the foundry operations which were listed as annealing, trimming, core making, tumbling and molding. As such, material use historically involved extensive amounts of coal, metals, oils and solvents.
- Previous environmental investigations have been completed for the entire Marina Village Housing Complex in preparation for redevelopment of the neighborhood. Results of these investigations identified recognized environmental concerns (RECs) across the complex generally as result of historical manufacturing and industrial operations conducted by Bridgeport Malleable Iron Works/Eastern Malleable Iron Works, Hotchkiss Sons Manufacturers Curry Combs & Company and Reliable Steel Drum Corporation. These RECs were listed as 1.) historical foundry operations; 2.)

historical metal pickling operations; 3.) historical manufacturing operations; 4.) historical japanning operations; 5.) historical steel drum reconditioning; 6.) historical coal storage; 7.) historical urban fill; 8.) #2 fuel oil release and 9) underground storage tanks.

- Two previous subsurface investigations completed across the entire housing complex and included the advancement of twenty soil borings, the installation of seven monitoring wells and the sampling and collection of twenty soil samples and seven groundwater samples. Two monitoring wells and one soil boring were completed near the Site, however without a survey of the Site boundaries and these three locations, it is unclear if the subsurface investigation extended to the RBD Pilot Area. Urban fill material and elevated concentrations of PAHs and select total and leachable metals were detected in the nearby soil samples. Elevated PAHs and select metals were also identified in the two nearby groundwater samples above CTDEEP RSR soil criteria.
- The Site appears to be identified in researched environmental databases, including the Voluntary Cleanup Program, and Asbestos and National Pollutant Discharge Elimination Database as a result of recent redevelopment and construction activities at the Site.
- Previous environmental investigations completed for the Marina Village Housing Complex indicated a release of #2 fuel oil was reported in December 1999 at the Community Building basement. A total of eighteen inches of oil was noted in the basement, yet no additional documentation of any cleanup, tank removals or remediation has been located and based on its proximity to the Site; this release may have impacted the soil and groundwater of the Site.
- Several area properties were identified on the ASTM database, which could have an impact on the environmental quality of the Site; however, most were located in an area where a potential off-site release would not be expected to have a significant impact on the Site. One possible exception is 401 Park Avenue, located approximately 487 feet east/northeast of the Site. This Site was identified on the Connecticut Leaking Underground Storage Tank database with releases of motor fuel, gasoline and waste oil from an underground storage tank. The LUST status is listed as complete and the database indicates soil was excavated and monitoring wells were sampled however additional details were not provided.
- Eastern portions of the Site, within the Marina Village Housing Complex, is currently an active construction site and within locked chain-link fenced areas. Former apartment buildings were recently demolished (Buildings 22 to 31) and the ground surface conditions of these areas were observed as soil covered with piles of construction rubble and vegetation. Construction equipment, such as track-mounted excavators were stored in the construction site area of the property.
- The western portion of the Site, within the Marina Village apartment complex, generally consists of the southern end of four, two-story brick apartment buildings and surrounding grassed/landscaped areas with concrete sidewalks.

9.0 APPLICABILITY OF THE CONNECTICUT TRANSFER ACT

Section 22a-134 of the Connecticut General Statutes (CGS), known as the Connecticut Transfer Act, requires environmental investigation and potentially remediation of "establishments" after a qualifying "transfer of establishment". An "establishment" is defined as "any real property at which or any business operation from which (A) on or after November 19, 1980, there was generated, except as the result of remediation of polluted soil, groundwater or sediment, more than one hundred kilograms of hazardous waste in any one month, (B) hazardous waste generated at a different location was recycled, reclaimed, reused, stored, handled, treated, transported or disposed of, (C) the process of dry-cleaning was conducted on or after May 1, 1967, (D) furniture stripping was conducted on or after May 1, 1967, or (E) a vehicle body repair facility was located on or after May 1, 1967." Our research has not identified any uses that would automatically qualify the Site as an "establishment" under the Transfer Act based upon its use as a dry cleaner, furniture stripper or vehicle body repair facility. Additionally, no documentation of any hazardous wastes are located for the Site.

10.0 OPINIONS AND CONCLUSIONS

We have completed a Phase I ESA in conformance with the scope and limitations of ASTM Practice E1527-2013 for the property identified as the RBD Pilot Area in Bridgeport, Connecticut. This assessment has revealed evidence of recognized environmental conditions (RECs) in connection with the Site as follows:

1. Historic Urban Fill: Previous subsurface investigations of the Marina Village Housing Complex have identified urban fill containing asphalt, concrete, red brick, coal, ash, etc. from previous industrial and manufacturing site operations including the demolition of associated former factory structures. These materials were observed in shallow soils up to approximately 12 feet below grade in areas investigated across the Marina Village Housing Complex and likely extend to the Site. Laboratory results of such fill materials identified elevated concentrations including PAHs and select total and leachable metals above CTDEEP RSR soil criteria. Similarly, these constituents of concern were also detected in groundwater samples collected from monitoring wells installed across the complex.
2. Several residential dwellings were formerly located along the north side of Ridge Avenue at the Site prior to the construction of the Marina Village Housing Complex. Based on the age of these structures, it is likely potential fuel oil USTs associated with former heating systems of the residences were utilized and may still be in place.
3. Previous investigations of the Site vicinity identified a spill report for a #2 fuel oil release within the basement of the Marina Village Housing Complex Community building which is located adjacent to the north of the Site. On December 7, 1999 eighteen-inches of #2 fuel oil was observed covering the 400-square foot basement and estimated to be a 4,500-gallon spill. However, the release was reported on December 9, 1999 and at that time only four inches of oil remained on the floor. The spill status of the reported is closed however no additional information was located in the file search. Based on the quantity and proximity of the release, it may have impacted the soil and groundwater at the Site.

As noted earlier, without a survey of the Site boundaries, previous soil boring/monitoring well locations and approximate boundaries of former industrial/manufacturing occupants, it is unclear if site operations associated with former industrial processes with Bridgeport Malleable Iron Works/Eastern Malleable Iron Works were conducted at the RBD Pilot Area. Regardless, site operations including a historic foundry and metal pickling operations are also considered RECs for the Site based on the long history of site usage and the proximity to the Site. These former operations involved the use of petroleum products/oils, solvents, heavy metals and hazardous materials from the metal foundry, manufacturing and metal pickling operations including coal ash, other foundry by-products.

11.0 DEVIATIONS/DATA GAPS

Data gaps identified by the ASTM standard include:

- Chain of Title documentation for the Site was not provided. A limited review of property deeds filed at the Bridgeport Clerk's office was performed and evidence of an environmental related deed encumbrance was not noted. Further, the EDR research included a search of State and Federal environmental deed restriction databases and none were identified for the Site.
- Significant portions of the Site were not accessible at the time of our inspection as a result of gated chain-link fencing (construction site). We note that interior inspections of the Site buildings were not completed. Our investigation included drive-by inspections of the Site. Previous investigations of the Site did involve more comprehensive inspections.

It is our opinion that the identified data gaps are not significant. However, it is our understanding that portions of the Superfund protection offered by the All Appropriate Inquiry Phase I Environmental Site Assessment process may not be afforded the User in the event that resolution of these data gap would have resulted in the identification of significant environmental issues at the Site.

12.0 QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

Resumes for WSP personnel involved in the ESA are presented in Appendix VI.

13.0 LIMITATIONS

The purpose of this Phase I Environmental Site Assessment is to identify potential impacts to the environment status of the physical conditions (i.e., soil, ground water, structure, etc.) at the Site, due to the use, storage or disposal of hazardous or toxic materials or wastes. As such, any other property conditions or characteristics are not addressed in the scope of work for this report. The scope of work does not include, nor should the report be considered as, an audit of compliance with environmental permits, management practices, or

federal, state or local laws and regulations, even though in the course of work such information may be obtained and noted in the report.

The conclusions stated above have been developed from what is considered to be a reasonable investigation based on the present and past land use of the Site and the property's location with respect to adjacent land uses. The conclusions, to some degree, are based upon information provided by others as referenced or noted in the report. Reasonable efforts have been made to confirm the information with other sources; however, WSP is not responsible for missing or incomplete information if such information is not available at the source or provided at WSP's request, or if such information cannot be obtained within the time constraints of the work or within a level of effort reasonable for the work being completed.

The conclusions and/or recommends are applicable to areas of the Site that were accessible at the time of inspection and represent the conditions observed in those areas. Areas that were hidden, covered or otherwise inaccessible to inspection are not covered by the conclusions and recommendations. The conclusions and recommendations are based in part on conditions observed on the Site at the time of the inspection. The conclusions do not include subsequent changes to the Site, or use of the Site, which could alter the environmental status of the property from its present condition.

This report, and all work associated with it, has been completed solely for the use of the Connecticut Department of Housing. Use of the report by others, or conclusions drawn from the information contained herein without confirmation by WSP, is done at the users risk. WSP asserts that the data are complete and appropriate at the time and for the work conducted, but is not responsible for the use of the information for purposes for which it was not intended.

14.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

We declare that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in 312.10 CFR 312. We have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the Site. We have developed and completed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

cmm

December 14, 2018

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REFERENCES

CTDEEP. 1987. Water Quality Classifications Map of Connecticut.

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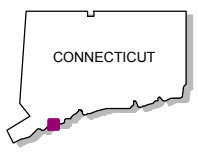
FIGURES

SOURCE: USGS TOPOGRAPHIC QUADRANGLE BRIDGEPORT, CONNECTICUT (2015).



QUADRANGLE LOCATION

0 2000

SCALE IN FEET

CONNECTICUT DEPARTMENT OF HOUSING
RBD PILOT AREA
BRIDGEPORT, CONNECTICUT

SITE LOCATION MAP

DATE	REVISED

PREPARED BY:

WSP USA
4 Research Drive
Suite 204
Shelton, Connecticut 06484
(203) 929-8555

DRAWN:	RAC	CHECKED:	MS	DATE:	12/11/18	FIGURE:	1

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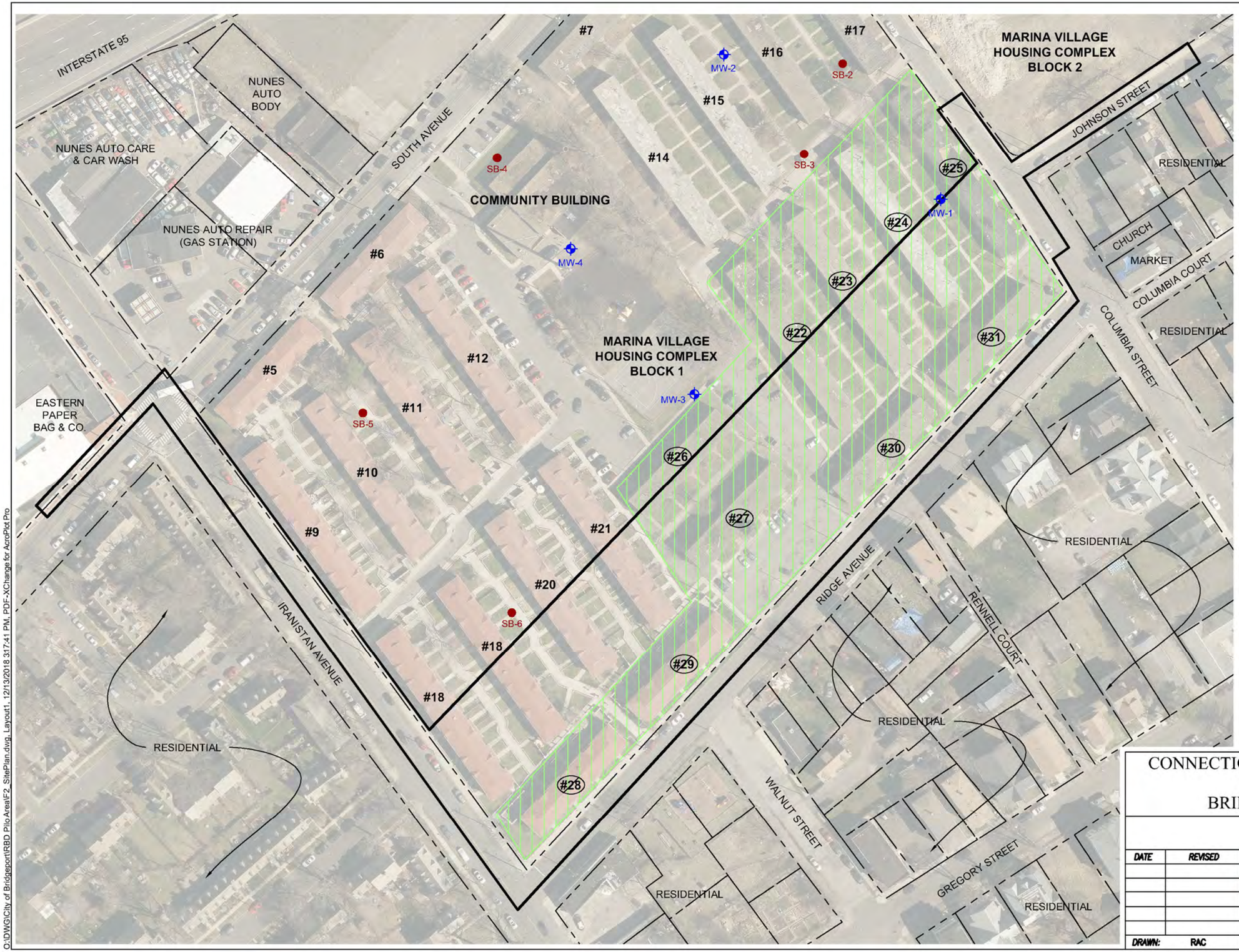

LEGEND

- RBD PILOT AREA
- PROPERTY BOUNDARY
- #5 MARINA VILLAGE HOUSING COMPLEX APARTMENT BUILDING
- (#28) DEMOLISHED APARTMENT BUILDING (CONSTRUCTION SITE)
- APPROXIMATE SOIL BORING LOCATION COMPLETED BY FREEMAN COMPANIES (2016)
- APPROXIMATE MONITOR WELL LOCATION COMPLETED BY FREEMAN COMPANIES (2016)

0 100
SCALE IN FEET

CONNECTICUT DEPARTMENT OF HOUSING
RBD PILOT AREA
BRIDGEPORT, CONNECTICUT

SITE PLAN

DATE	REVISED

PREPARED BY:

WSP USA
4 Research Drive
Suite 204
Shelton, Connecticut 06484
(203) 929-8555

DRAWN:	RAC	CHECKED:	MS	DATE:	12/13/18	FIGURE:	2

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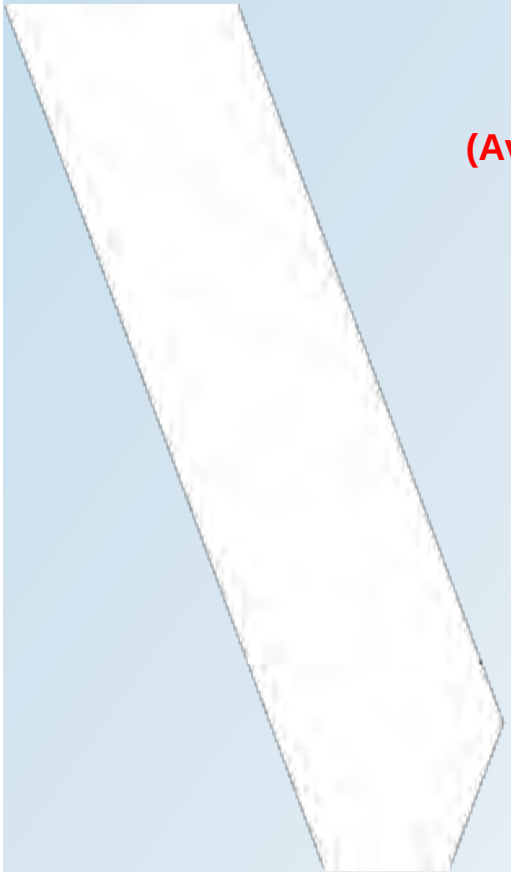
APPENDIX I

Tax Cards and Tax Maps

(Available Upon Request)



APPENDIX II
Historical Resources

(Available Upon Request)

APPENDIX III
Previous Environmental Reports

FREEMAN
COMPANIES
LAND DEVELOPMENT | ENGINEERING DESIGN | CONSTRUCTION SERVICES

Phase I Environmental Site Assessment Update
Marina Village Marina Village Housing Complex
Bridgeport, Connecticut

November 7, 2016

Prepared for:

Bridgeport Community Renewal Associates, LP
c/o JHM Group
1281 East Main Street, Suite 201
Stamford, Connecticut 06902

Prepared by:

Freeman Companies, LLC
36 John Street
Hartford, CT 06106

TABLE OF CONTENTS

Appendices

1 INTRODUCTION

1.1 Summary

This report provides an update to the September 2013 Phase I Environmental Site Assessment (ESA) performed for JHM Group by Fuss & O'Neill of Manchester, CT. A copy of the Phase I is attached as Appendix A. The subject property is currently utilized for residential housing.

The Site, located at 400 Iranistan Avenue, consists of a two adjacent parcels of land totaling 15.9 acres located in the City of Bridgeport. The Site is bounded on the north by South Avenue and Railroad Avenue, on the east by Park Avenue, on the south by Johnson Street and Ridge Avenue, and on the west by Iranistan Avenue. Columbia Street runs between the two parcels through the middle of the site.

1.2 Phase I Findings

Based on the information presented within the Phase I report, the Site has a long history of heavy industrial and manufacturing operations prior to its development as a residential housing complex in the late 1940s. Based on Section 8.2 of the Phase I report, the following recognized environmental conditions were identified:

- REC-1: Historic Foundry Operations - The Bridgeport Malleable Iron Works / Eastern Malleable Iron Company was present at the Site from prior to 1884 to the mid-1930s.
- REC-2: Historic Metal Pickling Operations - Historic metal pickling operations associated with the former foundry operations likely generated waste sludge that would currently be classified as hazardous.
- REC-3: Historic Manufacturing Operations - Hotchkiss Sons Manufacturers Curry Combs & Company / Edward S. Hotchkiss Hardware Manufacturing were present at the Site from prior to 1884 and were gone by 1913.
- REC-4: Historic Japanning Operations - Japanning operations associated with the Hotchkiss Sons Manufacturers Curry Combs & Company / Edward S. Hotchkiss Hardware Manufacturing have the potential to generate a release of petroleum based materials at the Site.
- REC-5: Historic Steel Drum Reconditioning - Following the closure of the Bridgeport Malleable Iron Works / Eastern Malleable Iron Company one of the former annealing buildings at the east end of the foundry was occupied by the Reliable Steel Drum Corporation for reconditioning steel drums and the area to the east of the former annealing building was used for the storage of steel drums.
- REC-6: Historic Coal Storage - Two historic coal storage areas were identified on the site. A coal storage shed was located along Railroad Avenue on the Bridgeport malleable Iron Works property and a coal bin associated with the Hotchkiss Sons Manufacturers Curry Combs & Company was located behind their manufacturing facility.
- REC-7: Historic Urban Fill - As with any site located in heavily urbanized area where former structures have been razed or with multiple generations of development, the potential for the presence of urban fill containing ash, coal, asphalt fragments, or manufacturing by-products exists.
- REC-8: #2 Fuel Oil Release - On December 9, 1999, release of 4,500 gallons of #2 fuel was reported to DEEP which occurred within the basement of the HACB's Marina Village office building (733 South Ave).
- REC-9: USTs - Approximately 30 former homes, storefronts, and apartment buildings were previously located on the Site along Ridge Avenue, Columbia Street, Johnson Street, Park Avenue and Railroad Avenue. There is potential for fuel oil USTs associated with these structures to have been abandoned in place.

1.3 Scope of Work

This Phase I ESA Update was conducted to identify Recognized Environmental Conditions (RECs) resulting from past or present activities on the site and to determine if any of the surrounding properties have the potential to impact the environmental integrity of the site. The assessment update consisted of a reconnaissance of accessible site areas and adjoining properties, a review of State and Federal environmental databases as they pertain to the site and an interview with the site owner/operator.

This ESA was conducted in a manner consistent with industry standard and practice and in general accordance with the Standards of the American Society for Testing and Materials (ASTM) E1527-13 Standard Practice for Environmental Site Assessment Updates.

2 SITE DESCRIPTION

2.1 Location

The Site, located at 400 Iranistan Avenue, consists of a two adjacent parcels of land totaling 15.9 acres located in the City of Bridgeport. The Site is bounded on the north by South Avenue and Railroad Avenue, on the east by Park Avenue, on the south by Johnson Street and Ridge Avenue, and on the west by Iranistan Avenue. Columbia Street runs between the two parcels through the middle of the site.

2.2 Current Usage

The Site is currently used for residential housing.

2.3 Historical Land Usage

Marina Village was originally constructed during the late 1940s. Prior to its construction, the Site was occupied by the Bridgeport Malleable Iron Works (later known as the Eastern Malleable Iron Company), a metal foundry that manufactured malleable and grey iron castings, Hotchkiss Sons' Manufacturers Curry Combs & Company and by a number of homes.

The foundry used coal to fuel their operations, which included operations such as annealing, trimming, core making, tumbling, and molding. Hotchkiss Sons Manufacturers Curry Combs & Company was located southwest of the Bridgeport Malleable Iron Works along South Avenue. The Hotchkiss Sons Manufacturers Curry Combs & Company property included a manufacturing building, a wood shop, coal storage, and lumber storage. Operations included scouring, tempering, and japanning. A number of homes were located along the north side of Johnson Street, the west side of Columbia Street, the west side of Park Avenue, and the south side of Railroad Avenue at the east end of the site.

2.4 Surrounding Land Use

The surrounding land use consists primarily of high-density housing to the southwest, southeast and northeast; and a mix of commercial and light industrial to the northwest.

2.5 Utilities

Marina Village is currently served by municipal sewer and water.

The Site's buildings were once heated by steam from the central boiler room of the Community Building, located on the northern side of Marina Village along South Avenue. The buildings made a switch from steam heat to natural gas sometime in the late 1990s. Electric, cable, and telephone services enter the Site via overhead wires.

2.6 Groundwater Classification

According to the CTDEEP water quality classification maps groundwater at the site is classified as GB. A GB classified groundwater is defined as groundwater within a historically highly urbanized area or an area of intense

industrial activity and where public water supply service is available. Such groundwater may not be suitable for human consumption without treatment due to waste discharges, spills or leaks of chemicals or land use impacts.

2.7 Environmental Assessment Activities

Several rounds of subsurface investigation activities have been conducted on the Site since the date of the original Phase I ESA. The initial round of sampling was conducted between the dates of May 12 through May 14, 2015. This investigation was conducted entirely within the "triangle" section of the Site. A total of ten soil borings were advanced at the Site as part of this investigation. The second subsurface investigation was conducted between the dates of May 25 through May 26, 2016. A total of ten soil borings were advanced at the Site as part of the second investigation.

2.7.1 Initial Subsurface Assessment "Triangle Property"

The initial assessment was conducted between the dates of May 12 through May 14, 2015. On the western section of the property. The primary purpose of the assessment was to define the nature/presence of target contaminants in the unconsolidated materials in both the saturated and unsaturated zones associated with historical Site activities. In addition, the boring program also provided information on Site stratigraphy and physical properties of the unconsolidated materials in both the saturated and unsaturated zones with particular emphasis on the characteristics of those materials that affect contaminant migration pathways and transport mechanisms.

New England Boring Contractors of Glastonbury, CT advanced the soil borings utilizing a hollow stemmed auger (HSA) drilling rig under the direct supervision of Freeman Companies field personnel. The location for each of the soil borings was chosen to maximize the information obtained based on Freeman Companies' understanding of existing site conditions.

All ten soil borings (B-1 through B-10) were advanced using a HSA drill rig spinning 4 ¼-inch inner diameter augers. Soil samples were collected with stainless steel, 2-inch diameter, two-foot split-spoon sampler advanced ahead of the augers in two-foot intervals using a weighted hammer. In general, sampling was conducted semi continuously at 2 foot intervals into the observed water table. Bedrock was not encountered at any boring locations.

Three of the soil borings were completed as overburden-monitoring wells (MW-1 through MW-3). The wells were set to depths of approximately 12 to 16 feet below grade. The wells are constructed of approximately 10 feet of 2-inch diameter, 0.010-inch slotted PVC screen, with 2-inch PVC riser extending to grade.

Laboratory analysis of the soil samples collected from sample locations B-5, B-7 and B-8, identified the presence of one or more of the following; poly aromatic hydrocarbons, total petroleum hydrocarbons, total arsenic and/or PCBs at concentrations exceeding default remediation criteria.

Laboratory analysis of groundwater samples did not detect the presence of any volatile organic compounds at concentrations that exceeded the RES VC within any of the monitoring wells. Analytical results of the groundwater samples identified the following poly aromatic hydrocarbons; benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and phenanthrene and the following metals; arsenic, copper, lead, mercury, and zinc at concentration exceeding the default SWPC in one or more of the monitoring wells. A copy of the assessment report is included as Appendix B.

2.7.2 Additional Assessment "Second Phase"

The second phase of the Marina Village redevelopment project involves the demolition of the portion of the complex that is bounded by South Avenue, Columbia Street, Ridge Avenue, and Iranistan Avenue (Buildings Numbered 5-31). The Second Phase Assessment activities were conducted between the dates of May 25 through May 26, 2016. A total of ten soil borings were advanced at the Site as part of the investigation.

Six of the ten soil borings proposed as part of the second phase (SB-1 through SB-6) were advanced using a direct push drill rig utilizing static force and dynamic percussion to drive steel boring rods into the ground. Soil samples were collected with a stainless steel, 2-inch diameter, five-foot spoon sampler interiorly lined within a single use acetate sleeve. Sampling was conducted continuously into the observed water table.

The remaining four soil borings (MW-1 through MW-4) were advanced using a HSA drill rig spinning a 4 ¼-inch inner diameter auger. Soil samples were collected with stainless steel, 2-inch diameter, two-foot split-spoon sampler advanced ahead of the augers in two-foot intervals using a weighted hammer. Sampling was conducted continuously at 2 foot intervals into the observed water table.

Soil encountered during the advancement of the second phase soil borings consisted primarily of a mixture of Urban Fill and ash, followed by brown and tan, fine to coarse sand intermixed with silt at several locations. Bedrock was not encountered at any boring locations.

Laboratory analysis of the soil samples collected from sample locations SB-1, SB-4, and MW-2 identified the presence of one or more of the following; poly-aromatic hydrocarbons and/or extractable total petroleum hydrocarbons, exceeding the RDEC and/or the GB PMC.

Although analytical results from groundwater samples collected as part of the did not detect the presence of any volatile organic compounds at concentrations that exceeded the RES VC; results did identify the presence of one or more poly aromatic hydrocarbons and or metals at concentrations exceeding the default SWPC within the samples collected from MW-1, MW-3 and MW-4.

2.8 Remedial Activities

The primary purpose of the soil removal activities was to excavate and disposal of contaminated soil/fill material that was encountered during the subsurface assessment activities of the "triangle property". Soil excavation and removal activities, conducted over an approximately eight week period, were initiated on April 21, 2016 and completed on June 16, 2016. A copy of the Close Out Report is included as Appendix D.

2.8.1 Previous Building Slab

During initial excavation activities it was identified that the floor slab from the former Eastern Malleable Iron Company was still present on the property. The slab was generally encountered at a depth of approximately 1-2 feet below the existing surface. Only within areas where the Marina Village buildings were constructed was the original slab removed. Inspection of the slab revealed that the slab consisted of approximately 4-6" of non-reinforced concrete. The slab appeared to be in good condition with no signs of staining. A small section of the slab was removed at a location to the southwest of building 35 in order to identify soil conditions under the slab. Soil conditions under the slab consisted of native sand. In order to confirm he initial findings Freeman Companies directed the contractor to remove small areas of slab at several additional locations. In all instances native sand was identified to be present under the slab. Since the slab did not appear to be stained and that native sand was located under the slab, the decision was made to leave the slab in place.

2.8.2 Ash Fill Areas

During the soil removal activities serval areas of ash material were encountered and removed. The ash was identified to contain small pieces of ceramic debris and glass. One of the larger areas of ash material was located to

the west of building 36, which is located just south of the former annealing area of the Eastern Malleable Company. The ash area measured approximately 30 feet long by 20 feet wide and extended to a depth of approximately 10-12 feet.

2.8.3 Demolition Debris

Various amounts of brick, asphalt, and broken concrete were encountered throughout the excavation area. The larger amounts of these materials were encountered primarily at locations on top of the former building slab. It appeared that the former building was crushed in place and filled with urban fill material to allow of the shaping of the property for construction of Marina Village.

2.8.4 Impacted Soil

Soil material identified to be impacted by PAHs and low concentration of PCBs was selected for removal from the site. The target areas for removal were primarily located to the northwest of building 36 and to the south and southwest of building 35. The largest of the impacted areas was located to the northwest of building 36, which was located within the former coal storage area for the former Eastern Malleable Iron Company. Soil within this area was primarily impacted from 1-4 feet in depth and encompassed almost the entire area north of the former building slab extending to Railroad Avenue. Other smaller pockets of impact generally consisted of areas measuring approximately 10 feet by 10 feet by 5 feet in depth.

2.8.5 Soil Disposal

Impacted soil and ash material excavated for removal from the site was brought to one of two locations for disposal. The soil and ash material located to the east of building 35 was brought to the Chicopee Landfill, in Chicopee Massachusetts. The remaining impacted material was brought to the Coventry Landfill in Coventry Rhode Island.

Based on weight tickets generated from the landfills, approximately 731.92 tons of impacted material were excavated and removed from the site for reuse at the Chicopee Landfill and approximately 3,503.11 tons of impacted material were excavated and removed from the site for reuse at the Coventry landfill.

2.8.6 Closure Sampling

As identified, impacted material related to the historical operations of the Eastern Malleable Iron Company primarily consisted of discolored fill material and ash which contained moderate concentrations of PAHs and low concentrations of PCBs. This impacted material was visually identifiable due to its composition and color as compared to the native sands located at depth. Removal of impacted material was generally conducted until the native sand material was encountered.

Upon completion of the removal of the impacted material soil removal, soil samples were collected from the floor of excavation areas in order to demonstrate removal of the impacted material. Since PAHs were the primary driver for removal activities and were present at the greatest concentrations, the closure samples were submitted for the analysis of PAHs. No PAHs were detected within the samples submitted.

3 RECORDS REVIEW

3.1 Standard Environmental Records Search

A database search report that identifies sites listed on state and federal databases within the ASTM-required radii was obtained for the property from Environmental Data Resources, Inc (EDR). A copy of EDR's complete report is provided as Appendix E.

The report included the following databases specified by the ASTM Phase I protocol as well as non-ASTM databases (not listed):

Database*	Search Radius
National Priorities List (NPL)	1 mile
Comprehensive Environmental Response, Compensation and Liability Information System	0.5 mile
Resource Conservation and Recovery Information System (RECRIS) Treatment, Storage, and Disposal Facilities (RCRA TSD)	0.5 mile
Resource Conservation and Recovery Corrective Action Sites (RCRA COR)	1 mile
RCRA Large and Small Quantity Generators (RCRA GEN)	0.25 mile
Emergency Response Notification System (ERNS)	Target Property
The Facility Index System (FINDS)	Target Property
State Hazardous Waste Sites	Target Property
Regulated State Underground Storage Tank (UST) and Aboveground Storage Tank database (AST)	0.25 mile
State Leaking Underground Storage Tank (LUST)	0.5 mile
Brownfield Site Database	0.5 mile
Engineering Controls Sites	0.5 mile
Institutional Controls Sites	0.5 mile
Indian Reservation Database	1 mile

*A description of these databases and additional sources searched is provided in the EDR report. A complete listing of sites identified on the above-referenced databases is provided in the EDR report.

Freeman Companies evaluated the following to determine whether additional environmental records with respect to these facilities, including the orphan sites, should be reviewed.

- Case status (i.e., whether a No Further Action letter has been issued or a case has been closed);
- Type of database and whether the presence of soil or groundwater contamination is known;
- Distance of the site from the subject property; and,
- Whether the site is upgradient or downgradient of the subject property based on local topography and the anticipated easterly groundwater flow direction.

Freeman Companies reviewed the information provided using the above criteria and the findings are discussed in the following Sections.

3.1.1 Subject Site

The subject Site was not listed within the any of the databases

3.1.2 Surrounding Properties

Based on the review of the database search, no new information regarding potential environmental impact to the Site was identified.

4 SITE RECONNAISSANCE

4.1 Methodology

As part of on-going abatement/demolition activities, Freeman Companies has conducted numerous site visits since the date of the original Phase I ESA. The latest visual inspection of the Site occurred on November 3, 2016. The inspection included a walk-through of the site for the purpose of identifying RECs.

A visual inspection of adjoining properties from the subject property line, public rights-of-way or other vantage points (e.g. aerial photography) including a visual inspection where hazardous substances may be or may have been stored, treated, handled or disposed was also conducted.

4.2 Observations

At the time of the initial Phase I ESA, the property contained 38 multi-family buildings and one community building which was the former boiler house. From 2015-2016, 12 of the 38 buildings (all within the "triangle" parcel) were demolished. As of November 3rd, 2016 two of the remaining 26 building are in the process of being demolished.

5 INTERVIEWS

5.1 Owner

An interview with was conducted with Site Manager Mike Cundiff on November 3, 2016. According to Mr. Cundiff, there have been no changes to the Site since the date of the original Phase I ESA.

6 FINDINGS AND CONCLUSIONS

Freeman Companies has performed a Phase I Environmental Site Assessment Update in conformance with the scope and limitations of ASTM Practice E 1527-13 Limitations of this assessment are described in Section 7.

6.1 Recognized Environmental Conditions

An REC is the presence or likely presence of any hazardous substance or petroleum products in, on, or at a property due to the release to the environment, under conditions indicative for a release to the environment, or under conditions that pose a material threat of a future release to the environment.

The following RECs were identified at the Site as part of the 2013 Phase I:

- REC-1: Historic Foundry Operations
- REC-2: Historic Metal Pickling Operations
- REC-3: Historic Manufacturing Operations
- REC-4: Historic Japanning Operations
- REC-5: Historic Steel Drum Reconditioning
- REC-6: Historic Coal Storage

- REC-7: Historic Urban Fill
- REC-8: #2 Fuel Oil Release
- REC-9: USTs

Based on assessment and remedial activities that have been conducted since the original Phase I was conducted, REC#5 has been closed. In addition, one of the coal storage areas identified as REC#6 has also been closed. Lastly, no USTs (REC#9) have yet been identified on the site.

7 ENVIRONMENTAL CERTIFICATION

7.1 Limitations

This report is prepared on behalf of and for the exclusive use of JHM Group (Client) and is subject to and issued in accordance with the Agreement and the provisions thereof. This report and any findings contained therein shall not, in whole or in part, be provided to or used by any other person, firm, entity or governmental agency in whole or in part, without the prior written consent of Client and Freeman Companies. However, Freeman Companies acknowledges and agrees that, subject to the Limitations set forth herein and prior written approval by Freeman Companies, this report may be provided to specific financial institutions, attorneys, title insurers, lessees and/or governmental agencies identified by Client at or about the time of issuance of the report in connection with the conveyance, mortgaging, leasing, or similar transaction involving the real property which is the subject matter of a report and any work product. Use of this report for any purpose by any persons, firm, entity, or governmental agency shall be deemed acceptance of the restrictions and conditions contained therein, these Limitations and the provisions of Freeman Companies' Agreement with Client. No warranty, express or implied, is made by way of Freeman Companies' performance of services or providing an environmental site assessment, including but not limited to any warranty with the contents of a report or with any and all work product.

In preparing a report, Freeman Companies may rely on certain information provided by governmental agencies or personnel as well as information and/or representations provided by other persons, firms, or entities, and on information in the files of governmental agencies made available to Freeman Companies at the time of the site assessment. To the extent that such information, representations, or files may be inaccurate, missing, incomplete or not provided to Freeman Companies, Freeman Companies is not responsible. Although there may be some degree of overlap in the information provided by these various sources, Freeman Companies does not assume responsibility for independently verifying the accuracy, authenticity, or completeness of any and all information reviewed by or received from others during the course of the site assessment.

Unless otherwise noted, a survey (which includes observations, sampling and analysis) for the presence of polychlorinated biphenyls (PCBs) and asbestos contained in building materials, mold and/or lead-based paint is not conducted as part of an assessment.

Unless otherwise noted, an evaluation (which includes observation, sampling and analysis) for Vapor Intrusion Conditions (VIC) is not conducted as part of an assessment.

No attempt is made to assess the compliance status of any past or present Owner or Operator of a site with any Federal, state, or local laws or regulations, unless specifically indicated otherwise in writing.

Findings, observations, and conclusions presented in this report, including but not limited to the extent of any subsurface explorations or other tests performed by Freeman Companies, are limited by the scope of services outlined in the Agreement, which may establish schedule and/or budgetary constraints for an environmental assessment or phase thereof. Furthermore, while it is anticipated that each assessment will be performed in accordance with generally accepted professional practices and applicable standards (such as ASTM, etc.) and then applicable state and Federal regulations, as may be further described in the report and/or the Agreement, Freeman Companies does not assume responsibility for

the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of its services.

The assessment presented in each report is based solely upon information obtained or received prior to issuance of the report, including a limited number of subsurface explorations (if performed) made on the dates indicated. If additional environmental or other relevant information is developed at a later date, Client agrees to bring such information to the attention of Freeman Companies promptly. Upon evaluation of such information, Freeman Companies reserves the right to recommend modification of this report and its conclusions.

If groundwater samples are collected for analysis or water level measurements are made in monitoring wells, such results/observations are provided as representative of conditions at the times stated in this report. Fluctuations in groundwater elevation may occur due to variations in precipitation cycle and multiple other factors, which may influence the concentrations of constituents present in the groundwater. Should additional data become available in the future, such data should be provided to Freeman Companies for review and Freeman Companies reserves the right to recommend modification of this report and its conclusions.

Except as may be noted specifically within the text of this report, no laboratory testing is performed as part of a site assessment. If such analyses have been conducted by an outside laboratory, Freeman Companies may rely upon the analyses or data provided, and makes no representation that an independent evaluation of the reliability of such testing has been conducted, with the exception of reviewing standard quality assurance/quality control data that may have been provided with the test results.

Although chemical analyses may be performed for specific parameters at specific locations during the course of a site assessment, as described in a report, the results are not definitive regarding the presence of the parameters at other concentrations or the absence of the parameters at other locations on the site. Additional chemical constituents not included in the list of analyzed parameters for a study may be present in soil and/or ground water at a site, and Freeman Companies assumes no responsibility for chemical constituents or parameters not analyzed.

If included, any database search is conducted under the Notice of Disclaimer/Waiver of Liability included in the database search report.

7.2 Reliance

The Environmental Professional hereby states that this Phase I ESA Update has been conducted in accordance ASTM E 1527-13, or the most current ASTM standard, and the EPA Rules. This Phase I ESA Update has been prepared for the sole use of JHM Group. This Phase I ESA Update should not be relied upon by other parties without the express written consent of Freeman Companies and JHM Group.

7.3 Environmental Professional Signature

The author of this report declares that, to the best of our professional knowledge and belief, I meet the definition of Environmental Professional as defined in §312.10 of 40 CFR 312. The author of this report has the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. The author has developed and performed the all appropriate inquiries in the conformance with the standards and practices set for the in 40 CFR 312.

Charles D. Brink, LEP
Manager of Environmental Services

APPENDIX A

FUSS AND O'NEILL PHASE I ENVIRONMENTAL SITE ASSESSMENT REPORT – SEPTEMBER 2013

Phase I Environmental Site Assessment

Marina Village

400 Iranistan Avenue
Bridgeport, CT

September 2013

FUSS & O'NEILL

56 Quarry Road
Trumbull, Connecticut 06611

20121111.A12

FUSS & O'NEILL

September 24, 2013

Ms. Sharon Lee, Associate AIA, PM
Planning Development & Modernization
Housing Authority of the City of Bridgeport
150 Highland Avenue
Bridgeport, CT 06604

RE: Phase I Environmental Site Assessment
Marina Village
400 Iranistan Avenue, Bridgeport, CT

Dear Ms. Lee:

We are pleased to submit the enclosed report of the Phase I Environmental Site Assessment (Phase I ESA) for the above-referenced site. The assessment was conducted in conformance with Standard Practice E 1527-05 for Environmental Site Assessments published by the American Society for Testing and Materials.

ASTM 1527-05 requires that certain elements of a Phase I ESA be updated if the data for the report are more than six months old. Therefore, if this report is to be relied on after March 24, 2014, we recommend you contact us to discuss options for such an update.

We have identified nine recognized environmental conditions associated with the site. This is discussed in the conclusion of our report (*Section 8.0*).

In accordance with the requirements of the ASTM 1527-05 Standard, we declare that to the best of our professional knowledge and belief, we meet the definition of an environmental professional as defined in §312.10 of 40 CFR 312 and we have the specific qualifications based on education, training, and experience to assess the nature, history, and setting of the subject property. We have developed and performed all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Thank you for the opportunity to conduct this work. Please contact us if we can be of further assistance.

Sincerely,

Richard S. Kulzer, LEP
Project Manager

Andrew R. Zlotnick, LEP, LEEP AP
Senior Vice President

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FUSS & O'NEILL

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FUSS & O'NEILL

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400 Iranistan Avenue

1 Introduction

Fuss & O'Neill, Inc. has been retained by the Housing Authority of the City of Bridgeport (HACB) to conduct a Phase I Environmental Site Assessment (Phase I ESA) of the Marina Village located at 400 Iranistan Avenue in Bridgeport, Connecticut (the "Site"). Marina Village is a thirty-nine building, 389 unit apartment complex owned by HACB. We understand that HACB requested this Phase I ESA in anticipation of obtaining financing from Housing and Urban Development (HUD) for demolition of the buildings.

1.1 Objective

The objective of this Phase I ESA was to identify recognized environmental conditions (RECs) present at the Site. As defined by Standard Practice for Environmental Site Assessments E 1527-05 developed by the American Society for Testing and Materials (ASTM, 2005), REC means:

> *…the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include de minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies.*

In portions of this report we refer to the Connecticut Department of Energy and Environmental Protection (DEEP). The Connecticut Department of Environmental Protection (CTDEP) was re-named the Department of Energy and Environmental Protection (DEEP) in July 2011. For convenience and consistency, we refer to the agency as the DEEP throughout this report, including the timeframe prior to July 2011.

1.2 Scope of Services

Our Phase I ESA was performed in conformance with Standard Practice E 1527-05 for Environmental Site Assessments by the American Society for Testing and Materials (ASTM, 2005).

Unless otherwise stated in this report, assessments for asbestos-containing materials, PCB-containing building materials, lead-based paint or plumbing materials, radon gas, and mold were not conducted as part of this Phase I ESA. Furthermore, we did not investigate the potential for the Site to contain wetlands, endangered species, ecological resources or historic/cultural resources. Additionally, environmental compliance or permitting issues were not considered during this investigation.

It is our understanding that this work is not being conducted under a United States Environmental Protection Agency (USEPA) Brownfield Assessment and Characterization Program grant awarded under CERCLA 9604(k)(2)(b); therefore, our investigation did not include an assessment of controlled

substances. Refer to *Appendix A* for the scope of work and restrictions of this ESA and to *Section 10.0* of this report for limitations on this work product.

2 Site Overview

2.1 Site Information

2.1.1 Property Location, Size of Parcel, and Site Plan

The Site, Marina Village, is located on the east side of Iranistan Avenue in a residential/commercial zone of Bridgeport, Connecticut (Fairfield County). A portion of a United States Geological Survey (USGS) topographic map showing the Site location is provided as *Figure 1* (USGS, 1970).

According to City of Bridgeport records, the Site is located on an 11.80-acre irregular-shaped parcel owned by HACB. The site is bound by South Avenue to the northwest, Railroad Avenue to the north, Park Avenue to the northeast, Johnson Street to the southeast, Ridge Avenue to the south, and Iranistan Avenue to the west. The site is bisected by Columbia Street which runs through the site. The Site includes 39 buildings constructed in the late 1940s to 1950. Seven of the buildings are currently vacant. A Site plan is provided as *Figure 2*. A copy of the online property description card available through the Bridgeport Assessor's Office website is attached in *Appendix B*. A description of the Site developed during the site inspection is presented in *Section 6.2*.

2.1.2 Utilities

According to the facility manager, Marina Village is served by municipal sewer and water. The City of Bridgeport Public Works Department, Building Department, and Aquarion, the public water supply company for the City of Bridgeport, did not have any information regarding the 400 Iranistan Avenue parcel hook-up dates. The public works department noted the buildings were built in the late 1940s to 1950 and the Water Pollution Control Authority for the City of Bridgeport was not established until 1989. Sanborn mapping indicates that municipal water was available in the vicinity of the site by 1889.

The Site's buildings were once heated by steam from the central boiler room of the Community Building, located on the northern side of Marina Village along South Avenue. According to the facility manager, the buildings made a switch from steam heat to natural gas. Although the exact date of the switch over to natural gas was not known by the site contact and not identified in our site research, we believe the switch over occurred in the late 1990s coinciding with removal of the oil supply tanks in 1999 which were formally located in the basement of the Community Building.

Electric, cable, and telephone services enter the Site via overhead wires.

2.1.3 Adjoining Land Use

Based on observations made during the site inspection and available mapping, properties adjoining the Site include the following:

Address	Description	Direction from Site
800 South Avenue	Industrial	NW
816 South Avenue	Warehouse	NW
824 South Avenue	Parking Lot	NW
840 South Avenue	Auto Repair	NW
478 Iranistan Avenue	Gas Station	NW
255 Iranistan Avenue #445	Residential	SW
310 Iranistan Avenue #320	Retail Store	S
139 Ridge Avenue	Vacant	S
123 Ridge Avenue #125	Playground	S
204 Walnut Street	Commercial	SE
99 Ridge Avenue #103	Vacant	SE
95 Ridge Avenue #97	Vacant	SE
91 Ridge Avenue #93	Vacant	SE
81 Ridge Avenue	Residential	SE
75 Ridge Avenue #77	Vacant	SE
67 Ridge Avenue #69	Vacant	SE
61 Ridge Avenue #63	Residential	SE
45 Ridge Avenue #51	Residential	SE
29 Ridge Avenue #35	Residential	SE
131 Columbia Street #137	Vacant	SE
160 Columbia Street	Commercial	SE
119 Johnson Street #123	Vacant	SE
109 Johnson Street #111	Residential	SE
105 Johnson Street #107	Residential	SE
99 Johnson Street #101	Vacant	SE
91 Johnson Street	Residential	SE
83 Johnson Street	Residential	SE
77 Johnson Street	Vacant	SE
67 Johnson Street	Residential	SE
59 Johnson Street	Residential	SE
49 Johnson Street #51	Residential	SE
41 Johnson Street #43	Vacant	SE
33 Johnson Street #35	Vacant	SE
25 Johnson Street	Church Property	SE

475 Park Avenue	Car Wash	SE
500 Park Avenue	Retail Stores	E
513 Park Avenue	Retail/Residential	N (Across Railroad Tracks)
561 Park Avenue	Retail/Residential	N (Across Railroad Tracks)
569 Park Avenue #571	Vacant	N (Across Railroad Tracks)

2.2 Environmental Setting

2.2.1 Physical Setting

Topography and Geology

The topography of the Site is flat (USGS, 1970). The regional topography generally slopes down gradually to the south, towards the Long Island Sound.

The University of Connecticut's Connecticut Environmental Conditions Online (CTECO) Advanced Map Viewer describes surficial material at the Site as sands overlying fines. Bedrock is not mapped underneath the Site.

Hydrology and Hydrogeology

The quality of groundwater beneath the Site is classified by the Connecticut Department of Energy and Environmental Protection as GB (DEEP, 2011). Such groundwater is presumed not to be suitable for human consumption without treatment and is used for industrial process water and cooling waters (DEEP, 2011).

The direction of groundwater flow within the surficial geological unit is influenced by a number of factors, including the physical characteristics of the geological unit (such as particle size), the local topography, the presence of surface water bodies, the depth to bedrock, and the type of aquifer. For an unconsolidated, unconfined aquifer, groundwater generally flows in the direction of the greatest topographic gradient. Based on USGS mapping and field observations of the local topography and surface water hydrology, the inferred groundwater flow direction is to the west. Depth to groundwater is estimated to be 10 feet.

The nearest surface water body, Cedar Creek, is located approximately 920 feet west of the Site (USGS, 1970). Cedar Creek is a tidally influenced river that discharges into the Long Island Sound and is classified by the State of Connecticut as SB (DEEP, 2011). Designated uses of such coastal and marine surface waters are for marine fish, shellfish and wildlife habitat, shellfish harvesting for transfer to approved areas for purification prior to human consumption, recreation, industrial and other legitimate uses including navigation (DEEP, 2011).

2.2.2 Location of Public Water Supply Sources

The DEEP's 2011 Connecticut Environmental Conditions Online (DEEP, 2011) and the Atlas of Public Water Supply Sources and Drainage Basins of Connecticut (CTDEP, 1982) show no public water-supply wells or aquifer protection areas within a one-half mile radius of the Site.

2.3 Previous Environmental Investigations

Key site manager, Sharon Lee of the HACB, is unaware of any previous environmental investigations having been performed on the Site.

3 Site History

The following sources were used to develop the history of the Site and, to the extent required by ASTM Practice E 1527-05, the nearby sites:

- City street directories (available at the Connecticut State Library) reviewed at approximately five-year intervals dating back to the year 1960
- Sanborn Fire Insurance Maps (available at the Connecticut State Library) for the years 1884, 1889, 1898, 1913, 1939, 1950 and 1972
- Aerial photographs (available at the State Archives of the Connecticut State Library) for the years 1975 and 1980
- Aerial photographs (obtained electronically from the State Archives of the Connecticut State Library) for the years 1934 and 1965
- Aerial photographs (obtained electronically from the University of Connecticut Map and Geographic Information Center) for the years 1951, 1970, 1986, 1990 and 1995
- Aerial photographs (obtained electronically from the DEEP's 2011 Connecticut Environmental Conditions Online (DEEP, 2011) for the years 2004 and 2010
- Historical USGS Topographic Maps for the years 1893 and 1951, available on-line from the Documents Department and Data Center of the University of New Hampshire (http://docs.unh.edu/nhtopos/nhtopos.htm)
- Sharon Lee, Associate AIA, PM, for the Planning Development & Modernization division at the Housing Authority of the City of Bridgeport

- Files and personnel at the City of Bridgeport offices of the City Clerk, Building Department, Engineering Department, Planning and Zoning Department, Health Department, and Fire Marshal.

The past uses of the Site and nearby properties based on the sources above are summarized below.

Site
The Marina Village was constructed during the late 1940s and is shown in its current location on the 1950 Sanborn fire insurance map. Prior to the 1930s, the Site was occupied by the Bridgeport Malleable Iron Works (later known as the Eastern Malleable Iron Company), a metal foundry that manufactured malleable and grey iron castings, Hotchkiss Sons' Manufacturers Curry Combs & Company and by a number of homes. The 1884 Sanborn map shows the foundry buildings located predominantly along both the northern and southern sides of South Avenue. The foundry used coal to fuel their operations, which included operations such as annealing, trimming, core making, tumbling, and molding. Hotchkiss Sons Manufacturers Curry Combs & Company was located southwest of the Bridgeport Malleable Iron Works along South Avenue. The Hotchkiss Sons Manufacturers Curry Combs & Company property included a manufacturing building, a wood shop, coal storage, and lumber storage. Operations included scouring, tempering, and japanning. A number of homes were located along the north side of Johnson Street, the west side of Columbia Street, the west side of Park Avenue, and the south side of Railroad Avenue at the east end of the site.

The 1889 Sanborn map shows that several residential dwellings were located on the Site along the north side of Johnson Street and near the corner of Railroad Avenue and Park Avenue. The Hotchkiss Sons Manufacturers and Curry Combs & Company site was vacant and the Bridgeport Malleable Iron Works had expanded its operations to the east.

The 1898 Sanborn Map shows the former Hotchkiss Sons Manufacturers Curry Combs & Company property was occupied by Edward S. Hotchkiss Hardware Manufacturing. Operations at the property included stamping, polishing, a machine shop, wood working, and japanning.

The 1913 Sanborn Map shows the Edward S. Hotchkiss Hardware Manufacturing buildings were no longer present at the Site and the Bridgeport Malleable Iron Works became the Eastern Malleable Iron Company. The Eastern Malleable Iron Company had expanded to the south toward Walnut Street adding additional foundry, core making, and sand bins. According to the 1913 Sanborn map, core making (or molding) buildings, foundry buildings, annealing, trimming, pickling, brick and old casting storage, carpentry shop, grinding, rolling, furnaces, shipping and storage, offices, a locomotive house, and storage sheds were present at the Site. The 1913 Sanborn map shows that the area between Walnut Street and Iranistan Avenue and between Ridge Avenue and South Avenue was vacant. The 1913 Sanborn map also shows that homes and stores were located along the north side of Ridge Avenue.

By 1939, the Sanborn maps show that the majority of the Eastern Malleable Iron Company had been razed and was no longer present at the Site or surrounding areas. One of the former annealing buildings located at the eastern end of the Site remained and was being utilized by The Reliable Steel Drum Corporation for reconditioning steel drums. A number of homes, apartments, and stores remained along Ridge Avenue, Columbia Street, Johnson Street, Railroad Avenue, and Park Avenue. As with any

site located in a heavily urbanized area where former structures have been razed, the potential exists for the presence of urban fill containing ash, coal, and asphalt fragments.

The 1950 Sanborn map shows the Marina Village was complete in its current layout.

Nearby Properties
Properties located to the south and east along Ridge Avenue, Columbia Street, and Johnson Street have historically been used for residential and retail store uses going back to the 1890s. Properties to the north were historically part of the Bridgeport Malleable Iron Works foundry going back to the 1880s. The Connecticut Clasp Company which manufactured metal corset parts was located to the east of the Site across Park Avenue from the early 1900s until after 1950. By 1972 the Connecticut Clasp Company buildings were razed and a retail store was located at the Site. The Bridgeport Deoxidized Bronze & Metal Company was historically located to the west of the site at the west corner of Iranistan Avenue and South Avenue. By 1950, the property along the northern side of South Avenue was occupied by a motor freight station. Outdoor parking areas are visible from aerial photographs and a gas tank was located outside the southeastern corner of the building. From approximately 1960 to 1980, this property was occupied by a beer distributor warehouse. The property located at 816 South Avenue, located northeast of the Site, has been occupied by a scrap metal yard since the 1960s. The property located at 840 South Avenue/478 Iranistan Avenue, located northwest of the Site has been occupied by Nunes Auto Repair, an auto body shop and gasoline station, since the 1960s.

4 Federal, State, and Local File Review

Files of Federal, State and local agencies were reviewed for environmentally-related issues pertinent to the Site and nearby parcels, such as permits, inspection reports, enforcement history or documented releases of hazardous materials. The sources of information listed in the following table were researched to identify properties of concern within distances of the Site specified by ASTM Practice E 1527-05.

Information Source*	Search Distance
Federal Files	
National Priorities List (NPL)	1 mile
Delisted NPL Sites	0.5 mile
Resource Conservation and Recovery Act (RCRA) CORRACTS list (RCRA Site Subject to Corrective Action)	1 mile
Resource Conservation and Recovery Act (RCRA) Treatment, Storage or Disposal Facility (TSDF) List	0.5 mile
Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) List, including No Further Remedial Action Planned (NFRAP) sites	0.5 mile
RCRA Generators List	property and adjoining
RCRA No Longer Regulated (NLR) List	property and adjoining
Federal Institutional / Engineered Control List	property only

Information Source*	Search Distance
Emergency Response and Notification (ERNS) List	property only
State Files	
Hazardous Waste Site List (State sites equivalent to NPL)	1 mile
Hazardous Waste Site List (State sites equivalent to CERCLIS)	0.5 mile
Landfill and Solid Waste Site	0.5 mile
Leaking Underground Storage Tank (LUST) List	0.5 mile
State Voluntary Clean-up or Brownfield Sites	0.5 mile
Oil & Chemical Spills Database	property and adjoining
Registered Underground Storage Tank (UST) List	property and adjoining
State Institutional / Engineered Control List	property only

*Fuss & O'Neill used Environmental Data Resources, Inc. (EDR), an environmental database search service, to obtain the information referenced in the above table. EDR provides access to publicly available environmental databases maintained by various Federal, State, and local agencies. A copy of the information provided by EDR relative to the Site and nearby properties is included in *Appendix C*. The listed information sources are defined and described in detail in the EDR report.

4.1 Summary of Regulatory Database Information

Site

As reported in the EDR Report in *Appendix C*, one environmental concerns was identified for the Site in the environmental databases searched.

- 733 South Avenue: On December 9, 1999, a LUST was reported at HACB's Marina Village office building. Eighteen inches of #2 fuel oil from an underground tank failure covered the floor of a 400 square-foot room on December 7, 1999. The local fire department, fire marshal, and DEP dispatch was notified. When recorded on December 9, 1999 only four inches of oil remained on the floor. According to the EDR Report, it was unknown where oil was going, how many tanks were buried outside, and of what volume they were. Groundwater and surface water was affected. The status for this event is closed. Upon completion of the site walk, we believe this was more likely a release from the above ground storage tank in the basement, not underground storage tanks.

Nearby Properties

As reported in the EDR Report in *Appendix C*, several properties were identified in the environmental databases within the minimum search radii required by ASTM Practice 1527-05. Based on distance from the Site and the local hydrogeology, these parcels are not anticipated to have a negative effect on the subject property, with the following exceptions:

- 478 Iranistan Avenue: Nunes Auto Repair Inc. is a general automotive repair shop and gasoline station located adjacent to the site on the opposite side of South Avenue. It is currently in use and includes three underground storage tanks installed in 2009. Two 3,000 gallon tanks and one 8,000 gallon tank store gasoline. Three underground storage tanks installed in 1992, two 8,000 and one 3,000 gallon, have been closed and removed.

- 800 South Avenue: A waste oil spill was reported on September 13, 1996. Current status is closed. The City of Bridgeport WPCA was listed as the discharger.

- 750 South Avenue: According to an emergency incident field report by John Aceto (CTDEEP), the Department of Transportation (DOT) discovered a 550-gallon leaking underground storage tank (LUST) during an I-95 highway project on April 23, 1997. The DOT wanted to remove the tank and address the impacted soils at a later date. Soil samples collected indicated high levels of total petroleum hydrocarbon (TPH) in surrounding soils. The LUST was removed, #2 fuel oil originally stored within the tank was pumped out and contained. Contaminated soil was removed and the status is closed.

- 720 South Avenue: The DOT closed and removed a 1,000-gallon underground storage tank located at the Former Westek Corporation. The former UST stored gasoline/motor fuel. On March 1, 1997 the tank was closed. Removal occurred March 26, 1997. The status for this event is closed. A LUST with an incident date of March 26, 1997 was also recorded for this address, but the EDR report does not include any release information other than the material was motor fuel and the status is completed.

Due to the inferred groundwater flow direction and/or the proximity of these properties to the Site, the potential exists for releases that occur at these sites to have an adverse impact on groundwater quality at the Site. However, the DEEP's policy on upgradient sources of contamination is that a downgradient property owner is not responsible for remediating groundwater contamination flowing onto his or her property from another site, as long as the contamination is present solely as a result of the off-site sources (Policy on Upgradient Contamination, Michael Harder, Director of Permitting, Enforcement, and Remediation Division, August 28, 1997).

4.2 State File Review

As part of our records review, correspondence files for the following were requested on November 13, 2012 from the DEEP Records Center and PCB Programs Department:

- 400 Iranistan Avenue
- Marina Village
- Miscellaneous Town Files

Files requested include the following:

- Property Transfer Program filings
- UST files
- Leaking UST files

- P-5 Inspection Reports
- Water Industrial/Remediation files
- Pre-1990 Spill files
- PCB files
- Hazardous Waste/RCRA files
- Environmental Land Use Restrictions

No correspondence files for the Site were available at the DEEP Records Center or the PCB Programs Department.

In addition, the DEEP Hazardous Waste Manifests Database, which summarizes manifests submitted from 1984 through 2007, was reviewed. No hazardous waste manifests were listed for the Site.

4.3 Wastewater and Leachate Discharge Sources

The Connecticut Leachate and Wastewater Discharge Sources Map (CTDEP, 1997) was reviewed to determine if any historical discharges to the ground in the area of the Site have been reported. The historical discharges listed below are located within a one half-mile radius of the Site.

Facility-Discharge	Distance / Direction from Site
Industrial wastewater	2,400' W
Miscellaneous	3,000' W
Cooling water	3,000' W
Cooling water	3,000' W
Oil/chemical spill	2,600' N
Oil/chemical spill	2,600' N
Oil/chemical spill	2,300' E
Leaking Underground Storage Tank	1,800' E

Due to distance from the Site and/or the inferred groundwater flow direction, none of these discharges are inferred to have a significant potential to adversely impact the Site.

4.4 Local File Review

The City of Bridgeport Assessor's office provided a record of ownership of the Site. Note that this review does not constitute a full title search.

According to the Tax Assessor and City Clerk, the Housing Authority of the City of Bridgeport has been the owner of the 400 Iranistan Avenue parcel since 1963. No ownership information dating further back than 1963 was available. The site plan, *Figure 2*, with a revision date of August 23, 1940 and titled, *South*

End Housing Project for the Housing Authority of the City of Bridgeport, Conn. under Loan Contract with the United States Housing Authority provides evidence of HACB ownership prior to 1963.

Files and personnel at the Bridgeport offices of the City Clerk, Tax Assessor, Building Department, Planning and Zoning Department, Health Department, and Fire Marshal were queried regarding environmental concerns at the Site and surrounding sites. No environmental concerns were identified for the Site.

As part of this assessment, staff members at the Office of the Fire Marshal were queried for any information pertinent to the Site. They stated they have no knowledge of releases or threatened releases of hazardous substance at the Site.

5 User-Provided Information

ASTM Practice 1527-05 describes certain tasks to be performed by the user of this assessment that will help to identify RECs at the parcel if they exist. ASTM Practice 1527-05 defines the user as "the party seeking to use Practice E 1527 to complete an environmental site assessment of the property." Users can include a potential purchaser or tenant of the property, a lender, a property manager, or a property owner.

As part of our agreement to conduct this work, we provided Sharon Lee, Associate AIA, PM for the Planning Development & Modernization division of HACB, with a User Questionnaire. A copy of this questionnaire and responses is provided in *Appendix E*.

The responses to this questionnaire were used to address the items in the subsections below.

5.1 Record of Environmental Liens or Activity and Use Limitations

Chain of title and title restriction records filed under federal, tribal, state or local law contain records of environmental liens or activity and use limitations (AULs), such as environmental land use restrictions in the State of Connecticut.

Ms. Lee reported, on behalf of HACB, that they are unaware of a chain of title and title restrictions records review having been performed for the Site. In addition, Ms. Lee reported that they have no actual knowledge of an environmental lien or ELURs recorded against the property.

Fuss & O'Neill reviewed the Connecticut database of recorded environmental land use restrictions on file at the DEEP. No environmental land use restrictions were identified for the Site.

5.2 Specialized Knowledge or Experience of the User

Ms. Lee, on behalf of HACB**,** reported that they have no specialized knowledge with respect to the Site or activities conducted at the Site.

5.3 Commonly Known or Reasonably Ascertainable Knowledge

Ms. Lee, on behalf of the HACB, reported that they are not aware of any commonly known or reasonably ascertainable knowledge within the local community that could assist the environmental professional with the identification of RECs.

5.4 Property Valuation, Reduction for Environmental Issues

Ms. Lee, on behalf of HACB did not provide information pertaining to the valuation of the Site as the Site is not subject to a property transaction. The HACB currently owns the property.

6 Site Reconnaissance and Interviews

6.1 Interviews

Owner/Key Site Manager

This assessment included an interview with the key site contact, Sharon Lee of the HACB. Prior to conducting the interview, Fuss & O'Neill forwarded a Phase I ESA Questionnaire to Ms. Lee. The completed questionnaires are included in *Appendix E*. Information provided by her is presented below and in previous sections of this report.

Ms. Lee of the Housing Authority of the City of Bridgeport, responded with, "No" to the each of the questions including:

> *4. Are there currently or have their previously been any damaged or discarded automotive or industrial batteries, pesticides, paints, or other chemicals in individual containers of greater than 5 gal (19 L) in volume or 50 gal (190 L) in the aggregate, stored on or used at the property or at the facility?*
>
> *5. Are there currently or previously has there been any industrial drums (typically 55 gal (208L)) or sacks of chemicals located on the property or at the facility?*
>
> *7. Are there currently or has there previously been any floor drains, septic systems, dry wells, pits, ponds, or lagoons located on the property in connection with waste treatment or waste disposal?*

12. Does the owner or occupant of the property have any knowledge of any environmental site assessment of the property or facility that indicated the presence of hazardous substances or petroleum products on, or contamination of, the property or recommended further assessment of the property?

6.2 Site Reconnaissance

The site reconnaissance was conducted on September 18, 2013 by Gregory Toothill, PE accompanied by a member of the facility maintenance team. The inspection included the physical observation of the exterior of the entire Site, the interior of the Community/Maintenance building, the interior of several vacant apartments, and the crawlspaces below 31 of the apartment buildings. Photographs taken during the inspection are presented in *Appendix F*.

Site Description

The Site consists of 39 buildings, including 38 apartment buildings and one community/maintenance building with a former heating plant. A playground is located on the Site as well as several parking areas. Refer to *Figure 2* for a site plan.

Building

According to the property card there are 39 building located at the site. Two are 7,028 square-feet, 19 are 7,236 square-feet, ten are 10,476 square-feet, and eight are 11,016 square feet. The buildings were built in 1950 and are constructed of a brick exterior. Twelve of the buildings are constructed with gable roofs with asphalt shingles while the remainder are flat, tar and gravel roofs. The apartment buildings consist of a first floor, a finished upper story, and an unfinished crawlspace below the buildings. A natural gas hot water heater and furnace are located in each unit. Suspect asbestos containing material was used as pipe insulation in many of the basement crawl spaces. An electric box and a natural gas meter hookup with associated piping are attached to each unit.

Seven of the buildings are currently vacant (Building #s 7, 25, 26, 27, 28, 29, and 34).

The Community/Maintenance Building consists of offices and a large community meeting room on the first floor and a maintenance area and a former boiler and fuel oil storage tank area in the basement. The Maintenance Area consisted of a carpentry shop, a storage area, an office, bathrooms, and a break room. Small quantities of paint, PVC cement, motor oil, and other chemicals were stored in the storage areas and the carpentry shop. All stored chemicals appeared to be properly stored in original sealed containers. The former boiler and fuel oil storage tank had been removed. A sump pump was located in the former boiler room.

A maintenance garage is located off the south side of the community building that is used for storage of lawn and maintenance equipment. Minor staining was observed on the concrete floor in the area where the lawn equipment was stored. The concrete floor in the maintenance garage appeared to be in good condition and the stains are believed to be a de minimis condition.

A shed located on the east side of the Community/Maintenance Building was inaccessible at the time of the inspection.

Grounds
The surrounding grounds are flat and landscaped with grass, trees, and sidewalks leading to individual units of the buildings.

6.3 Non-ASTM Scope Considerations

Housing and Urban Development requires a Phase I to include a discussion of available wetland, flood zone, and radon mapping for the Site. The University of Connecticut's CTECO Advanced Map Viewer shows no wetlands for the Site. The FEMA Flood Insurance Rate Map shows that a large portion of the south end of the Site, including all or portions of Buildings 5-14, 18-23, and 26-31 are located within the 100-year flood plain. Radon mapping is available online through CTDEEP. The indoor radon potential rating for the Site is low to medium.

7 Connecticut Transfer Law Status

The State of Connecticut Property Transfer Law, described in Sections 22a-134a through 22a-134e of the Connecticut General Statutes, requires the disclosure of environmental conditions when certain real properties and/or businesses are transferred. The law applies only to those properties that are deemed to be "establishments" as defined under the law. As defined by the Transfer Act (Sections 22a-134a et seq. of the Connecticut General Statutes, as amended), an establishment is:

> *…any real property at which or any business operation from which (A) on or after November 19, 1980, there was generated, except as the result of remediation of polluted soil, groundwater or sediment, more than one hundred kilograms of hazardous waste in any one month, (B) hazardous waste generated at a different location by another person or municipality was recycled, reclaimed, reused, stored, handled, treated, transported or disposed of, (C) the process of dry cleaning was conducted on or after May 1, 1967, (D) furniture stripping was conducted on or after May 1, 1967, or (E) a vehicle body repair facility is or was located on or after May 1, 1967.*

If the Site is determined to be an establishment, DEEP reporting and involvement may be required in order to transfer the property, and DEEP will require identification, delineation, and remediation of all environmental concerns in accordance with Connecticut's Remediation Standard Regulations.

Activities that would qualify the facility as an "establishment" have not been identified. However, should a determination as to the regulatory status of the Site with regard to the Connecticut Transfer Law be desired, legal counsel should be consulted.

8 Data Gaps, Findings and Conclusions

8.1 Data Gaps

Standard Practice 1527-05 requires the identification and evaluation of data gaps or data failures, which are defined as a lack of or inability to obtain information required by the practice despite good faith

efforts by the environmental professional to gather such information. The following data gaps were identified during this investigation:

- It was not possible to identify past uses of the Site back to its first known development. Past uses were identified back to 1889, at which time the parcel was used for industrial purposes. The potential for the presence of RECs resulting from activities conducted prior to 1889 is mitigated by the less common use of hazardous substances or petroleum products in the United States prior to the mid-1800s.

8.2 Findings and Conclusions

Fuss & O'Neill, Inc. prepared this Phase I ESA report in general conformance with the scope and limitations of ASTM Practice E 1527-05. Any exceptions to, or deletions from, this practice are described in *Appendix A* of this report.

This assessment has revealed several RECs in connection with the subject property that warrants additional investigation or action at this time.

REC-1: Historic Foundry Operations
The Bridgeport Malleable Iron Works / Eastern Malleable Iron Company was present at the Site from prior to 1884 to the mid-1930s. Releases of petroleum products or hazardous materials resulting from the historic metal foundry and manufacturing operations and/or deposition of coal ash or other foundry by-products used as fill at the Site may have occurred.

REC-2: Historic Metal Pickling Operations
Historic metal pickling operations associated with the former foundry operations likely generated waste sludge that would currently be classified as hazardous. A release of release of hazardous materials resulting from the historic pickling operations at the Site may have occurred.

REC-3: Historic Manufacturing Operations
Hotchkiss Sons Manufacturers Curry Combs & Company / Edward S. Hotchkiss Hardware Manufacturing were present at the Site from prior to 1884 and were gone by 1913. Releases of petroleum or hazardous materials from the manufacturing operations may have occurred.

REC-4: Historic Japanning Operations
Japanning operations associated with the Hotchkiss Sons Manufacturers Curry Combs & Company / Edward S. Hotchkiss Hardware Manufacturing have the potential to generate a release of petroleum based materials at the Site.

REC-5: Historic Steel Drum Reconditioning
Following the closure of the Bridgeport Malleable Iron Works / Eastern Malleable Iron Company one of the former annealing buildings at the east end of the foundry was occupied by the Reliable Steel Drum Corporation for reconditioning steel drums and the area to the east of the former annealing building was used for the storage of steel drums. Releases of petroleum products or hazardous materials resulting from the historic steel drum reconditioning operations may have occurred.

REC-6: Historic Coal Storage
Two historic coal storage areas were identified on the site. A coal storage shed was located along Railroad Avenue on the Bridgeport malleable Iron Works property and a coal bin associated with the Hotchkiss Sons Manufacturers Curry Combs & Company was located behind their manufacturing facility.

REC-7: Historic Urban Fill
As with any site located in heavily urbanized area where former structures have been razed or with multiple generations of development, the potential for the presence of urban fill containing ash, coal, asphalt fragments, or manufacturing by-products exists.

REC-8: #2 Fuel Oil Release
On December 9, 1999, release of #2 fuel was reported to DEEP which occurred within the basement of the HACB's Marina Village office building (733 South Ave). The spill report indicated that eighteen inches of #2 fuel oil was released to the basement the floor of a 400 square-foot room on December 7, 1999. The release was estimated at 4,500 gallons. When the spill was reported on December 9, 1999 only four inches of oil remained on the floor. The status of the spill report is closed; however, no confirmatory samples were available for review. There is a potential that the release has impacted soil and groundwater at the Site.

REC-9: USTs
Approximately 30 former homes, storefronts, and apartment buildings were previously located on the Site along Ridge Avenue, Columbia Street, Johnson Street, Park Avenue and Railroad Avenue. There is potential for fuel oil USTs associated with these structures to have been abandoned in place.

Potential off-site concerns:

- Petroleum releases were identified in areas nearby and inferred to be upgradient of the Site. These releases were generally small and appear to have been adequately addressed. Therefore, we believe that little risk of impact from these releases to groundwater at the Site exists, and no additional action is recommended.

Fuss & O'Neill has followed the guidelines described in ASTM E1527-05 to identify the RECs at the Site in a manner consistent with standard practice in the industry. However, as indicated in the ASTM standard, "No environmental site assessment can wholly eliminate uncertainty regarding the potential for RECs in connection with a property. Performance of this practice is intended to reduce, but not eliminate, uncertainty regarding the potential for RECs in connection with a property, and the practice recognizes reasonable limits of time and cost."

9 References

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Vision Government Solutions, Inc., 2011, Assessor's Online Database for Bridgeport, CT. Retrieved online from http://data.visionappraisal.com/BridgeportCT/. Accessed on November 16, 2012.

10 Limitations of Work Product

This document was prepared for the sole use of the Housing Authority of the City of Bridgeport, the only intended beneficiaries of our work. Those who may use or rely upon the report and the services (hereafter "work product") performed by Fuss & O'Neill, Inc. and/or its subsidiaries or independent professional associates, subconsultants and subcontractors (collectively the "Consultant") expressly accept the work product upon the following specific conditions.

1. Consultant represents that it prepared the work product in accordance with the professional and industry standards prevailing at the time such services were rendered.

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3. The observations described and upon which the work product was based were made under the conditions stated therein. Any conclusions presented in the work product were based solely upon the services described therein, and not on scientific or engineering tasks or procedures beyond the scope of described services.

4. In preparing its work product, Consultant may have relied on certain information provided by state and local officials and information and representations made by other parties referenced therein, and on information contained in the files of state and/or local agencies made available at the time of the project. To the extent that such files which may affect the conclusions of the work product are missing, incomplete, inaccurate or not provided, Consultant is not responsible. Although there may have been some degree of overlap in the information provided by these various sources, Consultant did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this project. Consultant assumes no responsibility or liability to discover or determine any defects in such information which could result in failure to identify contamination or other defect in, at or near the site. Unless specifically stated in the work product, Consultant assumes no responsibility or liability for the accuracy of drawings and reports obtained, received or reviewed.

5. If the purpose of this project was to assess the physical characteristics of the subject site with respect to the presence in the environment of hazardous substances, waste or petroleum and chemical products and wastes as defined in the work product, unless otherwise noted, no specific attempt was made to check the compliance of present or past owners or operators of the subject site with Federal, state, or local laws and regulations, environmental or otherwise.

6. If water level readings have been made, these observations were made at the times and under the conditions stated in the report. However, it must be noted that fluctuations in water levels may occur due to variations in rainfall, passage of time and other factors and such fluctuations may affect the conclusions and recommendations presented herein.

7. Except as noted in the work product, no quantitative laboratory testing was performed as part of the project. Where such analyses have been conducted by an outside laboratory, Consultant has relied upon the data provided, and unless otherwise described in the work product has not conducted an independent evaluation of the reliability of these tests.

8. If the conclusions and recommendations contained in the work product are based, in part, upon various types of chemical data, then the conclusions and recommendations are contingent upon the validity of such data. These data (if obtained) have been reviewed and interpretations made by Consultant. If indicated in the work product, some of these data may be preliminary or screening-level data and should be confirmed with quantitative analyses if more specific information is necessary. Moreover, it should be noted that variations in the types and concentrations of contaminants and variations in their flow paths may occur due to seasonal water table fluctuations, past disposal practices, the passage of time and other factors.

9. Chemical analyses may have been performed for specific parameters during the course of this project, as described in the work product. However, it should be noted that additional chemical constituents not included in the analyses conducted for the project may be present in soil, groundwater, surface water, sediments or building materials at the subject site.

10. Ownership and property interests of all documents, including reports, electronic media, drawings and specifications, prepared or furnished by Consultant pursuant to this project are subject to the terms and conditions specified in the contract between the Consultant and Client, whether or not the project is completed.

11. Unless otherwise specifically noted in the work product or a requirement of the contract between the Consultant and Client, any reuse, modification or disbursement of documents to third parties will be at the sole risk of the third party and without liability or legal exposure to Consultant.

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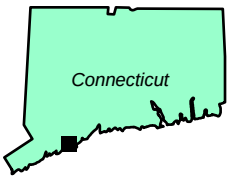
13. Any use of or reliance on the work product shall constitute acceptance of the terms hereof.

Figures

MAP REFERENCE:
THIS MAP WAS PREPARED FROM THE FOLLOWING
7.5 MINUTE SERIES TOPOGRAPHIC MAP:
BRIDGEPORT, CONN. 1970 REVISED 1984



Quadrangle Location

0 1000 2000
GRAPHIC SCALE

SCALE: 1"=2000'

www.FandO.com
FUSS & O'NEILL
56 QUARRY ROAD TRUMBULL, CT 06611 860.646.2469

PHASE I ESA

SITE LOCATION MAP

400 IRANASTAN AVENUE – MARINA VILLAGE

BRIDGEPORT CONNECTICUT

PROJ. No: 20121111.A12
DATE: SEPTEMBER 2013

FIGURE 1

NOTES:

BASE MAP OBTAINED AT HTTP://POI.PICTOMETRY.COM LOCATION OF ANNOTATED FEATURES ARE APPROXIMATE AND BASED ON FIELD OBSERVATIONS, AERIAL PHOTOGRAPHS, AND SANBORN MAPS.

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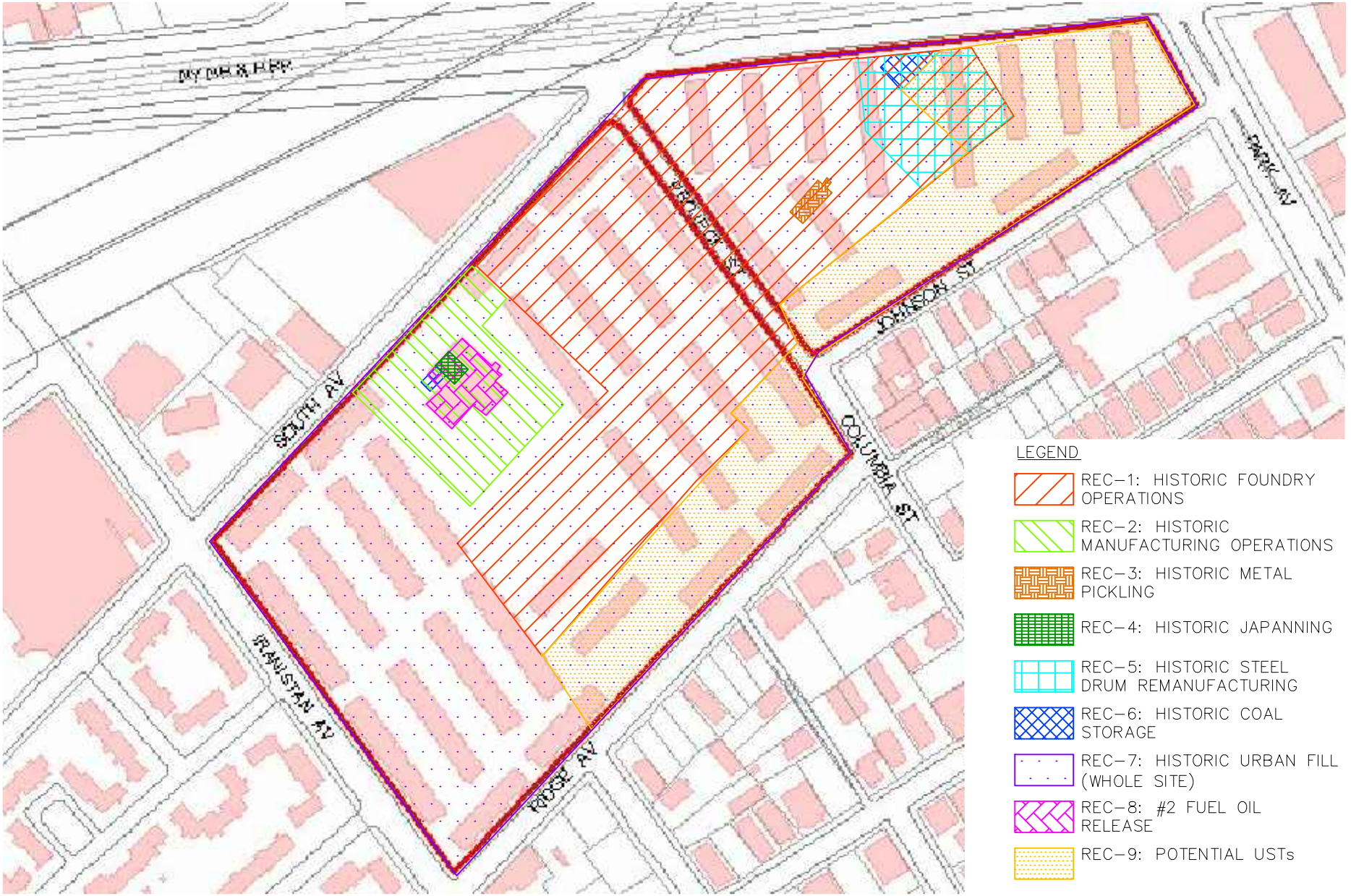
SITE PLAN
MARINA VILLAGE

400 IRANISTAN AVENUE **BRIDGEPORT, CT**

PROJ NO. 20121111.A12 **DATED: AUGUST 2013** **SCALE = GRAPHIC**



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SCALE:	
HORZ.: 1" = 200'	
VERT.:	
DATUM:	
HORZ.:	
VERT.:	

0 100 200
GRAPHIC SCALE

FUSS & O'NEILL
56 QUARRY ROAD
TRUMBULL, CONNECTICUT 06611
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BRIDGEPORT HOUSING AUTHORITY

RECOGNIZED ENVIRONMENTAL CONDITIONS PLAN

MARINA VILLAGE
400 IRANISTAN AVENUE

BRIDGEPORT CONNECTICUT

PROJ. No.: 20121111.A12
DATE: SEPTEMBER 2013

FIG. 3

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Appendix A

Scope of Work and Restrictions

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All Appropriate Inquiry Phase I ESA Scope of Work

Fuss & O'Neill uses Standard Practice E 1527-05 as the general standard for conducting Phase I ESAs. For consistency, this scope of work is generally presented based on the outline of our standard Phase I ESA report. The descriptions of the procedures and sources for obtaining the information for each section follow the section headings. As specified by Standard Practice E 1527-05, the scope of work described below allows for use of professional judgment to determine the extent to which specific sources are reviewed.

Unless otherwise specified, the following items are not considered in the course of completing an ASTM E 1527-05 Phase I ESA:

- Asbestos, Lead (paint/plumbing), Radon, Mold, Fluorescent Light Ballasts
- Wetlands, Ecological Resources, Historical/Cultural Resources
- Regulatory and Health & Safety Compliance
- Endangered species

These items typically present little environmental risk to the grounds of a site; however, these items may be liabilities during property transfer, regulatory audits, construction, renovation, or demolition projects.

1.0 Introduction

The objective of the ESA and the party that this ESA was conducted for are identified in this section.

2.0 Site Overview

2.1 Site Information

2.1.1 Property Location, Size of Parcel, and Site Plan
Review of USGS topographic maps, local assessor and zoning maps and property description cards, field observations and sketches, and, if available, plans provided by a contact for the Site. A site plan is included that is derived from these sources.

2.1.2 Potable Water Supply and Sewage Disposal
Query the local Department of Public Works, local Engineering Department, appropriate local utilities, and/or other local municipal sources and/or a knowledgeable site contact.

2.1.3 Adjoining Land Use
Site reconnaissance and assessor's mapping.

2.2 Physical Setting of Site

2.2.1 Geologic and Physiographic Setting
Site reconnaissance, USGS topographic maps, and available geological maps.

2.2.2 Groundwater
Site reconnaissance, USGS topographic maps, and DEEP water quality maps and water quality standards.

2.2.3 Surface Water
Site reconnaissance, USGS topographic maps, and DEEP water quality maps and water quality standards.

2.2.4 Location of Public Water Supply Sources
Site reconnaissance, DEEP water supply source mapping, and mapping available in local departments queried as part of the ESA.

2.3 Previous Environmental Investigations
Provided by the appropriate site contact or identified by other means during the course of conducting the ESA.

3.0 Site History

Site reconnaissance, knowledgeable site contacts, aerial photographs available at the State Archives and DEEP, Sanborn fire insurance maps available at the State Library, street directories

available at the State Library (note that street directories are reviewed at approximately five-year intervals, but may be reviewed at smaller intervals for multi-tenant properties), and local municipal sources (local municipal Building Department, Engineering Department, Planning and Zoning Department, Health Department,
and Fire Marshal).

4.0 Federal, State, and Local File Review

4.1 Summary of Regulatory Database Information
Regulatory databases specified by Standard Practice E 1527-05 are reviewed using Environmental Data Resources, Inc. (EDR) or a different environmental database search service.

The report provided by the environmental database search service is reviewed in detail. Sites that are inferred to present a significant risk to adversely impact the Site are identified and explained within the ESA report. However, sites inferred to pose little risk to adversely impact the Site are disclaimed within the attached environmental database search service report.

4.2 State File Review

DEEP Orders, Notices of Violation, and Connecticut Transfer Act Forms are provided for the Site using environmental database search service.

Correspondence files for the Site are requested from the DEEP solid waste and water management bureaus. If available, these files are reviewed for pertinent information, which is either copied or noted.

CTDEEP Connecticut Leachate and Wastewater Discharge Source maps are reviewed to identify any sites within one-half mile of the Site that may adversely impact the Site.

4.3 Local File Review
Files for the local municipal Tax Assessor, Building Department, Planning and Zoning Department, Health Department, and Fire Marshal are reviewed.

5.0 User Provided Information
Information provided by the user as required by the practice is discussed in this section

6.0 Site Reconnaissance, Interviews and Non-ASTM Scope Considerations

Field observations the results of required interviews are discussed in this section. In addition, surveys conducted to identify non-scope considerations are addressed.

7.0 Connecticut Transfer Act Status

Based on information obtained as part of the ESA, our opinion regarding the site's status with respect to the Connecticut Transfer Act is provided.

Hazardous waste manifests may be requested from DEEP or appropriate site contact to help resolve questions regarding the quantity of hazardous waste generated at the site.

8.0 Data Gaps, Findings and Conclusions

Data gaps relevant to the identification of recognized environmental conditions are discussed. In addition, recognized environmental conditions are summarized in this section as well as recommendations for further investigation, if appropriate.

9.0 References

References used as part of the ESA are presented here.

Restrictions: Exceptions to or Deletions from the Scope of Work

- Access to a shed located adjacent to the Community/Maintenance Building was not possible because a key could not be located.

- Access to the crawl spaces in seven buildings at the site was not possible because the entrances had either been welded shut or keys for the locks could not be located.
- Limited accessibility within the crawlspaces below the buildings limited inspection to the areas closest to the entrances.
- Equipment stored in the maintenance garage limited visibility of the floor surface.
- Due to the size of the Site and the large number of occupied units, only three representative vacant apartment units were inspected.

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Appendix B

Town File Information

AVAILABLE UPON REQUEST

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Appendix C

Environmental Database Search
Environmental Data Resources, Inc.

AVAILABLE UPON REQUEST

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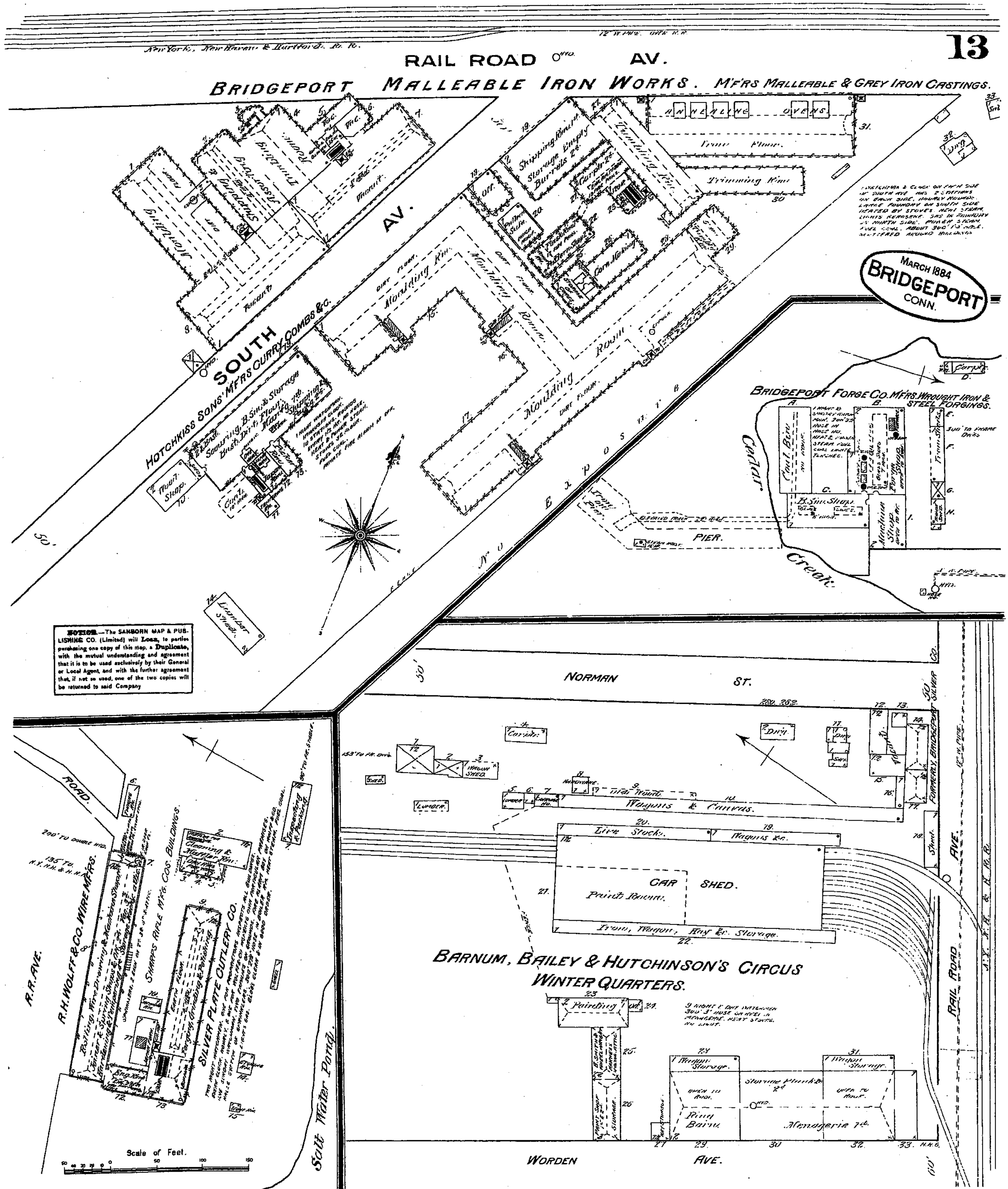
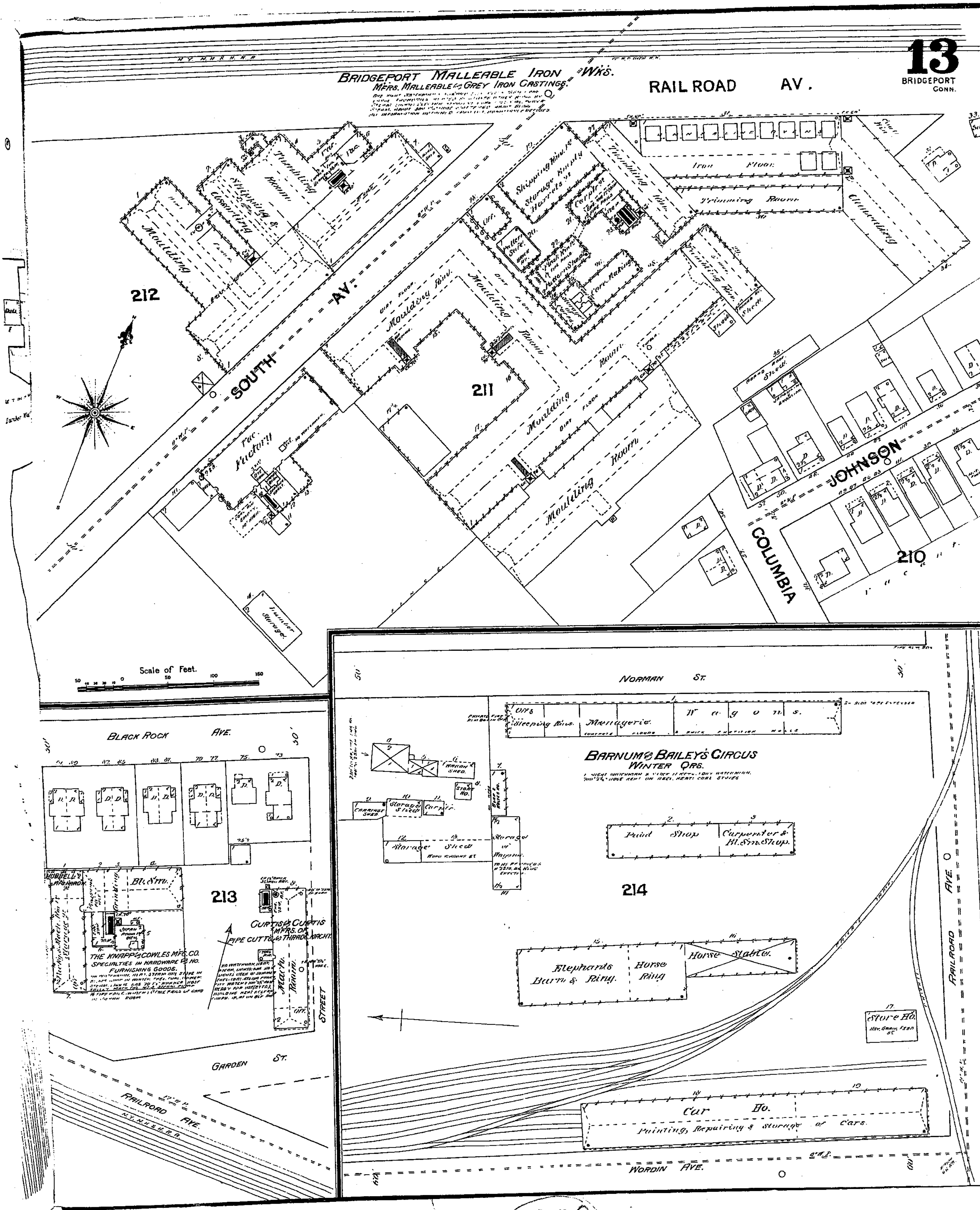
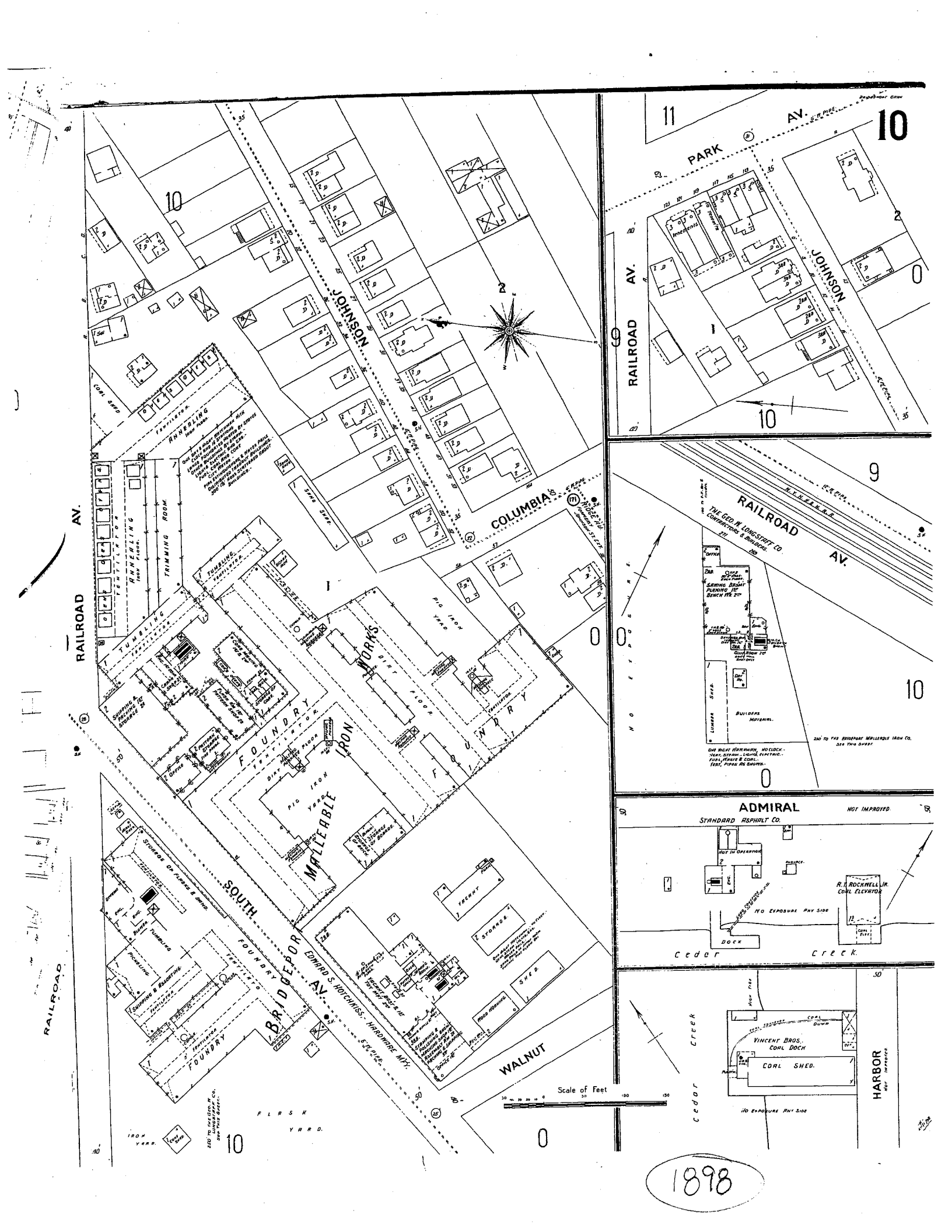
Appendix D

State File Information


New York, New Haven & Hartford R. R.
RAIL ROAD AV.
BRIDGEPORT MALLEABLE IRON WORKS. M'F'RS MALLEABLE & GREY IRON CASTINGS.
ANNEALING OVENS
Trimming Rm.
Moulding Rm.
Moulding Room
SOUTH AV.
HOTCHKISS SONS' M'F'RS CURRY COMBS & CO.
Wood Shop.
Lumber Shed.
MARCH 1884
BRIDGEPORT
CONN.
BRIDGEPORT FORGE CO. M'F'RS WROUGHT IRON & STEEL FORGINGS.
Coal Bin
B.Sm.Shop.
Machine Shop
PIER.
Cedar Creek
NORMAN ST.
Wagons & Canvas.
Live Stock.
CAR SHED.
Paint Room.
Iron, Wagon, Hay &c. Storage.
BARNUM, BAILEY & HUTCHINSON'S CIRCUS
WINTER QUARTERS.
Painting
Wagon Storage.
Ring Barn.
Menagerie
WORDEN AVE.
RAIL ROAD AVE.
FORMERLY BRIDGEPORT SILVER
R.H. WOLFF & CO. WIRE M'F'RS.
SHARPS RIFLE M'F'G CO'S. BUILDINGS.
SILVER PLATE CUTLERY CO.
ROAD
R.R. AVE.
Salt Water Pond.
Scale of Feet.
NOTICE.—The SANBORN MAP & PUBLISHING CO. (Limited) will Loan, to parties purchasing one copy of this map, a Duplicate, with the mutual understanding and agreement that it is to be used exclusively by their General or Local Agent, and with the further agreement that, if not so used, one of the two copies will be returned to said Company.

1884


13
BRIDGEPORT CONN.
BRIDGEPORT MALLEABLE IRON WKS.
MFRS. MALLEABLE & GREY IRON CASTINGS.
RAIL ROAD AV.
SOUTH AV.
JOHNSON
COLUMBIA
212
211
210
Moulding
Shipping & Cleaning
Tumbling Room
Shipping Room & Storage Supply Barrels
Tumbling Rm.
Iron Floor
Trimming Room
Cleaning
Moulding Rm.
Moulding Room
Core Making
Fac. Factory
Lumber Storage
Scale of Feet.
NORMAN ST.
BARNUM & BAILEY'S CIRCUS
WINTER QRS.
Sleeping Rms.
Menagerie
Wagons
Paint Shop
Carpenter & Bl. Sm. Shop.
214
Elephants Barn & Ring.
Horse Ring
Horse Stable.
Store Ho.
Car Ho.
Painting, Repairing & Storage of Cars.
WORDIN AVE.
RAILROAD AVE.
BLACK ROCK AVE.
213
THE KNAPP & COWLES MFG. CO.
SPECIALTIES IN HARDWARE & HO. FURNISHING GOODS.
CURTIS & CURTIS MFRS. OF PIPE CUTTG. & THRDG. MACHY.
Mach. Room
STREET
GARDEN ST.
RAILROAD AVE.
N.Y. N.H. & H. R.R.
1889


PARK AV.
JOHNSON
RAILROAD AV.
COLUMBIA
RAILROAD AV.
THE GEO. W. LONG STAFF CO.
CONTRACTORS & BUILDERS
ADMIRAL
STANDARD ASPHALT CO.
NOT IMPROVED
R. T. ROCKWELL JR. COAL ELEVATOR
NO EXPOSURE ANY SIDE
Cedar Creek
VINCENT BROS. COAL DOCK
COAL SHED.
HARBOR
NOT IMPROVED
SOUTH BRIDGE
EDWARD S. HOTCHKISS, HARDWARE MFR.
MALLEABLE IRON WORKS
FOUNDRY
PIG IRON YARD
DIRT FLOOR
TUMBLING
ANNEALING
TRIMMING ROOM
SHIPPING & RECEIVING
STORAGE
WALNUT
FLASK YARD
Scale of Feet
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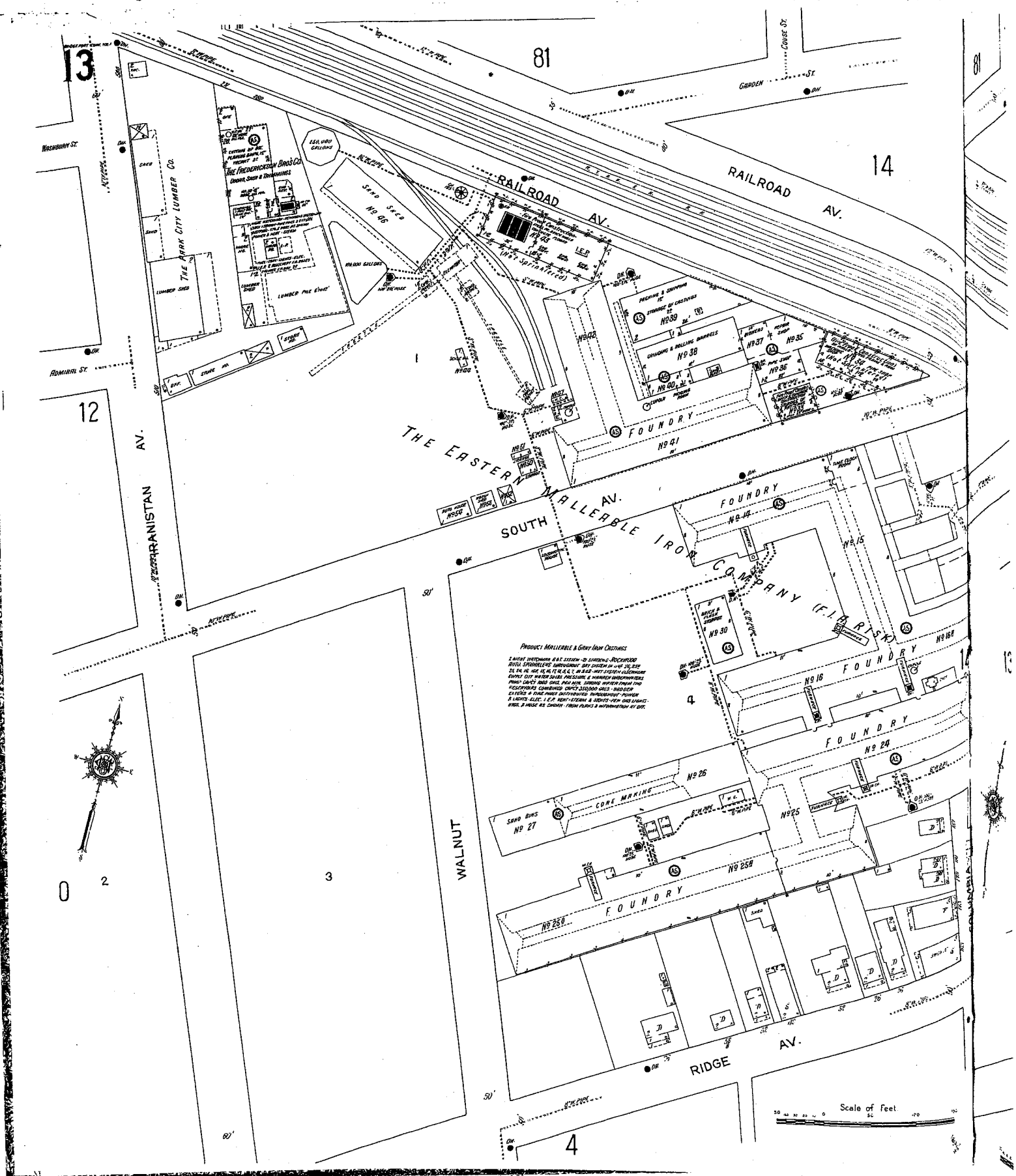
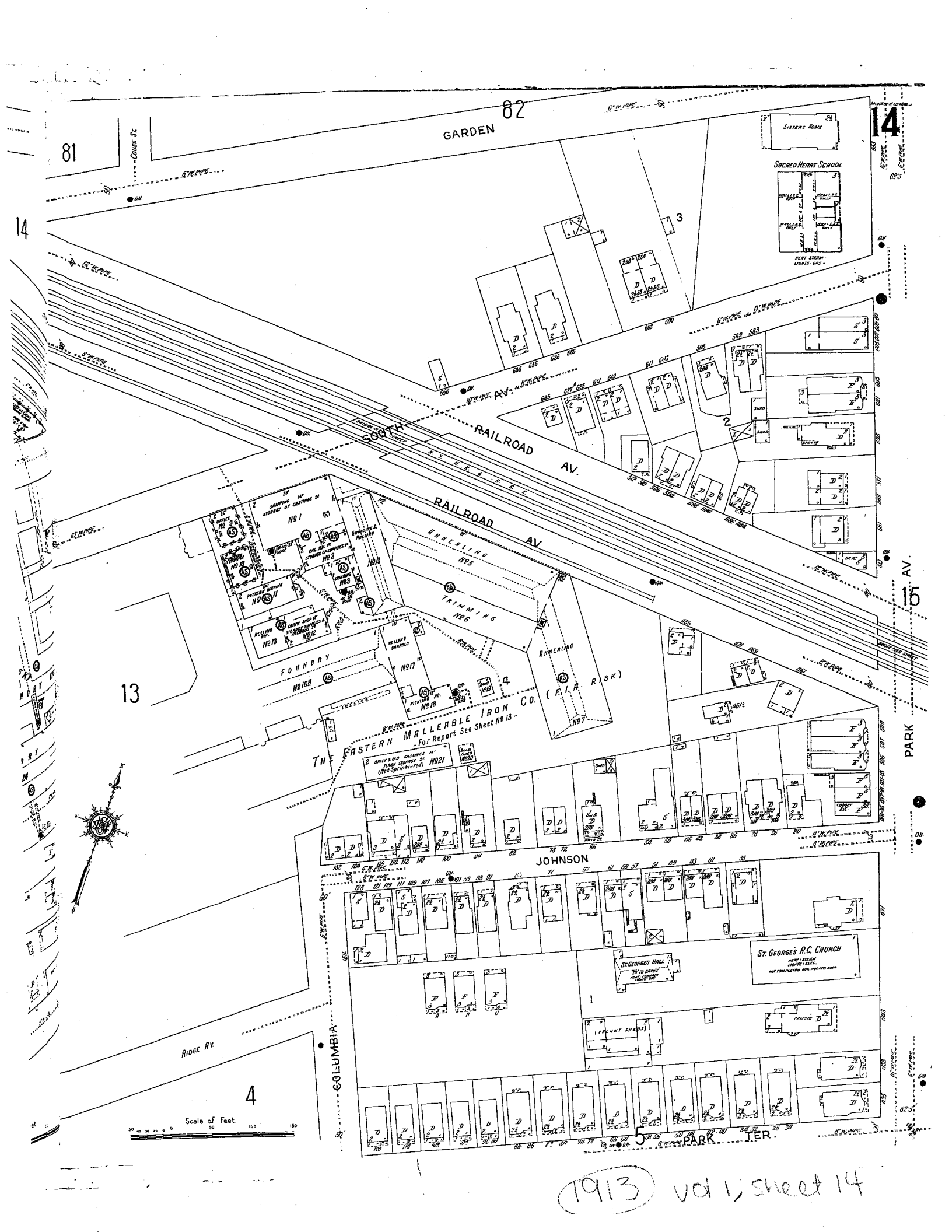


1913 Vol 1, Sheet 13



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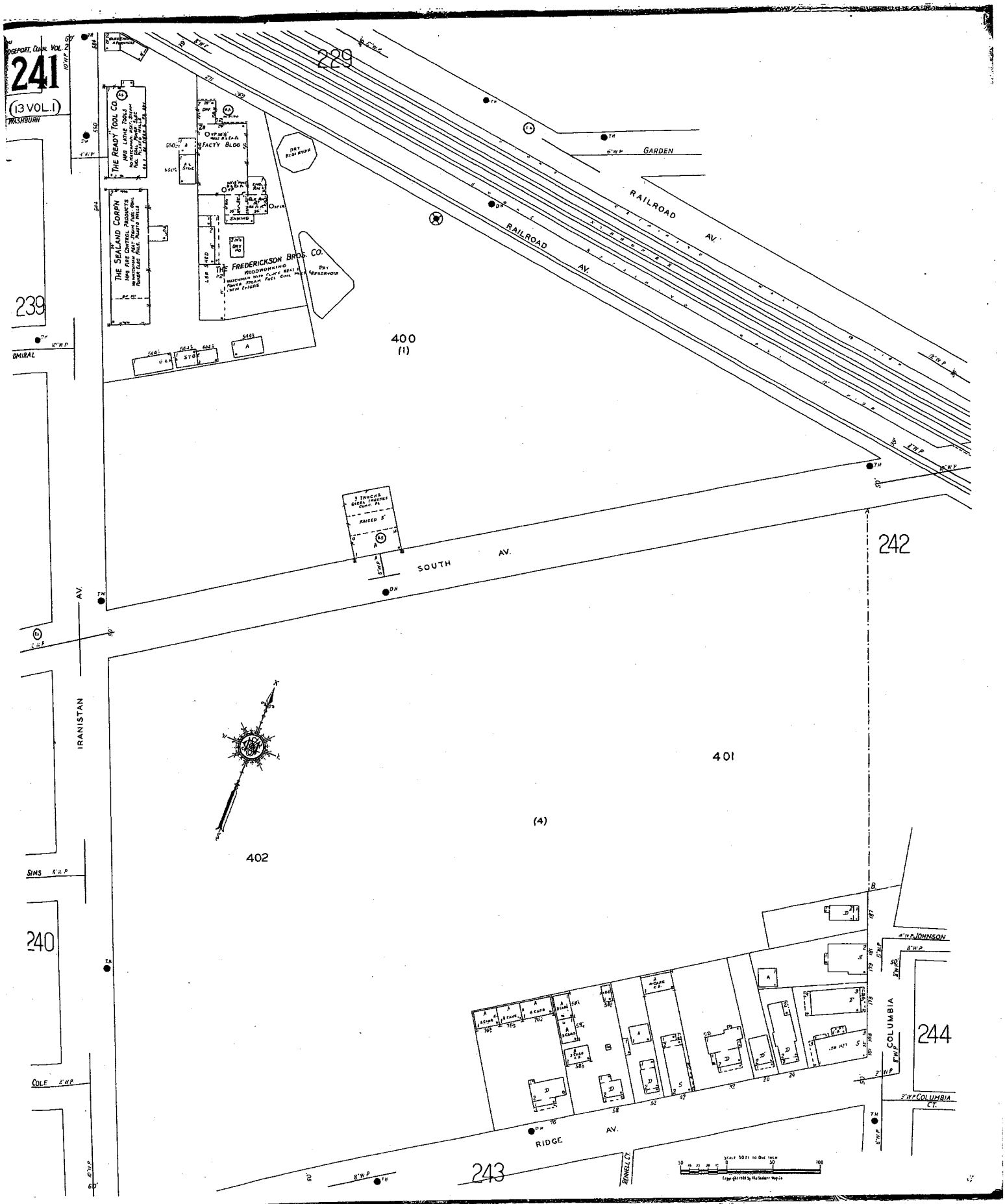
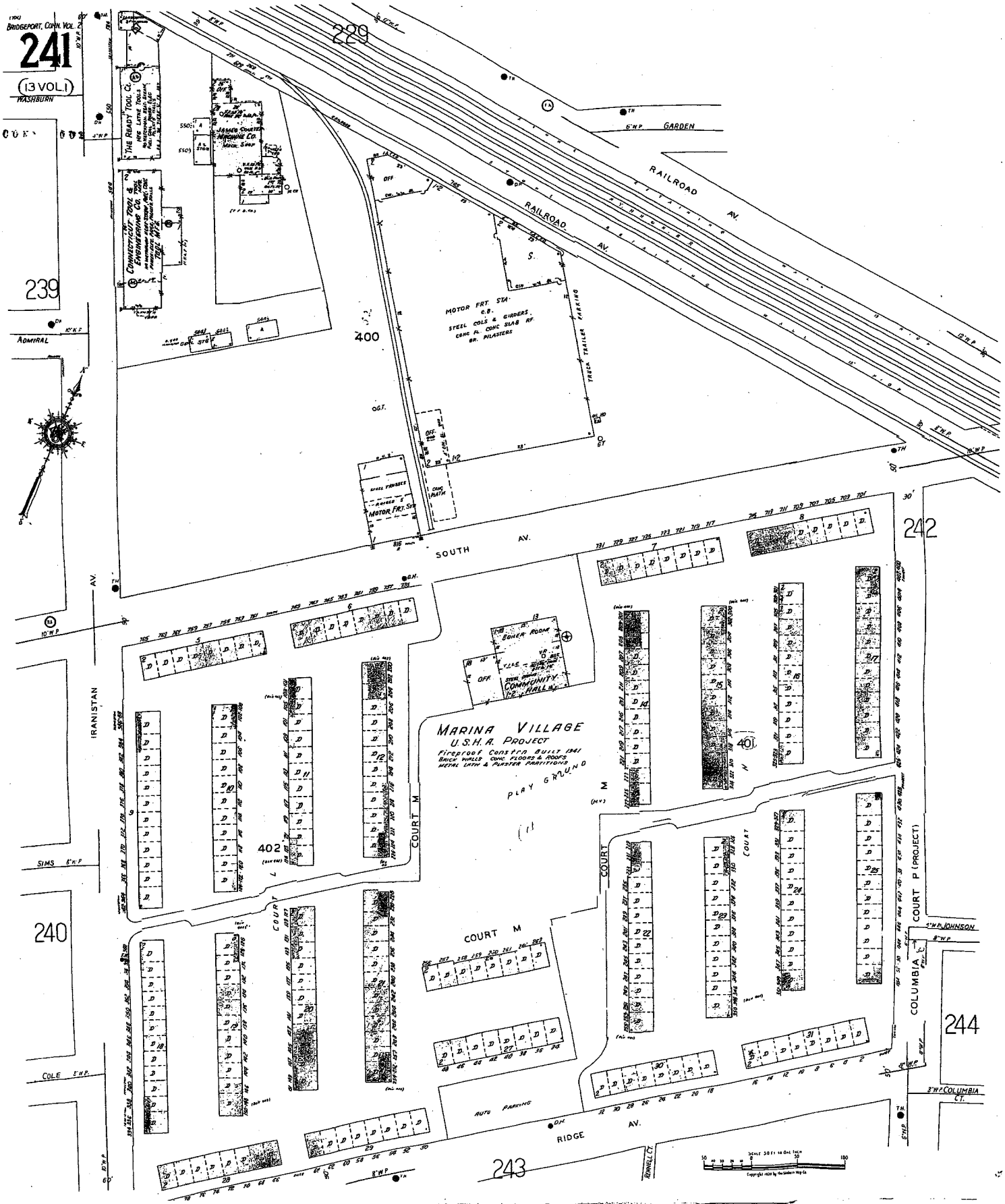
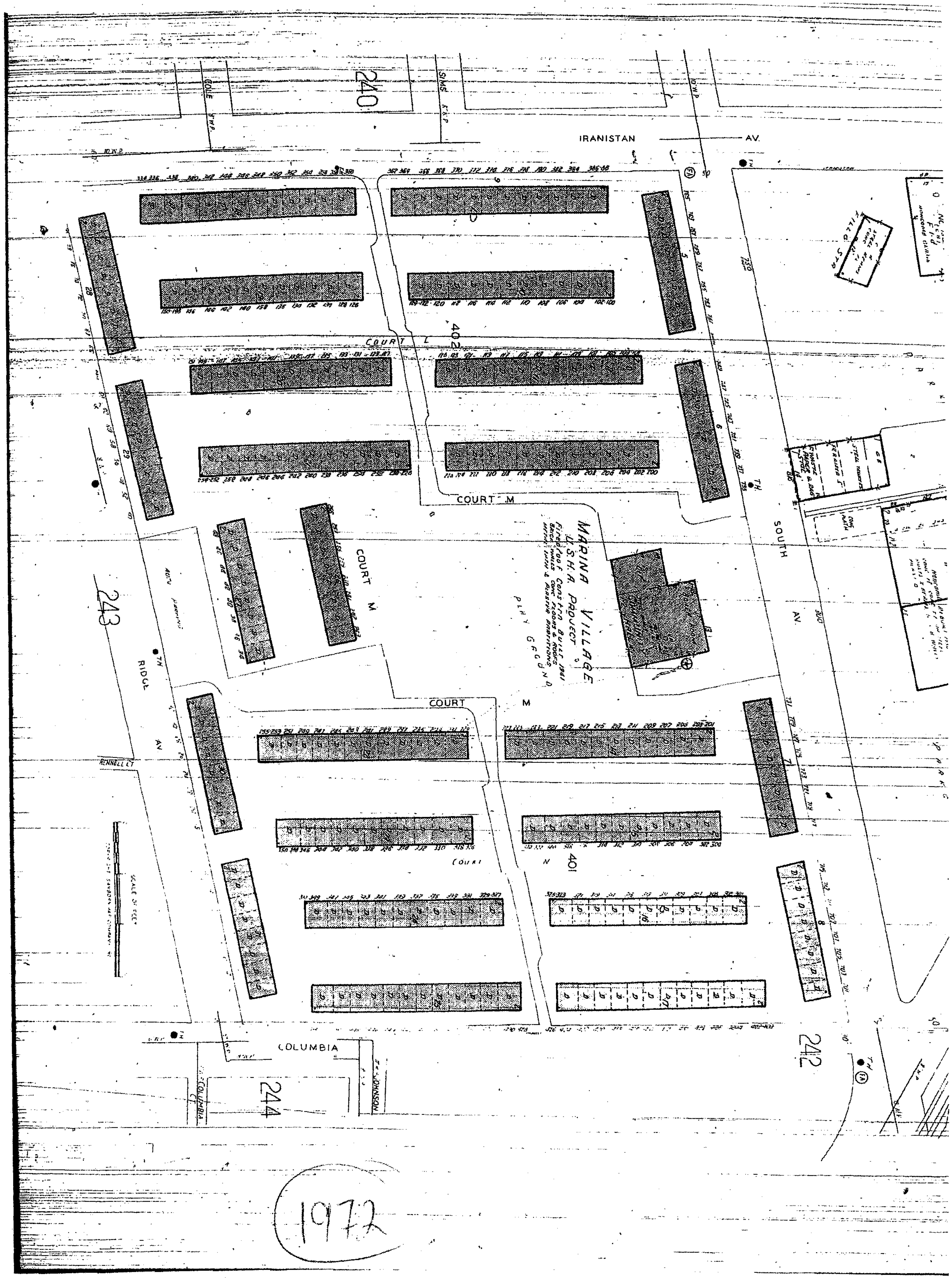


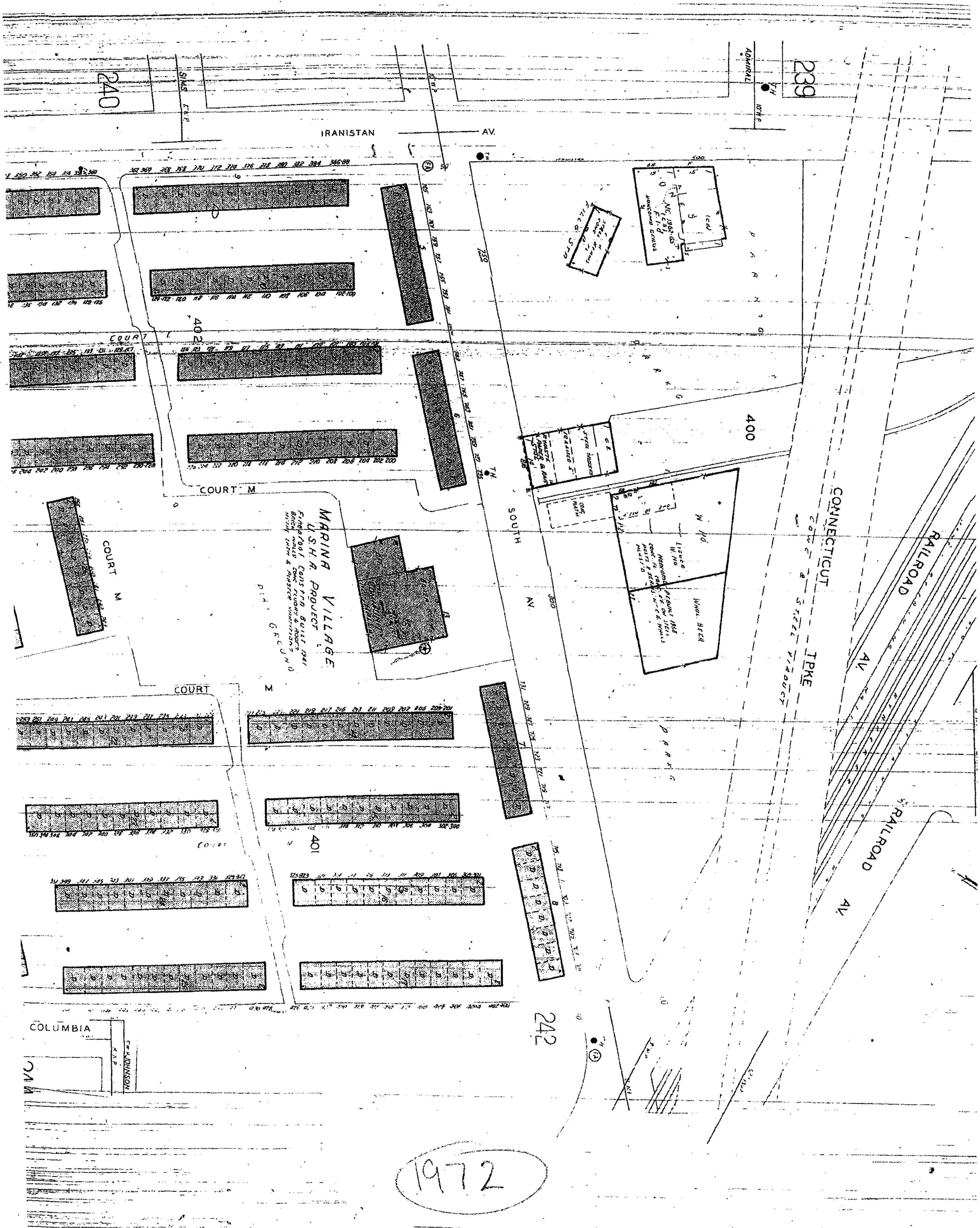
(1939) vol 2, sheet 241



1939 - 1950 vol 2, sheet 241


240
GOLE
SIMS
IRANISTAN AV.
COURT L
402
COURT M
MARINA VILLAGE
U.S.H.A. PROJECT
Fireproof Constrn Built 1941
PLAY GROUND
SOUTH AV.
RIDGE AV.
243
COURT M
COURT N
401
242
COLUMBIA
COLUMBIA CT
JOHNSON
244
SCALE OF FEET
1972


240
241
239
246
427
428
429
430
431
432
SOUTH AV
SIMS
COLE
BURNHAM
FLANDERS
ALBERT SQ
ALSACE
LITTLE
IRANISTAN AV
RIDGE AV
1972



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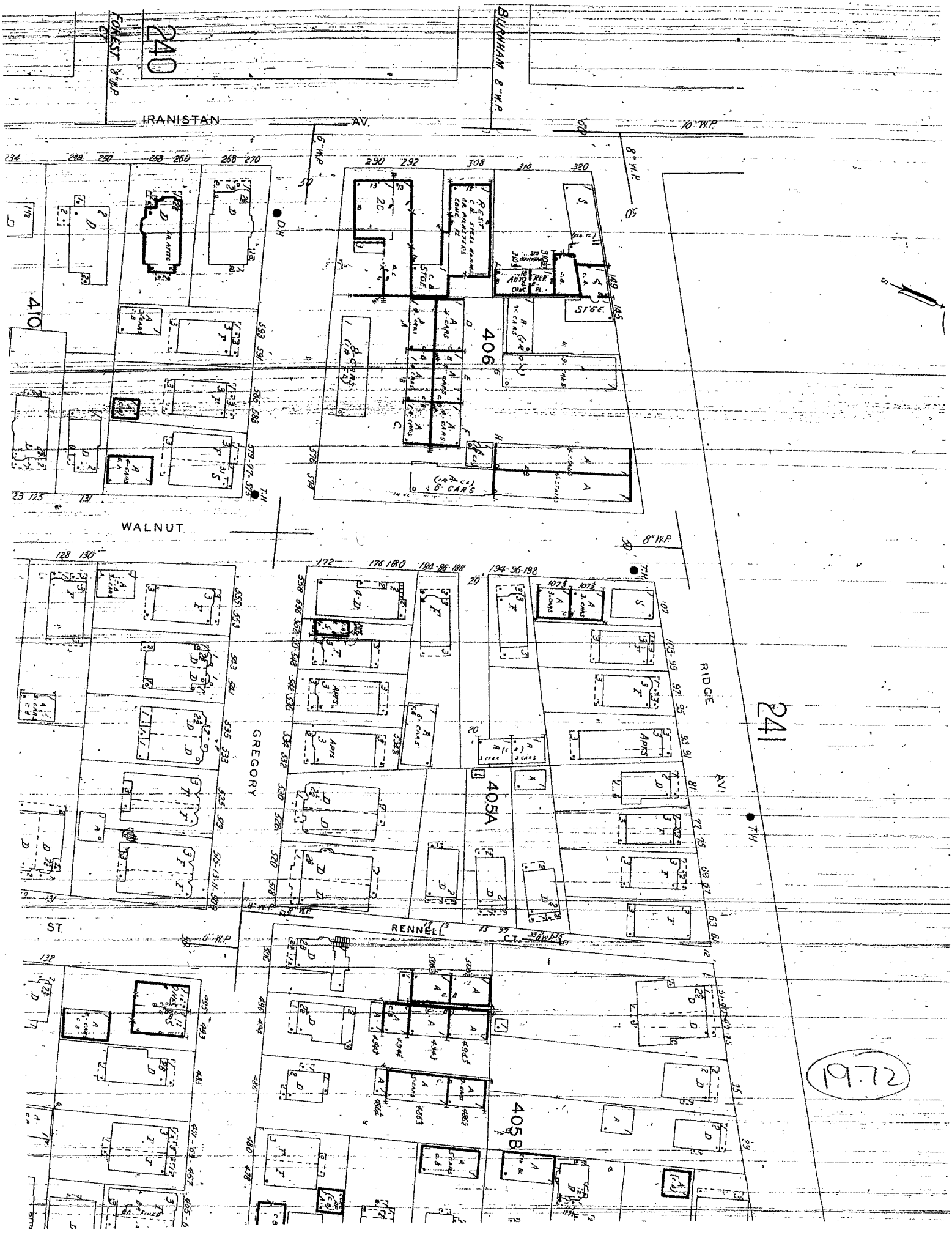
SIMS
IRANISTAN AV.
ADMIRAL
239
402
COURT
COURT M
MARINA VILLAGE
U.S.H.A. PROJECT
PLAY GROUND
SOUTH AV.
400
CONNECTICUT TPKE
STEEL VIADUCT
P A R K G
W. HO.
LIQUOR W. HO.
WHOL. BEER
RAILROAD AV.
RAILROAD AV.
401
COLUMBIA
JOHNSON
242
1972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FOREST
IRANISTAN
AV.
BURNHAM
8" W.P.
10" W.P.
6" W.P.
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290 292 308 310 320
406
410
405A
405B
241
WALNUT
GREGORY
RIDGE
AV.
RENNELL
ST.
128 130
172 176 180 184-186-188 194-196-198
132
9-72

FUSS & O'NEILL

memorandum

To: Date:

From: Subject:

Project No: BRIDGEPORT

'12 Iran (Ridge-South) res, 459-Berkins Moving + Stor. no(400)
HH+P, Inc. RD all res, S. res, 713-Bluthmert Comm. Health Ctr., res, 810-Seaside Scrap metal Co, 840-Nunes Auto repair

'10 Iran (Ridge-S) res, 459-saa PMS Scrap Fuel Inc, 478-Nunes Auto rep. RD-saa. S 733-Earthcomm Systems, 743-saa, 840-saa

'05 Iran all res, 459-Connecell + Patterson Co, Europa Foods, 478-Nunes RD: res, S saa + 750-Regency Construction. 810-Seaside scrap metal Co 840-Nunes

00 saa

95 saa "Manna Village" res

90 saa Johnson 25 Oldermen Brass Mfg Corp Manna Village (Court L, M, N, P, Q, R, S) S 810+840-saa.

'85 Iran 459-CT Trane+PaperCo, Easton Beg + PaperCo 478-Nunes John 25-Oldermen Mfg. res "Courts-res (SRQ); S 800-Agency Beer Dist., Inc. 810-saa

'74 ~~'80~~ saa Iran 478-Family Shield Serv Ctr II John 25-saa. 40 Manna Village, res South 733 Manna Vlg office; 770-Beer Dist saa 810 saa

'74 Iran saa John saa. S saa

'70 saa

'65 John 40-114 M Vill. S saa

'61 saa

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Appendix E

Completed Questionnaires

PHASE I ESA QUESTIONNAIRE-OWNER/KEY SITE MANAGER

SITE INFORMATION

***Site Name*:** **Marina Village – Buildings 26 & 27**

***Address*:** **50-80 Ridge Avenue, Bridgeport, CT 06604**

QUESTION	OWNER	OCCUPANT
1. Is or has the *property* been used industrially?	Unknown See Note Below	N/A
2. Is or has the *property* been used as a vehicle body repair facility, furniture stripping facility, dry cleaning facility, gasoline station, motor repair facility, commercial printing facility, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing or recycling facility (if applicable, identify which)?	Unknown See Note Below	N/A
3. Did you observe evidence or do you have any prior knowledge that any *adjoining property* has been used as a vehicle body repair facility, furniture stripping facility, dry cleaning facility, gasoline station, motor repair facility, commercial printing facility, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing or recycling facility (if applicable, identify which)?	Unknown See Note Below	N/A
4. Are there currently or have their previously been any damaged or discarded automotive or industrial batteries, pesticides, paints, or other chemicals in individual containers of greater than 5 gal (19 L) in volume or 50 gal (190 L) in the aggregate, stored on or used at the *property* or at the facility?	Unknown See Note Below	N/A
5. Are there currently or previously has there been any industrial *drums* (typically 55 gal (208L)) or sacks of chemicals located on the property or at the facility?	Unknown See Note Below	N/A
6. Did you observe evidence or do you have any prior knowledge that *fill material* has been brought onto the property that originated from a contaminated site or an See Note Below source.	Unknown See Note Below	N/A
7. Are there currently or has there previously been any *floor drains, septic systems, dry wells, pits, ponds, or lagoons* located on the *property* in connection with waste treatment or waste disposal?	Unknown See Note Below	N/A
8. Are there currently or has there previously been any registered or unregistered storage tanks (above or underground) located on the *property*?	Unknown See Note Below	N/A
9. Is there currently or has there previously been any evidence of leaks, spills or staining by substances other than water, or foul odors, associated with any flooring, drains, walls, ceilings, or exposed grounds on the property?	Unknown See Note Below	N/A
10. If the *property* is served by a private well or non-public water system, is there evidence or do you have prior knowledge that contaminants have been identified in the well or system?	Unknown See Note Below	N/A
11. Does that *owner* or *occupant* of the property have any knowledge of *environmental liens* or governmental notification relating to past or recurrent violations of environmental laws with respect to the *property* or any facility located on the *property*?	Unknown See Note Below	N/A

QUESTION	OWNER	OCCUPANT
12. Does the *owner* or *occupant* of the *property* have any knowledge of any *environmental site assessment* of the *property* or facility that indicated the presence of *hazardous substances* or *petroleum products* on, or contamination of, the *property* or recommended further assessment of the *property*?	**Unknown See Note Below**	**N/A**
13. Does the *owner* or *occupant* of the *property* know of any past, threatened, or pending lawsuits or administrative proceedings concerning a release or threatened release of any *hazardous substance* or *petroleum products* involving the *property* by any owner or occupant of the *property*?	**Unknown See Note Below**	**N/A**
14. Did you observe evidence, or do you have prior knowledge that any *hazardous substances* or *petroleum products*, unidentified waste materials, tires, automotive or industrial batteries or any other waste materials have been dumped above grade, buried and/or burned on the *property*?	**Unknown See Note Below**	**N/A**
15. Is there a transformer, capacitor, or any hydraulic equipment for which there are any records indicating the presence of PCBs?	**Unknown See Note Below**	**N/A**

NOTE: Fuss & O'Neill has been given a copy all reports that HACB has for this property. Please refer to these documents, reports etc. To the best of the knowledge of the organization, this is all the information that the Housing Authority of the City of Bridgeport (HACB) has regarding the property.

In accordance with Standard Practice ASTME 1527-05 for Phase I Environmental Site Assessments (ESAs), we are required to ask you as the property owner or a person identified as a key site manager, the following questions:

1) Please place an "X" next to each if you have or know of the existence of any of the following reports relating to the site:

- Environmental site assessment reports — See Note Above
- Environmental compliance audit reports — See Note Above
- Environmental permits — See Note Above
- Underground storage tank notification forms — See Note Above
- Registrations for underground injection systems — See Note Above
- Material safety data sheets — See Note Above
- Community right to know plans — See Note Above
- Safety plans, preparedness and prevention plans, spill prevention, counter-measure and control plans — See Note Above
- Reports regarding hydro-geologic conditions on the property or surrounding area — See Note Above
- Notices or other correspondence form any governmental agency relating to past or current violations of environmental laws — See Note Above
- Hazardous waste generators notices or reports — See Note Above
- Geotechnical studies — See Note Above
- Risk assessments — See Note Above
- Activity and use restrictions — See Note Above

Please provide copies of each report to Fuss & O'Neill prior to or at the time of the site visit.

Fuss & O'Neill has been given a copy all reports that HACB has for this property. Please refer to these documents, reports etc. To the best of the knowledge of the organization, this is all the information that the Housing Authority of the City of Bridgeport (HACB) has regarding the property.

2) Are you aware of any pending, threatened, or past litigation relevant to hazardous substances or petroleum products in, on, or from the property?

Fuss & O'Neill has been given a copy all reports that HACB has for this property. Please refer to these documents, reports etc. To the best of the knowledge of the organization, this is all the information that the Housing Authority of the City of Bridgeport (HACB) has regarding the property.

3) Are you aware of any pending, threatened, or past administrative proceedings relevant to hazardous substances or petroleum products in, on, or from the property?

Fuss & O'Neill has been given a copy all reports that HACB has for this property. Please refer to these documents, reports etc. To the best of the knowledge of the organization, this is all the information that the Housing Authority of the City of Bridgeport (HACB) has regarding the property.

4) Are you aware of any notices from any governmental entity regarding any possible violation of environmental laws or possible liability related to hazardous substances or petroleum products at the property?

Fuss & O'Neill has been given a copy all reports that HACB has for this property. Please refer to these documents, reports etc. To the best of the knowledge of the organization, this is all the information that the Housing Authority of the City of Bridgeport (HACB) has regarding the property.

The ***Owner*** questionnaire was completed by:

Name: **Dulce Nieves / Peter Hance**
Title: **Chairperson / Deputy Executive Director**
Firm: **Housing Authority of the City of Bridgeport**
Address: **150 Highland Avenue, Bridgeport, CT 06604**
Phone: **(203) 337-8900**

Owner's Signature:_____ Date: **March 8, 2013**

The ***Occupant*** portion of the questionnaire is **N/A.**

PHASE I USER QUESTIONNAIRE

SITE NAME: Marina Village – Buildings 26 & 27
SITE ADDRESS: 50-80 Ridge Avenue, Bridgeport, CT 06604

Completed By: Dulce Nieves/Peter Hance (Please Print) **Date:** March 8, 2013

Signature: _____

Representing: Housing Authority of the City of Bridgeport **Phone No:** (203) 337-8900

ASTM Questions to Address User Responsibilities:
In order to qualify for one of the *Landowner Liability Protections (LLPs)* offered by the Small Business Liability Relief and Brownfield's Revitalization Act of 2001 (the "*Brownfields Amendments*") the *user* should provide the following information (if available) to the *environmental professional.* Failure to provide this information could result in a determination that "*all appropriate inquiry*" is not complete.

1) Environmental cleanup liens that are file or recorded against the site (40 CFR 312.25). Has a ***chain of title and title restriction*** review been conducted? **HACB is not aware of any restrictions etc. related to this issue.**

Based on the results of a ***chain of title and title restriction*** review, are there any environmental cleanup liens against the *property* that are filed or recorded under federal, tribal, state or local law?

2) Activity and land use limitation (AUL) that are in place on the site or that have been filed or recorded in a registry (40 CFR 312.26). Based on the results of a ***chain of title and title restriction review***, are there any activity and land use limitations, such as *engineering controls*, *land use restrictions* or *institutional controls* that are in place at the site and/or have been filed or recorded in a registry under federal, tribal, state or local law? **HACB is not aware of any limitations restrictions etc. related to this issue.**

If yes, explain:

3) Specialized knowledge or experience of the person seeking to qualify for the LLP (40 CFR 312.28). As the *user* of this *ESA* do you have any specialized knowledge or experience related to the *property* or nearby properties? **HACB is not aware of having any specialized knowledge or experience related to this issue.**

For example, are you involved in the same line of business as the current or former *occupants* of the *property* or an adjoining *property* so that you would have specialized knowledge of the chemicals and processes used by this type of business? **HACB is not aware of having any specialized knowledge related to this issue.**

If yes, please explain:

4) The relationship of the purchase price to the fair market value of the *property* if it were not contaminated (40 CFR 312.29). Does the purchase price being paid for this *property* reasonably reflect the fair market value of the *property*? **N/A**

If you conclude that there is a difference, have you considered whether the lower purchase price is because contamination is known or believed to be present at the *property*?

5) Commonly known or *reasonably* ascertainable information about the *property* (40 CFR 312.30). Are you aware of commonly known or *reasonably ascertainable* information about the *property* that would help the *environmental professional* to identify conditions indicative of releases or threatened releases?

If yes, please answer the following questions:

a) What were the past uses of the *property*?
b) What chemicals are present or once were present at the *property*?
c) What spills or other chemical releases that have taken place at the *property*?
d) Explain any environmental cleanups that have taken place at the *property*.

PHASE I USER QUESTIONNAIRE
PAGE 2 of 3

HACB is not aware of having any information related to this issue.

6) The degree of obviousness of the presence of likely presence of contamination at the property, and the ability to detect the contamination by appropriate investigation (40 CFR 312.31). As the *user* of this *ESA*, based on your knowledge and experience related to the *property* are there any *obvious* indicators that point to the presence or likely presence of contamination at the *property*? **HACB is not aware of having any information related to this issue.**

Other Questions:

ASTM Practice 1527-05 also requires that the *user* answer the following questions:

7) As the user of this ESA, are you aware of any pending, threatened, or past litigation relevant to hazardous substances or petroleum products in, on, or from the property? **HACB is not aware of having any information related to this issue.**
If so, explain:

8) As the user of this ESA, are you aware of any pending, threatened, or past administrative proceedings relevant to hazardous substances or petroleum products in, on, or from the property? **HACB is not aware of having any information related to this issue.**
If yes, explain:

9) As the user of this ESA, are you aware of any notices from any governmental entity regarding any possible violation of environmental laws or possible liability related to hazardous substances or petroleum products? **HACB is not aware of having any information related to this issue.**
If yes, explain:

10) We are required to ask you as the user if you have any of the following reports in your possession. Please place an "X" next to each report that is available:

_____ Environmental site assessment reports

_____ Environmental compliance audit reports

_____ Environmental permits

_____ Underground storage tank notification forms

_____ Registrations for underground injection systems

_____ Material safety data sheets

_____ Community right to know plans

_____ Safety plans, preparedness and prevention plans, spill prevention, countermeasure and control plans

_____ Reports regarding hydrogeologic conditions on the property or surrounding area

_____ Notices or other correspondence from any governmental agency relating to past or current violations of environmental laws

_____ Hazardous waste generator notices or reports

PHASE I USER QUESTIONNAIRE
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_____ Geotechnical studies

_____ Risk assessments

_____ Activity and use restrictions

Please provide Fuss & O'Neill with copies of each report or make these reports available for inspection.

HACB is not aware of having any of the information listed above.

Appendix F

Site Photographs

Photo 1: Courtyard area between buildings.

Photo 2: Sump pump in former boiler room in the Community/Maintenance Building.

Photo 3: Storage of oil, paint, and other chemicals in maintenance storage area.

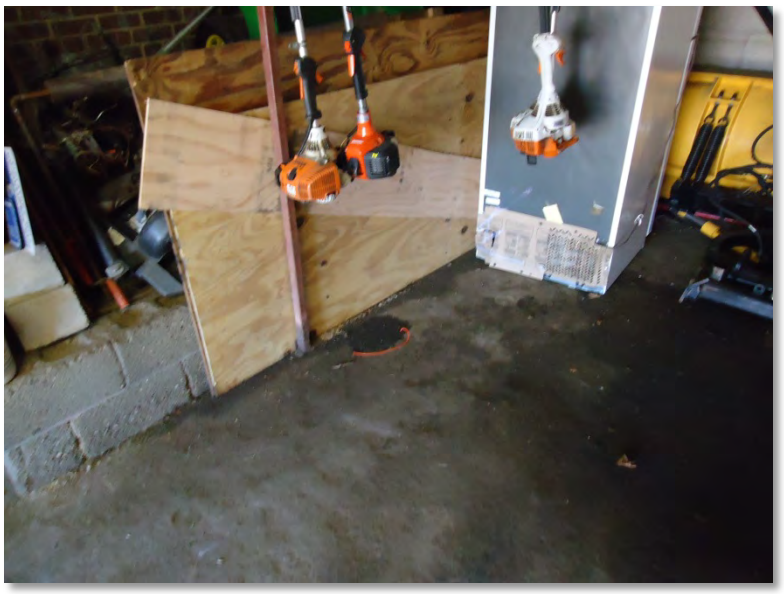

Photo 4: Minor staining below lawn equipment in the maintenance garage.

Photo 5: Potential asbestos containing pipe insulation in crawl space of apartment building.

Photo 6: Furnace and hot water heater (both natural gas) in apartment unit.

Photo 7: View of area between buildings.

Photo 8: View of Columbia Street running through the site.

Photo 9: View of courtyard between buildings.

Photo 10: View of parking lot at the east end of the site.

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Appendix G

Qualifications of Environmental Professionals and Staff

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Qualifications of Environmental Professionals and
Staff Scientists and Engineers

Environmental Professionals

Employee	Title	Education	Years of Applicable Experience	Licenses
Andy Zlotnick	Senior Vice President	BS Earth Science MS Hydrogeology	27	LEP, LEED AP
Dave Hurley	Vice President	BS Geology	32	LEP
Rob Danielson	Vice President	BS Geology MS Environmental Mgmt	26	CPG, LEP
John Carroll	Senior Project Manager	BA Geology	26	LEP
Dan Jahne	Senior Project Manager	BS Geology	18	LEP
Bob Bowden	Project Manager	BA Geology MS Geology	23	LEP
Jeremy Grant	Project Manager	BA Geology MS Geology	17	PG
Rick Kulzer	Project Manager	BA Geology	15	LEP

FUSS & O'NEILL

Staff Scientists and Engineers

Employee	Title	Education	Years of Applicable Experience	Licenses
Kevin Vanderveer	Senior Hydrogeologist I	BS Geology	19	--
Greg Toothill	Engineer III	BS Civil Engineering	10	PE
Sara Rochelt	Hydrogeologist III	BS Geology	22	--
Caleb Scheetz	Hydrogeologist III	BS Geology MS Geology	8	--
Mike Kostiuk	Hydrogeologist II	BS Environmental Science	12	--
Drew Derrick	Environmental Technician III	BS Geophysics	3	--
Reginald Butler	Environmental Technician II		4	--
Steve Sarica	Environmental Engineer	BS Environmental Engineer	1	--

Licenses

CPG: Certified Professional Geologist
CPESC: Certified Professional in Erosion and Sediment Control
PE: Professional Engineer
PG: Professional Geologist
LEP: Licensed Environmental Professional
LEED AP: Leadership in Energy and Environmental Design Accredited Professional

Education

BA: Bachelor of Arts
BS: Bachelor of Science
MS: Master of Science

APPENDIX B

ENVIRONMENTAL EVALUATION AND MATERIALS MANAGEMENT REPORT- MAY 2015 – TRIANGLE PROPERTY

FREEMAN COMPANIES

LAND DEVELOPMENT | ENGINEERING DESIGN | CONSTRUCTION SERVICES

Environmental Evaluation and Materials Management Report
Marina Village Housing Complex
Bridgeport, Connecticut

May 2015
Freeman File No.: 2015-0408

Prepared for:

Bridgeport Community Renewal Associates, LP
c/o JHM Group of Companies
1281 East Main St. Suite 201
Stamford, CT 06902

Prepared by:

Freeman Companies, LLC
36 John Street
Hartford, CT 06106

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APPENDICES

1 INTRODUCTION

Freeman Companies has completed an Environmental Evaluation Assessment of the Marina Village Housing Complex located at 400 Iranistan Avenue in Bridgeport, CT. The site consists of two adjacent parcels totaling 15.9 acres, bounded on the north by South Avenue and Railroad Avenue, on the east by Park Avenue, on the south by Johnson Street and Ridge Avenue, and on the west by Iranistan Avenue. Columbia Street runs between the two parcels through the middle of the site.

Bridgeport Community Renewal Associates, LP ("BCRA") is working with Park City Communities on the redevelopment of the Marina Village housing development in Bridgeport, Connecticut. The initial Phase of this development will involve the demolition of the portion of the site bounded by Park Avenue, Railroad Avenue, Project Street (Columbia), and Johnson Street. (Buildings Numbered 32-43).

1.1 Purpose

The purpose of the assessment was to collect sufficient information in order to provide an evaluation of the environmental impacts, if present, to soil and groundwater at the site and how these impacts may affect the redevelopment of the site.

Preliminary environmental information regarding historical environmental impact on the property was obtained from the September 2013 Phase I Environmental Site Assessment (ESA) prepared by Fuss & O'Neill. Based on the information presented within the reports, the site has a long history of heavy industrial and manufacturing operations prior to its development as a residential housing complex in the late 1940s. Industrial activities at the site included the following industries:

- Bridgeport Malleable Iron Works (later known as the Eastern Malleable Iron Company), a metal foundry that manufactured malleable and grey iron castings and conducted operations such as annealing, trimming, core making, tumbling, grinding, rolling, and molding;
- Hotchkiss Sons' Manufacturers Curry Combs & Company which conducted scouring, tempering, and japanning of various metals; and
- Reliable Steel Drum Corporation which conducted the reconditioning of steel drums

1.2 Scope of Work

Based on the historical industrial activities that were conducted on the site, the following scope of work was developed:

- Oversight of the the advancement of up to 10 soil borings, three of which were completed as a groundwater monitoring well.
- The collection and analysis of a soil samples from each of the proposed soil borings. Select soil samples would be analyzed for the following parameters: volatile aromatic hydrocarbons (VOCs), extractable total petroleum hydrocarbons (ETPH), poly aromatic hydrocarbons (PAHs), total and leachable RSR listed metals and polychlorinated biphenyls (PCBs).
- The collection of a groundwater sample from each of the three newly installed monitoring wells. Groundwater samples would be analyzed for one or more of the following parameters: VOCs, PAHs, and total RSR listed metals.
- The preparation of a report documenting the findings of the investigation.

Investigation activities were conducted in general accordance with the guidelines for environmental site assessments established in the Connecticut Department of Energy and Environmental Protection (CTDEEP) Site Characterization Guidance Document (SCGD) September 2007 (updated December 2010).

1.3 Objectives

The primary objective of this investigation was to obtain sufficient information on subsurface conditions in order to provide an understanding on how these conditions will affect the redevelopment of the Site.

2 SITE DESCRIPTION AND ENVIRONMENTAL SETTING

2.1 General

The Site, located at 400 Iranistan Avenue, consists of a two adjacent parcels of land totaling 15.9 acres located in the City of Bridgeport. The Site is bounded on the north by South Avenue and Railroad Avenue, on the east by Park Avenue, on the south by Johnson Street and Ridge Avenue, and on the west by Iranistan Avenue. Columbia Street runs between the two parcels through the middle of the site.

2.2 Surrounding Land Use

The surrounding land use consists primarily of high-density housing to the southwest, southeast and northeast; and a mix of commercial and light industrial to the northwest.

2.3 Groundwater Classification

According to the CTDEEP water quality classification maps (November 2013), groundwater at the site is classified as GB. A GB classified groundwater is defined as groundwater within a historically highly urbanized area or an area of intense industrial activity and where public water supply service is available. Such groundwater may not be suitable for human consumption without treatment due to waste discharges, spills or leaks of chemicals or land use impacts.

2.4 Previous Environmental Assessment Activities

As previously identified a Phase I ESA was conducted on the site in 2013. Based on the information with the 2013 report no previous environmental sampling has been conducted at the site.

3 GEOLOGIC INFORMATION

The physical conditions of the Site, including hydrology characteristics, are described in the following sections.

3.1 Site Topography

The site slopes from north to south ranging with a difference in elevation of approximately 10 feet (10 feet to 20 feet) above mean sea level. A majority of the site is located between elevations 10-12 feet.

3.2 Site Soils

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS) for the State of Connecticut (NRCS Webpage), the site is identified as primarily containing Urban Land. Urban land if defined as areas those are in urban and built up areas. The characteristics of this unit are so variable that an onsite investigation is required to determine the suitability for proposed uses.

Based on field observations soil conditions were observed to consist of the following:

Topsoil/ Asphalt – Topsoil was described as light brown to brown silty SAND (SM). Up to 1.1 feet of topsoil was encountered in the borings conducted in grassy areas. Asphalt thickness ranged from 1 inch to 3 inches.

Fill – Fill was described as very loose to dense, dark brown to light brown, silty SAND with gravel (SM), asphalt, crushed brick, concrete, and other manmade material debris. Standard Penetration Test N-Values ranged from 2 to 47 blows per foot (bpf). The fill extended to depths below ground surface ranging from 0 feet (B-10) to greater than 17 feet (B-9/MW).

Natural Sand – Natural sand was encountered in each of the borings, except B-9/MW, and was described as loose to very dense, poorly graded sand with silt and gravel varying to silty sand with gravel (SM). Standard Penetration Test N-Values ranged from 6 to 69 blows per foot (bpf).

Silt – A silt layer was encountered in Borings B-2 and B-3 at a depth of approximately 16.5 feet. The silt is described as light brown, silt (ML) to clayey silt. The thickness of this deposit was not determined.

4 REMEDIATION STANDARD REGULATIONS

The analytical results reported in this report have been compared to remediation criteria listed in the CTDEEP's Remediation Standard Regulations (RSRs). The RSRs (Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies) form the basis for evaluation of site conditions in respect to environmental impacts and the impacts associated risk factors to human health and the environment. The CTDEEP uses the RSRs to determine whether sufficient remediation has been conducted at sites that are required by statute, regulation or administrative order to be remediated, or that are remediated through a formal voluntary remediation process.

The RSRs provide: (1) baseline specific criteria that may be used at any site to determine whether or not remediation is necessary, (2) self-implementing alternatives to the baseline criteria for specific circumstances, (3) self-implementing exceptions to the criteria for specific circumstances, and (4) an opportunity to request approval of site-specific alternatives to the self-implementing standards and the options for remediation from the CTDEEP Commissioner.

Although the Site is not currently under an order by the CTDEEP or subject to regulation and or statute to meet the risk based criteria within the RSRs, Freeman Companies will utilize the listed values within the RSRs as guidance in order to be protective of human health and the environment.

4.1 Soil Remediation Criteria

The CTDEEP soil remediation criteria integrate two risk-based goals: (1) Direct Exposure Criteria (DEC) to protect human health and the environment from risks associated with direct exposure (ingestion) to contaminated soil; and (2) Pollutant Mobility Criteria (PMC) to protect groundwater quality from contaminants that migrate or leach from the soil to groundwater. Soils to which both criteria apply must be remediated to a level which is equal to the more stringent criteria.

4.1.1 Direct Exposure Criteria

Specific numeric exposure criteria for a broad range of contaminants in soil have been established by the CTDEEP, based on exposure assumptions relative to incidental ingestion of contaminants in soils. The DEC applies to accessible soil to a depth of 15 feet. The DEC for substances other than PCBs does not apply to inaccessible soil at a release area provided that, if such inaccessible soil is less than 15 feet below the ground surface, an environmental land-use restriction (ELUR) is in effect with respect to the subject release area.

Inaccessible soil generally means polluted soil which is the following:

- More than four feet below the ground surface;

- More than two feet below a paved surface comprised of a minimum of three inches of bituminous pavement or concrete;
- Beneath an existing building; or
- Beneath another permanent structure(s) approved by the CTDEEP Commissioner. Buildings can be constructed and/or clean fill can be placed over contaminated soils rendering them inaccessible.

The CTDEEP has established two sets of DEC using exposure assumptions appropriate for residential land use (RES DEC) or for industrial and certain commercial land use (I/C DEC). In general, all sites are required to be remediated to the residential criteria. If the industrial/commercial land use criteria are applicable and used, an ELUR notification is required in accordance with the RSRs.

4.1.2 Pollutant Mobility Criteria

The PMC that are utilized for remediation determination of a site depends on the groundwater classification of the site. The Site is within in a GB groundwater classified area.

The PMC generally apply to all soil in the unsaturated zone, from the ground surface to the seasonal high water table in GB classified areas. The criteria do not apply to environmentally isolated soils that are polluted with substances other than VOCs provided that an ELUR is recorded for the release area which ensures that such soils will not be exposed (unless approved in writing by the CTDEEP Commissioner). Environmentally isolated soils are defined as certain contaminated soils which are below the seasonal low water table, beneath an existing building and not a source of ongoing contamination. An ELUR must be recorded for the site which ensures that such soils will not be exposed as a result of building demolition or other activities. Buildings can be constructed over contaminated soils rendering them environmentally isolated.

Remediation based upon the listed PMC requires that a substance, other than an inorganic substance or PCB, in soil be remediated to at least that concentration at which the results of a mass analysis of soil for such substances does not exceed the PMC applicable to the groundwater classification (i.e., GA or GB) of the area in which the soil is located. An inorganic substance or PCB in soil must be remediated to at least that concentration at which the analytical results of leachate produced from SPLP does not exceed the PMC applicable to the groundwater classification of the area in which the soil is located. As an alternative method for determining compliance with the PCM the analytical results of leachate produced from SPLP for most volatile, semi-volatile and petroleum compounds can be compared to the Groundwater Protection Criterion (GWPC) for such substance.

4.2 Groundwater Remediation Criteria

Groundwater remediation requirements are dependent upon the groundwater classification of the site. The objectives of these standards are the following:

- Protect existing use of groundwater regardless of the area's groundwater classification;
- Prevent further degradation of groundwater quality;
- Prevent degradation of surface water from discharges of contaminated groundwater; and
- Protect human health and the environment.

Portions of the RSRs governing groundwater regulate remediation of groundwater based on each substance present within the plume and by each distinct plume of contamination. Several factors influence the remediation goal at a given site, including: background water quality, the groundwater classification, the proximity of nearby surface water, existing groundwater uses, and the presence of buildings and their usage. When assessing general groundwater remediation requirements, all of these factors must be considered in conjunction with the major numeric components of the RSRs.

In general, remediation of a groundwater plume in a GB groundwater classified area shall result in the attainment of the following:

- The Surfacewater Protection Criteria;
- The Volatilization Criteria; and
- Not interfere with any existing usage of the groundwater.

5 SUBSURFACE INVESTIGATION ACTIVITIES

The primary objective of this investigation was to obtain sufficient information on subsurface conditions in order to provide an understanding on how these conditions will affect the redevelopment of the Site. To achieve the stated objectives, the subsurface investigation activities were designed to include both environmental setting and contaminant identification investigations.

The approach, procedures and results of the site investigation activities are presented in the following sections.

5.1 Soil Sampling and Analysis

The primary purpose of the soils characterization portion of the assessment was to define the nature/presence of target contaminants in the unconsolidated materials in both the saturated and unsaturated zones associated with historical Site activities. In addition, the boring program also provided information on Site stratigraphy and physical properties of the unconsolidated materials in both the saturated and unsaturated zones with particular emphasis on the characteristics of those materials that affect contaminant migration pathways and transport mechanisms.

This section describes the specific soil borings and sampling performed in order to define Site stratigraphy, soil properties and soil contaminant profiles.

5.1.1 Soil Sampling

Soil sampling activities were conducted between the dates of May 12 through May 14, 2015. A total of ten soil borings were advanced at the Site as part of the investigation. New England Boring Contractors of Glastonbury, CT advanced the soil borings utilizing a hollow stemmed auger (HSA) drilling rig under the direct supervision of Freeman Companies field personnel. The location for each of the soil borings was chosen to maximize the information obtained based on Freeman Companies' understanding of existing site conditions. A figure depicting the locations of sampling activities is included in Appendix A. Boring and well completion logs are provided in Appendix B.

The following sections provide a summary of soil investigation drilling details.

5.1.2 Soil Sampling Via Hollow Stemmed Auger

All ten soil borings (B-1 through B-10) were advanced using a HSA drill rig spinning 4 ¼-inch inner diameter augers. Soil samples were collected with stainless steel, 2-inch diameter, two-foot split-spoon sampler advanced ahead of the augers in two-foot intervals using a weighted hammer. In general, sampling was conducted semi continuously at 2 foot intervals into the observed water table.

5.1.3 Soil Screening and Submittal

Upon retrieval of each soil sample, the supervising field personnel visually inspected each sample for staining, color, and moisture content and then characterized and logged each sample.

Following the completion of each soil boring and related soil sample collection activities, the resulting boreholes were backfilled with either the drill cuttings that were generated from the borehole and/or with virgin well materials.

Soil samples submitted for laboratory analysis were selected based on the groundwater interface zone and/or the identification of a contaminate migration pathways to the environment (HSA borings) and at predetermined depths for the manual soil borings. The selected soil samples were submitted to Phoenix Analytical laboratories of Manchester, CT and analyzed for those constituents that have the potential to be released to the subsurface due to current or historical activities related to the REC investigated. Based on the constituents of concern for each of the AOCs, the soil samples were analyzed for one or more of the following analysis:

- Volatile Organic Compounds (VOCs) in accordance with EPA Method 8260
- ETPH in accordance with CTDEEP extractable total petroleum hydrocarbons methodologies
- Poly-aromatic hydrocarbons (PAHs) via EPA Method 8270
- Total CT listed metals
- Leachable CT listed metals via the Synthetic Precipitation Leaching Procedure
- PCB's in accordance with EPA Method 8082

5.1.4 Sample Management

All soil and groundwater analytical samples were collected in laboratory-supplied containers and chilled immediately on ice for transit to the laboratory. Freeman Companies personnel maintained possession of the samples until transfer to a laboratory provided courier for transit to the laboratory. A chain-of-custody form accompanied the samples from their collection point to delivery at Phoenix. Complete chain-of-custody forms are included with the laboratory analytical data reports as provided in Appendix C.

5.2 Monitoring Well Installation Activities

The primary purpose of the groundwater characterization portion of the investigation was to determine the presence of contaminants of concern relative to historical site activities. In addition, the well installation program was designed to define groundwater elevations and aquifer characteristics across the Site in order to understand and evaluate potential contaminant fate and transport pathways/mechanisms.

Three overburden-monitoring wells (MW-1 through MW-3) were set to depths of approximately 12 to 16 feet below grade. The wells are constructed of approximately 10 feet of 2-inch diameter, 0.010-inch slotted PVC screen, with 2-inch PVC riser extending to grade. The annular space around the wells was filled with #2 sand extending up to approximately 1-2 feet above the screen. An approximate six inch layer of bentonite was placed above the sand pack to form a seal. Native fill and/or well sand was then used to fill the remaining borehole to grade. Each well was finished with an eight-inch diameter flush mounted road box set in concrete. A figure depicting monitoring well locations is included in Appendix A. Well construction logs are presented as Appendix B.

5.3 Groundwater Sampling

The primary purpose of the groundwater characterization portion of the site investigation was to attempt to identify the nature groundwater impacts from historic usage of the Site. In addition, the groundwater characterization portion of the site investigation was also used to define groundwater elevations and aquifer characteristics across the study area in order to understand and evaluate potential contaminant fate and transport pathways and mechanisms.

Freeman Companies personnel collected groundwater samples from the newly installed monitoring wells on May 18, 2015. Groundwater sampling was conducted using low flow procedures in general accordance with Region I EPA's Low Stress (low flow) Purging and Sampling Procedure (July 30, 1996, revised January 19, 2010). Purging and sampling were performed using an adjustable rate pneumatic bladder pump with dedicated polyethylene tubing for all sampled wells. Pump intake depths were selected to coincide with the center-of-saturated-screen elevations for the deep wells and the top of the saturated screens for the shallow water table wells.

Purged volumes were based on the rate of stabilization of field-measured water quality parameters, including: dissolved oxygen, specific conductance, temperature, pH, turbidity, and oxidation/reduction potential were obtained.

Field parameters were generally measured at five minute intervals; purging rates and water levels were also measured. Purged water from the wells did not exhibit any visual or olfactory evidence of impact such as odors and/or sheen. Due to the nature of the formation (urban fill) turbidity readings remained above the target of 5 NTUs, even after extended pumping.

Groundwater samples were collected from each well and submitted on ice to Phoenix for analysis. The following analyses were performed on all submitted groundwater samples:

- VOCs by EPA Method 8260
- PAHs via EPA Method 8270
- Total CT listed metals

Due to the turbid nature of the collected samples, ranging from 30 NTUs to 500 NTUs, the groundwater samples were also analyzed for total dissolved (filtered to remove turbidity) metals in order to evaluate interferences due to the turbidity.

5.4 Soil Sampling Results

Soil encountered during the advancement of the soil borings consisted primarily of brown, fine to medium sand. A layer of silt and clay was encountered at a depth of 11 feet below grade within boring FC-4. Bedrock was not encountered at any boring locations.

Based on non-restricted property use, guidance standards used for soil at the Site would be the Residential Direct Exposure Criteria (RDEC) and the Pollutant Mobility Criteria (PMC) for an area with a GB groundwater classification.

Laboratory analysis of the soil samples collected from sample locations B-5, B-7 and B-8, identified the presence of one or more of the following; poly aromatic hydrocarbons, total petroleum hydrocarbons, total arsenic and/or PCBs at concentrations exceeding the RDEC and/or the GB PMC.

A summary of the soil analytical results is presented in Table 1, within Appendix D and a copy of the laboratory analytical report is included as Appendix C.

5.5 Groundwater Sampling Results

Groundwater samples were collected from each monitoring well with dedicated sampling equipment in order to assess current water quality and to evaluate for the presence and distribution of contaminants in groundwater that may have originated from the Site or potentially from off-site locations. Samples were stored in laboratory provided glassware and submitted for analysis at for the suite of analytes identified based upon historic or current suspected potential sources of contamination. These parameters were used to indicate the presence of contaminants in groundwater and provided a basis for correlation with chemical data derived from the soil results.

Based on current land use and a GB groundwater classification, remediation guidance used for groundwater at the Site would be the Residential Volatilization Criteria (RES VC) and the Surface Water Protection Criteria (SWPC).

Analytical Results did not detect the presence of any volatile organic compounds at concentrations that exceeded the RES VC.

Analytical results of the poly aromatic hydrocarbons identified the presence of one or more of the following; benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and phenanthrene at concentration exceeding the default SWPC within the samples collected from MW-2 and MW-3.

Analytical results of the total metals analysis primarily detected the presence of one or more of the following metals; arsenic, copper, lead, mercury, and zinc at concentrations exceeding the default SWPC within the samples collected

from MW-1 and MW-3. Due to elevated turbidity levels that were encountered during sampling, the groundwater samples were filtered in order to remove suspended sediments and analyzed dissolved metals. Dissolved metals results did not indicate the presence of any metals exceeding the default SWPC.

A summary of the groundwater analytical results is presented as Table 2 in Appendix D, and a copy of the laboratory analytical report is included in Appendix C.

6 SOIL REUSE/DISPOSAL

Based on the findings of the assessment activities, the following general assumptions can be made regarding the soil at the site.

- Native soils may be managed as clean fill after confirmatory testing has been completed to ensure status as clean fill.
- Any urban fill material disturbed as part of proposed site activities shall be at a minimum be managed as a Regulated Soil.
- Urban fill material disturbed from the central portion of the site shall be classified as contaminated and must be removed from the site for proper disposal.
- Polluted soils may be reused on-site following site specific requirements

Further management/reuse discussions are provided in the following sections.

6.1 Soil Classifications

Based in the analytical results from the samples collected as part of the assessment activities the following soil types will be encountered as part of proposed site activities.

6.1.1 Clean Fill

Chemically clean fill that meets the definition of natural soil as defined in Sec. 22a-209-1 and Sec. 22a-133k-2(h) of the Regulations of Connecticut State Agencies (RCSA). Clean fill does not contain any substances above natural background levels. It is anticipated that a majority of native soils excavated from the project area will meet this definition of Clean Fill. Actual volumes will be determined by further analytical testing.

6.1.2 Polluted Soil

Soil affected by a release of a substance at a concentration above the analytical detection limit for such substance in accordance with RCSA 22a-133k-1(a)(45) and below the Residential Direct Exposure criteria and the GB Pollutant Mobility criteria as these terms are described in the Remediation Standard Regulations (RCSA 22a-133k-1 through 3). It is anticipated that a portion of the Urban Fill material will meet this definition. In most cases polluted soil may be reused at the project site with restriction.

6.1.3 Contaminated Soil

Soil affected by an identified or suspected release and determined, or reasonably expected to contain substances exceeding Residential Direct Exposure Criteria or GB Pollutant Mobility Criteria, as these terms are defined in the Remediation Standard Regulations (RCSA Section 22a-133k-1). It is anticipated that a majority of the Urban Fill located within the central portion of the project area will meet this soil type. In all cases contaminated soil disturbed as part of construction activities shall be removed from the site for proper disposal.

6.1.4 PCB Impacted Soil

Soil affected by a release of PCB at an as found concentration above 1 mg/Kg but <50 mg/kg for PCB. Soil will require special handling and management and will also require approvals for disposal at an approved disposal facility. It is anticipated that a small portion of the Urban Fill material, particularly located within the central portion of the site will meet this definition.

6.1.5 PCB Remediation Waste

Soil affected by a release of PCB at an as found concentration of >50 mg/kg. Soil remediation and management must be conducted under TSCA requirements within 40 CFR 761. It is not anticipated that any soil will meet the requirement of this criteria.

6.1.6 Hazardous Soil

Soil is classified as hazardous waste if it exhibits a hazardous waste characteristic or if it contains Resource Conservation and Recovery Act (RCRA) listed hazardous constituents above Connecticut's RCRA "Contained-In" Policy dated May 2002. It is not anticipated that any soil will meet the requirement of this criteria.

6.1.7 Regulated Soil

Regulated Soil includes Polluted Soil and Contaminated Soil. It is anticipated that almost all soil generated from site activities will be regulated

6.2 Soil Management

Based on the analytical results the testing conducted soil management activities for the handling and management of excavated material encountered during demolition/construction will be required. It is not intended that any soil remediation be conducted outside the limits of excavation anticipated for the project as designed.

All handling and management operations should be conducted in accordance with standard engineering practices applicable to such activity and in accordance with CTDEEP regulations including but not limited to the procedures contained in the CTDEEP General Permit for Contaminated Soil and/or Sediment Management.

Depending on the selected management approach, soils within the project area can be ether pre-classified, stockpiled and classified, or assumed to be contaminated.

All stockpiles of Regulated Soil should be constructed to isolate stored Regulated Soil from the environment. Stockpiles shall be constructed to include liners free of holes and other damage. The ground surface on which the liner is to be placed shall be free of rocks or and any other object which could damage the liner.

Regulated Soil cannot be stockpile off site unless a registration has been submitted to and approved by the CTDEEP under the General Permit for Contaminated Soil and/or Sediment Management.

6.3 Allowable Reuse Options

Polluted Soil may be reused in accordance with the following requirements:

- Reused on site as backfill in locations above the water table and not in areas subject to erosion in accordance with requirements of Section 22a-133K of the RCSA. The backfill location and depth shall be documented in a scaled drawing for any Polluted Soil that is reused on site. Any backfill material shall meet the structural/compaction geotechnical requirements.

- If the polluted soil is not suitable for reuse, the material shall be managed, disposed of, treated or recycled in accordance CTDEEP regulations

6.4 Health and Safety

All site health and safety controls shall be fully established and in operation prior to beginning any material handling activity. Site controls shall include but not be limited to the following: work zones properly barricaded, decontamination facilities established, air monitoring, and all support equipment and supplies including personal protective equipment.

7 WASTEWATER HANDLING

Based on the analytical testing conducted as part of this evaluation, it is anticipated that a majority of the dewatering wastewater generated from the project area will be contain some degree of contaminants, primarily metals and poly aromatic hydrocarbons, and therefore will likely require specific handling and management procedures to be implemented.

7.1 Allowable Disposal Options

Management of dewatered groundwater may be accomplished in accordance with CTDEEP General Permit for the Discharge of Groundwater Remediation Wastewater Directly to Surface Water (Storm sewers discharging to surface waters) and local regulations and ordinances or through the CTDEEP General Permit Groundwater Remediation Wastewater to a Sanitary Sewer and local regulations and ordinances.

7.2 Storage Options

If there is a need for storage of wastewater prior to discharge, fractionation tanks with a capacity of at least 20,000 gallons may be used. The tanks shall be equipped with a sample port to facilitate safe sampling of tank contents. Discharge valve shall be capable of controlling discharge flow rate.

7.3 Treatment Options

If it is necessary to treat the water in order to meet discharge limits, an activated carbon treatment and filtration system, sized to treat water with a minimum influent total volatile organic compound concentrations necessary to meet discharge goals, may be implemented. Systems of this type shall include one or more of the following components: pumps; piping; bag or cartridge filters; carbon treatment vessels; Influent, midpoint and effluent sampling ports and system flow meters.

7.4 Health and Safety

All site health and safety controls shall be fully established and in operation prior to beginning any material handling activity. Site controls shall include but not be limited to the following: work zones properly barricaded, decontamination facilities established, and all support equipment and supplies including personal protective equipment.

8 ENVIRONMENTAL REMEDIATION AND DISPOSAL COSTS

Freeman Companies conducted and environmental evaluation of the project area in order to obtain a better understanding of the subsurface conditions that may be encountered as part site demolition and construction activities.

Soil conditions encountered within soil borings consisted of sand (natural soil) overlain by various thicknesses of fill, which contained a variety of debris (asphalt, crushed brick, concrete), and other manmade material debris.

Analytical results identified that the fill material is generally impacted by a combination of poly aromatic hydrocarbons, metals and PCBs. Due to the presence of poly aromatic hydrocarbons, contaminated soils can be distinguished by both odor and discoloration.

In order to be protective of human health, Freeman Companies recommends that the following actions be taken for fill material encountered at the site:

- The removal of all contaminated fill to a depth of at least four feet below unpaved ground surfaces and two feet below paved surfaces; and
- The removal of all soil identified to be impacted by PCBs at concentrations of >1 mg/kg

The removed contaminated fill can either be removed from the site for disposal at a permitted disposal facility.

Due to the fact that the site will be re-graded following demolition activities, the Owner should attempt to reused polluted fill material to the maximum extent prudent upon the completion of demolition (i.e. within former building foundation excavations, within former tunnel excavations, as backfill within areas of remediation).

8.1 Remedial Costs

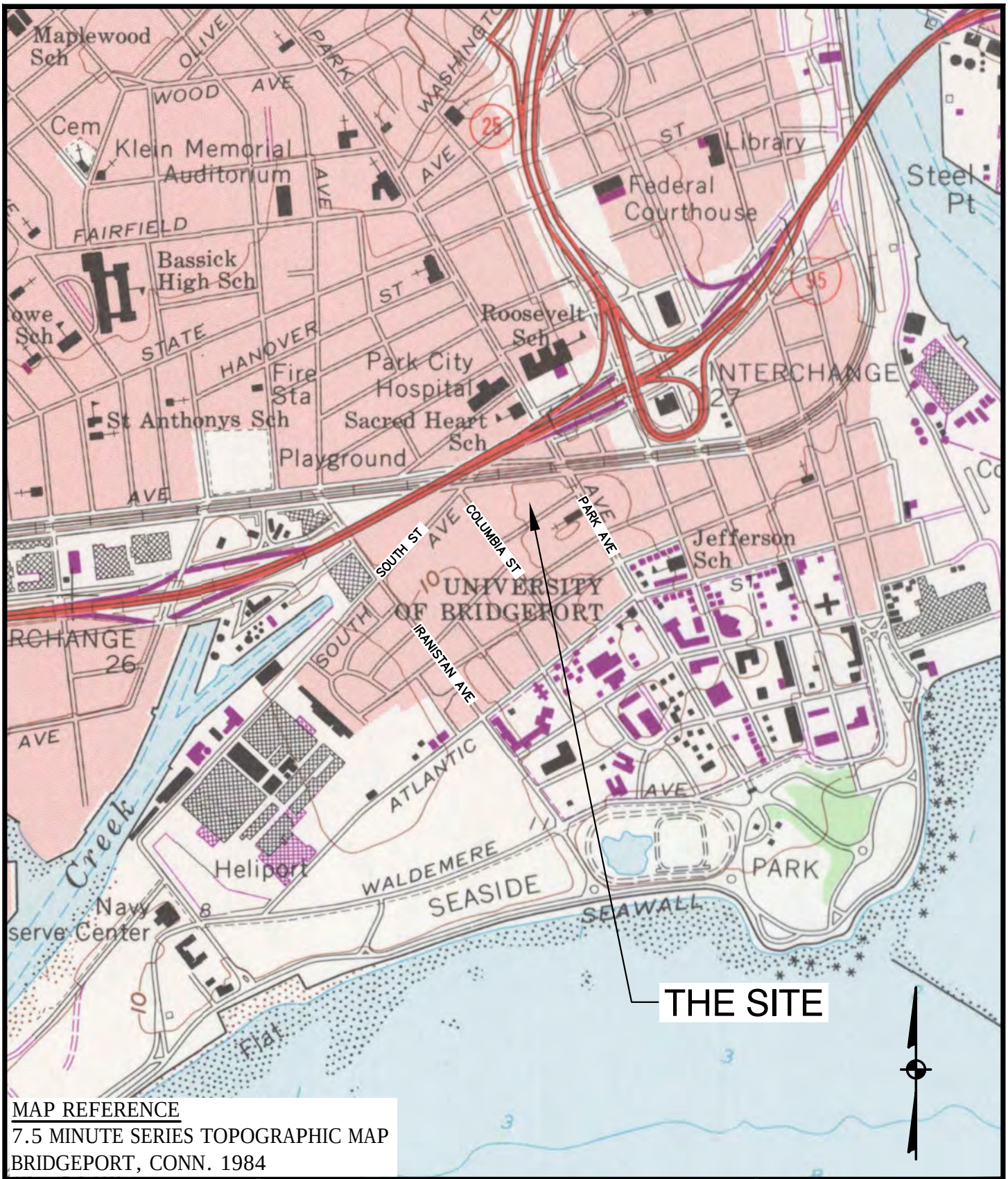
Based on the analytical results, the soil represented by the samples collected from borings B-5 and B-7 should be considered as contaminated and therefore Freeman Companies would recommend that any excavated material from within this area should be removed from the Site for proper disposal.

Based on initial estimates, approximately 2,000 – 5,000 tons of contaminated soil may need to be removed as part of the demolition activities. Freeman Companies estimates that the environmental costs associated with transportation and disposal of the Regulated soil to be approximately $50-70/ton for soils with PCB concentrations of <2 mg/kg and can be accepted at a Massachusetts landfill.

In addition, freeman companies would recommend that additional sampling be conducted during demolition activities in order to better define remedial areas and to continue the delineation/characterization of soils to remain on the site. Since the constituents of concern have been defined through evaluation testing, soil testing parameters may be limited to just PAHs, total arsenic and PCBs. Costs for analysis is estimated at $175/sample which will include all three parameters.

APPENDIX A

MAPS AND FIGURES



MAP REFERENCE
7.5 MINUTE SERIES TOPOGRAPHIC MAP
BRIDGEPORT, CONN. 1984

FREEMAN COMPANIES
LAND DEVELOPMENT · ENGINEERING DESIGN · CONSTRUCTION SERVICES
FREEMAN COMPANIES, LLC
36 JOHN STREET
HARTFORD, CT 06106
WWW.FREEMANCOS.COM
(860)251-9550
TOLL FREE:(800)604-5141
FAX:(860)986-7161
ELEVATE YOUR EXPECTATIONS

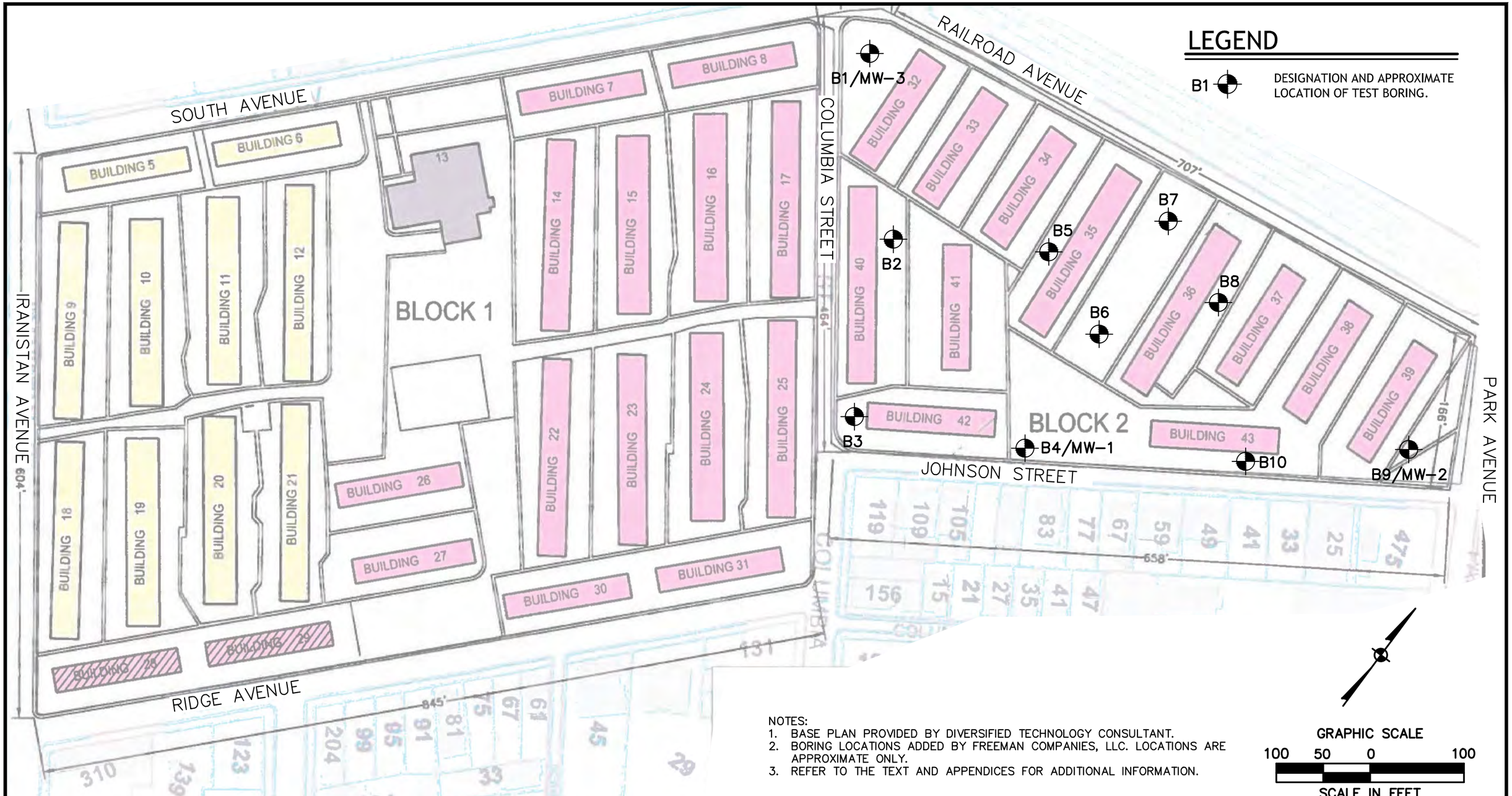
SITE LOCATION MAP

MARINA VILLAGE HOUSING COMPLEX
REDEVELOPMENT
BRIDGEPORT, CONNECTICUT

DRAFTED:	C.B.
CHECKED:	A.M.
APPROVED:	N.W.
SCALED:	1"=1000'
PROJECT NO.:	2015-0408
DATE:	05/29/15

FIG.

FIGURE 1



NOTES:
1. BASE PLAN PROVIDED BY DIVERSIFIED TECHNOLOGY CONSULTANT.
2. BORING LOCATIONS ADDED BY FREEMAN COMPANIES, LLC. LOCATIONS ARE APPROXIMATE ONLY.
3. REFER TO THE TEXT AND APPENDICES FOR ADDITIONAL INFORMATION.

GRAPHIC SCALE
100 50 0 100
SCALE IN FEET

SUBSURFACE EXPLORATION LOCATION PLAN

MARINA VILLAGE HOUSING COMPLEX REDEVELOPMENT
BRIDGEPORT, CONNECTICUT

FREEMAN COMPANIES
LAND DEVELOPMENT | ENGINEERING DESIGN | CONSTRUCTION SERVICES
FREEMAN COMPANIES, LLC
36 JOHN STREET
HARTFORD, CT 06106
WWW.FREEMANCOS.COM
(860)251-9550
TOLL FREE:(800)604-5141
FAX:(860)986-7161
ELEVATE YOUR EXPECTATIONS

No.	Date	Description
–	–	–

REVISIONS

DESIGNED:	AM
DRAWN:	CB
CHECKED:	AM
APPROVED:	NW
SCALE:	1"=100'
PROJECT NO.:	2015-0408
DATE:	05/29/15

SHEET NO.

FIGURE 2

APPENDIX B

BORING AND WELL COMPLETION LOGS

Exploration Location

NORTHING: _____ **EASTING:** _____ **STATION:** _____ **OFFSET:** _____

HORIZONTAL DATUM: _____ **STATION CENTERLINE:** _____

VERTICAL DATUM: _____ **ESTIMATED GROUND SURFACE ELEV. (FT):** _____

LOCATION: _____

EXPLORATION

B-1/MW-3

Drilling Information

DATE START / END: 5/14/2015 - 5/14/2015 **TOTAL DEPTH (FT):** 17.0

CONTRACTOR: New England Boring **DRILLER:** Mike St. John **LOGGED BY (Person):** J. Herpich

EQUIPMENT: _____ **EXPLORATION TYPE/METHOD:** Hollow Stem Auger

AUGER ID/OD: 4.25 in / N/A **CASING ID/OD:** N/A / N/A **CORE INFO:** _____

HAMMER TYPE: Safety Hammer **HAMMER WEIGHT (lbs):** 140 **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▼ 8.00 5/14/2015 ▼ 6.40 5/18/2015

GENERAL NOTES: _____

ABBREVIATIONS:

ID = Inside Diameter	bpf = Blows per Foot	U = Undistrubed Tube Sample	WOH = Weight of Hammer	S_v = Pocket Torvane Shear Strength
OD = Outside Diameter	mpf = Minute per Foot	C = Rock Core	RQD = Rock Quality Designation	F_v = Field Vane Shear Strength
Pen. = Penetration Length	S = Split Spoon	SC = Sonic Core	PID = Photoionization Detector	NA, NM = Not Applicable, Not Measured
Rec. = Recovery Length	DP = Direct Push Sample	WOR = Weight of Rods	Q_v = Pocket Penetrometer Strength	

Elev. (ft)	Depth (ft)	Casing Pen. (bpf) or Core Rate (mpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sample Description & Classification	H_20 Depth	WELL CONSTRUCTION DETAILS
			S-1		0.25 to 2.25	24/18	23-8-7-10			ASPHALT (1 in.)		backfill cuttings
										(0.1'- 0.3') POORLY GRADED GRAVEL (GP); ~100% gravel, coarse; dry, black, FILL.		6" bentonite seal. 1/4 bag
										(0.3'- 3') SILTY SAND (SM); ~75% sand, fine to coarse, ~15% fines, ~10% gravel, fine to medium; brown, FILL, with crushed brick.		
										(3'- 7') SILTY SAND WITH GRAVEL (SM); ~50% sand, fine to medium, ~35% gravel, coarse, ~15% fines; brown, FILL, with crushed brick, glass, black material (odor).		
			S-2		4 to 6	24/6	3-2-7-22				▼	
	5											#2 sand for sand pack. 3 bags.
			S-3		8 to 10	24/20	9-12-12-14			(7'- 16') POORLY GRADED SAND (SP); ~85% sand, medium to coarse, ~10% gravel, fine, ~5% fines; brown.	▼	2" diamter PVC Screen, 0.010 slot size
	10											
			S-4		15 to 17	24/18	5-8-14-20			(16'- 17') SANDY SILT (ML); ~60% fines, ~40% sand, fine to medium; brown.		17' bottom depth of boring, backfill cuttings, PVC plug
	15									Bottom of Exploration at 17 feet		
	20											

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

LOGGED BY (Consultant): Freeman Companies, LLC
PROJECT NAME: Marina Village Housing Complex Redeve
CITY/STATE: Bridgeport, CT
PROJECT NUMBER: 2015-0408

Freeman Companies, LLC
36 John Street
Hartford, CT 06102
(860) 251-9550
www.freemancos.com

FREEMAN COMPANIES PROJECT 2015-0408 - MARINA VILLAGE.GPJ GINT STD US LAB.GDT 5/29/15

Exploration Location

NORTHING: _____ **EASTING:** _____ **STATION:** _____ **OFFSET:** _____
HORIZONTAL DATUM: _____ **STATION CENTERLINE:** _____
VERTICAL DATUM: _____ **ESTIMATED GROUND SURFACE ELEV. (FT):** _____
LOCATION: _____

EXPLORATION

B-2

Drilling Information

DATE START / END: 5/12/2015 - 5/12/2015 **TOTAL DEPTH (FT):** 17.0
CONTRACTOR: New England Boring **DRILLER:** Mike St. John **LOGGED BY (Person):** J. Herpich
EQUIPMENT: _____ **EXPLORATION TYPE/METHOD:** Hollow Stem Auger
AUGER ID/OD: N/A / N/A **CASING ID/OD:** N/A / N/A **CORE INFO:** _____
HAMMER TYPE: Safety Hammer **HAMMER WEIGHT (lbs):** 140 **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▼ 8.00 5/12/2015
GENERAL NOTES: _____

ABBREVIATIONS:
ID = Inside Diameter; OD = Outside Diameter; Pen. = Penetration Length; Rec. = Recovery Length
bpf = Blows per Foot; mpf = Minute per Foot; S = Split Spoon; DP = Direct Push Sample
U = Undistrubed Tube Sample; C = Rock Core; SC = Sonic Core; WOR = Weight of Rods
WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector; Q_v = Pocket Penetrometer Strength
S_v = Pocket Torvane Shear Strength; F_v = Field Vane Shear Strength; NA, NM = Not Applicable, Not Measured

Elev. (ft)	Depth (ft)	Casing Pen. (bpf) or Core Rate (mpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sample Description & Classification	H_20 Depth	Remarks
			S-1		0 to 2	24/19	2-6-13-6			TOPSOIL		
										(1'- 1.5') POORLY GRADED SAND WITH GRAVEL (SP); ~70% sand, fine to coarse, ~25% gravel, fine to coarse, ~5% fines; tan, FILL, asphalt pieces.		
										(1.5'- 3') POORLY GRADED SAND WITH GRAVEL (SP); ~50% sand, fine to coarse, ~45% gravel, fine to coarse, ~5% fines; brown, FILL, crushed concrete and asphalt.		
			S-2		4 to 6	24/23	2-1-1-3			(3'- 4.9') SILTY SAND (SM); ~70% sand, fine to coarse, ~30% fines; brown.		
	5									(4.9'- 16.3') POORLY GRADED SAND (SP); ~95% sand, medium to coarse, ~5% fines; tan.		
			S-3		8 to 10	24/24	8-10-10-11				▼	
	10											
	15		S-4		15 to 17	24/24	15-14-16-18					
										(16.3'- 17') SILT (ML); ~80% fines, ~20% sand; wet, light brown.		
										Bottom of Exploration at 17 feet		
	20											

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

LOGGED BY (Consultant): Freeman Companies, LLC
PROJECT NAME: Marina Village Housing Complex Redeve
CITY/STATE: Bridgeport, CT
PROJECT NUMBER: 2015-0408

Freeman Companies, LLC
36 John Street
Hartford, CT 06102
(860) 251-9550
www.freemancos.com

Exploration Location

NORTHING: _____ **EASTING:** _____ **STATION:** _____ **OFFSET:** _____

HORIZONTAL DATUM: _____ **STATION CENTERLINE:** _____

VERTICAL DATUM: _____ **ESTIMATED GROUND SURFACE ELEV. (FT):** _____

LOCATION: _____

EXPLORATION

B-3

Drilling Information

DATE START / END: 5/12/2015 - 5/12/2015 **TOTAL DEPTH (FT):** 17.0

CONTRACTOR: New England Boring **DRILLER:** Mike St. John **LOGGED BY (Person):** J. Herpich

EQUIPMENT: _____ **EXPLORATION TYPE/METHOD:** Hollow Stem Auger

AUGER ID/OD: N/A / N/A **CASING ID/OD:** N/A / N/A **CORE INFO:** _____

HAMMER TYPE: Safety Hammer **HAMMER WEIGHT (lbs):** 140 **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▼ 8.00 5/12/2015

GENERAL NOTES: _____

ABBREVIATIONS:

ID = Inside Diameter	bpf = Blows per Foot	U = Undistrubed Tube Sample	WOH = Weight of Hammer	S_v = Pocket Torvane Shear Strength
OD = Outside Diameter	mpf = Minute per Foot	C = Rock Core	RQD = Rock Quality Designation	F_v = Field Vane Shear Strength
Pen. = Penetration Length	S = Split Spoon	SC = Sonic Core	PID = Photoionization Detector	NA, NM = Not Applicable, Not Measured
Rec. = Recovery Length	DP = Direct Push Sample	WOR = Weight of Rods	Q_v = Pocket Penetrometer Strength	

Elev. (ft)	Depth (ft)	Casing Pen. (bpf) or Core Rate (mpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sample Description & Classification	H_20 Depth	Remarks
			S-1		0.2 to 2.2	24/13	8-8-5-9			ASPHALT (2 in.) (0.2'- 2.2') POORLY GRADED SAND WITH GRAVEL (SP); ~60% sand, medium to coarse, ~30% gravel, fine, ~10% fines; dry, tan, FILL, conrete, asphalt and brick pieces (fill). (2.2'- 5') SILTY SAND (SM); ~60% sand, fine to coarse, ~25% gravel, fine, ~15% fines; dry, tan, FILL, conrete, asphalt and brick pieces (fill).		
			S-2		4 to 6	24/14	2-4-3-4					
	5									(5'- 12.5') POORLY GRADED SAND (SP); ~95% sand, coarse, ~5% fines; dry, tan, FILL.		
			S-3		8 to 10	24/24	6-5-7-8				▼	
	10											
										(12.5'- 16.4') POORLY GRADED SAND (SP); ~85% sand, medium to coarse, ~10% gravel, fine, ~5% fines; wet, brown.		
	15		S-4		15 to 17	24/24	22-24-27-28					
										(16.4'- 17') SILT (ML); ~60% fines, ~40% sand; wet, light brown. Bottom of Exploration at 17 feet		
	20											

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

LOGGED BY (Consultant): Freeman Companies, LLC
PROJECT NAME: Marina Village Housing Complex Redeve
CITY/STATE: Bridgeport, CT
PROJECT NUMBER: 2015-0408

Freeman Companies, LLC
36 John Street
Hartford, CT 06102
(860) 251-9550
www.freemancos.com

Exploration Location

NORTHING: _____ **EASTING:** _____ **STATION:** _____ **OFFSET:** _____

HORIZONTAL DATUM: _____ **STATION CENTERLINE:** _____

VERTICAL DATUM: _____ **ESTIMATED GROUND SURFACE ELEV. (FT):** _____

LOCATION: _____

EXPLORATION

B-4/MW-1

Drilling Information

DATE START / END: 5/13/2015 - 5/13/2015 **TOTAL DEPTH (FT):** 17.0

CONTRACTOR: New England Boring **DRILLER:** Mike St. John **LOGGED BY (Person):** J. Herpich

EQUIPMENT: _____ **EXPLORATION TYPE/METHOD:** Hollow Stem Auger

AUGER ID/OD: 4.25 in / N/A **CASING ID/OD:** N/A / N/A **CORE INFO:** _____

HAMMER TYPE: Safety Hammer **HAMMER WEIGHT (lbs):** 140 **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▼ 8.00 5/13/2015 ▼ 7.56 5/18/2015

GENERAL NOTES: _____

ABBREVIATIONS:

ID = Inside Diameter	bpf = Blows per Foot	U = Undistrubed Tube Sample	WOH = Weight of Hammer	S_v = Pocket Torvane Shear Strength
OD = Outside Diameter	mpf = Minute per Foot	C = Rock Core	RQD = Rock Quality Designation	F_v = Field Vane Shear Strength
Pen. = Penetration Length	S = Split Spoon	SC = Sonic Core	PID = Photoionization Detector	NA, NM = Not Applicable, Not Measured
Rec. = Recovery Length	DP = Direct Push Sample	WOR = Weight of Rods	Q_v = Pocket Penetrometer Strength	

Elev. (ft)	Depth (ft)	Casing Pen. (bpf) or Core Rate (mpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sample Description & Classification	H_20 Depth	WELL CONSTRUCTION DETAILS
			S-1		0.1 to 2.1	24/2	20-9-10-4			ASPHALT (1 in.) (0.1'- 0.4') POORLY GRADED GRAVEL (GP); ~60% gravel, medium to coarse, ~40% sand, fine; FILL.		backfill cuttings
			S-2		2 to 4	24/9	4-2-3-3			(0.4'- 2.1') POORLY GRADED GRAVEL WITH SAND (GP); ~60% gravel, medium to coarse, ~40% sand, fine; dry, black, FILL.		6" bentonite seal. 1/4 bag
			S-3		4 to 6	24/15	4-6-8-12			(2.1'- 2.5') SILTY SAND (SM); ~60% sand, fine, ~40% fines; dry, tan, FILL. (2.5'- 4') POORLY GRADED SAND WITH SILT AND GRAVEL (SM); ~70% sand, fine, ~20% fines, ~10% gravel, coarse, angular; dry, brown, FILL, asphalt pieces.		
	5									(4'- 9') POORLY GRADED SAND WITH GRAVEL (SP); ~90% sand, fine to coarse, ~10% gravel, fine; wet, tan.	▼ ▼	# sand for sand pack
			S-4		8 to 10	24/24	4-9-14-43					2" diamter PVC Screen, 0.010 slot size
	10									(9'- 12.5') SILTY SAND (SM); ~50% sand, fine to medium, ~40% fines, ~10% gravel, fine to coarse; wet, light brown.		
										(12.5'- 17') SILTY SAND WITH GRAVEL (SC); ~65% sand, medium to coarse, ~20% fines, ~15% gravel, fine to coarse; wet, gray.		
	15		S-5		15 to 17	24/14	18-13-16-18					17' bottom depth of boring, backfill cuttings, PVC plug
										Bottom of Exploration at 17 feet		
	20											

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

LOGGED BY (Consultant): Freeman Companies, LLC
PROJECT NAME: Marina Village Housing Complex Redeve
CITY/STATE: Bridgeport, CT
PROJECT NUMBER: 2015-0408

Freeman Companies, LLC
36 John Street
Hartford, CT 06102
(860) 251-9550
www.freemancos.com

FREEMAN COMPANIES PROJECT 2015-0408 - MARINA VILLAGE.GPJ GINT STD US LAB.GDT 5/29/15

Exploration Location

NORTHING: _____ **EASTING:** _____ **STATION:** _____ **OFFSET:** _____
HORIZONTAL DATUM: _____ **STATION CENTERLINE:** _____
VERTICAL DATUM: _____ **ESTIMATED GROUND SURFACE ELEV. (FT):** _____
LOCATION: _____

EXPLORATION

B-5

Drilling Information

DATE START / END: 5/12/2015 - 5/12/2015 **TOTAL DEPTH (FT):** 8.0
CONTRACTOR: New England Boring **DRILLER:** Mike St. John **LOGGED BY (Person):** J. Herpich
EQUIPMENT: _____ **EXPLORATION TYPE/METHOD:** Hollow Stem Auger
AUGER ID/OD: N/A / N/A **CASING ID/OD:** N/A / N/A **CORE INFO:** _____
HAMMER TYPE: Safety Hammer **HAMMER WEIGHT (lbs):** 140 **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▼ 6.50 5/12/2015
GENERAL NOTES: _____

ABBREVIATIONS:
ID = Inside Diameter; OD = Outside Diameter; Pen. = Penetration Length; Rec. = Recovery Length
bpf = Blows per Foot; mpf = Minute per Foot; S = Split Spoon; DP = Direct Push Sample
U = Undistrubed Tube Sample; C = Rock Core; SC = Sonic Core; WOR = Weight of Rods
WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector; Q_v = Pocket Penetrometer Strength
S_v = Pocket Torvane Shear Strength; F_v = Field Vane Shear Strength; NA, NM = Not Applicable, Not Measured

Elev. (ft)	Depth (ft)	Casing Pen. (bpf) or Core Rate (mpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sample Description & Classification	H_2O Depth	Remarks
			S-1		0 to 2	24/21	2-6-13-17			TOPSOIL (13 in.)		
			S-2		2 to 4	24/22	25-15-32-23			(1.1'- 2') SILTY SAND (SM); ~50% sand, ~50% fines, ~0% gravel; dry, dark brown, FILL, Pieces of brick and asphalt. (2'- 2.75') WELL GRADED SAND (SW); ~100% sand, fine to coarse; dry, light brown, FILL.		
	5		S-3		4 to 6	24/19	17-8-5-6			(2.75'- 4.8') SILTY SAND (SM); ~80% sand, fine, ~20% fines; dry, dark brown, FILL, with brick, asphalt, roof felt, and concrete. (4.8'- 5.4') SANDY SILT (ML); ~70% fines, ~30% sand, fine to coarse; moist, dark brown, FILL.		
			S-4		6 to 8	24/24	4-3-3-18			(5.4'- 6') SILTY SAND (SM); ~80% sand, fine to coarse, ~20% fines; moist, tan, FILL.	▼	
										(6'- 6.4') SANDY SILT (ML); ~70% fines, ~30% sand, fine to coarse; wet, dark brown, FILL. (6.4'- 6.7') SILTY SAND (SM); ~80% sand, medium to coarse, ~20% fines; wet, tan, FILL. (6.7'- 7.6') SILTY SAND WITH GRAVEL (SM); ~50% sand, medium to coarse, ~30% fines, ~20% gravel, fine; wet, tan, FILL.		
	10									(7.6'- 8') SILTY SAND (SM); ~85% sand, fine to medium, ~15% fines; wet, tan.		
										Bottom of Exploration at 8 feet		
	15											
	20											

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

LOGGED BY (Consultant): Freeman Companies, LLC
PROJECT NAME: Marina Village Housing Complex Redevel
CITY/STATE: Bridgeport, CT
PROJECT NUMBER: 2015-0408

Freeman Companies, LLC
36 John Street
Hartford, CT 06102
(860) 251-9550
www.freemancos.com

Exploration Location

NORTHING: _____ **EASTING:** _____ **STATION:** _____ **OFFSET:** _____

HORIZONTAL DATUM: _____ **STATION CENTERLINE:** _____

VERTICAL DATUM: _____ **ESTIMATED GROUND SURFACE ELEV. (FT):** _____

LOCATION: _____

EXPLORATION

B-6

Drilling Information

DATE START / END: 5/13/2015 - 5/13/2015 **TOTAL DEPTH (FT):** 10.0

CONTRACTOR: New England Boring **DRILLER:** Mike St. John **LOGGED BY (Person):** J. Herpich

EQUIPMENT: _____ **EXPLORATION TYPE/METHOD:** Hollow Stem Auger

AUGER ID/OD: N/A / N/A **CASING ID/OD:** N/A / N/A **CORE INFO:** _____

HAMMER TYPE: Safety Hammer **HAMMER WEIGHT (lbs):** 140 **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▼ 7.00 5/13/2015

GENERAL NOTES: _____

ABBREVIATIONS:

ID = Inside Diameter	bpf = Blows per Foot	U = Undistrubed Tube Sample	WOH = Weight of Hammer	S_v = Pocket Torvane Shear Strength
OD = Outside Diameter	mpf = Minute per Foot	C = Rock Core	RQD = Rock Quality Designation	F_v = Field Vane Shear Strength
Pen. = Penetration Length	S = Split Spoon	SC = Sonic Core	PID = Photoionization Detector	NA, NM = Not Applicable, Not Measured
Rec. = Recovery Length	DP = Direct Push Sample	WOR = Weight of Rods	Q_v = Pocket Penetrometer Strength	

Elev. (ft)	Depth (ft)	Casing Pen. (bpf) or Core Rate (mpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sample Description & Classification	H_20 Depth	Remarks
			S-1		0 to 2	24/19	13-17-11-14			ASPHALT (2 in.)		
										(0.2'- 4.7') SILTY SAND WITH GRAVEL (SM); ~65% sand, fine to coarse, ~20% fines, ~15% gravel, fine to coarse; dark brown, FILL, with concrete, brick, and black material.		
			S-2		2 to 4	24/19	13-22-105-30					
			S-3		4 to 6	24/21	15-2-2-2					
	5									(4.7'- 4.8') SILT WITH SAND (ML); ~50% sand, fine, ~50% fines; tan, FILL.		
			S-4		6 to 8	24/19	2-1-1-1			(4.8'- 6') SILT WITH SAND (ML); ~70% sand, fine to coarse, ~30% fines; gray, FILL, with concrete, brick, black material, unknown white material,.	▼	
			S-5		8 to 10	24/24	8-10-15-19			(6'- 7.6') SILTY SAND (SM); ~70% sand, fine to coarse, ~30% fines; tan, FILL.		
										(7.6'- 8.5') SILTY SAND (SM); ~85% sand, fine to coarse, ~15% fines; gray, FILL, with concrete, brick, black material, unknown white material,.		
	10									(8.5'- 10') POORLY GRADED SAND (SP); ~98% sand, fine to coarse, ~2% fines; tan.		
										Bottom of Exploration at 10 feet		
	15											
	20											

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

LOGGED BY (Consultant): Freeman Companies, LLC
PROJECT NAME: Marina Village Housing Complex Redeve
CITY/STATE: Bridgeport, CT
PROJECT NUMBER: 2015-0408

Freeman Companies, LLC
36 John Street
Hartford, CT 06102
(860) 251-9550
www.freemancos.com

Exploration Location

NORTHING: _____ **EASTING:** _____ **STATION:** _____ **OFFSET:** _____

HORIZONTAL DATUM: _____ **STATION CENTERLINE:** _____

VERTICAL DATUM: _____ **ESTIMATED GROUND SURFACE ELEV. (FT):** _____

LOCATION: _____

EXPLORATION

B-7

Drilling Information

DATE START / END: 5/12/2015 - 5/12/2015 **TOTAL DEPTH (FT):** 8.0

CONTRACTOR: New England Boring **DRILLER:** Mike St. John **LOGGED BY (Person):** J. Herpich

EQUIPMENT: _____ **EXPLORATION TYPE/METHOD:** Hollow Stem Auger

AUGER ID/OD: N/A / N/A **CASING ID/OD:** N/A / N/A **CORE INFO:** _____

HAMMER TYPE: Safety Hammer **HAMMER WEIGHT (lbs):** 140 **HAMMER DROP (inch):** 30

WATER LEVEL DEPTHS (ft): ▼ 6.00 5/12/2015

GENERAL NOTES: _____

ABBREVIATIONS:

ID = Inside Diameter	bpf = Blows per Foot	U = Undistrubed Tube Sample	WOH = Weight of Hammer	S_v = Pocket Torvane Shear Strength	
OD = Outside Diameter	mpf = Minute per Foot	C = Rock Core	RQD = Rock Quality Designation	F_v = Field Vane Shear Strength	
Pen. = Penetration Length	S = Split Spoon	SC = Sonic Core	PID = Photoionization Detector	NA, NM = Not Applicable, Not Measured	
Rec. = Recovery Length	DP = Direct Push Sample	WOR = Weight of Rods	Q_v = Pocket Penetrometer Strength		

Elev. (ft)	Depth (ft)	Casing Pen. (bpf) or Core Rate (mpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sample Description & Classification	H_20 Depth	Remarks
			S-1		0 to 2	24/17	9-21-21-39			APHALT (3 in.)		
			S-2		2 to 4	24/24	11-8-4-5			(0.3'- 4.4') SILTY SAND WITH GRAVEL (SM); ~65% sand, fine to medium, ~20% gravel, fine to coarse, ~15% fines; brown, FILL, with asphalt, plastic, and black materials.		
			S-3		4 to 6	24/24	2-2-2-2			(4.4'- 6') SILTY SAND WITH GRAVEL (SM); ~60% sand, fine to medium, ~20% gravel, fine, ~20% fines; moist, tan.	▼	
	5		S-4		6 to 8	24/20	4-16-21-14			(6'- 6.5') SILTY SAND WITH GRAVEL (SM); ~70% sand, fine, ~20% fines, ~10% gravel, medium to coarse; wet.		
										(6.5'- 8') POORLY GRADED SAND (SP); ~95% sand, medium to coarse, ~5% fines; wet, tan.		
										Bottom of Exploration at 8 feet		
	10											
	15											
	20											

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

LOGGED BY (Consultant): Freeman Companies, LLC
PROJECT NAME: Marina Village Housing Complex Redevel
CITY/STATE: Bridgeport, CT
PROJECT NUMBER: 2015-0408

Freeman Companies, LLC
36 John Street
Hartford, CT 06102
(860) 251-9550
www.freemancos.com

Exploration Location

NORTHING: _____ **EASTING:** _____ **STATION:** _____ **OFFSET:** _____
HORIZONTAL DATUM: _____ **STATION CENTERLINE:** _____
VERTICAL DATUM: _____ **ESTIMATED GROUND SURFACE ELEV. (FT):** _____
LOCATION: _____

EXPLORATION

B-8

Drilling Information

DATE START / END: 5/13/2015 - 5/13/2015 **TOTAL DEPTH (FT):** 12.0
CONTRACTOR: New England Boring **DRILLER:** Mike St. John **LOGGED BY (Person):** J. Herpich
EQUIPMENT: _____ **EXPLORATION TYPE/METHOD:** Hollow Stem Auger
AUGER ID/OD: N/A / N/A **CASING ID/OD:** N/A / N/A **CORE INFO:** _____
HAMMER TYPE: Safety Hammer **HAMMER WEIGHT (lbs):** 140 **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▼ 6.50 5/13/2015
GENERAL NOTES: _____

ABBREVIATIONS:
ID = Inside Diameter; OD = Outside Diameter; Pen. = Penetration Length; Rec. = Recovery Length
bpf = Blows per Foot; mpf = Minute per Foot; S = Split Spoon; DP = Direct Push Sample
U = Undistrubed Tube Sample; C = Rock Core; SC = Sonic Core; WOR = Weight of Rods
WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector; Q_v = Pocket Penetrometer Strength
S_v = Pocket Torvane Shear Strength; F_v = Field Vane Shear Strength; NA, NM = Not Applicable, Not Measured

Elev. (ft)	Depth (ft)	Casing Pen. (bpf) or Core Rate (mpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sample Description & Classification	H_20 Depth	Remarks
			S-1		0 to 2	24	9-12-8-16			TOPSOIL (6 in.)		
										(0.5'- 2') POORLY GRADED SAND WITH GRAVEL (SP); ~60% sand, fine to coarse, ~30% gravel, fine to coarse, ~10% fines; dry, FILL, with brick, concrete, and black material.		
			S-2		2 to 4	24	5-5-4-4			(2'- 4') POORLY GRADED SAND WITH GRAVEL (SP); ~70% sand, medium to coarse, ~30% gravel, fine to coarse; dry, tan, FILL, black material.		
			S-3		4 to 6	24	7-7-9-8			(4'- 7') POORLY GRADED SAND WITH GRAVEL (SP); ~75% sand, fine to coarse, ~20% gravel, fine to coarse, ~5% fines; moist, dark brown, FILL, with brick, black material, unknown white material.		
	5		S-4		6 to 8	24	5-5-4-3			(7'- 10') SILTY SAND WITH GRAVEL (SM); ~60% sand, fine to coarse, ~20% gravel, fine to coarse, ~20% fines; wet, dark brown, FILL, with brick, black material, unknown white material.	▼	
			S-5		8 to 10	24	100/2"					
	10		S-6		10 to 12	24	11-15-16-21			(10'- 12') SILTY SAND WITH GRAVEL (SM); ~55% sand, fine to coarse, ~30% gravel, fine to coarse, ~15% fines; wet, brown.		
										Bottom of Exploration at 12 feet		
	15											
	20											

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

LOGGED BY (Consultant): Freeman Companies, LLC
PROJECT NAME: Marina Village Housing Complex Redevel
CITY/STATE: Bridgeport, CT
PROJECT NUMBER: 2015-0408

Freeman Companies, LLC
36 John Street
Hartford, CT 06102
(860) 251-9550
www.freemancos.com

Exploration Location

NORTHING: _____ **EASTING:** _____ **STATION:** _____ **OFFSET:** _____
HORIZONTAL DATUM: _____ **STATION CENTERLINE:** _____
VERTICAL DATUM: _____ **ESTIMATED GROUND SURFACE ELEV. (FT):** _____
LOCATION: _____

EXPLORATION

B-9/MW-2

PAGE 1 of 1

Drilling Information

DATE START / END: 5/14/2015 - 5/14/2015 **TOTAL DEPTH (FT):** 17.0
CONTRACTOR: New England Boring **DRILLER:** Mike St. John **LOGGED BY (Person):** J. Herpich
EQUIPMENT: _____ **EXPLORATION TYPE/METHOD:** Hollow Stem Auger
AUGER ID/OD: 4.25 in / N/A **CASING ID/OD:** N/A / N/A **CORE INFO:** _____
HAMMER TYPE: Safety Hammer **HAMMER WEIGHT (lbs):** 140 **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▼ 6.41 5/18/2015
GENERAL NOTES: _____

ABBREVIATIONS:
ID = Inside Diameter; OD = Outside Diameter; Pen. = Penetration Length; Rec. = Recovery Length
bpf = Blows per Foot; mpf = Minute per Foot; S = Split Spoon; DP = Direct Push Sample
U = Undistrubed Tube Sample; C = Rock Core; SC = Sonic Core; WOR = Weight of Rods
WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector; Q_v = Pocket Penetrometer Strength
S_v = Pocket Torvane Shear Strength; F_v = Field Vane Shear Strength; NA, NM = Not Applicable, Not Measured

Elev. (ft)	Depth (ft)	Casing Pen. (bpf) or Core Rate (mpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sample Description & Classification	H_20 Depth	WELL CONSTRUCTION DETAILS
			S-1		0 to 2	24/20	14-16-24-24			(0'- 9.5') SILTY SAND WITH GRAVEL (SM); ~55% sand, fine to coarse, ~30% fines, ~15% gravel, fine to medium; moist, brown.		backfill cuttings 6" bentonite seal. 1/4 bag.
			S-2		4 to 6	24/17	14-19-17-21				▼	
			S-3		8 to 10	24/18	21-30-39-33					#2 sand for sand pack.
	10									(9.5'- 10') SILTY SAND WITH GRAVEL (SM); ~55% sand, fine to coarse, ~30% fines, ~15% gravel, fine to medium; moist, black, odor. (10'- 17') SILTY SAND WITH GRAVEL (SM); ~55% sand, fine to coarse, ~30% fines, ~15% gravel, fine to medium; moist, brown.		2" diamter PVC Screen, 0.010 slot size.
	15		S-4		15 to 17	24/22	32-41-72-100					17' bottom depth of boring, backfill cuttings, PVC plug
										Bottom of Exploration at 17 feet		
	20											

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

LOGGED BY (Consultant): Freeman Companies, LLC
PROJECT NAME: Marina Village Housing Complex Redeve
CITY/STATE: Bridgeport, CT
PROJECT NUMBER: 2015-0408

Freeman Companies, LLC
36 John Street
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(860) 251-9550
www.freemancos.com

FREEMAN COMPANIES PROJECT 2015-0408 - MARINA VILLAGE.GPJ GINT STD US LAB.GDT 5/29/15

Exploration Location

NORTHING: _____ **EASTING:** _____ **STATION:** _____ **OFFSET:** _____
HORIZONTAL DATUM: _____ **STATION CENTERLINE:** _____
VERTICAL DATUM: _____ **ESTIMATED GROUND SURFACE ELEV. (FT):** _____
LOCATION: _____

EXPLORATION

B-10

Drilling Information

DATE START / END: 5/13/2015 - 5/13/2015 **TOTAL DEPTH (FT):** 20.7
CONTRACTOR: New England Boring **DRILLER:** Mike St. John **LOGGED BY (Person):** J. Herpich
EQUIPMENT: _____ **EXPLORATION TYPE/METHOD:** Hollow Stem Auger
AUGER ID/OD: N/A / N/A **CASING ID/OD:** N/A / N/A **CORE INFO:** _____
HAMMER TYPE: Safety Hammer **HAMMER WEIGHT (lbs):** 140 **HAMMER DROP (inch):** 30
WATER LEVEL DEPTHS (ft): ▼ 11.00 5/13/2015
GENERAL NOTES: _____

ABBREVIATIONS:
ID = Inside Diameter; OD = Outside Diameter; Pen. = Penetration Length; Rec. = Recovery Length
bpf = Blows per Foot; mpf = Minute per Foot; S = Split Spoon; DP = Direct Push Sample
U = Undistrubed Tube Sample; C = Rock Core; SC = Sonic Core; WOR = Weight of Rods
WOH = Weight of Hammer; RQD = Rock Quality Designation; PID = Photoionization Detector; Q_v = Pocket Penetrometer Strength
S_v = Pocket Torvane Shear Strength; F_v = Field Vane Shear Strength; NA, NM = Not Applicable, Not Measured

Elev. (ft)	Depth (ft)	Casing Pen. (bpf) or Core Rate (mpf)	SAMPLE INFORMATION: Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sample Description & Classification	H_2O Depth	Remarks
			S-1		0 to 2	24/10	11-6-6-5			(0'- 3.5') SILTY SAND WITH GRAVEL (SM); ~40% sand, fine to coarse, ~40% fines, ~20% gravel, fine to medium; dry, brown.		
	5		S-2		4 to 6	24/24	20-17-20-16			(3.5'- 8.5') SILTY SAND WITH GRAVEL (SM); ~40% sand, fine to medium, ~40% fines, ~20% gravel, fine to coarse; dry, brown.		
			S-3		8 to 10	24/20	16-32-30-40			(8.5'- 20.7') SILTY SAND WITH GRAVEL (SM); ~60% sand, fine to coarse, ~20% gravel, fine to medium, ~20% fines; wet, brown.	▼	
	10											
	15		S-4		15 to 17	24/24	57-77-59-129					
	20		S-5		20 to 20.7	8/8	30-140/2"			Bottom of Exploration at 20.67 feet		

Stratification lines represent approximate boundary between soil types, transitions may be gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

LOGGED BY (Consultant): Freeman Companies, LLC
PROJECT NAME: Marina Village Housing Complex Redeve
CITY/STATE: Bridgeport, CT
PROJECT NUMBER: 2015-0408

Freeman Companies, LLC
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Hartford, CT 06102
(860) 251-9550
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APPENDIX C

LABORATORY ANALYTICAL DATA

AVAILABLE UPON REQUEST

APPENDIX D

SUMMARY TABLES OF RESULTS

Table 1
Summary of Soil Analytical Data
Marina Village Housing Complex
Bridgeport, CT

Parameter	GB PMC	RES DEC	B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	B-10
Matrix			Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample Profile (feet)			15-17	8-10	4-6	8-10	4-6	5-6	3-5	4-6	8-10	10-12
Collection Date			5/14/15	5/12/15	5/12/15	5/13/15	5/12/15	5/13/15	5/12/15	5/13/15	5/14/15	5/13/15
Volatile Organic Compounds (VOCs) (ug/Kg)												
Naphthalene	NE	NE	12	< 6.1	< 5.9	< 5.9	< 5.1	<12	2,100	< 6.9	< 310	< 4.6
Toluene	67,000	500,000	< 6.0	< 6.1	< 5.9	< 5.9	< 5.1	<12	550	< 6.9	< 310	< 4.6
Total Xylenes	19,500	500,000	< 6.0	< 6.1	< 5.9	< 5.9	< 5.1	<12	1,560	< 6.9	< 310	< 4.6
Poly Aromatic Hydrocarbons (PAHs) (ug/Kg)												
Anthracene	400,000	1,000,000	< 300	< 290	< 270	< 300	6,700	<290	< 5,300	< 270	< 260	< 260
Benz(a)anthracene	1,000	1,000	< 300	< 290	560	< 300	**21,000**	<290	**11,000**	620	340	< 260
Benzo(a)pyrene	1,000	1,000	< 300	< 290	560	< 300	**15,000**	<290	**11,000**	480	290	< 260
Benzo(b)fluoranthene	1,000	1,000	< 300	< 290	750	< 300	**19,000**	<290	**11,000**	560	340	< 260
Benzo(ghi)perylene	NE	NE	< 300	< 290	460	< 300	11,000	290	16,000	460	< 260	< 260
Benzo(k)fluoranthene	1,000	8,400	< 300	< 290	< 270	< 300	5,900	<290	< 5,300	< 270	< 260	< 260
Chrysene	NE	NE	< 300	< 290	570	< 300	16,000	<290	10,000	540	310	< 260
Fluoranthene	56,000	1,000,000	< 300	< 290	1,300	< 300	26,000	<290	13,000	780	630	< 260
Indeno(1,2,3-cd)pyrene	NE	NE	< 300	< 290	350	< 300	8,000	<290	6,400	340	< 260	< 260
Naphthalene	56,000	1,000,000	< 300	< 290	< 270	< 300	< 5300	<290	< 5300	< 270	270	< 260
Phenanthrene	40,000	1,000,000	< 300	< 290	600	< 300	28,000	<290	22,000	980	1,100	< 260
Pyrene	40,000	1,000,000	< 300	< 290	1,100	< 300	29,000	<290	15,000	810	450	< 260
Total RSR Listed Metals (mg/Kg)												
Arsenic	-	10	2.2	1.0	3.3	2.4	**13.6**	3.3	**12.3**	**19.2**	1.5	< 0.8
Barium	-	4,700	40.2	13.2	104	36	623	26.1	188	48.2	40.9	24.9
Beryllium	-	2	0.41	< 0.33	0.49	0.62	0.31	0.53	0.61	< 0.32	0.45	< 0.31
Cadmium	-	34	< 0.44	< 0.42	< 0.38	< 0.44	1.5	<0.45	0.73	1.99	< 0.38	< 0.39
Chromium	-	100	11	7.03	13.1	13.9	43.7	13.5	26.2	21.7	13.5	15.1
Copper	-	2,500	18.9	7.36	27.5	19.2	49.7	23.2	69.4	80	17.8	22.2
Lead	-	400	7.7	3.35	130	10.3	190	8.66	124	28.9	6.28	7.44
Mercury	-	20	0.05	< 0.03	0.08	< 0.03	0.65	<0.03	2.94	0.03	< 0.03	< 0.03
Nickel	-	1,400	9.31	5.5	9.05	16.3	61.9	8.56	19.1	55.4	9.06	9.24
Silver	-	340	< 0.44	< 0.42	< 0.38	< 0.44	< 0.37	<0.45	1.54	< 0.40	< 0.38	< 0.39
Vanadium	-	470	20.5	10.8	23.6	21.4	35	27	34.9	23.4	32.1	38.3
Zinc	-	20,000	36.4	19.9	136	52.5	660	21.7	147	75.1	27.7	19.7
SPLP RSR Listed Metals (mg/L)												
SPLP Arsenic	0.5	-	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004	<0.004	0.007	< 0.004	< 0.004	< 0.004
SPLP Barium	10	-	< 0.010	< 0.010	0.152	0.011	0.259	0.031	0.054	0.036	0.012	< 0.010
SPLP Chromium	0.5	-	< 0.010	< 0.010	< 0.010	< 0.010	0.087	<0.010	< 0.010	< 0.010	< 0.010	< 0.010
SPLP Copper	13	-	< 0.010	< 0.010	0.025	< 0.010	0.016	<0.010	< 0.010	< 0.010	< 0.010	< 0.010
SPLP Lead	0.15	-	< 0.010	< 0.010	0.128	< 0.010	0.069	<0.010	< 0.010	< 0.010	< 0.010	< 0.010
SPLP Nickel	1	-	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	<0.010	< 0.010	0.023	< 0.010	< 0.010
SPLP Vanadium	0.5	-	< 0.010	< 0.010	0.017	< 0.010	< 0.010	<0.010	< 0.010	< 0.010	< 0.010	< 0.010
SPLP Zinc	50	-	< 0.010	< 0.010	0.127	< 0.010	0.239	0.013	0.013	< 0.010	< 0.010	< 0.010
Extractable Total Petroleum Hydrocarbons (mg/Kg)												
ETPH	2,500	500	< 64	< 62	< 58	< 65	**570**	<62	**2,000**	< 58	< 55	< 56
PCBs By SW8082A (ug/kg)	Varies*	Varies*	-									
PCB-1254	-	1,000	< 430	< 410	< 390	< 430	< 380	<420	**1,400**	< 380	< 360	< 380
PCB-1260	-	1,000	< 430	< 410	< 390	< 430	890	<420	< 380	< 380	< 360	< 380

RES DEC - Residential Direct Exposure Criteria
GB PMC - Pollutant Mobility Criteria for a GB Classified Groundwater Area
* - Testing parameter(s) contains multiple constituents of concern with different detection limits; therefore no detection limits are provided within table
ND - Not Detected Above Laboratory Detection Limit
NA - Not Analyzed
NE - Criteria Not Established
ug/kg - micrograms per kilogram
mg/Kg - milligrams per kilogram

Table 2
Summary of Groundwater Analytical Data
Marina Village Housing Complex
Bridgeport, CT

Parameter	SWPC	RES VOL	MW-1	MW-2	MW-3
Matrix			Groundwater	Groundwater	Groundwater
Depth to Water (feet)			7.56	6.41	6.40
Collection Date			5/18/15	5/18/15	5/18/15
Volatile Organic Compounds (VOCs) (ug/l)					
1,2,4-Trimethylbenzene	NE	NE	< 1.0	42	< 1.0
1,3,5-Trimethylbenzene	NE	NE	< 1.0	26	< 1.0
2-Isopropyltoluene	NE	NE	< 1.0	2.6	< 1.0
Acetone	NE	50,000	< 25	130	< 25
Benzene	710	215	< 0.70	10	< 0.70
Bromodichloromethane	1,020	NE	1.4	< 0.50	1.6
Chloroform	14,100	287	12	< 1.0	8.1
Ethylbenzene	580,000	50,000	< 1.0	19	< 1.0
Isopropylbenzene	NE	NE	< 1.0	9.9	< 1.0
Methyl t-butyl ether (MTBE)	NE	50,000	< 1.0	1.6	< 1.0
Naphthalene	NE	NE	< 1.0	28	170
n-Butylbenzene	NE	NE	< 1.0	6.6	< 1.0
n-Propylbenzene	NE	NE	< 1.0	20	< 1.0
p-Isopropyltoluene	NE	NE	< 1.0	6.1	< 1.0
sec-Butylbenzene	NE	NE	< 1.0	10	< 1.0
Total Xylenes	NE	21,300	< 1.0	34.2	< 1.0
Poly Aromatic Hydrocarbons (PAHs) (ug/l)					
2-Methylnaphthalene	NE	-	< 0.10	4.2	< 50
Acenaphthene	NE	-	< 0.10	1.5	< 50
Anthracene	1,100,000	-	< 0.10	0.39	< 50
Benz(a)anthracene	0.3	-	0.03	0.12	**79**
Benzo(a)pyrene	0.3	-	< 0.02	0.1	**66**
Benzo(b)fluoranthene	0.3	-	< 0.02	0.14	**85**
Benzo(k)fluoranthene	0.3	-	< 0.02	0.04	< 50
Chrysene	NE	-	< 0.02	0.09	69
Fluoranthene	3,700	-	< 0.10	0.53	140
Fluorene	140,000	-	< 0.10	1.2	< 50
Indeno(1,2,3-cd)pyrene	NE	-	< 0.02	0.06	< 50
Naphthalene	NE	-	< 0.10	16	77
Phenanthrene	0.077	-	< 0.07	**2.1**	**200**
Pyrene	110,000	-	< 0.10	0.43	120
RSR Listed Metals (mg/l)					
Antimony	86	-	< 0.005	< 0.005	0.018
Antimony (Dissolved)	-	-	< 0.005	< 0.005	< 0.005
Arsenic	0.004	-	**0.006**	< 0.004	**0.015**
Arsenic (Dissolved)	-	-	< 0.004	< 0.004	< 0.004
Barium	NE	-	0.191	0.698	0.313
Barium (Dissolved)	-	-	0.068	0.661	0.096
Beryllium	0.004	-	0.001	< 0.001	0.002
Beryllium (Dissolved)	-	-	< 0.001	< 0.001	< 0.001
Cadmium	0.006	-	< 0.001	< 0.001	0.002
Cadmium (Dissolved)	-	-	< 0.001	< 0.001	< 0.001
Chromium	0.11	-	0.029	0.006	0.03
Chromium (Dissolved)	-	-	< 0.001	< 0.001	< 0.001
Copper	0.048	-	0.046	0.008	**0.309**
Copper (Dissolved)	-	-	< 0.005	< 0.005	< 0.005
Lead	0.013	-	**0.193**	0.011	**0.595**
Lead (Dissolved)	-	-	< 0.002	0.005	< 0.002
Mercury	0.0004	-	0.0002	< 0.0002	**0.0058**
Mercury (Dissolved)	-	-	< 0.0002	< 0.0002	< 0.0002
Nickel	0.88	-	0.033	0.016	0.027
Nickel (Dissolved)	-	-	0.006	0.011	0.002
Vanadium	NE	-	0.049	0.011	0.046
Vanadium (Dissolved)	-	-	< 0.002	< 0.002	< 0.002
Zinc	0.123	-	**0.131**	0.019	**0.482**
Zinc (Dissolved)	-	-	0.016	0.01	0.051

SWPC - Surfacewater Protection Criteria
RES VOL - Residential Volatilization Criteria
ND - Not Detected Above Laboratory Detection Limit
NA - Not Analyzed
NE - Criteria Not Established
mg/l - milligrams per liter
ug/l - micrograms per liter

APPENDIX C

ENVIRONMENTAL EVALUATION AND MATERIALS MANAGEMENT REPORT- JUNE 2016 - SECOND PHASE

FREEMAN COMPANIES

LAND DEVELOPMENT | ENGINEERING DESIGN | CONSTRUCTION SERVICES

Environmental Evaluation and Materials Management Report
Marina Village Housing Complex
Bridgeport, Connecticut

June 2016
Freeman File No.: 2015-0408

Prepared for:

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Prepared by:

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APPENDICES

1 INTRODUCTION

Freeman Companies has completed an Environmental Evaluation Assessment of what is referred to as Phase 2 of the redevelopment the Marina Village Housing Complex in Bridgeport, CT. Bridgeport Community Renewal Associates, LP ("BCRA") is working with Park City Communities on the redevelopment of the Marina Village housing complex. The second phase ("Phase 2") of this development will involve the demolition of the complex which is bounded by South Avenue, Columbia Street, Ridge Avenue, and Iranistan Avenue (Buildings Numbered 5-31).

1.1 Purpose

The purpose of the assessment was to collect sufficient information in order to provide an evaluation of the environmental impacts, if present, to soil and groundwater on the Phase 2 portion of the Site and how these impacts may affect the redevelopment of the site.

Preliminary environmental information regarding historical environmental impact on the property was obtained from the September 2013 Phase I Environmental Site Assessment (ESA) prepared by Fuss & O'Neill. Based on the information presented within the reports, the site has a long history of heavy industrial and manufacturing operations prior to its development as a residential housing complex in the late 1940s. Industrial activities at the site included the following industries:

- Bridgeport Malleable Iron Works (later known as the Eastern Malleable Iron Company), a metal foundry that manufactured malleable and grey iron castings and conducted operations such as annealing, trimming, core making, tumbling, grinding, rolling, and molding; and
- Hotchkiss Sons' Manufacturers Curry Combs & Company which conducted scouring, tempering, and japanning of various metals.

1.2 Scope of Work

Based on the historical industrial activities that were conducted on the site, the following scope of work was developed:

- Oversight of the advancement of 10 soil borings, four of which were completed as a groundwater monitoring well.
- The collection and analysis of soil samples from each of the proposed soil borings. Select soil samples were analyzed for the following parameters: volatile aromatic hydrocarbons (VOCs), extractable total petroleum hydrocarbons (ETPH), poly aromatic hydrocarbons (PAHs), total and leachable RSR listed metals, and polychlorinated biphenyls (PCBs).
- The collection of a groundwater sample from each of the four newly installed monitoring wells. Groundwater samples were analyzed for the following parameters: VOCs, PAHs, and total RSR listed metals.
- The preparation of a report documenting the findings of the investigation.

Investigation activities were conducted in general accordance with the guidelines for environmental site assessments established in the Connecticut Department of Energy and Environmental Protection (CTDEEP) Site Characterization Guidance Document (SCGD) September 2007 (updated December 2010).

1.3 Objectives

The primary objective of this investigation was to obtain sufficient information on subsurface conditions in order to provide an understanding on how these conditions will affect proposed redevelopment activities.

2 SITE DESCRIPTION AND ENVIRONMENTAL SETTING

2.1 General

The second phase ("Phase 2") of the Marina Village redevelopment will involve the demolition of the portion of the complex which is bounded by South Avenue, Columbia Street, Ridge Avenue, and Iranistan Avenue (Buildings Numbered 5-31).

Demolition of the Phase I portion of the complex was completed in 2015.

2.2 Surrounding Land Use

The surrounding land use consists primarily of high-density housing to the southwest, southeast and northeast; and a mix of commercial and light industrial to the northwest.

2.3 Groundwater Classification

According to the CTDEEP water quality classification maps (November 2013), groundwater at the site is classified as GB. A GB classified groundwater is defined as groundwater within a historically highly urbanized area or an area of intense industrial activity and where public water supply service is available. Such groundwater may not be suitable for human consumption without treatment due to waste discharges, spills or leaks of chemicals or land use impacts.

2.4 Previous Environmental Assessment Activities

As previously identified a Phase I ESA was conducted on the site in 2013. Based on the information with the 2013 report no previous environmental sampling has been conducted on the Phase 2 portion of the complex.

3 GEOLOGIC INFORMATION

The physical conditions of the Site, including hydrology characteristics, are described in the following sections.

3.1 Site Topography

The site slopes from north to south ranging with a difference in elevation of approximately 5 feet (8 feet to 13 feet) above mean sea level. A majority of the site is located between elevations 10-12 feet.

3.2 Site Soils

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS) for the State of Connecticut (NRCS Webpage), the site is identified as primarily containing Urban Land. Urban land if defined as areas those are in urban and built up areas. The characteristics of this unit are so variable that an onsite investigation is required to determine the suitability for proposed uses.

Based on field observations soil conditions were observed to consist of the following:

Topsoil/ Asphalt – Topsoil was described as a dark brown silt, and fine to coarse sand. Up to one foot of topsoil was encountered in the borings conducted in grassy areas. Asphalt thickness ranged from 1 inch to 5 inches.

Urban Fill – Urban Fill was described brown to dark brown, fine to coarse sand and silt, with asphalt, crushed brick, concrete, and other manmade material debris. Ash and pieces of coal were also found in fill in various borings. The fill extended to depths below ground surface ranging from 2 feet to greater than 12 feet. Fill was not observed in borings SB-5 or SB-6.

Natural Sand – Natural sand was encountered in each of the borings, except MW-4 which contained natural sand mixed with coal.

Silt – Silt layers were encountered in some borings (SB-1, SB-6, SB-4, and MW-3) at various depths throughout the borings. The silt layers ranged from half of a foot to two feet thick. The silt is described as being grey, tan, or brown.

4 REMEDIATION STANDARD REGULATIONS

The analytical results reported in this report have been compared to remediation criteria listed in the CTDEEP's Remediation Standard Regulations (RSRs). The RSRs (Sections 22a-133k-1 through 22a-133k-3 of the Regulations of Connecticut State Agencies) form the basis for evaluation of site conditions in respect to environmental impacts and the impacts associated risk factors to human health and the environment. The CTDEEP uses the RSRs to determine whether sufficient remediation has been conducted at sites that are required by statute, regulation or administrative order to be remediated, or that are remediated through a formal voluntary remediation process.

The RSRs provide: (1) baseline specific criteria that may be used at any site to determine whether or not remediation is necessary, (2) self-implementing alternatives to the baseline criteria for specific circumstances, (3) self-implementing exceptions to the criteria for specific circumstances, and (4) an opportunity to request approval of site-specific alternatives to the self-implementing standards and the options for remediation from the CTDEEP Commissioner.

Although the Site is not currently under an order by the CTDEEP or subject to regulation and or statute to meet the risk based criteria within the RSRs, Freeman Companies will utilize the listed values within the RSRs as guidance in order to be protective of human health and the environment.

4.1 Soil Remediation Criteria

The CTDEEP soil remediation criteria integrate two risk-based goals: (1) Direct Exposure Criteria (DEC) to protect human health and the environment from risks associated with direct exposure (ingestion) to contaminated soil; and (2) Pollutant Mobility Criteria (PMC) to protect groundwater quality from contaminants that migrate or leach from the soil to groundwater. Soils to which both criteria apply must be remediated to a level which is equal to the more stringent criteria.

4.1.1 Direct Exposure Criteria

Specific numeric exposure criteria for a broad range of contaminants in soil have been established by the CTDEEP, based on exposure assumptions relative to incidental ingestion of contaminants in soils. The DEC applies to accessible soil to a depth of 15 feet. The DEC for substances other than PCBs does not apply to inaccessible soil at a release area provided that, if such inaccessible soil is less than 15 feet below the ground surface, an environmental land-use restriction (ELUR) is in effect with respect to the subject release area.

Inaccessible soil generally means polluted soil which is the following:

- More than four feet below the ground surface;
- More than two feet below a paved surface comprised of a minimum of three inches of bituminous pavement or concrete;
- Beneath an existing building; or

- Beneath another permanent structure(s) approved by the CTDEEP Commissioner. Buildings can be constructed and/or clean fill can be placed over contaminated soils rendering them inaccessible.

The CTDEEP has established two sets of DEC using exposure assumptions appropriate for residential land use (RES DEC) or for industrial and certain commercial land use (I/C DEC). In general, all sites are required to be remediated to the residential criteria. If the industrial/commercial land use criteria are applicable and used, an ELUR notification is required in accordance with the RSRs.

4.1.2 Pollutant Mobility Criteria

The PMC that are utilized for remediation determination of a site depends on the groundwater classification of the site. The Site is within in a GB groundwater classified area.

The PMC generally apply to all soil in the unsaturated zone, from the ground surface to the seasonal high water table in GB classified areas. The criteria do not apply to environmentally isolated soils that are polluted with substances other than VOCs provided that an ELUR is recorded for the release area which ensures that such soils will not be exposed (unless approved in writing by the CTDEEP Commissioner). Environmentally isolated soils are defined as certain contaminated soils which are below the seasonal low water table, beneath an existing building and not a source of ongoing contamination. An ELUR must be recorded for the site which ensures that such soils will not be exposed as a result of building demolition or other activities. Buildings can be constructed over contaminated soils rendering them environmentally isolated.

Remediation based upon the listed PMC requires that a substance, other than an inorganic substance or PCB, in soil be remediated to at least that concentration at which the results of a mass analysis of soil for such substances does not exceed the PMC applicable to the groundwater classification (i.e., GA or GB) of the area in which the soil is located. An inorganic substance or PCB in soil must be remediated to at least that concentration at which the analytical results of leachate produced from SPLP does not exceed the PMC applicable to the groundwater classification of the area in which the soil is located. As an alternative method for determining compliance with the PCM the analytical results of leachate produced from SPLP for most volatile, semi-volatile and petroleum compounds can be compared to the Groundwater Protection Criterion (GWPC) for such substance.

4.2 Groundwater Remediation Criteria

Groundwater remediation requirements are dependent upon the groundwater classification of the site. The objectives of these standards are the following:

- Protect existing use of groundwater regardless of the area's groundwater classification;
- Prevent further degradation of groundwater quality;
- Prevent degradation of surface water from discharges of contaminated groundwater; and
- Protect human health and the environment.

Portions of the RSRs governing groundwater regulate remediation of groundwater based on each substance present within the plume and by each distinct plume of contamination. Several factors influence the remediation goal at a given site, including: background water quality, the groundwater classification, the proximity of nearby surface water, existing groundwater uses, and the presence of buildings and their usage. When assessing general groundwater remediation requirements, all of these factors must be considered in conjunction with the major numeric components of the RSRs.

In general, remediation of a groundwater plume in a GB groundwater classified area shall result in the attainment of the following:

- The Surfacewater Protection Criteria;

- The Volatilization Criteria; and
- Not interfere with any existing usage of the groundwater.

5 SUBSURFACE INVESTIGATION ACTIVITIES

The primary objective of this investigation was to obtain sufficient information on subsurface conditions in order to provide an understanding on how these conditions will affect the redevelopment. To achieve the stated objectives, the subsurface investigation activities were designed to include both environmental setting and contaminant identification investigations.

The approach, procedures and results of the site investigation activities are presented in the following sections.

5.1 Soil Sampling and Analysis

The primary purpose of the soils characterization portion of the assessment was to define the nature/presence of target contaminants in the unconsolidated materials in both the saturated and unsaturated zones associated with historical Site activities. In addition, the boring program also provided information on Site stratigraphy and physical properties of the unconsolidated materials in both the saturated and unsaturated zones with particular emphasis on the characteristics of those materials that affect contaminant migration pathways and transport mechanisms.

This section describes the specific soil borings and sampling performed in order to define Site stratigraphy, soil properties and soil contaminant profiles.

5.1.1 Soil Sampling

Soil sampling activities were conducted between the dates of May 25 through May 26, 2016. A total of ten soil borings were advanced at the Site as part of the investigation. Seaboard Drilling Services Inc. of Springfield, MA advanced the soil borings utilizing a direct push drill rig, as well as a hollow stemmed auger (HSA) drilling rig under the direct supervision of Freeman Companies field personnel. The location for each of the soil borings was chosen to maximize the information obtained based on Freeman Companies' understanding of existing site conditions. A figure depicting the locations of sampling activities is included in Appendix A. Boring and well completion logs are provided in Appendix B.

The following sections provide a summary of soil investigation drilling details.

5.1.2 Soil Sampling Via Hollow Stemmed Auger

Six of the ten soil borings (SB-1 through SB-6) were advanced using a direct push drill rig that utilizes static force and dynamic percussion to drive steel boring rods into the ground. Soil samples were collected with a stainless steel, 2-inch diameter, five-foot spoon sampler interiorly lined within a single use acetate sleeve. Sampling was conducted continuously into the observed water table.

The remaining four soil borings (MW-1 through MW-4) were advanced using a HSA drill rig spinning a 4 ¼-inch inner diameter auger. Soil samples were collected with stainless steel, 2-inch diameter, two-foot split-spoon sampler advanced ahead of the augers in two-foot intervals using a weighted hammer. Sampling was conducted continuously at 2 foot intervals into the observed water table.

5.1.3 Soil Screening and Submittal

Upon retrieval of each soil sample, the supervising field personnel visually inspected each sample for staining, color, and moisture content and then characterized and logged each sample. None of the collected samples contained any noticeable odor or petroleum impact.

Following the completion of each soil boring and related soil sample collection activities, the resulting boreholes were backfilled with either the drill cuttings that were generated from the borehole and/or with virgin well materials.

Soil samples submitted for laboratory analysis were selected based on the groundwater interface zone and/or the identification of a contaminate migration pathways to the environment. The selected soil samples were submitted to Phoenix Analytical laboratories of Manchester, CT and analyzed for those constituents that have the potential to be released to the subsurface due to current or historical activities related to the Recognized Environmental Condition ("REC") investigated. Based on the constituents of concern for each of the Areas of Concern ("AOCs"), the soil samples were analyzed for one or more of the following analysis:

- Volatile Organic Compounds (VOCs) in accordance with EPA Method 8260
- ETPH in accordance with CTDEEP extractable total petroleum hydrocarbons methodologies
- Poly-aromatic hydrocarbons (PAHs) via EPA Method 8270
- Total CT listed metals
- Leachable CT listed metals via the Synthetic Precipitation Leaching Procedure
- PCB's in accordance with EPA Method 8082

5.1.4 Sample Management

All soil and groundwater analytical samples were collected in laboratory-supplied containers and chilled immediately on ice for transit to the laboratory. Freeman Companies personnel maintained possession of the samples until transfer to a laboratory provided courier for transit to the laboratory. A chain-of-custody form accompanied the samples from their collection point to delivery at Phoenix. Complete chain-of-custody forms are included with the laboratory analytical data reports as provided in Appendix C.

5.2 Monitoring Well Installation Activities

The primary purpose of the groundwater characterization portion of the investigation was to determine the presence of contaminants of concern relative to historical site activities.

Four overburden-monitoring wells (MW-1 through MW-4) were set to a depth of 15 feet below grade. The wells are constructed of 10 feet of 2-inch diameter, 0.010-inch slotted PVC screen, with 2-inch diameter PVC riser extending to grade. The annular space around the wells was filled with #2 sand extending up to approximately 1-2 feet above the screen. An approximate twelve inch layer of bentonite was placed above the sand pack to form a seal. Native fill and/or well sand was then used to fill the remaining borehole to grade. Each well was finished with an eight-inch diameter flush mounted road box set in concrete. A figure depicting monitoring well locations is included in Appendix A. Well construction logs are presented as Appendix B.

5.3 Groundwater Sampling

Freeman Companies personnel collected groundwater samples from the newly installed monitoring wells on June 3, 2016. Groundwater sampling was conducted using low flow procedures in general accordance with Region I EPA's Low Stress (low flow) Purging and Sampling Procedure (July 30, 1996, revised January 19, 2010). Purging and sampling were performed using an adjustable rate pneumatic bladder pump with dedicated polyethylene tubing for all sampled wells. Pump intake depths were selected to coincide with the center-of-saturated-screen elevations for the deep wells and the top of the saturated screens for the shallow water table wells.

Purged volumes were based on the rate of stabilization of field-measured water quality parameters, including: dissolved oxygen, specific conductance, temperature, pH, turbidity, and oxidation/reduction potential were obtained. Field parameters were generally measured at five minute intervals; purging rates and water levels were also measured. Purged water from the wells did not exhibit any visual or olfactory evidence of impact such as odors and/or sheen. Due to the nature of the formation (urban fill) turbidity readings remained above the target of 5 NTUs, even after extended pumping.

Groundwater samples were collected from each well and submitted on ice to Phoenix for analysis. The following analyses were performed on all submitted groundwater samples:

- VOCs by EPA Method 8260
- PAHs via EPA Method 8270
- Total CT listed metals

5.4 Soil Sampling Results

Soil encountered during the advancement of the soil borings consisted primarily of a mixture of Urban Fill and ash, followed by brown and tan, fine to coarse sand intermixed with silt at several locations. Bedrock was not encountered at any boring locations.

Based on non-restricted property use, guidance standards used for soil at the Site would be the Residential Direct Exposure Criteria (RDEC) and the Pollutant Mobility Criteria (PMC) for an area with a GB groundwater classification.

Laboratory analysis of the soil samples collected from sample locations SB-1, SB-4, and MW-2 identified the presence of one or more of the following; poly aromatic hydrocarbons and/or extractable total petroleum hydrocarbons, exceeding the RDEC and/or the GB PMC.

A summary of the soil analytical results is presented in Table 1, within Appendix D and a copy of the laboratory analytical report is included as Appendix C.

5.5 Groundwater Sampling Results

Groundwater samples were collected from each monitoring well with dedicated sampling equipment in order to assess current water quality and to evaluate for the presence and distribution of contaminants in groundwater that may have originated from the Site or potentially from off-site locations. Samples were stored in laboratory provided glassware and submitted for analysis at for the suite of analytes identified based upon historic or current suspected potential sources of contamination. These parameters were used to indicate the presence of contaminants in groundwater and provided a basis for correlation with chemical data derived from the soil results.

Based on current land use and a GB groundwater classification, remediation guidance used for groundwater at the Site would be the Residential Volatilization Criteria (RES VC) and the Surface Water Protection Criteria (SWPC).

Analytical Results did not detect the presence of any volatile organic compounds at concentrations that exceeded the RES VC.

Analytical results did identify the presence of one or more of the following poly aromatic hydrocarbobs; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and phenanthrene at concentrations exceeding the default SWPC within the samples collected from MW-3 and MW-4.

Analytical results of the total metals analysis primarily detected the presence of one or more of the following metals; arsenic, copper, lead, and zinc at concentrations exceeding the default SWPC within the samples collected from MW-1, MW-3, and MW-4.

A summary of the groundwater analytical results is presented as Table 2 in Appendix D, and a copy of the laboratory analytical report is included in Appendix C.

6 SOIL REUSE/DISPOSAL

Based on the findings of the assessment activities, the following general assumptions can be made regarding the soil at the site.

- Native soils may be managed as clean fill after confirmatory testing has been completed to ensure status as clean fill.
- Any urban fill material disturbed as part of proposed site activities shall be at a minimum be managed as a Regulated Soil.
- Material disturbed from the northern portion of the project area, as characterized by samples collected from SB-1 and SB-4, shall be classified as contaminated and should be removed from the site for proper disposal.
- Polluted soils may be reused on-site following site specific requirements

Further management/reuse discussions are provided in the following sections.

6.1 Soil Classifications

Based in the analytical results from the samples collected as part of the assessment activities the following soil types will be encountered as part of proposed site activities.

6.1.1 Clean Fill

Chemically clean fill that meets the definition of natural soil as defined in Sec. 22a-209-1 and Sec. 22a-133k-2(h) of the Regulations of Connecticut State Agencies (RCSA). Clean fill does not contain any substances above natural background levels. It is anticipated that a majority of native soils excavated from the project area will meet this definition of Clean Fill. Actual volumes will be determined by further analytical testing.

6.1.2 Polluted Soil

Soil affected by a release of a substance at a concentration above the analytical detection limit for such substance in accordance with RCSA 22a-133k-1(a)(45) and below the Residential Direct Exposure criteria and the GB Pollutant Mobility criteria as these terms are described in the Remediation Standard Regulations (RCSA 22a-133k-1 through 3). It is anticipated that a portion of the Urban Fill material will meet this definition. In most cases polluted soil may be reused at the project site with restriction.

6.1.3 Contaminated Soil

Soil affected by an identified or suspected release and determined, or reasonably expected to contain substances exceeding Residential Direct Exposure Criteria or GB Pollutant Mobility Criteria, as these terms are defined in the Remediation Standard Regulations (RCSA Section 22a-133k-1). It is anticipated that a portion of the Urban Fill/ash material located within the northern portion of the project area will meet this soil type. In all cases contaminated soil disturbed as part of construction activities should be removed from the site for proper disposal.

6.1.4 Regulated Soil

Regulated Soil includes Polluted Soil and Contaminated Soil. It is anticipated that most of the Urban Fill material generated from site activities will be classified as regulated.

6.2 Soil Management

Based on the analytical results the testing conducted soil management activities for the handling and management of excavated material encountered during demolition/construction will be required. It is not intended that any soil remediation be conducted outside the limits of excavation anticipated for the project as designed.

All handling and management operations should be conducted in accordance with standard engineering practices applicable to such activity and in accordance with CTDEEP regulations including but not limited to the procedures contained in the CTDEEP General Permit for Contaminated Soil and/or Sediment Management.

Depending on the selected management approach, soils within the project area can be ether pre-classified, stockpiled and classified, or assumed to be contaminated.

All stockpiles of Regulated Soil should be constructed to isolate stored Regulated Soil from the environment. Stockpiles shall be constructed to include liners free of holes and other damage. The ground surface on which the liner is to be placed shall be free of rocks or and any other object which could damage the liner.

Regulated Soil cannot be stockpile off site unless a registration has been submitted to and approved by the CTDEEP under the General Permit for Contaminated Soil and/or Sediment Management.

6.3 Allowable Reuse Options

Polluted Soil may be reused in accordance with the following requirements:

- Reused on site as backfill in locations above the water table and not in areas subject to erosion in accordance with requirements of Section 22a-133K of the RCSA. The backfill location and depth shall be documented in a scaled drawing for any Polluted Soil that is reused on site. Any backfill material shall meet the structural/compaction geotechnical requirements.

- If the polluted soil is not suitable for reuse, the material shall be managed, disposed of, treated or recycled in accordance CTDEEP regulations

6.4 Health and Safety

All site health and safety controls shall be fully established and in operation prior to beginning any material handling activity. Site controls shall include but not be limited to the following: work zones properly barricaded, decontamination facilities established, air monitoring, and all support equipment and supplies including personal protective equipment.

7 WASTEWATER HANDLING

Based on the analytical testing conducted as part of this evaluation, it is anticipated that a majority of the dewatering wastewater generated from the project area will be contain some degree of impact, primarily metals and poly aromatic hydrocarbons, and therefore will likely require specific handling and management procedures to be implemented.

7.1 Allowable Disposal Options

Management of dewatered groundwater may be accomplished in accordance with CTDEEP General Permit for the Discharge of Groundwater Remediation Wastewater Directly to Surface Water (Storm sewers discharging to surface waters) and local regulations and ordinances or through the CTDEEP General Permit Groundwater Remediation Wastewater to a Sanitary Sewer and local regulations and ordinances.

7.2 Storage Options

If there is a need for storage of wastewater prior to discharge, fractionation tanks with a capacity of at least 20,000 gallons may be used. The tanks shall be equipped with a sample port to facilitate safe sampling of tank contents. Discharge valve shall be capable of controlling discharge flow rate.

7.3 Treatment Options

If it is necessary to treat the water in order to meet discharge limits, an activated carbon treatment and filtration system, sized to treat water with a minimum influent total volatile organic compound concentrations necessary to meet discharge goals, may be implemented. Systems of this type shall include one or more of the following components: pumps; piping; bag or cartridge filters; carbon treatment vessels; Influent, midpoint and effluent sampling ports and system flow meters.

7.4 Health and Safety

All site health and safety controls shall be fully established and in operation prior to beginning any material handling activity. Site controls shall include but not be limited to the following: work zones properly barricaded, decontamination facilities established, and all support equipment and supplies including personal protective equipment.

8 ENVIRONMENTAL REMEDIATION AND DISPOSAL COSTS

Freeman Companies conducted an environmental evaluation of the project area in order to obtain a better understanding of the subsurface conditions that may be encountered as part site demolition and construction activities.

Soil conditions encountered within soil borings consisted of sand (natural soil) overlain by various thicknesses of fill material, which contained a variety of debris (asphalt, crushed brick, concrete), ash, silt, and other manmade material.

Analytical results identified that the Urban Fill material is generally impacted by a combination of PAHs and ETPH. The area with the highest concentration of environmental impact was located under the former Hotchkiss Sons facility. Although the sample collected from this location contained elevated concentrations of PAHs, besides for the presence of ash and coal fragments, there was no clear indication of impact that would typically be found with this kind of impact. It is possible that the concentrations of PAHs are at least partially related to the burning of coke, formed by the destructive distillation of coal, within the furnaces as part of the malleable iron foundry process.

In order to be protective of for future residential reuse, Freeman Companies recommends the removal of the fill material containing elevated concentrations of PAHs. The removed fill material can be removed from the site for disposal at a permitted disposal facility.

Due to the fact that the site will be re-graded following demolition activities, the Owner should attempt to reuse polluted fill material to the maximum extent prudent upon the completion of demolition (i.e. within former building foundation excavations, within former tunnel excavations, as backfill within areas of remediation).

8.1 Remedial Costs

Based on the analytical results, the soil represented by the samples collected from borings SB-1 and SB-4 should be considered as contaminated and therefore Freeman Companies would recommend that any excavated material from within these areas should be removed from the Site for proper disposal.

Due to the limited testing conducted, initial estimates for soil removal quantities would be conservatively high (at least 5,000 tons). In order to provide a better definition of impacted fill material present within the project area, Freeman companies would recommend that additional sampling be conducted in order to better define remedial areas and to continue the delineation/characterization of soils to remain on the site. Since the constituents of concern have been defined through evaluation testing, soil testing parameters may be limited to just PAHs and ETPH. A cost for analysis is estimated at $175/sample which will include both parameters.

APPENDIX A

MAPS AND FIGURES

LEGEND:

SB-1	SOIL BORING
MW-1	MONITORING WELL

NOTE:

1. BASE PLAN PREPARED BY JULIANO ASSOCIATES, LLC.

GRAPHIC SCALE

100 50 0 100

SCALE IN FEET

BORING LOCATION PLAN

MARINA VILLAGE
400 IRANISTAN AVENUE
BRIDGEPORT, CONNECTICUT

FREEMAN COMPANIES
LAND DEVELOPMENT | ENGINEERING DESIGN | CONSTRUCTION SERVICES

FREEMAN COMPANIES, LLC
36 JOHN STREET
HARTFORD, CT 06106
WWW.FREEMANCOS.COM
TEL:(860)251-9550
TOLL FREE:(800)604-5141
FAX:(860)986-7161
ELEVATE YOUR EXPECTATIONS

No.	Date	Description
–	–	–

REVISIONS

DRAWN:	M.K.
CHECKED:	C.D.B.
APPROVED:	C.D.B.
SCALE:	1"=100'
PROJECT NO.:	2015-0408
DATE:	06/14/2016

SHEET NO.

FIGURE 1

APPENDIX B

BORING AND WELL COMPLETION LOGS

Boring/Well No. SB-1 **Date:** 5/25/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 15' **Water Level:** 13.5'
Drilling Method: Geoprobe **Sample Method:** 5' Sleeve
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
	S1	14"/60"			0-0.1' Asphalt
					0.1-3.2' Dark brown f-c sand, some silt; pieces of brick
1					3.2-5' Brown f-c sand and silt
2					
3					
4					
5					
	S2	50"/60"			5-5.5' Grey and tan silt
6					5.5-10' Beige f-c sand, little f gravel, trace silt
7					
8					
9					
10					
	S3	49"/60"			10-12.5' Tan and grey f-c sand
11					12.5-13.75' Grey silt, wet
12					13.75-15' Tan and grey f-c sand.
13					
14					
15					
					BOB 15'
					Sample 3.5-5.5'

Boring/Well No. SB-2 **Date:** 5/25/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 15' **Water Level:** 14'
Drilling Method: Geoprobe **Sample Method:** 5' Sleeve
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
	S1	30"/60"			0-0.5' Asphalt
1					0.5-1' Dark brown f sand
					1-2' Black silt
2					2-2.5' Tan sand and silt with some black silt
					2.5-5' Brown f-c sand, some silt
3					
4					
5					
	S2	48"/60"			5-10' Tan f-c sand, some f-m gravel
6					
7					
8					
9					
10					
	S3	55"/60"			10-11' Tan f-c sand, some f-m gravel
					11-15' Brown f-m sand, some silt, wet
11					
12					
13					
14					
15					
					BOB 15'
					Sample 2-4'

Boring/Well No. SB-3 **Date:** 5/25/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 15' **Water Level:** 8'
Drilling Method: Geoprobe **Sample Method:** 5' Sleeve
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
	S1	28"/60"			0-0.5' Asphalt
1					0.5-5' Brown silt and f-c sand, some f-m gravel; mixed with brick,
					concrete, and very small strips of black ash
2					
3					
4					
5					
	S2	48"/60"			5-6' Brown silt and f-c sand, some f-m gravel; mixed with brick,
6					concrete, and very small strips of black ash
7					6-10' Tan and brown f-c sand, little f gravel. Wet
8					
9					
10					
	S3	54"/60"			10-14' Tan and brown f-c sand, little f gravel
11					
					14-15' Brown silt and f sand
12					
13					
14					
15					
					BOB 15'
					Sample 4-6'

Boring/Well No. SB-4 **Date:** 5/25/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 15' **Water Level:** 7.5'
Drilling Method: Geoprobe **Sample Method: 5' Sleeve**
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
	S1	40"/60"			0-0.1' Asphalt
1					0.1-3' Dark brown f-c sand, some silt; pieces of brick;
					small black pieces, possibly coal
2					3-3.75' Brick
					3.75-5' Dark brown f-c sand, some silt;
3					small black pieces possibly coal; small amount of ash
4					
5					
	S2	55"/60"			6-6.3' Dark brown f-c sand, some silt;
6					small black pieces possibly coal; small amount of ash
					6.3-6.7' Brick
7					6.7-9' Tan f-c sand with striations of grey silt. Wet
					9-10' Tan f-c sand
8					
9					
10					
	S3	60"/60"			10-15' Tan f-c sand
11					
12					
13					
14					
15					
					BOB 15'
					Sample 4-6'

Boring/Well No. SB-5 **Date:** 5/25/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 15' **Water Level:** 8'
Drilling Method: Hand auger and Geoprobe **Sample Method: 5'** Sleeve
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
	S1	60"/60"			0-0.5' Topsoil; Dark brown silt and f-c sand
					0.5-2' Tan f-c sand, trace silt
1					2-5' Tan and beige f-c sand, trace silt
2					
3					
4					
5					
	S2	60"/60"			5-10' Tan and beige f-c sand, trace silt
6					wet at 8'
7					
8					
9					
10					
	S3	60"/60"			10-15' Tan and beige f-c sand, trace silt
11					
12					
13					
14					
15					
					BOB 15'
					Sample 6-8'

Boring/Well No. SB-6 **Date:** 5/25/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 15' **Water Level:** 9'
Drilling Method: Hand auger and Geoprobe **Sample Method: 5'** Sleeve
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
	S1	60"/60"			0-1' Topsoil; Dark brown silt and f-c sand, little f gravel
1					1-2' Tan f-c sand, little f gravel, trace silt
					2-5' Beige f-c sand, little f gravel, trace silt
2					
3					
4					
5					
	S2	60"/60"			5-6' Beige f-c sand, little f gravel, trace silt
6					6-7' Brown silt
					7-9.6' Brown f-c sand, trace silt. Wet
7					9.6-10' Brown silt
8					
9					
10					
	S3	60"/60"			10-14.5' Brown f-c sand, little silt
11					14.5-15' Brown silt
12					
13					
14					
15					
					BOB 15'
					Sample 5-7'

Boring/Well No. MW-1 **Date:** 5/26/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 12' **Water Level:** 9'
Drilling Method: Hollow Stem Auger **Sample Method: 2' Split Spoon**
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
1					
2	S1	12"/24"	17,56,12,6		2-2.5' Brown f-c sand and silt
3					2.5-3.5' Crushed concrete, gravel
4					3.5-4' Ash
5	S2	24"/24"	3,1,1,2		4-4.1' Ash and coal
6					4.1-5' Brown silt and f-c sand
7	S3	10"/24"	3,3,2,1		5-6' Brown and tan silt and f-c sand
8					6-8' Brown and tan silt and f-c sand
9	S4	12"/24"	9,20,26,4		8-10' Brown f-c sand and f-c gravel, little silt. Wet
10					
11	S5	17"/24"	3,4,16,20		10-11' Brown f-c sand, little silt
12					11-12' Brown f sand, some silt
13					
14					
15					BOB 12'
					Sample 3-5'

Boring/Well No. MW-2 **Date:** 5/26/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 12' **Water Level: 10'**
Drilling Method: Hollow Stem Auger **Sample Method: 2' Split Spoon**
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
1					
2	S1	15"/24"	5,5,5,6		2-3' Tan/orange silt and f-c sand
3					3-4' Beige f-c sand, some f-m gravel
4	S2	17"/24"	9,12,15,14		4-6' Beige and tan f-c sand, some f-m gravel
5					
6	S3	14"/24"	11,12,12,12		6-8' Beige and tan f-c sand, little f gravel
7					
8	S4	19"/24"	4,5,6,14		8-10' Beige f-c sand with layers of grey silt and tan silt
9					
10	S5	18"/24"	10,12,12,17		10-12' Brown f sand and silt. Wet
11					
12					
13					
14					
15					BOB 12'
					Sample 2-4'

Boring/Well No. MW-3 **Date:** 5/26/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 10' **Water Level:** 8'
Drilling Method: Hollow Stem Auger **Sample Method: 2' Split Spoon**
Driller: Seaboard **Log By:** JHerpich

Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
1					
2	S1	18"/24"	1,1,3,3		2-3' Dark brown silt and f-c sand; brick, concrete, black rock possibly coal
3					3-4' Tan silt and f-c sand
4	S2	20"/24"	8,11,12,12		4-6' Tan silt and f-c sand
5					
6	S3	20"/24"	7,8,10,11		6-6.5' Tan silt and f-c sand
7					6.5-8' Beige f-c sand, some silt. Wet
8	S4	11"/24"	10,6,5,10		8-8.3' Beige f-c sand, some silt
9					8.3'-10' Grey silt layered with brown f-m sand
10					
11					
12					
13					
14					
15					BOB 10'
					Sample 2-4'

Boring/Well No. MW-4 **Date:** 5/26/2016
Project: Marina Village **Client:**
Location: 400 Iranistan Ave., Bridgeport
Total Depth: 12' **Water Level:** 8'
Drilling Method: Hollow Stem Auger **Sample Method: 2' Split Spoon**
Driller: Seaboard **Log By:** JHerpich

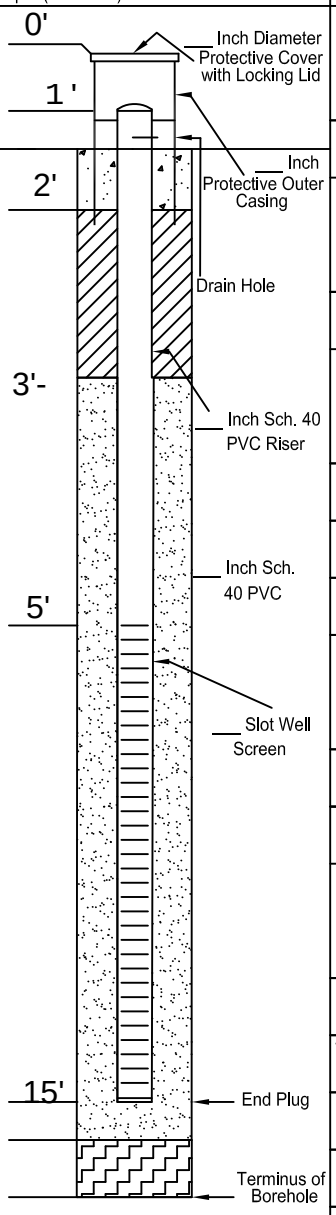
Depth (feet)	Sample Number	Recovery	Blow Counts (blows/6")	PID	Lithology
1					
2	S1	12"/24"	19,12,13,12		2-4' Brick mixed with coal pieces and black powdered coal / ash
3					
4	S2	7"/24"	7,10,16,6		4-6' Brick mixed with coal pieces and black powdered coal / ash
5					
6	S3	5"/24"	5,5,6,4		6-8' Black powdered coal and ash, chunks of coal. Wet 7-8'
7					
8	S4	3"/24"	3,1,1,1		8-10' F-c sand and silt mixed with black powdered coal and ash,
9					chunks of coal.
10	S5	3"/24"	1, 0,1,0		10-12' Tan f-c sand with few chunks of coal
11					
12					
13					
14					
15					Note: Building foundation at 6.5'
					BOB 12'
					Sample 5-7'

MONITORING WELL INSTALLATION FIELD LOG

FACILITY NAME: Marina Village/2nd Phase	FACILITY ID: 400 Iranistan Ave, Bridgeport	WELL NO.: MW-1
GEOLOGIST: JHerpich	DRILLING METHOD: Hollow Stem Auger	LOCATION/COORDINATES:
WEATHER:	DRILLING COMPANY: Seabaord	DATE/TIME 5/26/16
TEMPERATURE:	DRILL RIG: DRILLER:	STARTED: COMPLETED:

LITHOLOGIC DESCRIPTION | ELEVATION/ DEPTH | PID (ppm) | BLOWS/ft.

WELL CONSTRUCTION



MATERIALS INVENTORY

BENTONITE SEAL: TOP: 2' BOTTOM: 3'	
FILTER PACK GRAINSIZE: #2 sand	
FILTER PACK : TOP: 3' BOTTOM: 15'	
GROUT QUANTITY:	
GROUT : TOP: 0' BOTTOM: 1'	
GROUT TYPE: 1'-2' native fill	
SCREEN TYPE:	
WELL SCREEN: in. 5-15' l.f.	
SLOT SIZE:	
WELL CASING: Inches in Diameter 2" PVC l.f.	
CASING TYPE:	
TOP OF CASING (AGS):	
BOREHOLE (IN. DIAMETER):	
BOTTOM OF BOREHOLE (FT BGS): 15'	
TOP OF CASING ELEVATION (FT ABOVE MSL):	

CAVE IN (SLOUGH) | COARSE SAND | FINE FILTER SAND | BENTONITE GROUT | CEMENT PAD

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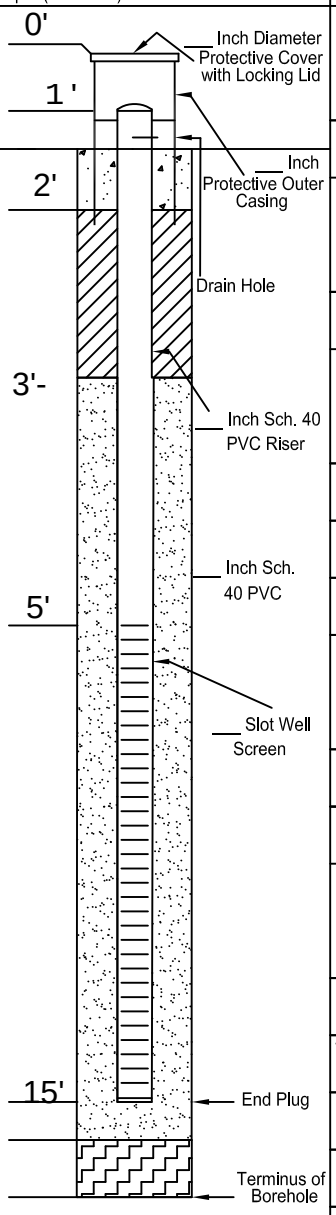
MONITORING WELL INSTALLATION FIELD LOG

FACILITY NAME: Marina Village/2nd Phase	FACILITY ID: 400 Iranistan Ave, Bridgeport	WELL NO.: MW-2
GEOLOGIST: JHerpich	DRILLING METHOD: Hollow Stem Auger	LOCATION/COORDINATES:
WEATHER:	DRILLING COMPANY: Seabaord	DATE/TIME 5/26/16
TEMPERATURE:	DRILL RIG: DRILLER:	STARTED: COMPLETED:

LITHOLOGIC DESCRIPTION | ELEVATION/ DEPTH | PID (ppm) | BLOWS/ft.

WELL CONSTRUCTION



MATERIALS INVENTORY

BENTONITE SEAL: TOP: 2' BOTTOM: 3'

FILTER PACK GRAINSIZE: #2 sand

FILTER PACK : TOP: 3' BOTTOM: 15'

GROUT QUANTITY:

GROUT : TOP: 0' BOTTOM: 1'

GROUT TYPE: 1'-2' native fill

SCREEN TYPE:

WELL SCREEN: in. l.f. 5-15'

SLOT SIZE:

WELL CASING: Inches in Diameter l.f. 2" PVC

CASING TYPE:

TOP OF CASING (AGS):

BOREHOLE (IN. DIAMETER):

BOTTOM OF BOREHOLE (FT BGS): 15'

TOP OF CASING ELEVATION (FT ABOVE MSL):

CAVE IN (SLOUGH) | COARSE SAND | FINE FILTER SAND | BENTONITE GROUT | CEMENT PAD

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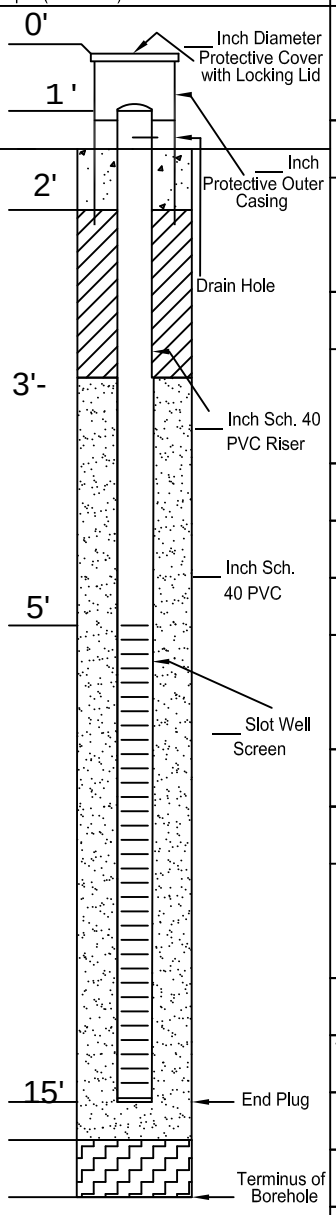
MONITORING WELL INSTALLATION FIELD LOG

FACILITY NAME: Marina Village/2nd Phase	FACILITY ID: 400 Iranistan Ave, Bridgeport	WELL NO.: MW-3
GEOLOGIST: JHerpich	DRILLING METHOD: Hollow Stem Auger	LOCATION/COORDINATES:
WEATHER:	DRILLING COMPANY: Seabaord	DATE/TIME 5/26/16
TEMPERATURE:	DRILL RIG: DRILLER:	STARTED: COMPLETED:

LITHOLOGIC DESCRIPTION | ELEVATION/ DEPTH | PID (ppm) | BLOWS/ft.

WELL CONSTRUCTION



MATERIALS INVENTORY

BENTONITE SEAL: TOP: 2' BOTTOM: 3'	
FILTER PACK GRAINSIZE: #2 sand	
FILTER PACK : TOP: 3' BOTTOM: 15'	
GROUT QUANTITY:	
GROUT : TOP: 0' BOTTOM: 1'	
GROUT TYPE: 1'-2' native fill	
SCREEN TYPE:	
WELL SCREEN: in. 5-15' l.f.	
SLOT SIZE:	
WELL CASING: Inches in Diameter 2" PVC l.f.	
CASING TYPE:	
TOP OF CASING (AGS):	
BOREHOLE (IN. DIAMETER):	
BOTTOM OF BOREHOLE (FT BGS): 15'	
TOP OF CASING ELEVATION (FT ABOVE MSL):	

CAVE IN (SLOUGH) | COARSE SAND | FINE FILTER SAND | BENTONITE GROUT | CEMENT PAD

TVA

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MONITORING WELL INSTALLATION FIELD LOG

FACILITY NAME: Marina Village/2nd Phase	FACILITY ID: 400 Iranistan Ave, Bridgeport	WELL NO.: MW-4
GEOLOGIST: JHerpich	DRILLING METHOD: Hollow Stem Auger	LOCATION/COORDINATES:
WEATHER:	DRILLING COMPANY: Seabaord	DATE/TIME 5/26/16
TEMPERATURE:	DRILL RIG: DRILLER:	STARTED: COMPLETED:

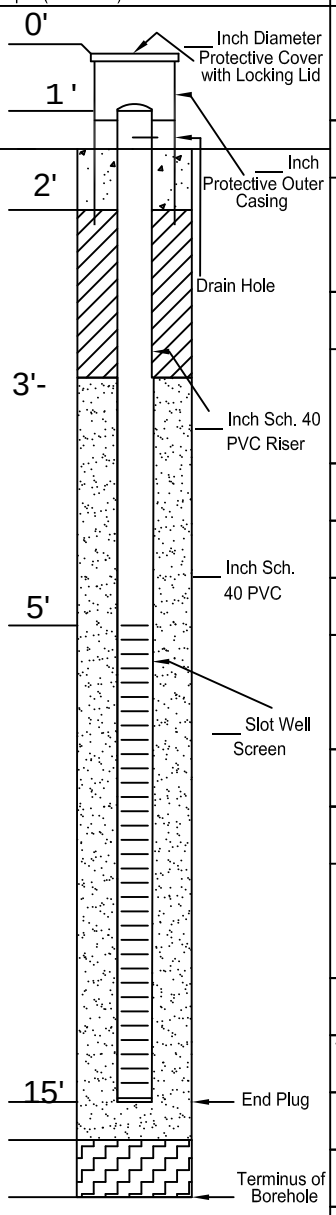
LITHOLOGIC DESCRIPTION

ELEVATION/ DEPTH

PID (ppm)

BLOWS/ft.

WELL CONSTRUCTION



MATERIALS INVENTORY

BENTONITE SEAL: TOP: 2' BOTTOM: 3'

FILTER PACK GRAINSIZE: #2 sand

FILTER PACK : TOP: 3' BOTTOM: 15'

GROUT QUANTITY:

GROUT : TOP: 0' BOTTOM: 1'

GROUT TYPE: 1'-2' native fill

SCREEN TYPE:

WELL SCREEN: in. l.f. 5-15'

SLOT SIZE:

WELL CASING: Inches in Diameter l.f. 2" PVC

CASING TYPE:

TOP OF CASING (AGS):

BOREHOLE (IN. DIAMETER):

BOTTOM OF BOREHOLE (FT BGS): 15'

TOP OF CASING ELEVATION (FT ABOVE MSL):

CAVE IN (SLOUGH) COARSE SAND FINE FILTER SAND BENTONITE GROUT CEMENT PAD

TVA

APPENDIX C

LABORATORY ANALYTICAL DATA

AVAILABLE UPON REQUEST

APPENDIX D

SUMMARY TABLES OF RESULTS

Table 1
Summary of Soil Analytical Data
Marina Village Housing Complex
Bridgeport, CT

Parameter	GB PMC	RES DEC	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	MW-1	MW-2	MW-3	MW-4
Matrix			Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample Profile (feet)			3.5-5.5	2-4	4-6	4-6	6-8	5-7	3-5	2-4	2-4	5-7
Collection Date			5/26/16	5/26/16	5/26/16	5/26/16	5/26/16	5/26/16	5/27/16	5/27/16	5/27/16	5/27/16
Volatile Organic Compounds (VOCs) (ug/Kg)												
Naphthalene	NE	NE	300	ND< 320	ND< 5.1	ND< 440	ND< 5.2	ND< 6.1	ND< 4.4	18	ND< 4.8	ND< 7.0
Poly Aromatic Hydrocarbons (PAHs) (ug/Kg)												
2-Methylnaphthalene	NE	NE	1,100	ND< 270	ND< 270	ND< 2700	ND< 250	ND< 270	ND< 280	ND< 250	ND< 260	ND< 250
Acenaphthene	NE	NE	2,800	ND< 270	ND< 270	ND< 2700	ND< 250	ND< 270	ND< 280	ND< 250	ND< 260	ND< 250
Acenaphthylene	84,000	1,000,000	400	ND< 270	ND< 270	8,800	ND< 250	ND< 270	ND< 280	ND< 250	ND< 260	ND< 250
Anthracene	400,000	1,000,000	6,400	ND< 270	ND< 270	10,000	ND< 250	ND< 270	ND< 280	760	ND< 260	ND< 250
Benz(a)anthracene	1,000	1,000	**14,000**	430	ND< 270	**44,000**	ND< 250	ND< 270	ND< 280	**1,300**	560	ND< 250
Benzo(a)pyrene	1,000	1,000	**13,000**	340	ND< 270	**49,000**	450	ND< 270	ND< 280	**1,200**	510	ND< 250
Benzo(b)fluoranthene	1,000	1,000	**12,000**	280	ND< 270	**44,000**	250	ND< 270	ND< 280	**1,100**	410	ND< 250
Benzo(ghi)perylene	NE	NE	6,000	ND< 270	ND< 270	29,000	300	ND< 270	ND< 280	850	350	ND< 250
Benzo(k)fluoranthene	1,000	8,400	**7,200**	310	ND< 270	**30,000**	270	ND< 270	ND< 280	930	410	ND< 250
Chrysene	NE	NE	15,000	420	ND< 270	45,000	ND< 250	ND< 270	290	1,300	630	ND< 250
Dibenz(a,h)anthracene	NE	NE	2,300	ND< 270	ND< 270	3,300	ND< 250	ND< 270	ND< 280	ND< 250	ND< 260	ND< 250
Fluoranthene	56,000	1,000,000	29,000	1,000	390	**89,000**	ND< 250	ND< 270	590	3,700	1,200	270
Fluorene	56,000	1,000,000	2,900	ND< 270	ND< 270	4,200	ND< 250	ND< 270	ND< 280	ND< 250	ND< 260	ND< 250
Indeno(1,2,3-cd)pyrene	NE	NE	9,000	ND< 270	ND< 270	33,000	340	ND< 270	ND< 280	890	350	ND< 250
Naphthalene	56,000	1,000,000	3,500	ND< 270	ND< 270	2,900	ND< 250	ND< 270	ND< 280	ND< 250	ND< 260	ND< 250
Phenanthrene	40,000	1,000,000	25,000	770	300	**49,000**	ND< 250	ND< 270	560	3,800	1,000	ND< 250
Pyrene	40,000	1,000,000	24,000	870	350	**88,000**	ND< 250	ND< 270	510	3,300	1,200	ND< 250
Total RSR Listed Metals (mg/Kg)												
Antimony	-	27	ND< 3.5	ND< 3.8	ND< 3.8	3.5	ND< 3.2	ND< 3.9	ND< 3.7	ND< 3.2	ND< 3.5	ND< 3.4
Arsenic	-	10	4.3	3.7	3.6	6.2	2	3.3	5.1	3.7	4.5	3.8
Barium	-	4,700	60.8	36.6	32.8	67.7	16.2	24.2	108	16.9	47.4	27.1
Beryllium	-	2	0.71	0.67	0.68	0.4	0.27	0.54	0.72	0.31	0.62	0.35
Cadmium	-	34	ND< 0.35	ND< 0.38	ND< 0.38	0.36	ND< 0.32	ND< 0.39	ND< 0.37	ND< 0.32	ND< 0.35	0.63
Chromium	-	100	15	13.6	12.2	12	5.77	10.4	14.6	10.2	15	14.7
Copper	-	2,500	24.4	8.44	10.4	156	6.45	12.7	68.5	8.92	14.7	11.8
Lead	-	400	21.2	8.41	57.6	176	3.48	4.98	263	5.25	9.1	10.7
Mercury	-	20	0.04	0.04	0.05	0.08	ND< 0.03	ND< 0.03	0.66	ND< 0.03	ND< 0.03	0.03
Nickel	-	1,400	9.87	10.8	9.51	10.9	4.35	8.63	10.2	6.26	13.1	10.4
Vanadium	-	470	26	27.3	24	20.3	10.5	17.5	27.9	19.8	29.1	19
Zinc	-	20,000	60.3	139	31.5	259	28.3	37.1	132	26.7	34.1	33.7
SPLP RSR Listed Metals (mg/L)												
SPLP Antimony	0.06	-	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005
SPLP Arsenic	0.5	-	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004	ND< 0.004
SPLP Barium	10	-	0.015	0.016	0.011	0.015	ND< 0.010	ND< 0.010	0.037	0.01	ND< 0.010	0.015
SPLP Beryllium	0.04	-	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001	ND< 0.001
SPLP Cadmium	0.05	-	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005	ND< 0.005
SPLP Chromium	0.5	-	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010
SPLP Copper	13	-	ND< 0.010	ND< 0.010	ND< 0.010	0.015	ND< 0.010	ND< 0.010	0.021	ND< 0.010	ND< 0.010	ND< 0.010
SPLP Lead	0.15	-	ND< 0.010	ND< 0.010	ND< 0.010	0.02	ND< 0.010	ND< 0.010	0.084	ND< 0.010	ND< 0.010	ND< 0.010
SPLP Mercury	0.02	-	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005	ND< 0.0005
SPLP Nickel	1	-	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	0.011	ND< 0.010
SPLP Vanadium	0.5	-	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010	ND< 0.010
SPLP Zinc	50	-	0.015	0.045	ND< 0.010	0.029	ND< 0.010	ND< 0.010	0.052	0.04	ND< 0.010	0.014
Extractable Total Petroleum Hydrocarbons (mg/Kg)												
ETPH	2,500	500	**840**	ND< 56	ND< 290	**550**	ND< 53	ND< 57	ND< 60	ND< 52	ND< 56	ND< 54
PCBs By SW8082A (ug/kg)	Varies*	Varies*	ND< 380	ND< 370	ND< 380	ND< 380	NA	NA	ND< 400	ND< 350	ND< 370	ND< 360

RES DEC - Residential Direct Exposure Criteria
GB PMC - Pollutant Mobility Criteria for a GB Classified Groundwater Area
* - Testing parameter(s) contains multiple constituents of concern with different detection limits; therefore no detection limits are provided within table

ND - Not Detected Above Laboratory Detection Limit
NA - Not Analyzed
NE - Criteria Not Established

ug/kg - micrograms per kilogram
mg/Kg - milligrams per kilogram

Table 2
Summary of Groundwater Analytical Data
Marina Village Housing Complex
Bridgeport, CT

Parameter	SWPC	RES VOL	MW-1	MW-2	MW-3	MW-4
Matrix			Groundwater	Groundwater	Groundwater	Groundwater
Depth to Water (feet)			7.81	7.25	6.71	7.20
Collection Date			6/3/16	6/3/16	6/3/16	6/3/16
Volatile Organic Compounds (VOCs) (ug/l)						
Bromodichloromethane	NE	NE	3.5	<ND 0.50	<ND 0.50	<ND 0.50
Chloroform	14,100	287	19	2.0	4.0	<ND 1.0
Poly Aromatic Hydrocarbons (PAHs) (ug/l)						
2-Methylnaphthalene	NE	-	<ND 0.05	<ND 0.05	0.18	<ND 0.05
Acenaphthene	NE	-	<ND 0.05	<ND 0.05	0.31	<ND 0.05
Acenaphthylene	0.3	-	<ND 0.05	<ND 0.05	0.14	<ND 0.05
Anthracene	1,100,000	-	0.06	<ND 0.05	0.77	<ND 0.05
Benz(a)anthracene	0.3	-	0.2	0.1	**1.8**	0.22
Benzo(a)pyrene	0.3	-	0.17	0.09	**0.7**	0.14
Benzo(b)fluoranthene	0.3	-	0.16	0.08	**1.4**	**0.23**
Benzo(ghi)perylene	NE	-	0.13	0.07	0.65	0.15
Benzo(k)fluoranthene	0.3	-	0.13	0.06	**1.2**	0.22
Chrysene	NE	-	0.19	0.09	2.1	0.26
Dibenz(a,h)anthracene	NE	-	<ND 0.01	<ND 0.01	0.28	0.05
Fluoranthene	3,700	-	0.53	0.33	5.3	0.42
Fluorene	140,000	-	<ND 0.05	<ND 0.05	0.3	<ND 0.05
Indeno(1,2,3-cd)pyrene	NE	-	0.12	0.06	0.77	0.18
Naphthalene	NE	-	<ND 0.10	<ND 0.10	0.3	<ND 0.10
Phenanthrene	0.077	-	0.26	0.2	**3.7**	0.2
Pyrene	110,000	-	0.45	0.29	3.2	0.31
RSR Listed Metals (mg/l)						
Antimony	86	-	<ND 0.005	<ND 0.005	<ND 0.005	<ND 0.005
Arsenic	0.004	-	<ND 0.004	<ND 0.004	**0.01**	**0.005**
Barium	NE	-	0.049	0.049	0.254	0.157
Beryllium	0.004	-	<ND 0.001	<ND 0.001	0.003	0.001
Cadmium	0.006	-	<ND 0.001	<ND 0.001	<ND 0.001	0.001
Chromium	0.11	-	0.008	0.001	0.047	0.017
Copper	0.048	-	0.012	<ND 0.005	**0.084**	0.042
Lead	0.013	-	**0.021**	0.002	**0.062**	**0.062**
Mercury	0.0004	-	<ND 0.0002	<ND 0.0002	<ND 0.0002	0.0003
Nickel	0.88	-	0.007	0.002	0.046	0.015
Vanadium	NE	-	0.012	<ND 0.002	0.088	0.03
Zinc	0.123	-	0.037	0.006	**0.298**	0.121

SWPC - Surfacewater Protection Criteria
RES VOL - Residential Volatilization Criteria
ND - Not Detected Above Laboratory Detection Limit
NA - Not Analyzed
NE - Criteria Not Established
mg/l - milligrams per liter
ug/l - micrograms per liter

APPENDIX D

CLOSE OUT REPORT

FREEMAN COMPANIES

LAND DEVELOPMENT | ENGINEERING DESIGN | CONSTRUCTION SERVICES

Close-out Report
Marina Village Redevelopment – Phase I
Bridgeport, Connecticut

August 2016
Freeman File No.: 2015-0408

Prepared for:

Bridgeport Community Renewal Associates, LP
c/o JHM Group of Companies
Attn: Dan Montanaro / Anthony T. Rowan
1281 East Main St. Suite 201
Stamford, CT

Prepared by:

Freeman Companies, LLC
36 John Street
Hartford, CT 06106

TABLE OF CONTENTS

APPENDICES

1 INTRODUCTION

Bridgeport Community Renewal Associates, LP ("BCRA") is working with Park City Communities on the redevelopment of the Marina Village housing development in Bridgeport, Connecticut. Phase I of the redevelopment consists of the 4.77-acre triangular portion of the Marina Village complex which is bounded by Park Avenue, Railroad Avenue, Columbia Street, and Johnson Street. A site plan depicting the Phase I project area is include within Appendix A.

2 SITE DESCRIPTION AND ENVIRONMENTAL SETTING

2.1 General

The Marina Village Complex, located at 400 Iranistan Avenue, consists of two adjacent parcels of land totaling approximately 15.9 acres located in the City of Bridgeport, Connecticut. The Site is bounded on the north by South Avenue and Railroad Avenue, on the east by Park Avenue, on the south by Johnson Street and Ridge Avenue, and on the west by Iranistan Avenue. Columbia Street runs between the two parcels through the middle of the site.

2.2 Historical Usage

The existing Marina Village housing complex was constructed during the late 1940s. Prior to its construction, the Site was occupied by the Bridgeport Malleable Iron Works (later known as the Eastern Malleable Iron Company), a metal foundry that manufactured malleable and grey iron castings, Hotchkiss Sons' Manufacturers Curry Combs & Company and by a number of residential structures.

The foundry used coal to fuel their operations, which included annealing, trimming, core making, tumbling, and molding. Hotchkiss Sons Manufacturers Curry Combs & Company was located southwest of the Bridgeport Malleable Iron Works along South Avenue. The Hotchkiss Sons Manufacturers Curry Combs & Company property included a manufacturing building, a wood shop, coal storage, and lumber storage. Operations included scouring, tempering, and japanning. A number of residential homes were located along the north side of Johnson Street, the west side of Columbia Street, the west side of Park Avenue, and the south side of Railroad Avenue at the east end of the site.

2.3 Groundwater Classification

According to the CTDEEP water quality classification maps (November 2013), groundwater at the site is classified as GB. A GB classified groundwater is defined as groundwater within a historically highly urbanized area or an area of intense industrial activity and where public water supply service is available. Such groundwater may not be suitable for human consumption without treatment due to waste discharges, spills or leaks of chemicals or land use impacts.

2.4 Environmental Assessment Activities

Based on the historical industrial activities that had been conducted on the site, an environmental assessment was performed in May 2015. The scope of work of the assessment included the following:

- Oversight of the advancement of up to 10 soil borings, three of which completed as a groundwater monitoring well.
- The collection and analysis of a soil samples from each of the proposed soil borings. Select soil samples would be analyzed for the following parameters: volatile aromatic hydrocarbons (VOCs), extractable total petroleum hydrocarbons (ETPH), poly aromatic hydrocarbons (PAHs), total and leachable RSR listed metals and polychlorinated biphenyls (PCBs).
- The collection of a groundwater sample from each of the three newly installed monitoring wells. Groundwater samples would be analyzed for one or more of the following parameters: VOCs, PAHs, and total RSR listed metals.

- The preparation of a report documenting the findings of the investigation.

The primary objective of the investigation was to obtain sufficient information on subsurface conditions in order to provide an understanding on how these conditions would affect the redevelopment of the Site.

2.5 Soil Conditions

Based on field observations the following soil conditions were generally observed:

- Topsoil/ Asphalt – Topsoil was described as light brown to brown silty SAND (SM). Up to 1.1 feet of topsoil was encountered in the borings conducted in grassy areas. Asphalt thickness ranged from 1 inch to 3 inches.

- Fill (Urban Fill) – Fill was described as very loose to dense, dark brown to light brown, silty SAND with gravel (SM), asphalt, crushed brick, concrete, and other manmade material debris. In addition, pockets of ash material were also encountered throughout the site. The fill extended to depths below ground surface ranging from 0 feet (B-10) to greater than 17 feet (B-9/MW).

- Natural Sand – Natural sand was encountered in each of the borings, except B-9/MW, and was described as loose to very dense, poorly graded sand with silt and gravel varying to silty sand with gravel (SM).

2.6 Soil Sampling Results

Results from the soil sampling activities identified the presence of PAHs, TPH, total arsenic and low concentrations of PCBs primarily located between former buildings 35 and 36. This area was once the location of the annealing and trimming area for Eastern Malleable Iron Company.

2.7 Groundwater Sampling Results

Analytical results from groundwater sampling activities did not detect the presence of any volatile organic compounds at concentrations that exceeded the residential volatilization criteria. Analytical results did detect the presence of (PAHs) including; benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and phenanthrene.

Based on the findings of the subsurface investigation, the following soil management recommendations were made

- Native soils can be managed as clean fill material;
- Any urban fill material disturbed as part of proposed site activities shall be at a minimum be managed as a Regulated Soil, but may remain on site for beneficial reuse; and
- Ash and oil stained soils are to be removed for disposal as contaminated soil

3 SPECIFIC INFORMATION

The following section provides specific information regarding the soil excavation activities conducted at the Site.

3.1 Construction Company

Standard Demolition Services, Inc.
30 Nutmeg Drive
Trumbull, CT 06611

Pro-Teck
85 Willow Street
New Haven, CT 06511

3.2 Oversight Firm

Freeman Companies
36 John Street
Hartford, CT 06106

3.3 Analytical Company

Phoenix Environmental (Soil and Water)
587 East Middle Turnpike
Manchester, CT 06040

3.4 Soil Disposal Facilities

Coventry Landfill
451 Arnold Road
Coventry, RI 02816

Chicopee Landfill
161 New Lombard Road
Chicopee, MA 01020

4 PERSONAL PROTECTION EQUIPMENT

Level D protection was the minimum protection required for the project. Appropriate PPE was chosen based on the physical and chemical properties of the product involved, a risk assessment of the situation, the work to be done, and the capabilities of the wearer. Level D protection is sufficient when work operations preclude splashes, immersion, or the potential for unexpected inhalation or contact with hazardous levels of chemicals. Appropriate Level D protective equipment included

- Work cloths;
- Disposable gloves;
- Boots/shoes, chemical-resistant steel toe and shank;
- Safety glasses or chemical splash goggles; and
- Hard hat

5 WORK PRACTICES

Freeman Company monitors observed the following general work practices during excavation activities:

1. Workers generally followed the procedures outlined in the project specifications
2. Waste profile forms were managed by Pro-Teck
3. Facility acceptance for the generated soil
4. Weight slips from the disposal facility were provided
5. Fencing was installed and maintained around the perimeter of the project area
6. Work areas were generally kept clean and free of debris

6 SOIL REMOVAL ACTIVITIES

The primary purpose of the soil removal activities was to excavate and disposal of contaminated soil/fill material that was encountered during the subsurface assessment activities. Based on the sol profile created during the assessment activities, the contractor, Standard Demolition Services (SDS), identified soil disposal locations as identified in Section 4.4.

Soil excavation and removal activities, conducted over an approximately eight week period, were initiated on April 21, 2016 and completed on June 16, 2016. A figure depicting excavation areas is included as Appendix A.

6.1 Previous Building Slab

During initial excavation activities it was identified that the floor slab from the former Eastern Malleable Iron Company was still present on the property. The slab was generally encountered at a depth of approximately 1-2 feet below the existing surface. Only within areas where the Marina Village buildings were constructed was the original

slab removed. Inspection of the slab revealed that the slab consisted of approximately 4-6" of non-reinforced concrete.

The slab appeared to be in good condition with no signs of staining. A small section of the slab was removed at a location to the southwest of building 35 in order to identify soil conditions under the slab. Soil conditions under the slab consisted of native sand. In order to confirm he initial findings Freeman Companies directed the contractor to remove small areas of slab at several additional locations. In all instances native sand was identified to be present under the slab.

Since the slab did not appear to be stained and that native sand was located under the slab, the decision was made to leave the slab in place.

6.2 Ash Fill Areas

During the soil removal activities serval areas of ash material were encountered and removed. The ash was identified to contain small pieces of ceramic debris and glass. One of the larger areas of ash material was located to the west of building 36, which is located just south of the former annealing area of the Eastern Malleable Company. The ash area measured approximately 30 feet long by 20 feet wide and extended to a depth of approximately 10-12 feet.

6.3 Demolition Debris

Various amounts of brick, asphalt, and broken concrete were encountered throughout the excavation area. The larger amounts of these materials were encountered primarily at locations on top of the former building slab. It appeared that the former building was crushed in place and filled with urban fill material to allow of the shaping of the property for construction of Marina Village.

6.4 Impacted Soil

Soil material identified to be impacted by PAHs and low concentration of PCBs was selected for removal from the site. The target areas for removal were primarily located to the northwest of building 36 and to the south and southwest of building 35. The largest of the impacted areas was located to the northwest of building 36, which was located within the former coal storage area for the former Eastern Malleable Iron Company. Soil within this area was primarily impacted from 1-4 feet in depth and encompassed almost the entire area north of the former building slab extending to Railroad Avenue. Other smaller pockets of impact generally consisted of areas measuring approximately 10 feet by 10 feet by 5 feet in depth.

7 SOIL DISPOSAL

Impacted soil and ash material excavated for removal from the site was brought to one of two locations for disposal. The soil and ash material located to the east of building 35 was brought to the Chicopee Landfill, in Chicopee Massachusetts. The remaining impacted material was brought to the Coventry Landfill in Coventry Rhode Island.

Based on weight tickets generated from the landfills, approximately 731.92 tons of impacted material were excavated and removed from the site for reuse at the Chicopee Landfill and approximately 3,503.11 tons of impacted material were excavated and removed from the site for reuse at the Coventry landfill. Copies of the weight tickets are included as Appendix B. Photos of the excavation activities are included as Appendix C.

8 CLOSURE SAMPLING

As identified, impacted material related to the historical operations of the Eastern Malleable Iron Company primarily consisted of discolored fill material and ash which contained moderate concentrations of PAHs and low concentrations of PCBs. This impacted material was visually identifiable due to its composition and color as compared to the native sands located at depth. Removal of impacted material was generally conducted until the native sand material was encountered.

Upon completion of the removal of the impacted material soil removal, soil samples were collected from the floor of excavation areas in order to demonstrate removal of the impacted material. Since PAHs were the primary driver for

removal activities and were present at the greatest concentrations, the closure samples were submitted for the analysis of PAHs. No PAHs were detected within the samples submitted. A figure depicting the endpoint sampling locations is provided in Appendix A. A summary of the analytical results is included as Appendix D.

9 BENEFICIAL REUSE OF URBAN FILL

Residual urban fill material, soil containing building debris and/or surficial soils that was located throughout the former Marina Village complex, will be beneficially reused on-site as part of redevelopment.

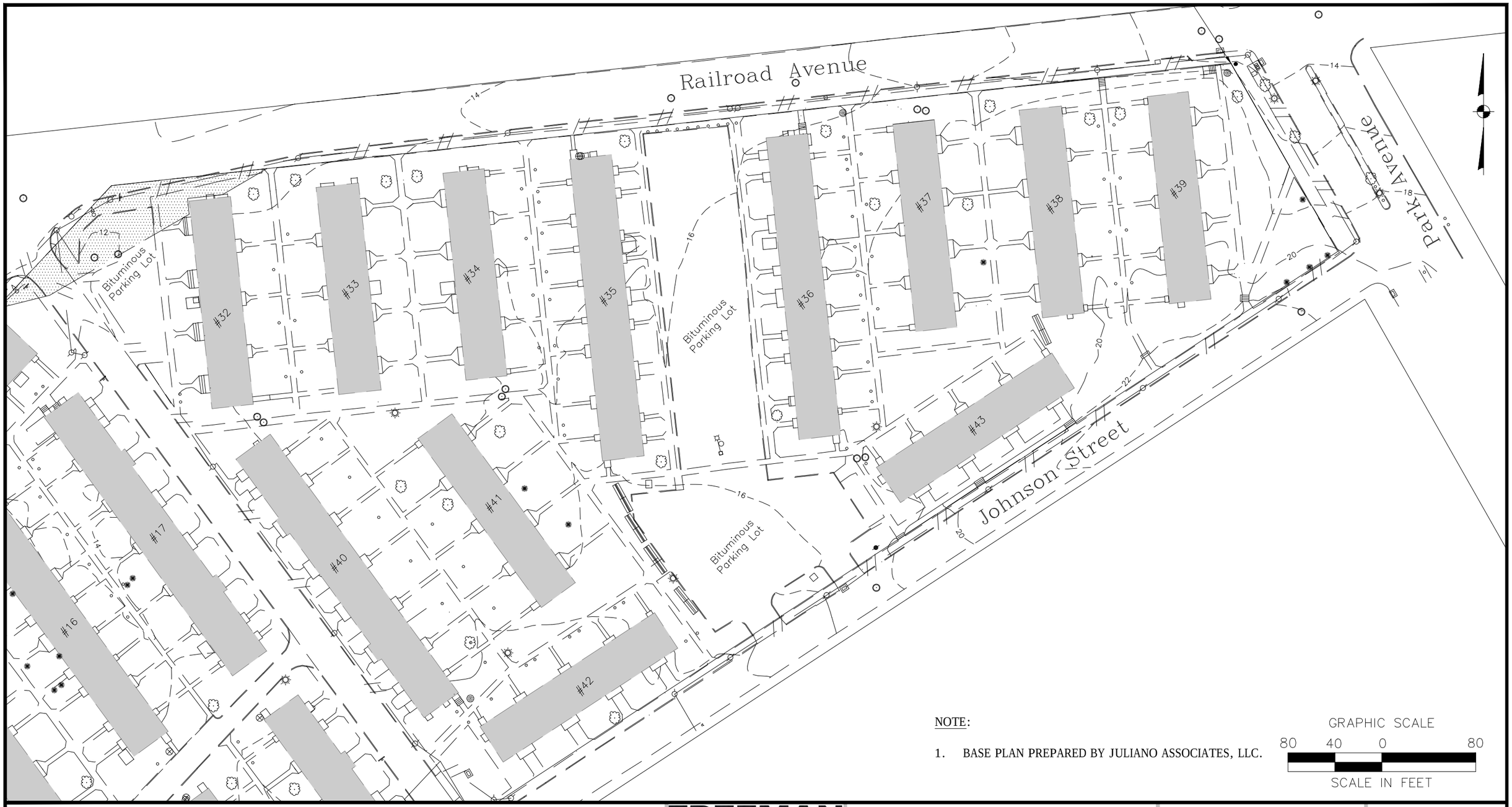
Urban fill is defined as non-native disturbed material within urban areas that typically contains a mixture of soil demolition debris, asphalt, brick, concrete, glass, ceramics, wood ash, coal and/or coal ash and is widespread within an urban environment. As a result of its composition it is common that urban fill typically contains low concentrations of PAHs and metals.

Urban fill was routinely encountered within the surficial soils on site during the demolition of site structures. Existing urban fill material remaining on-site will be beneficially reused either by being placed within the former building foundation excavations and covered with a new building structure or 2 feet of clean fill or will be placed under proposed parking areas and covered with at least 3 inches of asphalt.

Native sands located on the property, which were determined to be analytically free of historical impacts, will also be utilized in a non-restrictive manner as part of the redevelopment of the property.

APPENDIX A

FIGURES



NOTE:

1. BASE PLAN PREPARED BY JULIANO ASSOCIATES, LLC.

GRAPHIC SCALE

80 40 0 80

SCALE IN FEET

PLAN

MARINA VILLAGE
400 IRANISTAN AVENUE
BRIDGEPORT, CONNECTICUT

FREEMAN COMPANIES
LAND DEVELOPMENT | ENGINEERING DESIGN | CONSTRUCTION SERVICES

FREEMAN COMPANIES, LLC
36 JOHN STREET
HARTFORD, CT 06106
WWW.FREEMANCOS.COM
TEL:(860)251-9550
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REVISIONS

DRAWN:	M.K.
CHECKED:	C.D.B.
APPROVED:	C.D.B.
SCALE:	1"=80'
PROJECT NO.:	2015–0408
DATE:	08/11/2016

SHEET NO.

FIGURE 1

NOTE:

1. BASE PLAN PREPARED BY JULIANO ASSOCIATES, LLC.

GRAPHIC SCALE
80 40 0 80
SCALE IN FEET

PLAN

MARINA VILLAGE
400 IRANISTAN AVENUE
BRIDGEPORT, CONNECTICUT

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SHEET NO.

FIGURE 2

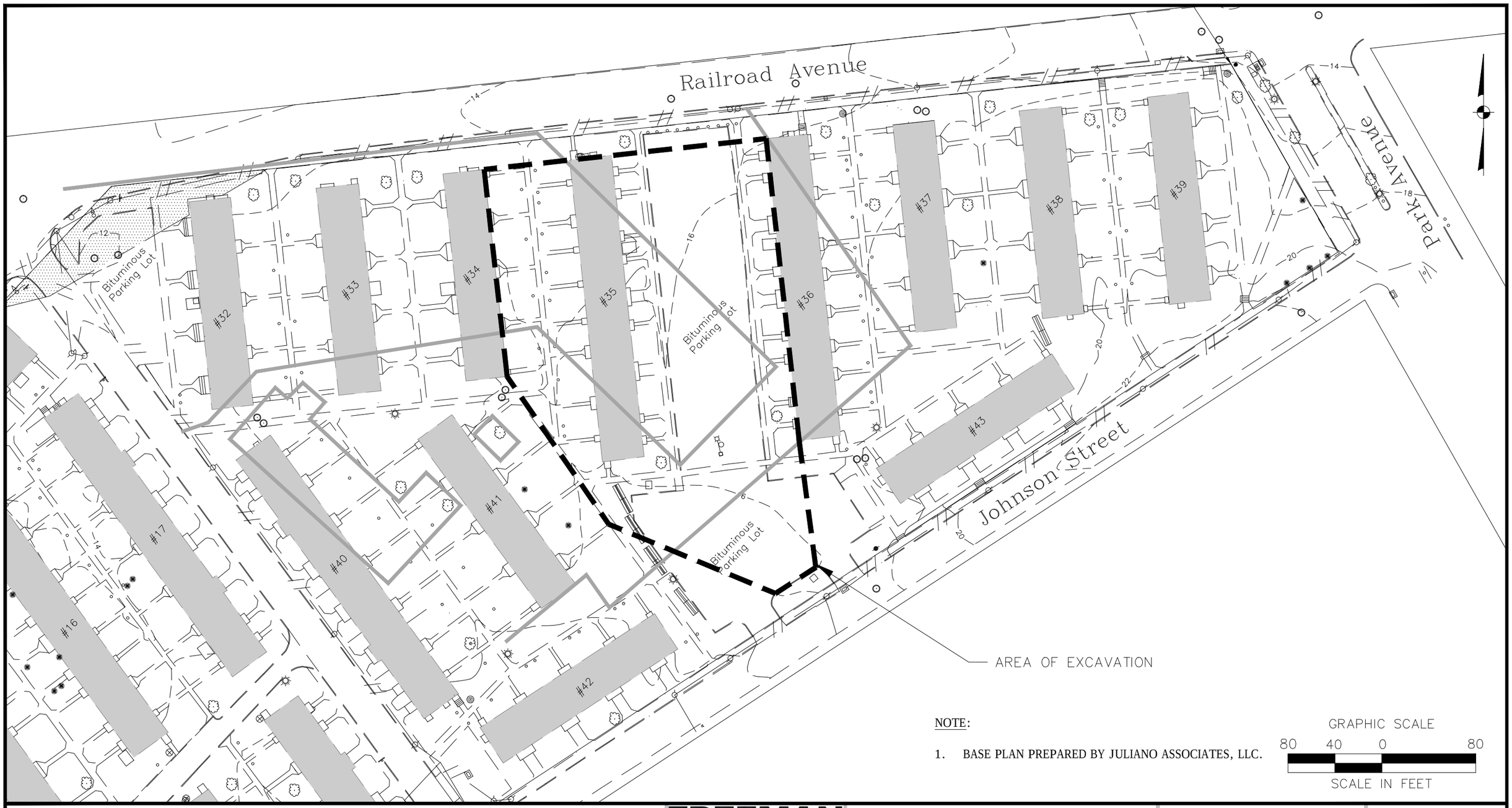

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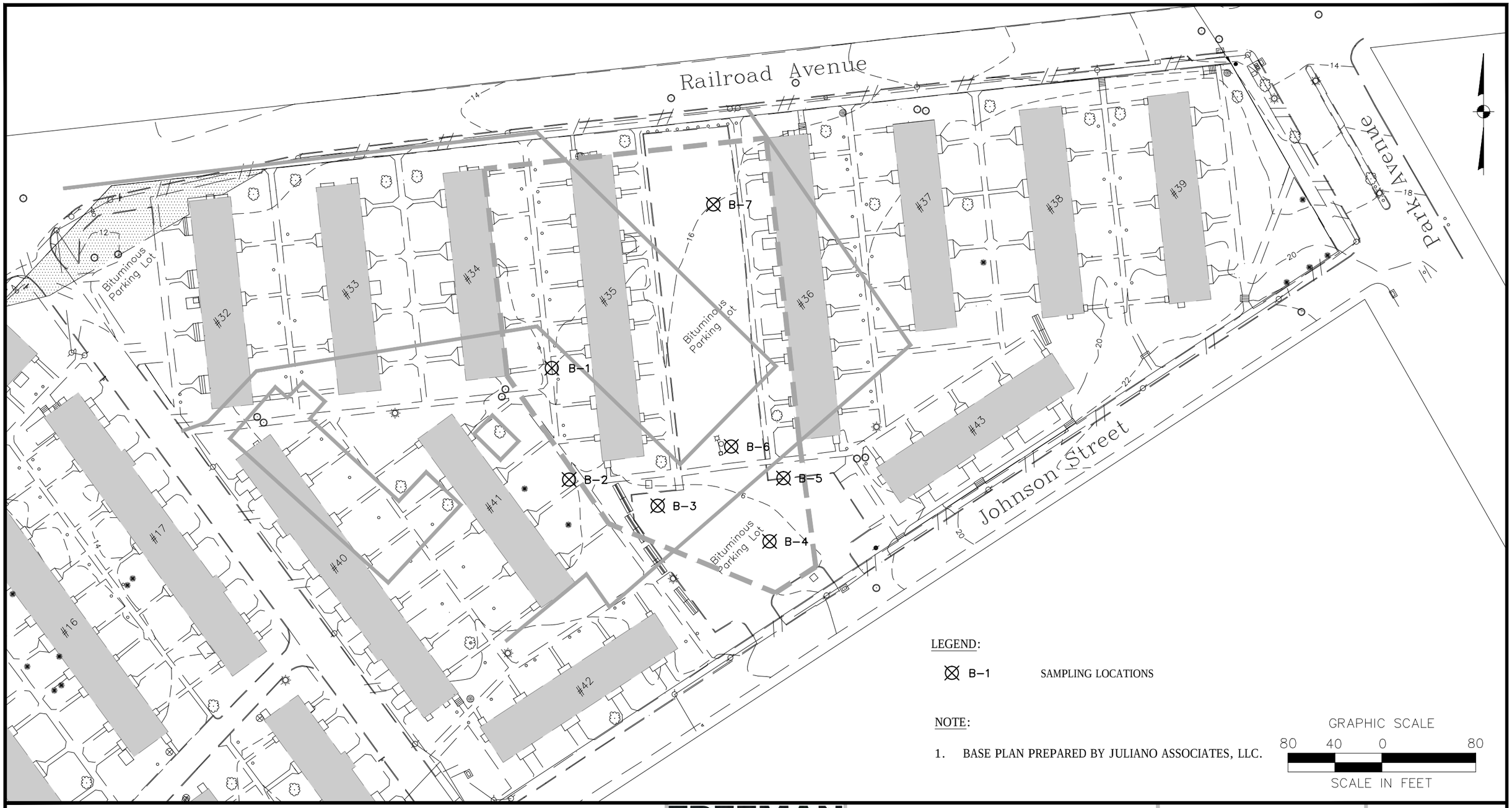
FIGURE 3



LEGEND:

⊗ B-1 SAMPLING LOCATIONS

NOTE:

1. BASE PLAN PREPARED BY JULIANO ASSOCIATES, LLC.

GRAPHIC SCALE
80 40 0 80
SCALE IN FEET

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SHEET NO.

FIGURE 4

APPENDIX B

SOIL WEIGHT TICKETS

AVAILABLE UPON REQUEST

APPENDIX C

SITE PHOTOS

Photo 1: Excavation activities

Photo 2: Removal of ash material

Photo 3: Removal of material from coal storage area

Photo 4: Clean sand remaining after removal of impacted material

APPENDIX D

SUMMARY OF ANALYTICAL RESULTS

AVAILABLE UPON REQUEST

APPENDIX E

ENVIRONMENTAL DATA RESOURCES REPORT

AVAILABLE UPON REQUEST

APPENDIX IV
Database Report

(Available Upon Request)

APPENDIX V
Site Photographs

CONNECTICUT DEPARTMENT OF HOUSING
RBD PILOT AREA
BRIDGEPORT, CONNECTICUT

Site Photographs – December 4, 2018

View looking down Johnson Street to the east from the corner of Columbia and Johnson Streets.

View of Columbia Street in the vicinity of Ridge Avenue (to the left) looking to the northwest towards Interstate 95.

Northwest corner of Ridge Avenue and Columbia Street with an active construction site from building demolition within the RBD Pilot area beyond.

Zoom view of previous photo showing soil covered grounds, building demolition piles and buildings 15, 16 and 17 of the Marina Village Housing Complex beyond to the northwest.

View of Ridge Street looking to the southeast

View of gated construction area entrance within the RBD Pilot area located along the approximate center of the north side of Ridge Avenue.

View of Buildings18-21 (left to right) at the southern portion of the RBD Pilot area from Ridge Avenue.


View of Buildings 20 and 21 located at the southern portion of the RBD Pilot Area looking to the northwest.

APPENDIX VI
Qualifications of Environmental Professionals

MICHAEL MANOLAKAS, LEP, CPG

Area Manager

Years with the firm

23

Years total

23

Professional qualifications

Licensed Environmental Professional: Connecticut,

Certified Professional Geologist, American Institute of Professional Geologists

Areas of practice

Hydrogeology, Environmental Investigation, Remediation and Estimating

Languages

English

CAREER SUMMARY

Michael Manolakas' 20 years of experience includes completion of numerous Phase I through Phase III environmental site investigations, delineation and full characterization of contaminated soils and groundwater, feasibility studies, remedial system design, remedial cost estimates, water treatment system design, and remediation of soils and groundwater. His remedial experience includes in-situ abiotic and biotic treatments, in-situ stabilization, soil-vapor extraction, air sparge, pump and treat, excavation, product removal, and encapsulation. He currently manages sites undergoing investigations and remediation as part of RCRA Corrective Action, CT Transfer Act, CT and NY Voluntary Remediation/Clean-Up/Brownfield Programs and under CT Consent Order. His experience also includes investigation and remediation of releases in accordance with 40 CFR 761 (TSCA).

Michael's experience includes performing comprehensive environmental liability assessments at industrial facilities, preparing detailed lifecycle construction/ remediation project cost estimates, preparing feasibility studies as well as project management, construction contract administration, preparation of project manuals, bidding documents, specifications, and management of remedial investigations. Additional experience includes assisting clients in administering construction bidding process and evaluating bids. Michael also has corporate experience in determining potential environmental financial liability related to the acquisition, leasing or sale of properties and businesses.

EDUCATION

B.S., Geological Sciences, Ohio State University, Columbus, Ohio 1994

PROFESSIONAL MEMBERSHIPS

American Institute of Professional Geologists (AIPG)

Environmental Professionals Organization of Connecticut (EPOC)

PROFESSIONAL EXPERIENCE

Environmental Site Investigation and Remediation

— Bridgeport, Connecticut: project management of investigations and remediation of a 76.5 acre former industrial site. This RCRA TSD facility included an approximate 1.5 million square foot manufacturing building, an inactive industrial landfill, 55 former USTs and two former metal hydroxide sludge beds. Investigations included the drilling of over ~1500 soil borings, installation of ~300 monitoring wells and ~350 soil-vapor point, collection of ~200 sediment samples, electromagnetic geophysics, ground penetrating radar, down-hole geophysics, aquifer test, groundwater flow modeling, collection and analyses of numerous soil and groundwater samples for various constituents of concern (COCs). COCs included PCBs, VOCs, SVOCs, metals, and pesticides. Remedial actions have included the removal and offsite disposal of thousands of tons of PCB remediation waste in accordance with 40 CFR 761, in-situ stabilization of over 3,000 tons of characteristically hazardous waste and disposal of this waste containing PCBs and non-aqueous phase liquids as PCB remediation waste, closure of multiple greater than 90-day RCRA waste storage areas, and remediation of four areas containing light non-aqueous phase liquids (LNAPL). Remediation also included the screening

and removal of solid waste from 40,000 cubic yards of landfilled materials. Remediation of this site is ongoing. Client: Name. Project Value: USD

- East Haven, Connecticut: characterization and remediation of PCB bulk product waste and PCB remediation waste at water-supply sedimentation basin in accordance with the self-implementing option for cleanup and disposal of PCB remediation waste (40 CFR 761.61(a)). The investigation and remediation were completed with the corporation of the CTDEEP and EPA Region 1 Administrator.
- Hamden, Connecticut: project management of investigation and remediation of an approximately 19-acre industrial waste landfill site located on residential and public school parcels. Tasks included development of chronological historical filling activities, a detailed investigation work plan, oversight of offsite investigations, implementation of extensive onsite soil and groundwater investigation, and remedial options and costs. Thus far, the field investigations have included the drilling of 70 soil borings, excavation of 8 test pits, collection and analysis of 105 soil samples, installation of 24 monitor wells and collection and analysis of 32 groundwater samples. In addition, tasks included monitor of communications, attend and report on CTDEEP, EPA and other primary responsible party public meetings and review of technical submittals of government agencies and primary responsible parties. Remediation underway includes the removal of PCB "hot spot" to be disposed as PCB remediation waste in accordance with 40 CFR 761.
- Fairfield, Connecticut: contracted for approximately four months to work at a large international conglomerate corporation. Tasks included review of over one hundred environmental site assessments and remedial closure reports to determine potential environmental risks with respect to acquiring, leasing or selling properties or businesses, and working with environmental health and safety managers to reduce risks associated with these types of transactions. Property and businesses reviewed were located throughout the world and ranged from leasing of office space to acquisition of $500 million corporations. Review of larger acquisitions often included development of work plans and determination of potential environmental liability.
- Danbury, Connecticut: identified offsite source of contamination through environmental file review and review of regional hydrogeologic setting. Designed and coordinated installation of potable water treatment system. Coordinated repairs of onsite well and distribution system to the satisfaction of the Connecticut Department of Public Health.
- Manhattan, New York: completed Phase I environmental site assessment for signature property assessed at approximately $250 million.
- Chester, Connecticut: project management of a RCRA ground-water quality assessment for a plume from metal hydroxide seepage lagoons. The project involved quarterly sampling and evaluation. Developed and implemented CTDEP approved work plan for closure investigation of waste lagoons. Receipt of CTDEP clean closure approval for former waste lagoons. Tasks also included characterization and monitoring of halogenated volatile organic plume and assessment of remedial performance. Remedial operations consisted of both a multi-phase extraction and pump and treat system.
- Norwalk, Connecticut: research and identification of inexpensive new technology (jet cavitation) for treatment of contaminated groundwater. Technology is

proposed to be used in conjunction with a pump and treat system to remove halogenated volatile organic compounds from bedrock and overburden aquifers.

- Winsted, Connecticut: project management of investigations and remediation at a former thread manufacturing facility. Tasks included identification and characterization of 22 potential release areas, and successful remediation of all identified release areas.
- Sag Harbor, New York: full characterization of halogenated VOC plume. Tasks included response to technical comments concerning hydrogeology, chemical transport, remedial effectiveness and SPDES discharge technical requirements.
- Detroit, Michigan: acted as the onsite supervisor for environmental investigations and remediation activities at three automotive plants. Tasks included operation and maintenance of phytoremediation berm, supervising closure of hazardous waste storage areas, excavation of petroleum, VOC and metal impacted soils and supervision of site investigations.
- Portland, Connecticut: supervision and development of monitor wells and evaluation of soil volatile organic levels.
- Stratford, Connecticut: supervision of test borings and monitor well installation, while sampling for PCB's and asbestos, to determine soil and groundwater quality.
- Illinois, New Jersey, New Hampshire, Pennsylvania, Rhode Island and Vermont: conducted several Phase I environmental site assessments for use of property transfer.
- Farmington, Connecticut: completion and submittal of the Environmental Condition Assessment Form and Form III to the CTDEP to satisfy requirements of the Connecticut Property Transfer Program.
- Yonkers, New York: supervision and development of monitor wells on periphery of landfill. Entailed collection of groundwater and surface water samples.
- Thomaston, Connecticut: characterization of MTBE and BTEX plume in the groundwater.
- Patterson, New York: project management of Phase II investigations. Project included sampling of groundwater, soils and paint and the evaluation of the laboratory results.
- Glastonbury, Connecticut: project management of subsurface investigation to determine the impact to the soil and groundwater from a former tannery operation. The project included the installation of monitor wells, sampling and evaluation.
- Cheshire, Connecticut: annual and quarterly reporting on efficiency and optimization of soil-vapor extraction (SVE) and sparge system (IAS) operation. SVE/IAS system orients hydraulic gradient so that halogenated solvents remain in localized area.
- Dutchess County, New York: completed numerous requirements of the hydrogeologic reporting section of the 6 NYCRR Part 360 Solid Waste Management Facilities rules and regulations for a proposed C&D landfill as a closure plan for a mining operation.
- Stratford, Connecticut: project management of subsurface investigation to determine the impact from former site operations to the soil and groundwater. Project included drilling of test borings, sampling, environmental database review

and evaluation. Completion of final remediation report and submittal of Form II Connecticut Property Transfer form.

- Orangetown, New York: project management of subsurface investigation to determine the impact of former site operations to the soil and groundwater. Development and implementation of final work plan to investigate the site under the NYSDEC voluntary remediation program.
- Cromwell, Connecticut: project management of bioremediation system, and monitoring program for petroleum release. Tasks also included fulfilling CTDEP reporting requirements.
- Hamden, Connecticut: project management of characterization, removal and disposal of mercury-impacted soils.
- Wallingford, Connecticut: project management of characterizing pesticide soil and groundwater contamination with respect to the Connecticut Remediation Standard Regulations. Identified concentrations of contaminant in soils posing a potential health threat for various uses of the property.
- Connecticut and New York: conducted numerous Phase I and Phase II environmental site assessments for use in a property transfer and financing.
- North Haven, Connecticut: supervised steam cleaning of impacted industrial sumps. Investigation and delineation of impacted soils and wetlands.

Groundwater Supply

- Suffolk County, New York: completed detailed salt-water and iron investigation as they responded to pumpage of eleven pumping wells in the Montauk Area. The study included pumpage recommendations intended to maximize potable water while limiting seasonal and long-term chloride and iron impacts. The study also provided alternative management approaches for rehabilitating impacted well fields and maximizing existing well fields.
- New Haven County, Connecticut: analysis and evaluation of groundwater levels, stream flows, precipitation and wetland conditions to determine the impact of groundwater withdrawals on the aquifers and surface-water systems in four well fields.
- Southington, Connecticut: conducted pumping and induced infiltration tests of municipal water supply wells.
- Town of Wappinger Falls, New York: conducted several geophysical investigations. Analyzed pump test to determine aquifer parameters and stream infiltration rates. Calculated optimal placement of an additional production well.
- New Haven County, Connecticut: evaluation of pumping test data and development of water table maps.
- Suffolk County, New York: conducted numerous geophysical investigations. Investigations required determination of optimal screen setting and size for design of production wells.
- Dutchess County, New York: completed numerous requirements of the hydrogeologic reporting section of the 6 NYCRR Part 360 Solid Waste Management Facilities rules and regulations for a proposed C&D landfill as a closure plan for a mining operation.

- Suffolk County, New York: development of numerous groundwater flow and salt-water intrusion models for locations in Suffolk County to determine optimal well field withdrawal rates in order to avoid potential adverse impacts to the Upper Glacial Aquifer, Magothy Aquifers and surrounding wetlands. Specifically, the models were utilized to determine pumping rates that would avoid salt-water upcoming or lateral encroachment or dewater of wetlands. Projects included management and analysis of pumping tests, design of monitoring well networks and response to concerns of the NYSDEC.
- Southold, New York: hydrogeologic assessment for proposed well field. Evaluated potential impacts from salt water upcoming. Project included a 72-hour pump test, collection of samples and evaluation.
- Carlin, Nevada: calibration of ground-water flow model (MODFLOW) to evaluate optimal use of pumpage for dewatering of gold mine.
- New Haven County, Connecticut: modification and calibration of groundwater flow model (MODFLOW) to determine the zone of influence during drought conditions for four existing well fields. The modification involved updating three separate 2-dimensional models to 3 dimensional models to better evaluate the effects of the surface-water bodies.
- Town of Thomaston, Connecticut: use of groundwater flow model (MODFLOW) and particle tracking program (PATH3D) to determine most efficient and economical remedial design for the characterized MTBE and BTEX plume in the groundwater.
- Sag Harbor, New York: modification and calibration of groundwater flow model (MODFLOW), particle tracking program (PATH3D) and solute transport program (MT3D) to determine, optimal remedial design for historical DNAPL Plume.
- Town of Wappinger Falls, New York: use of 2 dimensional groundwater flow model (Capzone) and particle tracking program (GWPATH) to determine safe and maximum yield of well field. Model output helped determine capture zone and optimum discharge rate of future production well.
- Litchfield County, Connecticut: development and calibration of groundwater flow model (MODFLOW) to determine the zone of influence during drought conditions for four existing well fields. Use of particle tracking program (PATH3D) to determine area of contribution for existing well field.
- Westchester County, New York: development and calibration of groundwater flow model (MODFLOW) to determine extent of mounding from proposed septic discharge.

Specific Experience in Groundwater Modeling

- Fairfield County, Connecticut: development and calibration of groundwater flow model (MODFLOW) to determine the zone of influence during average conditions of existing well fields. Use of particle tracking software (PATH3D) for determination of area of contribution. Model was used to evaluate safe yield for southern well field with respect to salt water intrusion.
- Orange County, New York: development and calibration of several groundwater flow models (MODFLOW) to determine zone of influence in drought conditions of existing well fields. Use of particle tracking software (PATH3D) for determination of area of contribution for travel times.
- Carlin, Nevada: calibration of groundwater flow model (MODFLOW) to evaluate optimal use of pumpage for dewatering of gold mine.

- New Haven County, Connecticut: modification and calibration of groundwater flow model (MODFLOW) to determine the zone of influence during drought conditions for four existing well fields. The modification involved updating three separate 2-dimensional models to 3 dimensional models to better evaluate the effects of the surface-water bodies.
- Thomaston, Connecticut: use of groundwater flow model (MODFLOW) and particle tracking program (PATH3D) to determine most efficient and economical remedial design for the characterized MTBE and BTEX plume.
- Suffolk County, New York: development of numerous (more than 20) groundwater flow (MODFLOW), particle tracking (PATH3d and MODPATH) and salt-water intrusion (SHARP) models for locations in Suffolk County which were utilized to determine optimal well field withdrawal rates to avoid potential adverse impacts to the Upper Glacial Aquifer, Magothy Aquifers and surrounding wetlands. Specifically, the models were utilized to determine pumping rates that would avoid salt-water upcoming or lateral encroachment or dewater of wetlands.
- Sag Harbor, New York: modification and calibration of groundwater flow model (MODFLOW), particle tracking program (PATH3D) and solute transport program (MT3D) to determine optimal remedial design for historical DNAPL plume. Through modeling determined contaminant removal times and optimum pumping locations and rates for focused source/contaminant removal actions.
- Wappinger Falls, New York: use of 2-dimensional groundwater flow model (Capzone) and particle tracking program (GWPATH) to determine safe and maximum yield of well field. Model output helped determine capture zone and optimum discharge rate of future production well.
- Litchfield County, Connecticut: development and calibration of groundwater flow model (MODFLOW) to determine the zone of influence during drought conditions for four existing well fields. Use of particle tracking program (PATH3D) to determine area of contribution for existing well field.
- Westchester County, New York: development and calibration of groundwater flow model (MODFLOW) to determine extent of mounding from proposed septic discharge.

PUBLICATIONS AND PRESENTATIONS

Publications

- Manolakas, Michael. “Achieving Compliance through Development of Alternative Soil Criteria,” *Monitor*, Spring 2004.
- Manolakas, Michael. “Guidance for EPA Technical Impracticability of Ground Water Restoration,” *LBG Short Notes*, Spring 1999.
- Manolakas, Michael. “Aquifer Mapping Integral to Well Field Protection Efforts”, *Land and Water*, July/August 1998.
- Manolakas, Michael. “The Use of Computer Models in Well Field Protection delineations,” *CE News*, April 1999.

Presentations

- Manolakas, Michael. “Stabilization of Characteristically Hazardous Volatile Organic Compounds and Metals Using Rice Hull Ash and Lime Kiln Dust.” Battelle Eighth

International Conference on Remediation of Chlorinated and Recalcitrant Compounds. May 2012.

— Manolakas, Michael. "Effectiveness of a Metal Stabilizer when Treating Hazardous Waste with Modified Fenton's Reagent and Sodium Persulfate: A Laboratory Treatability Study." Battelle Seventh International Conference on Remediation of Chlorinated and Recalcitrant Compounds. May 2010.

— Manolakas, Michael. "Investigation of Site Specific Mobility and Leaching Characteristics of Dieldrin in Soils." Battelle Fourth International Conference on Remediation of Chlorinated and Recalcitrant Compounds. May 2004.

MELANIE R. SHEPERD

Project Hydrogeologist

Years with the firm

12

Years total

18

Professional Qualifications

Professional Geologist, New York, 2018

Areas of practice

Geology, Hydrogeology, Environmental Investigation and Remediation

Languages

English

CAREER SUMMARY

Melanie has over eighteen years of experience conducting Phase I, II and III Environmental Site Assessments including completing all facets of field investigations, data tabulation and reporting. These investigations include a variety of drilling, well completion, soil and water sampling, environmental screening tasks associated with impacted soil and groundwater and remediation system monitoring and maintenance. Melanie's experience includes investigations of sites regulated by RCRA, Connecticut's Remediation Standard Regulations and other state regulations. Her experience also includes managing staff and subcontractors, communication with client and associated town and state representatives, project data compilation and reporting. Melanie is trained in all aspects of health and safety precautions related to environmental and geotechnical projects.

EDUCATION

B.S., Geology and Geophysics, University of Connecticut, Storrs, Connecticut	2000

ADDITIONAL TRAINING

Health and Safety Operations at Hazardous Waste Sites (HAZWOPER) 29 CFR 1910.120(e)(3), 40 hours with annual 8-hour refreshers	2000-2018
8-hour HAZWOPER Supervisor Training required by OSHA 29 CFR 1910.120(e)(4)	2012
Radiation Safety, 29 CFR 1910.1096	2015
EPOC Remediation Standard Regulations Course	2006

PROFESSIONAL EXPERIENCE

— Former Manufacturing Facility, Bridgeport, Connecticut: Monitored over 150 soil borings, monitoring wells and test pit excavations during extensive Phase II and Phase III investigations of a 77-acre property including a landfill area. Completed continuous soil sampling and geologic logging of site strata including identification of various historical fill materials, mapping a former stream bed and mapping and logging over 50 soil borings to identify deeper areas of industrial fill. Other tasks included completing a large soil vapor survey of the sub-slab soils beneath the Site building which totaled 240 survey points and performed several groundwater sampling rounds using EPA low flow techniques. Coordinated, setup and operated three dedicated, data-logging pressure transducers calibrated to existing stream staff gauges which collected surface water samples from three Site locations following significant storm events. Additional responsibilities included summarizing soil, groundwater and soil vapor data into formatted tables compared to regulatory criteria, creating site figures and assistance in report completion.

— Commercial Property, Stamford, Connecticut: Completed a Phase I ESA of a 60-acre commercial property where several areas of concern were identified and investigated in a widespread Phase II/Phase III investigation of over 250 soil borings/monitoring wells with several hundred soil samples analyzed. Responsibilities included locating, overseeing and logging soil borings/monitoring wells; completing quarterly groundwater monitoring; sediment sample collection and later tabulation of the soil

and groundwater analytical results in comparison to regulatory criteria. Remedial efforts of the property included mass excavation and off-site transport of impacted fill materials. Completed daily data tabulation to assess and determine the limits and extent of the impacts at the property to direct the excavation. Completed data quality assessment and data usability evaluation tables and associated reporting of the analytical laboratory reports.

— U.S. Army Corporation of Engineers, Hop Brook Dam, Naugatuck, Connecticut: Project Manager and lead geologist for installation monitoring of a grout curtain designed to remediate seepage and stabilize an earthen filled dam constructed in the late-1960s. Completed geologic logging and monitoring of the tightly-spaced, grout curtain boreholes in the unconsolidated dam soils and underlying fractured bedrock across the topography of the dam. Daily activities included overseeing two drill rigs using various techniques (sonic drilling, roller-bit advancing, rock coring) and logging of the soil and rock encountered per specifications of the U. S. Army Corporation of Engineers. Also, monitored the groundwater conditions and relative permeability of the fractured bedrock to provide subsurface details for creating a properly structured grout curtain. Developed written scope of work for geologic rock core logging including the project specifications required by the U.S. Army Corporation of Engineers to evaluate the integrity of the earthen dam.

— Former Research Facility, Rockland County, New York: Monitored an in-situ chemical oxidation (ISCO) pilot test which involved injecting sodium permanganate into a monitoring well network to remediate groundwater impacted with halogenated volatile organic compounds. Based on groundwater flow, fine-grained sand and silty surficial soils, a calculated sodium permanganate solution was injected into the saturated soils while water was extracted using a vacuum truck to radially disperse the remedy. My activities during the injection/extraction process included groundwater level monitoring to calculate a radius of influence of drawdown, measurement of water quality parameters using a multi-parameter water quality meter and monitoring downgradient monitoring wells to visually identify when and where the pink sodium permanganate was mobilized in the aquifer. As per specifications of the Site, additional field responsibilities including constant up- and down-gradient dust monitoring. Completed data tabulation of all field monitoring activities in summarized tables and field calculations were modified in the field during the test based on the behavior of the sodium permanganate in the aquifer and the measured groundwater table. Performed post-injection groundwater monitoring and associated data tabulation to evaluate the effectiveness of the chemical dispersion of the ISCO over designated time intervals.

— Over 30 Condominium & Apartment Complexes, Hartford, Connecticut: Completed individual Phase I ESAs of over 30 properties including a site inspection of each parcel and associated city and state research conducted at various city offices. Assessments of historical resources included topographic, aerial and Sanborn fire insurance maps and city directories evaluated to obtain the history of each parcel. Numerous environmental databases were researched and conclusions regarding potential groundwater flow, state groundwater classification, surficial materials and bedrock geology in conjunction with site history were determined in order to identify and potential liabilities. Following the completion of these Phase I assessments, several potential underground storage tanks (USTs) were identified. Monitored ground penetrating radar surveys to locate any subsurface anomalies, and completed Phase II soil boring investigations where USTs were suspected to evaluate if any releases from a UST had occurred. Several USTs, including No.2 and No. 6 oil of up to 10,000-gallon size tanks were found. My responsibilities included identifying impacted soils in the

field, monitoring the UST excavation, collecting tank closure samples and soil characterization samples for off-site removal of the impacted materials. Completed an individual report for each UST removal which summarized all field activities, including detailed site plans with pertinent site features, tank locations and confirmation soil sample locations. Lastly, completed the reporting and analytical data tabulation in comparison to applicable criteria to confirm all prudent actions had been completed to remove the tank and associated impacted soils.

— Various Commercial and Industrial Properties, Hartford/New Haven/Fairfield and Middlesex Counties, Connecticut: Completed over 45 Phase II and/or Phase III investigations at various properties in Connecticut. My responsibilities included monitoring drilling activities, geologic logging and field screening of all borings and monitoring wells; identifying groundwater depth; understanding the lithology of the surficial materials at each Site to determine the migration and distribution of contaminants; identifying fill materials and soil sample collection. Supplementary tasks included well development, groundwater sampling using US EPA low-flow methodology, completion of a groundwater elevation survey to determine inferred groundwater flow direction and created associated figures with soil boring/monitoring well locations and groundwater flow direction. Following completion of field work, tabulated analytical laboratory data and evaluated compliance with clean-up criteria and completed the necessary reporting.

APPENDIX E
Supplemental Natural Resources Information

Contents

Tables

Figures

Appendix E. Supplemental Natural Resources Information

E.1 ECOLOGICAL COMMUNITIES

A comprehensive field survey performed by certified ecologists identified nine distinct habitat types within the waterfront and inland portions of the study area. These nine habitat types are ruderal uplands, urban forest, freshwater wetlands, beaches and dunes, hardened shoreline, intertidal wetlands, intertidal flats, oyster reefs/shellfish beds, and subtidal bottom (Waggonner & Ball and Arcadis, 2018).

E.1.1 Ruderal Uplands

Within the study area, many upland spaces that have not been converted to impervious surface have been otherwise modified through extensive anthropogenic activity. This includes (1) spaces dominated by invasive plant communities; (2) spaces managed as grass lawns or landscape features; and (3) spaces comprised of disturbed soil, rock, or gravel. Such spaces, collectively referred to as ruderal uplands, possess little ecological value and primarily support urban wildlife (Waggonner & Ball and Arcadis, 2018). Brownfields, areas where significant contamination is known or expected, represent a ruderal upland habitat that is common throughout Bridgeport.

E.1.2 Urban Forest

Recreational parks, such as Seaside Park, and portions of residential neighborhoods harbor a diversity of plant life that is absent from much of the upland study area. These zones of relatively diverse vegetation comprise an urban forest habitat that is characterized by native trees, cultivars, maintained shrubs, and herbaceous plants. Tree species such as northern red oak (*Quercus rubra*), red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), American sycamore (*Platanus occidentalis*), eastern hemlock (*Tsuga canadensis*), American linden (*Tilia Americana*), and black birch (*Betula lenta*) can be found within Seaside Park, as well as along public roadways and within private yards. Several shrubs (e.g., sumacs (*Rhus* spp.), roses (*Rosa* spp.), etc.) and herbaceous plants (e.g., wildflowers) also populate these spaces. Ecosystem services provided by the study area's urban forest network include wave attenuation and habitat opportunity for an assemblage of wildlife – namely opportunistic mammals and resident birds (Waggonner & Ball and Arcadis, 2018).

E.1.3 Freshwater Wetlands

Many freshwater features within the South End of Bridgeport have been filled to support existing development. Two man-made, freshwater bodies are present along the eastern shoreline of the study area, north of Tongue Point. These waterbodies are located on PSEG property and may function to support industrial operations. Additionally, a small section of freshwater emergent wetland is present at the southeastern corner of the study area – also on PSEG property (USFWS, 2018). Freshwater emergent wetlands are typically dominated by rooted, herbaceous hydrophytes that remain present for the majority of the growing season. Within the state of Connecticut, hydrophytes of this nature include tussock sedge (*Carex stricta*), rice cutgrass (*Leersia oryzoides*),

bluejoint grass (*Calamagrostis canadensis*), sensitive fern (*Onoclea sensibilis*), Virginia chain fern (*Woodwardia virginica*), goldenrod (*Solidago spp.*), pickerelweed (*Pontederia cordata*), and others (Metzler and Tiner, 1992).

Freshwater wetlands offer a variety of recognized benefits, including water quality maintenance, nutrient cycling, flooding and erosion control, fishing area, and habitat opportunity for sensitive species (Waggonner & Ball and Arcadis, 2018). However, anthropogenic disturbances – vegetation removal, pollution, etc. – can restrict the scope of possible benefits. Given the location of the study area's remaining freshwater wetlands in an industrial zone, they may be impacted by contamination and characterized by reduced ecological and economic potential.

E.1.4 Beaches and Dunes

CTDEEP, through the CT Coastal Management Manual (2000), defines beaches as "dynamic areas abutting coastal waters that are characterized by sand, gravel, or cobbles." Dunes are generally defined as mounds of unconsolidated sediment that form along the inland edge of a beach. Together, beaches and dunes comprise a complex habitat that provides ecosystem services such as wave attenuation, shoreline stabilization, floodwater and erosion control, recreation, and wildlife support (Waggonner & Ball and Arcadis, 2018). Characteristic vegetation of this habitat includes beachgrass (*Ammophila breviligulata*), dusty miller (*Artemisia stelleriana*), beach pea (*Lathyrus japonicus*), sedge (*Carex spp.*), and seaside goldenrod (*Solidago sempervirens*). Other species, such as beach heather (*Hudsonia tomentosa*), bearberry (*Arctostaphylos uva-ursi*), beach pinweed (*Lechea maritime*), jointweed (*Polygonella articulate*), bayberry (*Myrica pensylvanica*), and beach-plum (*Prunus maritima*), commonly populate stabilized dunes (Waggonner & Ball and Arcadis, 2018).

The southern coast of the study area is characterized by a heavily utilized beach with a sparsely vegetated, fragmented dune community. Limited flora diversity remains, and the habitat is frequently encroached upon by bulkheads, riprap, revetments, and other hardened structures.

E.1.5 Hardened Shoreline

As mentioned above, Bridgeport's shoreline has been extensively modified through the addition of hardened structures to curb flooding and aid in erosion control. Riprap has been constructed along much of the study area, creating an unnatural continuum between the land and adjacent coastal waterbodies. In some places, hardened features have entirely replaced historic ecological communities (e.g., beaches, intertidal flats, etc.), causing an abrupt transition to open water. Shoreline hardening has had significant consequences, including habitat loss and degradation, loss of recreational space, and disruption of visual resources. However, existing riprap does function as a viable substrate for plant and animal colonizers, including oysters, mussels, barnacles, and other macroinvertebrates (Waggonner & Ball and Arcadis, 2018).

E.1.6 Intertidal Wetlands

Intertidal wetlands are a type of tidally-influenced ecological community that is inundated by surface water or groundwater frequently enough to support vegetation adapted to wet soil conditions. Distinct zones can be identified within an intertidal wetland, including low salt marsh and high salt marsh. Low salt marsh generally occurs between mean low water (MLW) and mean high water (MHW) and is inundated twice daily by normal high tides. Within Connecticut, areas of low salt marsh are usually dominated by saltmarsh cordgrass (*Spartina*

alterniflora). High salt marsh occurs between MHW and mean higher high water (MHHW) and is only inundated under extreme circumstances, such as during major storms or spring tides. Typical vegetation of this zone includes salt marsh hay (*Spartina patens*), saltgrass (*Distichlis spicata*), and marsh elder (*Iva frutescens*). (Waggonner & Ball and Arcadis, 2018)

Along Long Island Sound, many intertidal wetlands have been filled to support development or have been otherwise harmed through anthropogenic activity. Invasive plant species – namely the disturbance-tolerant common reed (*Phragmites australis*) – have outcompeted vulnerable native vegetation in wetlands across coastal Connecticut (Waggonner & Ball and Arcadis, 2018). Establishment of common reed produces expansive, monotypic communities characterized by reduced hydrological complexity and wildlife diversity. Due to these factors, very few native salt marshes offering a healthy range of ecosystem services remain in close proximity to the study area.

E.1.7 Intertidal Flats

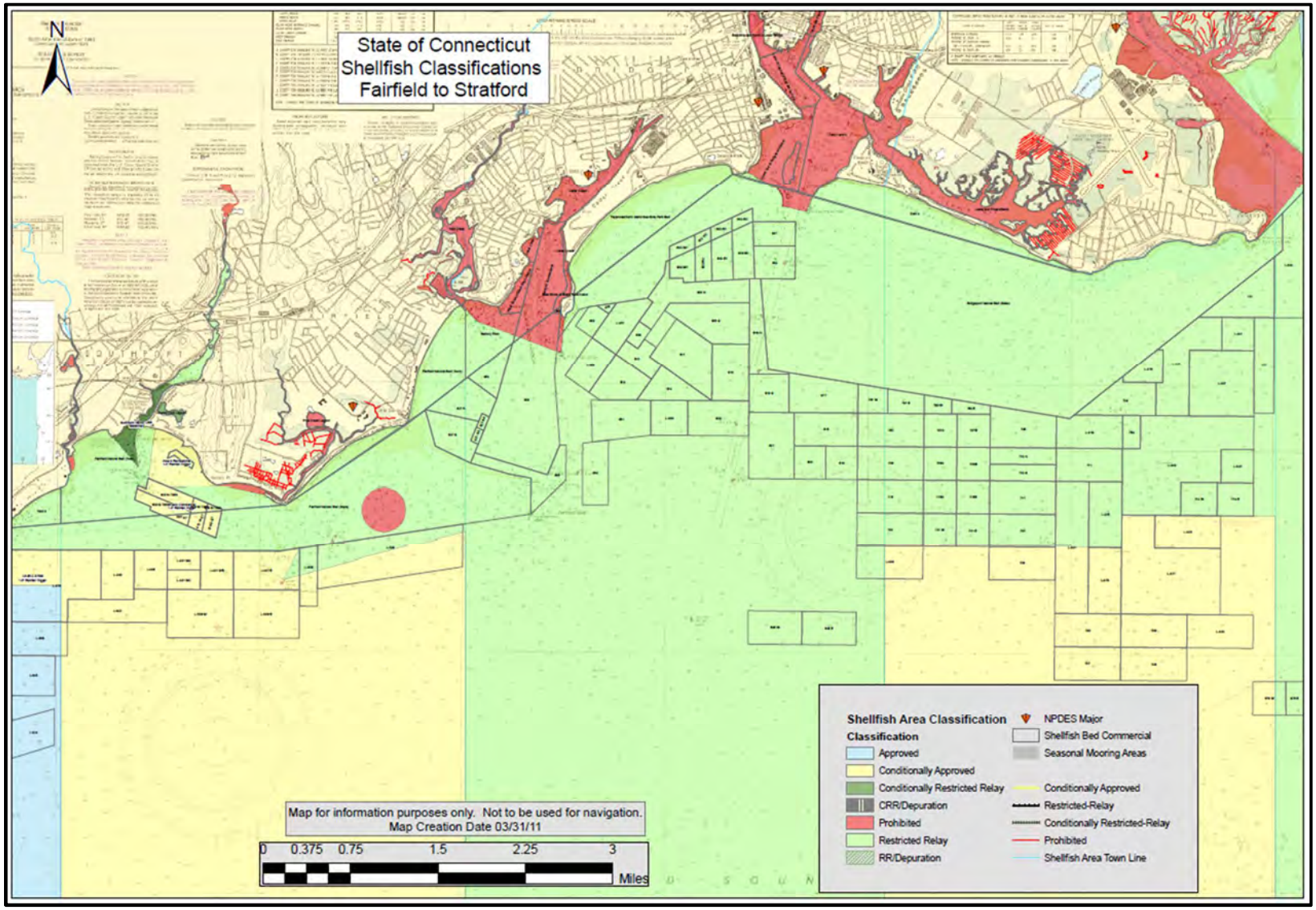
CTDEEP, through the CT Coastal Management Manual (2000), defines intertidal flats as "very gently sloping or flat areas located between high and low tides composed of muddy, silty, and fine sandy sediments and generally devoid of vegetation." This ecological community accounts for much of the South End's existing natural shoreline, primarily due to historic wetland loss and modified sediment transport. Intertidal flats stretch from the southwestern corner of the study area along the coast to Fayweather Island. Benefits provided by intertidal flats include shoreline protection, water quality enhancement, and habitat opportunity for benthic macro- and micro-invertebrates (Waggonner & Ball and Arcadis, 2018). Avian and fish species that feed on benthic invertebrates also frequent intertidal flats.

E.1.8 Oyster Reefs/Shellfish Beds

Oyster reefs and shellfish beds are valuable ecological communities that occur throughout the Bridgeport Estuary. These communities provide structural complexity to subtidal bottom environments and help to improve water quality via physical and biological filtration. Moreover, they function as natural substrate for small, encrusting invertebrates (e.g., barnacles, sea squirts, etc.); provide refuge, feeding, breeding, and nursery opportunity to a range of aquatic organisms (e.g., finfish, crustaceans, etc.); and serve as foraging habitat for various water-dependent birds (e.g., shorebirds, wading birds, etc.). Where environmental and regulatory conditions permit, oyster reefs/shellfish beds also support recreational fishing and commercial harvesting for sale or consumption. (Waggonner & Ball and Arcadis, 2018)

Unfortunately, shellfish communities have been degraded by poor water quality in many areas of the Bridgeport Estuary. CT Department of Agriculture's Bureau of Aquaculture has forbidden shellfish harvesting along Bridgeport's shoreline, with coastal waters in the vicinity of the study area mapped as either "prohibited" or "restricted-relay". Generally, the prohibited designation indicates that shellfish quality is severely compromised by pollution – often microbial contamination from sewage treatment plants or combined sewer outfalls. The restricted-relay designation applies when sanitary surveys have revealed moderate pollution, and shellfish must be transported (relayed) to cleaner waters for natural purification prior to harvesting. Figure E-1, developed by the Connecticut Bureau of Aquaculture, depicts shellfish classifications along Fairfield County as of March 2011.

Figure E-1. State of Connecticut Shellfish Classifications (Fairfield to Stratford)



Source: CT Department of Agriculture Bureau of Aquaculture Website (2011)

E.1.9 Subtidal Bottom

Subtidal bottom is defined as all open water spaces situated below the mean lower low water (MLLW) level (i.e., -3.1' North American Vertical Datum of 1988 [NAVD 88]). This area represents a significant portion of the Bridgeport Estuary and encompasses a variety of naturally-occurring and anthropogenically-modified water depths. Natural subtidal bottom communities contribute to water filtration and support a variety of resources, both terrestrial and aquatic. For example, the littoral zone – the nearshore zone that remains inundated by shallow water at low tide – facilitates the growth of submerged aquatic vegetation, such as eelgrass (*Zostera marina*). In turn, submerged aquatic vegetation acts as shelter, feeding, and breeding habitat for a diversity of wildlife, including crustaceans and small finfish. Deeper subtidal bottom habitats are utilized by additional resident and migratory fish species, as well as sea turtles. (Waggonner & Ball and Arcadis, 2018)

Along the coast of the study area, shoreline hardening has eliminated portions of the littoral zone by creating a sudden shift to deep water. Subtidal bottom areas further offshore have also been impaired by anthropogenic disturbances (e.g., pollution, trawling, etc.).

The study area lacks certain coastal habitats, such as maritime forests and maritime shrubland, that can be found elsewhere along the Long Island Sound.

E.2 BIRD SPECIES

The state of Connecticut conducted a bird atlas from 1982 to 1986, with results published in 1994 as the Atlas of Breeding Birds of Connecticut. The state was divided into 596 census blocks, and each block was surveyed to document avian species present during the breeding season and record evidence of breeding. Birds were classified as possible, probable, or confirmed breeders based on behavioral and physiological indicators. Indicators of confirmed breeding included distraction displays, nest incubation, feeding of young, and presence of a brood patch (among others). Table E-1 lists avian species identified by the atlas as confirmed breeders within the census blocks that intersect with the study area (i.e., blocks 109C, 109D, 109E, and 109F).

Table E-1. Confirmed Avian Breeders

COMMON NAME	SCIENTIFIC NAME
American Black Duck	*Anas rubripes*
American Crow	*Corvus brachyrhynchos*
American Goldfinch	*Spinus tristis*
American Kestrel	*Falco sparverius*
American Robin	*Turdus migratorius*
Baltimore Oriole	*Icterus galbula*
Barn Swallow	*Hirundo rustica*
Black-capped Chickadee	*Poecile atricapillus*
Blue Jay	*Cyanocitta cristata*
Brown Thrasher	*Toxostoma rufum*
Canada Goose	*Branta canadensis*
Chimney Swift	*Chaetura pelagica*
Chipping Sparrow	*Spizella passerina*
Common Grackle	*Quiscalus quiscula*
Common Nighthawk	*Chordeiles minor*
Common Tern	*Sterna hirundo*
Common Yellowthroat	*Geothlypis trichas*
Downy Woodpecker	*Picoides pubescens*
Eastern Kingbird	*Tyrannus*
European Starling	*Sturnus vulgaris*
Fish Crow	*Corvus ossifragus*
Gadwall	*Anas strepera*
Gray Catbird	*Dumetella carolinensis*
Green Heron	*Butorides virescens*
Horned Lark	*Eremophila alpestris*
House Finch	*Carpodacus mexicanus*
House Sparrow	*Passer domesticus*
House Wren	*Troglodytes aedon*
Indigo Bunting	*Passerina cyanea*
Killdeer	*Charadrius vociferus*
Least Bittern	*Ixobrychus exilis*
Least Tern	*Sternula antillarum*
Mallard	*Anas platyrhynchos*
Marsh Wren	*Cistothorus palustris*
Mourning Dove	*Zenaida macroura*
Mute Swan	*Cygnus olor*
Nelson's Sparrow	*Ammodramus nelsoni*
Northern Cardinal	*Cardinalis*
Northern Flicker	*Colaptes auratus*
Northern Mockingbird	*Mimus polyglottos*
Pied-billed Grebe	*Podilymbus podiceps*
Piping Plover	*Charadrius melodus*
Red-winged Blackbird	*Agelaius phoeniceus*
Rock Pigeon	*Columba livia*
Song Sparrow	*Melospiza melodia*
Spotted Sandpiper	*Actitis macularius*
Tufted Titmouse	*Baeolophus bicolor*
Willet	*Tringa semipalmata*
Wood Thrush	*Hylocichla mustelina*
Yellow Warbler	*Dendroica petechia*

Source: 1994 Atlas of Breeding Birds of Connecticut: blocks 109C, 109D, 109E & 109F; Breeding Bird Atlas Explorer (online resource). U.S. Geological Survey Patuxent Wildlife Research Center. (2018);

E.3 THREATENED AND ENDANGERED SPECIES

E.3.1 USFWS Species

E.3.1.1 Roseate Tern

The breeding range of the roseate tern spans the Atlantic coast from Novia Scotia south to Long Island; nesting colonies also occur along the southern tip of Florida. Preferred nesting habitat is sand/gravel beaches and pebbly/rocky offshore islands. (CTDEEP "Roseate Tern Fact Sheet," 1999)

In Connecticut, roseate terns are almost strictly observed along saltwater coastlines, and inland sightings are rare. The third largest roseate tern colony in North America exists at Falkner Island, with approximately 175 to 200 breeding pairs reported annually. Historic colony sites include Tuxis Island (observed 1989), Duck Island (observed 1989), and small islands in the vicinity of New London (observed 1970s). The terns arrive in Connecticut in late April and early May, and the first eggs are laid by the third week of May. In the case of nest or offspring loss, the birds will produce new nests later in the breeding season (usually into late July). Roseates that nest in the northeastern United States overwinter in the southern hemisphere, primarily along the coast of South America from Colombia to eastern Brazil. (CTDEEP "Roseate Tern Fact Sheet," 1999)

The Falkner Island roseate colony is located approximately thirty (30) miles east of the study area. Given this distance, it is unlikely that any nesting roseate terns would be disrupted by project activities. It is anticipated that any observations of roseates within the study area would be due to brief stopovers by migrants heading to their breeding or wintering grounds; therefore, any construction in the beach area along Seaside Park would not impact nesting habitat and there would be no effect to the roseate tern.

E.3.1.2 Red Knot

The red knot is a long-distance migrator, with some individuals completing a south-to-north journey of over nine-thousand (9,000) miles each spring and an equally extensive return trip each autumn. The species breeds in the tundra of the central Canadian Artic and overwinters primarily in the Caribbean and along the coasts of South America and the southeastern US. Small groups of red knots overwinter further north along the Atlantic, into New England and southern Canada. (USFWS "Rufa Red Knot," 2013)

According to the publication "Common Shorebirds of Connecticut" (2018), CTDEEP classifies the red knot as an uncommon migrant. Only a limited number of red knots visit the Connecticut coastline on an annual basis, typically between the months of April and September. These individuals utilize beaches and intertidal mudflats as stopover sites during their lengthy migration. They seek out spaces with abundant, easily accessible sources of nutrition – concentrations of aquatic snails, bivalves, horseshoe crab eggs, etc. – to refuel before resuming their flight. Given the ecological degradation that characterizes Bridgeport's waterfront habitats, it is unlikely that transient red knots congregate in or immediately proximate to the study area. There would be no effect to the red knot as a result of the proposed project.

E.3.2 NOAA Fisheries Species

Per guidance from NOAA Fisheries, in order to determine the effects of proposed project on each of the species listed below, CTDOH considered the following stressors:

- Sound – There would be no pile driving or other activities that would affect underwater noise levels.

- Habitat Structure & Disturbance – There would be no change in water depth or change in the substrate characteristics under the proposed project.

- Dredging – There would be no dredging under the proposed project.

- Water Quality – During construction, including repair and recommissioning work on existing outfalls, any built-up sediments would be cleared, removed and disposed of off-site rather than discharged into the water. There would be no increase in exposure to pollutants. In addition, best management practices including the use of silt management and soil erosion measures would be implemented to ensure there would be no change in water quality during construction. In the long-term, the proposed project would improve ambient water quality by reducing the occurrence of combined sewer overflow events.

- Prey Quantity/Quality – The project area is not used for foraging and there would be no loss of SAV or shellfish beds.

- Vessels – No in-water vessels would be used under construction or operation of the proposed project.

- In-water structures including aquaculture – No new water structures or aquaculture under the proposed project.

In addition, in an email dated June 13, 2018, NOAA Fisheries recommended CTDOH consider the following effects of the proposed project on sea turtles and sturgeon:

- For activities that increase levels of suspended sediment, consider the use of silt management and/or soil erosion best practices (i.e., silt curtains and/or cofferdams).

- Consider the related effects to water quality after the outfalls are built (i.e., will the standards still be met, will the effluent volume change, and will there be any effects to the species).

- For pile driving or other activities that may affect underwater noise levels, consider the use of cushion blocks and other noise attenuating tools to avoid reaching noise levels that will cause injury or behavioral disturbance to sturgeon.

E.3.2.1 Loggerhead Sea Turtle

The loggerhead sea turtle (*Caretta caretta*) has an extensive range; it is found in major waterbodies across the world, including the North and South Atlantic Ocean, the Mediterranean Sea, coastal portions of the Indian Ocean, and nearshore waters off the eastern coasts of Asia, Australia, and South America. Loggerheads nest along beaches from North Carolina to Florida, with some additional nesting along beach and bay communities of the Caribbean. (CTDEEP "Loggerhead Sea Turtle Fact Sheet," 1999).

NMFS correspondence (2018) indicates that the federally threatened Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead may occur in Long Island Sound. Juvenile turtles have been documented in eastern Long Island Sound and its associated bays, where they feed on crustaceans, mollusks,

and other macroinvertebrates. Adult loggerheads are rarely observed in Connecticut waters, and those reported in nearby areas (e.g., the north shore of Long Island) are often cold-stunned. All life stages of the loggerhead are sensitive to anthropogenic disturbances, including industrial development, oil releases, beachfront construction, beach traffic, commercial fishing, boating, litter accumulation, and light pollution (CTDEEP "Loggerhead Turtle Fact Sheet," 1999). Overall, loggerhead sea turtles are considered to have the potential to occur in the study area on rare occasions. However, given the above vulnerabilities, long-term occupation for breeding, wintering, growth, or development is highly unlikely. In addition, the proposed project would not expose the loggerhead turtle to stressors including sound or reduced water quality. There would be no effect to the loggerhead turtle under the proposed project.

E.3.2.2 Green Sea Turtle

The green sea turtle (*Chelonia mydas*) has been observed along the coasts of North America from Massachusetts to Mexico and from British Columbia to California. Major nesting grounds are located in Mexico, Costa Rica, Guyana, Suriname, and Ares Island in the West Indies. Only small nesting populations occur in the United States, most commonly on the eastern coast of Florida. (CTDEEP "Atlantic Green Sea Turtle Fact Sheet," 1999)

NMFS correspondence (2018) indicates that the federally threatened North Atlantic DPS of green sea turtle may occur in the vicinity of the study area. Green sea turtles prefer shallow water habitats in reefs, bays, and inlets and may be found in nearshore portions of Long Island Sound. However, they generally favor subtropical and tropical waters where their primary food source, turtle grass (*Thalassia testudinum*), grows in abundance. According to CTDEEP, a green sea turtle has never been reported along the Connecticut shoreline, although they may occasionally migrate through nearby waters during the warmer months (CTDEEP "Atlantic Green Sea Turtle Fact Sheet," 1999). Given the rarity of green sea turtle observations in Connecticut, it is unlikely that this species would be present during project activities. In addition, the proposed project would not expose the green sea turtle to stressors including sound or reduced water quality. There would be no effect to the green sea turtle under the proposed project.

E.3.2.3 Leatherback Sea Turtle

The leatherback sea turtle (*Dermochelys coriacea*) is a highly migratory species; it can be found in the tropical Atlantic, Pacific, and other areas of the world. In the United States, nesting leatherbacks have been documented along the Atlantic coast from Florida to North Carolina. Leatherbacks also move into the cooler waters of New England's sounds and bays as they follow jellyfish migratory patterns. (CTDEEP "Leatherback Sea Turtle Fact Sheet," 1999)

NMFS correspondence (2018) indicates that the leatherback sea turtle, federally classified as endangered, may occur near the study area. During the summer months, turtles have been observed in Long Island Sound's offshore waters where they frequently bask or rest at the surface. CTDEEP reports that leatherbacks can be spotted off the coasts of both Stonington and Block Island throughout the summer (CTDEEP "Leatherback Sea Turtle Fact Sheet," 1999). Like other sea turtle species, the leatherback is sensitive to various recreational, commercial, and industrial activities: boating, beachfront development, etc. Overall, it is anticipated that leatherbacks may occur in the vicinity of the study area during the warmer months, namely May through October. However, given that the proposed project would not expose the leatherhead sea turtle to stressors including sound or reduced water quality, there would be no effect to the species under the proposed project.

E.3.2.4 Kemp's Ridley Sea Turtle

The Kemp's Ridley sea turtle (*Lepidochelys kempii*) has been observed from Newfoundland south to Bermuda and west through the Gulf of Mexico. These turtles nest between the months of April and June on the beaches of Tamaulipas, Mexico and Padres Island, Texas. (CTDEEP "Kemp's (Atlantic) Ridley Sea Turtle Fact Sheet," 1999)

NMFS correspondence (2018) indicates that the Kemp's Ridley sea turtle, federally listed as endangered, may occur in waterbodies near the study area. Although adults of the species tend to remain in tropical waters, juveniles have been reported along much of the Atlantic coast of the United States. According to CTDEEP, juvenile turtles inhabit shallow coastal and estuarine habitats across Connecticut during the summer months, typically beginning in July (CTDEEP "Kemp's (Atlantic) Ridley Sea Turtle Fact Sheet," 1999). Consequently, the Kemp's Ridley may be seasonally present offshore of the study area. However, given that the proposed project would not expose the Kemp's Ridley sea turtle to stressors including sound or reduced water quality, there would be no effect to the species under the proposed project.

E.3.2.5 Atlantic Sturgeon

The range of the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) spans the east coast of North America from New Brunswick, Canada to the St. Johns River in Florida. The species is anadromous; in the spring, adult fish migrate from saltwater bodies to large freshwater river systems to spawn. The Hudson River in New York holds the only remaining spawning population in New England. (CTDEEP "Atlantic Sturgeon Fact Sheet," 1999)

The proposed project would not expose the Atlantic sturgeon to stressors including sound or reduced water quality. There would be no effect to the Atlantic sturgeon under the proposed project.

E.3.2.6 Shortnose Sturgeon

The shortnose sturgeon (*Acipenser brevirostrum*) is found along the east coast of North America from New Brunswick, Canada to the Indian River in Florida. This species has very specific spawning requirements; all spawning occurs in freshwater systems within a period of one-to-two weeks, from the end of April to the first week of May. (CTDEEP "Shortnose Sturgeon Fact Sheet," 1999)

Consultation with NMFS (2018) indicates that the shortnose sturgeon, federally classified as endangered, may occur in Long Island Sound and its adjacent bays and tributaries. Adults of the species have been observed in the lower Connecticut River from the Holyoke Dam to the waters of Long Island Sound (CTDEEP "Shortnose Sturgeon Fact Sheet," 1999). Early life stages – eggs, larvae, and juveniles – cannot tolerate saline conditions and, thus, are not anticipated to be present in the vicinity of the study area. In addition, the proposed project would not expose the shortnose sturgeon to stressors including sound or reduced water quality. There would be no effect to the shortnose sturgeon under the proposed project.

E.4 SURFACE WATERS

Water quality standards for Class SA and SB waterbodies are provided in Table E-2.

As required by permit, Bridgeport has conducted monitoring of targeted pollutants of stormwater discharges once a year since 2004 (CTDEEP 2015). Based on the available water quality sampling results, the following information has been observed from outfalls around Bridgeport (CTDEEP 2015) (Bridgeport Water Pollution Control Authority (WPCA) 2017):

- Wide range of *E. coli* observed, results ranged from 0 (the Minimal Detection Limit [MDL]) during the annual data presented by CTDEEP (2015). The WPCA results indicated several outfalls had over 200,000 CFU/100ml for the sampling undertaken on September 19, 2017 (2017). CTDEEP results indicated concentrations of *Escherichia coli* (*E. coli*), as high as 800,000 CFU/100ml in 2010 and 2011 (2015). The mean *E. coli* concentrations from 2004 to 2011 ranged from 53.5 CFU/100ml to 667,280 CFU/100ml.
- High variation in Total Suspended Sediments (TSS) concentration seen in sampling results (2015). Values of TSS observed ranged from below the MDL of 5mg/l to 400mg/l with a mean range of 11.67mg/l to 109.67mg/l.
- WPCA sampling from September 19, 2017 ranged from 8.10mg/l to 12.3mg/l for oil and grease at MS4 outfalls in Bridgeport (2017).
- Total Nitrogen (TN) has high variability; CTDEEP results ranged from a low of 0.63mg/l in 2007 to 38.35mg/l 2008 (2015). Yearly mean TN obtained from the six municipal separate storm sewer system (MS4) outfalls ranged from 1.06mg/l to 8.46mg/l from 2004 to 2011. The 2017 results average for TN was approximately 6.42mg/l (2017).
- Total Phosphorus (TP) ranged from no detection to 1.83mg/l from the CTDEEP study (2015). The mean ranged from 0.182mg/l to 0.782mg/l.

It is noted that water quality data is limited for the City of Bridgeport's MS4 outfalls and that the parameters have a wide range of results and are based from one annual sample at six separate MS4 outfalls; as such, results may not be indicative of actual wet and dry weather events at the MS4 outfalls.

Table E-2. Ambient Water Quality Standards for Classes SA and SB Waterbodies

PARAMETER	CLASS SA CRITERIA	CLASS SB/SC CRITERIA*
Aesthetics	Uniformly excellent	Good to excellent
Dissolved Oxygen	Acute: Not less than 3.0 mg/l	
	4.8> DO (mg/l) ≤ 4.5 [No. Of Days Allowed: 30] 4.5> DO (mg/l) ≤ 4.0 [No. Of Days Allowed: 14] 4.0> DO (mg/l) ≤ 3.5 [No. Of Days Allowed: 7] 3.5> DO (mg/l) ≤ 3.0 [No. Of Days Allowed:2]	
Sludge Deposits/Solid Refuse/Floating Solids/Oils and Grease/Scum	None other than of natural origin	None except for small amounts that may result from the discharge from a grease waste treatment facility providing appropriate treatment and none exceeding levels necessary to protect and maintain all designated uses
Color	None other than of natural origin	None resulting in obvious discoloration of the surface water outside of any designated zone of influence
Suspended and Settleable Solids	None other than of natural origin	None in concentrations or combinations which would impair the designated uses; none aesthetically objectionable; none which would significantly alter the physical or chemical composition of bottom sediments; none which would adversely impact organisms living in or on the bottom sediment
Silt or Sand Deposits	None other than of natural origin except as may result from normal agricultural, road maintenance, construction activity, dredging activity or the discharge of dredged or fill materials provided all reasonable controls or BMP are used in such activities and all designated uses are protected and maintained	
Turbidity	None other than of natural origin except as may result from normal agricultural, road maintenance, or construction activity, dredging activity or discharge of dredged or fill materials provided all reasonable controls BMP are used to control turbidity and none exceeding levels necessary to protect and maintain all designated uses	None other than of natural origin except as may result from normal agricultural, road maintenance, or construction activity, or discharge from a waste treatment facility providing appropriate treatment, dredging activity or discharge of dredged or fill materials provided all reasonable controls and BMP are used to control turbidity and none exceeding levels necessary to protect and maintain all designated uses
Indicator Bacteria	See Table 4.42	See Table 4.42
Taste and Odor	As naturally occurs	As naturally occurs. None that would impair any uses specifically assigned to this Class
pH	6.8 – 8.5	
Temperature Increase	There shall be no changes from natural conditions that would impair any existing or designated uses assigned to this Class and, in no case exceed 83F, or in any case raise the temperature of the receiving water more than 4°F. During the period including July, August and September, the temperature of the receiving water shall not be raised more than 1.5°F unless it can be shown that spawning and growth of indigenous organism will not be significantly affected	
Nutrients	The loading of nutrients, principally phosphorus and nitrogen, to any surface waterbody shall not exceed that which supports maintenance or attainment of designated uses	
Biological Conditions	Sustainable, diverse biological communities of indigenous taxa shall be present. Moderate changes, from natural conditions, in the structure of the biological communities, and minimal changes in ecosystem function may be evident; however, water quality shall be sufficient to sustain a healthy, diverse biological community	

Table E-3. Relevant Indicator Bacteria Standards for Ambient Saltwater Water Quality

DESIGNATED USE	CLASS	INDICATOR	CRITERIA
Shellfishing – Direct Consumption	SA	Fecal coliform	Geometric Mean < 14/100ml 90% of Samples < 31/100ml
Shellfishing – Indirect Consumption	SB	Fecal coliform	Geometric Mean < 88/100ml 90% of Samples < 260/100ml
Recreation – Designated Swimming	SA, SB	*Enterococci*	Geometric Mean < 35/100ml Single Sample Max < 104/100ml
All Other Recreational Uses	SA, SB	*Enterococci*	Geometric Mean < 35/100ml Single Sample Max < 500/100ml

APPENDIX F
Wetlands Letter Report

July 16, 2018

WSP USA Inc.
Attn: Nicole Weymouth
500 Winding Brook Drive,
Glastonbury, CT 06033

Re: HUD NDRC Bridgeport Resilience Design Project
BL Project No. 17C6199

Dear Ms. Weymouth,

At your request, BL Companies inspected the four proposed outfall locations labeled A, B, C, and D, and a fifth which will be referred to as E, between June 5, 2018 and July 9, 2018, and determined the presence or absence of coastal resources, specifically tidal wetland vegetation, at each location. All observations were completed at low tide. Any tidal wetland vegetation observed was horizontally located utilizing a handheld Trimble GeoExplorer 6000 Series. The coastal jurisdiction line (CJL) for Bridgeport is at 5.0' elevation. The Connecticut Department of Energy and Environmental Protection (CT DEEP) regulates everything below this elevation as well as tidal vegetation up to 1.0' above the CJL; therefore, tidal vegetation observed above elevation 6.0' is not considered to be within CT DEEP's jurisdiction[1].

Proposed Outfalls A and B, which are located along the strip of public beach associated with Seaside Park, were investigated on June 5, 2018 and again on July 9, 2018. An existing reinforced concrete pipe (RCP) outfall that was partially buried by sand and shells was observed in the vicinity of the proposed Outfall A. The existing RCP outfall discharges to the sandy beach were a small channel has formed, conveying the flows from the beach to an intertidal flat that becomes inundated during high tide. No tidal vegetation was observed in the immediate vicinity of the pipe, and no submerged aquatic vegetation was observed in the water near the discharge location. A small patch of poison ivy (*Toxicodendron radicans*), which is considered tidal vegetation, was observed in the large boulder revetment approximately 45 feet north of the existing pipe (see Figure 1). Additionally, tidal vegetation, namely smooth cordgrass (*Spartina alterniflora*), was noted in portions of the public beach approximately 350 feet south of Outfall A. Photos 1-3 depict these features.

No existing outfall structure was observed in the vicinity of the proposed Outfall B. Vegetation including beach grass (*Ammophila breviligulata*), American sea-rocket (*Cakile edentula*), rough cocklebur (*Xanthium stumarium*), orache (*Atriplex sp.*), Japanese knotweed (*Fallopia japonica*), hedge false bindweed (*Calystegia sepium*), American elm (*Ulmus americana*), northern catalpa (*Catalpa speciosa*), and tree-of-heaven (*Ailanthus altissima*) was observed in the vicinity of the proposed Outfall B. While

[1] Unless there are also freshwater inland wetlands present

vegetation is present, none of the observed species are included on the Connecticut tidal vegetation list. No submerged aquatic vegetation was observed in the vicinity of the proposed outfall; however, intertidal flats were observed south of the sandy beach area. Figure 2 depicts the approximately proposed location of the outfall, and Photo 4 shows the general location including the existing vegetation and intertidal flats.

Proposed Outfalls C and D, which are located on or immediately adjacent to PSE&G property, were investigated on June 22, 2018. BL Companies was accompanied by PSE&G employee Karl Wintermeyer during the field investigation. Outfalls C and D are proposed at existing outfalls. Proposed Outfall C is adjacent to an existing RCP, which is located in a small alcove surrounded by riprap slopes. No tidal vegetation was noted along the slopes. The pipe is still partially submerged during low tide, and the water was especially turbid during the site visit due to discharge from an adjacent pipe, therefore the substrate could not be seen and assessed for submerged aquatic vegetation. However, given the velocity of the discharges and the interspersed turbidity, it appears unlikely that this area would support submerged aquatic vegetation. Figure 3 depicts the existing and proposed outfall, and Photo 5 shows the existing outfall during low tide.

Proposed Outfall D is located near a small sandy beach, but does not appear to be accessible to the public. The existing outfall consists of two RCPs within a concrete endwall which discharge directly to the water and are surrounded by riprap and concrete stabilization. Both pipes appeared to have once had gates attached to the ends to prevent backflow, however both were observed to have fallen off into the water. No tidal vegetation or submerged aquatic vegetation were observed in the vicinity of Proposed Outfall D. Figure 4 depicts the existing and proposed outfall, and Photo 6 shows the existing outfall during low tide.

A fifth proposed outfall (referred to as Outfall E in mapping) located between 1498 and 1048 South Ave, Bridgeport along Cedar Creek Harbor was also assessed for coastal resources on July 9, 2018. The property is owned by the City of Bridgeport and is surrounded by a locked chain link fence; a site visit was coordinated with Max Perez of the City of Bridgeport. The property consists of disturbed land that has previously been cleared; compacted gravel forms the main substrate and small herbaceous plants are present throughout the property. A timber retaining wall paralleling Cedar Creek Reach forms the northern boundary of the property. A portion of the timber retaining wall along the northernmost section of the property has failed, allowing for erosion of the bank. In this collapsed area, tidal vegetation including smooth cordgrass (*Spartina alterniflora*), hightide bush (*Iva frutescens*), and groundsel bush (*Baccharis halmifolia*) are present (see Figure 5). The channel appeared opaque brown, therefore it could not be visually assessed for submerged aquatic vegetation at the time of the investigation. Photos 7 and 8 show the timber retaining wall and tidal vegetation in the vicinity of the proposed outfall.

It should be noted that in addition to the small patches of tidal vegetation observed in the immediate vicinity of proposed Outfalls A and E, as well as the tidal vegetation found south of Outfall A, other coastal resources are mapped on Coastal Area Management (CAM) mapping, which is included as an attachment, and were observed in the vicinity

of the proposed outfalls. These coastal resources, which may be regulated by CT DEEP, include developed shorefront, coastal hazard area, estuarine embayment, intertidal flats, modified escarpment, beaches, and areas of water-dependent recreation. Publicly accessible sandy beach is present at Outfalls A and B. Sandy beach is also present at Outfall D, but does not appear to be accessible by the public. No natural rocky shorefront is present near any of the outfalls, but the riprap slopes west of Outfall C are utilized by locals for fishing. Additionally, while seaweed was noted at all the sites, no submerged aquatic vegetation was observed in any of the areas that could be visually assessed.

Mapping and pertinent photos of the proposed outfall locations are included as attachments. The attached mapping shows the limits of tidal vegetation, but does not include topographic survey. Therefore, survey information should be referenced to determine the location of the CJL as well as the 1.0' above the CJL in order to determine the true limits of CT DEEP's jurisdiction.

Sincerely,
BL Companies

Rachael Hyland, WPIT, Certified Associate Ecologist
Project Scientist I

Legend

- Tidal Vegetation Limits
- CAM Zone

N

0 20 40 80 Feet

BL Project 17C6199
Bridgeport Resiliency
Proposed Outfalls

BL Companies
Architecture
Engineering
Environmental
Land Surveying

Figure 1: Proposed Outfall A

Legend

- Tidal Vegetation Limits
- CAM Zone

N

0 20 40 80 Feet

BL Project 17C6199
Bridgeport Resiliency
Proposed Outfalls

BL Companies — Architecture Engineering Environmental Land Surveying

Figure 2: Proposed Outfall B

Legend

- Tidal Vegetation Limits
- CAM Zone

N

0 20 40 80 Feet

BL Project 17C6199
Bridgeport Resiliency
Proposed Outfalls

BL Companies — Architecture Engineering Environmental Land Surveying

Figure 3: Proposed Outfall C

Legend

Tidal Vegetation Limits

CAM Zone

N

0 20 40 80 Feet

BL Project 17C6199
Bridgeport Resiliency
Proposed Outfalls

BL Companies
Architecture
Engineering
Environmental
Land Surveying

Figure 4: Proposed Outfall D

Legend

Tidal Vegetation Limits

CAM Zone

N

0 15 30 60 Feet

BL Project 17C6199
Bridgeport Resiliency
Proposed Outfall

BL Companies
Architecture
Engineering
Environmental
Land Surveying

Figure 5: Proposed Outfall E

PHOTO 1: Existing Outfall A, partially buried, looking west towards Seaside Park.

PHOTO 2: View of small patch of tidal vegetation (*Toxicodendron radicans*) in the vicinity of Outfall A, growing between the boulder revetment and the sidewalk.

BL Companies Architecture Engineering Environmental Land Surveying	**BL Project 17C6199** **Bridgeport Resiliency** **Proposed Stormwater Outfall Investigation**	**Figure 1**

PHOTO 3: View of existing tidal vegetation *(Spartina alterniflora*) approximately 350 feet south of Outfall A, looking north towards Outfall A.

PHOTO 4: View of approximate location of proposed Outfall B. Vegetation is present, but not considered tidal.

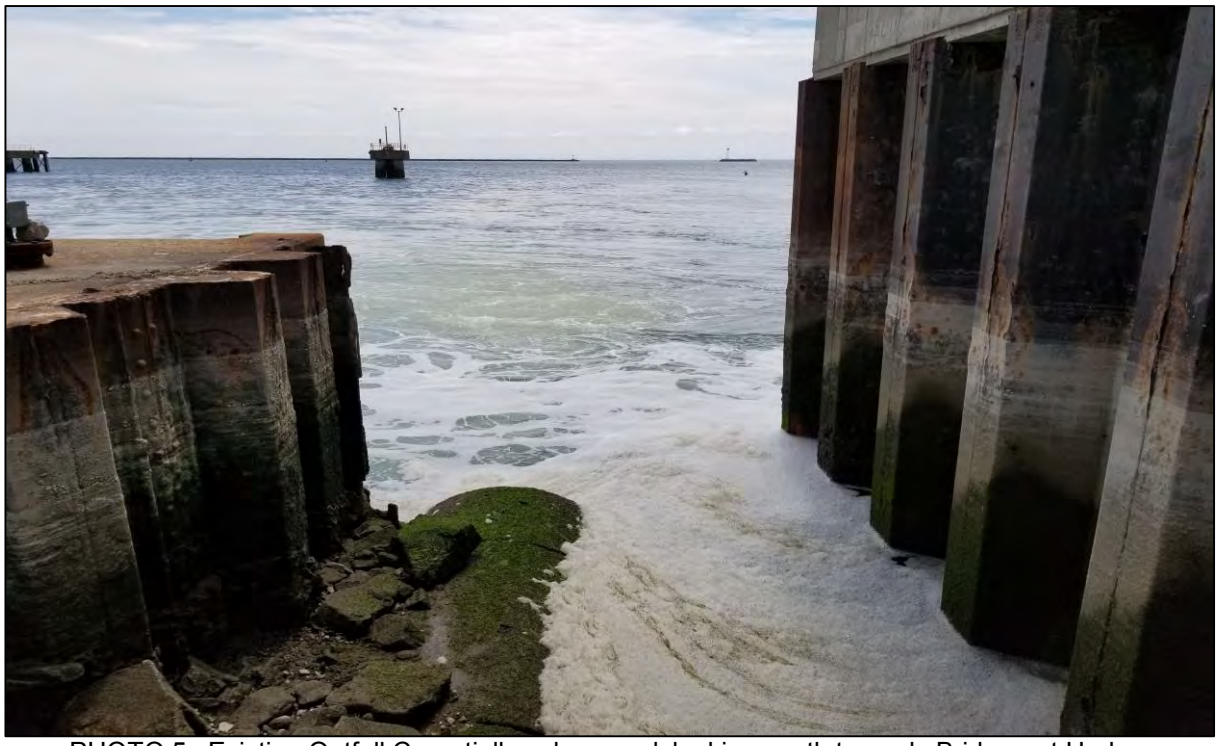
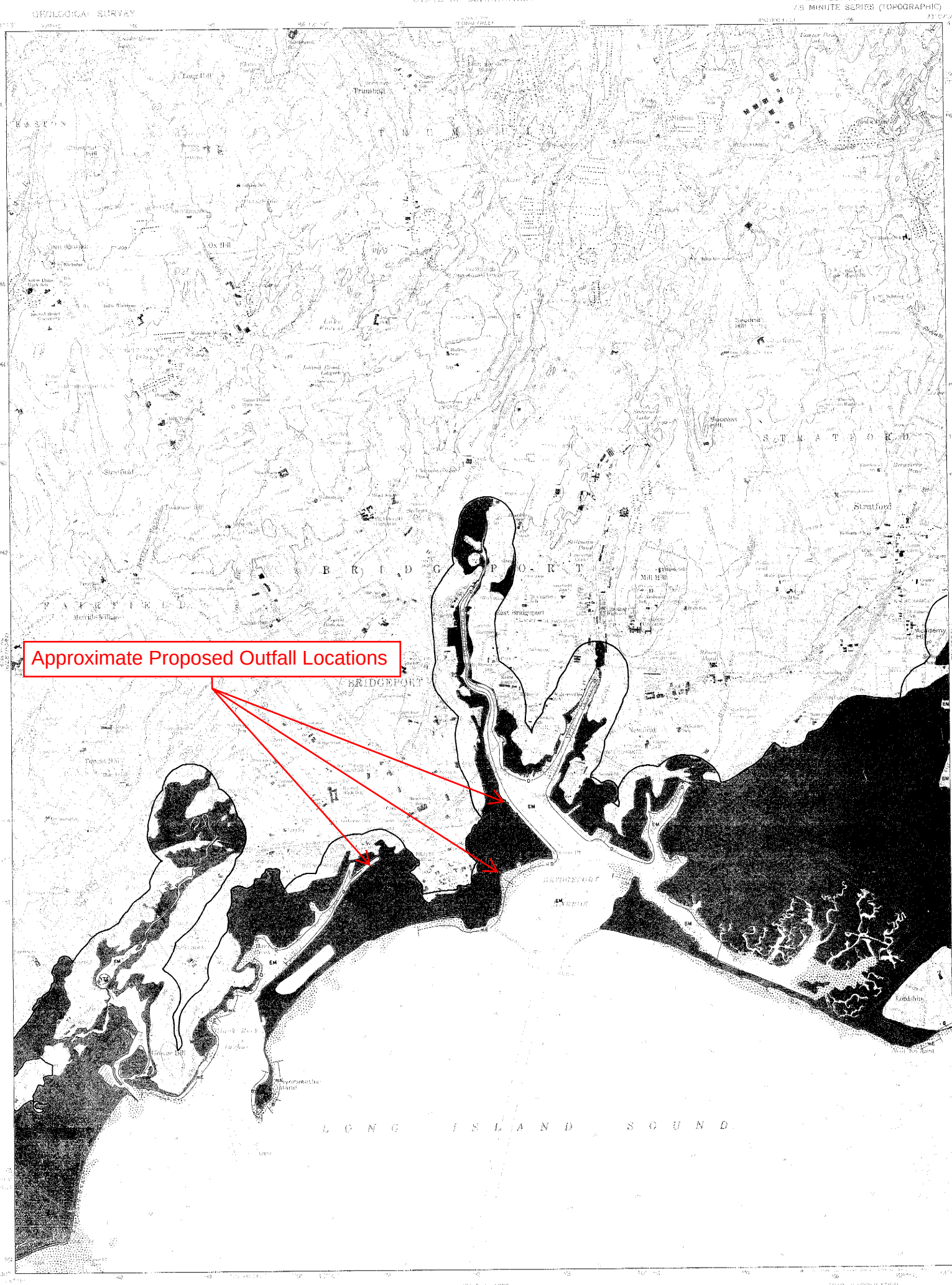


PHOTO 5: Existing Outfall C, partially submerged, looking south towards Bridgeport Harbor.

PHOTO 6: Existing Outfall D, looking east towards Bridgeport Harbor.

PHOTO 7: View of timber retaining wall along the approximate location of proposed Outfall E.

PHOTO 8: View of tidal vegetation (*S. alterniflora, Iva frutescens, Baccharis halmifolia*) along the collapsed portion of the timber retaining wall in the vicinity of proposed Outfall E.



LEGEND

COASTAL LAND RESOURCES

E — COASTAL BLUFFS AND ESCARPMENTS: Steep, seaward sloping marine cliffs or escarpments composed of unconsolidated bouldery to stony or sandy to gravelly soils. The slopes are active and the shores retreating(eroding). The slopes may be mantled with a sparse shrub or herb cover of salt spray tolerant plants. (Sources: 1,2)

mE — modified BLUFFS AND ESCARPMENTS: Bluffs and escarpments which have been temporarily stabilized by erosion control structures (revetment, bulkhead or seawall) positioned seaward of the marine cliff or escarpment. (Source: 1)

B — BEACHES AND DUNES: Moderately sloping shores composed of water worked sand, gravel or cobble deposits(beach) and when present, wind deposited sands(dunes or sand flats). The beach (proper) is positioned between mean low water and coastal bluffs/escarpments or dunes or vegetation. The map designations include all areas of sandy beach fill. Dunes and sand flats positioned landward and elevated above the beach, support coastal grasslands dominated by beach grass (*Ammophila breviligulata*). (Sources: 1,2,3,4)

mB — modified BEACHES AND DUNES: Beach systems temporarily stabilized by an erosion control structure (revetment, seawall or bulkhead) positioned between the dune ridge and the beach. (Source: 1)

R — ROCKY SHORELINES: Shorefront composed of bedrock or armored with a dense aggregate of boulder and stone. Includes rugged nearly vertical rock cliffs or gently seaward sloping rock and bouldery lands. (Source: 1)

COASTAL "FLOOD" HAZARD AREA: 100 year coastal flood hazard area as identified by the Federal Emergency Management Agency (FEMA). On those coastal islands currently unmapped by FEMA, the flood hazard area is conservatively approximated by the 10' contour interval. (Sources: 2,5)

F — FRESHWATER WETLANDS AND UNDESIGNATED TIDAL WETLANDS: Areas defined in Section 22a-38 of the Connecticut General Statutes as "land, including submerged land, not regulated pursuant to sections 22a-28 to 22a-35('Tidal' Wetlands and Watercourses Act), inclusive, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial and floodplain...[Inland Wetlands and Watercourses Act]." Includes all freshwater wetland soils and any poorly to very poorly drained soils of the Pawcatuck and Westbrook series (tidal wetland soils) that are unmapped and unregulated by the state tidal wetland program. (Sources: 1,5)

I — ISLANDS: A land mass of bedrock or till encircled by coastal waters. (Note: All critical coastal resource components of the island such as bluffs and escarpments, beaches and dunes, rocky shorefront and wetlands should be managed accordingly whether or not these are displayed on this map) (Sources: 1,2)

SHORELANDS: Upland areas at elevations in excess of the 100 year STILL water flood level and located within the coastal boundary. (Sources: 2,5)

D — DEVELOPED SHOREFRONT: Port and harbor areas which have been highly engineered and developed resulting in the functional impairment or substantial alteration of their natural physiographic features or systems. (Sources: 1,3,4,7)

W — WATER: Open water bodies such as but not limited to lakes and ponds subject to regulation under Sections 22a-36 to 22a-45 of the Connecticut General Statutes. (Source: 2)

INTERTIDAL RESOURCES

T — REGULATED TIDAL WETLANDS: Official state designated and regulated tidal wetlands located within the coastal boundary. The areas depicted on this map shall in no way supersede the official state regulated tidal wetland maps at the scale of 1:2400. (Source: 6)

INTERTIDAL FLATS: Level to gently sloping areas subjected to alternating periods of tidal inundation and exposure. Sediment is variable ranging from mud to sand. (Source: 2)

COASTAL WATERS

EM — ESTUARINE EMBAYMENTS: Protected coastal water bodies with an open connection to the Sound including tidal rivers, bays, coves and lagoons. (Source: 2)

NW — NEARSHORE WATERS: Those waters and submerged lands between mean low water and a depth approximated by the 10 meter bathymetric contour. (Source: 2)

OW — OFFSHORE WATERS: Those waters and submerged lands seaward of a depth approximated by the 10 meter bathymetric contour. (Source: 2)

COASTAL BOUNDARY: As defined in Section 22a-94 of the Connecticut General Statutes as amended by Public Act 79-535. (Lands and waters seaward of the inside edge of this line are subject to the provisions of the Connecticut Coastal Management Act)

SOURCES:

1. False Color Infrared Aerial Photographs (1:12000), 1974
2. U.S.G.S. 7½ Minute Quadrangle
3. Surficial Geology Maps (U.S.G.S. or Connecticut Geological and Natural History Survey)
4. Soil Conservation Service, Coastal Soil Maps (1:24000), 1979
5. Flood Insurance Maps Prepared by the Federal Emergency Management Agency (hazard boundary maps, preliminary flood insurance rate maps or final flood insurance rate maps, whichever ones were most current at this printing)
6. State Regulated Tidal Wetland Maps (1:2400)
7. Coastal Area Management, Land Use Overlays (1:24000)

This map is intended as a guide to identify the approximate locations of coastal resources. Map designations conform to the resource definitions in Section 22a-93 of the Connecticut General Statutes as amended by Public Act 79-535. Boundary lines are as precise as this map and source information permit. This map shall not supersede any existing and more precise official tidal wetland map, state or municipal inland wetlands map or FEMA flood insurance map. Specific questions or comments relating to the map units or the application of this map, should be directed to the Connecticut Coastal Area Management Program.

ROAD CLASSIFICATION

BRIDGEPORT, CONN.
1970

Base Map U.S.G.S. 7½ minute quadrangle

109

coastal area management

COASTAL RESOURCES

1979. Prepared by Coastal Area Management Program,
Connecticut Department of Environmental Protection.

APPENDIX G
Traffic Reports

Preliminary Traffic Data Collection and Analysis RBD Pilot Project

1 TRAFFIC ASSESSMENT

1.1 INTRODUCTION

In response to the extensive damage to communities in Connecticut and throughout the Northeast, the Obama administration created the Superstorm Sandy Rebuilding Task Force, chaired by the U.S. Department of Housing and Urban Development (HUD). As an outgrowth of the task force, in June 2013 HUD launched the Rebuild by Design (RBD) Competition, a multi-stage planning and design competition to promote innovation by developing regionally-scalable but locally-contextual solutions that increase resilience in the region. In June 2014, HUD announced the award of $930 million to seven winning RBD ideas, one of which was *Resilient Bridgeport*. In September 2014, HUD announced an additional round of funding through the National Disaster Resilience (NDR) Competition, a targeted effort under its Community Development Block Grant (CDBG) Program to broaden federal support for resiliency efforts in Connecticut, New Jersey, New York State, and New York City. Connecticut received approximately $54 million to continue the implementation of *Resilient Bridgeport* and expand its success to the regional and state scales. The proposed projects are considered a "major federal action significantly affecting the quality of the human environment," therefore, must comply with the requirements of the National Environmental Policy Act (NEPA). CTDOH will prepare the EIS in accordance with the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508) and HUD's NEPA Regulations (24 CFR 58).

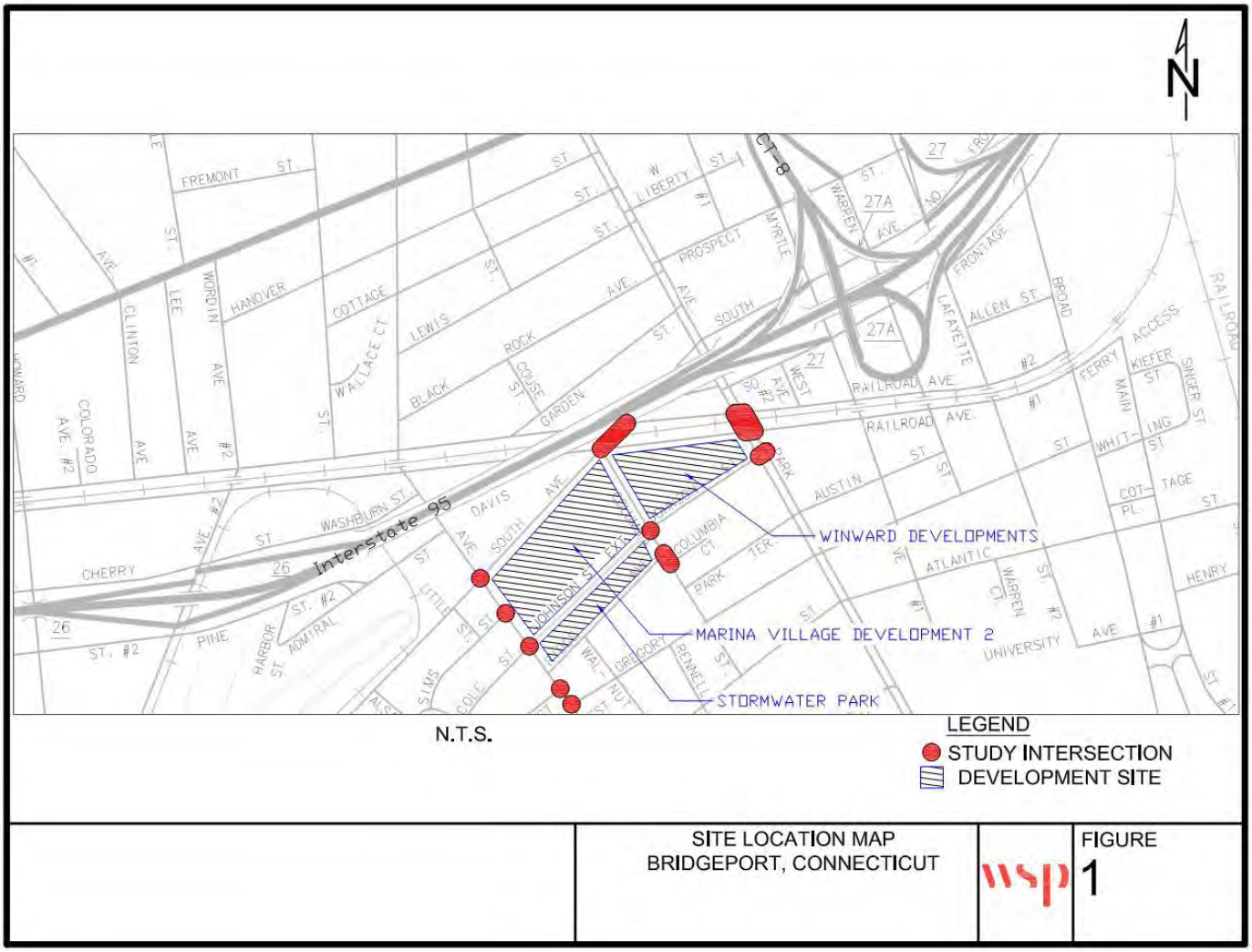
This traffic study evaluates the transportation impacts for the 2038 Build Year of the proposed Johnson Street reconfiguration, developments in the area bounded by Railroad Avenue to the north, Ridge Avenue and Johnson Street to the south, Iranistan Avenue to the west and Park Avenue to the east. Figure 1 depicts the study roadways and intersections including future development parcels for Marina Village and Windward Development.

1.2 PROJECT DESCRIPTION

The RBD project will convert Johnson Street from a one-way (northeast bound) to a two-way street from Park Avenue at the east terminus to Iranistan Avenue at the west. This involves extending Johnson Street across Columbia Street through a parcel to the north of Ridge Road. A 405-unit housing complex called Marina Village once occupied the study area. At the time of this report, a portion of Marina Village was vacant, and had been since 2012, with approximately 15 buildings already demolished. The proposed Johnson Street parcel (bounded by South Avenue, Railroad Avenue, Columbia Street, and the proposed Johnson Street Extension), is called the RBD Pilot Marina Village. At the time of preparing this report, the proposed development consisted of a 217-unit, 3-story, multibuilding, residential housing complex. A proposed storm water park will occupy the land south of the proposed Johnson Street Extension and north of Ridge Avenue, as shown on Figure 1. The proposed access to the Marina Village site is from Johnson Street Extension and Iranistan Avenue. A proposed mixed-use development will be located in the area bounded by Railroad Avenue to the north, Johnson Avenue to the south, Park Avenue to the east and Columbia Street to the west. On the adjacent parcel, east of Columbia Street, once part of Marina Village, is land now known as Windward Development.

This traffic assessment includes the collection and compilation of existing roadway and intersection geometry, the number and width of travel lanes, intersection controls, vehicle speed, pedestrian and bicycle facilities, transit, and other relevant transportation information. Additionally, local condition data were compiled for ten (10) intersections including: lane configuration, sight lines (turning and approach), turn restrictions, parking restrictions, bus stops, pedestrian controls, and signing by location and type (regulatory, warning, informational, school, other).

FIGURE 1 - STUDY AREA INTERSECTIONS AND ROADWAY NETWORK



Traffic impacts were evaluated in the study area for the following intersections:

1. Park Avenue at Railroad Avenue (East and West bound)- *signalized intersection*
2. Park Avenue at Johnson Road
3. Johnson Road at Columbia Street
4. South Avenue at Railroad Avenue / Columbia Street – *signalized intersection*
5. Iranistan Avenue at Sims Street
6. Iranistan Avenue at Coles Street
7. Iranistan Avenue at Burnham Street
8. Columbia Street at Ridge Avenue
9. Ridge Avenue at Iranistan Avenue
10. Iranistan Avenue at South Avenue – *signalized intersection*

Peak hour intersection turning movement counts, vehicle classifications, pedestrian and bicycle counts were collected at the above intersections for the analysis.

WSP compiled the crash data from the Connecticut Crash Data Repository for the ten (10) intersections based on the most recent three - year crash records and tabulated based on type, location, and severity.

1.3 STUDY METHODOLOGY

To determine the traffic impacts on the area roadway network by the proposed Johnson Street extension and developments associated with the future build condition, traffic operational performance measures at the study intersections were evaluated. WSP collected daily and peak hour traffic data to support the traffic operations analysis. When available, traffic data inventory from the City, Metropolitan Council of Governments (Metro COG), and Connecticut Department of Transportation (CTDOT) was also gathered. Crash data from the Connecticut Crash Data Repository website, maintained by the University of Connecticut (UCONN), was downloaded, compiled and analyzed for the most recent 3-year. The intersections in the study area were analyzed using the methodology described in the 2000 and 2010 Highway Capacity Manual (HCM), published by the Transportation Research Board and replicated in the Synchro® Version 9 software program. The following is a description of the Existing, Background and Build conditions:

1.4 2018 EXISTING CONDITION

The existing traffic conditions were established based on turning movement volume counts collected in January and February of 2018 together with the traffic and roadway data gathered at the study intersections. This information was inputted into the Synchro model to determine the existing traffic operations.

1.5 2038 BACKGROUND CONDITION

A background traffic growth rate of 0.5% per year for 20 years was used to develop the 2038 Background volumes. The growth rate was provided by CTDOT's Bureau of Policy and Planning on October 31, 2017. Added to the growth rate volumes were the potential trips generated by the proposed Windward Development. Based on the Fuss & O'Neill letter dated August 4, 2017, addressed to the City of Bridgeport Engineering Department, the Windward Apartments development will have a total of 128 residential units and 7,480 square feet of medical office space (a copy of Fuss &O'Neill letter addressed to the City is included in this report). Two full access driveways will be provided onto Railroad Avenue and Johnson Street will become two-way from Park Avenue to Columbia Street. Also, added to the Background volumes were the approximately 124 unoccupied and demolished units of the Marina Village

apartments. The sum of the growth rate, Windward Development and Marina Village apartment volumes determined the Background condition volumes. The background volumes were then distributed into the roadway network and inputted into the Synchro model to determine the background traffic operations.

1.6 2038 BUILD CONDITION

The 2038 build traffic conditions were developed by subtracting the prior existing 280 Marina Village apartment units and adding the RBD Pilot Marina Village proposed development. The RBD Pilot Marina Village proposed development consists of a 217-unit, 3-story, multibuilding, residential housing complex. This will slightly reduce the Build Site Generated traffic volumes from the Background condition. The roadway network will be modified with the extension of Johnson Street, as a two-way street, from Columbia Street to Iranistan Avenue. The build volumes were then distributed into the proposed roadway network and inputted into the Synchro model to determine the build traffic operations.

A review and comparison of the LOS and delays for the Existing, Background and Build conditions was then performed to identify improvements, if any, that were necessary to maintain acceptable traffic operations. Lastly, based on the information and analysis in this report, a conclusion was developed.

2 EXISTING ROADWAY CONDITIONS

The study area is a mix of residential housing (multi-family and single family), with a combination of commercial and retail property located on Park Avenue and Iranistan Avenue. The existing roadway network characteristics are shown in Table 1and intersection control inventory shown in Table 2.

2.1 ROADWAY GEOMETRY

Park Avenue is a two-lane, north-south, minor urban arterial with parallel, on-street parking on both sides of the road and a 6-foot median between travel ways. There are bicycle sharrows (shared-lane pavement marking depicting a bicycle) in both directions. The roadway width (curb-to-curb) is approximately 50 feet. Park Avenue runs from Route 15 (Merritt Parkway) in Fairfield, south to Waldemere Avenue by the parks and Long Island Sound. There is an existing signal at the intersection of Park Avenue and Railroad Avenue. The signal equipment is approximately 15 years old with mast arm mounted signal heads, pedestrian pushbuttons and hand/person pedestrian signal heads.

Railroad Avenue is an east-west road that has one lane in each direction on either side of the railroad tracks. Railroad Avenue runs in the eastbound direction south of the railroad tracks, and north of the tracks in the westbound direction. It is classified as major collector that runs from Fairfield Avenue to the west to Broad Street on the east. There is parallel, on-street parking on one side of the road in both directions for much of the roadway apart from the eastbound leg from Iranistan Avenue to Columbia Street (approximately 0.2 miles). In this section of Railroad Avenue there are bicycle sharrows and there is no on-street parking. The westbound leg from Park Avenue to Garden Street, approximately 0.25 miles, has a striped bike lane and no on-street parking. The roadway width is approximately 30 feet in each direction.

South Avenue is a two-lane minor arterial that runs east-west with parallel, on-street parking on both sides of the street except between Railroad Avenue and Park Avenue, where it runs under I-95. South Avenue has a roadway width of approximately 32 feet and sidewalks on both sides of the street. There is an existing signal at the intersection of South Avenue and Railroad Avenue that is approximately 20 years old. It has mast arm mounted signal heads, pedestrian pushbuttons and hand/person pedestrian signal heads.

Iranistan Avenue is a two-lane, north-south, major collector street that runs from U.S. Route 1 on the north end to Waldemere Avenue on the south end. The roadway width varies from approximately 40 - 48 feet with sidewalks on both sides of the street. There is parallel, on-street parking on both sides of the road. There are bar-type painted crosswalks across southbound and eastbound approaches. There is an existing signal at the intersection of Iranistan Avenue and South Avenue. The signal equipment is approximately 3 years' old and has mast arm mounted signal heads with backplates and countdown pedestrian heads. There is video detection installed for all approaches.

Johnson Street is one-way in the eastbound direction terminating at Park Avenue to the east and Columbia Street to the west. It is classified as a local road with parallel, on-street parking on the south side only. It has a roadway width of approximately 22 feet.

Columbia Street is one-way in the southbound direction from Railroad Avenue to Johnson Street with no on-street parking. From Johnson Street, it's two-way with parking on both sides of the street. It terminates at Atlantic Street in the south direction. It is classified as a local road and has a width of approximately 20 feet on the north end, and 32 feet south of Johnson Street.

Ridge Avenue is a two-way, east-west, local road that runs from Iranistan Avenue on the west end to Columbia Street on the east end. There is parallel parking allowed on both sides of the street. The roadway width is approximately 32 feet.

Sims Street, Coles Street and Burnham Street are all two-way, east-west, local roads that run off the west side of Iranistan Avenue. There is parallel parking only on the north side of these roads. The roadway widths are approximately 26 feet.

All roadways in the study area have speed limits of 25 miles per hour (mph). Many of the roadways do not have posted speed limits. In the City of Bridgeport, the speed limit is 25 mph if it is not posted. There are posted speed limit signs on Iranistan Avenue.

The sight lines all appear to be adequate with the roadways intersecting at, or near, 90 degrees and no vertical curvature. The exceptions are:

The signalized intersection of Railroad Avenue eastbound at South Avenue. The railroad bridge abutment blocks the driver's view to the north, looking left. The same condition is on the other side of the tracks, Railroad Avenue westbound at South Avenue looking left, to the south.

The signalized intersection of Railroad Avenue eastbound at Park Avenue. The railroad bridge abutment blocks the driver's view to the north, looking left. Again, the same condition is on the other side of the tracks, Railroad Avenue westbound at Park Avenue looking left, to the south.

TABLE 1 - ROADWAY INVENTORY

Thoroughfare	**Orientation**	**Lanes**	**On-Street Parking**	**Flow**	**Functional Classification**	**Approximate Width**	**Posted Limit**
Park Avenue	NB-SB	2	Yes	2-Way	Minor Arterial	50'	25 mph
Railroad Avenue	EB-WB	2	Yes	2-Way	Major Collector	30' + 30'	25 mph
South Avenue	EB-WB	2	Yes	2-Way	Minor Arterial	32'	25 mph
Iranistan Avenue	NB-SB	2	Yes	2-Way	Major Collector	40' to 48'	25 mph
Johnson Street	EB	1	South Side	1-Way	Local	22'	25 mph
Columbia Street	SB	1	No	1-Way	Local	20' to 32'	25 mph
Ridge Avenue	EB-WB	2	Yes	2-Way	Local	32'	25 mph
Sims Street	EB-WB	2	North Side	2-Way	Local	26'	25 mph
Cole Street	EB-WB	2	North Side	2-Way	Local	26'	25 mph
Burnham Street	EB-WB	2	North Side	2-Way	Local	26'	25 mph

Notes: NB: northbound, EB: eastbound, SB: southbound, and WB: westbound

TABLE 2- INTERSECTION INVENTORY

Intersection	Traffic Control	Crosswalk?
Park Avenue at Railroad Avenue (East and West bound)	Signal	Yes
Park Avenue at Johnson Road	TWSC	No
Johnson Road at Columbia Street	TWSC	No
South Avenue at Railroad Avenue / Columbia Street	Signal	Yes
Iranistan Avenue at Sims Street	TWSC	No
Iranistan Avenue at Cole Street	TWSC	No
Iranistan Avenue at Burnham Street	TWSC	No
Columbia Street at Ridge Avenue	TWSC	No
Ridge Avenue at Iranistan Avenue	TWSC	No
Iranistan Avenue at South Avenue	Signal	Yes

Notes: TWSC – Two Way Stop Control

2.2 EXISTING TRAFFIC VOLUMES

Turning movement volume/pedestrian and vehicle classification counts were collected at the study intersections. The counts were taken on Tuesday, January 9, 2018. on Tuesday, February 27, 2018 on the north side of Railroad Avenue at South Avenue and at Park Avenue. The commuter peak periods identified for weekdays are between 7:00 AM and 9:00 AM in the morning and 4:00 PM and 6:00 PM in the evening. The morning and evening peak hour traffic volumes are summarized and graphically depicted on Figure 2.

2.3 TRANSIT

Greater Bridgeport Transit (GBT) has Bus Route 1 that runs up Park Avenue and provides a stop at Railroad Avenue within the study area. GBT Route 9 runs up Iranistan Avenue with stops at Ridge Avenue, South Avenue and just north of Railroad Avenue within the study area.

2.4 BRIDGEPORT TO PORT JEFFERSON FERRY

The Long Island Ferry terminal is approximately 0.75 miles from Park Avenue at Railroad Avenue. The ferry, which operates from Bridgeport to Port Jefferson, NY, can be accessed from Railroad Avenue by heading east to Ferry Access Road. The ferry provides ten crossings per day, Monday through Thursday and Sundays, and eleven on Fridays and Saturdays.

2.5 PEDESTRIAN AND BICYCLE FACILITIES

The study area is located within the south end of Bridgeport. This is mainly a residential area with a mix of small retail shops. The pedestrian activity is accommodated by sidewalks and bar-type pedestrian crosswalks at the intersections. The signalized intersections provide pedestrian pushbuttons and faces. Iranistan Avenue at South Avenue has an exclusive pedestrian phase with countdown pedestrian signal heads. The intersection appears to be ADA compliant with sidewalk ramps and tactile warning strips. The signalized intersections of Park Avenue at Railroad Avenue and South Avenue at Railroad Avenue have concurrent pedestrian phasing. The pedestrian phases are pushbutton activated and turning traffic must yield to the pedestrians in the crosswalk. The pedestrian signal heads are hand/person type. There are no tactile warning strips at the sidewalk ramps at South Avenue and Railroad Avenue but there are tactile warning strips at Park Avenue. Also, there is no painted crosswalk across Railroad Avenue (south side) at South Avenue.

There are signed bicycle routes with sharrows in the study area. They run north-south on Park Avenue and east-west on Railroad Avenue.

2.6 CRASH ANALYSIS

A crash data analysis was performed for all the intersections within the study area. It was gathered from the University of Connecticut's (UCONN) Crash Data Repository (CTCDR). UCONN publishes the MMUCC or the 'Model Minimum Uniform Crash Criteria' Standard. WSP used the most current MMUCC recent 3-year data set from February 2015 to February 2018.

Table 3 lists the intersections within the project limits with at least 1 crash in during the 3-year study period. As evident, most of the crashes occur at the signalized intersections and are rear-end type crashes. The full crash data set is included in this report. A total of 38 crashes have been recorded at the study intersections over the three-year period. The crash analysis indicated that there are fewer than five crashes of a type within the past 12-month period susceptible to correction by a traffic control signal, or merit further investigation.

TABLE 3- THREE-YEAR CRASH DATA (FEB 2015-FEB 2018)

Intersection Name	**Total Number of Crashes**	**Crash Type**	**Maximum Crash Severity**
Park Avenue at Railroad Avenue	10	Front-to-Rear	Injury - Serious
Park Avenue at Johnson Street	4	Angle	Property Damage
Columbia Street at Johnson Street	1	Angle	Property Damage
South Avenue at Columbia Street and Railroad Avenue	9	Front-to Rear	Injury - Minor
Sims Street at Iranistan Avenue	1	Angle	Property Damage
Cole Street at Iranistan Avenue	1	Sideswipe (Same Direction)	Property Damage
South Avenue at Iranistan Avenue	12	Front-to-Rear	Injury - Serious
South Avenue at Burnham Street	*0*	*n/a*	*n/a*
Columbia Street at Ridge Avenue	*0*	*n/a*	*n/a*
Ridge Avenue at Iranistan Avenue	*0*	*n/a*	*n/a*

Notes: The following are the crash type definitions; Source: UCONN Connecticut Crash Data

Angle– A crash where two motor vehicles impact at an angle.

Front-to-Rear- A crash where the front end of one vehicle collides with the back of another vehicle, while the two vehicles are traveling in the same direction.

Sideswipe (Same Direction)- A crash where two vehicles traveling in the same direction impact one another where the initial engagement does not overlap the corner of either vehicle so that there is no significant involvement of the front or rear surface area.

3 FUTURE CONDITIONS

3.1 BACKGROUND TRAFFIC GROWTH

The CTDOT's Bureau of Policy and Planning was contacted on October, 2017 to determine the future growth. Their regional forecasting travel model shows very little growth in the study area and WSP was told to use between 0.2 – 0.5 percent growth per year. These rates do not include any future developments that may occur. To be conservative, this study considered using the high end, 0.5 percent annual growth rate over 20 years. This worked out to approximately ten (10) percent growth rate over the 20 years to arrive at the 2038 Future No-Build traffic volumes and are provided on Figure 3.

3.2 SITE-GENERATED TRAFFIC

Added to the growth rate volumes are the potential trips for approximately 124 units that are unoccupied on the Marina Village site, west of Columbia Street. Also, added to the growth rate volumes were the trips generated by the proposed Windward Development. This is a proposed 128 residential unit development with 7,485 square feet of Medical-Dental Office Building. The Institute of Transportation Engineer's Trip Generation Manual, 10th Edition, was used to determine the number of trips generated during the AM and PM Peak Hours by these uses. Land Use 221, Multifamily Housing (Mid-Rise) and Land Use 720, Medical-Dental Office Building, Peak Hour of Adjacent Street Traffic, was utilized to determine the volumes entering and exiting the proposed site. Table 4 shows the Windward Development Site-Generated Traffic. The traffic impact document by Fuss & O'Neill stated that two full access driveways will be provided onto Railroad Avenue. The Site Generated and distributed Traffic Background Conditions are shown on Figure 4 (Marina Village) and Figure 5 (Windward Development).

TABLE 4 - TRIP GENERATION – WINDWARD DEVELOPMENT (VEHICLES PER PEAK HOUR OF ADJACENT STREET TRAFFIC) – MORNING AND EVENING PEAK HOUR OF TRAFFIC

TRIP GENERATION CALCULATIONS **Morning Peak Hour of Traffic**					
LAND USE	AREA/UNIT	EQUATION	ENTER	EXIT	TOTAL
Residential Mid-Rise Apartments – Land Use Code 221	128 units	Ln(T) = 0.98 Ln(X) - 0.98	11	32	43
Medical – Dental Office Building – Land Use Code 720	7,480 sq.ft.	Ln(T) = 0.89 Ln(X) + 1.31	17	5	22
INCREASE IN TRAFFIC (Veh./hr.)		-	**28**	**37**	**65**
TRIP GENERATION CALCULATIONS **Evening Peak Hour of Traffic**					
LAND USE	AREA/UNIT	EQUATION	ENTER	EXIT	TOTAL
Residential Mid-Rise Apartments – Land Use Code 221	128 units	Ln(T) = 0.96 Ln(X) - 0.63	34	22	56
Medical – Dental Office Building – Land Use Code 720	7,480 sq.ft.	T = 3.39(X) + 2.02	8	20	28
INCREASE IN TRAFFIC (Veh./hr.)		-	**42**	**42**	**84**

3.3 BUILD CONDITION

The 2038 build traffic conditions were developed by subtracting the former existing 280 Marina Village apartment units and adding the RBD Pilot Marina Village proposed development. The proposed RBD Pilot Marina Village (Marina Village Phase 2) development consists of a 217-unit, 3-story, multibuilding, residential housing complex. As shown in Table 5, this would reduce the Build Site Generated traffic volumes from the Background condition. Because of this small net decrease from the Background to Build Condition, the Background volumes were also used for the Build Condition. They were distributed according to the proposed roadway network in the Build Condition with the extension of Johnson Street, as a two-way street, from Columbia Street to Iranistan Avenue. This will distribute volume to the proposed Johnson Street Extension which will serve as an access to Marina Village Phase 2. The build trips and distribution is shown on Figure 6. The volumes were inputted into the Synchro model to determine the 2038 Build traffic operations.

TABLE 5 – BUILD SITE GENERATED TRAFFIC

Existing/Approved Marina Village

	Mid-Rise Apt		Entering	Exiting	*Units*	*280*
Units	280	AM	24	69	*AM*	*93.88718*
		PM	73	46	*PM*	*119.0327*

Proposed Marina Village II

	Mid-Rise Apt		Entering	Exiting	*Units*	*217*
Units	217	AM	19	54	*AM*	*73.13444*
		PM	57	36	*PM*	*93.19569*

Total Volume		**Entering**	**Exiting**	**Total**
	AM	-5	-15	-20
	PM	-16	-10	-26

3.4 TRIP DISTRIBUTION

3.4.1 WINDWARD DEVELOPMENT

The following assumptions were made for distributing the Windward Development generated traffic volumes:

3.4.1.1 ENTERING THE SITE

50% of vehicles would come westbound on South Avenue (this includes I-95 SB, Route 8 SB and local traffic)

At the intersection of Park Avenue and South Avenue, 30% would continue west on South Avenue and 20% would turn left and go south on Park Avenue

50% would come from I-95 NB, exiting at Interchange 26, turning left on Wordin Avenue, right on Railroad Avenue and right into the main entrances to the development.

3.4.1.2 EXITING THE SITE

80% would go east on Railroad Avenue and north on Park Avenue

20% would go east on Johnson Street and north on Park Avenue

The Windward Development Site Generated Traffic is shown on Figure 5.

3.4.2 MARINA VILLAGE

The following assumptions were made for distributing Marina Village and Marina Village Phase 2 generated traffic volumes:

3.4.2.1 ENTERING THE SITE

50% of vehicles would come from the north and east, westbound on South Avenue (this includes I-95 SB, Route 8 SB and local traffic)

At intersection of South Avenue and Columbia Street, 25% would continue west on South Avenue to enter the site from the north and 25% would turn left and go south on Columbia Street.

In the Background Condition, vehicles would take a right onto Ridge Avenue to access Marina Village. In the Build Condition, vehicles would take right on Johnson Street Extension to access Marina Village Phase 2.

50% would come from south, on I-95 NB, exiting at Interchange 26, turning right on Wordin Avenue, an immediate left on Pine Street, left on Admiral Street and right on Iranistan Avenue.

At the intersection of Iranistan Avenue and South Avenue, 25% would turn left on South Avenue to enter Marina Village from the north, and 25% would continue straight on Iranistan Avenue. 15% of the vehicles would enter from Iranistan Avenue and 10% would continue and turn left on Ridge Avenue to enter the site from the south. In the Build Condition, the 10% would turn left on Johnson Street Extension.

3.4.2.2 EXITING THE SITE

25% would go east on South Avenue to South Frontage Road

25% would go east on Johnson Street, left on Park Avenue and right on South Frontage Road

25% would go west on South Avenue, right on Iranistan Avenue, left on Washburn Street to the Wordin Avenue I-95 SB On-Ramp

25% would go north on Iranistan Avenue and follow the same movements as above to the Wordin Avenue I-95 SB On-Ramp

The Marina Village Site Generated Traffic is shown on Figure 4. The Marina Village Phase 2 Site Generated Traffic is shown on Figure 6.

Figure 7 depicts 2023 background peak hour traffic volume, and figure 8 depicts 2023 build condition and Johnson Street proposed extension peak hour traffic volume.

4 TRAFFIC OPERATIONS

To ascertain this project's impacts on the area roadway network, an analysis of the key intersections in the study area was performed. The Existing, Background and Build AM and PM peak hour operating conditions were determined using the Synchro® Version 9 software program that closely replicates the 2000 and 2010 HCM.

LOS is a calculation of control delay for an intersection and an indication of driver discomfort, frustration, fuel consumption, and lost time. LOS is defined by a grading system similar to that in a school with A (free flow) being the best and F (breakdown in flow) the worst.

Signalized intersection analysis is based upon the capacity of each lane group and the correlating control delay associated with the intersection. Capacity is a measurement of the ability of an intersection design to accommodate all movements within the intersection. Delay is the measure of the user quality of service. Capacity is a function of physical geometry and signalization conditions.

For unsignalized intersections, delay values apply only to the controlled movements, since the main street movements are not restricted. Control delay is the elapsed time for deceleration, queue time, stopped delay, and final acceleration. For Two-Way Stop Controlled (TWSC) intersections, the LOS is characterized by the LOS of the movement with the greatest delay. This is typically the left turn movement from the minor approach to the intersection. If the intersection operates at LOS F a traffic signal warrant analysis may be done to justify installation of a signal. The minimum criteria as set forth in the U.S. Department of transportation, Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD) must be met before the installation of a traffic control signal. It should be noted that none of the unsignalized intersections in the study area have a LOS F or warrant a traffic control signal.

Table 6 and 7 summarize the results of the analysis conducted as part of this study. No changes were made to the signal timing nor phasing for the Background Condition. Timings were optimized at the signalized intersections for the Build Condition. All the stop controlled intersections operate at LOS B or better in the Existing, Background and Build scenarios. The intersection of South Avenue at Railroad Avenue operates at LOS D in the AM Peak Hour in the Existing, Background and Build Scenarios. It should be noted LOS D is considered acceptable in an urban environment. All the analysis from Synchro Reports are included in this report.

TABLE 6 - TRAFFIC OPERATIONAL ANALYSIS – SIGNALIZED INTERSECTIONS

Intersection		AM Peak Hour						PM Peak Hour					
		Existing Condition		Background Condition		20-Year Build Condition		Existing Condition		Background Condition		20-Year Build Condition	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	Park Av at Railroad Av	B	15.1	B	15.0	B	15.0	B	17.4	B	17.6	B	17.6
2	South Av at Railroad Av	D	37.2	D	52.3	D	52.3	C	25.7	C	32.1	C	32.1
3	South Av at Iranistan Av	B	11.0	B	12.3	B	12.3	B	10.9	B	11.3	B	11.3

Note: Delay values are in seconds per vehicle.

TABLE 7 - TRAFFIC OPERATIONAL ANALYSIS – UNSIGNALIZED INTERSECTIONS

Intersection		AM Peak Hour						PM Peak Hour					
		Existing Condition		Background Condition		20-Year Build Condition		Existing Condition		Background Condition		20-Year Build Condition	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	Park Ave. at Johnson St.	B	10.4	B	10.8	B	10.8	B	11.9	B	12.8	B	12.8
2	Columbia St at Ridge Ave	A	8.8	A	8.9	A	8.9	A	8.9	A	9	A	9
3	Iranistan Ave at Sims St	A	9.9	B	10.4	B	10.4	A	10	B	10.5	B	10.5
4	Iranistan Ave at Cole St	A	0.2	A	0.12			B	10.4	B	10.7		
5	Iranistan Ave at Ridge Ave	A	9.1	A	9.1	A	9.1	A	9.3	A	9.4	A	9.4
6	Iranistan Ave at Burnham	A	9.9	B	10.2	B	10.2	A	9.8	A	10	A	10
7	Johnson St at Columbia					A	9.6					A	9.7
8	Johnson St/Cole St at Iranistan Ave					A	9.1					B	11.2

Note: Delay is based on side street movement. Delay values are in seconds per vehicle.

5 CONCLUSIONS

As shown in Table 6 and 7 above, for the 20-year Build Condition (2038 Build Year) the delays and LOS slightly improve over the 2038 Background Conditions. It is anticipated that the proposed Johnson Street extension (two-way; one lane each direction) will not have a negative impact on the surrounding roadway network. It will have capacity to accommodate approximately 1,000 peak hour vehicles. The vehicles that in the Background Condition used Ridge Avenue will use Johnson Street Extension in the Build Condition. Therefore, the proposed Johnson Street extension, and its conversion to a two-way roadway, will not have any negative impacts and will provide for the proposed future developments.

6 BIBLIOGRAPHY

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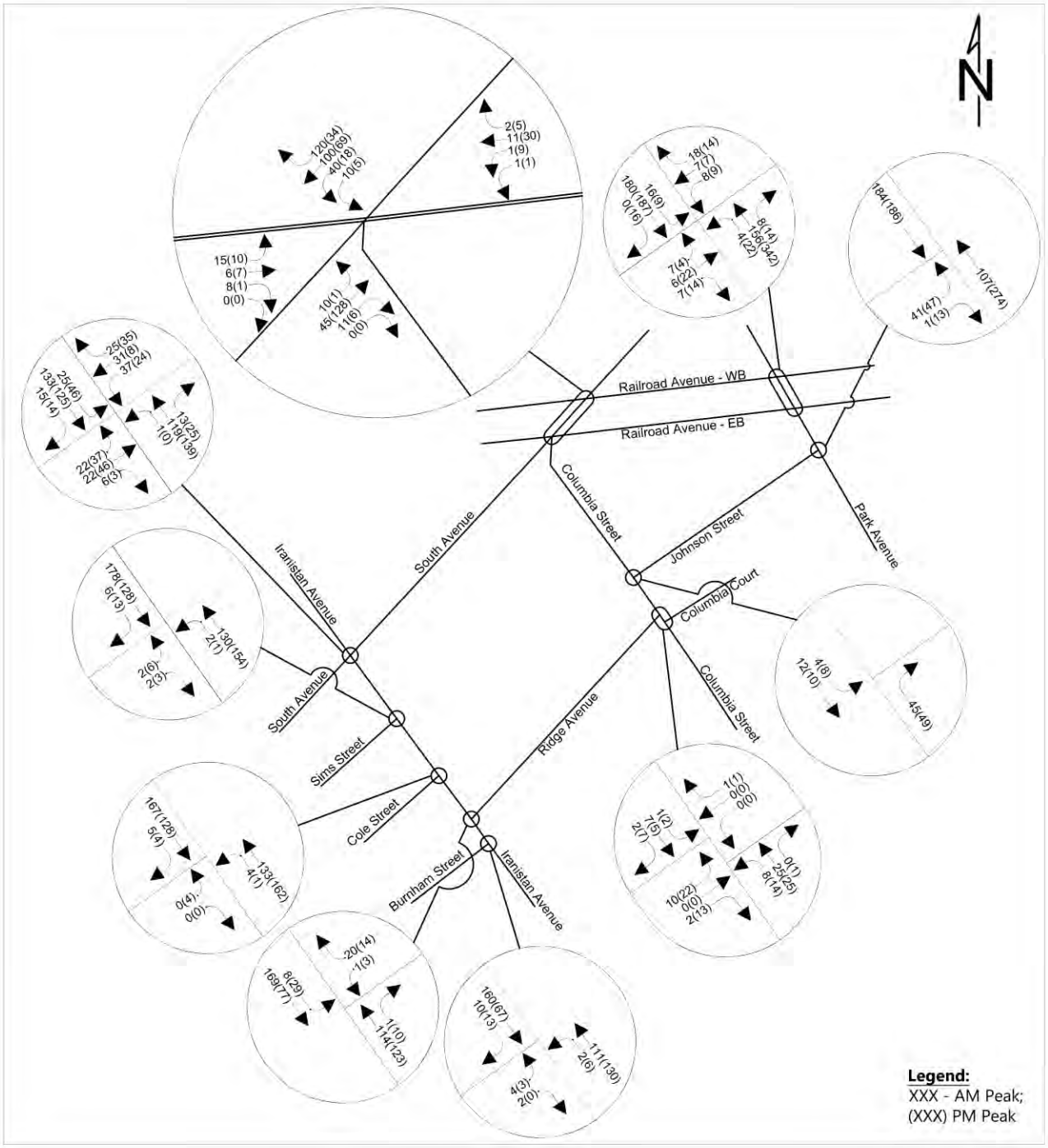


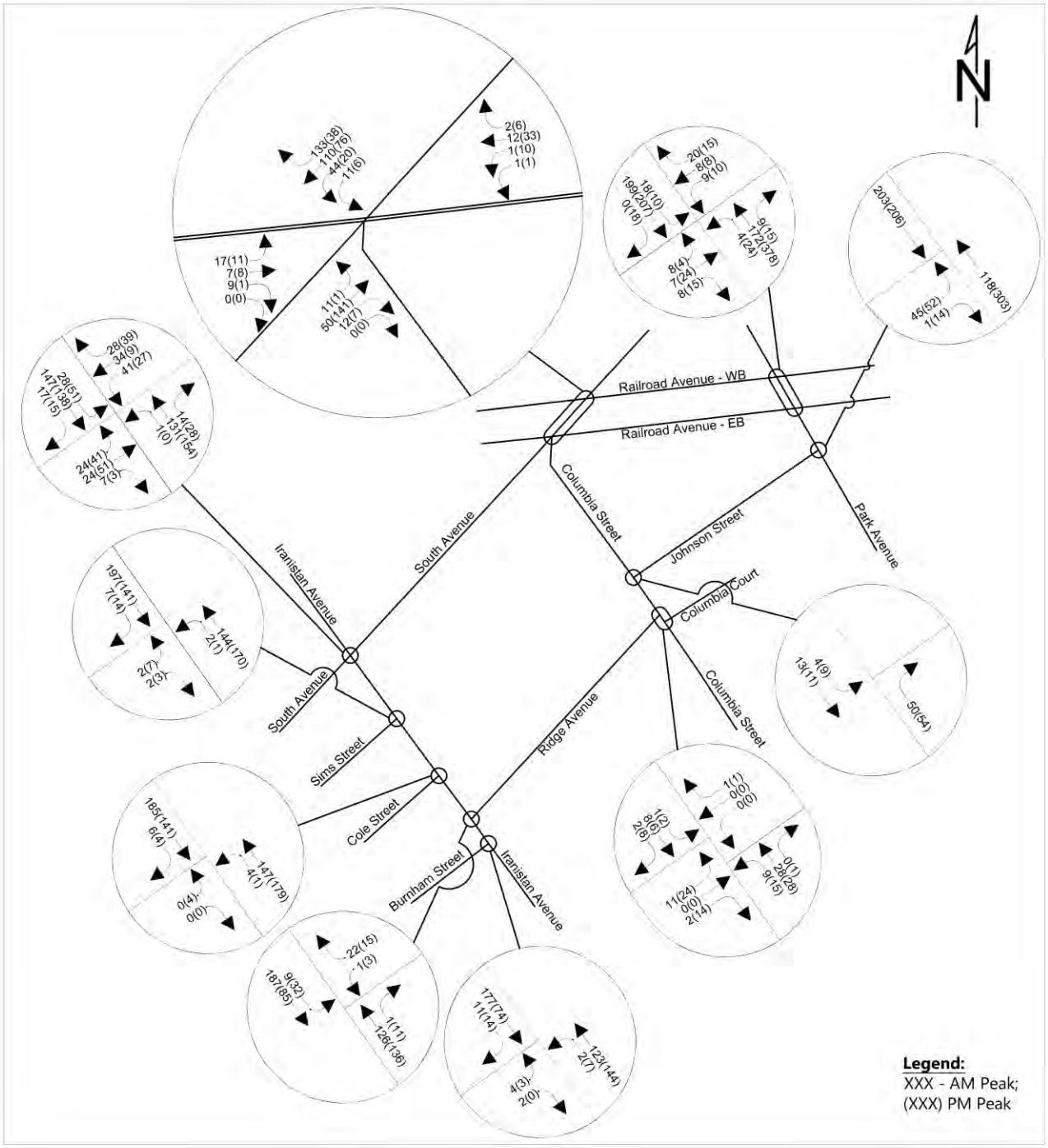
500 Winding Brook Dr.
Glastonbury, CT 06033

3/26/2018

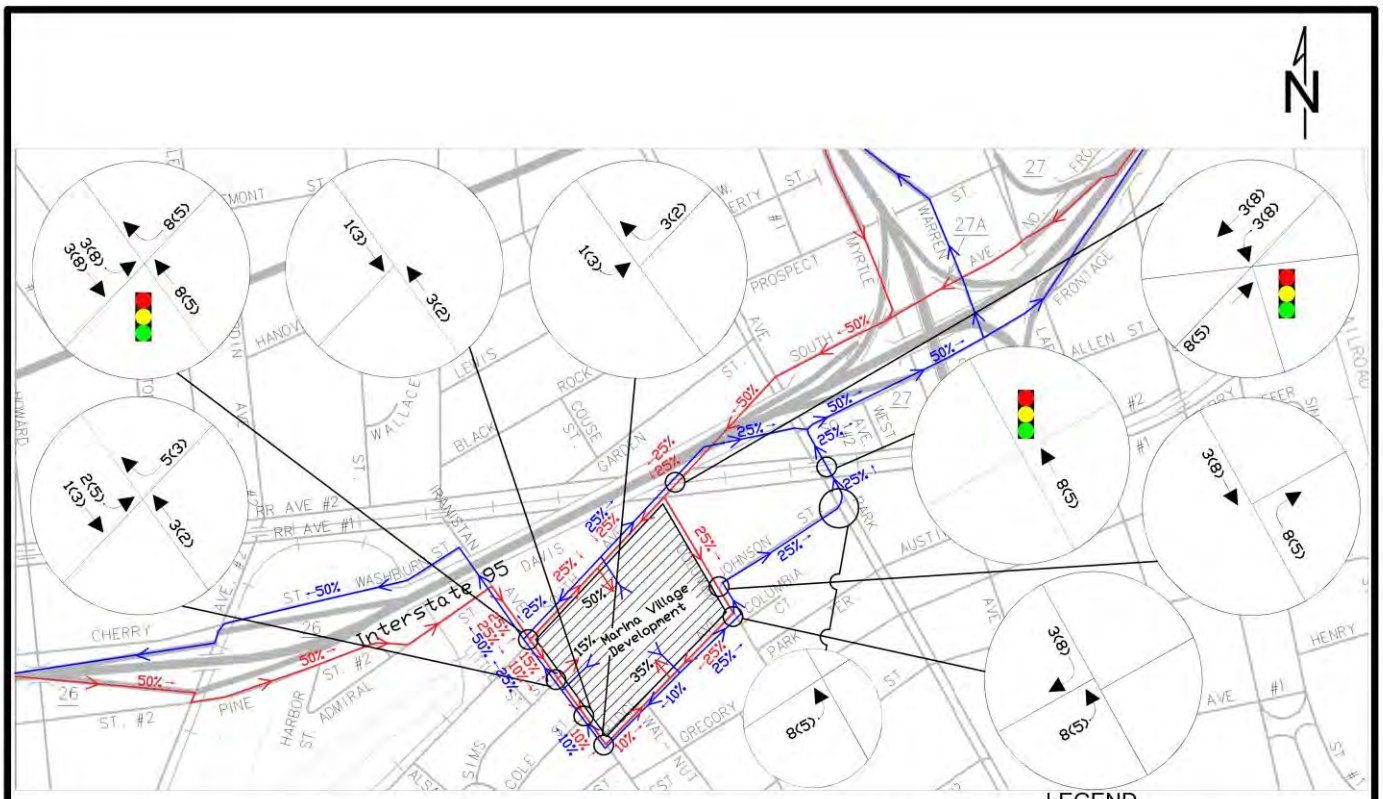
Not to Scale

RBD; Bridgeport, CT

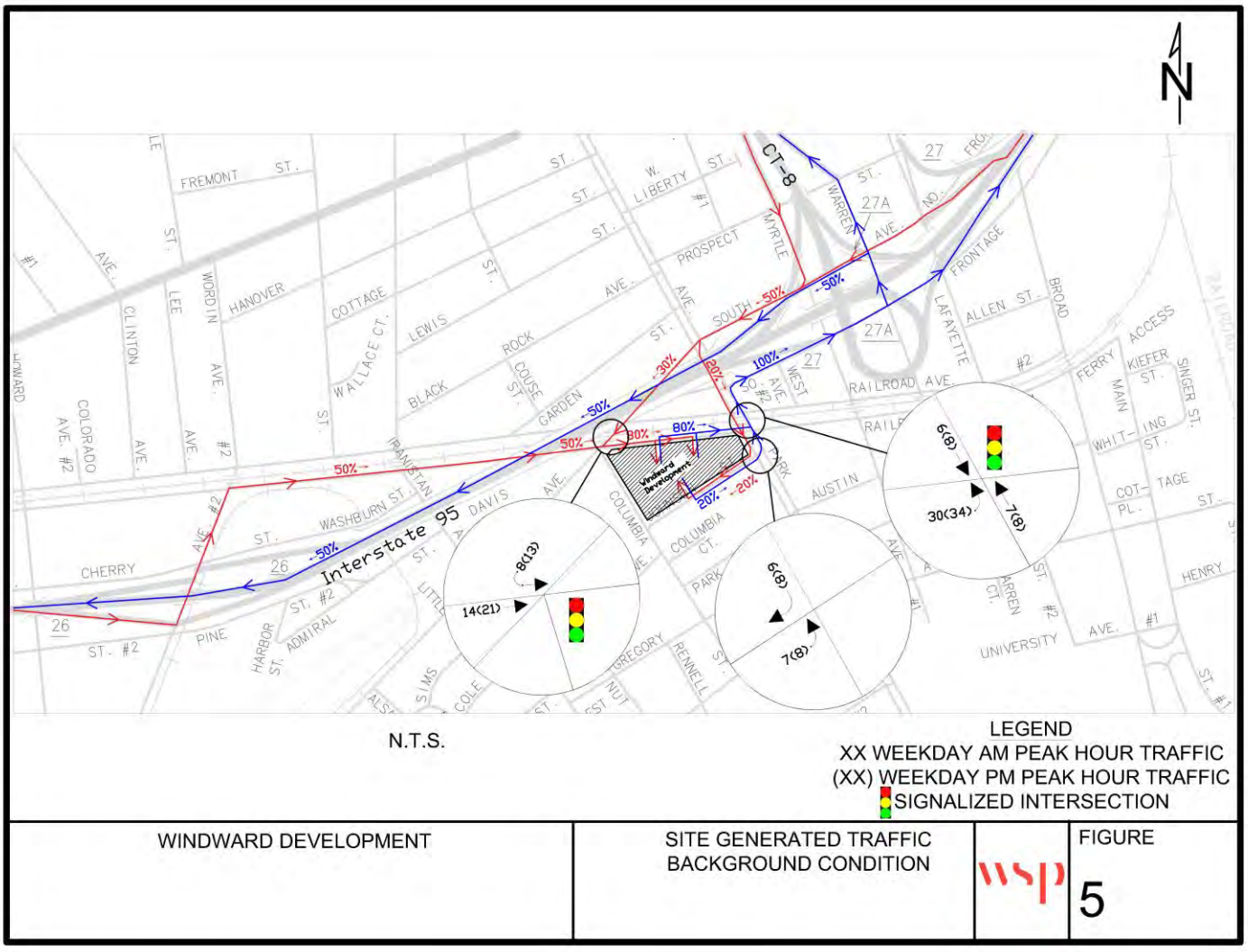
Figure 2
Existing Peak Hour Volumes



500 Winding Brook Dr. Glastonbury, CT 06033	3/26/2018 Not to Scale	**RBD; Bridgeport, CT** **Figure 3** **Future No-Build Peak Hour Volumes** **20 Year, 0.5% Growth/ Year**



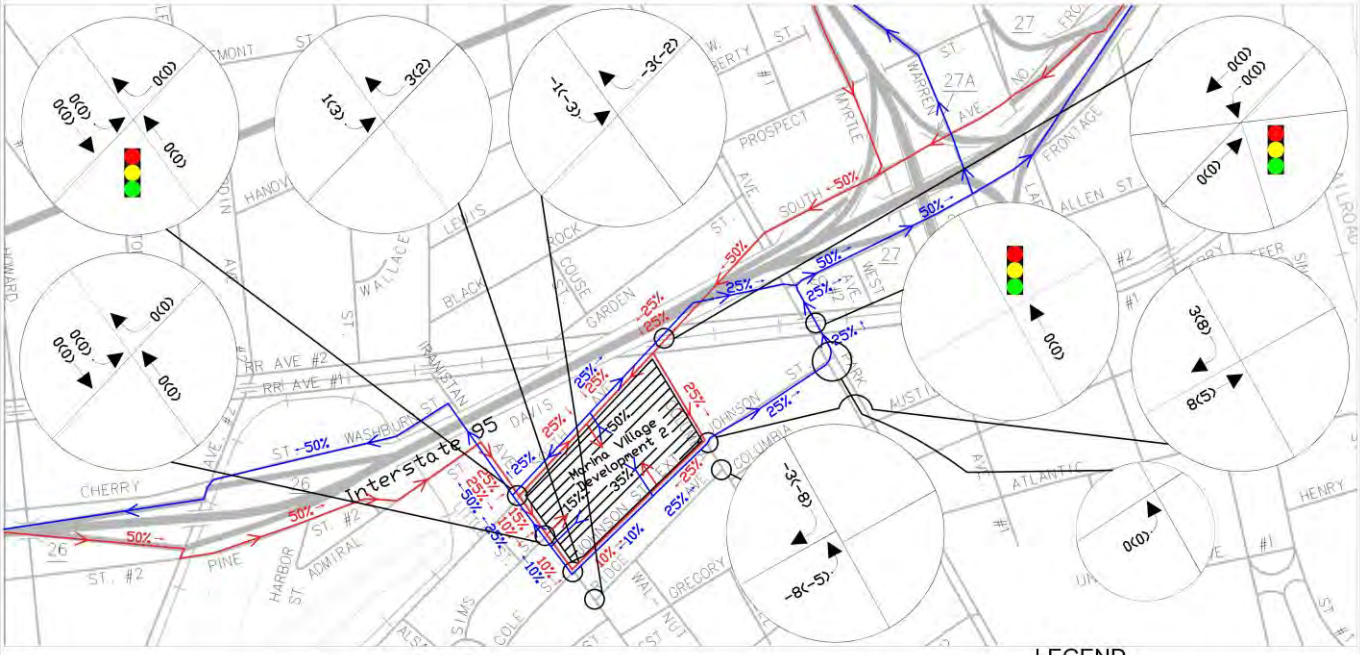
MARINA VILLAGE	SITE GENERATED TRAFFIC BACKGROUND CONDITION		FIGURE 4



N.T.S.

LEGEND
XX WEEKDAY AM PEAK HOUR TRAFFIC
(XX) WEEKDAY PM PEAK HOUR TRAFFIC
SIGNALIZED INTERSECTION

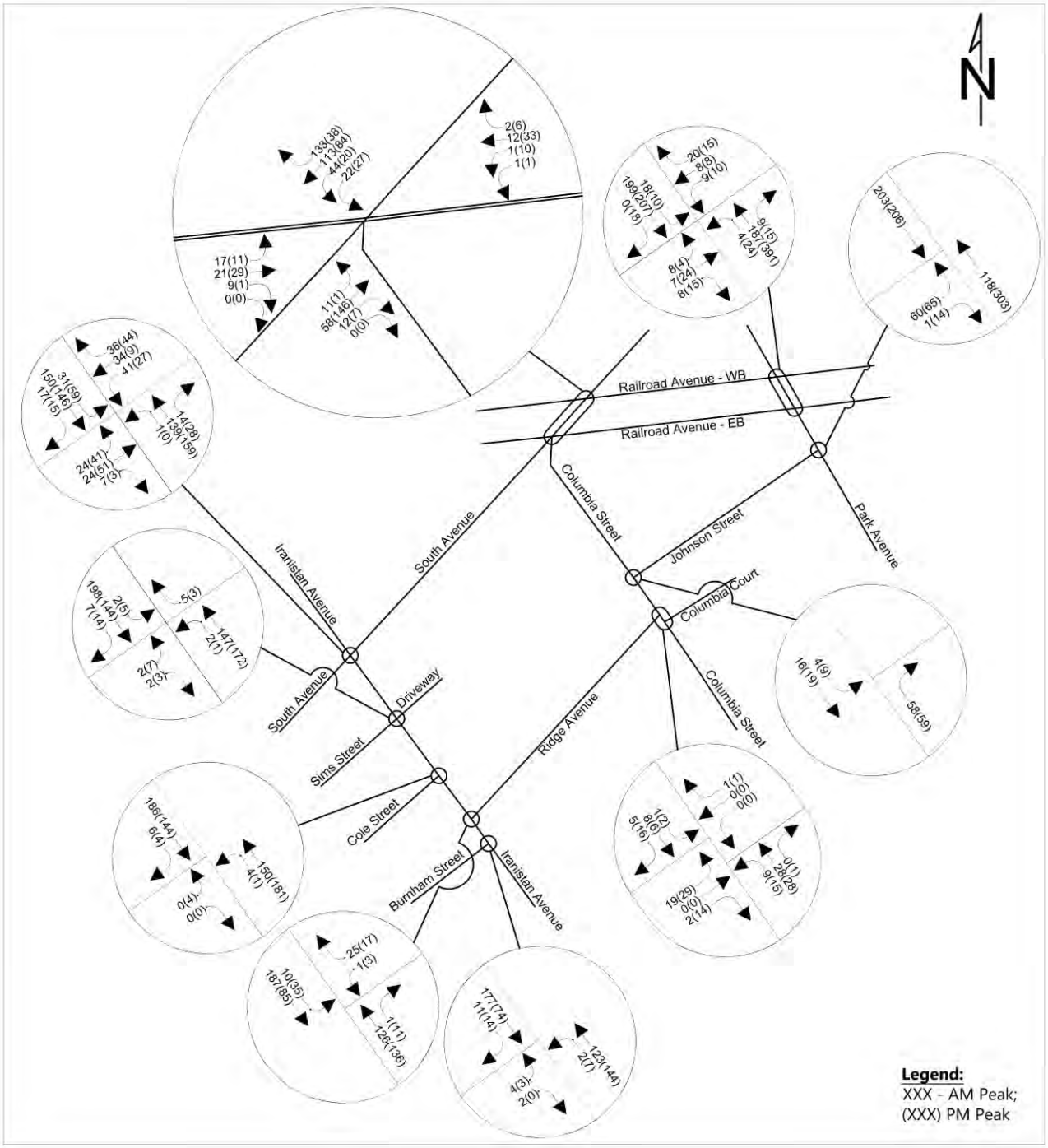
WINDWARD DEVELOPMENT	SITE GENERATED TRAFFIC BACKGROUND CONDITION		FIGURE 5



N.T.S.

LEGEND
XX WEEKDAY AM PEAK HOUR TRAFFIC
(XX) WEEKDAY PM PEAK HOUR TRAFFIC
SIGNALIZED INTERSECTION

MARINA VILLAGE PHASE 2	SITE GENERATED TRAFFIC BUILD CONDITION JOHNSON STREET EXTENSION	wsp	FIGURE 6



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3/26/2018

Not to Scale

RBD; Bridgeport, CT

Figure 7
2038 Background Peak Hour Volumes

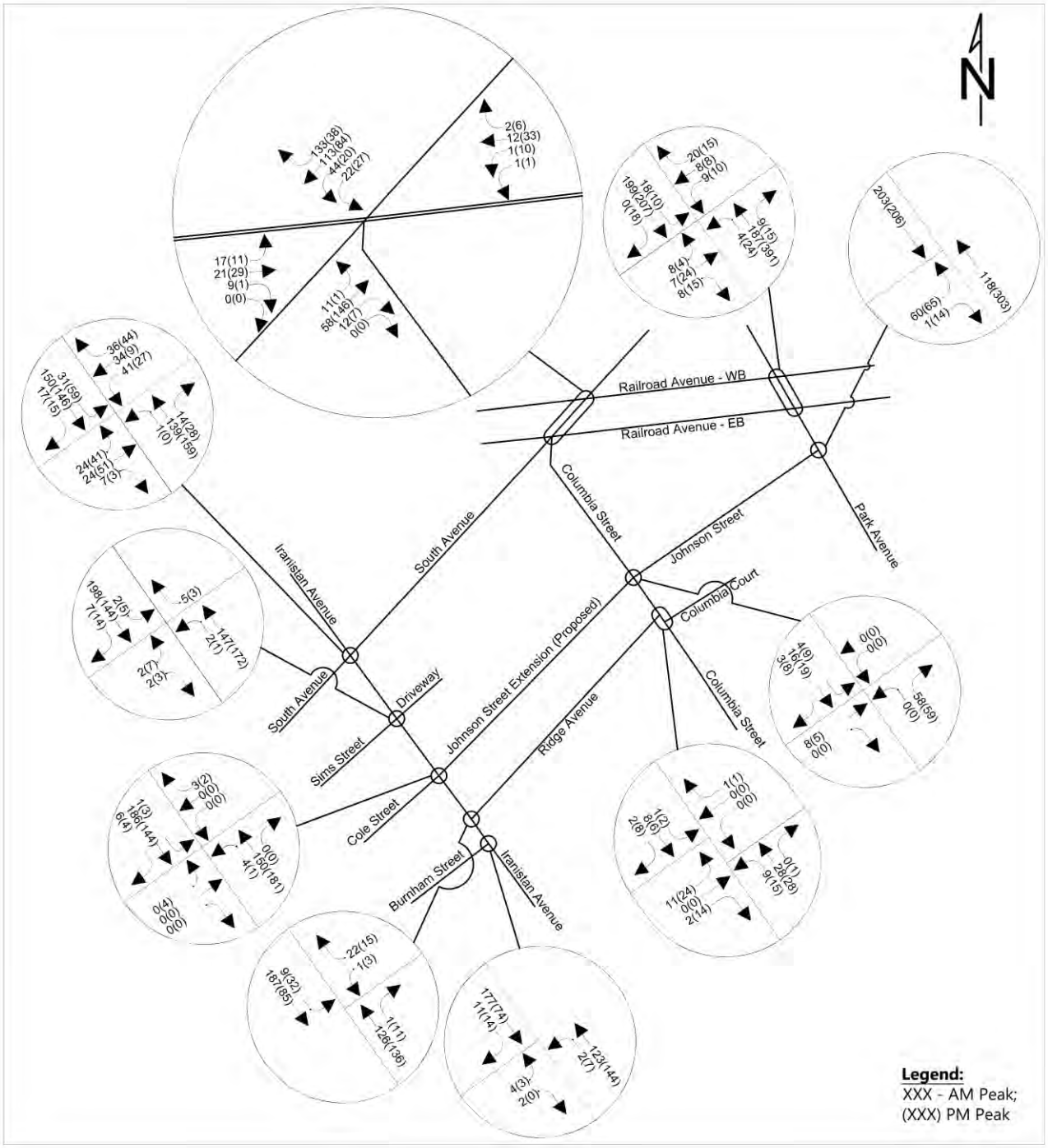

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Figure 8
2038 Build Peak Hour Volumes

Preliminary Traffic Data Collection and Analysis NDR Project

STATE OF CONNECTICUT DEPARTMENT OF HOUSING

RESILIENT BRIDGEPORT NATIONAL DISASTER RESILIENCE

PRELIMINARY TRAFFIC DATA COLLECTION AND ANALYSIS

AUGUST 06, 2018

RESILIENT BRIDGEPORT NATIONAL DISASTER RESILIENCE

PRELIMINARY TRAFFIC DATA COLLECTION AND ANALYSIS

STATE OF CONNECTICUT DEPARTMENT OF HOUSING

PROJECT NO.: 52829
DATE: AUGUST 2018
TYPE OF DOCUMENT (VERSION)
DRAFT

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August 06, 2018

DRAFT

Rebecca French – Director of Resilience
STATE OF CONNECTICUT DEPARTMENT OF HOUSING
505 Hudson St
Hartford, CT 06106

Dear Dr. French:

Subject: Preliminary Traffic Data Collection and Analysis

Please find enclosed our Preliminary Traffic Data Collection and Analysis for the Resilient Bridgeport National Disaster Resilience Competition (NDRC) project. This document forms part of the deliverables under Task 2.6 of our contract scope of services.

If you have any questions, please do not hesitate to contact me at 1.617.960.4964 or Dan.J.Kennedy@wsp.com

Yours sincerely,

Daniel Kennedy
Project Manager

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QUALITY MANAGEMENT

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Remarks	Draft			
Date	August 6, 2018			
Prepared by	Carl Duesler			
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Project number	Daniel Kennedy			
File reference				

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1 TRAFFIC ASSESSMENT

1.1 INTRODUCTION

In response to the extensive damage to communities in Connecticut and throughout the Northeast, the Obama administration created the Superstorm Sandy Rebuilding Task Force, chaired by the U.S. Department of Housing and Urban Development (HUD). As an outgrowth of the task force, in June 2013 HUD launched the Rebuild by Design (RBD) Competition, a multi-stage planning and design competition to promote innovation by developing regionally-scalable but locally-contextual solutions that increase resilience in the region. In June 2014, HUD announced the award of $930 million to seven winning RBD ideas, one of which was Resilient Bridgeport. In September 2014, HUD announced an additional round of funding through the National Disaster Resilience (NDR) Competition, a targeted effort under its Community Development Block Grant (CDBG) Program to broaden federal support for resiliency efforts in Connecticut, New Jersey, New York State, and New York City. Connecticut received approximately $54 million to continue the implementation of Resilient Bridgeport and expand its success to the regional and state scales. Approximately $42 million of the funding was allocated to the CTDOH to oversee design and construction of additional pilot projects in Bridgeport's South End focused on the eastern portion of the neighborhood. The proposed projects are considered a "major federal action significantly affecting the quality of the human environment," therefore, must comply with the requirements of the National Environmental Policy Act (NEPA). CTDOH will prepare the EIS in accordance with the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508) and HUD's NEPA Regulations (24 CFR 58).

The EIS includes both the Resilient Bridgeport NDR and RBD projects. This traffic assessment is developed to support the EIS and includes the NDR project only with RBD analyzed in a separate report. The NDR project includes a combination of measures in the eastern South End of Bridgeport, CT to reduce the flood risk within the project area from current and future coastal surge and chronic rainfall events. The measures would include constructing a coastal defense system (CDS) consisting of raising a portion of University Avenue, installing floodwalls connecting to high ground, and implementing stormwater and internal drainage management strategies (e.g., detention/retention features, drainage structures, and pump systems). The Project Team is currently evaluating alternatives for the location of the CDS, which is expected to include the eastern end of University Avenue, portions of the 60 Main Street Development and north-south corridor located somewhere between Main Street and the western edge of PSEG's property, terminating at the Metro North Rail Line north of Ferry Access Rd as shown in Figure 1.

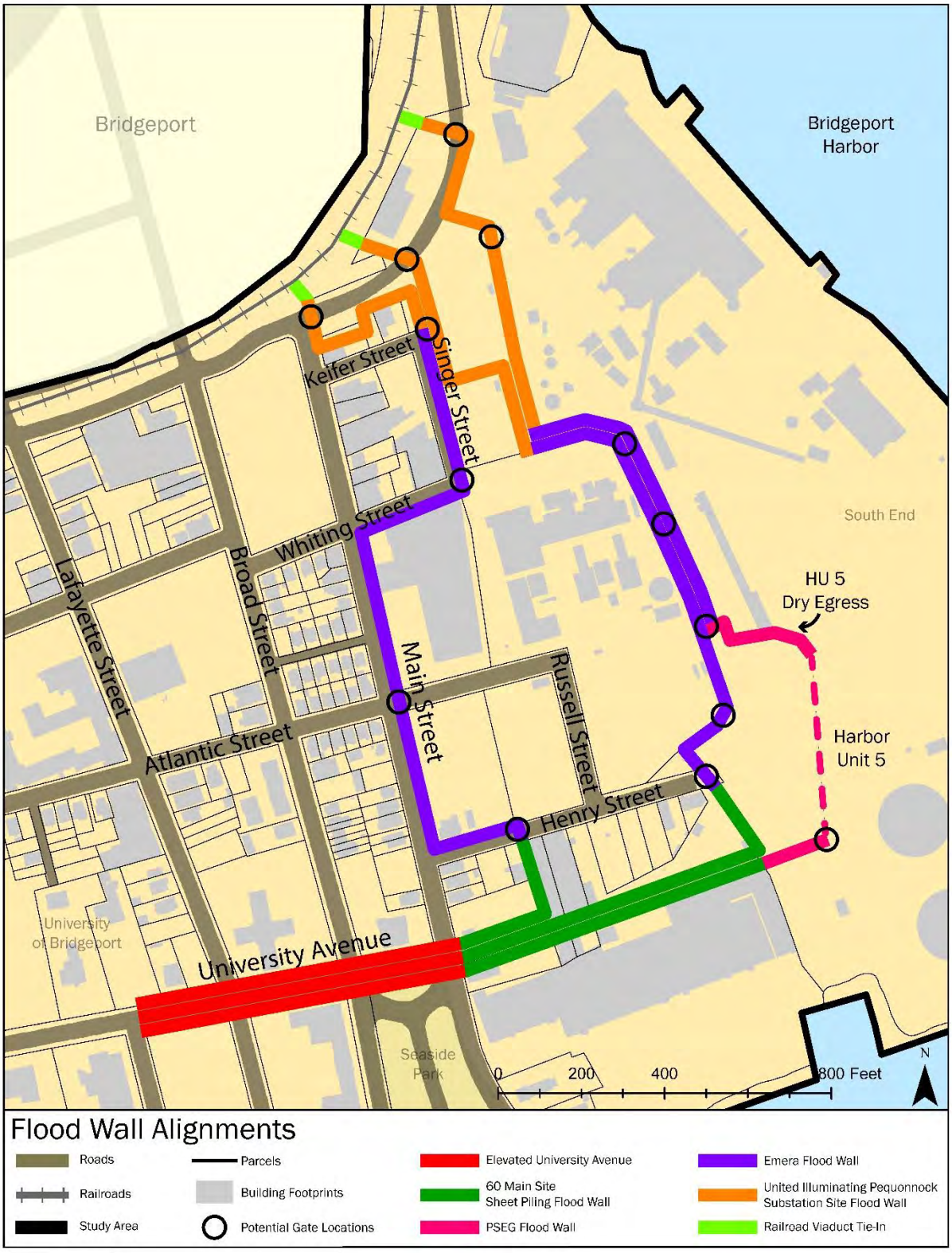

Figure 1 - Preliminary Coastal Defense System Alignments

This traffic study evaluates the transportation impacts for the 2038 Build Year of the proposed NDR Project.

1.2 PROJECT DESCRIPTION

This traffic report evaluates the transportation impacts associated with the modifications to University Avenue (i.e., elevating). University Avenue, within the study area, is a two-way road that runs east-west from Main Street two blocks to Lafayette Street where it meets a parking lot for the University of Bridgeport's (UB) stadium. From here it becomes a pedestrian way until it reaches Park Avenue to the west. All the properties along University Avenue in this area belong to UB. The NDR project considers elevating and closing University Avenue to vehicular traffic between Lafayette Street and Broad Street, elevating and closing Soundview Circle to vehicles, and dead-ending Main Street just north of University Avenue. Access to University Avenue would be from Broad Street. The analysis also assumes a future proposed mixed-use development referred to as 60 Main Street (located east of University Avenue, between Henry Street and the waterfront), although this project is independent of the NDR project. The study analyzes vehicular traffic, parking, pedestrians, bicycle, and transit services in this area that is part of the South End of Bridgeport. Other CDS street crossings shown on Figure 1 will be facilitated with movable gates, scheduled to remain open under normal operating conditions (non-storm events), and are expected to have no impact on traffic.

This traffic assessment includes the collection and compilation of existing roadway and intersection geometry, the number and width of travel lanes, intersection controls, vehicle speed, pedestrian and bicycle facilities, transit, and other relevant transportation information. Additionally, local condition data were compiled for six intersections including: lane configuration, sight lines, turn restrictions, parking restrictions, bus stops, pedestrian controls, and signing. The project study area includes Broad Street from Gregory Street to University Avenue; Lafayette Street from Atlantic Street to University Avenue; and University Avenue from Main Street to Lafayette Street, including Soundview Circle. The study locations are depicted on Figure 2. The study roadways and intersections inventoried are summarized in Table 1 and Table 2, respectively.

Traffic impacts were evaluated in the study area for the following intersections:

1. University Avenue at Lafayette Street
2. University Avenue at Broad Street
3. University Avenue at Main Street (including Soundview Circle at Main Street)
4. Atlantic Street at Lafayette Street
5. Atlantic Street at Broad Street
6. Gregory Street (Bishop JC White Boulevard) at Broad Street (including Whiting Street approach)

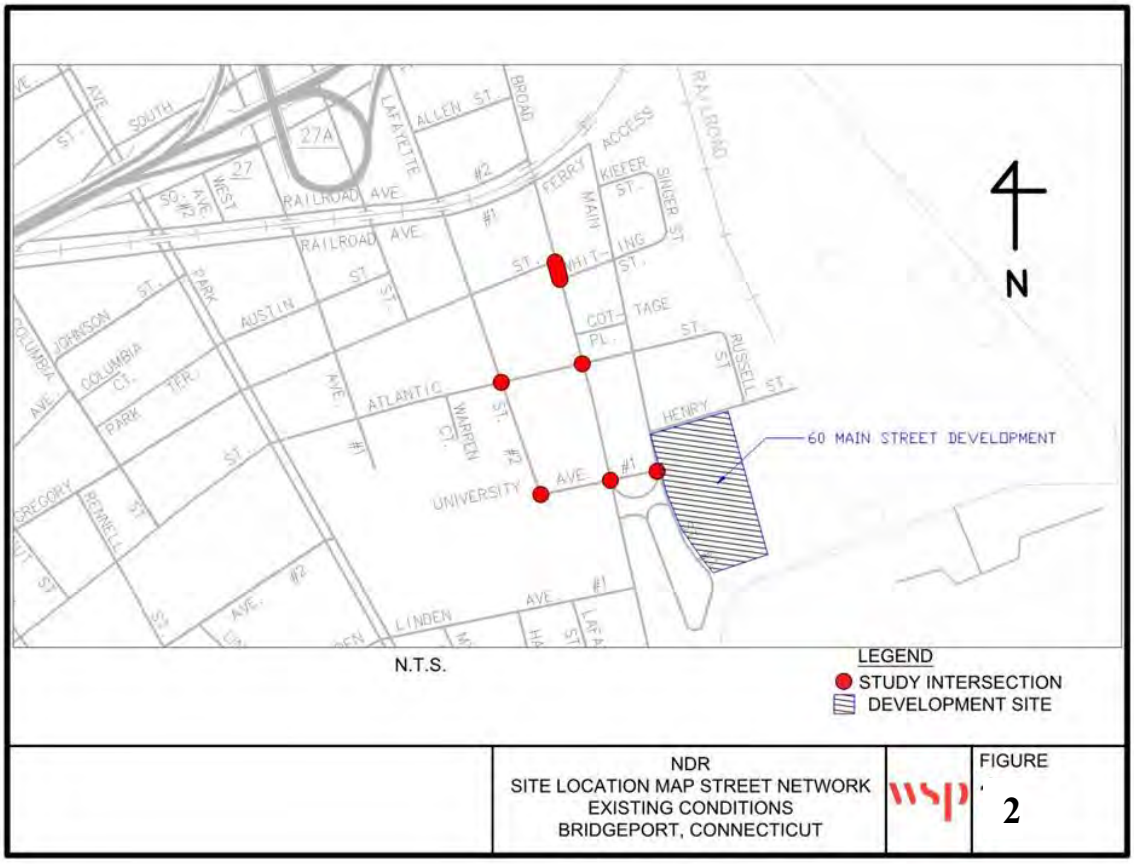

Figure 2 - Study Area Intersections and Roadway Network

Table 1 - Intersection Inventory

Thoroughfare	Orientation	Lanes	On-Street Parking	Flow	Functional Classification	Approximate Width	Posted Limit
Broad Street	NB-SB	2	Yes	2-Way	Collector	30'	25 mph
Lafayette Street	NB-SB	2	Yes	2-Way	Collector	30'	25 mph
Main Street	NB-SB	2	Yes	2-Way	Collector	36'	25 mph
University Avenue (W of Broad)	EB-WB	2	South Side Only	2-Way	Collector	32'	25 mph
Atlantic Street	EB	1	Yes	1-Way	Collector	31'	25 mph
University Avenue (E of Broad)	WB	1	No	1-Way	Collector	32'	25 mph
Gregory Street	WB	2	Yes	1-Way	Local	32'	25 mph
Whiting Street	EB-WB	2	No	2-Way	Local	31'	25 mph

Notes: NB: northbound, EB: eastbound, SB: southbound, and WB: westbound

Table 2 - Roadway Inventory

Intersection	Traffic Control	Crosswalk
University Avenue at Lafayette Street	AWSC	Yes
University Avenue at Broad Street	AWSC	Yes
University Avenue at Main Street (Including Soundview Circle at Main Street)	Free	No
Atlantic Street at Lafayette Street	AWSC	No
Atlantic Street at Broad Street	AWSC	No
Gregory Street (Bishop JC White Boulevard) at Broad Street (including Whiting Street approach)	TWSC	No

Notes: AWSC – All Way Stop Control, TWSC – Two Way Stop Control

1.3 STUDY METHODOLOGY

Traffic operational performance measures were evaluated at the study intersections to determine future traffic impacts associated with the proposed roadway reconfiguration on University Avenue and site development at 60 Main Street. WSP collected daily and peak hour traffic data to support the traffic operations analysis. When available, traffic data inventory from the City, Connecticut Metropolitan Council of Governments (MetroCOG), and Connecticut Department of Transportation (CTDOT) was also gathered. Crash data from the Connecticut Crash Data Repository website, maintained by the University of Connecticut (UCONN), was downloaded, compiled, and analyzed for the most recent three-years. The intersections in the study area were analyzed using the methodology described in the 2000 and 2010 Highway Capacity Manual (HCM), published by the Transportation Research Board and replicated in the Synchro® Version 9 software program. The following is a description of the existing, background and Build conditions:

1.3.1 EXISTING CONDITION (2018)

The existing traffic conditions were determined based on turning movement counts collected in December 2017 (see Appendix A) together with the traffic and roadway data gathered at the six study area intersections. This information was inputted into the Synchro model to determine the existing traffic operations.

1.3.2 BACKGROUND CONDITION (2038)

A background traffic growth rate of 0.5 percent per year for 20 years was used to develop the Background traffic volumes. The growth rate was referenced from CTDOT's Bureau of Policy and Planning (October 31, 2017).

1.3.3 BUILD CONDITION (2038)

The 2038 Build Condition was developed using the background traffic volumes and including traffic generated by the proposed 60 Main Street development. It was assumed no additional traffic would generated by the NDR project itself. The Build volumes were then distributed into the proposed roadway network and inputted into the Synchro model to determine the Build traffic operations.

A review and comparison of the Level of Service (LOS) and delays for the Existing, Background and Build conditions was then performed to identify impacts and any mitigation measures to improve traffic operations. Lastly, a conclusion was developed for this study based on the proposed roadway circulation changes and traffic analysis.

2 EXISTING CONDITIONS

2.1 EXISTING TRAFFIC VOLUMES

Intersection turning movement volume, pedestrian, and vehicle classification count data were recorded on December 7, 2017 from 7:00 AM to 9:00 AM (AM Peak Period) and from 4:00 PM to 6:00 PM (PM Peak Period). The count data was performed at the intersections of University Avenue at Lafayette Street, University Avenue at Broad Street, University Avenue at Main Street (including Soundview Circle at Main Street), Atlantic Street at Lafayette Street, Atlantic Street at Broad Street, and Gregory Street (Bishop JC White Boulevard) at Broad Street (including Whiting Street approach). Heavy Vehicle Percentages and Peak Hour Factors (PHFs) were also recorded and calculated at each intersection. The data is included in this report in Appendix A. These volumes and parameters were input into the existing conditions Synchro™ software model (Version 9). The morning and evening peak hour traffic volumes are summarized and illustrated on Figure 3.

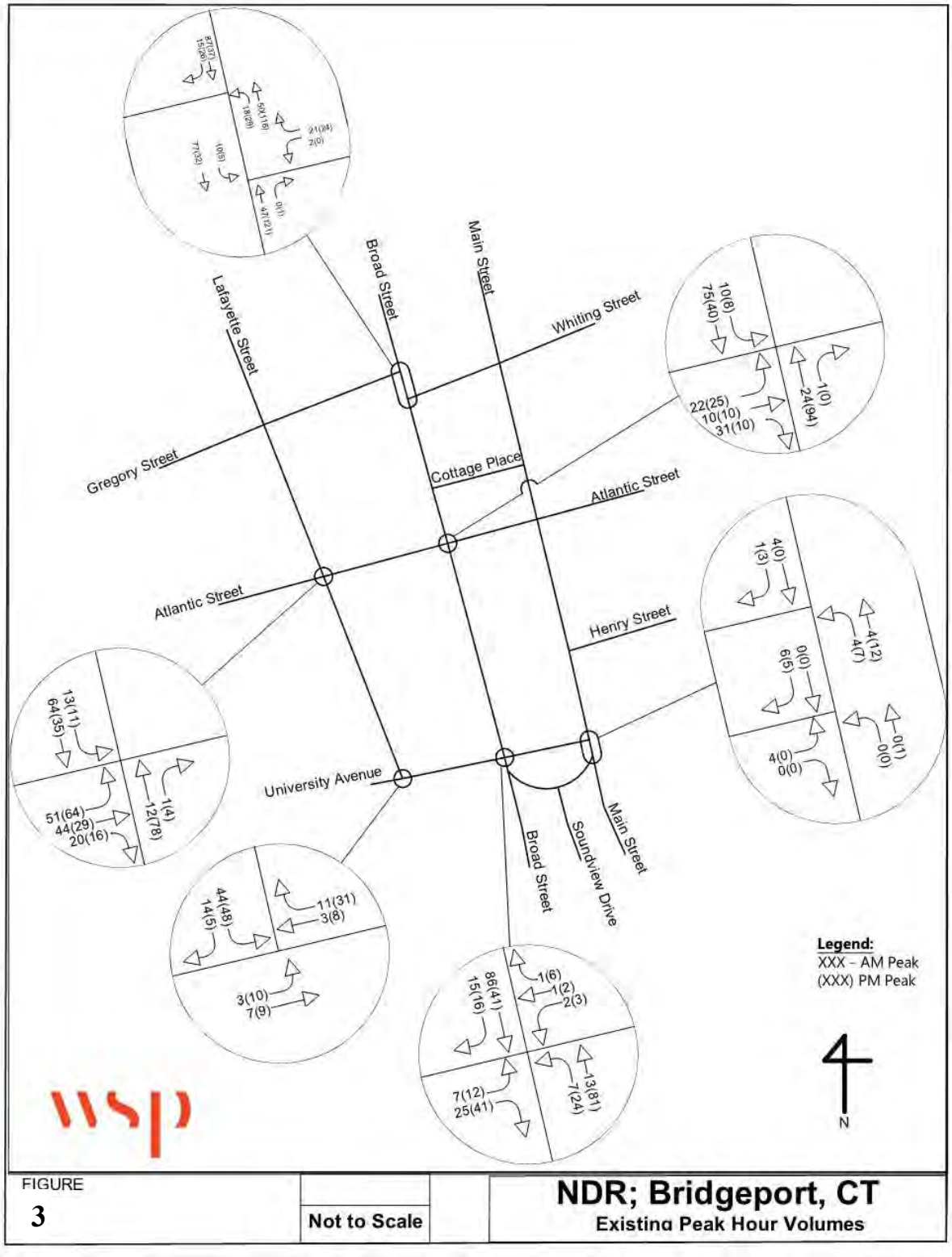

Figure 3 - Existing Conditions - AM and PM Peak Hour Volumes

2.2 TRANSIT

Greater Bridgeport Transit (GBT) provides local, regional and express bus service throughout the Bridgeport region with routes extending from Milford to Norwalk and from Bridgeport to the Naugatuck Valley[1]. Within the study area, Bus Route 1 provides a major stop (Stop 1) on Broad Street at University Avenue. This bus line makes 35 stops per day to this location, eastbound towards Stratford, and 36 stops per day westbound from Stratford. This bus line does not make stops on Saturday or Sunday.

2.3 PEDESTRIAN AND BICYCLE FACILITIES

The University of Bridgeport is located within the study area bringing increased pedestrian activity to the adjacent roadways. All study intersections are stop controlled. Sidewalks and handicap ramps exist with painted crosswalks. There currently are no bike lanes or markings on the roads in the study area. There are no pedestrian signals for crossing in the project area.

2.4 CRASH ANALYSIS

Analysis of the most recent three-year (January, 2015 to December, 2017) crash data was performed for all intersections within the project limit. The crash data from the UCONN Connecticut Crash Data Repository was compiled. UCONN publishes Crash Data from the MMUCC or the 'Model Minimum Uniform Crash Criteria' Standard.

Table 3 lists the intersections within the project limits with at least one crash in the most recent available three-year period. The full crash data set is included in this report. A total of four crashes have been recorded in the study area over the three-year period from January, 2015 to December, 2017. The crash analysis indicated that there are fewer than five crashes of a type within the past 12-month period susceptible to correction by a traffic control signal, or merit further investigation.

Table 3 - Three-Year Crash Data

Intersection Name	Total Number of Crashes	Crash Type	Maximum Crash Severity
University Avenue at Lafayette Street	1	Angle*	Property Damage
Broad Street at University Avenue	1	*Unknown*	Possible Injury
Main Street at University Avenue	*0*	*n/a*	*n/a*
Lafayette Street at Atlantic Street	*0*	*n/a*	*n/a*
Broad Street at Atlantic Street	1	Angle	Possible Injury
Gregory Street (Bishop JC White Boulevard) at Broad Street	*0*	*n/a*	*n/a*
Soundview Circle at Main Street	*0*	*n/a*	*n/a*
Broad Street at Whiting Street	1	*Unknown*	Property Damage

*Angle– A crash where two motor vehicles impact at an angle (UCONN Connecticut Crash Data).

[1] http://www.gogbt.com/

3 FUTURE CONDITIONS

3.1 BACKGROUND TRAFFIC GROWTH AND FUTURE NO-BUILD CONDITION

The CTDOT's Bureau of Policy and Planning was contacted on October 31, 2017 to determine the future growth. Their regional forecasting travel model shows very little growth in the study area and a rate of 0.2 – 0.5 percent growth per year was recommended. These rates do not include any future developments that may occur. To be conservative, this study used the high end, 0.5 percent annual growth rate over 20 years. This resulted in approximately ten (10) percent growth rate over the 20 years to arrive at the 2038 Future No-Build traffic volumes that are provided on Figure 4.

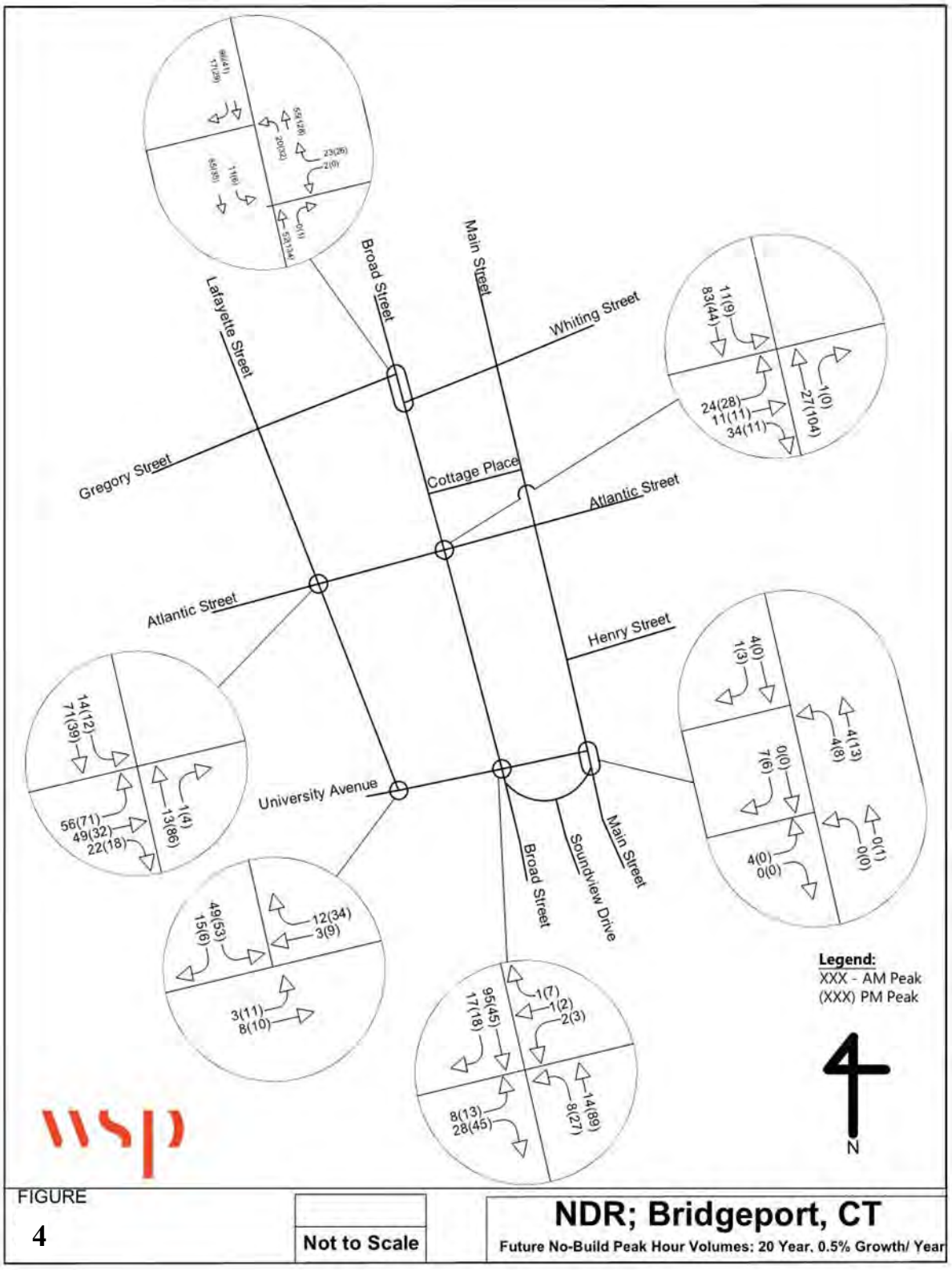

Figure 4 - Future No-Build Conditions - AM and PM Peak Hour Volumes

3.2 FUTURE BUILD CONDITION

The 2038 Build Condition was developed using the background traffic volume including traffic generated by the proposed 60 Main Street development. The volume was then distributed on the proposed roadway network that includes elevating and closing University Avenue between Lafayette Street and Broad Street, closing Soundview Circle to vehicles, and dead-ending Main Street just north of University Avenue. Figure 5 depicts the proposed roadway network and Figure 6 exhibits future build traffic volume for AM and PM peak periods. The volumes were inputted into the Synchro model to determine the 2038 Build traffic operations.

3.3 60 MAIN STREET MIX-USE DEVELOPMENT SITE-GENERATED TRAFFIC

The following traffic generation was calculated using the *Trip Generation Manual, 10th Edition, Volume 2: Data (2017).* The proposed 60 Main Street development is assumed to consist of two buildings, consisting of a shopping center (Trip Generation Manual Section 820) and mid-rise apartment buildings (Trip Generation Manual Section 221). One of the two apartment buildings would have 177 apartment units and the other building would have 45 apartment units and 12,000 square feet of retail. Table 4 presents the trip generation for the proposed uses and summarizes entering and exit trips for the peak hour of the adjacent street for both the AM and PM peak hour.

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Table 4 - Trip Generation - 60 Main Street Development - Morning and Evening Peak Hour of Traffic

TRIP GENERATION CALCULATIONS **Morning Peak Hour of Traffic**				
LAND USE	**AREA/UNIT**	**ENTER**	**EXIT**	**TOTAL**
Retail Shopping Center – Land Use Code 820	12,000 sq. ft.	98	60	158
Residential Mid-Rise Apartments – Land Use Code 221	45 units	4	11	15
Residential Mid-Rise Apartments – Land Use Code 221	177 units	16	44	60
INCREASE IN TRAFFIC (Veh./hr.)		**118**	**115**	**233**
TRIP GENERATION CALCULATIONS **Evening Peak Hour of Traffic**				
LAND USE	**AREA/UNIT**	**ENTER**	**EXIT**	**TOTAL**
Retail Shopping Center – Land Use Code 820	12,000 sq. ft.	54	59	113
Residential Mid-Rise Apartments – Land Use Code 221	45 units	13	8	21
Residential Mid-Rise Apartments – Land Use Code 221	177 units	47	30	77
INCREASE IN TRAFFIC (Veh./hr.)		**114**	**97**	**211**

The following proposed roadway network was assumed in the development of the future conditions traffic analysis:

- University Avenue will be closed between Lafayette Street and Broad Street;
- Soundview Circle will be closed to vehicles;
- University Avenue between Broad Street and Main Street will be modified to be two-way (it is currently only westbound);
- Main Street will be dead-ended just north of University Avenue. Access to Main Street south of University Avenue will be accessible from University Avenue and Main Street north of University Avenue will be not be accessible from University Avenue;
- Lafayette Street will retain access to the parking lot north of the University of Bridgeport soccer field;
- Main Street, just north of the intersection with Soundview Drive, will have an access point to 60 Main Street. Heading Northbound, it will be right-turn-only into the 60 Main Street development. Heading southbound on Main Street, it will be a left-through. Drivers exiting the development will have a right turn only, heading north;
- Between the intersection described in #6 and the intersection with University Avenue, there will be an access point to 60 Main Street. It will be a two-way, stop controlled entrance/exit;

- The intersection of Main Street and University Avenue will be an access point to the 60 Main Street development. It will be a two-way, stop controlled entrance/exit;
- North of the intersection of Main Street at University Avenue, there will be an access point to 60 Main Street on Main Street. As described in #4, this entrance will not be accessible from University Avenue; and
- On the south side of Henry Street (a one-way eastbound roadway with access to Main Street) there will be a one-way inlet to 60 Main Street, Broad Street at University Avenue will have stop control on the westbound approach, and Main Street at University Avenue will have stop control on the eastbound and westbound approach.

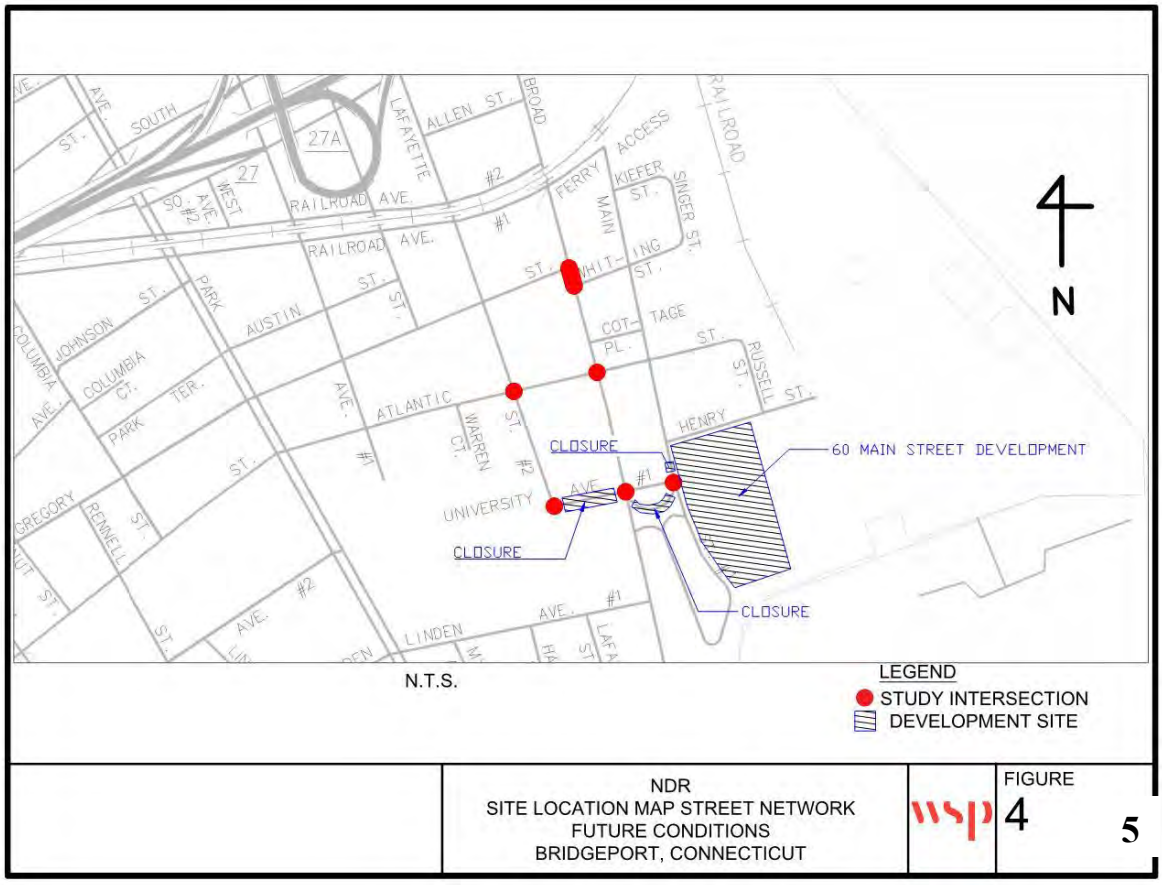

Figure 5 - Proposed Roadway Network - Build Future Condition

The following traffic assumptions were made in the development of the future conditions roadway volume network model:

- Figure 5 depicts the future condition traffic volume for AM and PM hours:
- Entering and exiting traffic will be evenly distributed through the network on Lafayette Street, Broad Street, and Main Street per existing proportionality;
- Entering traffic to 60 Main Street will be evenly distributed to all entrances to the development;
- Exiting traffic from 60 Main Street will be evenly distributed from all exits of the development;
- All impacted traffic due to the closure of Main Street north of University Avenue will be rerouted to Broad Street; and

- All impacted traffic due to the closure of University Avenue between Broad Street and Lafayette Street will be rerouted to Broad Street.
- Build Traffic Volumes distribution and assignment were calculated, and are included in this report.

3.4 FUTURE TRANSIT

GBT's Bus Route 1, that passes through the study area, will not be affected by the planned closing of roadways described above. Bus Route 1 will be able to maintain its route down Broad Street to Waldemere Avenue and up Park Avenue.

3.5 PEDESTRIAN AND BICYCLE FACILITIES

The University of Bridgeport's Campus Master Plan, Spring 2017, was reviewed. The vision for the campus shows a promenade running the length of University Avenue. A pedestrian way is also planned for Myrtle Avenue, a half block north and south of its intersection with University Avenue. The master plan states that an effort will be made to seamlessly connect campus with the downtown and the waterfront.

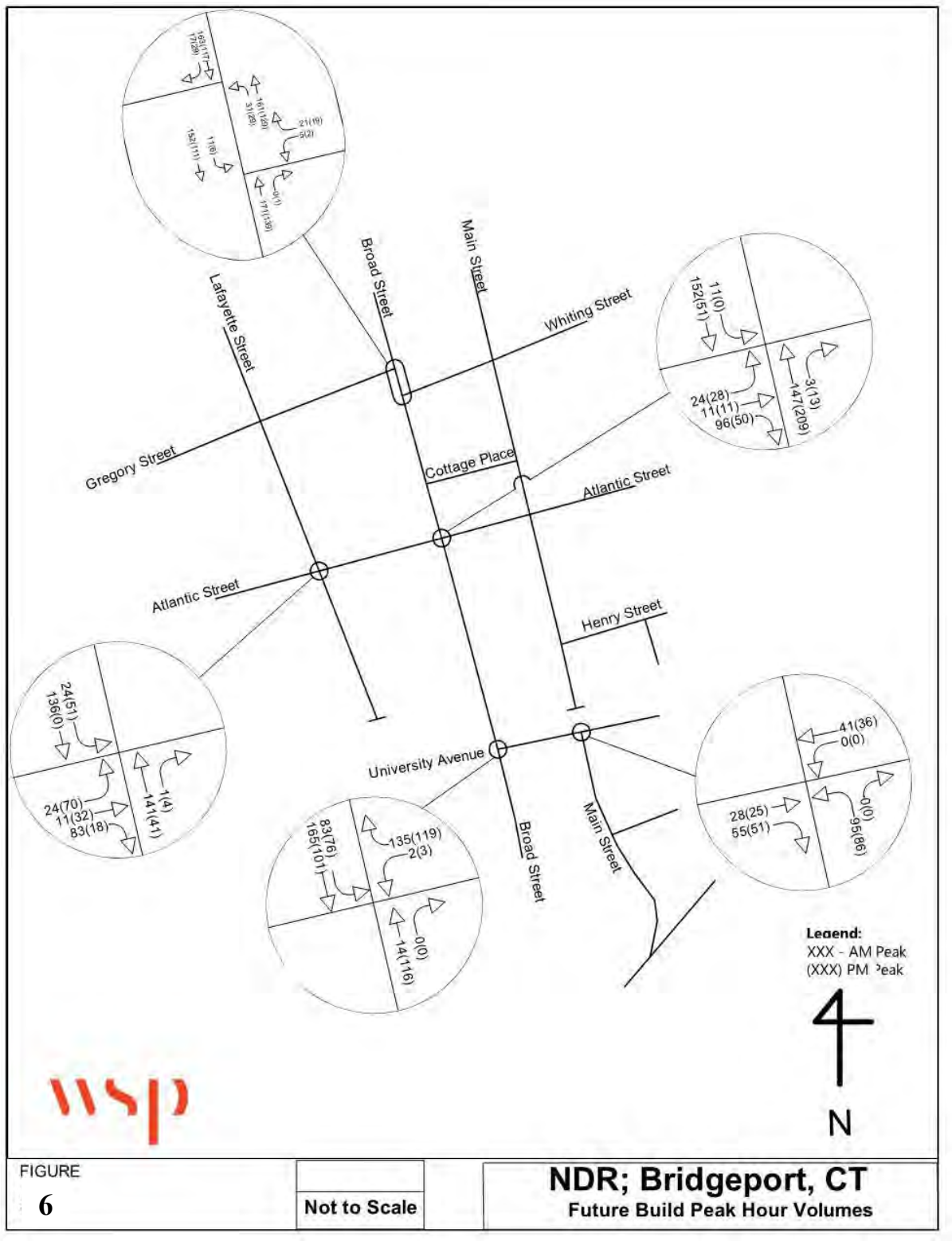

Figure 6 - Build Future Condition Roadway Volume Network

4 TRAFFIC OPERATIONS

To ascertain this project's impacts on the area roadway network, an analysis of the key intersections in the study area was performed. The existing, background and Build AM and PM peak hour operating conditions were determined using the Synchro® Version 9 software program that closely replicates the 2000 and 2010 HCM.

LOS is a calculation of control delay for an intersection and an indication of driver discomfort, frustration, fuel consumption, and lost time. LOS is defined by a grading system similar to that in a school with A (free flow) being the best and F (breakdown in flow) being the worst.

Signalized intersection analysis is based upon the capacity of each lane group and the correlating control delay associated with the intersection. Capacity is a measurement of the ability of an intersection design to accommodate all movements within the intersection. Delay is the measure of the user quality of service. Capacity is a function of physical geometry and signalization conditions.

For unsignalized intersections, delay values apply only to the controlled movements, since the main street movements are not restricted. Control delay is the elapsed time for deceleration, queue time, stopped delay, and final acceleration. For Two-Way Stop Controlled (TWSC) intersections, the LOS is characterized by the LOS of the movement with the greatest delay. This is typically the left turn movement from the minor approach to the intersection. If the intersection operates at LOS F, a traffic signal warrant analysis may be performed to justify installation of a signal. The minimum criteria as set forth in the U.S. Department of Transportation, Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD) must be met before the installation of a traffic control signal. It should be noted that none of the unsignalized intersections in the study area have a LOS F or warrant a traffic control signal.

Table 5 below summarizes the results of the analysis conducted as part of this study. All intersections operate at LOS B or better in the existing, background, and Build scenarios. In the Build condition, the delays increased at the intersection of Main Street and University Avenue with the closure of Soundview Circle. The Level of Service increased from LOS "A" to LOS "B" (delay increased to approximately 11 seconds per vehicle in the AM and PM Peak Hours). Synchro Reports are included in this report.

Table 5 - Traffic Operations Analysis

	Intersection	AM Peak Hour						PM Peak Hour					
		Existing Condition		20-Year No-Build Condition		20-Year Build Condition		Existing Condition		20-Year No-Build Condition		20-Year Build Condition	
		LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
1	University Ave at Lafayette St	A	7.3	A	7.3			A	7.5	A	7.5		
2	Broad St at University Ave	A	7.5	A	7.6	A	9	A	7.8	A	7.9	A	9.6
3	Main St at University Ave	A	0.0	A	0.0	B	11	A	0.0	A	0.0	B	10.7
4	Lafayette St at Atlantic St	A	7.8	A	7.9	A	8.4	A	8.0	A	8.1	A	8.0
5	Broad St at Atlantic St	A	7.6	A	7.6	A	8.7	A	7.6	A	7.7	A	9.0
6	Gregory St at Broad St	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow	Free Flow

Notes: All delays in seconds/ vehicle for highest delay of all approaches; LOS: Level of Service

4.1 CONCLUSION

Based on the traffic analysis as described above, site access and circulation would be at a satisfactory level of service in the Build Condition. All movements would operate at LOS B or better during peak periods. Thus, following the elevation of University Avenue and rerouting of traffic to the proposed roadway network, traffic operating conditions at study intersections in the 2038 Build Condition would remain at a satisfactory level during peak periods.

APPENDIX

A SYNCHRO REPORTS AND TURNING MOVEMENT COUNTS

APPENDIX

A-1 SYNCHRO REPORTS: AM PEAK HOUR EXISTING CONDITION

A-2 SYNCHRO REPORTS:
PM PEAK HOUR
EXISTING CONDITION

APPENDIX

A-3 SYNCHRO REPORTS: AM PEAK HOUR 2038 BACKGROUND CONDITION

A-4 SYNCHRO REPORTS: PM PEAK HOUR 2038 BACKGROUND CONDITION

APPENDIX

A-5 SYNCHRO REPORTS: AM PEAK HOUR 2038 BUILD CONDITION

A-6 SYNCHRO REPORTS: PM PEAK HOUR 2038 BUILD CONDITION

APPENDIX

A-7 TURNING MOVEMENT COUNTS