APPENDIX A: Worcester Road Sewer Pump Station-Hazardous Materials Survey

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Hazardous Materials Survey

Worcester Road Pump Station
City of Framingham, Massachusetts
July 1, 2022

Previous Reports

BETA reviewed the following previous reports for the Site:

- March 14, 2019: "Review and Assessment of Environmental Reports and Site Data"
- December 14, 2018 "Limited Hazardous Building Materials Survey Summary Report" by AECOM
- May 30, 2013 "Hazardous Materials Inspection Report" by Nobis Engineering, Inc. (Nobis)

The following sections of this memorandum include information from these reports, which are attached in Appendix A.

MassDEP Documentation

BETA reviewed the Massachusetts Department of Environmental Protection (MassDEP) database for known releases proximate to 730 Worcester Road in the City of Framingham, Massachusetts. Based on the information available on the MassDEP web site a release exceeding RCS-1 was identified in soil at the project site. C-19-C-36 aliphatics (6,800 mg/kg), C11-C22 Aromatics (1,600 mg/kg), 2-Methylnaphthalene (1.5 mg/kg), and lead (260 mg/kg) were identified in soil at the site. A release tracking number of 3-33648 was assigned to the site. Additional documentation associated with the release, beyond what is provided in this memo, can be found on the MassDEP website.

Site Inspection

On April 17, 2021, BETA Group, Inc. (BETA) and Smith & Wessel Associates, Inc. (SWA) conducted an inspection of the interior and exterior of the pump station building on Worcester Road in Framingham, Massachusetts (the Site). SWA inspected the building for the presence of asbestos-containing building materials and lead-based paint while BETA inspected the building for the presence of containers of and equipment that may contain hazardous materials. The purpose of these inspections was to identify items which may require special handling and/or disposal during planned work at the Site.

Asbestos-Containing Building Materials (ACBM)

The purpose of SWA's ACBM inspection was to supplement the previous work by Nobis and AECOM and to evaluate the types, locations, and extent of suspect ACBM in the Site. SWA's inspection addressed both friable materials (materials that can be easily crushed, crumbled, or pulverized by hand pressure) and non-friable suspect materials. On April 17, 2021, SWA identified and collected samples of several suspect materials at the Site including black wall/foundation vapor barrier, black roof tar flashings and felts, gray floor/wall seam sealer, and white/gray gasket material. SWA submitted a total of seven samples from these materials to EMSL Analytical, Inc. of Woburn, Massachusetts. Of these materials, black wall/foundation vapor barrier and the black roof tar flashings and felts were found to contain greater than 1% asbestos. SWA identified 120 square feet of black wall/foundation vapor barrier and 825 square feet of black roof tar flashings and felts. Refer to SWA's Inspection Report in Appendix B for more information regarding their inspection and results.

Previously, Nobis identified gray window glazing compound and associated caulking in six windows and vent caulking in two louver vents as asbestos-containing. Refer to Nobis' report in Appendix A.

Lead-Based Paint (LBP)

The purpose of SWA's LBP inspection was to evaluate the types, locations, and extent of suspect LBP throughout the Site building, to evaluate potential hazards associated with LBP, and to provide appropriate recommendations for its handling associated with demolition work. SWA used the United States Department of Housing and Urban Development (HUD)'s 1.0 milligrams per centimeter squared (mg/cm^2), as tested using and X-Ray Fluorescence Analyzer (XRFA), as a suitably analogous standard for identifying LBP at the Site. HUD's standard only applies to housing funded by the federal government; however, it is a useful reference for assessing hazards associated with LBP in other settings.
SWA used an XRFA to scan painted surfaces at the Site building and identified lead concentrations ranging from <0.1 mg/cm^2 to 3.8 mg/cm^2. The only surfaces that was identified to contain lead above the 1.0 mg/cm^2 HUD standard was the green paint on the main exit railings and the gray paint on the interior metal stair system. Refer to SWA's Inspection Report in Appendix B
for more information regarding their inspection and results.

Previously, Nobis identified lead-based paint on the pumping equipment at the station. Refer to Nobis' report in Appendix A.

Polychlorinated Biphenyls (PCBs)

AECOM conducted a survey for PCBs in October 2018 and identified three suspect materials: pipe penetration sealant, gray painted piping, and black wall coating. Laboratory analysis of samples of these materials identified PCBs in the gray painted piping at 720 and 820 milligrams per kilogram. Since these concentrations were greater than 50 mg/kg, these materials are considered Bulk Product Waste per EPA's requirements. Refer to AECOM's report in Appendix A.

On September 1, 2021, SWA visited the Site to collect additional paint samples to supplement AECOM's previous assessment. SWA collected ten samples of paint include green wall paint, gray pipe paint, gray duct paint, gray stair paint, gray floor plaint and white floor/lip paint from the basement and green wall paint, gray/red floor paint, green motor paint, and white ceiling paint from the first floor. The ten samples contained PCBs at concentrations ranging from 20 to 906 part per million. Based on these results, BETA has prepared a Risk-Based PCB Bulk Product Waste Disposal Plan which is included in Appendix G of the Contract Documents. This plan includes a summary of the historic sampling results.

Mercury

The purpose of BETA's mercury inspection was to conduct a visual inspection for building components that may contain mercury. BETA identified a possible mercury thermostat inside the building on the western building wall.

Hazardous Materials

BETA inspected the building for the presence of containers of and equipment that may contain hazardous materials. BETA only conducted a visual inspection of accessible areas and did not conduct any laboratory analysis or destructive testing at the Site. BETA did not inspect the underground trenches within the Site building or within any operating equipment at the Site. BETA has identified the following items that may contain hazardous materials.

Batteries/Electrical Equipment

BETA observed the following batteries and/or electrical equipment at the Site.

- Two 12-volt battery for pump motors;
- Computer, monitor, APC battery backup, and network equipment; and
- Dry type transformer and other electrical equipment inside the Site building.

These items may contain lead, polychlorinated biphenyls, or other hazardous materials.

Compressed Gas

BETA observed one 50-pound portable compressed gas tank in the Site building.

Containers of Potentially Hazardous Materials

BETA observed miscellaneous containers (one gallon or less) of cleaning and maintenance chemicals in the Site building.

Soil

Soil sampling conducted by AECOM in 2016 identified C_{19}-C_{36} Aliphatics, C_{11}-C_{22} Aromatics, 2-methylnaphthalene, and lead at concentrations above the MassDEP RCS-1 in soil samples from borings B-200, B-201, and B-202 which are located south of the Site building along the eastern property line. Refer to AECOM's report in Appendix A for a figure depicting these locations. AECOM observed evidence of urban fill in the soil samples which were collected from depths of 5-10 feet below grade. Based on AECOM's results, a Utility-related Abatement (URAM) plan will be required to manage soil generated during the pump station project.

Groundwater

In 2017, AECOM identified dissolved and total cadmium, dissolved and total zinc, and floating non-aqueous petroleum product in wells within the project vicinity. Appendix A contains a copy of AECOM's report.

On March 3, 2021, BETA collected groundwater samples from monitoring wells MW-202 and MW-208. Samples were submitted to Alpha Analytical, Inc. (Alpha) for analysis of volatile organic compounds (VOCs) by EPA Method 8260, total and dissolved thirteen metals by various EPA methods, and extractable petroleum hydrocarbons (EPH) with target polynuclear aromatic hydrocarbons (PAHs) and volatile petroleum hydrocarbons (VPH) with target VOCs both by the MassDEP method. Alpha identified concentrations of C_{19}-C_{36} Aliphatics and total and dissolved barium in the sample from MW-202. These concentrations were below the MassDEP RCGW-1 and RCGW-2 reportable concentrations. Appendix C contains a summary table and the laboratory certificates of analysis.

On October 28, 2021, BETA collected groundwater samples from monitoring wells MW-101, MW-201, and MW-203. The samples were submitted to Alpha for analysis of VOCs by EPA Method 8260, total and dissolved thirteen metals by various EPA methods, and EPH with target PAHs and VPH with target VOCs both by the MassDEP method. Alpha identified concentrations of C_{19}-C_{36} Aliphatics, total arsenic, and total zinc in the sample from MW-101. Alpha identified concentrations of total and dissolved arsenic, total and dissolved zinc, total copper, and total lead in the sample from MW-201. Alpha identified concentrations of total copper in the sample from MW-203. The concentration of total arsenic in the sample from MW-201 exceeded the MassDEP's RCGW-1 standard but was below the applicable RCGW-2 standards. The remaining concentrations of contaminants were below the MassDEP RCGW-1 and RCGW-2 reportable concentrations. The concentrations of total metals are likely due to silt entrained in the samples. Appendix C contains a summary table and the laboratory certificates of analysis.

Findings and Conclusions

The following summarizes the findings and conclusions from the HBMI. Please refer to the attached reports for more details.

- Asbestos was identified in black wall/foundation vapor barrier, black roof tar flashings and felts, gray window glazing compound and associated caulking in six windows, and vent caulking in two louver vents.
- Lead was identified in the green paint on the main exit railings, the gray paint on the interior metal stair system, and on the pumping equipment.
- Gray painted piping contains PCBs above the TSCA 50 ppm threshold.
- Batteries, electronics, electrical equipment, containers of hazardous materials, and a compressed gas tank were observed at the Site.
- Impacted soil and groundwater exist within the project area.

Recommendations

Based on the findings from this investigation, the following recommendations are offered.

- PCB impacted material shall be managed in accordance with the Risk-Based PCB Bulk Product Waste Disposal Plan.
- Prior to renovation of the building, known or assumed ACBM must be removed by qualified personnel in accordance with applicable regulations.
- If the LBP surfaces are to be impacted by the renovation in a manner that may generate dust or fumes, compliance with Occupational Safety and Health Administration (OSHA) regulations concerning worker exposure may be necessary. Additionally, U.S. Environmental Protection Agency (EPA) regulations relative to waste disposal may apply.
- The fluorescent light ballasts should be removed and properly disposed.
- If the batteries, fluorescent light bulbs, electronics, containers of hazardous materials, oil tank, and propane tanks are going to be removed from the Site or modified during the proposed renovations, proper handling and/or disposal in accordance with all applicable local, state, and federal regulations would be required.
- Handling and management of soil and groundwater under a URAM will be required at the Site.

Limitations

Please note that the condition of the building and the nature of the work necessitate the following limitations:

- The inspection was limited to areas that could be safely and physically accessed without demolition. The attached report notes areas that could not be inspected. Future renovation work in the uninspected areas may encounter ACM, lead-based paint, PCBs, and/or other hazardous materials that could not be identified during this work.
- With the exception of sampling of caulking and paint, inspection for PCBs was visual only. Light ballasts and other electrical equipment were not sampled. PCB content was ascertained by labels and/or apparent age of the electrical equipment.
- These inspections included limited intrusive sampling of building systems. Please note that some potentially hazardous building components may not be identified by these inspections due to seemingly homogenous materials that are not homogenous, seemingly representative locations that are not representative, layered materials that are not uniformly present or are isolated, and materials that are present in an isolated and/or limited quantity.

APPENDIX A
Reference Reports

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March 14, 2019

Mr. William Sedewitz, P.E.
Department of Public Works
City of Framingham
110 Western Avenue
Framingham, MA 01702

RE: Review and Assessment of Environmental Reports and Site Data
700 and 730 Worcester Road
Framingham, MA

Dear Mr. Sedewitz:

FSL Associates, Inc. (FSL) is pleased to submit this review and assessment of environmental reports at the above-referenced properties at 700 and 730 Worcester Road in Framingham, Massachusetts. The locations of these properties are shown in **Figures 1** and **2**.

FSL has reviewed the documents and associated data pertaining to the Massachusetts Contingency Plan (MCP) site located at 730 Worcester Road, Framingham (RTN 3-33648 and RTN 3-34122) and the adjacent property at 700 Worcester Road, Framingham. Specifically, FSL has reviewed in detail the Downgradient Property Status (DPS) and Immediate Response Action (IRA) submittals for 730 Worcester Road by AECOM. In addition, FSL has also included a summary of historic work FSL has completed at the adjacent 700 Worcester Road in the form of an ASTM Phase I Environmental Site Assessment in 2014 and a supplemental Phase II Investigation in 2017.

This report also includes the results of the groundwater sampling and groundwater elevation survey performed at all viable wells on both 700 and 730 Worcester Road that was performed in February 2019.

730 WORCESTER ROAD

The City of Framingham (City) submitted a Release Notification Form to the Massachusetts Department of Environmental Protection (MassDEP) on June 27, 2016, as a result of detected concentrations of extractable petroleum hydrocarbons (EPH) fractions, 2-methylnaphthalene, and lead in soil samples that exceeded MassDEP's Reportable Concentration (RC) S-1 standards in the MCP. The 730 Worcester Road property was assigned Release Tracking Number (RTN) 3-33648. Soil borings B-101, B-200, B-201, B-202, B-203, and B-208, (converted to groundwater monitoring wells) were installed by Nobis Engineering, Inc. in May 2016. Groundwater was not sampled at this time. The results of the 2016 soil sampling are included in **Table 1**. Boring/well locations are shown in **Figure 3**.

The reportable conditions in subsurface soil were found during the performance of soil borings in May 2016 as part of the City's Department of Public Work's pre-design work related to the planned construction of new utilities. The proposed work will consist of a new pump station to be located on other City property as a replacement for the 730 Worcester Road pump station; and the installation of up to 8,000 feet of new sewer utility piping, largely within existing rights-of-way. Work on the 730 Worcester Road property will involve decommissioning the existing pump station, installing approximately 500 feet of new gravity sewer, and abandoning approximately 500 feet of existing sewer line and 500 feet of force main.

Additional assessment took place on March 1, 2017 when the groundwater wells were sampled by AECOM. Samples were collected from wells MW-200, MW-201, MW-202, and MW-208 for volatile petroleum hydrocarbons (VPH), EPH, PCBs, volatile organic compounds (VOCs), and metals; the results of which are summarized in **Table 2** (MW-201 was re-sampled for metals on March 30, 2017). VPH, VOCs, and PCBs were not detected in any well. For EPH, only low levels (below MCP reportable concentrations) of the C_{19}-C_{36} aliphatic fraction was detected. For metals, concentrations of cadmium and zinc were detected in well MW-201 that exceeded MCP reportable concentrations; no other well had metals detected above reportable concentrations. No water sample was collected from MW-101 and a second RTN was assigned to the property on March 2, 2017, as a result of AECOM providing notification to MassDEP on behalf of the City related to the discovery of 0.5 inches of Non-Aqueous Phase Liquid (NAPL) in monitoring well MW-101 on March 1, 2017; this was a 72-hour Immediate Response Action (IRA) condition under the MCP regulations. This new notification was assigned RTN 3-34122 by MassDEP. MassDEP verbally approved an assessment-only IRA consisting of a month of regular gauging of B-101 and other wells at the property for the presence of NAPL, and inspection of the Sudbury River and a storm water drainage channel that bisects the property. AECOM performed this monitoring weekly for the month of March and monthly from May thru October 2017. A summary of the NAPL monitoring is shown in **Table 3**. These inspections indicated that the NAPL thickness was stable and not increasing. No NAPL has appeared in other wells except in MW-202 for a single occurrence in June 2017, the thickness decreased over time (no measureable NAPL was present in any well after June 2017), and there has been no evidence of impact to the Sudbury River or the drainage channel. AECOM concluded that the condition that led to the initial notification of an IRA condition was no longer present (and had not been present since the initial notification). No Imminent Hazard condition or Critical Exposure Pathway was ever present, and the NAPL was stable because it had not substantially changed in over six months of monitoring. Therefore, the IRA was deemed to be complete. An IRA Completion Report was submitted on December 26, 2017 and RTN 3-34122 for the IRA was linked to the original site RTN 3-33648.

The City's consultant, AECOM, postulated that the contamination appeared to be migrating in the groundwater from the adjacent, upgradient property at 700 Worcester Road. There were no indications that the impacts were associated with past or current activities on the City's property. Therefore, AECOM filed a DPS on behalf of the City in which it presumed that the source of contamination was from 700 Worcester Road based primarily on the historical use of 700 Worcester Road. The DPS concluded:

> "Based on historic research and discussions with the Town, there are no indications of sources of petroleum contamination on the Town's 730 Worcester Road property itself. Historic research indicates that the immediately upgradient property (700 Worcester Road) was used as a gasoline station and for other automotive-related uses. The groundwater flow direction based on measurements collected on March 2, 2017 is to the

> west from 700 Worcester Road, across the 730 Worcester Road property, and discharging to the Sudbury River. Therefore, it is concluded that an upgradient, historic source of petroleum (possibly waste oil) from the 700 Worcester Road (223 Walnut LP/Hamilton Properties) property is the most likely source of the compounds detected in subsurface soil and groundwater on the Town's 730 Worcester Road property, including the NAPL found in monitoring well B-101, the petroleum fractions/target analytes and lead found in the subsurface soil samples collected at or just below the water table at several locations, and the cadmium and zinc found in the groundwater from monitoring well B-201; therefore, Downgradient Property Status is appropriate for the Town's property at this location."

The DPS was filed on April 28, 2017.

700 WORCESTER ROAD

In November 2014, FSL completed a Phase 1 Environmental Site Assessment (ESA) pursuant to ASTM E 1527-05 for the property identified as 680-700 Worcester Road and 74-76, 80 and 86 Main Street in Framingham, MA. This inspection revealed evidence of a former automobile service station at 700 Worcester Road. The service station operated beginning in 1937 and was demolished circa 1977 for the construction of the shopping center on the subject Site. The automobile service station featured the underground storage of petroleum products (gasoline) in underground storage tanks (USTs) as part of their operations. This information was provided by previous reports and records on file at the Framingham Fire Department Fire Prevention Division for the subject Site. These USTs were purportedly removed circa 1977 (though no records could be found regarding their removal). FSL's ground penetrating radar survey in 1996 did not find any USTs at the subject Site.

The Phase I ESA summarized two historical subsurface investigations that were conducted at the subject Site at 700 Worcester Road to address the former presence of an automobile service station and underground storage of gasoline: one (1) by Certified Engineering & Testing, Inc. (CETI) in October 1990 and one (1) by FSL in January 1996. Both subsurface investigations indicated concentrations of petroleum hydrocarbons and VOCs in soil and groundwater at 700 Worcester Road. As of 1996, no constituents were detected in groundwater that were above the applicable MCP reportable concentrations. Additionally, no reportable concentrations were detected in soil during FSL's subsurface investigation. FSL's Subsurface Investigation in January 1996 also included a Ground Penetrating Radar (GPR) survey to identify evidence of USTs on the subject Site; no tanks were found. CETI's 1990 report included a groundwater flow direction map based on three monitoring wells installed at 700 Worcester Road; groundwater flow direction was to the southwest. This is somewhat different from AECOM's groundwater flow direction in the 2017 DPS showing flow to the west.

Soil borings B-1, B-2, B-3, B-4, and B-5, (converted to groundwater monitoring wells) were installed by FSL on May 17, 2017. The boring/well locations are shown in **Figure 3**. One soil sample was collected from each boring for VPH, EPH and metals. The results of the soil analysis are included in **Table 1**. No EPH or metals were detected above MCP reportable concentrations. VPH fractions were detected above MCP reportable concentrations in Borings B-4 and B-5, and naphthalene was detected above reportable concentrations in boring B-5. Groundwater samples were collected from wells MW-1, MW-2, and MW-3 on May 31, 2017 for VPH/EPH and metals analysis; the results of which are summarized in **Table 2**. No compounds were detected in groundwater over MCP reportable concentrations. NAPL measurements were also taken in the five wells installed by FSL; the results of which are summarized in **Table 3**. NAPL was not detected except for a measurement of 0.1 inches in well MW-4.

2019 SUPPLEMENTAL ASSESSMENT

FSL met with members and representatives of the City in December 2018 to discuss the situation at 730 Worcester Road as it related to the upcoming planned City construction of new utilities at 730 Worcester Road. Specifically, the City was concerned with the impact of the environmental contamination and how it would affect the planned construction. FSL stated that there was insufficient information to conclude the contamination on 730 Worcester Road due to 700 Worcester Road. The parties agreed for all viable wells on both properties to be sampled concurrently along with NAPL gauging and a groundwater elevation survey. FSL prepared a scope of work and submitted it to the City for their review and approval. The scope was ultimately approved.

Well locations were surveyed on February 19, 2019 by FSL's subcontractor EST Associates (EST). 700 Worcester Road is quite a bit upslope from 730 Worcester Road, so EST was unable to shoot the wells on the City property without a second setup. EST ultimately used two setups. Four wells (MW-2, MW-3, MW-4, and MW-5) were surveyed from one setup at 700 Worcester Road and five wells (MW-1, MW-101, MW-201, MW-203, and MW-208) were surveyed from 730 Worcester Road. A summary of the elevation survey is included as **Table 4**. Because of the two survey setups, two separate elevation maps were prepared. These are includes as **Figures 4A** and **4B**. For both maps, groundwater flow is shown to be to the west.

Groundwater sampling and NAPL gauging took place on February 25, 2019. One sample was collected for each well using low-flow protocols. Samples were collected by EST. Mr. Joseph McLoughlin of BETA Group (acting as City representative) was present for the sampling.

Samples were analyzed for VPH and EPH (with indicator compounds), total MCP 14 metals, and dissolved MCP 14 metals. The results of the sampling are included in **Table 2**. The full analytical laboratory analysis report is included as an attachment to this letter. All ten pre-existing wells at 700 and 730 Worcester Road were viable for sampling. Each well was able to produce sufficient water for proper well purging and sampling except for well MW-5 at 700 Worcester Road. MW-5 had insufficient recharge to allow for sufficient water volume for all analysis parameters; for this well analysis was limited to VPH and total metals. All wells were gauged for NAPL; gauging results are included in **Table 3**. NAPL was not detected in any well except for a sheen in MW-201.

VPH (all three fractions) was detected in wells MW-3 and MW-5; benzene, toluene, ethylbenzene, xylenes, and naphthalene were also detected in well MW-3. The concentrations of these compounds were all below MCP reportable concentrations. No other wells had the detected presence of VPH except for MW-101 where C_9-C_{12} aliphatics were detected at a concentration (62.5 ug/L) just above the analytical detection limit.

EPH and the polycyclic aromatic hydrocarbon (PAH) indicator compounds were not detected at any wells on the 730 Worcester Road property except for C_{19}-C_{36} aliphatics in wells MW-201 (106 ug/L – just over the analytical detection limit) and MW-202 (239 ug/L); these concentrations are below MCP reportable concentrations. At 700 Worcester Road, no EPH or PAHs were detected in well MW-4. Low levels of some EPH fractions and some PAH compounds were detected in wells MW-1, MW-2, and MW-3 but at concentrations well below MCP reportable concentrations. EPH was not analyzed for MW-5 due to insufficient water volume for sample collection.

For metals analysis, the concentrations in each well where both dissolved and total metals samples were collected indicated only a slight concentration variation. Six metals (antimony, beryllium, mercury, selenium, silver, and thallium) were not detected in any of the wells. At 730 Worcester Road, no metals were detected at concentration over MCP reportable concentrations. The exceedances of cadmium and zinc in MW-201 in 2017 were not replicated; cadmium was not detected and zinc was detected but at a concentration below the reportable concentration. It is of note though that the zinc concentration at MW-201 was by far the highest concentration of all site wells (zinc was not detected in any other wells except for MW-4 and MW-5). At 700 Worcester Road, no metals were detected above MCP reportable concentrations except for lead in wells MW-3, MW-4, and MW-5.

700-730 WORCESTER ROAD SITE DATA ANALYSIS

The data for both 700 and 730 Worcester Road collected from 2016-2019 was analyzed to ascertain the conditions at both properties. In summary:

- A MCP 120-day reportable condition is present at 700 Worcester Road due to the presence of lead in groundwater, and VPH fractions C_5-C_8 aliphatics and C_9-C_{10} aromatics and naphthalene in soil; and

- A MCP 120-day reportable condition was present at 730 Worcester Road due to the presence of cadmium and zinc in groundwater, and EPH fractions C_{19}-C_{36} aliphatics and C_{11}-C_{22} aromatics, lead, and 2-methylnaphthalene in soil. This lead the City to reporting 730 Worcester Road as an MCP site and ultimately filing a DPS.

The reportable condition at 700 Worcester Road is limited to wells MW-3, MW-4, and MW-5. Based on the 2014 ASTM Phase I ESA, these wells are located in the vicinity of the former gasoline USTs that were removed circa 1977. As the contaminants detected in the soil and groundwater are gasoline-related, it seems apparent that the contamination is related to the former use of gasoline at 700 Worcester Road during its previous use as a gasoline and auto repair station.

The contamination at 730 Worcester Road (soil, groundwater, and NAPL) is limited to wells MW-101, MW-200, MW-201, and MW-202. These wells are all located west of the building at 700 Worcester Road; wells further west closer to the Sudbury River did not detect the significant presence of contaminants. Given that general groundwater flow direction in that area is to the west, the historic use of 700 Worcester Road as a gasoline and auto repair station, and the lack of commercial/industrial use of 730 Worcester Road, an initial conclusion of a DPS for 730 Worcester Road appears to be logical. However, on closer inspection of the data, there are issues that conflict with this conclusion. These issues are listed below:

- The significant contaminants at 700 Worcester Road are all gasoline-related: lead in groundwater, and VPH fractions C_5-C_8 aliphatics and C_9-C_{10} aromatics and naphthalene in soil. None of these compounds were detected in the groundwater at 730 Worcester Road. If contaminants were migrating from 700 Worcester Road to 730 Worcester Road, one would expect to see these compounds detected at some level in groundwater in at least some of the wells at 730 Worcester Road.

- The significant soil contaminants at 730 Worcester Road include EPH fractions C_{19}-C_{36} aliphatics and C_{11}-C_{22} aromatics, lead, and 2-methylnaphthalene. None of those compounds were detected in significant levels in soil or groundwater (other than lead in groundwater) at any

sampling location at 700 Worcester Road. Additionally, the corresponding groundwater samples at 730 Worcester Road where the elevated soil concentrations were found did not detect significant levels of these compounds in groundwater. Compounds do not migrate in soil generally; they migrate via the groundwater. So the fact that elevated levels of compounds were present in the soil without the corresponding presence of the same compounds in groundwater is a clear indication that the actual source of those compounds is in the soil at 730 Worcester Road and not due to migration from off the property.

- The significant groundwater contaminants at 730 Worcester Road include cadmium and zinc; these contaminants were limited to MW-201. Cadmium was not detected in groundwater at 700 Worcester Road and zinc was detected in groundwater only in wells MW-4 and MW-5 at insignificant levels at 700 Worcester Road. The overall metals chemistry in groundwater is very different between 700 Worcester Road and 730 Worcester Road with several metals detected at 700 Worcester Road (lead, chromium, vanadium) that were not detected at 730 Worcester Road.

The City may be correct in its assumption that the City's activities and past uses of the property should not have resulted in contamination at 730 Worcester Road. Nevertheless, a contamination source seems to be apparent on 730 Worcester Road that is different and independent of the contamination at 700 Worcester Road. This source may have been due to historic storage or dumping of contaminated material at 730 Worcester Road. However, to assert a DPS in accordance with the MCP, the contamination present at 730 Worcester Road must have migrated there from another property. The data indicates no connection between the contamination at 700 Worcester Road and 730 Worcester Road. Therefore, the DPS at 730 Worcester Road is not valid.

CONCLUSIONS

1. The condition at 700 Worcester Road must be reported to the MassDEP by the responsible party of 700 Worcester Road within 120 days in accordance with the MCP. Additional MCP response actions must be taken as necessary to ultimately resolve the release condition and obtain a Permanent Solution.

2. The DPS for RTN 3-33648 for 730 Worcester Road should be terminated. Additional MCP response actions should be taken as necessary to ultimately resolve the release condition and obtain a Permanent Solution.

If you have any questions, please contact us at (617) 232-0001.

Sincerely yours,

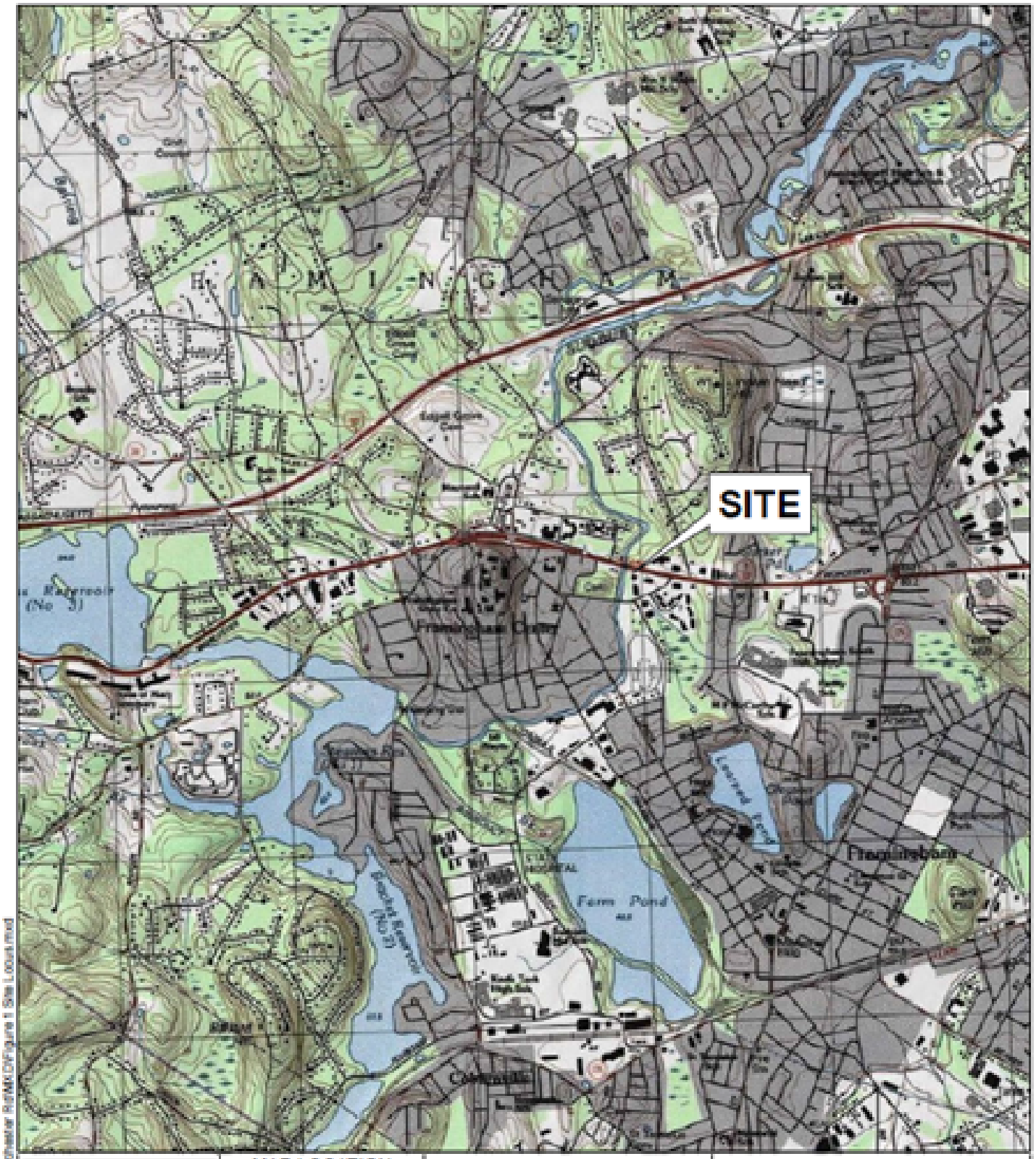
FSL Associates, Inc.

Bruce A. Hoskins, P.E., LSP
Senior Project Manager

cc: C. Rash, The Hamilton Company
R. Marchessault, DPW, Framingham
R. Sheldon, DPW, Framingham
C. Bois, Bois Consulting Co., Inc.

Figures, Tables, and Attachments:
Figure 1 - Site Locus Map
Figure 2 - Site Plan with Abutting Properties
Figure 3 - Site Plan with Sampling Locations
Figure 4A - 700 Worcester Road Groundwater Elevations, February 25, 2019
Figure 4B - 730 Worcester Road Groundwater Elevations, February 25, 2019
Table 1 - Analytical Results - Soil
Table 2 - Analytical Results - Groundwater
Table 3 - NAPL Measurements - Groundwater
Table 4 - Groundwater Elevation Survey
Attachment 1 – Laboratory Analysis Report (2019 Groundwater Samples)

FIGURES



FSL ASSOCIATES

MAP LOCATION

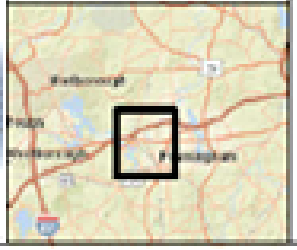


FIGURE 1

SITE LOCUS MAP

700 AND 730 WORCESTER ROAD,
FRAMINGHAM, MA

Y:\Projects\Framingham, MA\Rochester Rd\MXD\Figure 1 Site Locus.mxd

Map Location

N

0 50 100

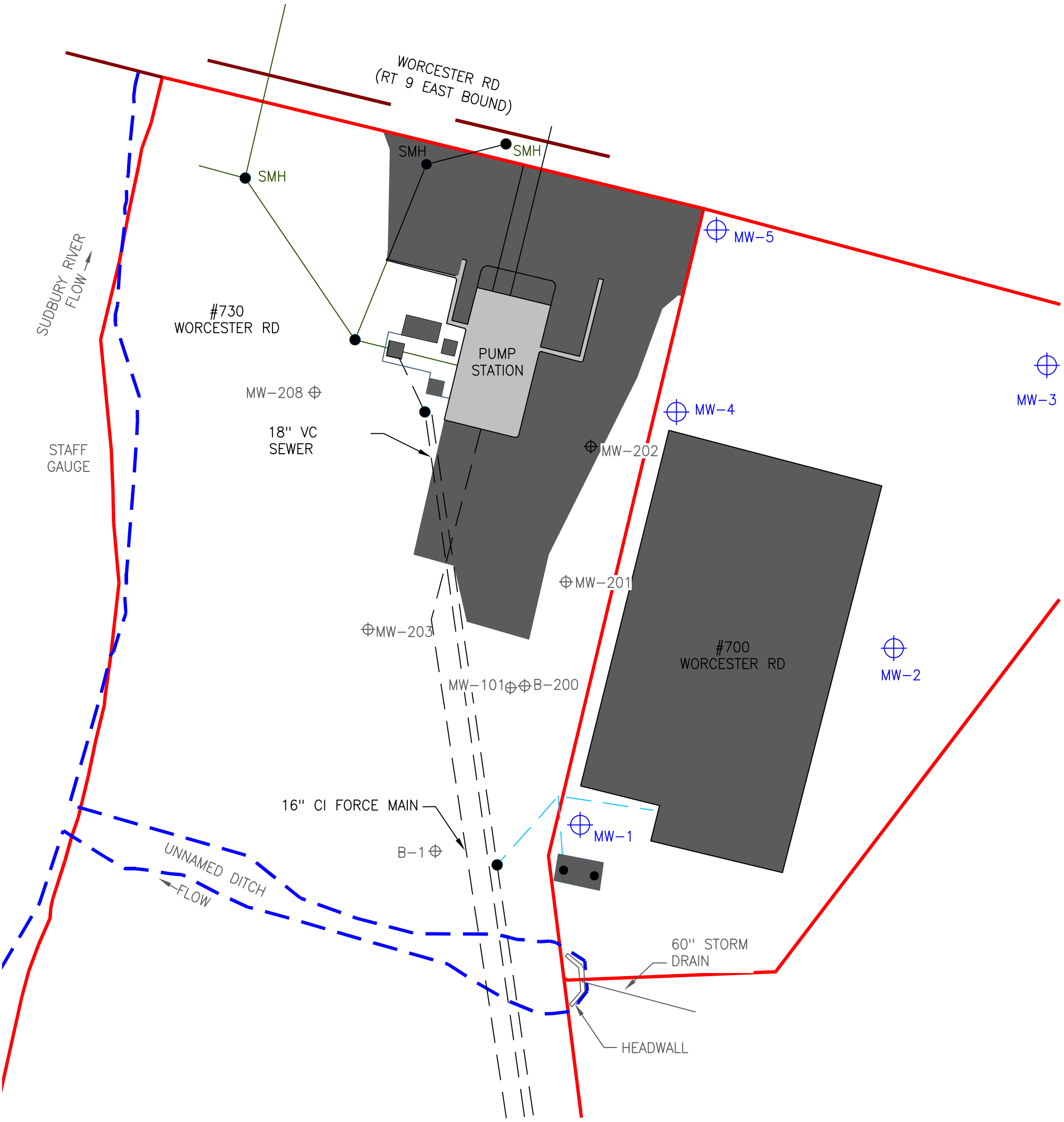
Scale in Feet

FIGURE 2
SITE LOCATION MAP

700 AND 730 WORCESTER ROAD
FRAMINGHAM, MASSACHUSETTS

Path: Y:\Projects\Framingham, MA\Worchester Rd\MXD\Figure2 Site Location.mxd

NOTE: SOURCE MAP FROM DOWNGRADIENT PROPERTY STATUS OPINION, AECOM, APRIL 2017



MAP LOCATION

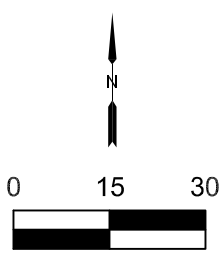
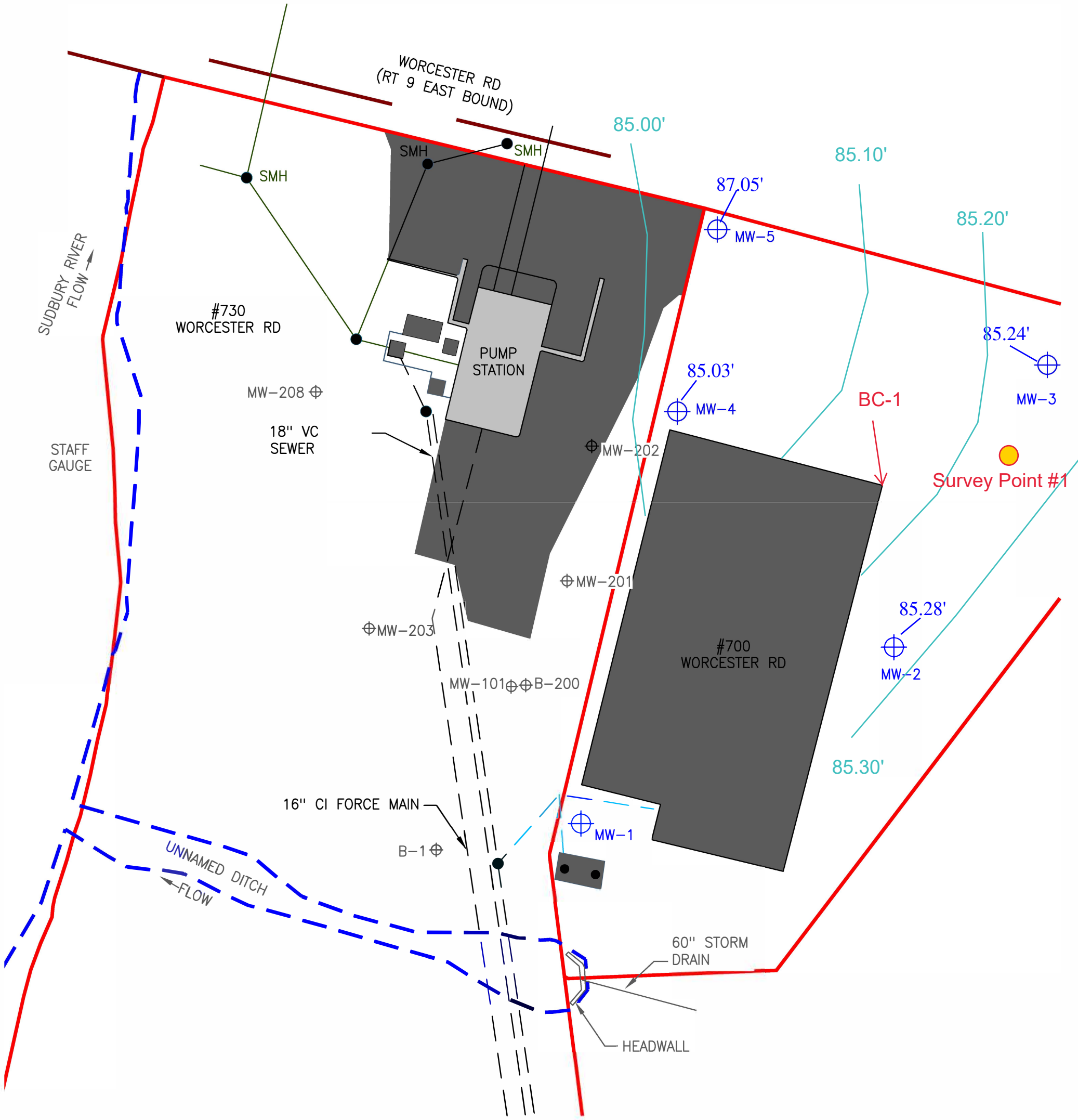


FIGURE 3

SITE PLAN WITH SAMPLING LOCATIONS

WORCESTER ROAD PUMP STATION RTN 3-33648
700 AND 730 WORCESTER ROAD
FRAMINGHAM, MASSACHUSETTS

NOTE: SOURCE PLAN FROM DOWNGRADIENT PROPERTY STATUS OPINION, AECOM, APRIL 2017



FSL ASSOCIATES

MAP LOCATION

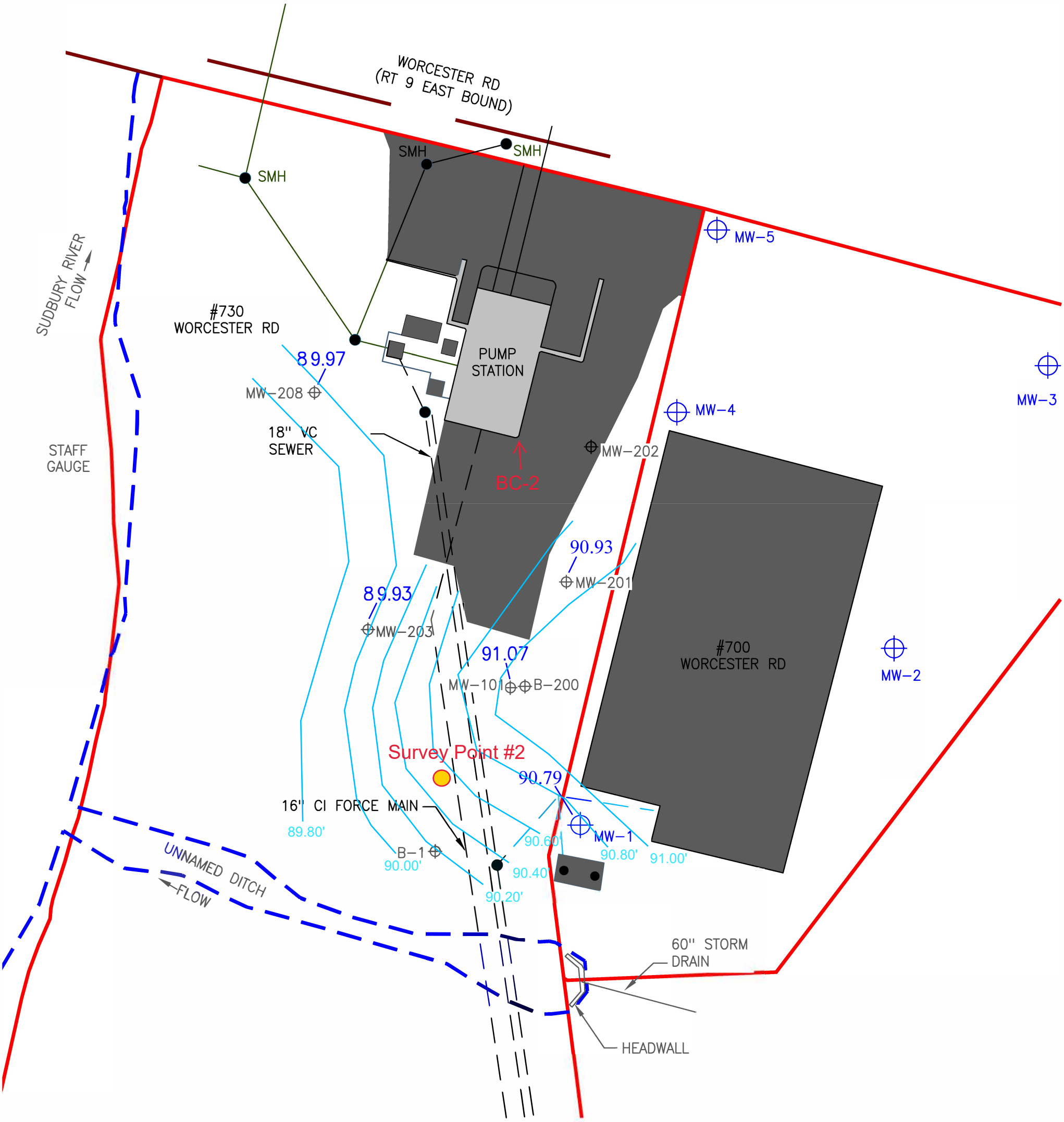
N

0 15 30

FIGURE 4a–
700 WORCESTER ROAD
GROUNDWATER ELEVATIONS

WORCESTER ROAD PUMP STATION RTN 3–33648
700 AND 730 WORCESTER ROAD
FRAMINGHAM, MASSACHUSETTS

NOTE: SOURCE PLAN FROM DOWNGRADIENT PROPERTY STATUS OPINION, AECOM, APRIL 2017



MAP LOCATION

N

0 15 30

FIGURE 4b
730 WORCESTER ROAD
GROUNDWATER ELEVATIONS

WORCESTER ROAD PUMP STATION RTN 3-33648
700 AND 730 WORCESTER ROAD
FRAMINGHAM, MASSACHUSETTS

NOTE: SOURCE PLAN FROM DOWNGRADIENT PROPERTY STATUS OPINION, AECOM, APRIL 2017

TABLES

Table 1. Analytical Results - Soil
700 - 730 Worcester Road
Framingham, MA 01702

Sample Identification	MADEP Reportable Concentrations[1]	MADEP Method 1 Standards[2]						Max Value	B-200	B-201	B-202	B-203	B-208	B-1	B-2	B-3	B-4	B-5
Depth									5-7'	5-7'	6-10'	3-5'	5-7'	4-8'	8-12'	8-12'	12-16'	12-16'
Sample Date	RCS-1	S1/GW-2	S1/GW-3	S-2/GW-2	S-2/GW-3	S-3/GW-2	S-3/GW-3		05/13/16	05/13/16	05/13/16	05/13/16	05/13/16	05/24/17	05/24/17	05/24/17	05/24/17	05/24/17
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
VPH																		
C5-C8 Aliphatics	100	100	100	500	500	500	500	530	24	<14	<11	<10	<10	<9.4	<8.0	8.1	**190**	**530**
C9-C12 Aliphatics	1,000	1,000	1,000	3,000	3,000	5,000	5,000	550	<16	<14	<11	<10	<10	<9.4	<8.0	105	120	550
C9-C10 Aromatics	100	100	100	500	500	500	500	350	48	59	44	<10	<10	<9.4	<8.0	73	54	**350**
Methyl-tert-butylether (MTBE)	0.1	100	100	100	500	100	500	0.00	<0.080	<0.072	<0.053	<0.051	<0.051	<0.094	<0.080	<0.061	<0.055	<0.11
Benzene	2	40	40	200	200	400	1,000	0.85	<0.080	<0.072	<0.053	<0.051	<0.051	<0.47	<0.40	<0.31	<0.27	0.85
Toluene	30	500	500	1,000	1,000	2,000	3,000	1.60	<0.080	<0.072	<0.053	<0.051	<0.051	<0.47	<0.40	<0.31	0.68	1.6
Ethylbenzene	40	500	500	1,000	1,000	1,000	3,000	8.20	0.19	<0.072	<0.053	<0.051	<0.051	<0.47	<0.40	<0.31	0.63	8.2
m,p-Xylene	100	100	500	100	1,000	100	3,000	42.00	<0.16	0.19	<0.11	<0.10	<0.10	<0.94	<0.80	<0.61	<0.55	42
o-Xylene	100	100	500	100	1,000	100	3,000	13.00	0.13	0.073	0.10	<0.051	<0.051	<0.47	<0.40	0.73	1.4	13
Naphthalene	4	20	500	20	1,000	20	3,000	4.40	<0.40	0.64	<0.26	<0.26	<0.26	<0.47	<0.40	1.5	0.81	**4.4**
EPH/PAH																		
C9-C18 Aliphatics	1,000	1000	1000	3,000	3,000	5,000	5,000	690	690	200	260	43	<12	<23	<22	<23	180	120
C19-C36 Aliphatics	3,000	3000	3000	5,000	5,000	5,000	5,000	6,800	**6,000**	**6,300**	**6,800**	950	31	25	<22	42	27	30
C11-C22 Aromatics	1,000	1000	1000	3,000	3,000	5,000	5,000	1,600	**1,600**	**1,200**	**1,300**	250	22	29	<22	44	58	67
Naphthalene	4	20	500	20	1,000	20	3,000	1.6	1.1	1.6	0.83	<0.12	<0.12	<0.5	<0.4	<0.5	<0.5	<0.6
2-Methylnaphthalene	0.7	80	300	80	500	80	500	1.5	**1.5**	**1.1**	0.69	<0.12	<0.12	<0.5	<0.4	<0.5	<0.5	0.81
Acenaphthylene	1	600	10	600	10	600	10	0.0	<0.29	<0.27	<0.25	<0.12	<0.12	<0.5	<0.4	<0.5	<0.5	<0.6
Acenaphthene	4	1000	1000	3,000	3,000	5,000	5,000	0.0	<0.29	<0.27	<0.25	<0.12	<0.12	<0.5	<0.4	<0.5	<0.5	<0.6
Fluorene	1,000	1000	1000	3,000	3,000	5,000	5,000	0.3	<0.29	<0.27	0.30	<0.12	<0.12	<0.5	<0.4	<0.5	<0.5	<0.6
Phenanthrene	10	500	500	1,000	1,000	3,000	3,000	0.9	<0.29	0.79	<0.25	<0.12	0.19	<0.5	<0.4	0.92	<0.5	0.63
Anthracene	1,000	1000	1000	3,000	3,000	5,000	5,000	0.0	<0.29	<0.27	<0.25	<0.12	<0.12	<0.5	<0.4	<0.5	<0.5	<0.6
Fluoranthene	1,000	1000	1000	3,000	3,000	5,000	5,000	1.4	<0.29	0.84	0.37	0.31	0.33	<0.5	<0.4	1.41	<0.5	1.16
Pyrene	1,000	1000	1000	3,000	3,000	5,000	5,000	1.1	<0.29	0.44	<0.25	0.23	0.34	<0.5	<0.4	1.12	<0.5	0.87
Benzo(a)anthracene	7	7	7	40	40	300	300	0.6	<0.29	<0.27	<0.25	<0.12	0.13	<0.5	<0.4	0.63	<0.5	<0.6
Chrysene	70	70	70	400	400	3,000	3,000	0.8	<0.29	<0.27	<0.25	<0.12	0.20	<0.5	<0.4	0.75	<0.5	0.73
Benzo(b)fluoranthene	7	7	7	40	40	300	300	0.6	<0.29	<0.27	<0.25	<0.12	0.25	<0.5	<0.4	<0.5	<0.5	0.62
Benzo(k)fluoranthene	70	70	70	400	400	3,000	3,000	0.6	<0.29	<0.27	<0.25	<0.12	<0.12	<0.5	<0.4	0.60	<0.5	0.64
Benzo(a)pyrene	2	2	2	7	7	30	30	0.7	<0.29	<0.27	<0.25	<0.12	0.18	<0.5	<0.4	<0.5	<0.5	0.68
Indeno(1,2,3-cd)pyrene	7	7	7	40	40	300	300	0.1	<0.29	<0.27	<0.25	<0.12	0.12	<0.5	<0.4	<0.5	<0.5	<0.6
Dibenzo(a,h)anthracene	0.7	0.7	0.7	4	4	30	30	0.0	<0.29	<0.27	<0.25	<0.12	<0.12	<0.5	<0.4	<0.5	<0.5	<0.6
Benzo(g,h,i)perylene	1,000	1000	1000	3,000	3,000	5,000	5,000	0.2	<0.29	<0.27	<0.25	<0.12	0.18	<0.5	<0.4	<0.5	<0.5	<0.6
MCP 14 Metals																		
Antimony	20	20	20	30	30	30	30	0	--	--	--	--	--	<5.6	<5.3	<5.8	<6.1	<7.2
Arsenic	20	20	20	20	20	50	50	0	--	--	--	--	--	<2.8	<2.7	<2.9	<3.1	<3.6
Barium	1,000	1,000	1,000	3,000	3,000	5,000	5,000	62	--	--	--	--	--	35	35	39	30	62
Beryllium	90	90	90	200	200	200	200	1	--	--	--	--	--	0.44	0.45	0.44	0.65	0.55
Cadmium	70	70	70	100	100	100	100	0	--	--	--	--	--	<0.28	<0.27	<0.29	<0.31	<0.36
Chromium	100	100	100	200	200	200	200	31	--	--	--	--	--	18	30	30	18	31
Lead	200	200	200	600	600	600	600	260	120	**260**	6.8	30	10	21	8.9	25	9.7	36
Mercury	20	20	20	30	30	30	30	0	--	--	--	--	--	<0.11	<0.11	<0.11	<0.12	<0.14
Nickel	600	600	600	1,000	1,000	1,000	1,000	27	--	--	--	--	--	14	24	14	15	27
Selenium	400	400	400	700	700	700	700	0	--	--	--	--	--	<5.6	<5.3	<5.8	<6.1	<7.2
Silver	100	100	100	200	200	200	200	0	--	--	--	--	--	<1.1	<1.1	<1.2	<1.2	<1.4
Thallium	8	8	8	60	60	80	80	0	--	--	--	--	--	<2.8	<2.7	<2.9	<3.1	<3.6
Vanadium	400	400	400	700	700	700	700	31	--	--	--	--	--	28	30	26	22	31
Zinc	1,000	1,000	1,000	3,000	3,000	5,000	5,000	50	--	--	--	--	--	39	33	33	41	50

All results in mg/kg
Values in **bold** exceed applicable MCP Reportable Concentrations
-- Not Analyzed
Additional Non-Detect (ND) analytes may not have been included in this table
1 = The Massachusetts Contingency Plan, 310 CMR 40.1600, Massachusetts OHM List, April 25, 2014
2 = The Massachusetts Contingency Plan, 310 CMR 40.0975(6)(a-c): Tables 2-4, April 25, 2014

Table 2. Analytical Results - Groundwater

700 - 730 Worcester Road

Framingham, MA 01702

Sample Location	MW-101	MW-201	MW-201	MW-201	MW-202	MW-202	MW-203	MW-203	MW-208	MW-208	MW-1	MW-1	MW-2	MW-2	MW-3	MW-3	MW-4	MW-5	Max Value	MADEP RCGW-2[1]	MADEP Method 1 GW Standards[3]	
Sample Date	02/25/19	03/01/17	03/30/17	02/25/19	03/01/17	02/25/19	03/01/17	02/25/19	03/01/17	02/25/19	05/31/17	02/25/19	05/31/17	02/25/19	05/31/17	02/25/19	02/25/19	02/25/19				
Groundwater Category	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3	GW-2/GW-3			GW-2	GW-3
VPH																						
Methyl-tert-butylether	<3	<2	--	<3	<2	<3	<2	<3	<2	<3	<5	<3	<5	<3	<5	<7.5	<3	<3	0.0	5000	50000	50000
Benzene	<2	<0.5	--	<2	<0.5	<2	<0.5	<2	<0.5	<2	<5	<2	<5	<2	<5	18.8	<2	<2	18.8	4000	1000	10000
Toluene	<2	<1	--	<2	<1	<2	<1	<2	<1	<2	<5	<2	<5	<2	<5	8.61	<2	<2	8.6	40000	50000	40000
Ethylbenzene	<2	<1	--	<2	<1	<2	<1	<2	<1	<2	<5	<2	<5	<2	<5	55.5	<2	<2	55.5	5000	20000	5000
m,p-Xylene	<2	<2	--	<2	<2	<2	<2	<2	<2	<2	<5	<2	<5	<2	<5	103	<2	<2	103.0	3000	3000	5000
o-Xylene	<2	<1	--	<2	<1	<2	<1	<2	<1	<2	<5	<2	<5	<2	<5	11.8	<2	<2	11.8	3000	3000	5000
Naphthalene	<4	<2	--	<4	<2	<4	<2	<4	<2	<4	<5	<4	<5	<4	<5	11.3	<4	<4	11.3	1000	700	20000
Adjusted C5-C8 Aliphatics (FID)	<50	<50	--	<50	<50	<50	<50	<50	<50	<50	<100	<50	<100	<50	<100	765	<50	610	765	3000	3000	50000
Adjusted C9-C12 Aliphatics (FID)	62.5	<50	--	<50	<50	<50	<50	<50	<50	<50	<100	<50	<100	<50	400	160	<50	199	400	5000	5000	50000
C9-C10 Aromatics (PID)	<50	<50	--	<50	<50	<50	<50	<50	<50	<50	<100	<50	<100	<50	420	854	<50	301	854	4000	4000	50000
EPH/PAH																						
C9-C18 Aliphatics	<100	<100	--	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	257	<100	--	257	5000	5000	50000
C19-C36 Aliphatics	<100	<100	--	106	259	239	<100	<100	<100	<100	<100	114	<100	281	<100	<100	<100	--	281	50000	NA	50000
C11 - C22 Aromatics	<100	<100	--	<100	<100	<100	<100	<100	<100	<100	<100	114	<100	<100	390	175	<100	--	390	5000	50000	5000
Napthalene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<1.0	<0.4	<1.0	<0.4	<1.0	9.92	<0.4	--	9.9	1000	700	20000
2-Methylnaphthalene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<1.0	<0.4	<1.0	<0.4	23	1.08	<0.4	--	23.0	2000	2000	20000
Acenaphthylene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<1.0	<0.4	<1.0	<0.4	<1.0	<0.4	<0.4	--	0.0	40	10000	40
Acenaphthene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<1.0	<0.4	<1.0	<0.4	2.7	<0.4	<0.4	--	2.7	10000	NA	10000
Fluorene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<1.0	<0.4	<1.0	<0.4	3.6	<0.4	<0.4	--	3.6	40	NA	40
Phenanthrene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<1.0	<0.4	<1.0	<0.4	3.5	0.816	<0.4	--	3.5	10000	NA	10000
Anthracene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<1.0	<0.4	<1.0	<0.4	<1.0	<0.4	<0.4	--	0.0	30	NA	30
Fluoranthene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<1.0	0.448	<1.0	0.572	<1.0	1.2	<0.4	--	1.2	200	NA	200
Pyrene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<1.0	0.448	<1.0	0.442	<1.0	0.988	<0.4	--	1.0	20	NA	20
Benzo(a)anthracene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<0.2	<0.4	<0.2	<0.4	<0.2	0.488	<0.4	--	0.5	1000	NA	1000
Chrysene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<0.2	<0.4	<0.2	<0.4	<0.2	0.438	<0.4	--	0.4	70	NA	70
Benzo(b)fluoranthene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<0.2	<0.4	<0.2	<0.4	<0.2	0.594	<0.4	--	0.6	400	NA	400
Benzo(k)fluoranthene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<0.2	<0.4	<0.2	<0.4	<0.2	<0.4	<0.4	--	0.0	100	NA	200
Benzo(a)pyrene	<0.2	<10	--	<0.2	<10	<0.2	<10	<0.2	<10	<0.2	<0.1	0.332	<0.1	0.288	<0.1	0.526	<0.2	--	0.5	500	NA	500
Indeno(1,2,3-cd)pyrene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<0.1	<0.4	<0.1	<0.4	<0.1	<0.4	<0.4	--	0.0	100	NA	100
Dibenzo(a,h)anthracene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<0.1	<0.4	<0.1	<0.4	<0.1	<0.4	<0.4	--	0.0	40	NA	40
Benzo(g,h,i)perylene	<0.4	<10	--	<0.4	<10	<0.4	<10	<0.4	<10	<0.4	<0.1	<0.4	<0.1	<0.4	<0.1	<0.4	<0.4	--	0.0	20	NA	20
MCP 14 Metals (Dissolved)																						
Antimony	<50	--	<50	<50	<50	<50	--	<50	--	<50	--	<50	--	<50	<2	<50	<50	--	0.0	8,000	NA	8,000
Arsenic	<5	--	<5	<5	<5	<5	--	<5	--	<5	--	11	--	<5	<1	11	<5	--	11.0	900	NA	900
Lead	<10	--	<10	<10	<10	<10	--	<10	--	<10	--	<10	--	<10	<1	**50**	**13**	--	50.0	10	NA	10
Barium	526	--	184	483	251	629	--	<10	--	52	--	223	--	100	215	635	1,230	--	1230.0	50,000	NA	5,000
Selenium	<10	--	<10	<10	<10	<10	--	<10	--	<10	--	<10	--	<10	<2	<10	<10	--	0.0	100	NA	100
Thallium	<20	--	<20	<20	<20	<20	--	<20	--	<20	--	<20	--	<20	<1	<20	<20	--	0.0	3,000	NA	3,000
Beryllium	<5	--	<5	<5	<5	<5	--	<5	--	<5	--	<5	--	<5	<1	<5	<5	--	0.0	200	NA	200
Cadmium	<4	--	**12**	<4	<4	<4	--	<4	--	<4	--	<4	--	<4	<0.1	<4	<4	--	12.0	4	NA	4
Chromium	<10	--	<10	<10	<10	<10	--	<10	--	<10	--	<10	--	<10	<50	15	<10	--	15.0	300	NA	300
Vanadium	<10	--	<10	<10	<10	<10	--	<10	--	<10	--	<10	--	<10	<1	17	<10	--	17.0	4,000	NA	4,000
Mercury	<0.2	--	<0.2	<0.2	<0.2	<0.2	--	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.5	<0.2	<0.2	--	0.0	20	NA	20
Nickel	<25	--	37	<25	<25	<25	--	<25	--	<25	--	<25	--	<25	<50	<25	<25	--	37.0	200	NA	200
Silver	<7	--	<7	<7	<7	<7	--	<7	--	<7	--	<7	--	<7	<1	<7	<7	--	0.0	7	NA	7
Zinc	<50	--	**1,510**	775	<50	<50	--	<50	--	<50	--	<50	--	<50	<100	51	258	--	1510.0	900	NA	900
MCP 14 Metals (Total)																						
Antimony	<50	<50	<50	<50	--	<50	<50	<50	<50	<50	--	<50	--	<50	--	<50	<50	<50	0.0	8,000	NA	8,000
Arsenic	<5	7	<5	<5	--	<5	8	<5	7	<5	--	17.8	--	6.7	--	9.8	<5	<5	17.8	900	NA	900
Lead	<10	<10	<10	<10	--	<10	<10	<10	<10	<10	--	<10	--	<10	--	**27**	**17**	**26**	27.0	10	NA	10
Barium	534	265	180	500	--	627	109	12	122	55	--	247	--	93	--	526	1,200	874	1200.0	50,000	NA	5,000
Selenium	<10	<10	<10	<10	--	<10	<10	<10	<10	<10	--	<10	--	<10	--	<10	<10	<10	0.0	100	NA	100
Thallium	<20	<20	<20	<20	--	<20	<20	<20	<20	<20	--	<20	--	<20	--	<20	<20	<20	0.0	3,000	NA	3,000
Beryllium	<5	<5	<5	<5	--	<5	<5	<5	<5	<5	--	<5	--	<5	--	<5	<5	<5	0.0	200	NA	200
Cadmium	<4	**8**	**14**	<4	--	<4	<4	<4	<4	<4	--	<4	--	<4	--	<4	<4	<4	14.0	4	NA	4
Chromium	<10	<10	<10	<10	--	<10	<10	<10	<10	<10	--	<10	--	<10	--	<10	<10	101	101.0	300	NA	300
Vanadium	<10	<10	<10	<10	--	<10	<10	<10	<10	<10	--	11	--	<10	--	<10	<10	126	126.0	4,000	NA	4,000
Mercury	<0.2	<0.2	<0.2	<0.2	--	<0.2	<0.2	<0.2	<0.2	<0.2	--	<0.2	--	<0.2	--	<0.2	<0.2	<0.2	0.0	20	NA	20
Nickel	<25	<25	39	<25	--	<25	<25	<25	<25	<25	--	<25	--	<25	--	<25	<25	81	81.0	200	NA	200
Silver	<7	<7	<7	<7	--	<7	<7	<7	<7	<7	--	<7	--	<7	--	<7	<7	<7	0.0	7	NA	7
Zinc	<50	736	**1,690**	876	--	<50	<50	<50	<50	<50	--	<50	--	<50	--	<50	300	192	1690.0	900	NA	900

All results in ug/L

Values in **bold** exceed applicable MADEP Reportable Concentration

-- = Not Analyzed

NA = Not Applicable

Non-detect (ND) analytes have not been included in this table

1 = The Massachusetts Contingency Plan, 310 CMR 40.1600, Massachusetts OHM List April 25, 2014

3 = The Massachusetts Contingency Plan, 310 CMR 40.0974(2): Table 1, April 25, 2014

Table 3. NAPL Measurements - Groundwater

700 - 730 Worcester Road
Framingham, MA 01702

Sample Location	MW-101	MW-201	MW-202	MW-203	MW-208	MW-1	MW-2	MW-3	MW-4	MW-5
Monitoring Date	Product Thickness (feet)	Product Thickness (feet)	Product Thickness (feet)	Product Thickness (feet)	Product Thickness (feet)	Product Thickness (feet)	Product Thickness (feet)	Product Thickness (feet)	Product Thickness (feet)	Product Thickness (feet)
3/2/2017	0.05	None	None	None	None	--	--	--	--	--
3/8/2017	0.04	None	None	None	None	--	--	--	--	--
3/13/2017	Trace	None	None	None	None	--	--	--	--	--
3/22/2017	Trace	None	None	None	None	--	--	--	--	--
5/31/2017	Trace	None	None	None	None	None	None	None	0.008	None
6/26/2017	0.01	None	0.03	None	None	--	--	--	--	--
7/26/2017	Trace	None	None	None	None	--	--	--	--	--
8/21/2017	Trace	Trace	Trace	None	None	--	--	--	--	--
9/25/2017	Trace	Trace	Trace	None	None	--	--	--	--	--
10/27/2017	Trace	Trace	Trace	None	None	--	--	--	--	--
2/25/2019	None	Trace	None	None	None	None	None	None	None	None

-- = Not Measured

Table 4: Groundwater Elevation Survey

700 -730 Worcester Road

Framingham, MA 01702

Location	Height of Instrument (ft)	Reading (ft)[i]	Top Reading[iii]	Bottom Reading[i] [v]	Distance (ft)[v]	Elevation (ft)	Depth to GW (ft)[ii]	GW Elevation (ft)
Readings: 2/19/19								
BC-1 *	100.000	5.310	5.470	5.160	31.0	94.690	N/A	N/A
MW-4	100.000	5.410	5.820	5.010	81.0	94.590	9.560	85.030
MW-5	100.000	5.420	5.800	5.040	76.0	94.580	9.510	85.070
MW-3	100.000	4.850	4.960	4.740	22.0	95.150	9.910	85.240
MW-2	100.000	6.450	6.680	6.220	46.0	93.550	8.270	85.280
BC-2**	100.000	5.100	5.570	4.620	95.0	94.900	N/A	N/A
MW-101	100.000	5.180	5.280	5.080	20.0	94.820	3.750	91.070
MW-201	100.000	5.360	5.650	5.080	57.0	94.640	3.710	90.930
MW-208	100.000	5.940	6.560	5.320	124.0	94.060	4.090	89.970
MW-1	100.000	3.500	3.660	3.340	32.0	96.500	5.710	90.790
MW-203	100.000	5.980	6.250	5.700	55.0	94.020	4.090	89.930

i - Reading at "Top of Well Casing"

ii - Taken from well casing inner shelf to top of PVC

iii - Upper level marker on level (for estimating distance-to reading)

iv - Lower level marker on level (for estimating distance-to reading)

v - Based upon a stadia constant of 100

* BC-1 = see Figure 4A

** BC-2= see Figure 4B

ATTACHMENT

ANALYTICAL REPORT

Lab Number:	L1907364
Client:	FSL Associates 358 Chestnut Hill Ave. Brighton, MA 02135
ATTN:	Bruce Hoskins
Phone:	(617) 232-0001
Project Name:	700 WORCESTER RD.
Project Number:	Not Specified
Report Date:	03/05/19

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: 700 WORCESTER RD.
Project Number: Not Specified

Lab Number: L1907364
Report Date: 03/05/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1907364-01	MW-1	WATER	700 WORCESTER RD., FRAMINGHAM, MA	02/25/19 11:00	02/25/19
L1907364-02	MW-2	WATER	700 WORCESTER RD., FRAMINGHAM, MA	02/25/19 09:35	02/25/19
L1907364-03	MW-3	WATER	700 WORCESTER RD., FRAMINGHAM, MA	02/25/19 09:30	02/25/19
L1907364-04	MW-4	WATER	700 WORCESTER RD., FRAMINGHAM, MA	02/25/19 10:25	02/25/19
L1907364-05	MW-5	WATER	700 WORCESTER RD., FRAMINGHAM, MA	02/25/19 14:00	02/25/19
L1907364-06	MW-101	WATER	700 WORCESTER RD., FRAMINGHAM, MA	02/25/19 11:25	02/25/19
L1907364-07	MW-201	WATER	700 WORCESTER RD., FRAMINGHAM, MA	02/25/19 12:00	02/25/19
L1907364-08	MW-202	WATER	700 WORCESTER RD., FRAMINGHAM, MA	02/25/19 12:25	02/25/19
L1907364-09	MW-203	WATER	700 WORCESTER RD., FRAMINGHAM, MA	02/25/19 12:50	02/25/19
L1907364-10	MW-208	WATER	700 WORCESTER RD., FRAMINGHAM, MA	02/25/19 13:15	02/25/19
L1907364-11	TRIP BLANK	WATER	700 WORCESTER RD., FRAMINGHAM, MA	02/25/19 00:00	02/25/19

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	YES
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	YES
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	YES

A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	NO
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	NO
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	YES

For any questions answered "No", please refer to the case narrative section on the following page(s).

Please note that sample matrix information is located in the Sample Results section of this report.

Project Name:	700 WORCESTER RD.	**Lab Number:**	L1907364
Project Number:	Not Specified	**Report Date:**	03/05/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	700 WORCESTER RD.	**Lab Number:**	L1907364
Project Number:	Not Specified	**Report Date:**	03/05/19

Case Narrative (continued)

MCP Related Narratives

VPH

In reference to question G:

L1907364-03: One or more of the target analytes did not achieve the requested CAM reporting limits.

EPH

In reference to question H:

The WG1212052-3 LCSD recovery, associated with L1907364-01 through -04 and -06 through -10, is outside the acceptance criteria for benzo(a)anthracene (145%); however, the target carbon ranges and analytes are within overall method allowances. The results of the original analysis are reported.

Dissolved Metals

In reference to question H:

The WG1210841-3 LCSD recovery, associated with L1907364-01 through -04 and -06 through -10, is outside the acceptance criteria for mercury (73%). Re-analysis of the LCSD yielded an unacceptable recovery of 75%. The LCS recovery was within acceptance criteria; therefore, no further action was taken.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Kelly Stenstrom

Title: Technical Director/Representative Date: 03/05/19

QC OUTLIER SUMMARY REPORT

Project Name: 700 WORCESTER RD.
Project Number: Not Specified

Lab Number: L1907364
Report Date: 03/05/19

Method	Client ID (Native ID)	Lab ID	Parameter	QC Type	Recovery/RPD (%)	QC Limits (%)	Associated Samples	Data Quality Assessment
EPH w/MS Targets - Westborough Lab								
EPH-04-1.1	Batch QC	WG1212052-3	Benzo(a)anthracene	LCSD	145	40-140	01-04,06-10	potential high bias
MCP Dissolved Metals - Mansfield Lab								
7470A	Batch QC	WG1210841-3	Mercury, Dissolved	LCSD	73	80-120	01-04,06-10	potential low bias

ORGANICS

PETROLEUM HYDROCARBONS

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-01	Date Collected:	02/25/19 11:00
Client ID:	MW-1	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/27/19 16:47		
Analyst:	MZ		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	ND		ug/l	50.0	--	1
C9-C12 Aliphatics	ND		ug/l	50.0	--	1
C9-C10 Aromatics	ND		ug/l	50.0	--	1
C5-C8 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
C9-C12 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
Benzene	ND		ug/l	2.00	--	1
Toluene	ND		ug/l	2.00	--	1
Ethylbenzene	ND		ug/l	2.00	--	1
p/m-Xylene	ND		ug/l	2.00	--	1
o-Xylene	ND		ug/l	2.00	--	1
Methyl tert butyl ether	ND		ug/l	3.00	--	1
Naphthalene	ND		ug/l	4.00	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	100		70-130
2,5-Dibromotoluene-FID	102		70-130

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-01			Date Collected:	02/25/19 11:00
Client ID:	MW-1			Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA			Field Prep:	Refer to COC
Sample Depth:					
Matrix:	Water			Extraction Method:	EPA 3510C
Analytical Method:	98,EPH-04-1.1			Extraction Date:	03/01/19 12:50
Analytical Date:	03/03/19 16:51	M.S. Analytical Date:	03/03/19 19:06	Cleanup Method1:	EPH-04-1
Analyst:	LL	M.S. Analyst:	ALS	Cleanup Date1:	03/03/19

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

EPH w/MS Targets - Westborough Lab

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
C9-C18 Aliphatics	ND		ug/l	100	--	1
C19-C36 Aliphatics	114		ug/l	100	--	1
C11-C22 Aromatics	116		ug/l	100	--	1
C11-C22 Aromatics, Adjusted	114		ug/l	100	--	1
Naphthalene	ND		ug/l	0.400	--	1
2-Methylnaphthalene	ND		ug/l	0.400	--	1
Acenaphthylene	ND		ug/l	0.400	--	1
Acenaphthene	ND		ug/l	0.400	--	1
Fluorene	ND		ug/l	0.400	--	1
Phenanthrene	ND		ug/l	0.400	--	1
Anthracene	ND		ug/l	0.400	--	1
Fluoranthene	0.448		ug/l	0.400	--	1
Pyrene	0.448		ug/l	0.400	--	1
Benzo(a)anthracene	ND		ug/l	0.400	--	1
Chrysene	ND		ug/l	0.400	--	1
Benzo(b)fluoranthene	ND		ug/l	0.400	--	1
Benzo(k)fluoranthene	ND		ug/l	0.400	--	1
Benzo(a)pyrene	0.332		ug/l	0.200	--	1
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.400	--	1
Benzo(ghi)perylene	ND		ug/l	0.400	--	1

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-01	Date Collected:	02/25/19 11:00
Client ID:	MW-1	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

EPH w/MS Targets - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	52		40-140
o-Terphenyl	56		40-140
2-Fluorobiphenyl	62		40-140
2-Bromonaphthalene	62		40-140
O-Terphenyl-MS	79		40-140

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-02	Date Collected:	02/25/19 09:35
Client ID:	MW-2	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/27/19 17:18		
Analyst:	MZ		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	ND		ug/l	50.0	--	1
C9-C12 Aliphatics	ND		ug/l	50.0	--	1
C9-C10 Aromatics	ND		ug/l	50.0	--	1
C5-C8 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
C9-C12 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
Benzene	ND		ug/l	2.00	--	1
Toluene	ND		ug/l	2.00	--	1
Ethylbenzene	ND		ug/l	2.00	--	1
p/m-Xylene	ND		ug/l	2.00	--	1
o-Xylene	ND		ug/l	2.00	--	1
Methyl tert butyl ether	ND		ug/l	3.00	--	1
Naphthalene	ND		ug/l	4.00	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	99		70-130
2,5-Dibromotoluene-FID	100		70-130

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-02	Date Collected:	02/25/19 09:35
Client ID:	MW-2	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water	Extraction Method:	EPA 3510C
Analytical Method:	98,EPH-04-1.1	Extraction Date:	03/01/19 15:20
Analytical Date:	03/03/19 17:23	M.S. Analytical Date:	03/03/19 19:37
Analyst:	LL	M.S. Analyst:	ALS
		Cleanup Method1:	EPH-04-1
		Cleanup Date1:	03/03/19

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
EPH w/MS Targets - Westborough Lab						
C9-C18 Aliphatics	ND		ug/l	100	--	1
C19-C36 Aliphatics	281		ug/l	100	--	1
C11-C22 Aromatics	ND		ug/l	100	--	1
C11-C22 Aromatics, Adjusted	ND		ug/l	100	--	1
Naphthalene	ND		ug/l	0.400	--	1
2-Methylnaphthalene	ND		ug/l	0.400	--	1
Acenaphthylene	ND		ug/l	0.400	--	1
Acenaphthene	ND		ug/l	0.400	--	1
Fluorene	ND		ug/l	0.400	--	1
Phenanthrene	ND		ug/l	0.400	--	1
Anthracene	ND		ug/l	0.400	--	1
Fluoranthene	0.572		ug/l	0.400	--	1
Pyrene	0.442		ug/l	0.400	--	1
Benzo(a)anthracene	ND		ug/l	0.400	--	1
Chrysene	ND		ug/l	0.400	--	1
Benzo(b)fluoranthene	ND		ug/l	0.400	--	1
Benzo(k)fluoranthene	ND		ug/l	0.400	--	1
Benzo(a)pyrene	0.288		ug/l	0.200	--	1
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.400	--	1
Benzo(ghi)perylene	ND		ug/l	0.400	--	1

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-02	Date Collected:	02/25/19 09:35
Client ID:	MW-2	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

EPH w/MS Targets - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	54		40-140
o-Terphenyl	53		40-140
2-Fluorobiphenyl	63		40-140
2-Bromonaphthalene	63		40-140
O-Terphenyl-MS	74		40-140

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-03			Date Collected:	02/25/19 09:30
Client ID:	MW-3			Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA			Field Prep:	Refer to COC
Sample Depth:					
Matrix:	Water			Extraction Method:	EPA 3510C
Analytical Method:	98,EPH-04-1.1			Extraction Date:	03/01/19 15:20
Analytical Date:	03/03/19 17:54	M.S. Analytical Date:	03/04/19 21:18	Cleanup Method1:	EPH-04-1
Analyst:	LL	M.S. Analyst:	CB	Cleanup Date1:	03/03/19

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
EPH w/MS Targets - Westborough Lab						
C9-C18 Aliphatics	257		ug/l	100	--	1
C19-C36 Aliphatics	ND		ug/l	100	--	1
C11-C22 Aromatics	191		ug/l	100	--	1
C11-C22 Aromatics, Adjusted	175		ug/l	100	--	1
Naphthalene	9.92		ug/l	0.400	--	1
2-Methylnaphthalene	1.08		ug/l	0.400	--	1
Acenaphthylene	ND		ug/l	0.400	--	1
Acenaphthene	ND		ug/l	0.400	--	1
Fluorene	ND		ug/l	0.400	--	1
Phenanthrene	0.816		ug/l	0.400	--	1
Anthracene	ND		ug/l	0.400	--	1
Fluoranthene	1.20		ug/l	0.400	--	1
Pyrene	0.988		ug/l	0.400	--	1
Benzo(a)anthracene	0.488		ug/l	0.400	--	1
Chrysene	0.438		ug/l	0.400	--	1
Benzo(b)fluoranthene	0.594		ug/l	0.400	--	1
Benzo(k)fluoranthene	ND		ug/l	0.400	--	1
Benzo(a)pyrene	0.526		ug/l	0.200	--	1
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.400	--	1
Benzo(ghi)perylene	ND		ug/l	0.400	--	1

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-03	Date Collected:	02/25/19 09:30
Client ID:	MW-3	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

EPH w/MS Targets - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	61		40-140
o-Terphenyl	68		40-140
2-Fluorobiphenyl	70		40-140
2-Bromonaphthalene	70		40-140
O-Terphenyl-MS	81		40-140

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-03 D	Date Collected:	02/25/19 09:30
Client ID:	MW-3	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/27/19 21:57		
Analyst:	MZ		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	792		ug/l	125	--	2.5
C9-C12 Aliphatics	1180		ug/l	125	--	2.5
C9-C10 Aromatics	854		ug/l	125	--	2.5
C5-C8 Aliphatics, Adjusted	765		ug/l	125	--	2.5
C9-C12 Aliphatics, Adjusted	160		ug/l	125	--	2.5
Benzene	18.8		ug/l	5.00	--	2.5
Toluene	8.61		ug/l	5.00	--	2.5
Ethylbenzene	55.5		ug/l	5.00	--	2.5
p/m-Xylene	103		ug/l	5.00	--	2.5
o-Xylene	11.8		ug/l	5.00	--	2.5
Methyl tert butyl ether	ND		ug/l	7.50	--	2.5
Naphthalene	11.3		ug/l	10.0	--	2.5

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	99		70-130
2,5-Dibromotoluene-FID	101		70-130

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-04	Date Collected:	02/25/19 10:25
Client ID:	MW-4	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/27/19 17:49		
Analyst:	MZ		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	ND		ug/l	50.0	--	1
C9-C12 Aliphatics	ND		ug/l	50.0	--	1
C9-C10 Aromatics	ND		ug/l	50.0	--	1
C5-C8 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
C9-C12 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
Benzene	ND		ug/l	2.00	--	1
Toluene	ND		ug/l	2.00	--	1
Ethylbenzene	ND		ug/l	2.00	--	1
p/m-Xylene	ND		ug/l	2.00	--	1
o-Xylene	ND		ug/l	2.00	--	1
Methyl tert butyl ether	ND		ug/l	3.00	--	1
Naphthalene	ND		ug/l	4.00	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	99		70-130
2,5-Dibromotoluene-FID	101		70-130

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-04			Date Collected:	02/25/19 10:25
Client ID:	MW-4			Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA			Field Prep:	Refer to COC
Sample Depth:					
Matrix:	Water			Extraction Method:	EPA 3510C
Analytical Method:	98,EPH-04-1.1			Extraction Date:	03/01/19 15:20
Analytical Date:	03/03/19 18:26	M.S. Analytical Date:	03/03/19 20:39	Cleanup Method1:	EPH-04-1
Analyst:	LL	M.S. Analyst:	ALS	Cleanup Date1:	03/03/19

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
EPH w/MS Targets - Westborough Lab						
C9-C18 Aliphatics	ND		ug/l	100	--	1
C19-C36 Aliphatics	ND		ug/l	100	--	1
C11-C22 Aromatics	ND		ug/l	100	--	1
C11-C22 Aromatics, Adjusted	ND		ug/l	100	--	1
Naphthalene	ND		ug/l	0.400	--	1
2-Methylnaphthalene	ND		ug/l	0.400	--	1
Acenaphthylene	ND		ug/l	0.400	--	1
Acenaphthene	ND		ug/l	0.400	--	1
Fluorene	ND		ug/l	0.400	--	1
Phenanthrene	ND		ug/l	0.400	--	1
Anthracene	ND		ug/l	0.400	--	1
Fluoranthene	ND		ug/l	0.400	--	1
Pyrene	ND		ug/l	0.400	--	1
Benzo(a)anthracene	ND		ug/l	0.400	--	1
Chrysene	ND		ug/l	0.400	--	1
Benzo(b)fluoranthene	ND		ug/l	0.400	--	1
Benzo(k)fluoranthene	ND		ug/l	0.400	--	1
Benzo(a)pyrene	ND		ug/l	0.200	--	1
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.400	--	1
Benzo(ghi)perylene	ND		ug/l	0.400	--	1

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-04	Date Collected:	02/25/19 10:25
Client ID:	MW-4	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

EPH w/MS Targets - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	58		40-140
o-Terphenyl	62		40-140
2-Fluorobiphenyl	65		40-140
2-Bromonaphthalene	65		40-140
O-Terphenyl-MS	84		40-140

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-05	Date Collected:	02/25/19 14:00
Client ID:	MW-5	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/28/19 13:57		
Analyst:	MZ		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	610		ug/l	50.0	--	1
C9-C12 Aliphatics	500		ug/l	50.0	--	1
C9-C10 Aromatics	301		ug/l	50.0	--	1
C5-C8 Aliphatics, Adjusted	610		ug/l	50.0	--	1
C9-C12 Aliphatics, Adjusted	199		ug/l	50.0	--	1
Benzene	ND		ug/l	2.00	--	1
Toluene	ND		ug/l	2.00	--	1
Ethylbenzene	ND		ug/l	2.00	--	1
p/m-Xylene	ND		ug/l	2.00	--	1
o-Xylene	ND		ug/l	2.00	--	1
Methyl tert butyl ether	ND		ug/l	3.00	--	1
Naphthalene	ND		ug/l	4.00	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	116		70-130
2,5-Dibromotoluene-FID	117		70-130

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-06	Date Collected:	02/25/19 11:25
Client ID:	MW-101	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/27/19 18:20		
Analyst:	MZ		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	ND		ug/l	50.0	--	1
C9-C12 Aliphatics	62.5		ug/l	50.0	--	1
C9-C10 Aromatics	ND		ug/l	50.0	--	1
C5-C8 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
C9-C12 Aliphatics, Adjusted	62.5		ug/l	50.0	--	1
Benzene	ND		ug/l	2.00	--	1
Toluene	ND		ug/l	2.00	--	1
Ethylbenzene	ND		ug/l	2.00	--	1
p/m-Xylene	ND		ug/l	2.00	--	1
o-Xylene	ND		ug/l	2.00	--	1
Methyl tert butyl ether	ND		ug/l	3.00	--	1
Naphthalene	ND		ug/l	4.00	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	99		70-130
2,5-Dibromotoluene-FID	101		70-130

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-06			Date Collected:	02/25/19 11:25
Client ID:	MW-101			Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA			Field Prep:	Refer to COC
Sample Depth:					
Matrix:	Water			Extraction Method:	EPA 3510C
Analytical Method:	98,EPH-04-1.1			Extraction Date:	03/01/19 15:20
Analytical Date:	03/03/19 18:57	M.S. Analytical Date:	03/03/19 21:11	Cleanup Method1:	EPH-04-1
Analyst:	LL	M.S. Analyst:	ALS	Cleanup Date1:	03/03/19

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
EPH w/MS Targets - Westborough Lab						
C9-C18 Aliphatics	ND		ug/l	100	--	1
C19-C36 Aliphatics	ND		ug/l	100	--	1
C11-C22 Aromatics	ND		ug/l	100	--	1
C11-C22 Aromatics, Adjusted	ND		ug/l	100	--	1
Naphthalene	ND		ug/l	0.400	--	1
2-Methylnaphthalene	ND		ug/l	0.400	--	1
Acenaphthylene	ND		ug/l	0.400	--	1
Acenaphthene	ND		ug/l	0.400	--	1
Fluorene	ND		ug/l	0.400	--	1
Phenanthrene	ND		ug/l	0.400	--	1
Anthracene	ND		ug/l	0.400	--	1
Fluoranthene	ND		ug/l	0.400	--	1
Pyrene	ND		ug/l	0.400	--	1
Benzo(a)anthracene	ND		ug/l	0.400	--	1
Chrysene	ND		ug/l	0.400	--	1
Benzo(b)fluoranthene	ND		ug/l	0.400	--	1
Benzo(k)fluoranthene	ND		ug/l	0.400	--	1
Benzo(a)pyrene	ND		ug/l	0.200	--	1
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.400	--	1
Benzo(ghi)perylene	ND		ug/l	0.400	--	1

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-06	Date Collected:	02/25/19 11:25
Client ID:	MW-101	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

EPH w/MS Targets - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	59		40-140
o-Terphenyl	47		40-140
2-Fluorobiphenyl	50		40-140
2-Bromonaphthalene	50		40-140
O-Terphenyl-MS	109		40-140

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-07	Date Collected:	02/25/19 12:00
Client ID:	MW-201	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/27/19 18:51		
Analyst:	MZ		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	ND		ug/l	50.0	--	1
C9-C12 Aliphatics	ND		ug/l	50.0	--	1
C9-C10 Aromatics	ND		ug/l	50.0	--	1
C5-C8 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
C9-C12 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
Benzene	ND		ug/l	2.00	--	1
Toluene	ND		ug/l	2.00	--	1
Ethylbenzene	ND		ug/l	2.00	--	1
p/m-Xylene	ND		ug/l	2.00	--	1
o-Xylene	ND		ug/l	2.00	--	1
Methyl tert butyl ether	ND		ug/l	3.00	--	1
Naphthalene	ND		ug/l	4.00	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	96		70-130
2,5-Dibromotoluene-FID	99		70-130

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-07			Date Collected:	02/25/19 12:00
Client ID:	MW-201			Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA			Field Prep:	Refer to COC
Sample Depth:					
Matrix:	Water			Extraction Method:	EPA 3510C
Analytical Method:	98,EPH-04-1.1			Extraction Date:	03/01/19 15:20
Analytical Date:	03/03/19 19:29	M.S. Analytical Date:	03/03/19 21:42	Cleanup Method1:	EPH-04-1
Analyst:	LL	M.S. Analyst:	ALS	Cleanup Date1:	03/03/19

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
EPH w/MS Targets - Westborough Lab						
C9-C18 Aliphatics	ND		ug/l	100	--	1
C19-C36 Aliphatics	106		ug/l	100	--	1
C11-C22 Aromatics	ND		ug/l	100	--	1
C11-C22 Aromatics, Adjusted	ND		ug/l	100	--	1
Naphthalene	ND		ug/l	0.400	--	1
2-Methylnaphthalene	ND		ug/l	0.400	--	1
Acenaphthylene	ND		ug/l	0.400	--	1
Acenaphthene	ND		ug/l	0.400	--	1
Fluorene	ND		ug/l	0.400	--	1
Phenanthrene	ND		ug/l	0.400	--	1
Anthracene	ND		ug/l	0.400	--	1
Fluoranthene	ND		ug/l	0.400	--	1
Pyrene	ND		ug/l	0.400	--	1
Benzo(a)anthracene	ND		ug/l	0.400	--	1
Chrysene	ND		ug/l	0.400	--	1
Benzo(b)fluoranthene	ND		ug/l	0.400	--	1
Benzo(k)fluoranthene	ND		ug/l	0.400	--	1
Benzo(a)pyrene	ND		ug/l	0.200	--	1
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.400	--	1
Benzo(ghi)perylene	ND		ug/l	0.400	--	1

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-07	Date Collected:	02/25/19 12:00
Client ID:	MW-201	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

EPH w/MS Targets - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	58		40-140
o-Terphenyl	62		40-140
2-Fluorobiphenyl	66		40-140
2-Bromonaphthalene	66		40-140
O-Terphenyl-MS	97		40-140

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-08	Date Collected:	02/25/19 12:25
Client ID:	MW-202	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/27/19 19:22		
Analyst:	MZ		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	ND		ug/l	50.0	--	1
C9-C12 Aliphatics	ND		ug/l	50.0	--	1
C9-C10 Aromatics	ND		ug/l	50.0	--	1
C5-C8 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
C9-C12 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
Benzene	ND		ug/l	2.00	--	1
Toluene	ND		ug/l	2.00	--	1
Ethylbenzene	ND		ug/l	2.00	--	1
p/m-Xylene	ND		ug/l	2.00	--	1
o-Xylene	ND		ug/l	2.00	--	1
Methyl tert butyl ether	ND		ug/l	3.00	--	1
Naphthalene	ND		ug/l	4.00	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	98		70-130
2,5-Dibromotoluene-FID	100		70-130

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-08	Date Collected:	02/25/19 12:25
Client ID:	MW-202	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water	Extraction Method:	EPA 3510C
Analytical Method:	98,EPH-04-1.1	Extraction Date:	03/01/19 15:20
Analytical Date:	03/03/19 20:00	M.S. Analytical Date:	03/03/19 22:13
Analyst:	LL	M.S. Analyst:	ALS
		Cleanup Method1:	EPH-04-1
		Cleanup Date1:	03/03/19

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
EPH w/MS Targets - Westborough Lab						
C9-C18 Aliphatics	ND		ug/l	100	--	1
C19-C36 Aliphatics	239		ug/l	100	--	1
C11-C22 Aromatics	ND		ug/l	100	--	1
C11-C22 Aromatics, Adjusted	ND		ug/l	100	--	1
Naphthalene	ND		ug/l	0.400	--	1
2-Methylnaphthalene	ND		ug/l	0.400	--	1
Acenaphthylene	ND		ug/l	0.400	--	1
Acenaphthene	ND		ug/l	0.400	--	1
Fluorene	ND		ug/l	0.400	--	1
Phenanthrene	ND		ug/l	0.400	--	1
Anthracene	ND		ug/l	0.400	--	1
Fluoranthene	ND		ug/l	0.400	--	1
Pyrene	ND		ug/l	0.400	--	1
Benzo(a)anthracene	ND		ug/l	0.400	--	1
Chrysene	ND		ug/l	0.400	--	1
Benzo(b)fluoranthene	ND		ug/l	0.400	--	1
Benzo(k)fluoranthene	ND		ug/l	0.400	--	1
Benzo(a)pyrene	ND		ug/l	0.200	--	1
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.400	--	1
Benzo(ghi)perylene	ND		ug/l	0.400	--	1

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-08	Date Collected:	02/25/19 12:25
Client ID:	MW-202	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

EPH w/MS Targets - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	57		40-140
o-Terphenyl	58		40-140
2-Fluorobiphenyl	62		40-140
2-Bromonaphthalene	62		40-140
O-Terphenyl-MS	85		40-140

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-09	Date Collected:	02/25/19 12:50
Client ID:	MW-203	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/27/19 19:53		
Analyst:	MZ		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	ND		ug/l	50.0	--	1
C9-C12 Aliphatics	ND		ug/l	50.0	--	1
C9-C10 Aromatics	ND		ug/l	50.0	--	1
C5-C8 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
C9-C12 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
Benzene	ND		ug/l	2.00	--	1
Toluene	ND		ug/l	2.00	--	1
Ethylbenzene	ND		ug/l	2.00	--	1
p/m-Xylene	ND		ug/l	2.00	--	1
o-Xylene	ND		ug/l	2.00	--	1
Methyl tert butyl ether	ND		ug/l	3.00	--	1
Naphthalene	ND		ug/l	4.00	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	97		70-130
2,5-Dibromotoluene-FID	99		70-130

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-09			Date Collected:	02/25/19 12:50
Client ID:	MW-203			Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA			Field Prep:	Refer to COC
Sample Depth:					
Matrix:	Water			Extraction Method:	EPA 3510C
Analytical Method:	98,EPH-04-1.1			Extraction Date:	03/01/19 15:20
Analytical Date:	03/03/19 20:32	M.S. Analytical Date:	03/03/19 22:44	Cleanup Method1:	EPH-04-1
Analyst:	LL	M.S. Analyst:	ALS	Cleanup Date1:	03/03/19

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
EPH w/MS Targets - Westborough Lab						
C9-C18 Aliphatics	ND		ug/l	100	--	1
C19-C36 Aliphatics	ND		ug/l	100	--	1
C11-C22 Aromatics	ND		ug/l	100	--	1
C11-C22 Aromatics, Adjusted	ND		ug/l	100	--	1
Naphthalene	ND		ug/l	0.400	--	1
2-Methylnaphthalene	ND		ug/l	0.400	--	1
Acenaphthylene	ND		ug/l	0.400	--	1
Acenaphthene	ND		ug/l	0.400	--	1
Fluorene	ND		ug/l	0.400	--	1
Phenanthrene	ND		ug/l	0.400	--	1
Anthracene	ND		ug/l	0.400	--	1
Fluoranthene	ND		ug/l	0.400	--	1
Pyrene	ND		ug/l	0.400	--	1
Benzo(a)anthracene	ND		ug/l	0.400	--	1
Chrysene	ND		ug/l	0.400	--	1
Benzo(b)fluoranthene	ND		ug/l	0.400	--	1
Benzo(k)fluoranthene	ND		ug/l	0.400	--	1
Benzo(a)pyrene	ND		ug/l	0.200	--	1
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.400	--	1
Benzo(ghi)perylene	ND		ug/l	0.400	--	1

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-09	Date Collected:	02/25/19 12:50
Client ID:	MW-203	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

EPH w/MS Targets - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	65		40-140
o-Terphenyl	65		40-140
2-Fluorobiphenyl	69		40-140
2-Bromonaphthalene	68		40-140
O-Terphenyl-MS	91		40-140

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-10	Date Collected:	02/25/19 13:15
Client ID:	MW-208	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/27/19 20:24		
Analyst:	MZ		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	ND		ug/l	50.0	--	1
C9-C12 Aliphatics	ND		ug/l	50.0	--	1
C9-C10 Aromatics	ND		ug/l	50.0	--	1
C5-C8 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
C9-C12 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
Benzene	ND		ug/l	2.00	--	1
Toluene	ND		ug/l	2.00	--	1
Ethylbenzene	ND		ug/l	2.00	--	1
p/m-Xylene	ND		ug/l	2.00	--	1
o-Xylene	ND		ug/l	2.00	--	1
Methyl tert butyl ether	ND		ug/l	3.00	--	1
Naphthalene	ND		ug/l	4.00	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	95		70-130
2,5-Dibromotoluene-FID	98		70-130

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-10			Date Collected:	02/25/19 13:15
Client ID:	MW-208			Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA			Field Prep:	Refer to COC
Sample Depth:					
Matrix:	Water			Extraction Method:	EPA 3510C
Analytical Method:	98,EPH-04-1.1			Extraction Date:	03/01/19 15:20
Analytical Date:	03/03/19 21:03	M.S. Analytical Date:	03/03/19 23:15	Cleanup Method1:	EPH-04-1
Analyst:	LL	M.S. Analyst:	ALS	Cleanup Date1:	03/03/19

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
EPH w/MS Targets - Westborough Lab						
C9-C18 Aliphatics	ND		ug/l	100	--	1
C19-C36 Aliphatics	ND		ug/l	100	--	1
C11-C22 Aromatics	ND		ug/l	100	--	1
C11-C22 Aromatics, Adjusted	ND		ug/l	100	--	1
Naphthalene	ND		ug/l	0.400	--	1
2-Methylnaphthalene	ND		ug/l	0.400	--	1
Acenaphthylene	ND		ug/l	0.400	--	1
Acenaphthene	ND		ug/l	0.400	--	1
Fluorene	ND		ug/l	0.400	--	1
Phenanthrene	ND		ug/l	0.400	--	1
Anthracene	ND		ug/l	0.400	--	1
Fluoranthene	ND		ug/l	0.400	--	1
Pyrene	ND		ug/l	0.400	--	1
Benzo(a)anthracene	ND		ug/l	0.400	--	1
Chrysene	ND		ug/l	0.400	--	1
Benzo(b)fluoranthene	ND		ug/l	0.400	--	1
Benzo(k)fluoranthene	ND		ug/l	0.400	--	1
Benzo(a)pyrene	ND		ug/l	0.200	--	1
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	--	1
Dibenzo(a,h)anthracene	ND		ug/l	0.400	--	1
Benzo(ghi)perylene	ND		ug/l	0.400	--	1

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-10	Date Collected:	02/25/19 13:15
Client ID:	MW-208	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

EPH w/MS Targets - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	61		40-140
o-Terphenyl	56		40-140
2-Fluorobiphenyl	60		40-140
2-Bromonaphthalene	60		40-140
O-Terphenyl-MS	84		40-140

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID:	L1907364-11	Date Collected:	02/25/19 00:00
Client ID:	TRIP BLANK	Date Received:	02/25/19
Sample Location:	700 WORCESTER RD., FRAMINGHAM, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/28/19 13:26		
Analyst:	MZ		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	ND		ug/l	50.0	--	1
C9-C12 Aliphatics	ND		ug/l	50.0	--	1
C9-C10 Aromatics	ND		ug/l	50.0	--	1
C5-C8 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
C9-C12 Aliphatics, Adjusted	ND		ug/l	50.0	--	1
Benzene	ND		ug/l	2.00	--	1
Toluene	ND		ug/l	2.00	--	1
Ethylbenzene	ND		ug/l	2.00	--	1
p/m-Xylene	ND		ug/l	2.00	--	1
o-Xylene	ND		ug/l	2.00	--	1
Methyl tert butyl ether	ND		ug/l	3.00	--	1
Naphthalene	ND		ug/l	4.00	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	99		70-130
2,5-Dibromotoluene-FID	103		70-130

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 131,VPH-18-2.1
Analytical Date: 02/27/19 14:43
Analyst: MKS

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Petroleum Hydrocarbons - Westborough Lab for sample(s): 01-04,06-10 Batch: WG1211208-4					
C5-C8 Aliphatics	ND		ug/l	50.0	--
C9-C12 Aliphatics	ND		ug/l	50.0	--
C9-C10 Aromatics	ND		ug/l	50.0	--
C5-C8 Aliphatics, Adjusted	ND		ug/l	50.0	--
C9-C12 Aliphatics, Adjusted	ND		ug/l	50.0	--
Benzene	ND		ug/l	2.00	--
Toluene	ND		ug/l	2.00	--
Ethylbenzene	ND		ug/l	2.00	--
p/m-Xylene	ND		ug/l	2.00	--
o-Xylene	ND		ug/l	2.00	--
Methyl tert butyl ether	ND		ug/l	3.00	--
Naphthalene	ND		ug/l	4.00	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	95		70-130
2,5-Dibromotoluene-FID	97		70-130

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 131,VPH-18-2.1
Analytical Date: 02/28/19 09:49
Analyst: MZ

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Petroleum Hydrocarbons - Westborough Lab for sample(s): 05,11 Batch: WG1211557-4					
C5-C8 Aliphatics	ND		ug/l	50.0	--
C9-C12 Aliphatics	ND		ug/l	50.0	--
C9-C10 Aromatics	ND		ug/l	50.0	--
C5-C8 Aliphatics, Adjusted	ND		ug/l	50.0	--
C9-C12 Aliphatics, Adjusted	ND		ug/l	50.0	--
Benzene	ND		ug/l	2.00	--
Toluene	ND		ug/l	2.00	--
Ethylbenzene	ND		ug/l	2.00	--
p/m-Xylene	ND		ug/l	2.00	--
o-Xylene	ND		ug/l	2.00	--
Methyl tert butyl ether	ND		ug/l	3.00	--
Naphthalene	ND		ug/l	4.00	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	97		70-130
2,5-Dibromotoluene-FID	100		70-130

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 98,EPH-04-1.1
Analytical Date: 03/03/19 15:17
Analyst: LL

M.S. Analytical Date: 03/03/19 17:33
M.S. Analyst: ALS

Extraction Method: EPA 3510C
Extraction Date: 03/01/19 12:50
Cleanup Method: EPH-04-1
Cleanup Date: 03/03/19

Parameter	Result	Qualifier	Units	RL	MDL
EPH w/MS Targets - Westborough Lab for sample(s): 01-04,06-10 Batch: WG1212052-1					
C9-C18 Aliphatics	ND		ug/l	100	--
C19-C36 Aliphatics	ND		ug/l	100	--
C11-C22 Aromatics	ND		ug/l	100	--
C11-C22 Aromatics, Adjusted	ND		ug/l	100	--
Naphthalene	ND		ug/l	0.400	--
2-Methylnaphthalene	ND		ug/l	0.400	--
Acenaphthylene	ND		ug/l	0.400	--
Acenaphthene	ND		ug/l	0.400	--
Fluorene	ND		ug/l	0.400	--
Phenanthrene	ND		ug/l	0.400	--
Anthracene	ND		ug/l	0.400	--
Fluoranthene	ND		ug/l	0.400	--
Pyrene	ND		ug/l	0.400	--
Benzo(a)anthracene	ND		ug/l	0.400	--
Chrysene	ND		ug/l	0.400	--
Benzo(b)fluoranthene	ND		ug/l	0.400	--
Benzo(k)fluoranthene	ND		ug/l	0.400	--
Benzo(a)pyrene	ND		ug/l	0.200	--
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	--
Dibenzo(a,h)anthracene	ND		ug/l	0.400	--
Benzo(ghi)perylene	ND		ug/l	0.400	--

Project Name: 700 WORCESTER RD.
Project Number: Not Specified

Lab Number: L1907364
Report Date: 03/05/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 98,EPH-04-1.1
Analytical Date: 03/03/19 15:17 03/03/19 17:33
Analyst: LL ALS

Extraction Method: EPA 3510C
Extraction Date: 03/01/19 12:50
Cleanup Method: EPH-04-1
Cleanup Date: 03/03/19

Parameter	Result	Qualifier	Units	RL	MDL
EPH w/MS Targets - Westborough Lab for sample(s): 01-04,06-10 Batch: WG1212052-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	69		40-140
o-Terphenyl	62		40-140
2-Fluorobiphenyl	69		40-140
2-Bromonaphthalene	69		40-140
O-Terphenyl-MS	95		40-140

Lab Control Sample Analysis
Batch Quality Control

Project Name: 700 WORCESTER RD.
Project Number: Not Specified

Lab Number: L1907364
Report Date: 03/05/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 01-04,06-10 Batch: WG1211208-2 WG1211208-3								
C5-C8 Aliphatics	95		95		70-130	1		25
C9-C12 Aliphatics	109		107		70-130	2		25
C9-C10 Aromatics	113		111		70-130	2		25
Benzene	106		104		70-130	2		25
Toluene	109		107		70-130	2		25
Ethylbenzene	111		109		70-130	2		25
p/m-Xylene	113		111		70-130	2		25
o-Xylene	109		107		70-130	2		25
Methyl tert butyl ether	106		106		70-130	0		25
Naphthalene	106		106		70-130	0		25
1,2,4-Trimethylbenzene	113		111		70-130	2		25
Pentane	88		87		70-130	1		25
2-Methylpentane	97		96		70-130	1		25
2,2,4-Trimethylpentane	102		100		70-130	2		25
n-Nonane	107		106		30-130	1		25
n-Decane	106		104		70-130	2		25
n-Butylcyclohexane	113		111		70-130	2		25

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2,5-Dibromotoluene-PID	105		104		70-130
2,5-Dibromotoluene-FID	107		106		70-130

Lab Control Sample Analysis

Batch Quality Control

Project Name: 700 WORCESTER RD.

Project Number: Not Specified

Lab Number: L1907364

Report Date: 03/05/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 05,11 Batch: WG1211557-2 WG1211557-3								
C5-C8 Aliphatics	97		96		70-130	1		25
C9-C12 Aliphatics	110		108		70-130	2		25
C9-C10 Aromatics	114		111		70-130	3		25
Benzene	105		105		70-130	0		25
Toluene	108		107		70-130	1		25
Ethylbenzene	112		109		70-130	3		25
p/m-Xylene	114		111		70-130	3		25
o-Xylene	110		107		70-130	3		25
Methyl tert butyl ether	107		106		70-130	1		25
Naphthalene	111		106		70-130	5		25
1,2,4-Trimethylbenzene	114		111		70-130	3		25
Pentane	89		88		70-130	1		25
2-Methylpentane	98		98		70-130	0		25
2,2,4-Trimethylpentane	102		102		70-130	0		25
n-Nonane	109		107		30-130	2		25
n-Decane	107		105		70-130	2		25
n-Butylcyclohexane	115		113		70-130	2		25

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2,5-Dibromotoluene-PID	109		104		70-130
2,5-Dibromotoluene-FID	110		107		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: 700 WORCESTER RD.
Project Number: Not Specified

Lab Number: L1907364
Report Date: 03/05/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
EPH w/MS Targets - Westborough Lab Associated sample(s): 01-04,06-10 Batch: WG1212052-2 WG1212052-3								
C9-C18 Aliphatics	62		71		40-140	14		25
C19-C36 Aliphatics	75		82		40-140	9		25
C11-C22 Aromatics	66		75		40-140	13		25
Naphthalene	97		107		40-140	10		25
2-Methylnaphthalene	74		83		40-140	11		25
Acenaphthylene	120		134		40-140	11		25
Acenaphthene	106		119		40-140	12		25
Fluorene	121		135		40-140	11		25
Phenanthrene	102		110		40-140	8		25
Anthracene	107		116		40-140	8		25
Fluoranthene	125		133		40-140	6		25
Pyrene	125		132		40-140	5		25
Benzo(a)anthracene	138		**145**	Q	40-140	5		25
Chrysene	117		122		40-140	4		25
Benzo(b)fluoranthene	129		136		40-140	5		25
Benzo(k)fluoranthene	118		123		40-140	4		25
Benzo(a)pyrene	109		115		40-140	5		25
Indeno(1,2,3-cd)Pyrene	117		120		40-140	3		25
Dibenzo(a,h)anthracene	108		110		40-140	2		25
Benzo(ghi)perylene	102		101		40-140	1		25
Nonane (C9)	46		55		30-140	18		25
Decane (C10)	53		63		40-140	17		25
Dodecane (C12)	58		67		40-140	14		25

Lab Control Sample Analysis
Batch Quality Control

Project Name: 700 WORCESTER RD.
Project Number: Not Specified

Lab Number: L1907364
Report Date: 03/05/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
EPH w/MS Targets - Westborough Lab Associated sample(s): 01-04,06-10 Batch: WG1212052-2 WG1212052-3								
Tetradecane (C14)	61		71		40-140	15		25
Hexadecane (C16)	65		74		40-140	13		25
Octadecane (C18)	71		78		40-140	9		25
Nonadecane (C19)	72		79		40-140	9		25
Eicosane (C20)	73		80		40-140	9		25
Docosane (C22)	74		80		40-140	8		25
Tetracosane (C24)	74		81		40-140	9		25
Hexacosane (C26)	74		80		40-140	8		25
Octacosane (C28)	74		80		40-140	8		25
Triacontane (C30)	73		79		40-140	8		25
Hexatriacontane (C36)	72		78		40-140	8		25

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Chloro-Octadecane	56		62		40-140
o-Terphenyl	57		63		40-140
2-Fluorobiphenyl	68		68		40-140
2-Bromonaphthalene	69		68		40-140
O-Terphenyl-MS	120		129		40-140
% Naphthalene Breakthrough	0		0		
% 2-Methylnaphthalene Breakthrough	0		0		

METALS

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID: L1907364-01 Date Collected: 02/25/19 11:00

Client ID: MW-1 Date Received: 02/25/19

Sample Location: 700 WORCESTER RD., FRAMINGHAM, MA Field Prep: Refer to COC

Sample Depth:

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 21:01	EPA 3005A	97,6010D	MC
Arsenic, Total	0.0178		mg/l	0.0050	--	1	02/26/19 19:01	02/27/19 21:01	EPA 3005A	97,6010D	MC
Barium, Total	0.247		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:01	EPA 3005A	97,6010D	MC
Beryllium, Total	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 21:01	EPA 3005A	97,6010D	MC
Cadmium, Total	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 21:01	EPA 3005A	97,6010D	MC
Chromium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:01	EPA 3005A	97,6010D	MC
Lead, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:01	EPA 3005A	97,6010D	MC
Mercury, Total	ND		mg/l	0.0002	--	1	02/27/19 12:34	03/01/19 12:21	EPA 7470A	97,7470A	MG
Nickel, Total	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 21:01	EPA 3005A	97,6010D	MC
Selenium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:01	EPA 3005A	97,6010D	MC
Silver, Total	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 21:01	EPA 3005A	97,6010D	MC
Thallium, Total	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 21:01	EPA 3005A	97,6010D	MC
Vanadium, Total	0.011		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:01	EPA 3005A	97,6010D	MC
Zinc, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 21:01	EPA 3005A	97,6010D	MC
MCP Dissolved Metals - Mansfield Lab											
Antimony, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:29	EPA 3005A	97,6010D	MC
Arsenic, Dissolved	0.011		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:29	EPA 3005A	97,6010D	MC
Barium, Dissolved	0.223		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:29	EPA 3005A	97,6010D	MC
Beryllium, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:29	EPA 3005A	97,6010D	MC
Cadmium, Dissolved	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 22:29	EPA 3005A	97,6010D	MC
Chromium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:29	EPA 3005A	97,6010D	MC
Lead, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:29	EPA 3005A	97,6010D	MC
Mercury, Dissolved	ND		mg/l	0.0002	--	1	02/27/19 12:34	02/28/19 16:18	EPA 7470A	97,7470A	GD
Nickel, Dissolved	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 22:29	EPA 3005A	97,6010D	MC
Selenium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:29	EPA 3005A	97,6010D	MC
Silver, Dissolved	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 22:29	EPA 3005A	97,6010D	MC
Thallium, Dissolved	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 22:29	EPA 3005A	97,6010D	MC
Vanadium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:29	EPA 3005A	97,6010D	MC
Zinc, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:29	EPA 3005A	97,6010D	MC

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID: L1907364-02 Date Collected: 02/25/19 09:35

Client ID: MW-2 Date Received: 02/25/19

Sample Location: 700 WORCESTER RD., FRAMINGHAM, MA Field Prep: Refer to COC

Sample Depth:

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 21:05	EPA 3005A	97,6010D	MC
Arsenic, Total	0.0067		mg/l	0.0050	--	1	02/26/19 19:01	02/27/19 21:05	EPA 3005A	97,6010D	MC
Barium, Total	0.093		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:05	EPA 3005A	97,6010D	MC
Beryllium, Total	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 21:05	EPA 3005A	97,6010D	MC
Cadmium, Total	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 21:05	EPA 3005A	97,6010D	MC
Chromium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:05	EPA 3005A	97,6010D	MC
Lead, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:05	EPA 3005A	97,6010D	MC
Mercury, Total	ND		mg/l	0.0002	--	1	02/27/19 12:34	03/01/19 12:23	EPA 7470A	97,7470A	MG
Nickel, Total	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 21:05	EPA 3005A	97,6010D	MC
Selenium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:05	EPA 3005A	97,6010D	MC
Silver, Total	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 21:05	EPA 3005A	97,6010D	MC
Thallium, Total	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 21:05	EPA 3005A	97,6010D	MC
Vanadium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:05	EPA 3005A	97,6010D	MC
Zinc, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 21:05	EPA 3005A	97,6010D	MC
MCP Dissolved Metals - Mansfield Lab											
Antimony, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:34	EPA 3005A	97,6010D	MC
Arsenic, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:34	EPA 3005A	97,6010D	MC
Barium, Dissolved	0.10		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:34	EPA 3005A	97,6010D	MC
Beryllium, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:34	EPA 3005A	97,6010D	MC
Cadmium, Dissolved	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 22:34	EPA 3005A	97,6010D	MC
Chromium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:34	EPA 3005A	97,6010D	MC
Lead, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:34	EPA 3005A	97,6010D	MC
Mercury, Dissolved	ND		mg/l	0.0002	--	1	02/27/19 12:34	02/28/19 16:20	EPA 7470A	97,7470A	GD
Nickel, Dissolved	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 22:34	EPA 3005A	97,6010D	MC
Selenium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:34	EPA 3005A	97,6010D	MC
Silver, Dissolved	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 22:34	EPA 3005A	97,6010D	MC
Thallium, Dissolved	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 22:34	EPA 3005A	97,6010D	MC
Vanadium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:34	EPA 3005A	97,6010D	MC
Zinc, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:34	EPA 3005A	97,6010D	MC

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID: L1907364-03 Date Collected: 02/25/19 09:30

Client ID: MW-3 Date Received: 02/25/19

Sample Location: 700 WORCESTER RD., FRAMINGHAM, MA Field Prep: Refer to COC

Sample Depth:

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 21:10	EPA 3005A	97,6010D	MC
Arsenic, Total	0.0098		mg/l	0.0050	--	1	02/26/19 19:01	02/27/19 21:10	EPA 3005A	97,6010D	MC
Barium, Total	0.526		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:10	EPA 3005A	97,6010D	MC
Beryllium, Total	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 21:10	EPA 3005A	97,6010D	MC
Cadmium, Total	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 21:10	EPA 3005A	97,6010D	MC
Chromium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:10	EPA 3005A	97,6010D	MC
Lead, Total	0.027		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:10	EPA 3005A	97,6010D	MC
Mercury, Total	ND		mg/l	0.0002	--	1	02/27/19 12:34	03/01/19 12:29	EPA 7470A	97,7470A	MG
Nickel, Total	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 21:10	EPA 3005A	97,6010D	MC
Selenium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:10	EPA 3005A	97,6010D	MC
Silver, Total	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 21:10	EPA 3005A	97,6010D	MC
Thallium, Total	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 21:10	EPA 3005A	97,6010D	MC
Vanadium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:10	EPA 3005A	97,6010D	MC
Zinc, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 21:10	EPA 3005A	97,6010D	MC
MCP Dissolved Metals - Mansfield Lab											
Antimony, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:50	EPA 3005A	97,6010D	MC
Arsenic, Dissolved	0.011		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:50	EPA 3005A	97,6010D	MC
Barium, Dissolved	0.635		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:50	EPA 3005A	97,6010D	MC
Beryllium, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:50	EPA 3005A	97,6010D	MC
Cadmium, Dissolved	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 22:50	EPA 3005A	97,6010D	MC
Chromium, Dissolved	0.015		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:50	EPA 3005A	97,6010D	MC
Lead, Dissolved	0.050		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:50	EPA 3005A	97,6010D	MC
Mercury, Dissolved	ND		mg/l	0.0002	--	1	02/27/19 12:34	02/28/19 16:22	EPA 7470A	97,7470A	GD
Nickel, Dissolved	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 22:50	EPA 3005A	97,6010D	MC
Selenium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:50	EPA 3005A	97,6010D	MC
Silver, Dissolved	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 22:50	EPA 3005A	97,6010D	MC
Thallium, Dissolved	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 22:50	EPA 3005A	97,6010D	MC
Vanadium, Dissolved	0.017		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:50	EPA 3005A	97,6010D	MC
Zinc, Dissolved	0.051		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:50	EPA 3005A	97,6010D	MC

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID: L1907364-04 Date Collected: 02/25/19 10:25

Client ID: MW-4 Date Received: 02/25/19

Sample Location: 700 WORCESTER RD., FRAMINGHAM, MA Field Prep: Refer to COC

Sample Depth:

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 21:14	EPA 3005A	97,6010D	MC
Arsenic, Total	ND		mg/l	0.0050	--	1	02/26/19 19:01	02/27/19 21:14	EPA 3005A	97,6010D	MC
Barium, Total	1.20		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:14	EPA 3005A	97,6010D	MC
Beryllium, Total	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 21:14	EPA 3005A	97,6010D	MC
Cadmium, Total	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 21:14	EPA 3005A	97,6010D	MC
Chromium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:14	EPA 3005A	97,6010D	MC
Lead, Total	0.017		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:14	EPA 3005A	97,6010D	MC
Mercury, Total	ND		mg/l	0.0002	--	1	02/27/19 12:34	03/01/19 12:31	EPA 7470A	97,7470A	MG
Nickel, Total	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 21:14	EPA 3005A	97,6010D	MC
Selenium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:14	EPA 3005A	97,6010D	MC
Silver, Total	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 21:14	EPA 3005A	97,6010D	MC
Thallium, Total	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 21:14	EPA 3005A	97,6010D	MC
Vanadium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:14	EPA 3005A	97,6010D	MC
Zinc, Total	0.300		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 21:14	EPA 3005A	97,6010D	MC
MCP Dissolved Metals - Mansfield Lab											
Antimony, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:55	EPA 3005A	97,6010D	MC
Arsenic, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:55	EPA 3005A	97,6010D	MC
Barium, Dissolved	1.23		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:55	EPA 3005A	97,6010D	MC
Beryllium, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:55	EPA 3005A	97,6010D	MC
Cadmium, Dissolved	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 22:55	EPA 3005A	97,6010D	MC
Chromium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:55	EPA 3005A	97,6010D	MC
Lead, Dissolved	0.013		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:55	EPA 3005A	97,6010D	MC
Mercury, Dissolved	ND		mg/l	0.0002	--	1	02/27/19 12:34	02/28/19 16:23	EPA 7470A	97,7470A	GD
Nickel, Dissolved	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 22:55	EPA 3005A	97,6010D	MC
Selenium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:55	EPA 3005A	97,6010D	MC
Silver, Dissolved	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 22:55	EPA 3005A	97,6010D	MC
Thallium, Dissolved	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 22:55	EPA 3005A	97,6010D	MC
Vanadium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:55	EPA 3005A	97,6010D	MC
Zinc, Dissolved	0.258		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:55	EPA 3005A	97,6010D	MC

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID: L1907364-05 Date Collected: 02/25/19 14:00

Client ID: MW-5 Date Received: 02/25/19

Sample Location: 700 WORCESTER RD., FRAMINGHAM, MA Field Prep: Not Specified

Sample Depth:

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 21:18	EPA 3005A	97,6010D	MC
Arsenic, Total	ND		mg/l	0.0050	--	1	02/26/19 19:01	02/27/19 21:18	EPA 3005A	97,6010D	MC
Barium, Total	0.874		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:18	EPA 3005A	97,6010D	MC
Beryllium, Total	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 21:18	EPA 3005A	97,6010D	MC
Cadmium, Total	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 21:18	EPA 3005A	97,6010D	MC
Chromium, Total	0.101		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:18	EPA 3005A	97,6010D	MC
Lead, Total	0.026		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:18	EPA 3005A	97,6010D	MC
Mercury, Total	ND		mg/l	0.0002	--	1	02/27/19 12:34	03/01/19 12:32	EPA 7470A	97,7470A	MG
Nickel, Total	0.081		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 21:18	EPA 3005A	97,6010D	MC
Selenium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:18	EPA 3005A	97,6010D	MC
Silver, Total	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 21:18	EPA 3005A	97,6010D	MC
Thallium, Total	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 21:18	EPA 3005A	97,6010D	MC
Vanadium, Total	0.126		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:18	EPA 3005A	97,6010D	MC
Zinc, Total	0.192		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 21:18	EPA 3005A	97,6010D	MC

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID: L1907364-06 Date Collected: 02/25/19 11:25

Client ID: MW-101 Date Received: 02/25/19

Sample Location: 700 WORCESTER RD., FRAMINGHAM, MA Field Prep: Refer to COC

Sample Depth:

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:08	EPA 3005A	97,6010D	MC
Arsenic, Total	ND		mg/l	0.0050	--	1	02/26/19 19:01	02/27/19 22:08	EPA 3005A	97,6010D	MC
Barium, Total	0.534		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:08	EPA 3005A	97,6010D	MC
Beryllium, Total	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:08	EPA 3005A	97,6010D	MC
Cadmium, Total	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 22:08	EPA 3005A	97,6010D	MC
Chromium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:08	EPA 3005A	97,6010D	MC
Lead, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:08	EPA 3005A	97,6010D	MC
Mercury, Total	ND		mg/l	0.0002	--	1	02/27/19 12:34	03/01/19 12:34	EPA 7470A	97,7470A	MG
Nickel, Total	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 22:08	EPA 3005A	97,6010D	MC
Selenium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:08	EPA 3005A	97,6010D	MC
Silver, Total	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 22:08	EPA 3005A	97,6010D	MC
Thallium, Total	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 22:08	EPA 3005A	97,6010D	MC
Vanadium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:08	EPA 3005A	97,6010D	MC
Zinc, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:08	EPA 3005A	97,6010D	MC
MCP Dissolved Metals - Mansfield Lab											
Antimony, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:59	EPA 3005A	97,6010D	MC
Arsenic, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:59	EPA 3005A	97,6010D	MC
Barium, Dissolved	0.526		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:59	EPA 3005A	97,6010D	MC
Beryllium, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:59	EPA 3005A	97,6010D	MC
Cadmium, Dissolved	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 22:59	EPA 3005A	97,6010D	MC
Chromium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:59	EPA 3005A	97,6010D	MC
Lead, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:59	EPA 3005A	97,6010D	MC
Mercury, Dissolved	ND		mg/l	0.0002	--	1	02/27/19 12:34	02/28/19 16:25	EPA 7470A	97,7470A	GD
Nickel, Dissolved	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 22:59	EPA 3005A	97,6010D	MC
Selenium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:59	EPA 3005A	97,6010D	MC
Silver, Dissolved	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 22:59	EPA 3005A	97,6010D	MC
Thallium, Dissolved	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 22:59	EPA 3005A	97,6010D	MC
Vanadium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:59	EPA 3005A	97,6010D	MC
Zinc, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:59	EPA 3005A	97,6010D	MC

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID: L1907364-07 Date Collected: 02/25/19 12:00

Client ID: MW-201 Date Received: 02/25/19

Sample Location: 700 WORCESTER RD., FRAMINGHAM, MA Field Prep: Refer to COC

Sample Depth:

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:12	EPA 3005A	97,6010D	MC
Arsenic, Total	ND		mg/l	0.0050	--	1	02/26/19 19:01	02/27/19 22:12	EPA 3005A	97,6010D	MC
Barium, Total	0.500		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:12	EPA 3005A	97,6010D	MC
Beryllium, Total	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:12	EPA 3005A	97,6010D	MC
Cadmium, Total	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 22:12	EPA 3005A	97,6010D	MC
Chromium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:12	EPA 3005A	97,6010D	MC
Lead, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:12	EPA 3005A	97,6010D	MC
Mercury, Total	ND		mg/l	0.0002	--	1	02/27/19 12:34	03/01/19 12:36	EPA 7470A	97,7470A	MG
Nickel, Total	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 22:12	EPA 3005A	97,6010D	MC
Selenium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:12	EPA 3005A	97,6010D	MC
Silver, Total	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 22:12	EPA 3005A	97,6010D	MC
Thallium, Total	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 22:12	EPA 3005A	97,6010D	MC
Vanadium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:12	EPA 3005A	97,6010D	MC
Zinc, Total	0.876		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:12	EPA 3005A	97,6010D	MC
MCP Dissolved Metals - Mansfield Lab											
Antimony, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 23:03	EPA 3005A	97,6010D	MC
Arsenic, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 23:03	EPA 3005A	97,6010D	MC
Barium, Dissolved	0.483		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:03	EPA 3005A	97,6010D	MC
Beryllium, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 23:03	EPA 3005A	97,6010D	MC
Cadmium, Dissolved	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 23:03	EPA 3005A	97,6010D	MC
Chromium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:03	EPA 3005A	97,6010D	MC
Lead, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:03	EPA 3005A	97,6010D	MC
Mercury, Dissolved	ND		mg/l	0.0002	--	1	02/27/19 12:34	02/28/19 16:27	EPA 7470A	97,7470A	GD
Nickel, Dissolved	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 23:03	EPA 3005A	97,6010D	MC
Selenium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:03	EPA 3005A	97,6010D	MC
Silver, Dissolved	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 23:03	EPA 3005A	97,6010D	MC
Thallium, Dissolved	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 23:03	EPA 3005A	97,6010D	MC
Vanadium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:03	EPA 3005A	97,6010D	MC
Zinc, Dissolved	0.775		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 23:03	EPA 3005A	97,6010D	MC

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID: L1907364-08 Date Collected: 02/25/19 12:25

Client ID: MW-202 Date Received: 02/25/19

Sample Location: 700 WORCESTER RD., FRAMINGHAM, MA Field Prep: Refer to COC

Sample Depth:

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:17	EPA 3005A	97,6010D	MC
Arsenic, Total	ND		mg/l	0.0050	--	1	02/26/19 19:01	02/27/19 22:17	EPA 3005A	97,6010D	MC
Barium, Total	0.627		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:17	EPA 3005A	97,6010D	MC
Beryllium, Total	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:17	EPA 3005A	97,6010D	MC
Cadmium, Total	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 22:17	EPA 3005A	97,6010D	MC
Chromium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:17	EPA 3005A	97,6010D	MC
Lead, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:17	EPA 3005A	97,6010D	MC
Mercury, Total	ND		mg/l	0.0002	--	1	02/27/19 12:34	03/01/19 12:38	EPA 7470A	97,7470A	MG
Nickel, Total	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 22:17	EPA 3005A	97,6010D	MC
Selenium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:17	EPA 3005A	97,6010D	MC
Silver, Total	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 22:17	EPA 3005A	97,6010D	MC
Thallium, Total	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 22:17	EPA 3005A	97,6010D	MC
Vanadium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:17	EPA 3005A	97,6010D	MC
Zinc, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:17	EPA 3005A	97,6010D	MC
MCP Dissolved Metals - Mansfield Lab											
Antimony, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 23:08	EPA 3005A	97,6010D	MC
Arsenic, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 23:08	EPA 3005A	97,6010D	MC
Barium, Dissolved	0.629		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:08	EPA 3005A	97,6010D	MC
Beryllium, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 23:08	EPA 3005A	97,6010D	MC
Cadmium, Dissolved	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 23:08	EPA 3005A	97,6010D	MC
Chromium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:08	EPA 3005A	97,6010D	MC
Lead, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:08	EPA 3005A	97,6010D	MC
Mercury, Dissolved	ND		mg/l	0.0002	--	1	02/27/19 12:34	02/28/19 16:29	EPA 7470A	97,7470A	GD
Nickel, Dissolved	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 23:08	EPA 3005A	97,6010D	MC
Selenium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:08	EPA 3005A	97,6010D	MC
Silver, Dissolved	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 23:08	EPA 3005A	97,6010D	MC
Thallium, Dissolved	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 23:08	EPA 3005A	97,6010D	MC
Vanadium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:08	EPA 3005A	97,6010D	MC
Zinc, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 23:08	EPA 3005A	97,6010D	MC

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID: L1907364-09 Date Collected: 02/25/19 12:50

Client ID: MW-203 Date Received: 02/25/19

Sample Location: 700 WORCESTER RD., FRAMINGHAM, MA Field Prep: Refer to COC

Sample Depth:

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:21	EPA 3005A	97,6010D	MC
Arsenic, Total	ND		mg/l	0.0050	--	1	02/26/19 19:01	02/27/19 22:21	EPA 3005A	97,6010D	MC
Barium, Total	0.012		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:21	EPA 3005A	97,6010D	MC
Beryllium, Total	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:21	EPA 3005A	97,6010D	MC
Cadmium, Total	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 22:21	EPA 3005A	97,6010D	MC
Chromium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:21	EPA 3005A	97,6010D	MC
Lead, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:21	EPA 3005A	97,6010D	MC
Mercury, Total	ND		mg/l	0.0002	--	1	02/27/19 12:34	03/01/19 12:40	EPA 7470A	97,7470A	MG
Nickel, Total	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 22:21	EPA 3005A	97,6010D	MC
Selenium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:21	EPA 3005A	97,6010D	MC
Silver, Total	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 22:21	EPA 3005A	97,6010D	MC
Thallium, Total	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 22:21	EPA 3005A	97,6010D	MC
Vanadium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:21	EPA 3005A	97,6010D	MC
Zinc, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:21	EPA 3005A	97,6010D	MC
MCP Dissolved Metals - Mansfield Lab											
Antimony, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 23:12	EPA 3005A	97,6010D	MC
Arsenic, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 23:12	EPA 3005A	97,6010D	MC
Barium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:12	EPA 3005A	97,6010D	MC
Beryllium, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 23:12	EPA 3005A	97,6010D	MC
Cadmium, Dissolved	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 23:12	EPA 3005A	97,6010D	MC
Chromium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:12	EPA 3005A	97,6010D	MC
Lead, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:12	EPA 3005A	97,6010D	MC
Mercury, Dissolved	ND		mg/l	0.0002	--	1	02/27/19 12:34	02/28/19 16:31	EPA 7470A	97,7470A	GD
Nickel, Dissolved	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 23:12	EPA 3005A	97,6010D	MC
Selenium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:12	EPA 3005A	97,6010D	MC
Silver, Dissolved	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 23:12	EPA 3005A	97,6010D	MC
Thallium, Dissolved	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 23:12	EPA 3005A	97,6010D	MC
Vanadium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:12	EPA 3005A	97,6010D	MC
Zinc, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 23:12	EPA 3005A	97,6010D	MC

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

SAMPLE RESULTS

Lab ID: L1907364-10 Date Collected: 02/25/19 13:15

Client ID: MW-208 Date Received: 02/25/19

Sample Location: 700 WORCESTER RD., FRAMINGHAM, MA Field Prep: Refer to COC

Sample Depth:

Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab											
Antimony, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:25	EPA 3005A	97,6010D	MC
Arsenic, Total	ND		mg/l	0.0050	--	1	02/26/19 19:01	02/27/19 22:25	EPA 3005A	97,6010D	MC
Barium, Total	0.055		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:25	EPA 3005A	97,6010D	MC
Beryllium, Total	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 22:25	EPA 3005A	97,6010D	MC
Cadmium, Total	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 22:25	EPA 3005A	97,6010D	MC
Chromium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:25	EPA 3005A	97,6010D	MC
Lead, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:25	EPA 3005A	97,6010D	MC
Mercury, Total	ND		mg/l	0.0002	--	1	02/27/19 12:34	03/01/19 12:42	EPA 7470A	97,7470A	MG
Nickel, Total	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 22:25	EPA 3005A	97,6010D	MC
Selenium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:25	EPA 3005A	97,6010D	MC
Silver, Total	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 22:25	EPA 3005A	97,6010D	MC
Thallium, Total	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 22:25	EPA 3005A	97,6010D	MC
Vanadium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 22:25	EPA 3005A	97,6010D	MC
Zinc, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 22:25	EPA 3005A	97,6010D	MC
MCP Dissolved Metals - Mansfield Lab											
Antimony, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 23:16	EPA 3005A	97,6010D	MC
Arsenic, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 23:16	EPA 3005A	97,6010D	MC
Barium, Dissolved	0.052		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:16	EPA 3005A	97,6010D	MC
Beryllium, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 23:16	EPA 3005A	97,6010D	MC
Cadmium, Dissolved	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 23:16	EPA 3005A	97,6010D	MC
Chromium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:16	EPA 3005A	97,6010D	MC
Lead, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:16	EPA 3005A	97,6010D	MC
Mercury, Dissolved	ND		mg/l	0.0002	--	1	02/27/19 12:34	02/28/19 16:43	EPA 7470A	97,7470A	GD
Nickel, Dissolved	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 23:16	EPA 3005A	97,6010D	MC
Selenium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:16	EPA 3005A	97,6010D	MC
Silver, Dissolved	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 23:16	EPA 3005A	97,6010D	MC
Thallium, Dissolved	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 23:16	EPA 3005A	97,6010D	MC
Vanadium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 23:16	EPA 3005A	97,6010D	MC
Zinc, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 23:16	EPA 3005A	97,6010D	MC

Project Name: 700 WORCESTER RD. **Lab Number:** L1907364

Project Number: Not Specified **Report Date:** 03/05/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Dissolved Metals - Mansfield Lab for sample(s): 01-04,06-10 Batch: WG1210543-1										
Antimony, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 21:56	97,6010D	MC
Arsenic, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 21:56	97,6010D	MC
Barium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:56	97,6010D	MC
Beryllium, Dissolved	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 21:56	97,6010D	MC
Cadmium, Dissolved	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 21:56	97,6010D	MC
Chromium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:56	97,6010D	MC
Lead, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:56	97,6010D	MC
Nickel, Dissolved	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 21:56	97,6010D	MC
Selenium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:56	97,6010D	MC
Silver, Dissolved	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 21:56	97,6010D	MC
Thallium, Dissolved	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 21:56	97,6010D	MC
Vanadium, Dissolved	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 21:56	97,6010D	MC
Zinc, Dissolved	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 21:56	97,6010D	MC

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab for sample(s): 01-10 Batch: WG1210544-1										
Antimony, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 20:40	97,6010D	MC
Arsenic, Total	ND		mg/l	0.0050	--	1	02/26/19 19:01	02/27/19 20:40	97,6010D	MC
Barium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 20:40	97,6010D	MC
Beryllium, Total	ND		mg/l	0.005	--	1	02/26/19 19:01	02/27/19 20:40	97,6010D	MC
Cadmium, Total	ND		mg/l	0.004	--	1	02/26/19 19:01	02/27/19 20:40	97,6010D	MC
Chromium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 20:40	97,6010D	MC
Lead, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 20:40	97,6010D	MC
Nickel, Total	ND		mg/l	0.025	--	1	02/26/19 19:01	02/27/19 20:40	97,6010D	MC
Selenium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 20:40	97,6010D	MC
Silver, Total	ND		mg/l	0.007	--	1	02/26/19 19:01	02/27/19 20:40	97,6010D	MC
Thallium, Total	ND		mg/l	0.020	--	1	02/26/19 19:01	02/27/19 20:40	97,6010D	MC
Vanadium, Total	ND		mg/l	0.010	--	1	02/26/19 19:01	02/27/19 20:40	97,6010D	MC
Zinc, Total	ND		mg/l	0.050	--	1	02/26/19 19:01	02/27/19 20:40	97,6010D	MC

Project Name: 700 WORCESTER RD.
Project Number: Not Specified
Lab Number: L1907364
Report Date: 03/05/19

Method Blank Analysis
Batch Quality Control

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Total Metals - Mansfield Lab for sample(s): 01-10 Batch: WG1210840-1										
Mercury, Total	ND		mg/l	0.0002	--	1	02/27/19 12:34	03/01/19 12:16	97,7470A	MG

Prep Information

Digestion Method: EPA 7470A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Dissolved Metals - Mansfield Lab for sample(s): 01-04,06-10 Batch: WG1210841-1										
Mercury, Dissolved	ND		mg/l	0.0002	--	1	02/27/19 12:34	02/28/19 16:08	97,7470A	GD

Prep Information

Digestion Method: EPA 7470A

Lab Control Sample Analysis

Batch Quality Control

Project Name: 700 WORCESTER RD.

Project Number: Not Specified

Lab Number: L1907364

Report Date: 03/05/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Dissolved Metals - Mansfield Lab Associated sample(s): 01-04,06-10 Batch: WG1210543-2 WG1210543-3								
Antimony, Dissolved	96		99		80-120	3		20
Arsenic, Dissolved	110		108		80-120	2		20
Barium, Dissolved	100		100		80-120	0		20
Beryllium, Dissolved	99		99		80-120	0		20
Cadmium, Dissolved	104		104		80-120	0		20
Chromium, Dissolved	99		100		80-120	1		20
Lead, Dissolved	102		102		80-120	0		20
Nickel, Dissolved	101		101		80-120	0		20
Selenium, Dissolved	110		112		80-120	2		20
Silver, Dissolved	102		102		80-120	0		20
Thallium, Dissolved	103		106		80-120	3		20
Vanadium, Dissolved	102		102		80-120	0		20
Zinc, Dissolved	106		106		80-120	0		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: 700 WORCESTER RD.

Project Number: Not Specified

Lab Number: L1907364

Report Date: 03/05/19

Parameter	LCS %Recovery	LCSD %Recovery		%Recovery Limits	RPD	RPD Limits
MCP Total Metals - Mansfield Lab Associated sample(s): 01-10 Batch: WG1210544-2 WG1210544-3						
Antimony, Total	98	99		80-120	1	20
Arsenic, Total	111	110		80-120	1	20
Barium, Total	101	100		80-120	1	20
Beryllium, Total	100	99		80-120	1	20
Cadmium, Total	106	105		80-120	1	20
Chromium, Total	100	100		80-120	0	20
Lead, Total	103	103		80-120	0	20
Nickel, Total	102	101		80-120	1	20
Selenium, Total	112	112		80-120	0	20
Silver, Total	103	102		80-120	1	20
Thallium, Total	105	103		80-120	2	20
Vanadium, Total	103	102		80-120	1	20
Zinc, Total	107	107		80-120	0	20
MCP Total Metals - Mansfield Lab Associated sample(s): 01-10 Batch: WG1210840-2 WG1210840-3						
Mercury, Total	98	97		80-120	1	20
MCP Dissolved Metals - Mansfield Lab Associated sample(s): 01-04,06-10 Batch: WG1210841-2 WG1210841-3						
Mercury, Dissolved	85	**73**	Q	80-120	15	20

Project Name: 700 WORCESTER RD.
Project Number: Not Specified

Lab Number: L1907364
Report Date: 03/05/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1907364-01A	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-01B	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-01C	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-01D	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CD-6010S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-TL-6010S-10(180),MCP-ZN-6010S-10(180),MCP-AS-6010S-10(180),MCP-CR-6010S-10(180),MCP-BA-6010S-10(180),MCP-BE-6010S-10(180),MCP-SB-6010S-10(180),MCP-PB-6010S-10(180),MCP-NI-6010S-10(180),MCP-SE-6010S-10(180),MCP-V-6010S-10(180)
L1907364-01E	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CR-6010T-10(180),MCP-7470T-10(28),MCP-AS-6010T-10(180),MCP-CD-6010T-10(180),MCP-TL-6010T-10(180),MCP-AG-6010T-10(180),MCP-SB-6010T-10(180),MCP-ZN-6010T-10(180),MCP-BE-6010T-10(180),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),MCP-V-6010T-10(180),MCP-NI-6010T-10(180),MCP-PB-6010T-10(180)
L1907364-01F	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-01G	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-02A	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-02B	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-02C	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-02D	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CD-6010S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-TL-6010S-10(180),MCP-ZN-6010S-10(180),MCP-AS-6010S-10(180),MCP-CR-6010S-10(180),MCP-BA-6010S-10(180),MCP-BE-6010S-10(180),MCP-SB-6010S-10(180),MCP-PB-6010S-10(180),MCP-NI-6010S-10(180),MCP-SE-6010S-10(180),MCP-V-6010S-10(180)

*Values in parentheses indicate holding time in days

Project Name: 700 WORCESTER RD.
Project Number: Not Specified

Lab Number: L1907364
Report Date: 03/05/19

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1907364-02E	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CR-6010T-10(180),MCP-7470T-10(28),MCP-AS-6010T-10(180),MCP-CD-6010T-10(180),MCP-TL-6010T-10(180),MCP-AG-6010T-10(180),MCP-SB-6010T-10(180),MCP-ZN-6010T-10(180),MCP-BE-6010T-10(180),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),MCP-V-6010T-10(180),MCP-NI-6010T-10(180),MCP-PB-6010T-10(180)
L1907364-02F	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-02G	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-03A	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-03B	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-03C	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-03D	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CD-6010S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-TL-6010S-10(180),MCP-ZN-6010S-10(180),MCP-AS-6010S-10(180),MCP-CR-6010S-10(180),MCP-BA-6010S-10(180),MCP-BE-6010S-10(180),MCP-SB-6010S-10(180),MCP-PB-6010S-10(180),MCP-NI-6010S-10(180),MCP-SE-6010S-10(180),MCP-V-6010S-10(180)
L1907364-03E	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CR-6010T-10(180),MCP-7470T-10(28),MCP-AS-6010T-10(180),MCP-CD-6010T-10(180),MCP-TL-6010T-10(180),MCP-AG-6010T-10(180),MCP-SB-6010T-10(180),MCP-ZN-6010T-10(180),MCP-BE-6010T-10(180),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),MCP-V-6010T-10(180),MCP-NI-6010T-10(180),MCP-PB-6010T-10(180)
L1907364-03F	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-03G	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-04A	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-04B	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-04C	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)

*Values in parentheses indicate holding time in days

Project Name: 700 WORCESTER RD.
Project Number: Not Specified

Lab Number: L1907364
Report Date: 03/05/19

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1907364-04D	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CD-6010S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-TL-6010S-10(180),MCP-ZN-6010S-10(180),MCP-AS-6010S-10(180),MCP-CR-6010S-10(180),MCP-BA-6010S-10(180),MCP-BE-6010S-10(180),MCP-SB-6010S-10(180),MCP-PB-6010S-10(180),MCP-NI-6010S-10(180),MCP-SE-6010S-10(180),MCP-V-6010S-10(180)
L1907364-04E	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CR-6010T-10(180),MCP-7470T-10(28),MCP-AS-6010T-10(180),MCP-CD-6010T-10(180),MCP-TL-6010T-10(180),MCP-AG-6010T-10(180),MCP-SB-6010T-10(180),MCP-ZN-6010T-10(180),MCP-BE-6010T-10(180),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),MCP-V-6010T-10(180),MCP-NI-6010T-10(180),MCP-PB-6010T-10(180)
L1907364-04F	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-04G	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-05A	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-05B	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-05C	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-05E	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CR-6010T-10(180),MCP-7470T-10(28),MCP-AS-6010T-10(180),MCP-CD-6010T-10(180),MCP-TL-6010T-10(180),MCP-AG-6010T-10(180),MCP-SB-6010T-10(180),MCP-ZN-6010T-10(180),MCP-BE-6010T-10(180),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),MCP-V-6010T-10(180),MCP-NI-6010T-10(180),MCP-PB-6010T-10(180)
L1907364-05F	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		ARCHIVE()
L1907364-06A	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-06B	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-06C	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)

*Values in parentheses indicate holding time in days

Project Name: 700 WORCESTER RD.
Project Number: Not Specified

Lab Number: L1907364
Report Date: 03/05/19

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1907364-06D	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CD-6010S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-TL-6010S-10(180),MCP-ZN-6010S-10(180),MCP-AS-6010S-10(180),MCP-CR-6010S-10(180),MCP-BA-6010S-10(180),MCP-BE-6010S-10(180),MCP-SB-6010S-10(180),MCP-PB-6010S-10(180),MCP-NI-6010S-10(180),MCP-SE-6010S-10(180),MCP-V-6010S-10(180)
L1907364-06E	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CR-6010T-10(180),MCP-7470T-10(28),MCP-AS-6010T-10(180),MCP-CD-6010T-10(180),MCP-TL-6010T-10(180),MCP-AG-6010T-10(180),MCP-SB-6010T-10(180),MCP-ZN-6010T-10(180),MCP-BE-6010T-10(180),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),MCP-V-6010T-10(180),MCP-NI-6010T-10(180),MCP-PB-6010T-10(180)
L1907364-06F	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-06G	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-07A	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-07B	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-07C	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-07D	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CD-6010S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-TL-6010S-10(180),MCP-ZN-6010S-10(180),MCP-AS-6010S-10(180),MCP-CR-6010S-10(180),MCP-BA-6010S-10(180),MCP-BE-6010S-10(180),MCP-SB-6010S-10(180),MCP-PB-6010S-10(180),MCP-NI-6010S-10(180),MCP-SE-6010S-10(180),MCP-V-6010S-10(180)
L1907364-07E	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CR-6010T-10(180),MCP-7470T-10(28),MCP-AS-6010T-10(180),MCP-CD-6010T-10(180),MCP-TL-6010T-10(180),MCP-AG-6010T-10(180),MCP-SB-6010T-10(180),MCP-ZN-6010T-10(180),MCP-BE-6010T-10(180),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),MCP-V-6010T-10(180),MCP-NI-6010T-10(180),MCP-PB-6010T-10(180)
L1907364-07F	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-07G	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-08A	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)

*Values in parentheses indicate holding time in days

Project Name: 700 WORCESTER RD.
Project Number: Not Specified

Lab Number: L1907364
Report Date: 03/05/19

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1907364-08B	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-08C	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-08D	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CD-6010S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-TL-6010S-10(180),MCP-ZN-6010S-10(180),MCP-AS-6010S-10(180),MCP-CR-6010S-10(180),MCP-BA-6010S-10(180),MCP-BE-6010S-10(180),MCP-SB-6010S-10(180),MCP-PB-6010S-10(180),MCP-NI-6010S-10(180),MCP-SE-6010S-10(180),MCP-V-6010S-10(180)
L1907364-08E	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CR-6010T-10(180),MCP-7470T-10(28),MCP-AS-6010T-10(180),MCP-CD-6010T-10(180),MCP-TL-6010T-10(180),MCP-AG-6010T-10(180),MCP-SB-6010T-10(180),MCP-ZN-6010T-10(180),MCP-BE-6010T-10(180),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),MCP-V-6010T-10(180),MCP-NI-6010T-10(180),MCP-PB-6010T-10(180)
L1907364-08F	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-08G	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-09A	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-09B	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-09C	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-09D	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CD-6010S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-TL-6010S-10(180),MCP-ZN-6010S-10(180),MCP-AS-6010S-10(180),MCP-CR-6010S-10(180),MCP-BA-6010S-10(180),MCP-BE-6010S-10(180),MCP-SB-6010S-10(180),MCP-PB-6010S-10(180),MCP-NI-6010S-10(180),MCP-SE-6010S-10(180),MCP-V-6010S-10(180)
L1907364-09E	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CR-6010T-10(180),MCP-7470T-10(28),MCP-AS-6010T-10(180),MCP-CD-6010T-10(180),MCP-TL-6010T-10(180),MCP-AG-6010T-10(180),MCP-SB-6010T-10(180),MCP-ZN-6010T-10(180),MCP-BE-6010T-10(180),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),MCP-V-6010T-10(180),MCP-NI-6010T-10(180),MCP-PB-6010T-10(180)
L1907364-09F	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)

*Values in parentheses indicate holding time in days

Project Name: 700 WORCESTER RD.
Project Number: Not Specified

Lab Number: L1907364
Report Date: 03/05/19

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1907364-09G	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-10A	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-10B	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-10C	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-10D	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CD-6010S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-TL-6010S-10(180),MCP-ZN-6010S-10(180),MCP-AS-6010S-10(180),MCP-CR-6010S-10(180),MCP-BA-6010S-10(180),MCP-BE-6010S-10(180),MCP-SB-6010S-10(180),MCP-PB-6010S-10(180),MCP-NI-6010S-10(180),MCP-SE-6010S-10(180),MCP-V-6010S-10(180)
L1907364-10E	Plastic 250ml HNO3 preserved	A	<2	<2	3.6	Y	Absent		MCP-CR-6010T-10(180),MCP-7470T-10(28),MCP-AS-6010T-10(180),MCP-CD-6010T-10(180),MCP-TL-6010T-10(180),MCP-AG-6010T-10(180),MCP-SB-6010T-10(180),MCP-ZN-6010T-10(180),MCP-BE-6010T-10(180),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),MCP-V-6010T-10(180),MCP-NI-6010T-10(180),MCP-PB-6010T-10(180)
L1907364-10F	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-10G	Amber 1000ml HCl preserved	A	<2	<2	3.6	Y	Absent		EPH-MS-10(14),EPHD-GC-10(14)
L1907364-11A	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)
L1907364-11B	Vial HCl preserved	A	NA		3.6	Y	Absent		VPH-DELUX-18(14)

*Values in parentheses indicate holding time in days

Project Name:	700 WORCESTER RD.	**Lab Number:**	L1907364
Project Number:	Not Specified	**Report Date:**	03/05/19

GLOSSARY

Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

1	- The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total'

result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Project Name:	700 WORCESTER RD.	**Lab Number:**	L1907364
Project Number:	Not Specified	**Report Date:**	03/05/19

REFERENCES

97 EPA Test Methods (SW-846) with QC Requirements & Performance Standards for the Analysis of EPA SW-846 Methods under the Massachusetts Contingency Plan, WSC-CAM-IIA, IIB, IIIA, IIIB, IIIC, IIID, VA, VB, VC, VIA, VIB, VIIIA and VIIIB, July 2010.

98 Method for the Determination of Extractable Petroleum Hydrocarbons (EPH), MassDEP, May 2004, Revision 1.1 with QC Requirements & Performance Standards for the Analysis of EPH under the Massachusetts Contingency Plan, WSC-CAM-IVB, July 2010.

131 Method for the Determination of Volatile Petroleum Hydrocarbons (VPH), MassDEP, February 2018, Revision 2.1 with QC Requirements & Performance Standards for the Analysis of VPH under the Massachusetts Contingency Plan, WSC-CAM-IVA, June 1, 2018.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), Methyl methacrylate, 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 6860: SCM: Perchlorate

SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

EST Associates, Inc.
51 Fremont Street Needham, MA 02494 Tel: 781-455-0003, Fax: 781-455-8336

CHAIN OF CUSTODY RECORD

L1907364

Laboratory: Alpha

Client	FSL Associates
Address	358 Chestnut Hill Ave. Boston, MA
Contact	Bruce Hoskins
Phone #	617-232-0001
Project Name	700 Worcester Road, Framingham MA
Address	
Contact	Bruce Hoskins tel:
Location ID #	Fax:
Description	PO#

MATRIX
1. Wastewater
2. Groundwater
3. Drinking Water
4. Soil
5. Surface Water
6. Other _____

EST to Invoice: FSL Associates
Lab to Invoice: FSL Associates
Lab Report to: Bhoskins@FSLassociates.com
Billing Reference: FSL Associates

Field ID / Point of Collection	Collection Date	Collection Time	Matrix	# of bottles Glass	# of bottles Plastic	# of bottles VOA's	Preservation HCL	NaOH	HNO3	H2SO4	MEOH	Other	None	VPH	EPH	MCP-14 Total Metals	MCP-14 Dissolved metals								Comments:
MW-1	2/25/19	1100		2	2	3	5		2					X	X	X	X								
MW-2		0935		2	2	3	5		2					X	X	X	X								
MW-3		0930		2	2	3	5		2					X	X	X	X								
MW-4		1025		2	2	3	5		2					X	X	X	X	(KS)							
MW-5		1400		~~0~~ 2	~~2~~ 1	3	~~3~~ 5		~~1~~ 2					X	✓	X	✓								
MW-101		1125		2	2	3	5		2					X	X	X	X								
MW-201		1200		2	2	3	5		2					X	X	X	X								
MW-202		1225		2	2	3	5		2					X	X	X	X								
MW-203		1250		2	2	3	5		2					X	X	X	X								
MW-208	↓	1315		2	2	3	5		2					X	X	X	X								
Trip Blank	—	—												X											Hold, contact Bruce prior to running

Turnaround Information
- ☐ Std. 10 Day Turnaround
- ☐ 7 Day *RUSH*
- ☐ 5 Day *RUSH*
- ☐ 3 Day *RUSH*
- ☐ 2 Day *RUSH*
- ☐ 1 Day *RUSH*

Approved By:

QA/QC
SPECIAL QA/QC or DATA Requirements:
CAM protocols required.

Additional Information

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Date Time:
1	2/25/19 1500	1	2/25/19 15:15
2	2/25/19 1610	2	2/28/19 1610
3		3	

Seal # | Preserve where applicable ☐ | On Ice ☐ | Temp.

AECOM Environment

Prepared for:
Framingham DPW
110 Western Avenue
Framingham, MA 01702

Prepared by:
AECOM
250 Apollo Drive
Chelmsford, MA 01824

December 14, 2018

AECOM Project: 60588483

Limited Hazardous Building Materials Survey Summary Report

Worcester Road Pumping Station
730 Worcester Road
Framingham, Massachusetts 01702

Table of Contents

Figures

Tables

Appendices

1.0 INTRODUCTION

1.1 General

AECOM Technical Services, Inc. (AECOM) conducted a limited pre-demolition hazardous building materials survey of select target areas at the Worcester Road Pumping Station located in Framingham, Massachusetts (the "Facility") to support future selective demolition as part of the Walnut Street Pump Station and Sewers – Project I. The survey was completed on October 31, 2018 and included an assessment of accessible suspect asbestos-containing materials (ACM) and polychlorinated biphenyl-(PCB) containing materials located in targeted interior and exterior areas of the Facility.

1.2 Statement of Purpose

The purpose of this assessment was to explore for the presence of building materials potentially containing asbestos and PCBs that will require proper removal, handling, and disposal prior to upcoming planned selective demolition. The extent of the exploration is identified on **Figure 1,** Sample Location Plan. An inventory of the materials identified and sampled was also developed. This report documents the findings of the limited hazardous materials survey associated with the selective demolition of the Facility.

1.3 Methodology and Limiting Conditions

The Facility was operational at the time of the exploration. Findings and opinions presented in this report reflect the observations of accessible suspect hazardous building materials present on the date of the exploration.

During AECOM's survey, reasonable efforts were made to locate and sample building materials representative of the Facility that are proposed to be affected by the upcoming selective demolition activities; however, the potential exists for unique or concealed hazardous building materials or debris to be present. The survey conducted by AECOM consisted of a walkthrough of targeted areas, including visual observations of materials subject to proposed selective demolition activities, as well as the collection of building material samples suspected of containing asbestos and PCBs. AECOM's survey was limited to specific components proposed for selective demolition, if such components were suspected of containing asbestos or PCBs. This included collecting samples representative of the following: painted surfaces of wastewater piping and pumping components, observed coatings on the interior surfaces of the wetwell, and sealants around one pipe opening (chemical tank vent pipe through exterior wall). The survey did not include factory coatings since industry practice at the time precluded use of PCB-containing paint. Since wall, ceiling and floor paint, window and other caulking and other building materials are not part of selective demolition, such areas were not sampled for asbestos and PCBs, but may contain these and other hazardous components.

The City of Framingham, Massachusetts should be aware that it is common practice to collect additional bulk samples during actual abatement or demolition activities when hidden suspect hazardous building materials are encountered. Should non-sampled suspect hazardous building materials be identified during future demolition or renovation activities, these materials should be sampled and tested to determine proper handling and disposal requirements.

2.0 ASBESTOS-CONTAINING MATERIAL SURVEY

2.1 Survey Description

On October 31, 2018, AECOM's Massachusetts-licensed Asbestos Inspector conducted a survey of accessible wetwell interior coating material as suspect ACM in general accordance with U.S. Environmental Protection Agency's (USEPA) National Emission Standard for Hazardous Air Pollutants (NESHAP) and Asbestos Hazard Emergency Response Act (AHERA) sampling protocols. AECOM

collected a total of two (2) bulk samples using stainless steel hand tools and wet methods. The wetwell interior coating samples were placed in a polyethylene sample bag, sealed, and labeled. Sampling tools were decontaminated after use with wet wipes and dry cloths. Collected samples were submitted under chain-of-custody procedures to Optimum Analytical and Consulting (Optimum) of Salem, New Hampshire for asbestos fiber analysis via polarized light microscopy (PLM) with dispersion staining (PLM/DS) techniques in accordance with EPA Method 600/M4-82-020 with visual area estimate (VAE) techniques (EPA 600/R-93/116). The approximate locations of suspect ACM samples collected for asbestos analysis are depicted on **Figure 1.**

Optimum is fully accredited to perform bulk asbestos sample analysis under the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology (NIST). Samples were handled and stored in a manner so as to maintain their integrity and are routinely retained for a period of 90 days after results are reported to allow for any desired analytical follow-up and/or re-analysis. Site photographs are provided in **Appendix A**.

2.2 Findings

The Commonwealth of Massachusetts has established a level equal to or greater than one percent (≥1%) asbestos content for a material to be considered to be asbestos-containing. PLM analysis results did not identify any asbestos-containing materials in the wetwell coating sample.

A summary of observed suspect ACM and laboratory analysis results are presented in **Table 1,** and a copy of the laboratory analytical data report is provided in **Appendix B**.

3.0 POLYCHLORINATED BIPHENYLS SURVEY

3.1 PCB Sealant and Coating Survey

On October 31, 2018, AECOM performed a survey for polychlorinated biphenyls (PCBs) in building materials at select portions of the Facility which are proposed to be affected by the upcoming selective demolition work. These materials were observed for color, composition, and location to evaluate the number of different material types present. Three potential PCB-containing materials were identified: pipe penetration sealant, gray painted piping and a black wall coating. Two samples were collected from each of the suspect homogenous materials, for a total of six samples. The approximate locations of samples collected for PCB analysis are depicted on **Figure 1.**

The samples collected during the field survey were delivered under chain-of-custody protocol to Con-Test Analytical Laboratory (Con-Test) of East Longmeadow, Massachusetts for analysis of PCBs using EPA Methods SW-846 3540C/8082. A limited data quality review was conducted of the laboratory PCB results, which confirmed that the data may be used for decision-making purposes. Site photographs are provided in **Appendix A.**

3.2 Findings

PCBs are regulated under the federal Toxic Substances Control Act (TSCA) 40 CFR §761. Under TSCA 40 CFR§761.62, PCBs present in building material products (i.e., materials intentionally manufactured with PCBs) at concentrations greater than 50 milligram per kilogram (mg/kg) are classified as *PCB Bulk Product Waste* (BPW). There are regulatory requirements pertaining to management and disposal of BPW, and abatement may be required prior to demolition.

PCBs were detected in two of the six samples submitted for analysis. PCBs were detected at 720 mg/kg and 820 mg/kg in the two samples representing the gray paint on the piping system located on the Pump Level. As these concentrations exceed 50 mg/kg, this material is classified as BPW.

Building material sample results are presented on **Table 2** and analytical laboratory reports are provided in **Appendix C**.

4.0 CONCLUSIONS

AECOM provided services to explore the presence of asbestos and PCBs in building materials representative of the Facility that are proposed to be affected by the upcoming selective demolition activities. AECOM's conclusions are provided below.

4.1 Asbestos-Containing Materials (ACM)

Laboratory results did not identify materials containing greater than one percent asbestos in the wetwell coating sample.

4.2 Polychlorinated Biphenyls (PCBs)

PCBs in building materials are regulated under the federal Toxic Substances Control Act (TSCA) 40 § CFR 761.62. PCB building material containing ≥ 50 mg/kg PCBs is regulated as BPW and cannot be left in-place (it is not an authorized use under 40 CFR §761.30). Laboratory results indicated that one of the building materials tested (gray paint on piping) contained regulated levels of PCBs which classifies this material as BPW. The sampling results are provided in **Table 2**.

Based on the results of this survey, it is AECOM's opinion that the following items be addressed as part of any future selective demolition activities at the Facility that could potentially disturb regulated PCB-containing building materials (gray painted piping):

1. Remediate Site PCB BPW in accordance with the TSCA *Performance-Based Disposal* (40 CFR§761.62).

2. Identified PCB-containing waste materials must be properly disposed of at a disposal facility that is permitted, licensed, or registered by a state or EPA to accept this waste. The selected receiving facility must be notified of the presence and levels of PCBs in the waste material. The receiving facility will likely require Toxicity Characteristic Leaching Procedure (TCLP) testing of the waste stream.

3. Concrete pads and concrete piping supports to be removed that are in contact with PCB-containing building materials should be disposed as presumptive BPW.

4. PCB-containing building materials should be removed from piping and appurtenances to remain and properly disposed. This would include, but not be limited to the portions of piping from the wall face to proposed watertight caps.

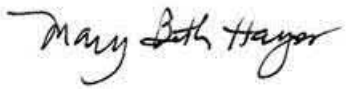
5. Completion of a summary report documenting the PCB BPW abatement is required, which includes a narrative of the project activities; photo documentation; characterization and waste profile sampling results; laboratory reports; an estimate of the waste volume disposed; copies of manifests and/or bills of lading; and copies of certificates of disposal issued by the receiving facility. This summary document is for the clients' records and should be retained by the City of Framingham for at least 5 years, per 40 CFR§761.125(c) (Spill Cleanup Policy), as cited in 40 CFR§761.61(a)(9).

6. Since the survey completed by AECOM was limited to components subject to selective demolition and did not include widespread sampling of painted surfaces, caulking and other building materials, the City of Framingham should complete a more comprehensive investigation as part of future plans to renovate or repurpose the existing pump station building and appurtenances.

AECOM appreciates the opportunity to assist the City of Framingham with this project. If you have any questions, please do not hesitate to contact Project Manager, Mr. Joe Boccadoro at (978) 905-2127.

Sincerely,
AECOM Technical Services, Inc.

Patrick Guglielmo
Scientist IV – Safety, Health & Environment



Marybeth Hayes
Project Manager, TSCA Lead

Joseph M. Boccadoro, PE
Project Manager

FIGURE 1

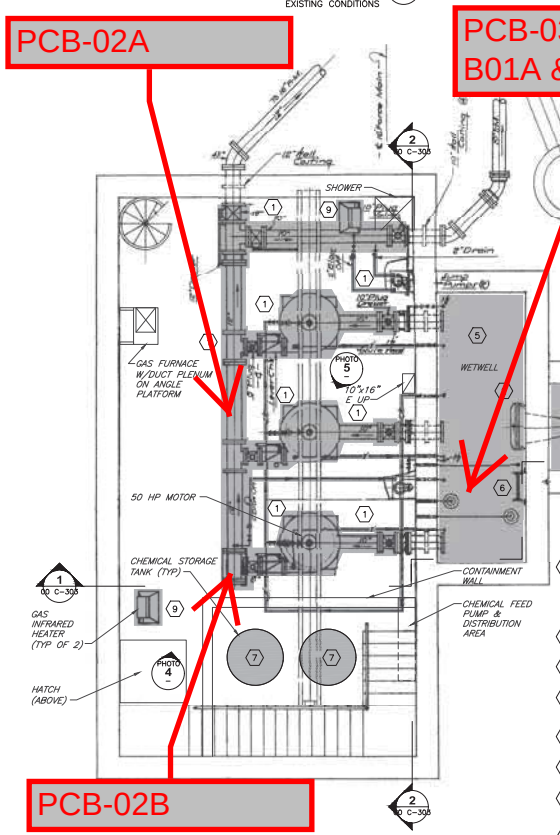
PHOTO
PARSHALL FLUME
1 / PR-3

PHOTO
PUMP LEVEL
EXISTING CONDITIONS
5 / –

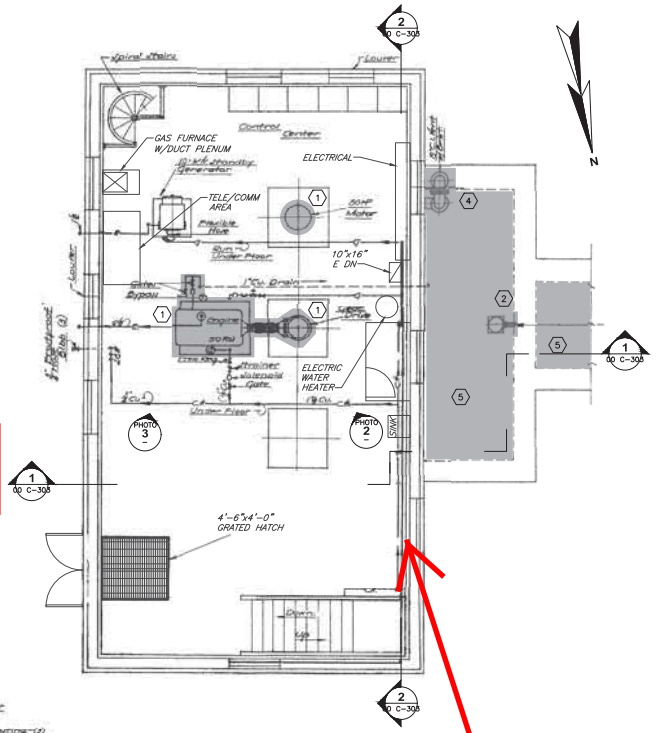
PHOTO
MAIN FLOOR
EXISTING CONDITIONS
2 / –

PHOTO
MAIN FLOOR
EXISTING CONDITIONS
3 / –

PHOTO
PUMP LEVEL
EXISTING CONDITIONS
4 / –



PUMP LEVEL DEMOLITION PLAN
SCALE: SCANNED



MAIN FLOOR DEMOLITION PLAN
SCALE: SCANNED

PCB-01A & B

DEMOLITION NOTES:

1. REMOVE/DEMOLISH THE EXISTING PUMPS (3) IN THEIR ENTIRETY INCLUDING, BUT NOT LIMITED TO; PUMPS, MOTORS, ELECTRICAL COMPONENTS, AND CONTROLS. REMOVE/DEMOLISH THE SUCTION AND DISCHARGE, DRAIN, AND WATER PIPING, FROM THE PUMPS TO ITS ORIGIN ENTIRELY INCLUDING SUPPORTS, FITTINGS, VALVES AND ASSOCIATED APPURTENANCES. CAP EXISTING PIPING AT ALL WALL PENETRATIONS WITH WATER TIGHT FITTINGS AS REQUIRED.
2. REMOVE/DEMOLISH THE EXISTING INFLUENT GATE IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO; GATE, OPERATOR, OPERATOR STAND, ELECTRICAL COMPONENTS, AND CONTROLS.
3. REMOVE/DEMOLISH THE EXISTING PARSHALL FLUME WITHIN THE INLET CHAMBER IN ITS ENTIRETY.
4. REMOVE/DEMOLISH THE EXISTING TANK VENT IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO; PIPING, SUPPORTS, AND ALL ASSOCIATED APPURTENANCES. CONCRETE FILL ALL PENETRATIONS AND FINISH TO MATCH EXISTING.
5. AFTER DEMOLITION OF INTERIOR EQUIPMENT COMPLETELY FILL AREA WITH CONTROLLED DENSITY FILL (CDF).
6. REMOVE/DEMOLISH THE EXISTING LADDERS WITHIN THE WET WELL, AND INLET CHAMBER IN THEIR ENTIRETY.
7. REMOVE/DEMOLISH EXISTING CHEMICAL TANKS AND PUMP SKID IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO; SKID, PUMPS, CHEMICALS, TUBING, PIPING, TANKS, CONTROLS, WIRING, AND ALL ASSOCIATED APPURTENANCES.
8. CONTRACTOR SHALL SEAL WATER-TIGHT EXISTING PENETRATION WITH BRICK AND NON-SHRINK GROUT.
9. REMOVE/DEMOLISH EXISTING GAS INFRARED HEATER IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO; HEATER, SUPPORTS, PIPING, VALVES, WIRING, CONDUIT, AND ALL ASSOCIATED APPURTENANCES.

NOTES:

1. FOR GENERAL NOTES, LEGEND, AND ABBREVIATIONS REFER TO DWG 00 C-001.
2. CONTRACTOR TO NOTE A SCANNED IMAGE OF THE EXISTING CONTRACT DRAWINGS HAS BEEN USED FOR WORCESTER ROAD PUMP STATION DEMOLITION. EXISTING INFORMATION HAS BEEN FADED BACK FOR CLARITY. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO BIDDING AND/OR COMMENCING CONSTRUCTION. FOR INFORMATION PERTAINING TO EXISTING CONTRACT DRAWINGS, REFER TO THE DEMOLITION GENERAL NOTES DRAWING 00 C-301.
3. FOR ADDITIONAL DEMOLITION, REFER TO CIVIL DRAWINGS.
4. EXISTING PIPING THAT IS TO BE ABANDONED IN PLACE SHALL BE FILLED WITH CLSM.
5. THE PAINT ON PUMPS AND PIPING CONTAINS LEAD. REMOVAL AND DISPOSAL SHALL BE IN ACCORDANCE WITH ALL FEDERAL, STATE & LOCAL REGULATIONS.
6. THE EXISTING BUILDING HAS ASBESTOS IN THE FOLLOWING LOCATIONS:
   - 6.1. WINDOW GLAZING AND CAULKING
   - 6.2. VENT COVER CAULKING
   - 6.3. ROOFING MATERIALS

   THESE AREAS ARE NOT TO BE DISTURBED DURING CONSTRUCTION.

AECOM

PROJECT
WORCESTER ROAD PUMP STATION ELIMINATION

CLIENT
City of Framingham, MA

CONSULTANT
AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

Figure 1
Sample
Location Plan

REGISTRATION

60% SUBMITTAL
PRELIMINARY COPY
NOTE: This document is preliminary only and is not intended for any purpose except review and comment by the owner and its agents.

ISSUE/REVISION

I/R	DATE	DESCRIPTION

PROJECT NUMBER
60545792

Designed By:	A. ANGLES
Drawn By:	M. CURRAN
Dept Check:	C. BENZIGER
Proj Check:	J. BOCCADORO
Date:	JULY 2018
Scale:	AS NOTED

DISCIPLINE
CIVIL

SHEET TITLE
WORCESTER ROAD PUMP STATION DEMOLITION PLAN

SHEET NUMBER
00 C-302

PATH\FILENAME: P:\60545792 - WORCESTER ROAD PS ELIMINATION\PROJECTS\SHEETS\00\00 C-302.DWG
LAST UPDATE: Monday, July 16, 2018 2:05:30 PM
PLOT DATE: Tuesday, July 17, 2018 2:04:13 PM

TABLES

Table 1: Bulk Sample Summary of Suspect Asbestos-Containing Materials Worcester Road Pumping Station - Framingham, Massachusetts 01702		
Sample ID	**Material Description / Location**	**Results**
B01A	Black Wall Coating / Interior Wall of Wet Well	ND
B01B	Black Wall Coating / Interior Wall of Wet Well	ND

ND - No Asbestos Detected (<1% Asbestos Fibers)

Table 2: Summary of PCB Concentrations in Sealant and Coating Samples
Worcester Road Pumping Station - Framingham, Massachusetts 01702

Sample ID	Material Description / Location	Total PCB Concentration (mg/kg)	Action Level (mg/kg)*
PCB-01A	White Pipe Penetration Sealant / Main Floor, Northwest Area	ND (<0.78)	50
PCB-01B	White Pipe Penetration Sealant / Main Floor, Northwest Area	ND (<0.71)	50
PCB-02A	Gray Paint / Pump Level, Pump System Piping	**820**	50
PCB-02B	Gray Paint / Pump Level, Pump System Piping	**720**	50
PCB-03A	Black Wall Coating / Interior Wall of Wet Well	ND (<0.97)	50
PCB-03B	Black Wall Coating / Interior Wall of Wet Well	ND (<0.91)	50

* - TSCA Criteria: A building material product such as sealant or paint containing ≥ 50 mg/kg total PCBs is classified as PCB Bulk Product Waste and is regulated under EPA TSCA regulations (40 CFR 761.62). Sealant or paint containing <50 mg/kg total PCBs is classified as Excluded PCB Product and is not regulated by TSCA.

ND – Not detected at specified quantitation limit.

Values shown in Bold and Shaded exceed the listed action level.

mg/kg - milligrams per kilogram

APPENDICES

APPENDIX A

SITE PHOTOGRAPHS

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Town of Framingham, Massachusetts	730 Worcester Road, Framingham, MA 01702	60588483

Photo No.	Date:
1	10-31-18

Direction Photo Taken:

Southeast

Description:

Main Entrance

Photo No.	Date:
2	10-31-18

Direction Photo Taken:

West

Description:

White Pipe Penetration Sealant

Sample:
PCB-01A & B

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Town of Framingham, Massachusetts	730 Worcester Road, Framingham, MA 01702	60588483

Photo No.	Date:
3	10-31-18

Direction Photo Taken:

West

Description:

White Pipe Penetration Sealant

Sample:
PCB-01A & B

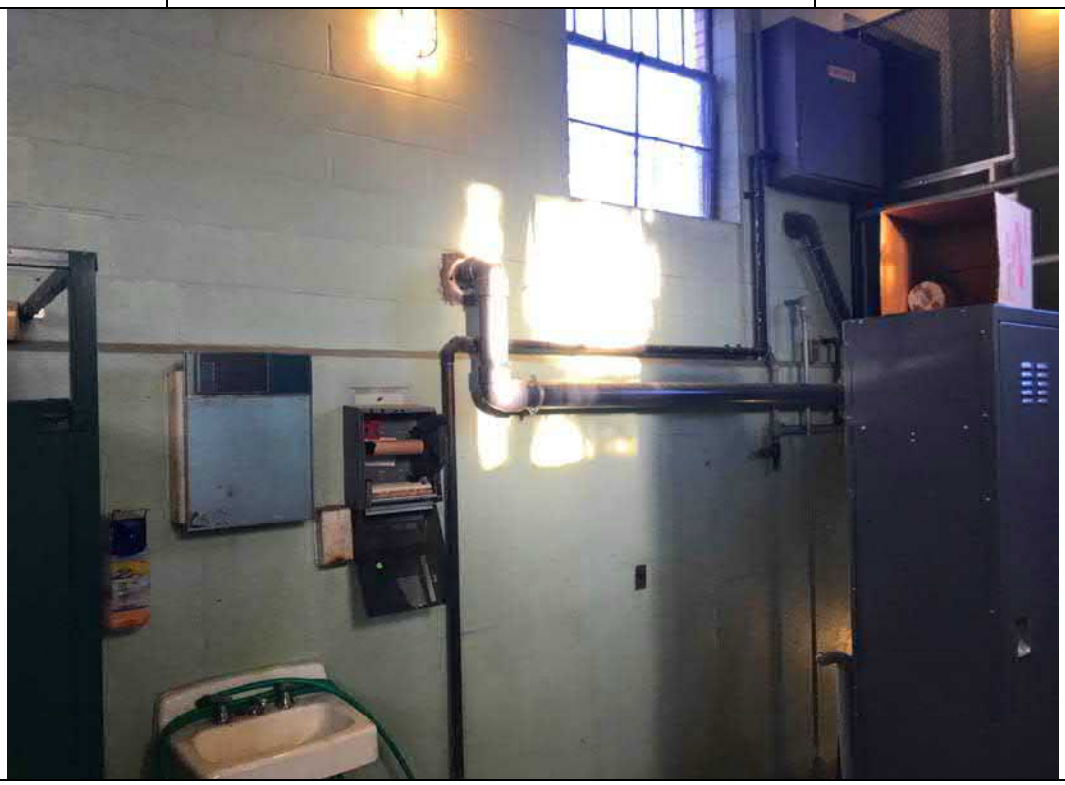


Photo No.	Date:
4	10-31-18

Direction Photo Taken:

West

Description:

Gray Paint

Pump Level, Pump System Piping

Sample:
PCB-02A

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Town of Framingham, Massachusetts	730 Worcester Road, Framingham, MA 01702	60588483

Photo No.	Date:
5	10-31-18

Direction Photo Taken:

West

Description:

Gray Paint

Pump Level, Pump System Piping

Sample:
PCB-02A

Photo No.	Date:
6	10-31-18

Direction Photo Taken:

West

Description:

Gray Paint

Pump Level, Pump System Piping

Sample:
PCB-02B

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Town of Framingham, Massachusetts	730 Worcester Road, Framingham, MA 01702	60588483

Photo No.	Date:
7	10-31-8

Direction Photo Taken:

West

Description:

Gray Paint

Pump Level, Pump System Piping

Sample:
PCB-02B

Photo No.	Date:
8	10-31-18

Direction Photo Taken:

East

Description:

Exterior, Wet Well

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Town of Framingham, Massachusetts	730 Worcester Road, Framingham, MA 01702	60588483

Photo No.	Date:
9	10-31-18

Direction Photo Taken:

West

Description:

Exterior, Wet Well, Looking Inside

Sample:
PCB-03A & B
BO1A & B (Asbestos)

Photo No.	Date:
10	10-31-18

Direction Photo Taken:

West

Description:

Exterior, Wet Well, Looking Inside

Sample:
PCB-03A & B
BO1A & B (Asbestos)

AECOM

APPENDIX B

ANALYTICAL DATA REPORT
SUSPECT BULK SAMPLES FOR ASBESTOS

OPTIMUM
Analytical and Consulting, LLC

85 Stiles Road, Suite 201
Salem, NH 03079
603-458-5247

Brian Vailancourt
AECOM
1155 Elm St. Suite 401
Manchester NH 03101

Project Reference:	60588483-Task 10
Laboratory Batch #:	1827436
Date Samples Received:	11/01/2018
Date Samples Analyzed:	11/05/2018
Date of Final Report:	11/05/2018

SAMPLE IDENTIFICATION:

Two (2) samples from Worcester Road Pumping Station; 730 Worcester Rd., Framingham, MA project were submitted by Patrick Guglielmo on 11/01/2018

This bulk sample(s) was delivered to Optimum Analytical Consulting, LLC (Optimum) located in Salem, New Hampshire for asbestos content determination.

ANALYTICAL METHOD:

Analytical procedures were performed in accordance with the U.S. Environmental Protection Agency (EPA) Recommended Method for the Determination of Asbestos in Bulk Samples by Polarized Light Microscopy and Dispersion Staining (PLM/DS)(EPA-600/M4-82-020, EPA-600/ R-93-116). This report relates only to those samples analyzed, and may not be indicative of other similar appearing materials existing at this, or other sites. Quantification of asbestos content was determined by Calibrated Visual Estimation. Optimum is not responsible for sample collection activities or analytical method limitations. The laboratory is not responsible for the accuracy of results when requested to physically separate and analyze layered samples.

In any given material, fibers with a small diameter (<0.25µm) may not be detected by the PLM method. Floor tile and other resinously bound material may yield a false negative if the asbestos fibers are too small to be resolved using PLM. Additional analytical methods may be required. Optimum recommends using Transmission Electron Microscopy (TEM) for a more definitive analysis.

Optimum will retain all samples for a minimum of three months. Further analysis or return of samples must be requested within this three month period to guarantee their availability. This report may not be reproduced except in full, without the written approval of Optimum Analytical and Consulting, LLC.

Use of the NVLAP and AIHA Logo in no way constitutes or implies product certification, approval, or endorsement by the National Institute of Standards and Technology or the American Industrial Hygiene Association.

Detection Limit <1%, Reporting Limits: CVES = 1%, 400 Point Count = .25%, 1000 Point Count = 0.1%; Present or Absent are observations made during a qualitative analysis.

This report is considered preliminary until signed by both the Laboratory Analyst and Laboratory Director or Supervisor. If you have any questions regarding this report, please do not hesitate to contact us.

Jamie L. Noel
Laboratory Director

Kristina Scaviola
Laboratory Supervisor

NVLAP Lab ID#: 101433-0

OPTIMUM
Analytical and Consulting, LLC
85 Stiles Road, Suite 201, Salem, NH 03079 Phone: (603)-458-5247

BULK SAMPLE ANALYSIS REPORT POLARIZED LIGHT MICROSCOPY

PLM (EPA-600/M4-82-020, EPA-600/ R-93-116) NVLAP Lab Code: 101433-0

CLIENT:	AECOM	**ORDER #:**	1827436
ADDRESS:	1155 Elm St. Suite 401	**PROJECT #:**	60588483-Task 10
CITY / STATE / ZIP:	Manchester NH 03101	**DATE COLLECTED:**	10/31/2018
CONTACT:	Brian Vailancourt	**COLLECTED BY:**	Patrick Guglielmo
DESCRIPTION:	PLM Analysis	**DATE RECEIVED:**	11/01/2018
LOCATION:	Worcester Road Pumping Station; 730 Worcester Rd., Framingham, MA	**ANALYSIS DATE:**	11/05/2018
		REPORT DATE:	11/05/2018
		ANALYST:	Lauren Oakes

REPORT OF ANALYSIS

Laboratory ID Sample No.	Sample Location Description	Layer No. Layer %	Asbestos Type	(%)	Non-Asbestos Components	(%)
1827436-001 B01A	Interior Wall of Wet Well Wall Coating, Black	LAYER 1 100%	None Detected		Cellulose Fiber Non-Fibrous Material	2% 98%
		Total % Asbestos:	No Asbestos Detected		**Total % Non-Asbestos:**	100.0%
1827436-002 B01B	Interior Wall of Wet Well Wall Coating, Black	LAYER 1 100%	None Detected		Cellulose Fiber Non-Fibrous Material	2% 98%
		Total % Asbestos:	No Asbestos Detected		**Total % Non-Asbestos:**	100.0%

Analyst Signatory: Lauren Oakes

Lauren Oakes

NVLAP® Lab Code: 101433-0

OPTIMUM
Analytical and Consulting, LLC
85 Stiles Road, Suite 201, Salem, NH 03079 Phone: (603)-458-5247

BULK SAMPLE ANALYSIS REPORT
POLARIZED LIGHT MICROSCOPY

PLM (EPA-600/M4-82-020, EPA-600/ R-93-116) NVLAP Lab Code: 101433-0

CLIENT:	AECOM
ADDRESS:	1155 Elm St. Suite 401
CITY / STATE / ZIP:	Manchester NH 03101
CONTACT:	Brian Vailancourt
DESCRIPTION:	PLM Analysis
LOCATION:	Worcester Road Pumping Station; 730 Worcester Rd., Framingham, MA

ORDER #:	1827436
PROJECT #:	60588483-Task 10
DATE COLLECTED:	10/31/2018
COLLECTED BY:	Patrick Guglielmo
DATE RECEIVED:	11/01/2018
ANALYSIS DATE:	11/05/2018
REPORT DATE:	11/05/2018
ANALYST:	Lauren Oakes

1827436

AECOM

AECOM TECHNICAL SERVICES, INC.
ASBESTOS BULK CHAIN OF CUSTODY

Date: 10/31/18

PROJECT NAME: Worcester Road Pumping Station
PROJECT NUMBER: 60588483, Task 10
SITE ADDRESS: 730 Worcester Road, Framingham, MA
REPORT TO: Patrick.Guglielmo@AECOM.com
PROJECT MANAGER: Brian Vailancourt
SAMPLER: Patrick Guglielmo
SAMPLER LICENSE: On File
TAT: ASAP 3Hour 24 Hour (48 Hour) Standard
POSITIVE STOP: (YES) NO

SAMPLE ID	SAMPLE DESCRIPTION	SAMPLE LOCATION	QUANTITY
B01A	Black Wall Coating	Interior wall of Wet Well	
B01B	↓	↓	

RELINQUISHED BY: (SIGNATURE)	TIME:	DATE:	RECEIVED BY: (SIGNATURE)	TIME:	DATE:
	4:05P	11/1/18		8:00	11/1/18
RELINQUISHED BY (SIGNATURE)	TIME:	DATE:	RECEIVED BY: (SIGNATURE)	TIME:	DATE:

1 Of 1

AECOM

APPENDIX C

ANALYTICAL DATA REPORT
PCB SAMPLE RESULTS

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

November 9, 2018

Joe Boccadoro
AECOM - NH
1155 Elm Street, Suite 401
Manchester, NH 03101

Project Location: 730 Worcester Rd., Framingham, MA
Client Job Number:
Project Number: 605884.83.Task 10 - Worcester Rd. Pump Station
Laboratory Work Order Number: 18J1531

Enclosed are results of analyses for samples received by the laboratory on October 31, 2018. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Aaron L. Benoit
Project Manager

Table of Contents

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

AECOM - NH
1155 Elm Street, Suite 401
Manchester, NH 03101
ATTN: Joe Boccadoro

REPORT DATE: 11/9/2018

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 605884.83.Task 10 - Worcester Rd. Pump Statio

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 18J1531

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: 730 Worcester Rd., Framingham, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
PCB-01A	18J1531-01	Caulk	white pipe penetration sealant	SW-846 8082A	
PCB-01B	18J1531-02	Caulk	white pipe penetration sealant	SW-846 8082A	
PCB-02A	18J1531-03	Paint	gray paint/pump piping	SW-846 8082A	
PCB-02B	18J1531-04	Paint	gray paint/pump piping	SW-846 8082A	
PCB-03A	18J1531-05	Product/Solid	black tank coating interior	SW-846 8082A	
PCB-03B	18J1531-06	Product/Solid	black tank coating interior	SW-846 8082A	

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

SW-846 8082A

Qualifications:

DL-03

Elevated reporting limit due to matrix.

Analyte & Samples(s) Qualified:

18J1531-05[PCB-03A], 18J1531-06[PCB-03B]

O-32

A dilution was performed as part of the standard analytical procedure.

Analyte & Samples(s) Qualified:

18J1531-01[PCB-01A], 18J1531-02[PCB-01B]

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

Decachlorobiphenyl
18J1531-03[PCB-02A], 18J1531-04[PCB-02B]

Decachlorobiphenyl [2C]
18J1531-03[PCB-02A], 18J1531-04[PCB-02B]

Tetrachloro-m-xylene
18J1531-03[PCB-02A], 18J1531-04[PCB-02B]

Tetrachloro-m-xylene [2C]
18J1531-03[PCB-02A], 18J1531-04[PCB-02B]

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Tod E. Kopyscinski
Laboratory Director

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 730 Worcester Rd., Framingham, Sample Description: white pipe penetration sealant Work Order: 18J1531

Date Received: 10/31/2018

Field Sample #: PCB-01A Sampled: 10/31/2018 08:05

Sample ID: 18J1531-01

Sample Matrix: Caulk

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1221 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1232 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1242 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1248 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1254 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1260 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1262 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1268 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	90.7	30-150		11/8/18 15:50
Decachlorobiphenyl [2]	97.4	30-150		11/8/18 15:50
Tetrachloro-m-xylene [1]	86.5	30-150		11/8/18 15:50
Tetrachloro-m-xylene [2]	92.7	30-150		11/8/18 15:50

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 730 Worcester Rd., Framingham, Sample Description: white pipe penetration sealant Work Order: 18J1531

Date Received: 10/31/2018

Field Sample #: PCB-01B Sampled: 10/31/2018 08:05

Sample ID: 18J1531-02

Sample Matrix: Caulk

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1221 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1232 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1242 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1248 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1254 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1260 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1262 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1268 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	77.4	30-150		11/8/18 16:08
Decachlorobiphenyl [2]	82.1	30-150		11/8/18 16:08
Tetrachloro-m-xylene [1]	72.7	30-150		11/8/18 16:08
Tetrachloro-m-xylene [2]	77.2	30-150		11/8/18 16:08

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 730 Worcester Rd., Framingham, Sample Description: gray paint/pump piping Work Order: 18J1531

Date Received: 10/31/2018

Field Sample #: PCB-02A Sampled: 10/31/2018 09:15

Sample ID: 18J1531-03

Sample Matrix: Paint

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1221 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1232 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1242 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1248 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1254 [1]	820	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1260 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1262 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1268 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	11/6/18 22:53
Decachlorobiphenyl [2]	*	30-150	S-01	11/6/18 22:53
Tetrachloro-m-xylene [1]	*	30-150	S-01	11/6/18 22:53
Tetrachloro-m-xylene [2]	*	30-150	S-01	11/6/18 22:53

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 730 Worcester Rd., Framingham, Sample Description: gray paint/pump piping Work Order: 18J1531

Date Received: 10/31/2018

Field Sample #: PCB-02B Sampled: 10/31/2018 09:30

Sample ID: 18J1531-04

Sample Matrix: Paint

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1221 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1232 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1242 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1248 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1254 [1]	720	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1260 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1262 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1268 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	11/6/18 23:11
Decachlorobiphenyl [2]	*	30-150	S-01	11/6/18 23:11
Tetrachloro-m-xylene [1]	*	30-150	S-01	11/6/18 23:11
Tetrachloro-m-xylene [2]	*	30-150	S-01	11/6/18 23:11

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 730 Worcester Rd., Framingham, Sample Description: black tank coating interior Work Order: 18J1531

Date Received: 10/31/2018

Field Sample #: PCB-03A Sampled: 10/31/2018 10:00

Sample ID: 18J1531-05

Sample Matrix: Product/Solid

Sample Flags: DL-03

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1221 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1232 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1242 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1248 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1254 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1260 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1262 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1268 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	79.8	30-150		11/6/18 20:11
Decachlorobiphenyl [2]	110	30-150		11/6/18 20:11
Tetrachloro-m-xylene [1]	72.4	30-150		11/6/18 20:11
Tetrachloro-m-xylene [2]	78.2	30-150		11/6/18 20:11

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 730 Worcester Rd., Framingham, Sample Description: black tank coating interior Work Order: 18J1531

Date Received: 10/31/2018

Field Sample #: PCB-03B Sampled: 10/31/2018 10:00

Sample ID: 18J1531-06

Sample Matrix: Product/Solid

Sample Flags: DL-03

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1221 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1232 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1242 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1248 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1254 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1260 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1262 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1268 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	85.6	30-150		11/6/18 20:24
Decachlorobiphenyl [2]	137	30-150		11/6/18 20:24
Tetrachloro-m-xylene [1]	90.6	30-150		11/6/18 20:24
Tetrachloro-m-xylene [2]	94.8	30-150		11/6/18 20:24

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Sample Extraction Data

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J1531-01 [PCB-01A]	B216457	0.513	10.0	11/06/18
18J1531-02 [PCB-01B]	B216457	0.563	10.0	11/06/18

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J1531-03 [PCB-02A]	B216229	0.218	10.0	11/01/18
18J1531-04 [PCB-02B]	B216229	0.212	10.0	11/01/18

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J1531-05 [PCB-03A]	B216277	2.06	10.0	11/02/18
18J1531-06 [PCB-03B]	B216277	2.19	10.0	11/02/18

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B216229 - SW-846 3540C										
Blank (B216229-BLK1)				Prepared: 11/01/18 Analyzed: 11/06/18						
Aroclor-1016	ND	0.50	mg/Kg							
Aroclor-1016 [2C]	ND	0.50	mg/Kg							
Aroclor-1221	ND	0.50	mg/Kg							
Aroclor-1221 [2C]	ND	0.50	mg/Kg							
Aroclor-1232	ND	0.50	mg/Kg							
Aroclor-1232 [2C]	ND	0.50	mg/Kg							
Aroclor-1242	ND	0.50	mg/Kg							
Aroclor-1242 [2C]	ND	0.50	mg/Kg							
Aroclor-1248	ND	0.50	mg/Kg							
Aroclor-1248 [2C]	ND	0.50	mg/Kg							
Aroclor-1254	ND	0.50	mg/Kg							
Aroclor-1254 [2C]	ND	0.50	mg/Kg							
Aroclor-1260	ND	0.50	mg/Kg							
Aroclor-1260 [2C]	ND	0.50	mg/Kg							
Aroclor-1262	ND	0.50	mg/Kg							
Aroclor-1262 [2C]	ND	0.50	mg/Kg							
Aroclor-1268	ND	0.50	mg/Kg							
Aroclor-1268 [2C]	ND	0.50	mg/Kg							
Surrogate: Decachlorobiphenyl	*9.54*		mg/Kg	10.0		95.4	30-150			
Surrogate: Decachlorobiphenyl [2C]	*10.1*		mg/Kg	10.0		101	30-150			
Surrogate: Tetrachloro-m-xylene	*9.57*		mg/Kg	10.0		95.7	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*9.78*		mg/Kg	10.0		97.8	30-150			
LCS (B216229-BS1)				Prepared: 11/01/18 Analyzed: 11/06/18						
Aroclor-1016	2.3	0.50	mg/Kg	2.50		93.0	40-140			
Aroclor-1016 [2C]	2.6	0.50	mg/Kg	2.50		102	40-140			
Aroclor-1260	2.5	0.50	mg/Kg	2.50		99.9	40-140			
Aroclor-1260 [2C]	2.5	0.50	mg/Kg	2.50		98.4	40-140			
Surrogate: Decachlorobiphenyl	*9.66*		mg/Kg	10.0		96.6	30-150			
Surrogate: Decachlorobiphenyl [2C]	*10.1*		mg/Kg	10.0		101	30-150			
Surrogate: Tetrachloro-m-xylene	*9.69*		mg/Kg	10.0		96.9	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*9.90*		mg/Kg	10.0		99.0	30-150			
LCS Dup (B216229-BSD1)				Prepared: 11/01/18 Analyzed: 11/06/18						
Aroclor-1016	2.4	0.50	mg/Kg	2.50		96.5	40-140	3.74	30	
Aroclor-1016 [2C]	2.7	0.50	mg/Kg	2.50		107	40-140	4.96	30	
Aroclor-1260	2.4	0.50	mg/Kg	2.50		96.4	40-140	3.63	30	
Aroclor-1260 [2C]	2.5	0.50	mg/Kg	2.50		101	40-140	2.22	30	
Surrogate: Decachlorobiphenyl	*9.49*		mg/Kg	10.0		94.9	30-150			
Surrogate: Decachlorobiphenyl [2C]	*10.1*		mg/Kg	10.0		101	30-150			
Surrogate: Tetrachloro-m-xylene	*9.76*		mg/Kg	10.0		97.6	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*9.89*		mg/Kg	10.0		98.9	30-150			

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B216277 - SW-846 3540C										
Blank (B216277-BLK1)				Prepared: 11/02/18 Analyzed: 11/06/18						
Aroclor-1016	ND	0.10	mg/Kg							
Aroclor-1016 [2C]	ND	0.10	mg/Kg							
Aroclor-1221	ND	0.10	mg/Kg							
Aroclor-1221 [2C]	ND	0.10	mg/Kg							
Aroclor-1232	ND	0.10	mg/Kg							
Aroclor-1232 [2C]	ND	0.10	mg/Kg							
Aroclor-1242	ND	0.10	mg/Kg							
Aroclor-1242 [2C]	ND	0.10	mg/Kg							
Aroclor-1248	ND	0.10	mg/Kg							
Aroclor-1248 [2C]	ND	0.10	mg/Kg							
Aroclor-1254	ND	0.10	mg/Kg							
Aroclor-1254 [2C]	ND	0.10	mg/Kg							
Aroclor-1260	ND	0.10	mg/Kg							
Aroclor-1260 [2C]	ND	0.10	mg/Kg							
Aroclor-1262	ND	0.10	mg/Kg							
Aroclor-1262 [2C]	ND	0.10	mg/Kg							
Aroclor-1268	ND	0.10	mg/Kg							
Aroclor-1268 [2C]	ND	0.10	mg/Kg							
Surrogate: Decachlorobiphenyl	*0.999*		mg/Kg	1.00		99.9	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.983*		mg/Kg	1.00		98.3	30-150			
Surrogate: Tetrachloro-m-xylene	*0.929*		mg/Kg	1.00		92.9	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.948*		mg/Kg	1.00		94.8	30-150			
LCS (B216277-BS1)				Prepared: 11/02/18 Analyzed: 11/06/18						
Aroclor-1016	1.1	0.10	mg/Kg	1.00		109	40-140			
Aroclor-1016 [2C]	1.1	0.10	mg/Kg	1.00		108	40-140			
Aroclor-1260	1.1	0.10	mg/Kg	1.00		107	40-140			
Aroclor-1260 [2C]	1.1	0.10	mg/Kg	1.00		106	40-140			
Surrogate: Decachlorobiphenyl	*1.03*		mg/Kg	1.00		103	30-150			
Surrogate: Decachlorobiphenyl [2C]	*1.01*		mg/Kg	1.00		101	30-150			
Surrogate: Tetrachloro-m-xylene	*0.966*		mg/Kg	1.00		96.6	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.984*		mg/Kg	1.00		98.4	30-150			
LCS Dup (B216277-BSD1)				Prepared: 11/02/18 Analyzed: 11/06/18						
Aroclor-1016	1.1	0.10	mg/Kg	1.00		109	40-140	0.751	30	
Aroclor-1016 [2C]	1.1	0.10	mg/Kg	1.00		108	40-140	0.00137	30	
Aroclor-1260	1.1	0.10	mg/Kg	1.00		105	40-140	1.35	30	
Aroclor-1260 [2C]	1.1	0.10	mg/Kg	1.00		105	40-140	0.997	30	
Surrogate: Decachlorobiphenyl	*0.984*		mg/Kg	1.00		98.4	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.967*		mg/Kg	1.00		96.7	30-150			
Surrogate: Tetrachloro-m-xylene	*0.945*		mg/Kg	1.00		94.5	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.967*		mg/Kg	1.00		96.7	30-150			

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B216457 - SW-846 3540C										
Blank (B216457-BLK1)				Prepared: 11/06/18 Analyzed: 11/08/18						
Aroclor-1016	ND	0.19	mg/Kg							
Aroclor-1016 [2C]	ND	0.19	mg/Kg							
Aroclor-1221	ND	0.19	mg/Kg							
Aroclor-1221 [2C]	ND	0.19	mg/Kg							
Aroclor-1232	ND	0.19	mg/Kg							
Aroclor-1232 [2C]	ND	0.19	mg/Kg							
Aroclor-1242	ND	0.19	mg/Kg							
Aroclor-1242 [2C]	ND	0.19	mg/Kg							
Aroclor-1248	ND	0.19	mg/Kg							
Aroclor-1248 [2C]	ND	0.19	mg/Kg							
Aroclor-1254	ND	0.19	mg/Kg							
Aroclor-1254 [2C]	ND	0.19	mg/Kg							
Aroclor-1260	ND	0.19	mg/Kg							
Aroclor-1260 [2C]	ND	0.19	mg/Kg							
Aroclor-1262	ND	0.19	mg/Kg							
Aroclor-1262 [2C]	ND	0.19	mg/Kg							
Aroclor-1268	ND	0.19	mg/Kg							
Aroclor-1268 [2C]	ND	0.19	mg/Kg							
Surrogate: Decachlorobiphenyl	*3.15*		mg/Kg	3.86		81.6	30-150			
Surrogate: Decachlorobiphenyl [2C]	*3.26*		mg/Kg	3.86		84.6	30-150			
Surrogate: Tetrachloro-m-xylene	*2.95*		mg/Kg	3.86		76.6	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*2.88*		mg/Kg	3.86		74.6	30-150			
LCS (B216457-BS1)				Prepared: 11/06/18 Analyzed: 11/08/18						
Aroclor-1016	2.5	0.18	mg/Kg	3.61		68.8	40-140			
Aroclor-1016 [2C]	2.6	0.18	mg/Kg	3.61		71.3	40-140			
Aroclor-1260	2.5	0.18	mg/Kg	3.61		69.8	40-140			
Aroclor-1260 [2C]	2.6	0.18	mg/Kg	3.61		72.5	40-140			
Surrogate: Decachlorobiphenyl	*2.85*		mg/Kg	3.61		79.0	30-150			
Surrogate: Decachlorobiphenyl [2C]	*2.96*		mg/Kg	3.61		82.0	30-150			
Surrogate: Tetrachloro-m-xylene	*2.70*		mg/Kg	3.61		74.8	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*2.62*		mg/Kg	3.61		72.5	30-150			
LCS Dup (B216457-BSD1)				Prepared: 11/06/18 Analyzed: 11/08/18						
Aroclor-1016	2.2	0.19	mg/Kg	3.73		59.8	40-140	10.6	30	
Aroclor-1016 [2C]	2.3	0.19	mg/Kg	3.73		62.1	40-140	10.5	30	
Aroclor-1260	2.3	0.19	mg/Kg	3.73		60.9	40-140	10.3	30	
Aroclor-1260 [2C]	2.3	0.19	mg/Kg	3.73		62.5	40-140	11.5	30	
Surrogate: Decachlorobiphenyl	*2.47*		mg/Kg	3.73		66.1	30-150			
Surrogate: Decachlorobiphenyl [2C]	*2.56*		mg/Kg	3.73		68.6	30-150			
Surrogate: Tetrachloro-m-xylene	*2.39*		mg/Kg	3.73		64.1	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*2.35*		mg/Kg	3.73		62.9	30-150			

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

PCB-02A

Lab Sample ID: 18J1531-03 Date(s) Analyzed: 11/06/2018 11/06/2018

Instrument ID (1): ECD4 Instrument ID (2): ECD4

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1254	1	0.000	0.000	0.000	820	
	2	0.000	0.000	0.000	760	7.6

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

PCB-02B

Lab Sample ID: 18J1531-04 Date(s) Analyzed: 11/06/2018 11/06/2018

Instrument ID (1): ECD4 Instrument ID (2): ECD4

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1254	1	0.000	0.000	0.000	720	
	2	0.000	0.000	0.000	690	4.3

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B216229-BS1 Date(s) Analyzed: 11/06/2018 11/06/2018

Instrument ID (1): ECD4 Instrument ID (2): ECD4

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	2.3	
	2	0.000	0.000	0.000	2.6	12.2
Aroclor-1260	1	0.000	0.000	0.000	2.5	
	2	0.000	0.000	0.000	2.5	0.0

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B216229-BSD1 Date(s) Analyzed: 11/06/2018 11/06/2018

Instrument ID (1): ECD4 Instrument ID (2): ECD4

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	2.4	
	2	0.000	0.000	0.000	2.7	11.8
Aroclor-1260	1	0.000	0.000	0.000	2.4	
	2	0.000	0.000	0.000	2.5	4.1

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B216277-BS1 Date(s) Analyzed: 11/06/2018 11/06/2018

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	1.1	
	2	0.000	0.000	0.000	1.1	0.0
Aroclor-1260	1	0.000	0.000	0.000	1.1	
	2	0.000	0.000	0.000	1.1	0.0

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B216277-BSD1 Date(s) Analyzed: 11/06/2018 11/06/2018

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	1.1	
	2	0.000	0.000	0.000	1.1	0.0
Aroclor-1260	1	0.000	0.000	0.000	1.1	
	2	0.000	0.000	0.000	1.1	0.0

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B216457-BS1 Date(s) Analyzed: 11/08/2018 11/08/2018

Instrument ID (1): ECD1 Instrument ID (2): ECD1

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	2.5	
	2	0.000	0.000	0.000	2.6	3.9
Aroclor-1260	1	0.000	0.000	0.000	2.5	
	2	0.000	0.000	0.000	2.6	3.9

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B216457-BSD1 Date(s) Analyzed: 11/08/2018 11/08/2018

Instrument ID (1): ECD1 Instrument ID (2): ECD1

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	2.2	
	2	0.000	0.000	0.000	2.3	4.4
Aroclor-1260	1	0.000	0.000	0.000	2.3	
	2	0.000	0.000	0.000	2.3	0.0

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
DL-03	Elevated reporting limit due to matrix.
O-32	A dilution was performed as part of the standard analytical procedure.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8082A in Product/Solid	
Aroclor-1016	CT,NH,NY,ME,NC,VA
Aroclor-1016 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1221	CT,NH,NY,ME,NC,VA
Aroclor-1221 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1232	CT,NH,NY,ME,NC,VA
Aroclor-1232 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1242	CT,NH,NY,ME,NC,VA
Aroclor-1242 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1248	CT,NH,NY,ME,NC,VA
Aroclor-1248 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1254	CT,NH,NY,ME,NC,VA
Aroclor-1254 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1260	CT,NH,NY,ME,NC,VA
Aroclor-1260 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1262	NY,NC,VA
Aroclor-1262 [2C]	NY,NC,VA
Aroclor-1268	NY,NC,VA
Aroclor-1268 [2C]	NY,NC,VA

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	03/1/2020
MA	Massachusetts DEP	M-MA100	06/30/2019
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2019
NY	New York State Department of Health	10899 NELAP	04/1/2019
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2019
RI	Rhode Island Department of Health	LAO00112	12/30/2018
NC	North Carolina Div. of Water Quality	652	12/31/2018
NJ	New Jersey DEP	MA007 NELAP	06/30/2019
FL	Florida Department of Health	E871027 NELAP	06/30/2019
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2019
ME	State of Maine	2011028	06/9/2019
VA	Commonwealth of Virginia	460217	12/14/2018
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2019
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2019
NC-DW	North Carolina Department of Health	25703	07/31/2019

18J1531

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Doc # 381 Rev 1_03242017

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Page 1 of 1

Company Name: AECOM
Address: 1155 Elm St, Suite 401, Manchester, NH
Phone: 603-812-6803
Project Name: Worcester Road (Cutter) Pumping Station
Project Location: 730 Worcester Road, Framingham, MA
Project Number: 60588483, Task 10
Project Manager: Joe Boccadoro
Con-Test Quote Name/Number:
Invoice Recipient: Joe.Boccadoro@AECOM.com
Sampled By: Patrick Guglielmo

Requested Turnaround Time
7-Day ☒ 10-Day ☐
Due Date:

Rush-Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Data Delivery
Format: PDF ☒ EXCEL ☒
Other:
CLP Like Data Pkg Required: ☐
Email To: Joe.Boccadoro@AECOM.com
Fax To #:

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	Composite	Grab	[1]Matrix Code	Conc Code	PCBs
1	PCB-01A-White pipe penetration sealant	10/31/18	8:05A		X	SOL	U	X
2	01B-	↓	8:05A		X	SOL	U	X
3	02A-Gray paint/Pump Piping	↓	9:15A		X	O	U	X
4	02B-	↓	9:30A		X	O	U	X
5	03A-Black tank coating exterior	↓	10:00A		X	SOL	U	X
6	03B-	↓	10:00A		X	SOL	U	X

ANALYSIS REQUESTED

# of Containers: 1
[2] Preservation Code: I
[3] Container Code: A

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

[1] **Matrix Codes:**
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define) Paint

[2] **Preservation Codes:**
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

[3] **Container Codes:**
A = Amber Glass
G = Glass
P = Plastic
ST = Sterile
V = Vial
S = Summa Canister
T = Tedlar Bag
O = Other (please define)

Comments:
~~Hold "B" samples pending results of "A" samples & w/ authorization from AECOM.~~
- Also Email Results to Patrick.Guglielmo@AECOM.com

Please use the following codes to indicate possible sample concentration within the **Conc Code** column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

	Date/Time:
Relinquished by: (signature) [signature] 10/31/18	2:00p
Received by: (signature) [signature]	1400 10-31-18
Relinquished by: (signature) [signature]	10-31-18 1640
Received by: (signature) [signature] 2.4 10-31-18	1640
Relinquished by: (signature)	
Received by: (signature)	

Detection Limit Requirements
MA
CT
Other

Special Requirements
☐ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

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NELAC and AIHA-LAP, LLC Accredited

Project Entity
☐ Government ☐ Municipality ☐ MWRA ☐ WRTA
☐ Federal ☐ 21 J ☐ School
☐ City ☐ Brownfield ☐ MBTA

Other
☐ Chromatogram
☐ *AIHA-LAP, LLC*

PCB ONLY
☒ Soxhlet
☐ Non Soxhlet

I Have Not Confirmed Sample Container Numbers With Lab Staff Before Relinquishing Over Samples_____

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Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client AECOM

Received By LR Date 10-31-18 Time 1640

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____ Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 557 Actual Temp - 2.4 By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? NA Were Samples Tampered with? NA

Was COC Relinquished ? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all pertinent Information? Client T Project T Analysis T ID's T Sampler Name T Collection Dates/Times T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F Who was notified? _____

Are there Rushes? F Who was notified? _____

Are there Short Holds? F Who was notified? _____

Is there enough Volume? T

Is there Headspace where applicable? NA MS/MSD? F

Proper Media/Containers Used? T Is splitting samples required? F

Were trip blanks received? F On COC? F

Do all samples have the proper pH? NA Acid _____ Base _____

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	6
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

May 30, 2013
File No. 86640.03

Mr. Kevin Olson, PE
Wright-Pierce
40 Shattuck Road Suite 305
Andover, MA 01810

Re: Hazardous Materials Inspection Report
Worcester Road Pump Station, Framingham, Massachusetts

Dear Mr. Olson:

Nobis Engineering, Inc. (Nobis) prepared this Inspection Report to identify asbestos containing materials (ACM) and lead based paint (LBP) at the pump station buildings located on Kittredge Road and Worcester Road in Framingham, Massachusetts. Nobis understands that the stations will be decommissioned as part of a new pump station construction project.

The Kittredge Road pump station is an underground "tin can" style pump station located approximately 20 feet below ground surface. Access to the pump station is gained from an entrance tube with a permanent ladder. This station is a confined space.

The Worcester Road pump station is a two-story (ground floor and basement) concrete and brick building with a flat tar and gravel roof and basement. The wet well and weir associated with this station is located and is accessed from outside of the pump station structure.

SCOPE OF WORK

Inspection activities were outlined in the Hazardous Materials Survey proposal submitted to Wright-Pierce on March 13, 2013. This survey was designed to assess the presence of ACM and LBP located throughout the pump stations. Inspection tasks included the following:

- Locate, quantify, and assess the general condition of ACM located throughout the Site buildings and collect bulk samples of suspect ACM for laboratory for testing.

- Locate, quantify, and assess the general condition of LBP located throughout the buildings by paint chip sampling and testing as required by the Occupational Safety and Health Administration (OSHA) regulations for demolition and worker safety characterization.

Nobis Engineering, Inc.
585 Middlesex Street
Lowell, MA 01851
T (978) 683-0891

The following scope of work limitations are noted for the inspection:

- Nobis did not excavate soil cover to inspect the exterior of the tin can type pump station.
- Roofing materials were sampled from a ladder on the ground. Nobis did not climb onto the roof; therefore Nobis did not collect samples of materials that were inaccessible from the ladder (i.e. possible vent sealants, etc).
- Nobis did not inspect the interior of equipment, controls, or electrical banks.
- Nobis did not inspect interior areas of the wet well. Observations of the wet well were made from the manway on the ground surface.
- At the request of the client, Nobis did not core through the roof to identify all possible roofing layers. Nobis did however sample two layers of roofing material accessible from the ladder without causing damage to the roof structure.
- Additional inspection, sampling, or analysis of air, water, soil, PCBs, or any other regulated or hazardous materials was beyond the scope of this inspection.

Additional limitations to this report are included as Appendix A.

INSPECTION ACTIVITIES

Nobis was on-site May 8, 2013 to perform the inspection activities listed above. Nobis subcontracted EFI Global of Wilmington, Massachusetts to conduct the lead inspection and paint chip sampling at both pump stations. Due to the confined space nature of the tin can pump station, Nobis contracted EFI Global to perform the ACM inspection at the Kittredge Road pump station as well.

Nobis inspected the Worcester Road pump station for the presence of ACM. Results of the inspection are presented in the following sections.

Asbestos Containing Materials (ACM) Inspection Results

Massachusetts regulations require that multiple samples be collected from homogeneous areas identified throughout the buildings to properly identify asbestos content in suspect ACM. Homogeneous areas consist of areas which appear to be similar with regards to material color, texture, and date of installation or application. Homogeneous bulk samples were analyzed using the “hit-stop” procedure. According to this procedure, additional duplicate samples collected from identical homogeneous areas are not required to be analyzed if asbestos is detected in one of the samples.

Kittredge Road Pump Station

EFI Global did not observe suspect ACM at this location; therefore, ACM samples were not collected from the Kittredge Road pump station.

Worcester Road Pump Station

Massachusetts-certified asbestos inspector Jeff Brunelle (AI00090) collected 35 bulk samples from suspect ACM identified throughout the Worcester Road pump station building. Samples were analyzed by polarized light microscopy (PLM) in accordance with the United States Environmental Protection Agency (EPA) "Method for Determination of Asbestos in Bulk Material"; EPA/600/R-93/116 (July 1993). Bulk samples were transmitted under a chain-of-custody to EMSL Analytical, Inc., an accredited Massachusetts-certified laboratory located at 7 Constitution Way, Suite 107 in Woburn, Massachusetts.

29 bulk samples of suspect ACM were analyzed by PLM (6 samples were omitted by the hit-stop procedure). Asbestos was detected in three of the samples submitted for PLM analysis.

Five non-organically bound (NOB) materials (roofing, mastics, caulking) that tested negative for asbestos by PLM were submitted for TEM analysis to confirm analytical results. Asbestos was detected in one of the NOB samples submitted for TEM analysis, but with results less than 1 percent asbestos (trace). Massachusetts regulations state that materials with trace amounts of asbestos do not have specific abatement needs; however, regulations require proper disposal of materials with any level of asbestos.

In addition, Massachusetts Policy #BWP-96-012 specifically details removal, handling, and disposal exemptions for asphalt based roofing material. If policy conditions are met, abatement of the asphalt based roofing may be exempt from certain MassDEP regulations, including abatement notification and some special handling requirements.

Asbestos samples that tested positive for the presence of asbestos are presented in Table 1. Asbestos samples that returned negative results for the presence of asbestos are presented in Table 2. Figure 1 depicts sampling locations. Laboratory analytical data for asbestos bulk sampling is included as Appendix B.

Lead Based Paint Survey Results

EFI Global completed a lead paint screening of painted surfaces located throughout both pump stations. Lead screening results are used to calculate worker exposure levels for OSHA compliance and to assess lead levels for proper handling and disposal during demolition.

Building components were tested for LBP by collecting paint chip samples from representative painted/coated building components for analysis of lead by Atomic Absorption Spectrometry using EPA Method 7420. Paint chip sampling results are presented in units of percent lead by

weight and compared to the EPA residential standard of 0.50 percent lead. According to EPA, concentrations of lead detected above this standard are considered LBP, however the OSHA Lead in Construction Standard (29 CFR 1926.62) considers any detectable level of lead to be a potential for exposure to workers if dust is generated from the disturbance of surfaces coated with paint containing lead. Therefore, any painted surfaces containing lead at any concentration that will be disturbed during renovation or demolition activities must be handled as LBP.

Paint chip sampling results are presented in Table 3. Refer to EFI's Hazardous Materials Consulting Services report in Appendix C for specific screening values for each building component tested.

Kittredge Road Pump Station

Lead was not detected above 0.50 percent by weight in any of the samples collected from the Kittredge Road tin can pump station.

Worcester Road Pump Station

Lead was detected above 0.50 percent by weight in one sample collected from the Worcester Road Pump Station. This sample was collected from the basement equipment (pumps and associated piping). Other materials screened during the inspection returned results less than 0.50 percent lead by weight.

CONCLUSIONS AND RECOMMENDATIONS

On May 8, 2013, Nobis performed an ACM and LBP inspection of the Kittredge Road and Worcester Road pump stations. The objective of these inspections was to identify building materials containing ACM or LBP to determine the requirements for proper disposal of demolition debris. Photographs taken during the inspection are included in Appendix D. An abatement cost estimate is included in Table 4.

Asbestos Containing Materials

ACM was not identified at the Kittredge Road pump station.

ACM was detected at the Worcester Road pump station in window glazing and caulking and in caulking around the exterior louvered vents. Trace levels of ACM were detected in the roofing composite sample. Refer to Tables 1 and 2 for results of the asbestos inspection. Quantities are estimated based on survey observations. Actual quantities and costs should be confirmed by the abatement/disposal company prior to bidding and performing work.

Any suspect asbestos-containing materials discovered during demolition or renovation activities that were not identified during the survey should be sampled and analyzed for asbestos content prior to removal.

Demolition activities that will affect ACM will require asbestos abatement and disposal in accordance with local, State, and Federal regulations. EPA and Massachusetts regulations require a 10-day notification, and asbestos notification forms must be filed prior to the commencement of any asbestos abatement work. As stated above, Massachusetts regulations do not require abatement of materials that are less than 1 percent asbestos; however, regulations do require that any amount of ACM is handled and disposed of properly.

Asbestos abatement must be conducted in accordance with the Commonwealth of Massachusetts Department of Labor and Workforce Development Chapter 453, Section 6.00 of the Code of Massachusetts Regulations (453 CMR 6.00), "The Removal, Containment, or Encapsulation of Asbestos;" and MassDEP 310 CMR 7.15 "Air Pollution Control Regulations," 310 CMR 18.00 and 19.00, "Solid Waste Regulations".

Abatement activities must be conducted in accordance with Federal, State, and local regulations and protocols, and by a certified asbestos abatement contractor. A Massachusetts certified Asbestos Project Monitor must provide abatement oversight, background/ambient air sampling, a final visual inspection, and final clearance air sampling during and at the completion of abatement activities.

Lead Based Paint

LBP was not identified at the Kittredge Road pump station.

LBP was identified on basement equipment (pumps and associated piping) at the Worcester Road pump station. Refer to Table 3 for a summary of lead paint screening results for materials sampled during the survey.

LBP demolition/renovation is required to be performed by a contractor in compliance with the OSHA Rules for Occupational Health and Environmental Controls for Lead 29 CFR 1926.62, including implementation of a written worker protection program, personal air monitoring, and respiratory protection program.

Representative samples of any LBP waste generated during demolition should be collected for toxicity characteristic leaching procedure (TCLP) lead analysis in accordance with 40 CFR Part 261 prior to material disposal.

Under the Resource Conservation and Recovery Act (RCRA), the acceptable level of lead (i.e. not hazardous waste) in demolition debris is 5 milligrams per liter (mg/L) by TCLP. If demolition debris exceeds 5 mg/L of lead by TCLP, it must be disposed of as hazardous waste. Sampling and TCLP analysis of materials with low to mid-range results may be used to establish lower limits under which materials can be disposed of as non-hazardous waste. If metal building components are to be recycled, lead abatement may not be necessary.

Thank you for the opportunity to be of service. Should you require additional information, please do not hesitate to contact us.

Sincerely,

NOBIS ENGINEERING, INC.

Jeff Brunelle
Project Geologist

Stephen Vetere, PE, LSP
Senior Project Manager

Attachments: Table 1 – Summary of Positive Asbestos Bulk Sampling Analytical Results
Table 2 – Summary of Negative Asbestos Bulk Sampling Analytical Results
Table 3 – Summary of Lead Paint Sampling Results
Table 4 – Abatement Cost Estimate
Figure 1 – Building Layout and Asbestos Sampling Locations
Appendix A – Limitations
Appendix B – Laboratory Analytical Data for Asbestos Bulk Samples
Appendix C – EFI Global Hazardous Materials Consulting Services Report
Appendix D – Photographs

c: File No. 86640.03 (w/attach.)

TABLES

Table 1
Summary of Positive Asbestos Bulk Sampling Analytical Results
Worcester Road Pump Station
Framingham, Massachusetts

Sample ID	Descript	Room/Location	Color	Int/Ext	% Asbestos	Quantity
1A-C	Window Glazing - Metal to Glass	First Floor	Grey	Exterior	2% Chrysotile	1134 LF
2A-C	Window Caulking - Frame to Wall	First Floor	Grey	Exterior	3% Chrysotile	266 LF
9A-C	Vent Cover Caulking	First Floor	Tan	Exterior	3% Chrysotile	20 LF
10A, 11A, 12A Composite	Roofing Materials	N/A	Black	Exterior	0.72% Chrysotile (trace)	819 SF

Notes:
1. Quantities are estimated and should be confirmed by the abatement contractor prior to bidding/removal.
2. LF = linear feet
3. Materials with less than 1% asbestos do not need abatement; however, ACM will require proper disposal.
4. Window glazing and caulking quantities are for all window sets. Window sets will likely be abated as one structure.

Table 2
Summary of Negative Asbestos Bulk Sampling Analytical Results
Worcester Road Pump Station
Framingham, Massachusetts

Sample ID	Description	Color	Location	Int/Ext	% Asbestos	TEM Confirmation
3A-C	Caulking	Clear	Around Electrical Box on East Side of Building	Exterior	ND	--
4A-C	Exhaust Packing/Insulation	Grey	Ford Motor Exhaust Horizontal and Vertical Sections	Interior	ND	ND
5A-C	Soft Caulking	Brown	2-Inch Pipe/Wall Penentration Near Door	Interior	ND	--
6A-C	Soft Caulking	White	6-Inch Pipe/Wall Penentration	Interior	ND	--
7A-B	Fiber Exhaust Wrap	White	Ford Motor Exhaust Vertical Section	Interior	ND	ND
8A-C	Window Caulking	White	Center Window, West Side - Metal to Glass	Exterior	ND	--
10A-C	Flat Roof	Black	Lower Roof Layer	Exterior	ND	Trace (0.72%)
11A-C	Black glazing with Sample 10	Black	Roof	Exterior	ND	
12A-C	Flat Roof	Black	Upper Roof Layer	Exterior	ND	

Notes:
1. ND - None Detected
2. -- Not Tested/Not Required
3. Composite Sample of roofing material (10, 11, 12) submitted for TEM analysis.

Table 3
Summary of Lead Paint Sampling Results
Kittredge and Worcester Road Pump Stations
Framingham, Massachusetts

Sample ID	Pump Station	Sample Description	Analytical Results (% lead by weight)
Pb-01	Kittredge	Light green masonry walls	0.025
Pb-02	Kittredge	Concrete floor	0.021
Pb-03	Kittredge	HVAC Duct	0.018
PC-01	Worcester	Light green masonry walls	0.031
PC-02	Worcester	Concrete floor	0.111
PC-03	Worcester	HVAC duct	0.257
PC-04	Worcester	Mechanical equipment	<0.008 (<RL)
PC-05	**Worcester**	**Basement pumping equipment**	**1.952**
PC-06	Worcester	Basement masonry	0.211
PC-07	Worcester	Exterior green railing	0.040
PC-08	Worcester	Window exterior	0.145

Notes:
1. RL - Reporting Limit

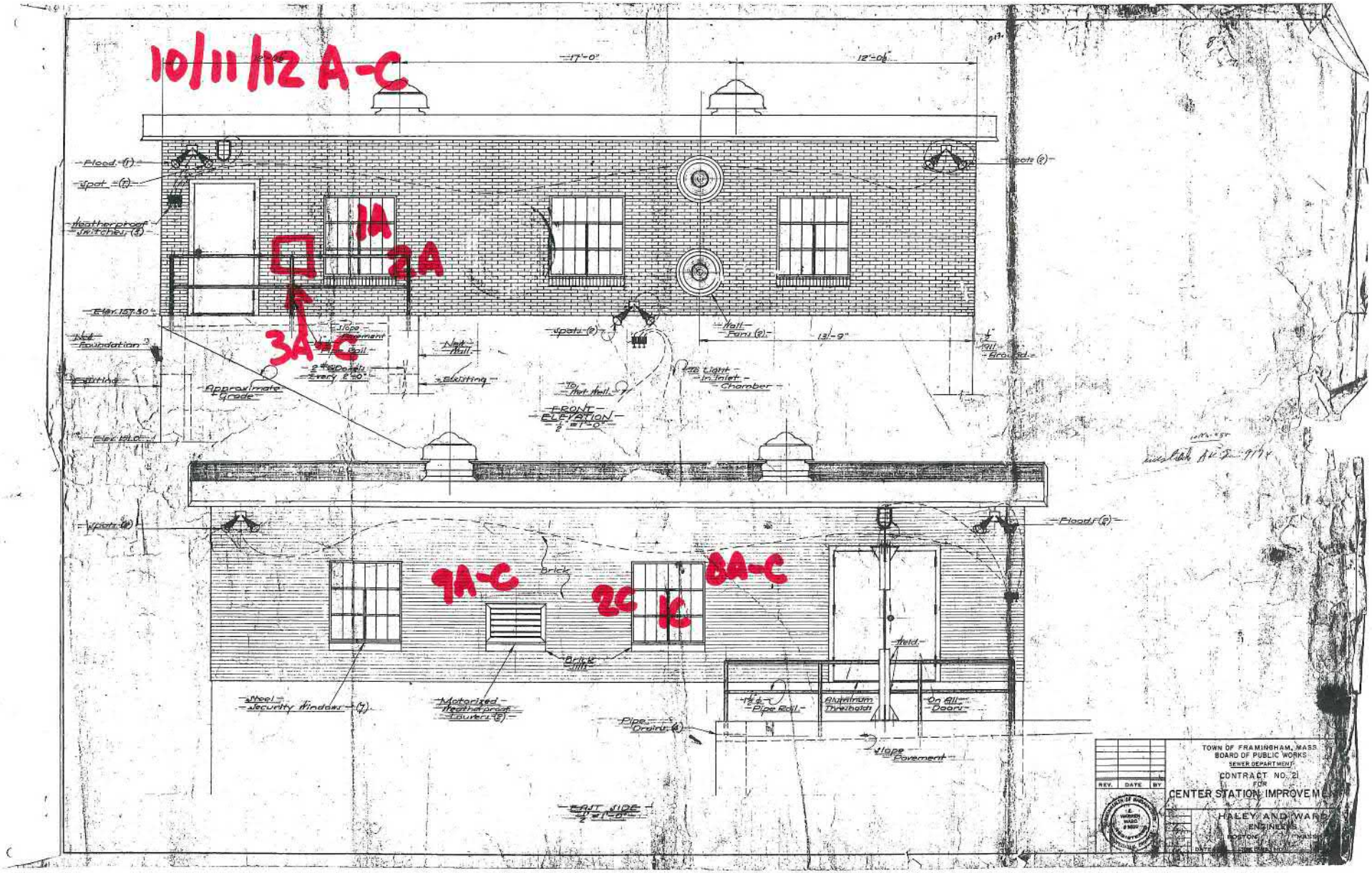
Table 4
Abatement Cost Estimate
Worcester Road Pump Station
Framingham, Massachusetts

ITEM	QUANTITY	PRICE PER UNIT	UNITS	DISPOSAL COST
CONFIRMED ACM				
Window Sets	7	$ 500.00	each	$ 3,500.00
Vent Louver Caulking (2 vents)	20	$ 25.00	LF	$ 500.00
			Subtotal	$ 4,000.00
PROJECT MONITOR - ABATEMENT CLEARANCE/OVERSIGHT/SAMPLING				
Project Monitor Oversight/Clearance Sampling	8	$ 85.00	hour	$ 680.00
Air Sample Cassettes (case)	1	$ 50.00	each	$ 50.00
Equipment/Consumables	1	$ 75.00	each	$ 75.00
Final Results/Report	1	$ 800.00	LS	$ 800.00
			Subtotal	$ 1,605.00
			Grand Total	$ 5,605.00

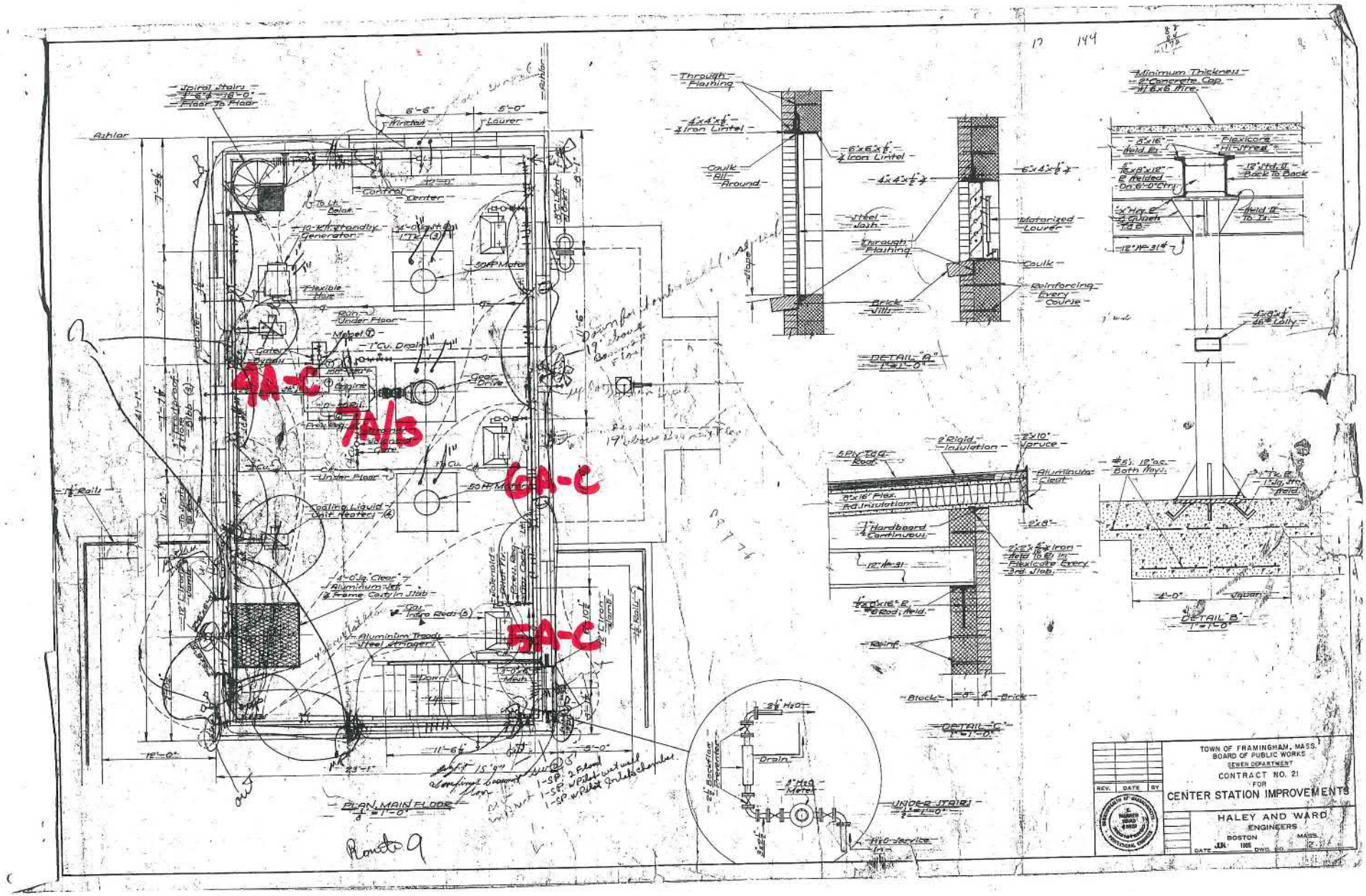
Notes:
1. Quantities are estimated based on survey observations. Actual quantities should be confirmed by the abatement/disposal company prior to bidding and performing work.
2. Abatement costing is based on current market pricing. Actual pricing should be confirmed by the abatement/disposal company prior to bidding and performing work.

FIGURES

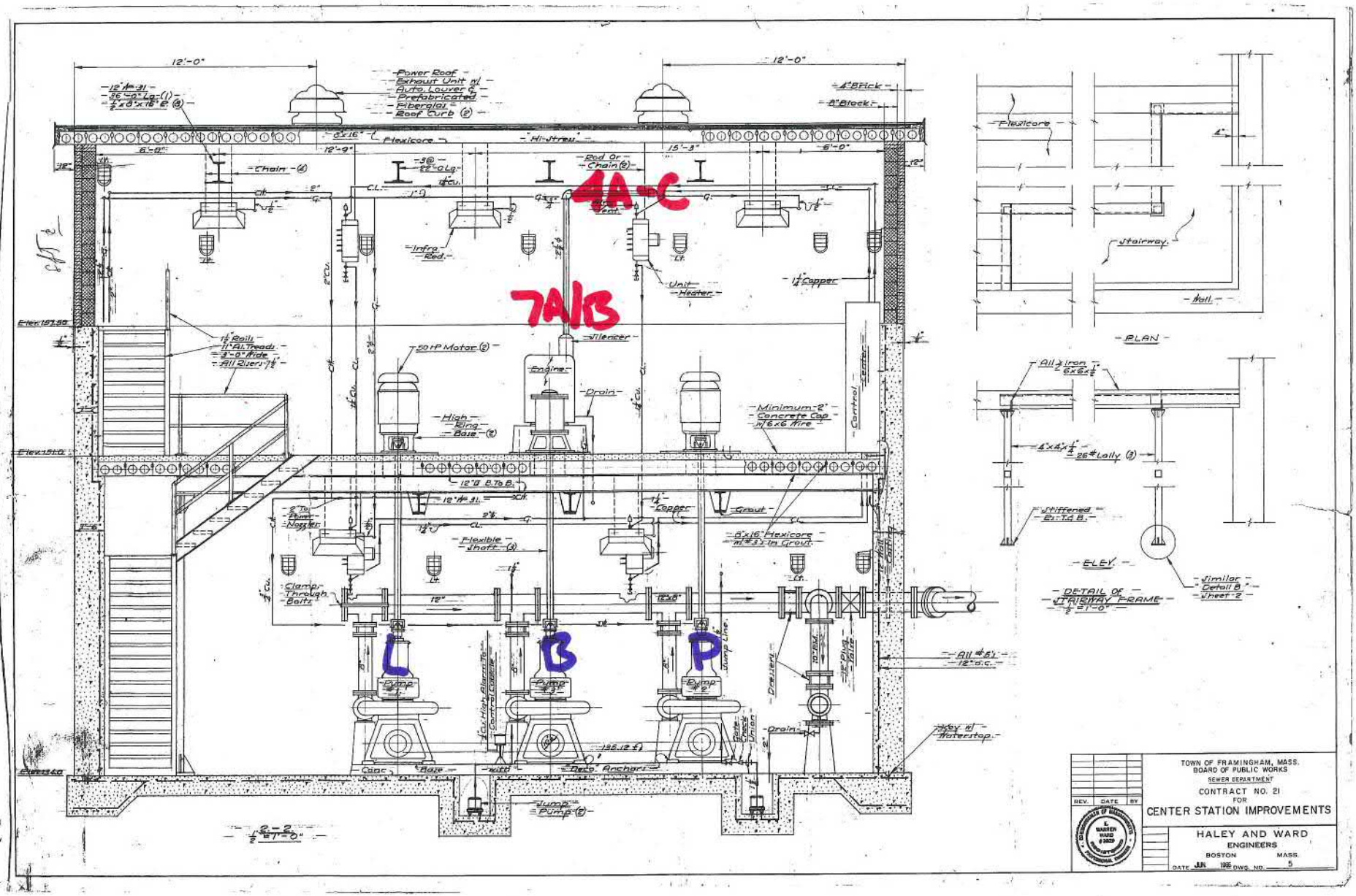
FIGURE 1



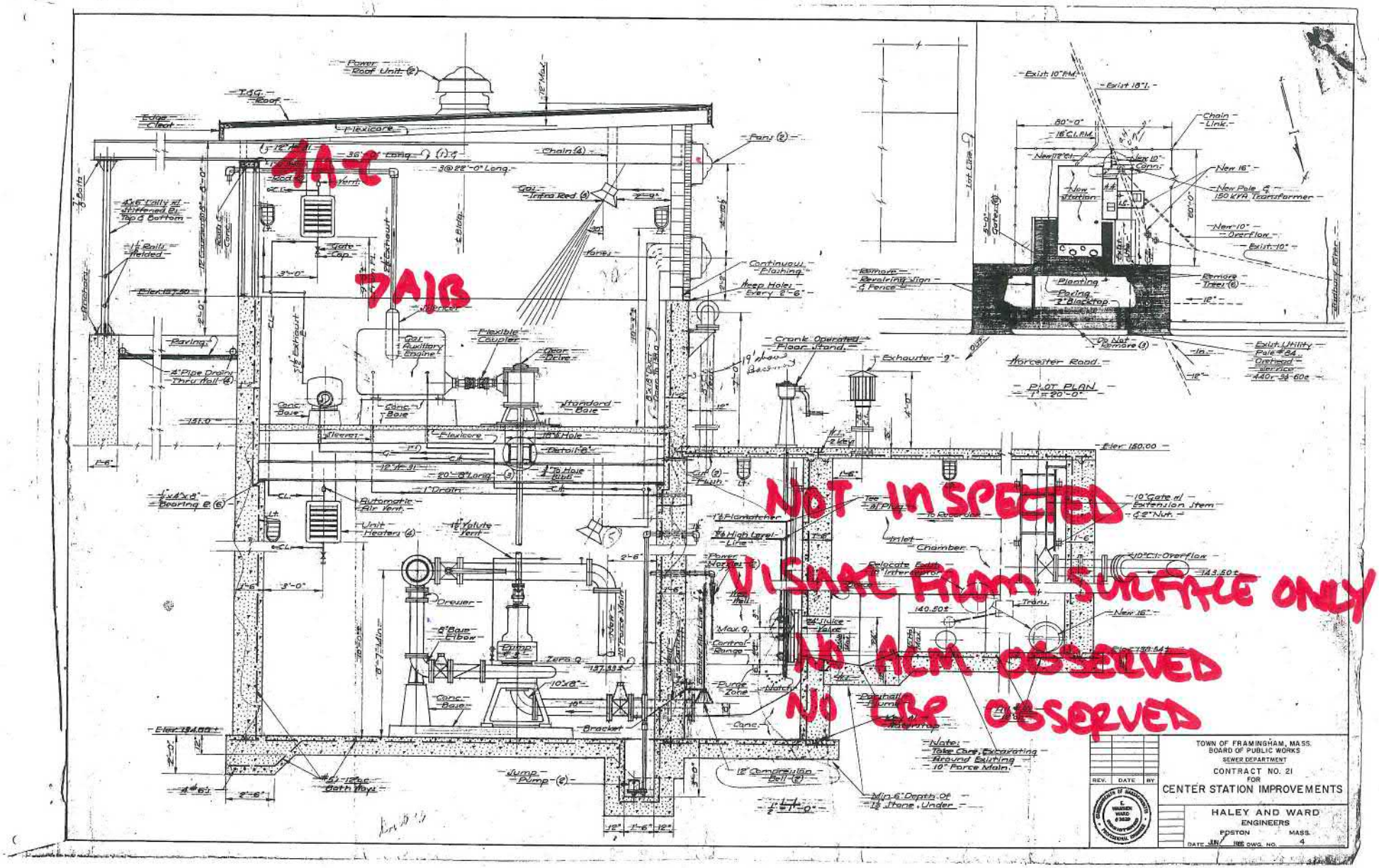
1A = ACM SAMPLE LOCATION


4A-C
7A/B
6A-C
5A-C
PLAN, MAIN FLOOR
DETAIL "A"
DETAIL "B"
DETAIL "C"
Route 9
TOWN OF FRAMINGHAM, MASS.
BOARD OF PUBLIC WORKS
SEWER DEPARTMENT
CONTRACT NO. 21
FOR
CENTER STATION IMPROVEMENTS
HALEY AND WARD
ENGINEERS
BOSTON
MASS.
REV.
DATE
BY

(2)



LBP = LEAD BASED PAINT


AAC
7A1B
NOT INSPECTED
VISUAL FROM SURFACE ONLY
NO ACM OBSERVED
NO PBC OBSERVED
PLOT PLAN
1" = 20'-0"
Worcester Road
TOWN OF FRAMINGHAM, MASS.
BOARD OF PUBLIC WORKS
SEWER DEPARTMENT
CONTRACT NO. 21
FOR
CENTER STATION IMPROVEMENTS
HALEY AND WARD
ENGINEERS
BOSTON MASS.
DATE JAN 1985 DWG. NO. 4

APPENDIX B
Smith and Wessel Reports

May 11, 2021

Mr. Joseph McLoughlin II, LSP, LEP
Senior Project Manager
Beta Group, Inc.
6 Blackstone Valley Place # 101
Lincoln, RI 02865-1112

Re: Supplemental Inspection/Sampling of Suspect Asbestos Building Materials & Lead Based Paint at the Pump Station, 730 Worcester Road, Framingham, MA

Dear Mr. McLoughlin:

On April 17, 2021 Smith & Wessel Associates, Inc. (SWA) was on-site at the Worcester Road Pump Station located at 730 Worcester Road in Framingham, Massachusetts. The purposes of the visit were to collect samples of suspect building materials to be analyzed for asbestos content in anticipation of significant renovations and select demolition. SWA understands that Nobis Group of Lowell, Massachusetts, conducted a hazard materials inspection at the site on May 8th of 2013 and that this report is supplemental to their findings. Also, AECOM collected 2 suspect asbestos samples of black wall coating from the wet well on October 31, 2018. In addition, SWA tested painted components for lead content throughout the impact garage location.

Asbestos

The purpose of the supplemental inspection was to evaluate the types, locations, and extent of any additional suspect ACBM and to provide appropriate recommendations for its abatement and or management. SWA's inspection addressed both friable materials (materials that can be easily crumbled, crushed, or pulverized by hand pressure) and non-friable suspect materials. SWA identified several suspect materials at the site that were sampled and analyzed for asbestos content. However, if any suspect materials are identified at later dates that are not addressed in this report, they must be assumed to be ACBM unless appropriate sampling and analysis demonstrate otherwise.

The asbestos bulk samples were placed into labeled individual sealed plastic bags and delivered via proper chain of custody to EMSL Analytical, Inc. (EMSL) of Woburn, Massachusetts, a fully accredited asbestos analytical laboratory. EMSL analyzed the samples using Polarized Light Microscopy (PLM) in accordance with the requirements of 40 CFR Part 763, Subpart F, Appendix A.

For each homogeneous sampling group, the laboratory analyzed samples until a positive result

was obtained (i.e. equal to or greater than one percent asbestos) or until all samples were analyzed. If one sample indicates an asbestos content of equal to or greater than one percent, the entire homogenous area must be considered to be an asbestos-containing building material (ACBM) even if one or more samples in the group indicates an asbestos content of less than one percent.

A total of 7 additional samples were collected by SWA of which, 5 were analyzed. PLM results indicate that the roof tar flashing and wall/foundation vapor barrier contain asbestos as part of the materials compositions. Additionally, asbestos building materials were originally identified by Nobis that have been incorporated into this supplemental report. Complete laboratory results are attached as Appendix A of this report.

SWA has listed in **Table 1**, the location and estimated quantity, by square foot (sf), linear foot (lf), or other appropriate unit, of each type of ACBM identified.

Table 1 • List of Materials Testing Positive for Asbestos			
Type of Material	**Location**	**Quantity**	**Sample number**
Black wall/foundation vapor barrier	Throughout perimeter between concrete foundation and brick walls	120 sf	0428-01A
Black roof tar flashings and felts *(treat entire roof as asbestos down to the concrete substrate)*	Throughout roof	825 sf	0428-03A, *10A, 11A, 12A (0.72% asbestos sampled by Nobis)*
Nobis PLM Bulk Sample Results from May of 2013			
Gray window glazing compound and associated caulking	*Throughout*	*6 ea. (4'x4')*	*1A, 2A*
Louver vent caulking	*Exterior*	*2 ea.*	*9A*

In **Table 2 below**, SWA has listed all materials that tested negative for asbestos, including the locations where these materials were observed and the corresponding bulk sample reference number(s).

Table 1 • List of Materials Testing Negative for Asbestos		
Type of Material	**Location**	**Sample No.**
Gray floor/wall seam sealer	Throughout lower level perimeter walls	0428-02A, 0428-02B
White/gray gasket material	Exterior at main entrance	0428-04A
Nobis PLM Bulk Sample Results from May of 2013		
Clear caulking	*Around electrical box on east side of building - Exterior*	*3A, 3B, 3C*

Table 1 • List of Materials Testing Negative for Asbestos		
Type of Material	**Location**	**Sample No.**
Gray exhaust packing/insulation	*Ford motor exhaust horizontal and vertical sections - Interior*	*4A, 4B, 4C*
Brown soft caulking	*2-inch pipe/wall penetration near door - Interior*	*5A, 5B, 5C*
White soft caulking	*2-inch pipe/wall penetration - Interior*	*6A, 6B, 6C*
White fiber exhaust wrap	*Ford motor exhaust vertical section - Interior*	*7A, 7B, 7C*
White window caulking	*Center window, west side – Metal to glass - Exterior*	*8A, 8B, 8C*
Black flat roof material	*Lower roof layer*	*10A, 10B, 10C (Trace asbestos)*
Black glazing with sample 10	*Roof*	*11A, 11B, 11C (Trace asbestos)*
Black flat roof material	*Upper roof layer*	*12A, 12B, 12C (Trace asbestos)*
AECOM PLM Bulks		
Black wall coating	*Wet well interior wall*	*B-01A, B-01B*

General Notes Regarding the Supplemental Inspection:

- Knowing that the building is slated for significant renovations and select demolition, SWA made every effort to conduct intrusive investigations with the use of hand tools only.
- Based on our review, the gaskets we were able to observe were orange rubber gaskets and not suspect for asbestos.
- A small portion of the exterior brick was taken out to look for vapor barrier wall material and no suspect materials were observed in those locations.
- A hole in the cinderblock was made for the purpose of identifying fillers such as vermiculite, of which none were identified.
- The metal bathroom stall was cut into and no suspect asbestos was observed.
- Because SWA identified asbestos in roof tar flashing and Nobis through a core sample, the entire roof system must be treated as asbestos-containing.
- The contractor should reference the previous report information generated by AECOM & Nobis for the purpose of better understanding the building.

Lead Based Paint

SWA's Massachusetts licensed Lead Paint Inspector Ted Sherry (Cert. # 2753) tested representative painted components for lead. SWA analyzed the painted components for lead content using the NITON XLS-303A X-ray Fluorescence Analyzer (XRF) following the manufacturer's instructions for initial calibration and operation. The XRF uses a radioactive source to excite the electrons of lead atoms (if present) in paint. As the lead atom electrons return to their normal state, they emit x-rays that are measured by the XRF and then processed

and the results converted to mg/cm^2 of sampled surface area. On most substrates, the XRF is precise to $\pm$0.1 mg/cm^2.

The United States Department of Housing and Urban Development (HUD) has established a standard for lead-based paint, as tested using an XRF analyzer, of 1.0 mg/cm^2. Although this standard only applies to housing funded by the federal government, it is a useful reference concentration for assessing hazards associated with lead in paint in other settings. Thus, when paint contains greater than 1.0 mg/cm^2, special care should be taken when conducting activities that impact these paints. When conducting abrasive blasting, torch burning, or similar activities that generate significant dust or fume, hazards can be caused even at concentrations below the HUD standard. In addition, the waste stream generated during renovations or demolition must be tested by toxicity characteristic leaching procedure (TCLP) to determine the amount of lead that will leach into the landfill soil. If lead will leach from the waste stream at 5 ppm or greater, components know to be coated with elevated LBP must be segregated for disposal as a hazardous lead waste.

The Table below details the components tested at the site and the subsequent lead results in mg/cm^2: The bolded results are elevated 1.0 mg/cm^2.

Location	**Substrate**	**Color**	**Component**	**Result (mg/cm^2)**
Exterior	Metal	Green	Door system	0.1
	Metal	Green	Railings *(at main exit only)*	**3.8**
	Metal	Gray	Window sash/bars	<0.1
	Wood	White	Upper trim	0.3
	Concrete	White	Soffit	0.1
	Metal	Green	Dock railing/structural steel	<0.1 – 0.2
Main level interior	Cinderblock	Green	Wall	<0.1
	Metal	Gray	Stair system	**0.7 – 1.1**
	Concrete	Green	Wall	<0.1
	Concrete	Gray/red	Floor	<0.1
	Metal	Green	Motors	<0.1
	Metal	Green	Stall	<0.1
	Concrete	White	Ceiling	<0.1
	Metal	Gray	Structural steel	<0.1
Lower level	Concrete	Green	Wall	<0.1
	Concrete	Gray	Floor	<0.1
	Metal	Gray	Pumps/pipes	<0.1
	Metal	Blue	Pump/motor	<0.1
	Concrete	White	Ceiling	<0.1

Only limited components were determined to contain elevated lead in paint at the site. Handling of components that are coated with LBP requires compliance with the OSHA lead standard whether elevated or negligible levels are determined. To minimize exposure to airborne dust or fumes, torch burning, cutting, grinding, or similar high impact work on components covered by LBP should be avoided. Such work would need to be conducted by properly trained workers using appropriate worker protection and engineering controls.

For work activities that may generate airborne lead, the contractor(s) should perform an initial exposure assessment in the form of personal air monitoring for each individual task (e.g. demolition, abrasive blasting, and painting) that has the potential for causing worker exposure to be at or above the OSHA Action Level. In lieu of exposure monitoring, recent historical data from similar operations may be used to comply with OSHA requirements.

Further, if lead paint is removed from the components, representative waste must be analyzed via Toxicity Characteristic Leaching Procedure (TCLP) to determine proper disposal requirements. If the lead paint debris will leach into the landfill soil at 5 ppm or greater as determined via TCLP, the materials must be disposed in a lined landfill permitted to accept hazardous lead waste. Metal components coated with LBP may be recycled without concerns for the lead.

Should you have any questions or require further information, please do not hesitate to contact me.

Respectfully submitted,
Smith & Wessel Associates Inc.

Ted Sherry
Project Manager

APPENDIX A

Certificates of Asbestos Bulk Sample Analysis
(PLM)

EMSL Analytical, Inc.

5 Constitution Way, Unit A Woburn, MA 01801

Tel/Fax: (781) 933-8411 / (781) 933-8412

http://www.EMSL.com / bostonlab@emsl.com

EMSL Order:	132103043
Customer ID:	SMIT50B
Customer PO:	
Project ID:	

Attention:	Ted Sherry	**Phone:**	(978) 994-3643
	Smith & Wessel Associates, Inc.	**Fax:**	(978) 346-7265
	188 Greenville Street	**Received Date:**	04/30/2021 10:40 AM
	Spencer, MA 01562	**Analysis Date:**	05/04/2021
		Collected Date:	04/28/2021

Project: 21172 - Worcester Road Pump Station; 730 Worcester Road; Framingham, MA

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
0428-01A *132103043-0001*	West - Between Foundation & Wall - Black Vapor Barrier	Gray/Black Fibrous Homogeneous	25% Cellulose	70% Non-fibrous (Other)	5% Chrysotile
0428-01B *132103043-0002*	East - Between Foundation & Wall - Black Vapor Barrier				Positive Stop (Not Analyzed)
0428-02A *132103043-0003*	Lower Level - N/E Floor/Wall Base - Gray Floor Seam	Gray Non-Fibrous Homogeneous	2% Fibrous (Other)	98% Non-fibrous (Other)	None Detected
0428-02B *132103043-0004*	Lower Level - South at Circular Stairs Floor/Wall Base - Gray Floor Seam	Gray Non-Fibrous Homogeneous	2% Fibrous (Other)	98% Non-fibrous (Other)	None Detected
0428-03A *132103043-0005*	Roof Drip Edge - West - Black Tar Flashing	Black Non-Fibrous Homogeneous		90% Non-fibrous (Other)	10% Chrysotile
0428-03B *132103043-0006*	Roof Drip Edge - East - Black Tar Flashing				Positive Stop (Not Analyzed)
0428-04A *132103043-0007*	Exterior at Entrance Doors - White Light Gasket Material	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Analyst(s)

John McCarthy (5)

Steve Grise, Laboratory Manager
or Other Approved Signatory

Initial report from: 05/04/2021 12:21:41

APPENDIX B

Site Photographs

Worcester Road Pump Station – Framingham, MA

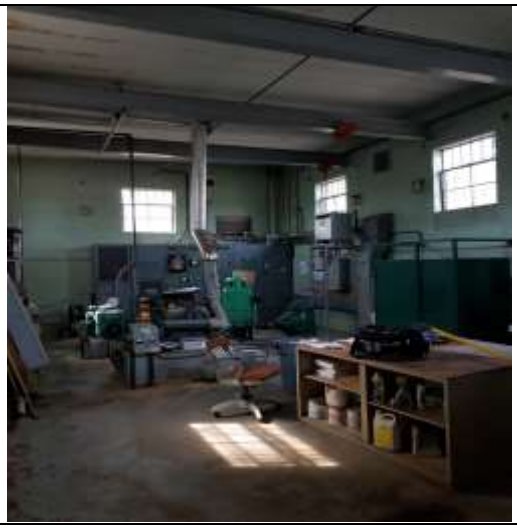
	
Front main entrance	Side dock entrance
	
Wall/foundation black vapor barrier, asbestos	Lower level pipes
	
Lower level pipes/motors	Orange rubber gasket lower level

Worcester Road Pump Station – Framingham, MA

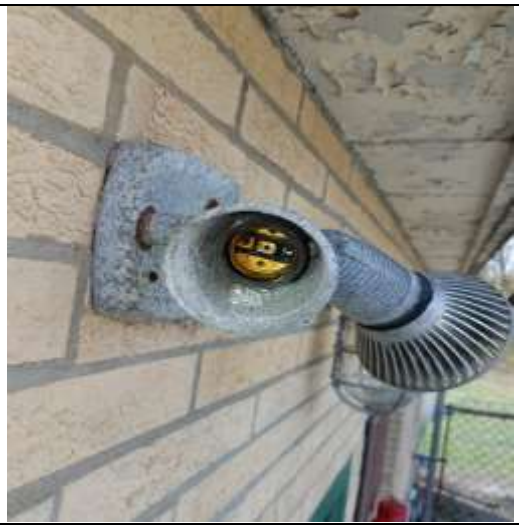
	
Orange rubber gasket lower level	Wall seam sealer lower level outer wall
	
Wall seam sealer lower level outer wall	Main level cinderblock, no fillers observed
	
Brick to block wall, no vapor barriers	Tar flashing, asbestos

Worcester Road Pump Station – Framingham, MA

Tar & gravel roof, asbestos



Main level view



Light gasket debris, not asbestos

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SMITH & WESSEL ASSOCIATES, INC.
HAZARDOUS BUILDING MATERIALS AND AIR QUALITY SPECIALISTS

September 13, 2021

Mr. Joseph McLoughlin II, LSP, LEP
Senior Project Manager
Beta Group, Inc.
6 Blackstone Valley Place # 101
Lincoln, RI 02865-1112

Re: Sampling of Suspect Paints to be analyzed for PCB concentrations at the Pump Station at 730 Worcester Road, Framingham, Massachusetts

Dear Mr. McLoughlin:

On September 1, 2021, Smith & Wessel Associates, Inc. (SWA) was on-site at the Water Pump Station located at 730 Worcester Road in Framingham, Massachusetts. The purpose of the site visit was to collect samples of suspect paints throughout the structure to be analyzed for the presence of polychlorinated biphenyls (PCBs). Previously, in December of 2018, limited PCB bulk sampling was conducted by AECOM Environment of Chelmsford, Massachusetts.

The suspect paints were submitted to New England Testing Laboratory, Inc. (NETLAB) of Warwick, Rhode Island to be analyzed for PCB concentrations. NETLAB analyzed the samples via EPA Method 3540C-8082A Soxhlet.

Analytical results indicate PCB concentrations are present in majority of paints tested exceeding the EPA Regulatory standard of 50 ppm or greater that deems a material a hazardous PCB waste. Only the green wall paint and white ceiling paint were determined to contain PCBs at concentrations <50 ppm.

Results of PCB Sampling

Material sampled/#	**Location** *(estimated quantity)*	**Result (ppm)**
Green wall paint (0901-01)	Basement east wall *(est. 1,860 sf)*	906
Gray pipe paint (0901-02)	Basement middle *(90 lf @ 8' x 12' dia.)*	371
Gray duct paint (0901-03)	Basement at west wall *(11 sf)*	163
Gray stair paint (0901-04)	Basement main north stairs *(1 ea.)*	454
Gray floor paint (0901-05)	Basement near main stairs *(600 sf)*	128
White floor/lip paint (06)	Basement N/W chemical tank section *(245 sf)*	312
Green wall paint (0901-07)	Floor 1 east wall *(1,740 sf)*	35

188 GREENVILLE STREET
SPENCER, MA 01562
TELEPHONE: (978) 346-4800
FAX: (978) 346-7265

Results of PCB Sampling		
Material sampled/#	**Location** *(estimated quantity)*	**Result (ppm)**
Gray/red floor paint (0901-08)	Floor 1 near floor grate *(500 sf)*	321
Green motor paint (0901-09)	Floor 1 middle section *(2 motors)*	396
White ceiling paint (0901-10)	Floor 1 N/E ceiling section *(600 sf)*	20

Any materials containing PCBs equal to or greater than 50 parts per million (ppm) are regulated under the Toxic Substance Control Act and the PCB regulation found at 40 CFR Part 761. Building materials containing PCBs at concentrations greater than 50 ppm are not authorized for use in building products and must be removed and properly disposed of. Further, because PCBs may have leached into surrounding substrates, such as brick, CMU, and cement, or may have degraded and contaminated adjacent soil, assessment of masonry and soils is necessary to determine the extent of PCB contamination. All regulated PCB materials must be disposed in accordance with EPA PCB Regulation 40 CFR part 761, Subpart D. Typically, building materials with low level PCB concentrations also require special handling and disposal in a landfill permitted to accept such waste.

Should you have any questions or require further information, please do not hesitate to contact me.

Respectfully submitted,
Smith & Wessel Associates Inc.

Ted Sherry
Project Manager

APPENDIX A

Certificates of Analysis for PCBs

New England Testing Laboratory, Inc.
(401) 353-3420

REPORT OF ANALYTICAL RESULTS

NETLAB Work Order Number: 1I02023
Client Project: 21381 - 730 Worcester Rd, Framingham

Report Date: 09-September-2021

Prepared for:

Ted Sherry
Smith & Wessel Associates
515 Wildlife Glen
Bradenton, FL 34209

Richard Warila, Laboratory Director
New England Testing Laboratory, Inc.
59 Greenhill Street
West Warwick, RI 02893
rich.warila@newenglandtesting.com

Samples Submitted :

The samples listed below were submitted to New England Testing Laboratory on 09/02/21. The group of samples appearing in this report was assigned an internal identification number (case number) for laboratory information management purposes. The client's designations for the individual samples, along with our case numbers, are used to identify the samples in this report. This report of analytical results pertains only to the sample(s) provided to us by the client which are indicated on the custody record. The case number for this sample submission is 1I02023. Custody records are included in this report.

Lab ID	Sample	Matrix	Date Sampled	Date Received
1I02023-01	0901-01	Solid (Misc)	09/01/2021	09/02/2021
1I02023-02	0901-02	Solid (Misc)	09/01/2021	09/02/2021
1I02023-03	0901-03	Solid (Misc)	09/01/2021	09/02/2021
1I02023-04	0901-04	Solid (Misc)	09/01/2021	09/02/2021
1I02023-05	0901-05	Solid (Misc)	09/01/2021	09/02/2021
1I02023-06	0901-06	Solid (Misc)	09/01/2021	09/02/2021
1I02023-07	0901-07	Solid (Misc)	09/01/2021	09/02/2021
1I02023-08	0901-08	Solid (Misc)	09/01/2021	09/02/2021
1I02023-09	0901-09	Solid (Misc)	09/01/2021	09/02/2021
1I02023-10	0901-10	Solid (Misc)	09/01/2021	09/02/2021

Request for Analysis

At the client's request, the analyses presented in the following table were performed on the samples submitted.

0901-01 (Lab Number: 1I02023-01)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-02 (Lab Number: 1I02023-02)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-03 (Lab Number: 1I02023-03)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-04 (Lab Number: 1I02023-04)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-05 (Lab Number: 1I02023-05)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-06 (Lab Number: 1I02023-06)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-07 (Lab Number: 1I02023-07)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-08 (Lab Number: 1I02023-08)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-09 (Lab Number: 1I02023-09)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-10 (Lab Number: 1I02023-10)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

Method References

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, USEPA

Case Narrative

Sample Receipt:

The samples associated with this work order were received in appropriately cooled and preserved containers. The chain of custody was adequately completed and corresponded to the samples submitted.

Exceptions: None

Analysis:

All samples were prepared and analyzed within method specified holding times and according to NETLAB's documented standard operating procedures. The results for the associated calibration, method blank and laboratory control sample (LCS) were within method specified quality control requirements and allowances. Results for all soil samples, unless otherwise indicated, are reported on a dry weight basis. Samples were extracted via EPA 3540C - Soxhlet.

Exceptions:
PCB: Samples "0901-07" and "0901-09" were reported without surrogates due to matrix pattern coelution in retention window of interest.

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-01

Lab Number: 1I02023-01 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1254	**906000**		79900	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		79900	ug/kg	09/03/21	09/08/21
PCBs (Total)	**906000**		79900	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*64.7%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*79.9%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-02

Lab Number: 1I02023-02 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1254	**371000**		39300	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		39300	ug/kg	09/03/21	09/08/21
PCBs (Total)	**371000**		39300	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*69.6%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*64.6%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-03

Lab Number: 1I02023-03 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1254	**163000**		18800	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		18800	ug/kg	09/03/21	09/08/21
PCBs (Total)	**163000**		18800	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*52.8%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*61.8%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-04

Lab Number: 1I02023-04 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1254	**454000**		20400	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		20400	ug/kg	09/03/21	09/08/21
PCBs (Total)	**454000**		20400	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*71.8%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*75.7%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-05

Lab Number: 1I02023-05 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1254	**128000**		17800	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		17800	ug/kg	09/03/21	09/08/21
PCBs (Total)	**128000**		17800	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*57.5%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*68.3%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-06

Lab Number: 1I02023-06 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1254	**312000**		16700	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		16700	ug/kg	09/03/21	09/08/21
PCBs (Total)	**312000**		16700	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*50.0%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*70.9%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-07

Lab Number: 1I02023-07 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1254	**35100**		19400	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		19400	ug/kg	09/03/21	09/08/21
PCBs (Total)	**35100**		19400	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-08

Lab Number: 1I02023-08 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1254	**321000**		20300	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		20300	ug/kg	09/03/21	09/08/21
PCBs (Total)	**321000**		20300	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*59.4%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*92.2%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-09

Lab Number: 1I02023-09 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		15100	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		15100	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		15100	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		15100	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		15100	ug/kg	09/03/21	09/08/21
Aroclor-1254	**48800**		15100	ug/kg	09/03/21	09/08/21
Aroclor-1260	**347000**		15100	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		15100	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		15100	ug/kg	09/03/21	09/08/21
PCBs (Total)	**396000**		15100	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-10

Lab Number: 1I02023-10 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1221	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1232	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1242	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1248	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1254	**19900**		1020	ug/kg	09/03/21	09/09/21
Aroclor-1260	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1262	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1268	ND		1020	ug/kg	09/03/21	09/09/21
PCBs (Total)	**19900**		1020	ug/kg	09/03/21	09/09/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*64.8%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*65.0%*	*30-105*	09/03/21	09/08/21

Quality Control

Polychlorinated Biphenyls (PCBs)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B1I0140 - EPA 3540C										
Blank (B1I0140-BLK1)					Prepared: 09/03/21 Analyzed: 09/07/21					
Aroclor-1016	ND		200	ug/kg						
Aroclor-1221	ND		200	ug/kg						
Aroclor-1232	ND		200	ug/kg						
Aroclor-1242	ND		200	ug/kg						
Aroclor-1248	ND		200	ug/kg						
Aroclor-1254	ND		200	ug/kg						
Aroclor-1260	ND		200	ug/kg						
Aroclor-1262	ND		200	ug/kg						
Aroclor-1268	ND		200	ug/kg						
PCBs (Total)	ND		200	ug/kg						
Surrogate: 2,4,5,6-Tetrachloro-m-xylene (TCMX)			*38.3*	ug/kg	*80.0*		*47.9*	*30-100*		
Surrogate: Decachlorobiphenyl (DCBP)			*42.0*	ug/kg	*80.0*		*52.5*	*30-105*		
LCS (B1I0140-BS1)					Prepared: 09/03/21 Analyzed: 09/07/21					
Aroclor-1016	691		200	ug/kg	1000		69.1	64-112		
Aroclor-1260	817		200	ug/kg	1000		81.7	59.4-124		
Surrogate: 2,4,5,6-Tetrachloro-m-xylene (TCMX)			*48.7*	ug/kg	*80.0*		*60.9*	*30-100*		
Surrogate: Decachlorobiphenyl (DCBP)			*58.6*	ug/kg	*80.0*		*73.2*	*30-105*		
LCS Dup (B1I0140-BSD1)					Prepared: 09/03/21 Analyzed: 09/07/21					
Aroclor-1016	738		200	ug/kg	1000		73.8	64-112	6.50	20
Aroclor-1260	832		200	ug/kg	1000		83.2	59.4-124	1.79	20
Surrogate: 2,4,5,6-Tetrachloro-m-xylene (TCMX)			*49.5*	ug/kg	*80.0*		*61.9*	*30-100*		
Surrogate: Decachlorobiphenyl (DCBP)			*54.8*	ug/kg	*80.0*		*68.5*	*30-105*		

Notes and Definitions

Item	Definition
Wet	Sample results reported on a wet weight basis.
ND	Analyte NOT DETECTED at or above the reporting limit.

Site: Worcester Rd Pump Station

730 Worcester Rd, Framingham, MA Project # 21381

		Location
0901-01	Green Wall Paint	Basement - East Wall
0901-02	Gray Pipe Paint	Basement - Middle
0901-03	Gray Duct Paint	Basement - At west wall
0901-04	Gray Stair Paint	Basement - Main Stairs (North)
0901-05	Gray Floor Paint	Basement - Near Main Stairs
0901-06	White Floor/Lip Paint	Basement - Chem Tank section
0901-07	Green Wall Paint	Floor 1 - East wall
0901-08	Gray/Red Floor Paint	Floor 1 - Near Floor grate
0901-09	Green Motor Paint	Floor 1 - Middle Section
0901-10	White Ceiling Paint	Floor 1 - N/E ceiling section

Chain-of-custody

Relinquished by Ted Sherry Date 9/2/21 Time 7AM

Received by Bill Wood Date 9-2-21 Time 1115

Bill Wood 9.2.21/1400

Analysis requested: *

Turnaround time 5-Day

Total # of samples 10

* **Analysis for PCBs via EPA's SW-846 Method 3540C/8082 SOXHLET Extraction**

MassDEP Analytical Protocol Certification Form

Laboratory Name: New England Testing Laboratory, Inc. Project #: 21381

Project Location: Framingham, MA RTN:

This Form provides certifications for the following data set: list Laboratory Sample ID Number(s): 1I02023

Matrices: ☐ Groundwater/Surface Water ☐ Soil/Sediment ☐ Drinking Water ☐ Air ☒ Other: Solid

CAM Protocol (check all that apply below):

8260 VOC CAM II A ☐	7470/7471 Hg CAM III B ☐	MassDEP VPH (GC/PID/FID) CAM IV A ☐	8082 PCB CAM V A ☒	9014 Total Cyanide/PAC CAM VI A ☐	6860 Perchlorate CAM VIII B ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	MassDEP VPH (GC/MS) CAM IV C ☐	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	MassDEP APH CAM IX A ☐
6010 Metals CAM III A ☐	6020 Metals CAM III D ☐	MassDEP EPH CAM IV B ☐	8151 Herbicides CAM V C ☐	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐

Affirmative Responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☒ Yes ☐ No
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	☒ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☒ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	☒ Yes ☐ No
E	VPH, EPH, APH, and TO-15 only a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	☒ Yes ☐ No

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☒ Yes ☐ No[1]

***Data User Note:** Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.*

H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	☒ Yes ☐ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☒ Yes ☐ No[1]

[1] *All negative responses must be addressed in an attached laboratory narrative.*

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, is accurate and complete.

Signature: _____ **Position:** Laboratory Director

Printed Name: Richard Warila **Date**: 9/9/2021

APPENDIX B

Photographs

Worcester Road Pumping Station – Framingham, MA

	
Pump Station view	Gray duct paint
	
Gray pipe paint	Gray stair system paint
	
Chemical tank section	Floor 1 floor paint & general view

Worcester Road Pumping Station – Framingham, MA

Floor 1 green motor paint

Floor 1 white painted ceiling

Basement general view

APPENDIX C
Tables and Groundwater Reports

Table 2
Groundwater Analytical Results
730 Worcester Road, Framingham, Massachusetts

LOCATION	MW-101	MW-201	MW-203	MW-202			MW-208			MassDEP	MassDEP
SAMPLING DATE	10/28/2021	10/28/2021	10/28/2021	3/1/2017	2/25/2019	3/3/2021	3/1/2017	2/25/2019	3/3/2021	RCGW-1	RCGW-2
Extractable Petroleum Hydrocarbons, milligrams per liter (mg/L)											
C9-C18 Aliphatics	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.7	5
C19-C36 Aliphatics	**0.161**	0.1 U	0.1 U	**0.259**	**0.239**	**0.13**	0.1 U	0.1 U	0.1 U	14	50
C11-C22 Aromatics, Adjusted	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2	5
Naphthalene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.14	0.7
2-Methylnaphthalene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01	2
Acenaphthylene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.03	0.04
Acenaphthene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.02	10
Fluorene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.03	0.04
Phenanthrene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.04	10
Anthracene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.03	0.03
Fluoranthene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.09	0.2
Pyrene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.02	0.02
Benzo(a)anthracene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.001	1
Chrysene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.002	0.07
Benzo(b)fluoranthene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.001	0.4
Benzo(k)fluoranthene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.001	0.1
Benzo(a)pyrene	0.01 U	0.01 U	0.01 U	0.01 U	0.0002 U	0.01 U	0.01 U	0.0002 U	0.01 U	0.0002	0.5
Indeno(1,2,3-cd)Pyrene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.0005	0.1
Dibenzo(a,h)anthracene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.0005	0.04
Benzo(ghi)perylene	0.01 U	0.01 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.01 U	0.0004 U	0.01 U	0.02	0.02
Dissolved Metals, mg/L											
Antimony, Dissolved	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	NT	0.05 U	0.05 U	0.006	8
Arsenic, Dissolved	0.005 U	**0.007**	0.005 U	0.005 U	0.005 U	0.005 U	NT	0.005 U	0.005 U	0.01	0.9
Barium, Dissolved	NT	NT	NT	**0.251**	**0.629**	**0.374**	**NT**	**0.052**	**0.056**	2	50
Beryllium, Dissolved	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	NT	0.005 U	0.005 U	0.004	0.2
Cadmium, Dissolved	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	NT	0.004 U	0.004 U	0.004	0.004
Chromium, Dissolved	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	NT	0.01 U	0.01 U	0.1	0.3
Copper, Dissolved	0.01 U	0.01 U	0.01 U								
Lead, Dissolved	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	NT	0.01 U	0.01 U	0.01	0.01
Nickel, Dissolved	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	NT	0.025 U	0.025 U	0.1	0.2
Selenium, Dissolved	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	NT	0.01 U	0.01 U	0.05	0.1
Silver, Dissolved	0.007 U	0.007 U	0.007 U	0.007 U	0.007 U	0.007 U	NT	0.007 U	0.007 U	0.007	0.007
Thallium, Dissolved	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	NT	0.02 U	0.02 U	0.002	3
Vanadium, Dissolved	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	NT	0.01 U	0.01 U	0.03	4
Zinc, Dissolved	0.05 U	**0.59**	0.05 U	0.05 U	0.05 U	0.05 U	NT	0.05 U	0.05 U	0.9	0.9
Total Metals, mg/L											
Antimony, Total	0.05 U	0.05 U	0.05 U	NT	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.006	8
Arsenic, Total	**0.006**	**0.0119**	0.005 U	NT	0.005 U	0.005 U	**0.009**	0.005 U	0.005 U	0.01	0.9
Barium, Total	NT	NT	NT	NT	**0.627**	**0.376**	**0.122**	**0.055**	**0.066**	2	50
Beryllium, Total	0.005 U	0.005 U	0.005 U	NT	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.004	0.2
Cadmium, Total	0.004 U	0.004 U	0.004 U	NT	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.004	0.004
Chromium, Total	0.01 U	0.01 U	0.01 U	NT	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.1	0.3
Copper, Total	0.01 U	**0.015**	**0.01**	NT	NT	NT	NT	NT	NT	10	100
Lead, Total	0.01 U	**0.022**	0.01 U	NT	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01	0.01
Nickel, Total	0.025 U	0.025 U	0.025 U	NT	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.1	0.2
Selenium, Total	0.01 U	0.01 U	0.01 U	NT	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.05	0.1
Silver, Total	0.007 U	0.007 U	0.007 U	NT	0.007 U	0.007 U	0.007 U	0.007 U	0.007 U	0.007	0.007
Thallium, Total	0.02 U	0.02 U	0.02 U	NT	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.002	3
Vanadium, Total	0.01 U	0.01 U	0.01 U	NT	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.03	4
Zinc, Total	**0.343**	**0.687**	0.05 U	NT	0.05 U	**0.141**	0.05 U	0.05 U	**0.053**	0.9	0.9
Volatile Organics Compounds, mg/L											
Methylene chloride	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	0.005	2
1,1-Dichloroethane	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.07	2
Chloroform	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.05	0.05
Carbon tetrachloride	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.002	0.002
1,2-Dichloropropane	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.003	0.003
Dibromochloromethane	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.002	0.02
1,1,2-Trichloroethane	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.005	0.9
Tetrachloroethene	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.005	0.05
Chlorobenzene	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.1	0.2
Trichlorofluoromethane	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	10	100
1,2-Dichloroethane	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.005	0.005
1,1,1-Trichloroethane	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.2	4
Bromodichloromethane	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.003	0.006
trans-1,3-Dichloropropene	0.0004 U	0.0004 U	0.0004 U	0.0004 U	NT	0.0004 U	0.0004 U	NT	0.0004 U	0.0004	0.01
cis-1,3-Dichloropropene	0.0004 U	0.0004 U	0.0004 U	0.0004 U	NT	0.0004 U	0.0004 U	NT	0.0004 U	0.0004	0.01
1,3-Dichloropropene, Total	0.0004 U	0.0004 U	0.0004 U	0.0004 U	NT	0.0004 U	0.0004 U	NT	0.0004 U	0.0004	0.01
Bromoform	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	0.004	0.7
1,1,2,2-Tetrachloroethane	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.002	0.009
Benzene	0.0005 U	0.0005 U	0.0005 U	0.0005 U	NT	0.0005 U	0.0005 U	NT	0.0005 U	0.005	1
Toluene	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	1	40
Ethylbenzene	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.7	5
Chloromethane	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	1	10
Bromomethane	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	0.007	0.007
Vinyl chloride	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.002	0.002
Chloroethane	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	1	10
1,1-Dichloroethene	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.007	0.08
trans-1,2-Dichloroethene	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.08	0.08
Trichloroethene	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.005	0.005
1,2-Dichlorobenzene	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.6	2
1,3-Dichlorobenzene	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.1	6
1,4-Dichlorobenzene	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.005	0.06
Methyl tert butyl ether	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	0.07	5
p/m-Xylene	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	3	3
o-Xylene	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	3	3
Xylenes, Total	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	3	3
cis-1,2-Dichloroethene	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.02	0.02
Dibromomethane	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	5	50
1,2,3-Trichloropropane	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	1	10
Styrene	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.1	0.1
Dichlorodifluoromethane	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	10	100
Acetone	0.005 U	0.005 U	0.005 U	0.005 U	NT	0.005 U	0.005 U	NT	0.005 U	6.3	50
Carbon disulfide	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	1	10
Methyl ethyl ketone	0.005 U	0.005 U	0.005 U	0.005 U	NT	0.005 U	0.005 U	NT	0.005 U	4	50
Methyl isobutyl ketone	0.005 U	0.005 U	0.005 U	0.005 U	NT	0.005 U	0.005 U	NT	0.005 U	0.35	50
2-Hexanone	0.005 U	0.005 U	0.005 U	0.005 U	NT	0.005 U	0.005 U	NT	0.005 U	1	10
Tetrahydrofuran	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	5	50
1,2-Dibromoethane	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	0.00002	0.002
1,3-Dichloropropane	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	5	50
1,1,1,2-Tetrachloroethane	0.001 U	0.001 U	0.001 U	0.001 U	NT	0.001 U	0.001 U	NT	0.001 U	0.005	0.01
Bromobenzene	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	1	10
tert-Butylbenzene	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	1	10
o-Chlorotoluene	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	1	10
1,2-Dibromo-3-chloropropane	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	0.1	1
Hexachlorobutadiene	0.0006 U	0.0006 U	0.0006 U	0.0006 U	NT	0.0006 U	0.0006 U	NT	0.0006 U	0.0006	0.05
Isopropylbenzene	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	10	100
p-Isopropyltoluene	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	1	10
Naphthalene	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	0.14	0.7
n-Propylbenzene	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	1	10
1,2,4-Trichlorobenzene	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	0.07	0.2
1,3,5-Trimethylbenzene	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	0.1	1
1,2,4-Trimethylbenzene	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	10	100
Diethyl ether	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	1	10
Diisopropyl Ether	0.002 U	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	NT	0.002 U	1	10
1,4-Dioxane	0.25 U	0.25 U	0.25 U	0.25 U	NT	0.25 U	0.25 U	NT	0.25 U	0.0003	6
Volatile Petroleum Hydrocarbons, mg/L											
C9-C10 Aromatics	0.1 U	0.1 U	0.1 U	0.05 U	0.05 U	0.1 U	0.05 U	0.1 U	0.1 U	0.2	4
C5-C8 Aliphatics, Adjusted	0.1 U	0.1 U	0.1 U	0.05 U	0.05 U	0.1 U	0.05 U	0.1 U	0.1 U	0.3	3
C9-C12 Aliphatics, Adjusted	0.1 U	0.1 U	0.1 U	0.05 U	0.05 U	0.1 U	0.05 U	0.1 U	0.1 U	0.7	5
Benzene	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.005	1
Toluene	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	1	40
Ethylbenzene	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.7	5
p/m-Xylene	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	3	3
o-Xylene	0.002 U	0.002 U	0.002 U	NT	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	3	3
Methyl tert butyl ether	0.003 U	0.003 U	0.003 U	NT	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.07	5
Naphthalene	0.004 U	0.004 U	0.004 U	NT	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.14	0.7

Notes
BOLD - compound detected
BOLD and Shaded - compound detected above regulatory standard
U - Not detected above listed detection limit.
NE - Standard not established
NT - Not tested

Table 1
Groundwater Elevations
700 and 730 Worcester Road, Framingham, Massachusetts

700 Worcester Road										
Well ID	MW-1		MW-2		MW-3		MW-4		MW-5	
Top of PVC	155.24		158.63		160.27		159.64		159.66	
Depth to Bottom	UNKNOWN		14.10		14.25		15.24		14.70	
Date	DTW	Elevation	DTW	Elevation	DTW	Elevation	DTW	Elevation	DTW	Elevation
2/19/19	Well destroyed		8.27	150.36	9.91	150.36	9.56	150.08	9.51	150.15
3/21/21	Well destroyed		8.62	150.01	10.06	150.21	9.64	150.00	8.87	150.79

730 Worcester Road										
Well ID	MW-200		MW-201		MW-202		MW-203		MW-208	
Top of PVC	153.42		153.39		154.25		152.78		152.77	
Depth to Bottom	19.50		14.41		13.72		14.70		14.81	
Date	DTW	Elevation	DTW	Elevation	DTW	Elevation	DTW	Elevation	DTW	Elevation
3/2/17	NM	--	4.04	149.35	4.80	149.45	3.67	149.11	3.84	148.93
2/19/19	NM	--	3.71	149.68	NM	--	4.09	148.69	4.09	148.68
3/21/21	3.96	149.46	3.75	149.64	4.32	149.93	3.45	149.33	3.52	149.25

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APPENDIX B: City of Framingham Construction Standards

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City of Framingham

Department of Public Works

Construction Standards

Revised June 2021

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Appendices

Glossary

AAB	Architectural Access Board
AASHTO	American Association of State Highway and Transportation Officials
AC	Asbestos Cement
ACM	Asbestos containing material
ACP	Asbestos Cement Pipe
ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Accessibility Guidelines
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials. Note: ASTM International is originally known as the American Society for Testing and Materials, is an international standards organization that develops and publishes voluntary technical standards for a wide range of materials, products, systems, and services
AWWA	American Water Works Association
ATSSA	American Traffic Safety Services Association
BMP	Best Management Practice
CDF	Controlled Density Fill
CLOMR	Conditional Letter of Map Revisions
CMR	Code of Massachusetts Regulations
Contractor	The entity doing the construction on behalf of the Developer, Owner, or DPW
DBH	Diameter at Breast Height (the diameter of a tree trunk at 4.5 feet above ground)
DI	Ductile Iron
DPW	Framingham Department of Public Works
Engineer	A member of the Framingham Department of Public Works Engineering & Transportation Division or an authorized representative thereof
FEMA	Federal Emergency Management Agency
HDPE	High Density Polyethylene
HMA	Hot Mix Asphalt

ID	Inner Diameter
Inspector	The DPW Inspector assigned to the project
LDCC	Low Density Cellular Concrete
LOMR	Letter of Map Revisions
Mandrel Test	The roundness of a pipeline is tested by moving a slightly smaller steel shank, called a mandrel, through the inside of the pipeline. If the pipeline is out of round, the mandrel will be held and kept from moving forward.
MGL30 §39M	Massachusetts General Law "General Provisions Relative to State Departments, Commissions, Officers and Employees: Contracts for Construction and Materials; Manner of Awarding"
mg/l	milligrams per liter
MassDEP	Massachusetts Department of Environmental Protection
Mass DLS	Massachusetts Department of Labor and Standards
MassDOT	Massachusetts Department of Transportation (formerly Massachusetts Highway Department)
MS4	Municipal Separate Storm Sewer System
MUTCD	Manual on Uniform Traffic Control Devices
NPDES	National Pollutant Discharge Elimination System
OD	Outer Diameter
OSHA	Occupational Safety and Health Administration
PE	Polyethylene
PP	Polypropylene
PVC	Polyvinyl Chloride
ppm	Parts per million
PM	The DPW Project Manager assigned to the project
psi, psig	Pounds per square inch, pounds per square inch (gauge)
RCP	Reinforced Concrete Pipe
RE	The Engineer or Construction Administrator working on behalf of the DPW
SOP	Street Opening Permit
SDR	Standard Diameter Ratio
TOP	Trench Opening Permit

US DOT	U.S. Department of Transportation
US EPA	U.S. Environmental Protection Agency

1 General

1.1 Preamble

A. These Construction Standards are hereby established by the City of Framingham Department of Public Works (DPW). Their purpose is to provide a consistent policy under which the controlling requirements for construction of physical aspects of infrastructure system improvements within the City limits will be implemented. These aspects include streets, sidewalks, street lighting, storm drains, water supply and distribution, and sewer lines.

B. These Design and Construction Standards and Construction Details are herein after referred to as the Standards. The Design and Construction Standards are provided as minimum requirements for performing work relative to the City of Framingham's infrastructure systems. The Construction Details are provided to graphically depict and to help illustrate key elements outlined within the written portion of these Standards.

C. Most of the elements contained in this document are related to public improvements and City of Framingham contract projects; however, it is intended that they apply to both public and private work designated herein. For private work that does not fall within the regulatory jurisdiction of City ordinances or regulations, DPW strongly recommends that these standards be used as a basis for construction. These Standards address the more typical infrastructure components. Accordingly, these Standards are intended to assist but not to substitute for competent work by design professionals by providing basic information. It is expected that engineers will bring to each project the best of skills from their respective disciplines, and design professionals shall contact the DPW for clarification and direction regarding designs not covered by these Standards.

D. These Standards are also not intended to unreasonably limit any innovative or creative effort which could result in better quality, cost savings, or both. However, any proposed departure from the Standards will be judged on the likelihood that such variance will produce a long-term compensating or comparable result, in every way adequate for the user and City resident. Any variances from these Standards must be approved by the DPW. Further, these Standards are not intended to restrict the DPW in its effort to obtain the maximum benefits for the City in any construction project.

E. These Standards are supplemented by regulations and fee structures. Reference to the pertinent regulations and fee structures is provided within each section of this document. In some cases, the regulations, fee structures, and forms are provided as Appendices to these Standards.

1.2 Regulatory Framework

A. These Standards are provided to outline the DPW minimum criteria for construction of infrastructure within City limits. It is the responsibility of the property owner to verify and obtain all applicable permits.

B. These standards are supplemental to the standards in the *City of Framingham Zoning By-Law* regulations and the *Rules and Regulations Governing the Subdivision of Land in Framingham*. Please refer to these documents for design requirements.

C. All work shall conform to the current versions of the City of Framingham Water and Sewer regulations.

D. All construction materials and methods shall conform to the requirements contained in the latest version of the Massachusetts Department of Transportation (MassDOT) Standard Specifications for Highways and Bridges as amended, unless otherwise specified herein or approved by the City of Framingham DPW.

E. DIG SAFE shall be contacted to determine the location of all existing underground utilities prior to any excavation. Call the Framingham Fire Department to mark out their lines.

1.3 Plan Review

A. No person shall uncover, excavate over, block access to, make any connection with or opening into, alter, or disturb the City's water, wastewater, stormwater, or roadway system without prior authorization from the DPW.

B. Proposed construction must be approved by the DPW. The approval must be by the City Engineer, or designee. Proposed work shall be submitted as an Engineering Plan stamped by a Professional Engineer registered in the Commonwealth of Massachusetts. The DPW will provide the Applicant or Contractor with written correspondence indicating approval of the plan, or required changes. See Appendix A for Plan content requirements.

C. In addition to plan review approval, it is the responsibility of the property owner to verify and obtain all written permits from appropriate agencies and pay all permit fees before construction begins.

D. DPW Inspector of Construction and Utilities may approve field changes, or allowances, that differ from submitted plans or City standards. No changes are allowed without prior approval by the Inspector and operations manager of the appropriate Division.

1.4 Submittals

A. The Owner/Contractor shall be required to submit the following to the City's Engineering Department.

1.4.1 Materials List and Shop Drawings

A. Materials list of materials proposed shall be submitted to the City.

B. Approved shop drawings for all materials and structures shall be submitted to the City.

1.4.2 Bypass and Testing Plans

A. Plans for chlorination, dechlorination, pressure test, and water bypass construction shall be submitted to and approved by the City.

B. All testing shall be performed by a qualified third party approved by the City.

C. All testing must be in conformance to a written plan submitted to, and approved by, the City. Results of testing and inspections shall be submitted to the City.

1.4.3 Temporary Water or Sewer Bypass Plans

A. Temporary Bypass Plans shall be prepared by a registered professional engineer and submitted to DPW for review and approval prior to installation.

B. Bypass plans shall include a proposed schedule for installing, testing, disinfecting, operating, restoring flows to normal conditions, and removing the temporary bypass.

C. Plans shall include details of the materials, size, and location of temporary facilities including piping layout, bypass pumps, bypass mains, valves, connections, laterals, services, fire hydrants, upstream suction manhole and downstream discharge manhole locations.

D. Plans shall include sewer plugging location(s) and method, type, and quantity of plugs.

E. Temporary stone sump systems are not allowed as a temporary wastewater disposal method for service connection flows

F. Calculations of flow rate, static head, friction losses, total dynamic head, flow velocity, and pump curves indicating operating range shall be submitted with plans

G. Plans shall include primary and backup bypass pump sizes, capacity, and number to be on site, power requirements, and power supply.

H. Method of noise control for pumps and generators shall be submitted with plans.

I. All plans shall include provision of twenty-four/seven contact information for operation and maintenance of the bypass system.

1.4.4 Erosion and Sediment Control Plans

A. The Erosion and Sediment Control Plan shall be designed to ensure compliance with these standards and the NPDES General Permit for Storm Water Discharges from Construction Activities. In addition, the plan shall ensure that the Massachusetts Surface Water Quality Standards (314 CMR 4.00) are met in all seasons.

B. If a project requires a Stormwater Pollution Prevention Plan (SWPPP) per the NPDES General Permit for Storm Water Discharges from Construction Activities, then the permittee is required to submit a complete copy of the SWPPP (including the signed Notice of Intent and approval letter) to the Conservation Commission. If the SWPPP meets the requirements of the NPDES General Permit, it will be considered equivalent to the Erosion and Sediment Control Plan described in this section. The SWPPP shall be made available to the DPW, if requested.

1.4.5 Traffic Management Plans

A. The DPW requires that a traffic management plan be prepared and submitted for review and approval. All traffic management plans shall be approved by the Engineering Division before construction may begin. Contractor shall be responsible for all traffic management for the construction work zone.

B. The plan shall show the routing of traffic during construction. The plan shall show the area and dimensions of the roadway pavement available for traffic during each stage of the work. The plan shall include all temporary barriers, signs, pavement markings, drums and other traffic control devices required to maintain traffic together with the limits of temporary pavement and necessary steel plates.

C. Traffic management plans shall meet the requirements and guidance set forth in the MassDOT Work Zone Safety Guidelines, the ATSSA Guide to Temporary Traffic Control, the MUTCD guidelines, and all federal and state regulations.

D. Contractor shall be responsible for all traffic management for the construction work zone.

1.4.6 Long-term Operation and Maintenance Plans

A. A long-term operation and maintenance plan (O&M Plan) shall be designed to ensure compliance with performance standards throughout the life of the system(s).

B. The O&M Plan shall remain on file with the City and shall be an ongoing requirement. The City may require that a covenant referencing the O&M plan be recorded at the Middlesex Registry of Deeds for the record deed of the parcel in which work is approved.

C. Operation and maintenance rcords shall be made available to the DPW, if requested.

1.4.7 Easements

A. The Developer shall process and record permanent easements.

B. Easements for Water, Sewer, or Drainage on or across lots or centered on rear lot lines or side lines shall be provided where necessary and shall be at least 30 feet wide. Major easements (i.e., over three hundred feet (300 feet) long) for sewer, water and drainage must be at least forty 40 feet wide. Easements for infrastructure over 15 feet deep must be at least forty 40 feet wide.

C. Where a subdivision is traversed by a water course, drainage way, channel, or stream, the DPW may require a stormwater easement or drainage right of way be provided of adequate width to conform substantially to the lines of such water course, drainage way, channel, or stream and the necessary width for access.

D. Easements for street lighting facilities located on private property shall be sufficient in size to allow for City forces to access and maintain these facilities in the future.

E. Signed copies of easements and agreements affecting land not within a subdivision, but necessary for provision of utilities shall be submitted to the DPW before a plan can be approved.

1.4.8 As-built Drawings

A. The Contractor shall be responsible for the preparation and submittal of one (1) copy of As-Built Drawings to the DPW upon completion and acceptance of work, as well as an electronic version of the drawings in both AutoCAD and Acrobat (PDF) format. Contact the DPW to determine the current acceptable electronic format.

B. Record drawings shall be a full set of drawings showing all details of the construction, along with any specifications or design reports. As-Built Drawings shall be complete and shall indicate the true measurement and location, horizontal and vertical, of all new construction. This plan shall include all drain lines and structures with rim and invert elevations; all water lines, gates and dwelling service shut offs; all sewer lines and structures with rim and invert elevations; all service wyes with distances to the nearest structures and all relevant easements. As-Built Drawings shall include a minimum of three (3) ties to each valve cover and curb stop from fixed permanent objects. Three (3) ties shall also be provided for each bend or other unanticipated field change. As-Built drawings shall also contain any additional information required by the municipality. See Appendix A for complete list of As-built Plan content requirements.

C. Record drawings and reports shall be certified (signed and stamped) true and correct by a Professional Engineer registered in the Commonwealth of Massachusetts and/or Professional Land Surveyor registered in the Commonwealth of Massachusetts, as applicable.

D. As-Built Drawings shall be filed or stored on property and available for use by DPW for all commercial, industrial, and institutional properties and large residential properties, such as apartment or condominium complexes and assisted or congregate living facilities.

E. Certificates of Occupancy will not be signed by DPW until payments of the required fees are confirmed and a final site inspection is concluded to validate completeness and accuracy of the submitted as-built plan documents. The DPW requires a minimum of five business days following the delivery of as-built documents package (turnaround time subject to document package completeness) to provide Occupancy Certificate Sign-off.

1.5 Inspections

A. All work shall be inspected by the City's Inspector of Construction and Utilities or designated representative. The City of Framingham DPW and Engineering Department shall be notified 48 hours in advance of any roadway or municipal service construction.

B. Boring or test pits may be required, as determined by the DPW. These shall show soil strata and high ground water elevations. Drought conditions shall be noted.

C. Inspections by the City's Inspector of Construction and Utilities or designated representative are required at the following milestones before proceeding with work:

1. Prior to backfill. Backfilling shall not occur without DPW approval.
2. Prior to laying hot mix asphalt.
3. Disinfection Testing
4. Tightness Testing

D. Inspection of materials shall be made after delivery. Materials shall be subject to rejection at any time on account of failure to meet any of the specification requirements, even though samples may have been accepted as satisfactory at the place of manufacture.

E. All materials shall be inspected before placement in the work and any found to be defective from any cause, including damage caused by handling, and determined by the City to be unrepairable, shall be replaced at no cost to the City.

F. All televised inspections or other third party inspections results shall be provided to the City, in digital format.

G. Completed inspections do not constitute acceptance of the utilities by the City of Framingham.

1.6 Other Requirements

1.6.1 Brand Name or Equal

A. If an item in these Standards is identified as "brand name or an approved equal," the product will reflect the characteristics and level of quality that will satisfy the City's needs. The City will evaluate "equal" products on the basis of information furnished by the Applicant or Contractor. All "or Equal" submissions must be approved during the Plan review process and will be judged consistent with MGL 30 §39M. All technical information submitted must be as provided by the manufacturer. The City is not responsible for locating or obtaining any information not identified.

1.6.2 Protection of Private Utilities

A. Electric, telephone, cable television and fire alarm cables and ducts shall be placed in the grass strip or sidewalk outside of the traveled way, on the opposite side of the centerline of the street as the water main.

B. The Contractor shall protect all utilities and appurtenances from any and all damage during construction. Any damage to utilities and appurtenances prior to acceptance by the City shall be repaired in a manner satisfactory to the DPW and the full cost of such repair shall be paid by the Owner. Any material used which does not meet the standards of the DPW shall be replaced by the Owner at no cost to the City.

1.6.3 Construction Site Maintenance

A. At the completion of each working day, all areas affected by work shall be brought to a reasonably clean, safe, and usable condition as determined by the City or its designee.

1.6.4 Waste Management

A. Disposal of demolition debris, removed pavement, concrete, soil, or other construction materials shall comply with all local, state and federal laws and guidelines. Construction sites must have controls for other wastes including, but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes.

B. If either asbestos cement pipe (ACP) or asbestos containing material (ACM) in soil is encountered, notification shall be immediately provided to the DPW Engineering and Transportation Division.

1. Handling of any ACP or ACM shall be according to federal and state regulations, specifically but not limited to EPA's *National Emission Standards for Hazardous Air Pollutants* (NESHAP) Title 40, Part 61; EPA's *Guide to Respiratory Protection for the Asbestos Abatement Industry* OSHA 29 CFR part 1926.1101; OSHA 29 CFR 1010.1001; USDOT 49 CFR 100-185; Massachusetts Division of Labor Standards 453 CMR 6; MassDEP 310 CMR 7.00, 7.09, 7.15; and MassDEP *Asbestos Cement Pipe Guidance Document*.
2. Handing, management, storage and disposal of any ACP or ACM generated from a City right-of-way or easement shall comply with Framingham's Standard Operating Procedures for ACM.
3. Any connection to a public main of asbestos cement material type shall require coordination with DPW staff. For any City-owned pipe, DPW will remove and dispose of asbestos material.
4. The U.S. EPA determined that "the pumping of grout into buried lines is not a process which, in and of itself, would cause asbestos cement pipe to become regulated asbestos containing material" (guidance letter dated July 17, 1991, Identified as Control # C99 within the Agency Applicability Determination Index). Therefore when abandoning asbestos cement pipe, care shall be used to prevent pipe material from becoming friable, thereby rendering it as regulated asbestos containing material.
5. No ACP or ACM shall be abandoned or stored in the City right-of-way.

1.7 Items Not Covered in This Document

A. Items not covered in this document include the following:

1. Complex and specialty items such as bridges, culverts, siphons, pump stations, proprietary products, and backflow prevention. Plans for these items are to be provided for individual review by the DPW.
2. Street Opening Permit (SOP) requirements for any facility installation that may occur within the City Right or Way limits. For SOP policy details please refer to City of Framingham Web site link as follows: http://www.framinghamma.gov/public_works/sop/default.htm.
3. Trench Opening Permit (TOP) requirements for any excavation that meets the definition of a trench as per MGL Chapter 82A Unattended Open Trenches Safety Hazards Rules, Regulations and Fines, and regulated under 520 CMR 14.00 Excavation and Trench Safety Regulations.
4. Water and Wastewater Regulations, the current edition is available at http:// https://www.framinghamma.gov/.

2 Water Construction Standards

2.1 General

A. The work includes furnishing and installing all pipe, fittings, valves, structures and appurtenances required for the proposed system to supply water to users of the City's Water System.

B. Work and materials shall be performed in accordance with the State Plumbing Code when work is within ten (10) feet of buildings.

C. No electrical grounds shall be made on water service pipes where a driven ground rod can provide the needed grounding service. Electrical grounding shall be provided in accordance with the Massachusetts Electric Code.

D. Only one domestic water service shall be installed per parcel.

E. All materials used in public or private water systems within the Town of Framingham's water system must be certified "lead free."

F. All water connections shall be to City owned distribution mains.

G. Submittals required for water projects include:

1. Materials List and Shop Drawings
2. Chlorination and Dechlorination Plan
3. Pressure testing
4. Temporary Bypass Plans
5. As-built Plans

2.2 Temporary Water Bypass

A. All components of the bypass shall be for potable water transmission and distribution with a minimum service pressure of 150 psi. Piping and hose shall be galvanized steel, high density polyethylene (HDPE) or polyvinylchloride (PVC) pipe. All plastic pipe or hose shall bear the imprint of the National Sanitary Foundation (NSF) approval for potable water NSF-PW or shall be capable of meeting the standards established by the NSF for this use.

B. Bypass mains shall be supplied by at least two connections to the existing system either via an existing hydrant or a direct connection to an underground main.

C. Bypass mains shall be a minimum of 6-inches in diameter when supplying water for fire protection to temporary hydrants. Temporary hydrants shall be located in the same approximate location as existing hydrants that have been placed out of service and bagged. The number of hydrants on the temporary bypass shall be greater than or equal to the number of existing hydrants that are placed out of service.

D. Minimum size of bypass mains that do not supply water for fire protection is 2-inches. All temporary services shall be greater than or equal to the diameter of the existing service.

E. Bypass mains shall be laid outside of the traveled and access ways whenever possible and trenched when crossing roadways. All services shall be ramped or trenched.

F. Where possible, services shall be connected to the user's sill cock using a wye fitting with valves to accommodate connections of garden hoses by the user.

G. In the case where the property to be put on bypass utilizes a backflow preventer on the service connection, the temporary bypass connection should be excavated and connected to the existing service connection pipe (i.e., a "Bulkhead" connection) prior to the backflow preventer.

H. Pressure testing and disinfection testing shall comply with the requirements in the following sections.

I. All work shall be coordinated with DPW and the Fire Department and no construction activity shall commence without a minimum of 48 hours advance notice to each department.

2.3 Piping

2.3.1 Pipe

A. All water mains shall be minimum Ductile Iron Class 52, single gasket, double sealing pipe with cement mortar lining. All ductile iron water main pipe shall be rated for a minimum operating pressure of 350 psi. All water mains shall be encased in polyethylene film when the trench is backfilled with control density fill.

B. All water mains shall be minimum 8-inch diameter. All hydrant branches shall be minimum 6-inch diameter.

C. Push-on type joints are recommended on straight runs of pipe. Gaskets must be standard for pipe used and be acceptable to the DPW. Push-on pipe gaskets shall be clean and thoroughly coated with lubricant specified by the manufacturer during installation.

   a. Where petroleum contamination is known or suspected to be in the soil and/or groundwater, nitrile gaskets shall be required.

D. Water pipe shall be installed with minimum distance from sewer and septic pipe as summarized below. Reference detail S 3.5.0

   1. *Horizontal Separation:* Whenever possible, proposed water main shall be laid at a minimum at least 10 feet horizontally from any existing or proposed sewer main. Should local conditions prevent a lateral separation of 10 feet, a water may be laid closer than 10 feet to a sewer main, if:

      - It is laid in a separate trench, or if
      - It is laid in the same trench with the water mains located at one side on a bench of undistributed earth, and if
      - In either case, the elevation of the top (crown) of the sewer is at least 18 inches below the bottom (invert) of the water main.

   2. *Vertical Separation:* Whenever water must cross over sewer mains, the water shall be laid at such an elevation that the bottom of the water is at least 18 inches above the top of the sewer main. When the elevation of the sewer cannot be varied to meet the above requirements, the water main shall be relocated to provide this separation or reconstructed with mechanical-joint pipe for a distance of 10 feet on each side of the sewer. One full length of the water main should be centered over the sewer so that both joints will be as far from the sewer as possible.

   3. When it is impossible to obtain horizontal and/or vertical separation as stipulated above, water and wastewater operations shall be given the opportunity to review and provide more stringent requirements such as:

a. Pipes shall be pressure tested by an approved method to assure water tightness ;and/or

b. Both pipes shall be encased in control density fill (CDF); any ductile or cast iron shall be double wrapped in 6. mil polyethylene plastic.

c. Other.

E. Pipe shall be laid accurately to line and grade in sand bedding conforming to MassDOT Standard Spec. M1.04.0 Sand Borrow and AWWA guidelines. The depth of the sand bedding shall be one half (1/2) the diameter of the pipe under the main and one half (1/2) the diameter of the pipe over the main or 6 inches both under and over the pipe, whichever is greater. Bedding shall be placed in layers not over six inches thick, and each layer shall be thoroughly compacted by tamping and chinking on each side of pipe to provide uniform support.

F. All piping shall be installed with a minimum 5-foot cover. In such cases where 5-foot cover is not possible, the piping shall be appropriately insulated.

G. Backfill material placed above the bedding material and below the roadway foundation shall conform to detail W-2.3.0. Roadway foundation and surface restoration shall conform to Section 5, Roadway Construction Standards, and Section 6, Existing Road Openings, as applicable.

2.3.2 Service Connections

A. The City has standardized on lead-free service connections manufactured by McDonald, Mueller, Ford or an approved equal. Copper tubing shall be of the type commercially known as type "K" soft and conforms to ASTM Specifications B-88-49.

B. Plastic services are allowed on a case-by-case basis. In such circumstances, the City will require that the applicant verify that no petroleum constituents are present in subsurface soil in the vicinity of the service. Plastic water services shall be NSW-PW, listed, High Density Polyethylene (HDPE) blue plastic and shall conform to the following:

a. Copper Tube Size (CTS) – ASTM 2737, 200 psi, PE 3608 or PE 3710, SDR9

b. Iron Pipe Size (IPS) – ASTM 2239, 200 psi, PE 3608 or PE 3710, SIDR7

C. Plastic pipe shall be as manufactured by Silver Line Plastics or approved equal. Dimensional and performance characteristics shall conform to the requirements of AWWA C901. The use of HDPE pipe and tubing may be allowed for water service - two (2) inches or under in diameter (4-inch and larger diameter water services shall use cement lined ductile iron water pipe). HDPE pipe shall be installed with enough slack to compensate for settlement and compaction and shall be laid on a bed of sand conforming to MassDOT M1.04.0.

D. Curb valves shall not include a drain.

E. Curb boxes shall be Erie box style for 1-inch services and Buffalo box style (no rod) for 1-1/2-inch and larger services.

2.3.3 Cut & Cap

A. Cutting and capping of water services greater than 2-inches shall be constructed by cutting out the tee at the main, removing it, and installing a straight piece of pipe. If connecting ductile iron pipe, couplings shall be solid sleeve. If connecting to another material, coupling shall be submitted to the DPW Inspector for approval prior to installation.

2.3.4 Corporations

A. Corporations for 1 inch installations shall be heavy pattern, solid plug, easy turning. The inlet shall be an AWWA (CC) thread. The 1 inch, 1-1/2 inch and 2 inch corporations shall be of a tee head ball valve type which incorporates Teflon seats to assure self-centering of Teflon coated bronze ball. The corporation shall be easy turning and non-binding. The inlet shall be an AWWA (CC) thread. Corporations shall be subject to a sustained hydraulic pressure of 200 psi. All 1½ and 2-inch saddles shall have stainless steel straps.

2.3.5 Fittings

A. Ductile iron fittings shall be used and shall be cement lined. Fittings shall be equipped with a mechanical joint restraint, unless otherwise specified by the DPW. Mechanical joint fittings in sizes 4 inch through 12 inch shall be ductile iron compact fittings and rated for 350 psi working pressure. All nuts and bolts shall be of a type equal to ductile iron or KOR-10 steel T-bolts and nuts or an approved equal.

2.3.6 Couplings

A. Couplings shall be provided with AWWA approved plain, Grade 27, rubber gaskets and track-head bolts with nuts. Couplings shall be Smith Blair, Style 441 or Dress, Style 153; 360 or an approved equal. If the outer diameter of the pipe permits, a Dresser coupling is preferred. Hardware shall be stainless steel.

B. Where petroleum contamination is known or suspected to be in the soil and/or groundwater, nitrile gaskets shall be required.

2.3.7 Repair Clamps

A. All repair clamps shall consist of a stainless steel wrap and stainless steel hardware.

B. The City has standardized Smith-Blair Style 261 or approved equal.

2.3.8 Resilient Seat Gate Valves

A. Resilient seat gate valve bodies shall be manufactured of ductile iron. Gate valves shall be open left (counter clockwise). All valves shall be designed for minimum 250 psi working water pressure.

B. Valve stems shall be stainless steel.

C. The City has standardized on American Flow Control and Kennedy, or approved equal.

2.3.9 Valves

A. Valve boxes shall be heavy duty, adjustable style with the lower part manufactured of cast iron and the upper part of steel or cast iron. All valve boxes shall be designed and constructed to prevent direct transmission of traffic loads to the pipe or valve, and shall have the lower part manufactured of cast iron and the upper part of steel or cast iron. The top of the cover shall be flush with the finish grade. Boxes shall be as manufactured by Bibby Ste-Croix or approved equal.

B. Box covers shall be round frame and cover manufactured by the Bibby Ste-Croix or approved equal. The boxes shall be labeled to differentiate between division valves (“DIV”), Blow-Off (“B.O.”) and generic valves as indicated in the Construction Details.

C. Box covers shall have a minimum height of four (4) inches.

D. All foreign matter shall be removed from valve openings and seat faces. All nuts and bolts shall be checked for tightness.

E. For any T-connections that may be considered a lateral connection, the valve for the lateral line shall be attached with an anchor-T or tapping sleeve if approved by DPW (See Detail W-2.4.1)`. The valves on the main line shall be installed in line with the curb (see Detail W-2.4.3).

2.3.10 Tapping

A. Where there is more than one public water main in a street, the City shall determine which main the owner may tap for water service pipe connection. Water mains designated as transmission mains shall not be tapped for water service, except when approved by the City.

B. Service taps to the distribution main shall be separated by a minimum of 18-inches in all directions.

C. Temporary taps installed for filling and testing a pipe shall be abandoned prior to City acceptance. Abandonment shall include cutting pipe no more than 3-inches from the corporation stop and leaving corporation stop in the closed position.

D. Service taps on active public water mains shall be conducted by DPW staff for all services 2-inches and less in size.

E. Tapping sleeves shall be of the mechanical joint type. The valves shall be flanged by mechanical joint outlet with non-rising stem and designed for vertical burial. Tapping valves shall be rated at 200 psi working pressure and shop tested at 300 psi. Bolts on bonnet and stuffing box shall be stainless steel (316 stainless steel), stuffing boxes shall be "O" ring type. The operating nut shall be 2 inches square. Gaskets shall cover the entire flange surface. Valves shall open left, (counter clockwise).

F. Tapping sleeves shall be no greater than one-half of the diameter of the main being tapped.

G. The City has standardized on American Darling 1004 or an approved equal.

H. Any connection to a public main of asbestos cement material type shall require coordination with DPW staff. For any City-owned pipe, DPW will remove and dispose of asbestos material type, Contractor shall install new tee and pipe.

2.3.11 Restraints

A. Mechanical joint restraints shall consist of individually actuated wedges that increase their resistance to pull out as pressure or external forces increase. The device shall be capable of full mechanical joint deflection during assembly and the flexibility of the joint shall be maintained after burial. They shall have a rated work pressure of 350 psi in sizes 16-inch and smaller and 250 psi on in sizes greater than 16 inches.

B. Thrust blocks may only be used against undisturbed soil. They shall be designed in accordance with the Design Standards using the appropriate concrete and pressures as specified in the Construction Details and the AWWA standards and guidelines.

C. Tie rod systems may be used where approved by the City. All materials shall be steel and coated with an approved bituminous coating or other approved corrosion resistant coatings. Unless otherwise required or approved by the Engineer, the Contractor shall install tie rods in accordance with the following schedule for all fittings:

Minimum Tie Rod Design		
Pipe Size (inches)	**Number of Rods**	**Tie Rod Diameter (inches)**
4”-12”	2	¾”
16”	4	¾”
20” – 24”	4	1 ½”

D. Wedge Action Retaining Joints may be used wherever approved by the City and shall be manufactured of ductile iron conforming to ASTM A536. The mechanical joint restraint shall be Megalug Series 1100 or equal approved by DPW.

2.4 Hydrants

A. Hydrants shall have a 5-1/4-inch valve opened by turning the operating unit in the counter clockwise direction. The hydrant shall have one 4-1/2- inch steamer and two 2-1/2- inch hose connections. The hose and steamer connections shall have National Standard Thread. The operating nuts shall be pentagonal in shape, 1-1/2- inch from point to opposite flat and shall open left (counter clockwise). The hydrant shall be the hub or mechanical-joint type having a 6-inch pipe connection to an 8-inch or larger diameter main.

B. The hydrant valve shall consist of a cast iron valve and valve bottom and hydrant valve rubber. The rod threads shall be permanently sealed from contact with water. The hydrant valve shall seal against the bronze hydrant seat. The upper barrel shall be ductile iron with markings identifying size, model and year of manufacture. The lower barrel shall be ductile iron.

C. The upper barrel shall connect to the lower barrel with a breakable traffic flange and 8 bolts and nuts. This connection shall allow 360 degree rotation of the upper nozzle section.

D. The hydrant shall have a bronze drain ring securely held between the barrel and base flange. It shall provide bronze to bronze threaded connection for hydrant seal. The bronze drain ring shall serve as a non-corrosive multi-port drain channel.

E. Hydrant anchor tees shall be located at the main.

F. The hydrant shall have a minimum working pressure of 200 psi. Hydrant design shall be of positive automatic drain type to prevent freezing.

G. All hydrants that will not be City owned shall be painted red. Hydrants that are City owned, or will be City owned, shall be factory painted with Sherman-Williams brand paint to the City’s paint scheme:

- Hydrant body: hydrant blue b54tz104
- Caps: Pure white-b54w2101

H. The City has standardized on American Darling Model No. B-62B as manufactured by American Flow Control Inc.

2.5 Fire Suppression

A. All new fire suppression (i.e. sprinkler) connections shall be coordinated with and approved by the City’s fire department.

B. Fire suppression connections shall be coordinated with the property owner. Sprinkler valves shall only be operated by a certified sprinkler operator. The certified sprinkler operator shall bleed air from the sprinkler system upon completion of installation.

C. Single-family detached dwellings (i.e. single-family homes) may tap a single fire suppression service connection from their domestic water line if all of the following conditions are met:

1. The connection is made after the water meter
2. A testable backflow preventer is installed on the fire service line next to the connection
3. All pipes used in the fire suppression system are approved to carry potable water
4. Fire suppression system does not contain anti-freeze or any substance other than potable water

A. No fire service connection may be tapped off a domestic service (and vice-versa) for all commercial and multi-family properties. Separate domestic and fire services shall be installed from the building serviced to the public water main.

2.6 Testing of Water System

A. Pipelines shall be tested for strength and for leakage. Tests shall be made for all newly installed pipe and when required by the City. Methods of testing and plans showing sections to be tested shall be submitted to the City for approval, as requested. A 48-hour notice shall be given to the DPW Inspector of Construction and Utilities prior to all tests.

B. Testing shall be at a pressure of 200 pounds per square inch. In certain circumstances, the City may require higher pressure tests.

C. No more than 1,000 feet of water main shall be tested in a single test. In certain circumstances, the City may request smaller sections.

D. The tests for leakage shall last for two hours. The City may allow a one hour test subject to advanced approval.

E. The additional water needed to maintain the required pressure shall be accurately measured in a manner approved by the City. The container shall be clearly labeled with its capacity in gallons. Allowable leakage amounts will be determined by the AWWA standards for pressure testing Ductile Iron pipe (AWWA C600 latest revision).

F. The Contractor shall pay for and make all necessary arrangements for securing the water for test purposes. For projects where water is collected straight from an un-metered source, the Contractor shall meter the water. The City will subsequently bill the contractor on a private job for that water usage. For DPW projects, the Contractor will not be billed, but water usage shall be documented.

G. During this test all hydrant laterals shall be in the open position. The Contractor will not perform a pressure test against existing valves unless authorized by the City.

H. The Contractor shall submit a written report to the DPW summarizing the results. The Contractor shall repair all leaks discovered under any of the required tests and retest the pipe. The City will not accept any installation where a final test has not been passed.

2.7 Disinfection of the Pipeline

A. Prior to disinfection, the Contractor shall submit a detailed disinfection plan to the DPW. The plan shall be prepared consistent with AWWA standards and federal and state regulations, and it shall outline and describe the disinfection procedures.

B. General

1. All water mains, water services, attached appurtenances and connections shall be disinfected in accordance with AWWA Standard C651 continuous feed method and as required below.

2. Disinfection of new mains, including all chlorination, chlorine residual measurements, collection of samples, and certification shall be conducted by a third party testing agency approved by the DPW.

3. All pipe, fittings, and appurtenances shall be kept free from dirt and foreign matter at all times. During construction all open pipe ends and fittings shall be fitted with a water tight plug. At the end of the work day the open pipe in the trench shall be plugged in an equally suitable manner.

4. The Disinfection Plan shall document the locations and methods for applying the chlorine into the pipeline and practices shall conform to AWWA Standard C 651.

5. All water used to disinfect pipe shall be discharged and managed consistent with the appropriate state and local regulations. These shall include the City of Framingham Conservation Commission permitting and the *Illicit Discharges to Municipal Separate Storm Sewer System* bylaw. Discharge to the sanitary sewer or municipal stormwater system is not allowed.

6. Water mains and appurtenances must be completely installed, flushed, disinfected, and satisfactory bacteriological sample results received prior to connections being made to the active distribution system.

C. Chlorination

1. The interior surfaces of new valves, pipe and appurtenances shall be swabbed, as well as the interior surfaces of existing main, both upstream and downstream of the new pipe section, with a minimum five percent concentration of hypochlorite disinfection solution before installation. During the chlorination or chlorinating process, all valves shall be operated, and the chlorine solution shall be drawn through all laterals and appurtenances.

2. The Disinfection Plan shall summarize the intended chlorine dosage and the method for establishing that dosage.

3. In the event of leakage or where repairs are necessary, added disinfection shall be made only by injecting chlorine into the line whereby adequate mixing is assured. If the test results are not satisfactory, additional disinfection shall be required.

D. Flushing and Sampling

1. Water shall be flushed from the line at its extremities and at all outlets until the chlorine residual of the water system being flushed is equal or less than the distribution system level.

2. Sampling – Sampling shall be performed by an independent certified laboratory according to AWWA C651 – Disinfecting Water Mains, Option B. All sampling results shall be submitted to the DPW in writing prior to activation of the water main. If activation is not going to take place within 7 days of passing results this pipe shall be flushed once a week, with Water Department staff on site, until pipe is permanently activated. Failure to do so will result in re sampling and submitting passing results and possibly re disinfection, using the continuous feed method, if sampling results do not pass.

3. Sampling and analysis shall also include Heterotrophic Place Count (HPC) unless Colilert is used. The results of the HPC test shall be submitted in writing.

2.8 Pipe, Valve, and Structure Abandonment/Removal

A. Pipes left in place that are equal to or less than 6 inches in diameter may be left unfilled.

B. Pipes left in place that are greater than 6 inches in diameter shall be filled with LDCC regardless of material (e.g., DI, PVC).

C. Structures left in place shall be demolished down to five feet below ground surface, the bottom shall be cracked and compacted, and the remaining structure filled with CDF, LDCC, or clean gravel, as directed the City Inspector. Demolition debris shall be removed, and the area regraded and compacted over the filled structure.

3 Sewer Construction Standards

3.1 General

A. This Section specifies requirements for a gravity flow sewerage system and pressure sewer system.

B. The work covered under this section includes:

1. Furnishing and installing all pipe, fittings, manholes, structures and appurtenances required for the proposed system to convey sewage by gravity flow conditions.
2. When applicable, will include furnishing and installing all pipe, fittings, valves and structures for a pressure sewer system.
3. Rehabilitation of sewer pipes and structures.
4. Grease Traps.

C. Work and materials shall be performed in accordance with the State Plumbing Code when work is within ten (10) feet of buildings.

D. Work under this section shall comply with federal, state, and local requirements for the design, installation, testing, and certification.

E. Work shall comply with local, state and federal electrical codes to provide "watertight and corrosion resistant" installations. Electrical junctions of any kind are prohibited within the confines of the wetwell.

H. Submittals required for wastewater projects include:

1. Materials List and Shop Drawings
2. Temporary Bypass Plans
3. As-built Plans

3.2 Temporary Wastewater Bypass

A. Bypass mains shall be laid outside of the traveled and access ways whenever possible and trenched when crossing roadways. All services shall be ramped or trenched.

B. Spare plugs of the proper size and material shall be stored on site and available at all times of bypass operation.

C. Pumps shall be either submersible or self-priming type.

D. All bypass piping and system components shall be watertight and pressure rated for the proposed bypass system operating conditions.

E. Surcharging of upstream flows during bypass shall be minimized at all times. The pumping system may not surcharge the upstream sewer more than 18-inches in the vertical direction as measured from the invert of the existing suction manhole from which bypass pumps are withdrawing wastewater. The suction and discharge manholes shall be frequently monitored by the Contractor to observe flow rate and flow depth conditions in the existing system during bypass operations.

F. Flow turbulence in the downstream discharge manhole shall be minimized at all times.

G. All work shall be coordinated with DPW and no construction activity shall commence without a minimum of 48 hours advance notice.

3.3 Gravity Sewer

3.3.1 Gravity Sewer Pipe and Fittings

A. All pipes shall be designed based on the standards established in the Water Environment Federation/American Society of Civil Engineers *Manual of Practice No. FD-5, Gravity Sanitary Sewer Design and Construction*, latest edition, and New England Interstate Water Pollution Control Commission, *Guides for the Design of Wastewater Treatment Works, Technical Report #* 16, latest edition, and sound engineering principals.

B. The connection of the building sewer to the public sewer shall be made at the "Y" branch, if such branch is available at a suitable location. Lateral stubs or stubs for future sewer extensions shall be capped watertight until permanent connections are completed. All lateral stubs shall be approved by the City prior to installation. If no branch is available, a connection may be made by tapping the public sewer by an approved method, then inserting an approved cast iron, ductile iron, stainless steel or PVC "Y" or "T" saddle with stainless steel mounting bands or other approved connection device. Cutting a hole in the public sewer by hand is prohibited.

C. All sewer mains shall be laid with a straight alignment between manholes. When tying into an existing manhole, the manhole wall shall be cored and an insert installed for water-tightness.

D. The minimum pipe diameters for gravity building sewers and public sewers shall be six and eight inches, respectively.

E. Gravity sewers and force mains shall be constructed of Polyvinyl Chloride (PVC) Plastic Pipe and Fittings Polyvinyl chloride pipe and fittings (PVC) shall be minimum SDR 35 with full diameter dimensions conforming to the specifications for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings, ASTM Designation D-3034, latest revision, for sizes 3 inches to 15 inches. For sizes 18 inches to 48 inches, the pipe shall comply with ASTM F679, latest record.

F. Pipe color shall be in accordance with Uniform Color Code as established by the American Public Works Association Utility Location and Coordination Council (adopted September 2000).

G. Ductile Iron Pipe (Gravity) – where required by City

1. Ductile Iron Pipe: ASTM A746, Extra Heavy type, bell and spigot end, with Inderon Protecto 401 ceramic epoxy lining or equivalent applied per manufacturer's recommendation.
2. Ductile Iron Pipe Joint: ANSI A21.11, rubber gasket joint.
3. Where petroleum contamination is known or suspected to be in the soil and/or groundwater, nitrile gaskets shall be required.

H. All sewer pipes shall be laid accurately to the lines and grades shown in the Drawings and in conformance with pipe manufacturer's recommended procedures.

I. Pipe shall be handled in an approved manner, using slings or other approved devices. No pipe shall be dropped from trucks or into trenches.

J. Notch under pipe bells and joints, where applicable, to provide for uniform bearing under entire length of pipe.

K. Laying Pipe:

1. Pipe shall be laid accurately to line and grade in three-quarter (3/4") crushed stone. The depth of the crushed stone shall be one half (1/2) the diameter of the pipe under the main and one half (1/2) the diameter of the pipe over the main or 6 inches both under and over the pipe, whichever is greater. Stone shall be placed in layers not over six inches thick, and each layer shall be thoroughly compacted by tamping and chinking on each side of pipe to provide uniform support.
2. Each length of pipe shall be laid with firm, full and even bearing throughout its entire length, in a prepared trench. Pipe shall be laid with bells upgrade unless otherwise approved by the Engineer. Do not permanently support pipes on bells.
3. Every length of pipe shall be inspected and cleaned of all dirt and debris before being laid. The interior of the pipe and the jointing seal shall be free from sand, dirt and trash. Extreme care shall be taken to keep the bells of the pipe free from dirt and rocks so that joints may be properly lubricated and assembled. No pipe shall be trimmed or chipped to fit.
4. No length of pipe shall be laid until the proceeding lengths of pipe have been thoroughly embedded in place, to prevent movement or disturbance of the pipe alignment.
5. All piping shall be laid in the dry with the spigot ends pointing in the direction of flow. Installation shall proceed from the downstream to upstream in all cases.
6. Backfill material placed above the bedding material and below the roadway foundation shall conform to 6.3.1. Roadway foundation and surface restoration shall conform to Section 5, Roadway Construction Standards, and Section 6, Existing Road Openings, as applicable.
7. Impervious material may be required on service connections for a distance 10 feet from the inside wall of the foundation to where crushed stone can start. Pipe shall be laid with the spigot end pointing in the direction of the flow.
8. Sewer pipe shall have a minimum cover of 3 feet unless otherwise approved by DPW.

L. Pipe Extension: Where an existing pipe is to be extended, the same type of pipe shall be used, unless otherwise approved by the Inspector.

M. Full Lengths of Pipe: Only full lengths of pipe shall be used in the installation except that partial lengths of pipe may be used at the entrance to structures, and to accommodate the required locations of service connection fittings.

N. Pipe Entrances to Structures: All pipe entering structures shall be cut flush with the inside face of the structure, and cut ends of the pipe surface within the structure shall be properly rounded and finished so that there will be no protrusion, ragged edges or imperfections that will impede or affect the hydraulic characteristics of the sewage flow. The method of cutting and finishing shall be subject to the approval of the Inspector.

O. Protection During Construction: The Contractor shall protect the installation at all times during construction, and movement of construction equipment, vehicles and loads over and adjacent to any pipe shall be performed at the Contractor's risk.

1. At all times when pipe laying is not in progress, all open ends of pipes shall be closed by approved temporary water-tight plugs. If water is in the trench when work is resumed, the plug shall not be removed until the trench has been dewatered and all danger of water entering the pipe eliminated.

P. Sewer pipe shall be installed with minimum distance from water pipes as summarized below. Reference detail S 3.5.0

1. *Horizontal Separation:* Whenever possible, sewer shall be laid at a minimum at least 10 feet horizontally from any existing or proposed water main. Should local conditions prevent a lateral separation of 10 feet, a sewer main may be laid closer than 10 feet to a water main, if:
   a. It is laid in a separate trench, or if
   b. It is laid in the same trench with the water mains located at one side on a bench of undistributed earth, and if
   c. In either case, the elevation of the top (crown) of the sewer is at least 18 inches below the bottom (invert) of the water main.
2. *Vertical Separation:* Whenever sewer must cross under water mains, the sewer shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be varied to meet the above requirements, the water main shall be relocated to provide this separation or reconstructed with mechanical-joint pipe for a distance of 10 feet on each side of the sewer. One full length of the water main should be centered over the sewer so that both joints will be as far from the sewer as possible.
3. When it is impossible to obtain horizontal and/or vertical separation as stipulated above, water and wastewater operations shall be given the opportunity to review and provide more stringent requirements such as:
   a. Pipes shall be pressure tested by an approved method to assure water tightness ;and/or
   b. Both pipes shall be encased in control density fill (CDF); any ductile or cast iron shall be double wrapped in 6. mil polyethylene plastic.
   c. Other.

Q. Sewer pipe shall be laid at a minimum of 5 feet horizontally from a drainage main and 18 inches vertically from a drainage main.

R. Sewer Pipes-Laser Installation: Sewer pipes shall be laid to required grades by use of a laser and target system, unless otherwise specifically approved in writing by engineer.

3.3.2 Gravity Sewer Couplings and Connectors

A. Fittings, couplings, and adaptors for use with the gravity sewer system shall be Romac Industries, Inc. or an approved equal. Saddles for low-pressure sewers shall be bolt-on premier units. They shall have polypropylene bodies, stainless steel fasteners, stainless steel reinforced outlets.

B. Joints: PVC pipe shall have an integral wall bell and spigot push-on joint with elastomeric gaskets secured in place in the bell of the pipe. The bell shall consist of an integral wall section with a solid cross section elastomeric gasket, factory assembled, securely locked in place to prevent displacement during assembly. Elastomeric gaskets shall conform to ASTM D3212.

C. Spigot pipe ends shall be supplied with bevels from the manufacturer to ensure proper insertion. Each spigot end shall have an “assembly stripe” imprinted thereon to which the bell end of the mated pipe will extend upon proper joining of the two pipes.

D. Where petroleum contamination is known or suspected to be in the soil and/or groundwater, nitrile gaskets shall be required.

3.3.3 Cast Iron Pipe (Gravity) (For Plumbing Code Areas Only)

A. Cast Iron Soil Pipe: ANSI/ASTM A74, Extra Heavy type, bell and spigot end, inside to be asphalt coated per manufacturer standard.

B. Cast Iron Pipe Joint: ASTM C564, rubber gasket joint devices.

C. Transitions between different gravity pipe sizes shall be accomplished by using Fernco, or approved equal flexible eccentric reducing couplings with stainless steel bands. Completed pipelines shall be free of deviations from grade. Visible leaks, broken pipes, etc., shall be repaired or replaced.

D. Fittings for pressure sewer pipe shall be of similar style and material to match the force main material (PVC or DI). Bells shall be gasketed joint conforming to ASTM D3139 with gaskets conforming to ASTM F477. Gasket material shall be equal to that specified for pipe.

3.4 Pressure Sewer

3.4.1 Pressure Sewer Pipe and Fittings

A. Whenever possible, the force main will be designed on a continuous slope so that no "high points" exist, which may result in entrapment of gases and so that no "low points" exist which may induce settlement of solids. If unavoidable, all "high points" will have an air/vacuum release valve, and "low points" will have a cleanout. Details for these appurtenances will be provided and they will be accessible for maintenance without the need for excavation. During backfill, a polyethylene warning tape will be buried two feet below the ground surface along the entire length of the force main. Restrained joints on the force main should be used in place of thrust blocks.

B. The minimum pipe diameters for pressure building sewers shall be two inches. All pipe should be sized based on sound engineering principals.

C. Pressure sewers and force mains shall be constructed of Inderon Protecto 401 ceramic epoxy lined Class 52 DI or SRD 21 (pressure rated) PVC. Polyvinyl Chloride (PVC) Plastic Pipe and Fittings:

1. Size 2 inch to 12 inch diameter, SDR 21, ASTM D-2241, with material per ASTM D-1784, Grade 1, Type 1.
2. Push on joint, bell and spigot type with pressure rating of 200 psi.
3. Joints to meet ASTM F477 and tested to ASTM D-3139 standard.
4. Install at locations and sizes indicated on drawings.

D. Ductile Iron Pipe and Fittings:

1. Pipe size 4 to 12 inches diameter, push-on joint, pressure Class 350, ANSI/AWWA C150/A21.50, inside epoxy coating per manufacturer standard.
2. Pipe size 12 to 24 inches diameter, push-on joint, pressure Class 250, ANSI/AWWA C150/A21.50, inside epoxy coating per manufacturer standard.
3. Fittings, size 4 to 12 inches diameter, pressure Class 350, ANSI/AWWA C153/A21.53, push-on joints per ANSI/AWWA C111/A21.11.
4. Gaskets shall conform to ANSI/AWWA C111/A21.11. Restrained joints shall be provided by a field lock gasket supplied by the manufacturer of the pipe for that purpose. (U.S. Pipe – "FIELDLOK", Clow –"SUPER-LOCK," or U.S. Pipe – "TRFLEX").
5. Pipe and fittings to have an outside coating of asphaltic material per ANSI/AWWA C153/A21.53 and ANSI/AWWA C110/A21.10.
6. Valves and fittings to have an inside coating of epoxy lining applied in accordance with AWWA C550.

E. Flanged Ductile Iron Pipe and Fittings:

1. Pipe and fitting sizes 3 inches to 24 inches, pressure Class 250 psi, per ANSI/AWWA C115 A21.15 with asphaltic coating outside and epoxy coated inside.
2. Flange bolt circle and holes per ANSI/AWWA/C115/A21.15.
3. Gaskets per ANSI/AWWA C111/A21.11.
4. Flange adapters to push-on joint pipe sections shall be supplied by the manufacturer of the pipe.

3.4.2 Pressure Sewer Couplings and Connectors

A. Sleeve Couplings

1. Sleeve Type, Buried will consist of the following materials: Cast iron or epoxy coated steel, middle rings, ASTM A513; Reducer type where required; Followers, two steel rings epoxy coated; Bolts ANSI 21.11/AWWA C111, galvanized; Two wedge section compressible gaskets; Dresser Manufacturing Co. – Style 38, 162, or 128 as appropriate.
2. Sleeve Type, Exposed will consist of the following materials: Steel middle ring, shop prime; Reducer type for different pipe sizes; Two steel follower rings; Two wedge section compressible gaskets; Steel bolts; Dresser Manufacturing Co., Style 38.
3. Thoroughly clean pipe ends for a distance of 8 inches from the ends prior to installing couplings, and use soapy water as a gasket lubricant.
4. Slip a follower ring and gasket (in that order) over each pipe and place the middle ring centered over the joint.
5. Insert the other pipe length into the middle ring the proper distance.
6. Press the gaskets and followers evenly and firmly into the middle ring flares.
7. Insert the bolts, finger tighten and progressively tighten diametrically opposite nuts uniformly around the adapter with a torque wrench applying the torque recommended by the manufacturer.
8. Insert and tighten the tapered threaded lock pins.
9. Insert the nuts and bolts for the flange, finger tighten and progressively tighten diametrically opposite bolts uniformly around the flange applying the torque recommended by the manufacturer.

C. Flexible Connectors:

1. Do not use rubber or elastomeric PVC type flexible couplings to connect pressure sewers.
2. Material shall be compatible with pipes being joined.
3. Maximum allowable deflection per joint shall be 15 degrees or per manufacturer's recommendation, whichever is less.
4. Stainless steel metal retaining rings.
5. Use suitable retaining control rods.

3.4.3 Air Release

1. Air Release and Air and Vacuum Release Valves of size and type specified herein are to be able to fit into structure with ample room for access and maintenance of these units.

2. Air Release and Vacuum Valve shall be similar to a Clow F 3077, Valmatic VM-49BW.3 or approved equivalent, threaded joint end, valve with cast iron body and bronze body seat, all in accord with APCO 400 Sewage Valves with a working pressure of 150 psi. ASTM A48, Class 30 and ASTM B62.
3. Air Release and Vacuum Valve shall be installed in the Air Release chamber as shown along the pressure pipe and at any high points constructed due to changes in the pressure pipe route or elevations.
4. If the air release valve manhole is equipped with a water-tight cover, a vent pipe shall be installed. Vent pipe shall be 4 or 6-inch ductile iron "Candy Cane" with an insect screen.

3.5 Pipe Joints

A. All joints shall be made water-tight.

B. Pipe shall be jointed in strict accordance with the Pipe manufacturer's instruction. Jointing of all pipe shall be done entirely in the trench.

C. Lubricant for jointing of PVC pipe shall be applied as specified by the pipe manufacturer. Use only lubricant supplied by the pipe manufacturer.

D. PVC Pipe shall be pushed home by hand or with the use of bar and block. The use of power equipment, such as a backhoe bucket, shall only be used at the direction of the manufacturer.

E. Field-cut pipe ends shall be cut square and the pipe surface beveled to the size and shape of a factory-finished beveled end. All sharp edges shall be rounded off.

F. Jointing of Ductile Iron and Cast Iron Pipe shall be in accordance with Section 2, Water Construction Standards.

G. Bentonite collars shall be placed every 500 feet on sewer lines placed in the groundwater table that are more than 1200 feet in length. Collars shall extend to the width and height of the stone bed.

3.6 Cured-In-Place Pipeliners

A. Pipeline rehabilitation using cured in place pipeliners (CIPP) may be approved by DPW for existing public sewers 8-inches in diameter and greater. CIPP rehabilitation of public sewers less than 8-inches in diameter is not permitted.

B. The CIPP shall conform to the provisions and all test requirements specified in ASTM D790 – Test Methods for Flexural Properties of Un-reinforced and Reinforced Plastics and Insulating Materials, ASTM F1216 – Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube, and ASTM F2561-11 Standard Practice for Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One Piece Main and Lateral Cured-in-Place Liner.

C. The CIPP shall be designed based on a fully deteriorated condition of the existing host pipe in which it is assumed that the existing host pipe provides no structural support. The CIPP shall be designed to carry soil, groundwater, and other superimposed loads.

D. The CIPP shall be designed in accordance with ASTM F1216 under the following conditions:

1. Fully deteriorated host pipe
2. Height of groundwater above pipe invert = Ground surface elevation
3. Height of soil above pipe = Final design ground surface elevation

4. Live Load = AASHTO HS-20
5. Soil density = 120 lbs. / cubic foot
6. Ovality = 2% to 8%

E. The Contractor shall prepare and submit a design submittal prepared and stamped by a registered professional engineer that includes the following:

1. Description of materials and product samples
2. Design parameters
3. Installation process
4. Long term creep data, testing duration 10,000 hours minimum
5. Proposed flexural modulus and flexural strength
6. Proposed wall thickness supported by design calculations
7. Bypass pumping plan
8. Installer's qualifications and relevant experience

F. The existing sewer shall be cleaned and closed circuit television inspected prior to the CIPP installation to prepare the host pipe and locate the existing service connections.

G. Installation, curing, cool down, finish, and sealing at manhole and service connections shall conform to CIPP manufacturer's requirements. Curing shall be performed using steam unless otherwise approved by DPW and MWRA.

H. All service connections shall be reinstated after the CIPP is installed to no less than 95% of the existing service connection diameter and ground or brushed as required to form a neat lateral opening free of any jagged edges, lips, or protuberances. All service connections shall be grouted to prevent infiltration from the edge of lined sewer main to a minimum distance of 3 feet up the service connection.

I. If any open cut repairs or wye replacements are required, that work shall be completed prior to CIPP lining.

3.7 Cleanouts

A. The sewer cleanouts shall be minimum 6-inch diameter or sized to match the service pipe, whichever is greater. The cleanouts shall be either stubbed 6 inches above surface grade, or completed at finish grade if contained within a hand hole clearly marked "SEWER" per Standard Detail S-3.2.0. Cleanouts shall include a water-tight cap.

3.8 Sewer Manholes

A. All manholes shall be built in accordance with the Details and in the locations shown on the City of Framingham Details.

B. All masonry shall be installed by personnel experienced and skilled in this work, and any person not deemed to be such by the Engineer shall be removed and replaced by a person so qualified.

C. Manholes shall be constructed as soon as the pipe laying reaches the location of the manhole. Should the Contractor continue pipe laying without making provision for completion of the manhole, the Engineer shall have the authority to stop the pipe laying operations until the manhole is completed.

D. The Contractor shall accurately locate each manhole and set accurate templates to conform to the required line and grade. Any manhole which is mislocated or oriented improperly shall be removed and rebuilt in its proper location, alignment and orientation at no additional cost to the Owner.

E. Foundations: All manholes shall be constructed on a 12-inch layer of compacted bedding material. The excavation shall be dewatered to provide a dry condition while placing bedding material and setting the base.

F. Precast Manholes

1. Structures shall be constructed of precast concrete with a one-pour monolithic base in accordance with ASTM C478and installed only after Shop Drawings have been approved. All precast concrete manholes shall conform to the ASTM "Specifications for Precast Reinforced Concrete Manhole Sections," Designation D478.
2. The barrel shall be 4-foot or 5-foot diameter at the City's discretion.
3. The precast structures shall be manufactured with 4,000 psi minimum compressive strength concrete, with eccentric cone section tapering to 30-inch diameter, or flat top, and one pour monolithic base section conforming to ASTM C478. All units to be designed for HS-20 loading.
4. The top grade of the precast concrete cone section shall be set sufficiently below finished grade to permit a maximum of five and a minimum of two courses (laid in the flat position) of eight inch brick to be used as risers to adjust the grade of the manhole frame.
5. Lifting holes on all manhole sections shall be filled with grout.
6. Precast Unit Joint: Butyl rubber section joint conforming to ASTM C443.
7. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section.

G. Manhole frames and covers

1. Manhole frames and covers shall be minimum Class 25 conforming to ASTM "Standard Specification for Gray Iron Castings," Designation: A48. Manhole frame shall have a clear opening of 26 inches and be a minimum of 6 inches in height.
2. The surface of the cover shall have a diamond pattern with the words "FRAMINGHAM SEWER" if in the public right-of-way or "SEWER" if on private property cast thereon for sewer manholes.
3. All manholes frames and covers shall be manufactured by East Jordan Iron Works (formerly LeBaron Foundry Co.) or an approved equal.
4. Manhole covers shall be watertight when placed in the 100-year flood plain, wetland areas, cross country easements, or as determined by DPW, and as specified in federal, state and local regulations. Manhole frames shall be set on a grout pad to make a watertight fit. Watertight manhole covers shall be secured with four (4) stainless steel bolts and have a watertight gasket. The frame and cover shall be watertight up to 15 psig external pressure.

H. The corbel shall be constructed of red brick or reinforced concrete grading rings for adjusting frame to match finished surface. Manhole frame shall be flush with grade using a minimum of two (2) and a maximum of five (5) brick courses. Elevations greater than 6 inches vertical may include riser rings designed for that purpose. Brick shall conform to sewer bricks (made from clay) ASTM designation C32, Grade MS.

I. Inverts

1. Brick invert channels shall be constructed in all manholes to provide a smooth channel for sewage flow through the structure, and shall correspond in shape to the lower half of the pipe. Curve side inverts and layout main inverts (where direction changes) shall be constructed with smooth curves of longest possible radius tangent to adjoining pipelines centerline.
2. Brick shelves shall be constructed to the elevation of the highest pipe crown and sloped to drain toward the flow channel. Only red sewer brick shall be used for any invert, brick shelves and manhole frame adjustments. Brick shall comply with ASTM Standard Specification for Sewer Brick (made from clay or shale), Designation C32, for Grade SA, hard brick.
3. Special care shall be taken in laying brick inverts. Joints shall not exceed three-sixteenth inch in thickness and each brick shall be carefully laid in full cement mortar joints on bottom, side and end in one operation. No grouting or working in of mortar after laying of the brick will be permitted. Bricks forming the shaped inverts in manholes shall be laid on edge.
4. Invert channels shall be built for future extensions where shown on the Drawings and where directed by the Engineer.
5. Inverts shall not be built above ground. All inverts shall be built with the manhole in place (i.e. at the design elevation) and with all pipes installed.
6. All inverts shall be constructed with 4,000 psi concrete in void areas and with sewer brick. Brick shall conform to sewer bricks (made from clay) ASTM designation C32, Grade SS.
7. All sewer inverts are to be constructed once the manhole is installed. Manhole inverts built above ground will not be accepted.

J. Mortar shall be in conformance with ASTM C270, Type M. The mortar shall be composed of Portland cement hydrated lime, and sand, in the proportions of 1 part cement to ¼ part hydrated lime to 3 ½ parts sand, by volume. Sand for masonry mortar shall conform to the gradation requirements of ASTM C144.

K. Cement shall be Type I or II Portland cement conforming to ASTM C150, Standard Specification for Portland Cement. Hydrated lime shall be Type S conforming to ASTM D207.

L. All drop manholes will be of the external type. The drop pipe shall be constructed of minimum SDR 35 PVC. The drop piping and horizontal cleanout sections will be sized the same as the sewer main piping and shall enter the manhole at invert elevation. The drop portion of the piping shall be secured with anchor straps. The drop piping shall be encased with control density fill.

M. Manhole Pipe Connections: Flexible sleeve or rubber gaskets shall be Lock Joint, Kor-n-Seal, A-Lok, or approved equivalent.

3.9 Manhole Connections

A. Manhole pipe connections for precast manhole bases may be accomplished by any method described below. The Contractor shall make sure that the outside diameter of the pipe is compatible with the particular pipe connection used.

1. A tapered hole filled with non-shrink waterproof grout after the pipe is inserted. This connection method will not be allowed when connecting PVC pipe to manholes.
2. The LOCK JOINT Flexible Manhole Sleeve cast in the wall of the manhole base. The stainless steel strap and exposed sleeve shall be protected from corrosion with a bitumastic coating.

3. PRESS WEDGE II gasket cast into the wall on the manhole base. The rubber wedge shall only be driven into the V slot from the outside of the manhole.

4. The RES-SEAL, a cast iron compression ring which compresses a rubber "O" ring gasket into a tapered hole in the wall of the manhole base. Exposed metal shall be protected from corrosion with a bitumastic coating.

5. KOR-N-SEAL neoprene boot cast into the manhole wall. The stainless steel clamp shall be protected from corrosion with a bitumastic coating.

B. Sewer manholes shall be constructed with drop connections when the proposed invert of the connection is at least 2 feet above the manhole invert. Drop connections for differences of less than 2 feet shall also be provided if required by the City.

3.10 Bitumastic Coatings

A. The entire exterior surface of all masonry and concrete (whether precast or cast-in-place) structures associated with sewerage systems, such as: manholes, grease traps, holding tanks, tight tanks, septic tanks, aeration tanks, pump stations, valve pits, etc., shall receive two coats of waterproofing such as Carboline Bitumastic 300M as manufactured by SOMAY Products, Inc., Miami, FL; Sonnoshield HLM 5000 as manufactured by Sonneborn, Shakopee, MN or approved equal at a minimum thickness of 7 mils per coat and a total thickness of 14 mils; however, in no case shall the thickness per coat be less than that recommended by the manufacturer.

3.11 Service Connections

A. General Requirements: The Contractor shall make all required connections of the building sewer service pipes into the sewer system. Work shall include making the service pipe connections into the sewer system pipes or into the manholes located ten (10) feet outside of the proposed building lines. If stubs are constructed for later connection to the building pipes, the ends shall be sealed with watertight plugs.

B. Coordination with Building Contractor: The Contractor shall coordinate the work with the work of the Building Contractor to determine the exact location and elevation of the point of entry into the building.

C. Gravity service connections shall be minimum 6 inch PVC.

D. Sewer service pipe connections to the pipe of the public sewer system shall be made with fittings supplied by the pipe manufacturer. All connections into sewers shall be by wyes, T-wyes, or a Romac saddle, and couplings manufactured for use with the same type of pipe. The Contractor shall install 45 degree wye branch or 90 degree tee fittings in the sewer pipes at all locations where building sewer service pipe connections are shown on the Drawings. Connections of the sewer service pipes shall be made into the wye branches or tees by means of 45 degree bends. The connections shall be made thoroughly watertight and concrete shall be placed under each connection to bear on undisturbed earth and firmly support the connection. Sewer chimneys shall be encased in concrete unless directed otherwise by the City.

E. Service connections made using saddles and tapping sleeves shall be allowed only when authorized by the DPW. Replacement of an existing service shall include the replacement of the existing wye, tap or tee. Penetrations to the sewer main shall be kept to a minimum.

F. All service connections shall have a slope between 2 and 6 percent. Service connections that have a vertical drop of 4 feet to 12 feet between the house sewer invert at the street and the main sewer

invert shall be by sloped line using 22-degree or 45-degree angle connectors to allow snakes and rods to clean the line between the house and the main sewer.

G. Any sewer lateral that contains a 45-degree (45º) bend or greater shall require a manhole. Alternative connections shall be allowed only if reviewed and approved by DPW.

H. Chimney drop sewer services shall only be allowed where the depth of the mainline sewer crown is more than 12-feet from the ground surface. Installation of chimney when the mainline crown is less than 12-feet deep will not be allowed without the prior review by DPW. Service connections shall preferably be installed utilizing the most direct (shortest) route from building to main. Services should be laid out to run perpendicular to the main. Refer to standard installation details for materials and requirements.

I. For grinder pump to gravity sewer connections, the service connections shall be minimum 2-inch DI or SDR 21 PVC. Check valves shall be Y-pattern commercial bronze valves.

J. On private projects, portions of existing service piping to remain shall be video inspected prior to approval to verify pipe condition, ensure integrity, and limit infiltration. The inspection shall be witnessed by DPW staff. Service piping video shall be provided to DPW for final review prior to approval of existing piping reuse.

3.12 Testing of Sewer

A. If the visual inspection of the completed sewer or any part thereof shows any pipe, manhole or joint which allows infiltration of water, the defective work or material shall be replaced or repaired as directed. After completing installation and backfill of sewer pipe to the satisfaction of the DPW, the Contractor shall conduct a line acceptance test under the following procedures.

3.12.1 Gravity Main Testing

A. All gravity sewers that will be become the property of the City of Framingham shall undergo mandrel testing, televised inspection and, as directed by the City, pressure testing. All televised inspections shall be recorded and provided to the City in digital format.

B. Pressure Testing Gravity Sewers – After a manhole to manhole reach of pipe has been backfilled and cleaned, pneumatic plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches four psig greater than the average back pressure of any groundwater that may be over the pipe. A minimum two minutes shall be allowed for the air pressure to stabilize.

After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be termed “Acceptable” if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any groundwater that may be over the pipe), shall not be less than the time shown for the given diameters as indicated in the Uni-Bell PVC Pipe Association’s, Handbook of PVC Pipe, current edition, and the following table.

MINIMUM LOW-PRESSURE TEST TIMES

Pipe Diameter (inches)	Minimum Time (min:sec)	Allowable Maximum Length (L = ft) for Minimum Time	Time for Longer Length (sec)
8	3:46	597	0.380L
10	5:40	398	0.854L
12	7:34	298	1.520L
15	14:10	159	5.342L
18	17:00	133	7.692L
24	22:40	99	13.674L
30	28:20	80	21.366L
36	34:00	66	30.768L
42	39:48	57	41.883L
48	45:34	50	54.705L

C. If testing is not feasible between manholes due to live sewer service connections the contractor shall conduct low pressure air testing at each pipe joint.

D. Vacuum testing of service connections may be required as directed by the City.

E. Deflection testing shall be performed on all flexible pipes, if directed by the Inspector. The tests shall be conducted after the final backfill has been in place for at least 60 days to allow for stabilization. Pipe shall be installed so there is no more than a maximum deflection of 5 percent. Deflection testing shall be performed using a specially designed gauge assembly (mandrel) pulled through the complete section. The gauge assembly shall have a diameter of not less than 95 percent of the base inside diameter or the average inside diameter as specified by ASTM. The pipe shall comply with ASTM D2122, Standard Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings. The deflection test shall be performed without mechanical pulling devices. Other testing methods such as electronic deflectometers, calibrated video cameras, or laser profilers must be submitted for review and approval by DPW prior to use.

3.12.2 Pressure Main Testing

A. Except as otherwise directed, pressure sewers (force mains) shall be given combined pressure and leakage tests in sections of approved length. The Contractor shall furnish and install suitable temporary testing plugs or caps; necessary pressure pumps, pipe connections, meters, gauges, gates, and other necessary equipment; and required labor. The Owner and Engineer shall have the option of using their own gauges.

B. Subject to approval and provided that the tests are made within a reasonable time considering the progress of the project as a whole, and the need to put the section into service, the Contractor may make the tests when he desires. However, pipelines in excavation or embedded in concrete shall be tested after the backfilling of the excavation or curing of the concrete and exposed piping shall be tested prior to field painting.

C. The section of pipe to be tested shall be filled with water of approved quality, and air shall be expelled from the pipe. If blow offs are not available at high points for releasing air, the

Contractor shall make the necessary excavations and do the necessary backfilling and make the necessary taps at such points and shall plug said holes after completion of the test.

D. The section under test shall be maintained full of water for a period of 24 hours prior to the combined pressure and leakage test being applied.

E. The pressure and leakage test shall consist of first raising the water pressure (based on the elevation of the lowest point of the section under test corrected to the gage location) to the pressure rating of the pipe or alternately, to two times the maximum calculated operating pressure of the pipe, as approved by the Engineer. If the Contractor cannot achieve the specified pressure and maintain it for a period of one hour, the section shall be considered as having failed the test.

F. Following or during the pressure test, the Contractor shall make a leakage test by metering the flow of water into the pipe while maintaining in the section being tested a pressure equal to the pressure rating of the pipe. If the average leakage during the two-hour period exceeds a rate of leakage indicated in AWWA Section C600 per 24 hours per mile of pipeline, the section shall be considered as having failed the leakage test.

G. Reference the appropriate AWWA standards latest version for tightness testing. At minimum, all force mains shall be pressure tested with a minimum pressure of 150 psi for a minimum of two hours.

H. If the section fails to pass the pressure and leakage test, the Contractor shall do everything necessary to locate, uncover, and repair or replace the defective pipe, fitting, or joint, all at his own expense and without extension of time for completion of the work. Additional tests and repairs shall be made until the section passes the specified test.

I. If, in the judgment of the City of Framingham, it is impracticable to follow the foregoing procedure exactly for any reason, modifications in the procedure shall be made as approved, but in any event the Contractor shall be responsible for the ultimate tightness of the line within the above leakage and pressure requirements. Passing the test does not absolve the Contractor from his responsibility if leaks develop later within the period of warranty.

J. The sewer lines shall be inspected via closed-circuit television (CCTV) after completion with a 2 gpm flow of water to reveal pipe bellies. The remote camera shall also pan to view up the service connections to the Fernco fitting.

3.12.3 Manhole Testing

A. All tests shall be observed by a representative of the DPW and the Contractor on each manhole. Manholes shall be tested by vacuum methods [see below].

B. Vacuum Testing of Manholes – Leakage tests for four and five foot diameter manholes may be made using vacuum testing equipment. This type of test may be used only immediately after assembly of the manhole and only prior to backfilling. The manhole to pipe connection should only be a flexible connector. All lift holes shall be plugged with a non-shrinking mortar. For this test, each four or five foot diameter manhole shall be tested under 10 inches of Hg vacuum.

Manholes shall be vacuum tested per ASTM C1244 – 11. Manholes shall be prepared by plugging all lift holes and pipes entering the manhole. Care shall be taken to securely brace the pipes and plugs to prevent them from being drawn into the manhole. The test head shall be placed at the top of the manhole in accordance with manufacturer's recommendations and a vacuum of 10 inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 in. of mercury. The manhole shall pass if the time for the vacuum reading to drop from 10 in. of mercury to 9 in. of mercury meets or exceeds the values indicated in the table below. If the manhole fails the initial

test, necessary repairs shall be made by an approved method. The manhole shall then be retested until a passing test is obtained.

	Testing Time (Seconds) for 48 and 60-Inch Diameter Manhole (inches)	
Depth (feet)	48-Inch	60-Inch
8 (and less)	20	26
10	25	33
12	30	39
14	35	46
16	40	52
18	45	59
20	50	65
22	55	72
24	59	78
26	64	85
28	69	91
30	74	98

C. All excess material including dirt, loose concrete, bricks, grit, stones and any other material, shall be removed from all manholes prior to final acceptance by DPW.

3.12.4 Cured-In-Place Pipeliner Testing

A. Post construction acceptance testing of the rehabilitated sewer shall conform to manufacturers requirements, ASTM D5813-04 (2012 or latest edition) - Standard Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems, and the requirements of Section 3.3.2.

B. For each separate manhole to manhole segment of CIPP installed, at least one sample shall be prepared and tested in accordance with ASTM F1216 and ASTM D790. A “restrained” sample shall be taken for pipes 18-inches or less in diameter. A “flat plate” sample shall be taken for pipes more than 18-inches in diameter. The proposed testing laboratory shall be submitted for approval to DPW. Samples shall be tested to verify that the flexural modulus, flexural strength, and wall thickness of the CIPP are at least equal to the parameters proposed in the approved design submittal.

3.13 Sewer Abandonment

A. Pipes left in place that are equal to or less than 6 inches in diameter may be left unfilled.

B. Pipes left in place that are greater than 6 inches in diameter shall be filled with LDCC regardless of material (e.g., DI, PVC).

C. When abandoning asbestos cement pipe, care shall be used to prevent pipe material from becoming friable, thereby rendering it as regulated asbestos containing material.

D. Structures left in place shall be demolished down to five feet below ground surface, the bottom shall be cracked and compacted, and the remaining structure filled with CDF, LDCC, or clean gravel, as directed the DPW Inspector of Construction and Utilities. Demolition debris shall be removed, and the area regraded and compacted over the filled structure.

3.14 Grease Traps

3.14.1 Exterior Grease Traps

A. Exterior grease traps shall be designed by a registered Professional Engineer. The plans shall be stamped and include the design criteria and calculations used to size the grease trap.

B. Grease traps shall be sized in accordance with Massachusetts Uniform State Plumbing Code 248 CMR 10.00 and shall have a minimum capacity of 1,000 gallons. The grease trap shall be sized to provide a minimum of 24 hours of detention time for the design flow.

C. The discharge concentration for grease trap effluent fats, oils, and grease (FOG) shall not exceed 100 mg/l.

D. The grease trap shall be located a minimum of 10 feet from buildings, property lines, water services, and in compliance with all applicable building and zoning codes. The grease trap shall be located where it is accessible for inspection and cleaning.

F. Sanitary wastewater flow into the grease trap is strictly prohibited. Sanitary flow from the building shall connect to a manhole located downstream of the grease trap. A manhole shall be provided upstream and downstream of the grease trap to facilitate bypass and treatment of flows if the grease trap must be temporarily taken out of service.

G. The grease trap shall be constructed of reinforced concrete and shall be designed for AASHTO HS-20 loading at a minimum. A 1-inch thick butyl rubber gasket shall be provided between precast sections of tank. Buoyancy calculations shall be provided by the Contractor, and if necessary, sufficient ballast (such as a buoyancy slab) shall be provided to counteract buoyancy forces when the grease trap is empty, assuming the groundwater table is at the ground surface. Interior baffles shall be provided to retain collected grease and other materials and prevent the discharge of these materials into the City's sewer system.

I. Water cooled grease traps are prohibited.

J. The grease trap shall be tested to demonstrate water tightness prior to acceptance and use. Testing shall consist of a water infiltration / exfiltration test. The grease trap shall be filled to 4 inches below the outlet invert. Leakage into or out of the tank shall not exceed 10 gallons per 1,000 gallons of tank volume in a 72-hour period. Test shall be performed before backfilling, and shall be witnessed by the Department.

K. The grease trap shall be filled to its normal fluid operating depth with clean water prior to its first use.

L. Unless otherwise required by a schedule established by the DPW, owners or operators shall clean grease traps of accumulated grease and oil in accordance with all applicable local, state and federal laws, and no less frequently than a minimum of once every three months or whenever one quarter of the liquid depth of the trap consists of grease or oil, whichever occurs first. Grease traps shall be cleaned by physically removing accumulated grease, scum, oil or other floating substances and solids. Chemical, biological, or physical means (including flushing with water) shall not be used to release fats, wax, oil, or grease into the sewer, bypass the trap, or otherwise make the trap operate less effectively.

3.14.2 Interior Grease Traps

A. At locations where Exterior Grease Traps cannot be constructed to serve a building, an interior grease trap shall be provided. Interior grease traps shall be the automatic grease and oil removal type and sized and installed in accordance with Massachusetts Uniform State Plumbing Code 248

CMR 10.00. The grease trap shall be sized using a one (1) minute drain down period. The grease trap shall be cleaned of accumulated grease and oil based on the manufacturer's recommendations, applicable local, state, and federal laws, at a minimum monthly, or on a more frequent basis at the discretion of the DPW. A sample point downstream of the grease trap shall be provided to permit sampling at the digression of DPW to ensure compliance.

4 Stormwater Construction Standards

4.1 General

A. This Section specifies requirements for a stormwater management (aka drainage) systems, including conveyance and water quality structures.

B. Groundwater and stormwater runoff should be managed on-site to the extent possible. On-site retainage of stormwater and implementation of other stormwater management measures to control the rate, volume and characteristics of stormwater discharged to the City's storm drainage systems shall be required whenever feasible, with exceptions to be approved by the City. Storm drains, catch basins, manholes, retention/detention structures, water quality structures, permeable surfaces, and related best management practices (BMPs), shall be installed where necessary to provide adequate treatment and onsite infiltration or offsite disposal of surface water from all streets and adjacent land as shown on the proposed plans that require approval by the City prior to construction.

C. Groundwater shall not be managed by or discharged (such as by sump pumps) into the stormwater system. Lowest level floors and the bottom of stormwater BMPs should be at least 3 feet, but no less than 2 feet, above the seasonal high ground water table. The seasonal high ground water table should be field verified at the site.

D. No stormwater discharge shall cause or contribute to an exceedance of water quality standards. Additional stormwater quality controls may be required to reduce pollutant loading from drainage systems that ultimately discharge to a water body listed as an impaired water on the most recent Massachusetts Integrated Report of Waters.

E. Stormwater drainage systems shall incorporate Low Impact Development (LID) techniques, where feasible.

F. No stormwater discharge (point or sheet flow) shall cause flooding or erosion on adjacent properties. Driveways, aprons, and other entrances to the street shall be constructed to prevent roadway drainage from entering the private property.

G. Work under this section shall comply with federal, state, and local requirements. All private and public stormwater management systems shall comply with the most current National Pollutant Discharge Elimination System (NPDES) requirements.

H. The Developer shall process and record permanent easements for communal drainage structures or BMPs located on private property.

I. Calculations and designs shall demonstrate compliance with the DEP Stormwater Management Standards. The specified design storms shall be defined as a 24-hour storm using the rainfall distribution recommended by the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, as amended.

I. Submittals required for stormwater projects include:

1. Designs and calculations showing: post-construction runoff will be equal to or less than pre-construction conditions, recharge, and pollutant removal.
2. Erosion and sediment control plan
3. As-built Plans
4. Recorded easements

5. Long-term operation and maintenance plan for all permanent stormwater management measures. Such a plan shall include non-structural and structural measures to manage stormwater after construction of the new or expanded facility. An approved long-term operations and maintenance plan for that stormwater system shall be recorded with the deed at the Massachusetts Registry of Deeds.

4.2 Erosion Control

A. All construction shall comply with the City's By-Laws/Ordinances regarding clearing, erosion control, and stormwater management. In addition, construction shall comply with any applicable federal and state requirements, including but not limited to National Pollutant Discharge Elimination System (NPDES) Construction General Permit.

B. Silt fencing may be used as one of the primary erosion control measures. Silt fence shall consist of a sheet of synthetic fabric such as polypropylene, nylon, polyester, or polyethylene yarn. Silt fence shall be erected in a continuous fashion from a single roll of fabric. The bottom of the fabric fence shall be buried sufficiently below the ground surface to prevent gaps from forming, usually 4 to 6 inches below ground surface. The fabric shall be installed on the upstream side of the stakes. Stakes shall be strong enough and tall enough to securely anchor the fabric to the ground. Stake spacing shall be no more than 10 feet apart for extra-strength fabric and 6 feet apart for standard strength fabric. Maintenance of the fence is required during construction. Material shall be based on the synthetic fabric requirements as follows:

1. Filtering efficiency: 75% (minimum)
2. Tensile strength: Standard strength: 30 lb./linear inch (minimum), Extra strength: 50 lb./linear inch (minimum)
3. Elongation: 20% (maximum)
4. Ultraviolet radiation: 90% (minimum)
5. Slurry flow rate: 0.3 gal/ft2/min (minimum)

C. Fiber rolls or an approved equal may be used as another primary erosion control measures. Fiber rolls shall be trenched between 3 and 5 inches into the ground, depending on the size of the fiber roll. Fiber rolls shall be staked securely into the ground using wood stakes. A minimum of 3 inches of the stake shall stick out above the roll. Stakes shall be spaced 3 to 4 feet. Fiber rolls placed around drain inlets shall be placed a minimum of one (1) foot back from the inlet.

For slope stabilization, fiber rolls shall be placed perpendicular to the expected flow of stormwater runoff, with the following separation:

1:1 slopes = 10 feet apart
2:1 slopes = 20 feet apart
3:1 slopes = 30 feet apart
4:1 slopes = 40 feet apart

D. Gravel aprons shall be installed at the entrance of construction sites or where new roads under construction are being connected to the public way to prevent sediment from the construction site entering the roadway. Aprons shall be a minimum of 25 feet in length and the width of the proposed street or at least 15 feet in width and filled with 6 inches of 2-inch crushed stone. Regular maintenance to remove trapped dirt and to replace stone shall be provided to keep the public way clean.

E. Silt sacks (or equivalent) shall be placed in down gradient catch basins to prevent sediment from entering the drainage system. Silt sacks shall be periodically cleaned while in use and must be cleaned prior to and after precipitation events. Contractors are advised they may be required to

respond immediately for repair and maintenance at the request of the City within two hours of notification.

F. All soil stockpiles to be in place for more than 14 days shall have erosion controls (e.g., fiber rolls) installed on the down gradient side to prevent migration of soils.

G. All erosion and sediment controls shall remain in effective operating condition during construction activities. The contractor shall inspect all erosion and sediment controls regularly and make the necessary repairs or modifications to ensure effectiveness or as directed by the City Inspector.

H. The contractor shall initiate soil stabilization measures immediately whenever earth-disturbing activities have permanently or temporarily ceased on any portion of the site. The contractor shall complete soil stabilization measures as soon as practicable, but no later than 14 calendar days after the initiation of soil stabilization measures.

4.3 Private Connections to City Drainage System

A. In general, discharge of groundwater or stormwater runoff from sources on private property to the City's drainage system or right-of-way is prohibited. This includes sump pumps, foundation drains, roof downspouts, and runoff from driveways and yards. However, when suitable alternatives do not exist, private drainage systems may be connected to the City drainage system with approval from the DPW.

B. New private stormwater management systems that connect to the City's drainage system shall be approved by DPW and shall be constructed, installed, maintained, repaired, and operated to the satisfaction of the DPW

C. Private drains, including building storm drains for new or existing buildings, groundwater sump drains, cellar drains, and drains from irrigation systems, shall not be connected directly to the City's sanitary sewer system. Illicit connections to the sanitary sewer system shall be removed by the property owner at their expense.

D. For redevelopment projects, existing connections to the City's system that will remain connected shall be video inspected to verify pipe condition and ensure integrity prior to approval of redevelopment plans. The inspection should be witnessed by DPW staff.

E. Proposed private connections must discharge to the City's drainage system by gravity. If the private stormwater system is lower than the City's system, stormwater shall be lifted by approved means to a structure on the private property prior to connecting to the City's MS4.

F. The City assumes no responsibility for the installation and maintenance of private connections or for any damage that may result from their failure or from water backflow from the City's drainage system. The owner is required to submit a waiver to this effect, signed and dated by the owner.

G. Private connections shall include a backflow preventer, cleanout, and a shutoff device in such places that all fittings are accessible to the municipality.

4.4 Drainage Piping

4.4.1 Pipe Material

4.4.1.1 PVC

A. Polyvinyl chloride (PVC) pipe shall not be used in drainage systems within the City right-of-way or other roadways, except for underdrains.

B. The DPW prefers headwalls to pipe ends for most drainage conditions. Designs for pipe ends shall be submitted for approval by the DPW.

C. Minimum inside drainage pipe diameter – 12 inches

D. Outfall protection (e.g. headwalls, riprap) shall be constructed at the open ends of any drainage pipes.

4.4.1.2 High Density Polyethylene (HDPE) Pipe

A. The DPW prefers HDPE for drainage piping.

B. The pipe shall conform to MassDOT Section M5.03.10. Pipe shall be smooth interior wall and corrugated exterior wall, and be water-tight. Pipe shall be minimum 12-inch diameter. Ends shall be bell-and-spigot unless approved by the DPW for the specific application. Pipe shall comply with the requirements for test methods, dimensions and markings found in AASHTO Designations M252 and M294. Pipe shall support an HS-20 live load with a maximum deflection of 5% of the minimum pipe diameter. Pipe and fittings shall be made from virgin polyethylene compounds which conform to the applicable current edition of the AASHTO Material Specifications for cell classification as defined and described in ASTM D3350. Nominal sizes of 12- to 60-inch shall be either AASHTO Type 'S' or Type 'D.'

C. Flared end HDPE sections shall conform to MassDOT Section M5.03.10. They shall also meet AASHTO Designations M252 and M294 as well as cell specifications in ASTM D3350.

4.4.1.3 Reinforced Concrete Pipe (RCP)

A. Pipe and flared ends shall conform to the AASHTO M170 for Standard Strength Reinforced Concrete Culvert Pipe for class III Pipe, Wall B. or ASTM C76 for Reinforced Concrete Culvert and Storm Drain Pipe. All pipe 24 inches in diameter or smaller shall be of the bell and spigot type. Pipes larger than 24 inches in diameter shall be tongue and groove or bell and spigot. A preformed flexible plastic sealing compound of Butyl Mastic Rope Sealer ” 1" size, "EZ Stick" as manufactured by Concrete Products supply or an approved equal shall be used for sealing water-tight joints.

B. Flared end RCP sections shall be fabricated to conform to the requirements of AASHTO M170, Class III except the edge bearing tests shall not be required. The flare shall be of the same thickness and materials as the barrel and shall have steel reinforcement equaling or exceeding the requirements of AASHTO M170, Class III except that a double row of steel will not be required. The end sections shall meet MassDOT Standard Specifications Section 230 and MassDOT Construction and Traffic Standard Details Drawing 206.8.0.

4.4.2 Pipe Laying

A. Pipe, manholes, catch basins, and leaching basins shall be laid in any of the following materials, as specified hereafter or as approved by the inspector.

1. Pea stone (3/8 inch in size)
2. Angular crushed stone or rock, dense or open graded with little or no fines (¼ inch to 1 ½ inches in size).
3. AASHTO classifications A1 and A3: Clean, coarse grained materials, such as gravel, coarse sands and gravel/sand mixtures (1 ½ inches maximum in size).
4. AASHTO classifications A-2-4 and A-2-5: Coarse grained materials with fines including silty or clayey gravels or sands. Gravel or sand must comprise more than 50 percent of Class III materials (1 ½ inches maximum size).

5. Reuse of approved native material shall be sifted to remove rocks larger than 3 inches.

B. Pipe bedding material shall be carefully and lightly tamped under pipe to provide uniform support. Fill to a minimum depth of 12 inches above the top of the pipe. Material for backfilling the rest of the trench, except for sub base (top 15 inches) shall be suitable material, approved by the DPW Inspector. The compaction process shall be material placed in 12-inch lifts and thoroughly compacted by mechanical rammers, vibrators, or other methods to be approved by the Department (e.g., hydraulic plate compactors) to 90 percent Modified Proctor density in off-road or nonstructural areas and 95% in roadway or structural areas. Haunching large-diameter pipes (greater than 30 inches) shall be performed using maximum 8-inch lifts and compacted to 90 percent standard proctor density. Bucket compaction will not be accepted.

C. Minimum Drain Pipe Grades

1. Main lines and cross runs – grades 1% minimum
2. Building storm drainage stubs – 1% minimum
3. Subdrain – 0.5% minimum
4. All other – 0.5% minimum.
5. Any slope greater than 8% requires Department approval.

D. The bottom of the trench shall be excavated to a flat grade 6 inches below the pipe invert for trenches in suitable earth and 12 inches below pipe invert for trenches in rock. When rock or ledge is encountered it shall be removed to such widths as will give a clearance of at least 12 inches on each side of the pipe or other structure and a sand cushion used. The width of trenches shall be sufficient to allow thorough compacting of the refill adjacent to the lower quarters of the pipe

E. Water tight joints shall be used. Pipe shall be watertight according to the ASTM D3212. Joint design shall be bell-and-spigot with an elastomeric rubber gasket meeting ASTM F477 or equal approved by the DPW Inspector.

F. Trenches at pipe joints shall be excavated as necessary to give ample room for properly making and inspecting the pipe joints. RCP joints shall be cement mortared (as specified in MassDOT Section M4.02) carefully placed in the joints around its entire perimeter and mixed relatively dry, in the ratio of one part cement to two parts sand.

G. When laying pipe in groundwater, pipe material and method of installation shall be approved by the DPW Inspector. A qualified engineer shall be consulted to determine dewatering methods, if needed. Water must not be permitted to rise in the trench until all pipes have been securely bedded, jointed and observed by the City and until backfilling has progressed to an elevation at least one foot above the top of the pipe. Temporary plugs shall be installed in open ends of pipe to prevent silt from washing into pipe during construction; and open ends of the pipe shall be closed with suitable plugs upon suspension of the work for any reason.

H. The minimum cover over drainage pipes shall be 3 feet below the pavement slab or as specified by the type of pipe per manufacturer's specifications, whichever is greater. Where the clearance is less than 1 foot below the pavement, provide a design method to maintain the integrity of the pipe and right of way. For drainage pipe outside of the pavement, the minimum cover shall be 18 inches or as specified by the type of pipe, whichever is greater.

I. Pipe ends shall be accurately aligned on compacted gravel fill unless otherwise approved by the DPW. Rip Rap stone shall be placed to line and grade as shown on the plans on a prepared bed of embankment material or existing materials. Each stone shall be placed or embedded to prevent erosion and displacement. Stone size shall be determined by the design storm flow discharging from the pipe.

J. Drainage pipe shall be installed with minimum distance from water pipes as summarized below.

1. *Horizontal Separation:* Drainage mains shall be located at least 5 feet horizontally from sewer mains. The distance shall be measured from inside edge of pipe.
2. *Vertical Separation:* Drainage mains shall be laid to provide a separation of at least 18 inches from either water or sewer lines. The minimum vertical separation is measured from outside of water or sewer main to outside of the storm drain main.
3. At crossings, sewer should cross under drainage lines.
4. When it is impossible to obtain horizontal and/or vertical separation as stipulated above, DPW shall be given the opportunity to review and provide more stringent requirements.

4.5 Drainage Manholes

A. Drainage manholes shall have a minimum inside diameter of 4 feet minimum. Manholes over 12 feet in depth shall have minimum of 5 feet inside diameter.

B. A drainage manhole shall be located at any change in direction or slope of a drain pipe. A drainage manhole will be constructed at private connections to the City's drainage system, unless otherwise approved by DPW.

C. Manholes shall be constructed in series and shall have a distance of no more than 250 feet between manholes, unless otherwise approved by DPW.

D. Cross-drain inverts should, where possible, enter the structure a minimum of one foot (1') above the outgoing invert.

E. When drop manholes are used the drop shall not be more than 3 ½ feet.

F. Contractor shall excavate to a depth of 12 inches below the bottom of and all around the proposed manhole, compact and fine grade and install washed screened gravel as a sub-base material. Pipes shall extend no more than 3 inches inside the interior wall and all openings around pipe entrances and lift holes shall be thoroughly grouted with non-shrink grout prior to back filling. Compaction process shall be the same manner as compaction around pipe.

G. When ground water is higher than the elevation of the bottom of the manhole, ¾-inch to 1-inch washed stone shall be placed around structure to a distance of at least half-way up the barrel of the highest pipe. The manhole shall be tested for tightness prior to backfill and approval.

H. Precast Manholes shall be constructed of reinforced precast concrete monolithic base section, barrel section and dome section meeting the latest applicable requirements of ASTM C478 I and AASHTO M 199, or latest revision thereto. Special manholes shall also meet the requirements of MassDOT Standard Specifications, Section M4.02.14, Precast Units. After curing a minimum of 14 days, the outside surface of the tapered or cone section of precast cement concrete drainage structures shall be dried and cleaned. Pre-cast manholes shall not have steps installed.

I. Constructed in Place Manholes shall be built of precast sump, 6-inch concrete barrel blocks, and 4-inch (pie) plates with an inside diameter of 4 feet. Such manholes shall have a solid (impenetrable) sump. Cement concrete blocks shall conform to ASTM C139. As circular concrete block walls are laid, the horizontal joints and key ways shall be flush full with mortar. As rectangular blocks are laid, all horizontal and vertical joints shall be flushed full with mortar.

J. All joints between the frame, grade rings, dome, barrels and base shall be set in place with non-shrink mortar. Inside the manhole, all joints where the sealing material is not flush with the inside wall shall be grouted with nonshrink mortar and finished by hand / wet-brushed. Tongue and groove sections between barrel sections shall be mortared or use butyl rubber sealants.

K. Risers shall be brick, not concrete blocks. Risers shall be clay or shale brick, and shall conform to the requirements of AASHTO M 91, Grade MM or as specified in MassDOT M4.05.

L. Grade adjustments shall be made using either precast grade rings/risers or clay/shale bricks.

M. Live load design shall be H-20 loading.

N. Manhole frames and covers

1. Manhole frames and covers shall be minimum Class 25 conforming to ASTM “Standard Specification for Gray Iron Castings,” Designation: A48. Manhole frame shall have a clear opening of 26 inches and be a minimum of 6 inches in height.
2. The surface of the cover shall have a diamond pattern with the words "FRAMINGHAM DRAIN" if in the public right-of-way or “DRAIN” if on private property cast thereon for drainage manholes.
3. All manholes frames and covers shall be manufactured by East Jordan Iron Works (formerly LeBaron Foundry Co.) or an approved equal.
4. Manhole covers shall be watertight when placed in the 100-year flood plain, wetland areas, cross country easements, or as determined by DPW, and as specified in federal, state and local regulations. Manhole frames shall be set on a grout pad to make a watertight fit. Watertight manhole covers shall be secured with four (4) stainless steel bolts and have a watertight gasket. The frame and cover shall be watertight up to 15 psig external pressure.

N. The tops of frames and covers shall be set 1/8 inch below finish grade pavement in the street. Final grade locations for installations outside of the paved roadway shall be as approved by the DPW Inspector.

O. Frames shall be set upon a full bed of mortar, and mortar shall be brought up alongside of frame to provide a water-tight joint.

4.6 Catch Basins

A. Catch basins shall be installed on both sides of the roadway, at low points in the roadway, and near the upper point of curvature of the curb roundings of intersecting streets. Catch basins shall not be installed in the roadway within driveway entrances.

B. Catch basins shall be located so that the maximum distance which water will have to flow over the surface shall not be greater than 250 feet.

C. Catch basins shall be connected to manholes and not to other catch basins. Chain basins are prohibited.

D. All basins shall have a sump of at least 48 inches (4 feet) below the invert of the outlet pipe, or otherwise approved by the DPW, and an inside diameter of 4 feet minimum.

E. Contractor shall excavate to a depth of 12 inches below the bottom of and all around the proposed catch basin base, compact and fine grade and install washed screened gravel as a sub-base material. Pipes shall extend no more than 3 inches inside the interior wall and all openings around pipe entrances and lift holes shall be thoroughly grouted with non-shrink grout prior to back filling. Compaction process shall be the same manner as compaction around pipe.

F. When ground water is higher than the elevation of the bottom of catch basins, ¾-inch to 1-inch washed stone shall be placed 2 feet all around structure to a distance of the high ground water elevation. The stone shall be placed against and over the end of the pipe opening to prevent entrance of the finer filling material. The catch basin shall be tested for tightness prior to backfill and approval.

G. Precast Catch Basins shall conform to ASTM C478 and AASHTO M 199, or latest revision thereto. Live load design shall be H-20 loading. Catch basins which are limited by height shall be installed with a flat top slab, cast in place, designed for H-20 loading and cast iron frame cast in place.

H. Constructed in place catch basins shall be constructed of a precast sump, 6-inch cement block and 4-inch (pie) plates that conform to ASTM C139. Live load design shall be HS-25 loading.

I. Drop (aka Direct) inlet catch basins may be connected to standard catch basins. They shall not be connected to drainage manholes unless otherwise approved by DPW.

J. Circular concrete block walls are laid up the horizontal and key ways shall be flush full with mortar above the outlet invert. The dome or cone section shall be constructed in the same manner. The opening between the plates shall be filled with washed, screened gravel and left open. A 24-inch opening shall be left open at the top for a frame and grate.

K. Grade adjustments shall be made using either precast grade rings/risers or clay/shale bricks.

L. Catch basin grates shall be 24-inch square grate with an 8-inch heavy duty frame, East Jordan Iron Works (formerly LeBaron Foundry Co.), LF248-2-4F. Single or dual catch basin grate shall consist of a 24-inch square grate LeBaron Foundry Co. L24SG1-000 or approved equal with an 8-inch heavy duty frame (MassDOT Standard).

M. Grates shall have the following wording cast into the outside borders: "Dump No Waste" and "Drains to Waterway". Text shall be bold capital letters, at least 1 inch high. Placement may be as per manufacturer

N. All catch basins that do not have a flat top slab designed for H-20 loading and cast iron frame cast in place shall be installed using blocks to make a square hole that will accept a frame and grate, and there shall be at least two full courses of brick for frame adjustment.

O. The tops of frames and covers shall be set 1/8 inch below finish grade pavement in the street. Final grade locations for installations outside of the paved roadway shall be as approved by the DPW Inspector.

P. Frames shall be set upon a full bed of mortar, and mortar shall be brought up alongside of frame to provide a water-tight joint.

4.7 Granite Curb Inlets (Throat Stones)

A. Granite Curb Inlets shall be installed at all catch basins. Granite curb and inlets shall be constructed in conformance with MassDOT Standard Specification Section 501, except that cement concrete shall be placed beneath the center section of each curbstone and as backfill in front and behind the curb.

B. The back face for a distance of 3 inches down from the top shall have no projections greater than 1 inch. The front shall be straight split, free from drill holes, and shall have no projection greater than 1 inch or depression greater than 1/2 inch for a distance of 10 inches down from the top. For the remaining distance there shall be no depression or projection greater than 1 inch. The ends shall be squared with the top for the depth of the face finish. The granite curb inlet shall be 6 feet in length, plus or minus 1/2 inch from 17 to 19 inches in depth, 6 inches wide at the top and at least 6 inches wide at the bottom. The reveal shall be 10 inches.

C. Curb inlets set on a radius of 160 feet or less shall be cut to that radius. The gutter mouth at least 3 inches in depth and at least 2 feet in length shall be cut in the front face of the stone. If there is no other curbing, or as applicable, transitional curbing shall be required on both sides of the inlet. The transitional curbing shall be 6 feet in length, with a height equal to the inlet and tapering to grade at the end.

4.8 Drainage Swales

A. Drainage swales shall be stabilized with vegetation or rip rap to prevent erosion.

B. Drainage swales shall be designed to convey the 2-year and 10-year 24-hour storms.

C. The maximum depth of a swale shall be 24 inches. Side slopes shall be no steeper than 3:1 (horizontal: vertical) with a minimum grade of 0.5 percent and maximum grade of 5%. The minimum bottom width for a swale, whether earthen, gravel, or paved is 2 feet.

D. The bottom of the drainage swale shall be at least 3 feet above seasonal high water table or bedrock.

E. The use of swales draining across a sidewalk into the gutter is generally unacceptable. In those cases where necessary, DPW approval shall be required for the design.

4.9 Structural Stormwater BMPs

A. Post-construction structural Best Management Practices (BMPs) shall follow design practices outlined in Volume 2 of the Massachusetts Department of Environmental Protection (DEP) Stormwater Management Standards: "Structural BMP Specifications for the Massachusetts Stormwater Handbook". Stormwater BMPs shall be built in accordance with approved plans and manufacturer's specifications.

B. This document contains standards for some BMPs. The inclusion of these standards is not meant to be an exhaustive listing of approved BMPs. The *Massachusetts Stormwater Handbook* shall be considered as a guide for other BMPs.

C. In accordance with MS4 permit requirements, all stormwater management systems for new development must be designed to:

1. Retain the volume of runoff equivalent to, or greater than, one (1.0) inch multiplied by the total post-construction impervious surface area on the site OR

2. Remove 90% of the average annual load of Total Suspended Solids (TSS) generated from the total post-construction impervious area on the site AND 60% of the average annual load of Total Phosphorus (TP) generated from the total post-construction impervious surface area on the site. Pollutant removal shall be calculated consistent with EPA Region 1's BMP Accounting and Tracking Tool (2016) or other BMP performance evaluation tool provided by EPA Region 1, where available. If EPA Region 1 tools do not address the planned or installed BMP performance any federally or State approved BMP design guidance or performance standards (e.g. State stormwater handbooks and design guidance manuals) may be used to calculate BMP performance, OR

3. meeting a combination of retention and treatment that achieves the above standards.

D. In accordance with MS4 permit requirements, all stormwater management systems for redevelopment must be designed to:

1. Retain the volume of runoff equivalent to, or greater than, 0.8 inch multiplied by the total post-construction impervious surface area on the site OR

2. Remove 80% of the average annual load of Total Suspended Solids (TSS) generated from the total post-construction impervious area on the site AND 50% of the average annual load of Total Phosphorus (TP) generated from the total post-construction impervious surface area on the site. Pollutant removal shall be calculated consistent with EPA Region 1's BMP Accounting and Tracking Tool (2016) or other BMP performance evaluation tool provided by EPA Region 1, where available. If EPA Region 1 tools do not address the planned or installed

BMP performance any federally or State approved BMP design guidance or performance standards (e.g. State stormwater handbooks and design guidance manuals) may be used to calculate BMP performance.

a. Redevelopment activities that are exclusively limited to maintenance and improvement of existing roadways, (including widening less than a single lane, adding shoulders, correcting substandard intersections, improving existing drainage systems, and repaving projects) shall improve existing conditions where feasible and are exempt from part l above. Roadway widening or improvements that increase the amount of impervious area on the redevelopment site by greater than or equal to a single lane width shall meet these requirements.

E. Areas excavated for stormwater BMPs shall be backfilled with clean fill or aggregate.

F. An appropriate number of observation and access points shall be installed to enable inspections and maintenance.

4.9.1 Proprietary Separators

A. If constructed in the public right-of-way, the City has standardized on Stormceptor hydrodynamic separators or approved equal.

4.9.2 Infiltration BMPs

A. Infiltration BMPs are stormwater runoff impoundment constructed on or beneath the surface over permeable soils. Examples include: dry wells, infiltration pits, chambers, perforated pipes, and galleys. Infiltration systems shall be designed and constructed in accordance with The Massachusetts Stormwater Handbook and the EPA NPDES Small MS4 permit.

B. Pretreatment BMPs shall remove at least 25% TSS. In the following areas, at least 44% TSS shall be removed:

1. Areas with rapid infiltration (greater than 2.4 inches/hour);
2. Land use with a higher potential pollutant loads (LUHPPL);
3. Zone II or an Interim Wellhead Protection Area of a Public Drinking Water Source/Supply;
4. Discharge to or near a critical area (Outstanding Resource Waters or bathing beaches).

C. Infiltration systems shall be designed to treat the runoff volume generated by the 2-year and 10-year 24-hour storms.

D. The bottom of the infiltration system shall be at least 3 feet above seasonal high water table or bedrock.

E. Infiltration systems shall be placed only in soil where the permeability allows a percolation rate of at least 0.17 inch/hour. Percolation rates shall be field verified prior to completion of design, when feasible. Do not allow construction equipment to drive across the area intended to be used for infiltration.

F. The infiltration system shall be designed to drain within three days of filling under normal conditions, and completely dewater between storms.

G. Infiltration systems shall be placed at least 10 feet downslope or 100 feet upslope from any building foundations including slab foundations without basements. Systems shall be placed at least 10 feet from property lines.

H. Infiltration systems shall not be used in the following locations:

1. In industrial and commercial areas where petroleum products, herbicides, pesticides, or solvents may be loaded/unloaded, stored, or applied within the drainage area, especially locations with soluble heavy metals and toxic organics in the runoff;

2. In areas with documented soil contamination;
3. Where the soil around and below infiltration basin does not have the necessary permeability to infiltrate the entire Stormwater Quality Design Storm runoff volume; or
4. Where infiltration would create a significant risk for basement seepage or adversely impact a septic system's disposal field.

4.10 Testing of Drainage System

A. At the discretion of the Department, a mandrel test shall be conducted following completion of pipe laying.

B. Placement of curb, gutter, sidewalk, or asphalt concrete pavement shall not occur until the DPW Inspector has approved the mandrel test. The DPW Inspector shall be present through the duration of the mandrel testing.

C. The allowable deflection (reduction in vertical inside diameter) for all non-rigid pipe shall be 7.5 percent maximum. The deflection shall be tested by pulling a mandrel which is 92.5 percent of the inside pipe diameter through all installed pipe. The mandrel shall be the "go/no-go" type and shall be pulled without mechanical assistance. At each location in which the mandrel cannot pass, the cause shall be ascertained. Obstacles in the pipe shall be removed. If it is determined that the deflection exceeds 7.5 percent, that a gasket has been improperly installed or that the pipe has been damaged due to trenching for another utility, the respective section of pipe shall be re-bedded or removed, replaced and re-bedded using water tight repair couplings. A passing mandrel retest is required. At the contractor's discretion, any sections of non-rigid pipe not passing the mandrel test may be televised to ascertain the problem.

D. A CCTV inspection may be requested after installation, with the results being provided to the DPW.

4.11 Pipe/Structure Abandonment

A. Pipes left in place that are equal to or less than 6 inches in diameter may be left unfilled.

B. Pipes left in place that are greater than 6 inches in diameter shall be filled with LDCC.

C. Structures left in place shall be demolished down to five feet below ground surface, the bottom shall be cracked and compacted, and the remaining structure filled with CDF, LDCC, or clean gravel, as directed the City Inspector. Demolition debris shall be removed, and the area regraded and compacted over the filled structure.

4.12 Long-term Maintenance

A. Private stormwater management systems will be constructed, installed, maintained, repaired, and operated by their owners, at the owner's expense. Ongoing maintenance of stormwater management systems placed on private property, rather than within the City right-of-way limits, shall be responsibility of the property owner or homeowners' association.

B. The owner of any property on which a drainage system is located is responsible for the maintenance and upkeep of the system. The inspection and maintenance of the drainage systems shall be performed at minimum on an annual basis, and more frequently depending on the circumstances.

C. The owner shall provide documents that describe the long-term operation and maintenance of all permanent stormwater management measures. Such a plan shall include non-structural and structural measures to manage stormwater after construction of the new or expanded facility. An approved long-term operations and maintenance plan for that stormwater system shall be recorded with the deed at the Massachusetts Registry of Deeds.

5 Roadway Construction Standards

5.1 General

A. This Section specifies requirements for a roadway design and construction.

B. For the purposes of these Standards, streets shall be classified as Local, Collector and Arterial. These classifications are shown in the City Subdivision Rules and Regulations as Residential Access, Residential Subcollector and Primary.

C. Street design minimum standards for Primary Streets shall conform to the best accepted design practice as recommended by the Institute of Traffic Engineer's Street and Highway Design Manual and the MassDOT Project Development and Design Guide, in consultation with the DPW.

D. Pavement shall be designed to provide a 20-year life based on soil and traffic conditions. The pavement cross section shall be approved by the City Engineer.

E. Nothing shall not interfere with the sight distance of the traveled way.

F. These construction standards need to be met as conditions for acceptance of streets.

A. As-Built Drawings shall be submitted to the DPW upon completion and acceptance of work.

5.2 Roadways

5.2.1 Design

A. Location, alignment, and street design minimum standards for Residential Subcollector and Residential Access shall conform to the requirements contained in the current edition of the City of Framingham Subdivision Regulations and the following Street Design Minimum Standards.

Street Design Minimum Standards

Characteristic	Street	
	Residential Subcollector	**Residential Access**
Maximum Grade	6%	8%
Minimum Grade	1%	1%
Maximum Grade of leveling area at approach of Intersections (negative grade required)	2% for 100 feet	2% for 50 feet
Horizontal Alignment: • Minimum radius at centerline	500 feet	200 feet
Vertical Alignment: • K - Value	30 feet per percent Change in grade, 100 feet min.	25 feet per percent Change in grade, 100 feet min.
Width in all Zoning Districts except R-4: • Street width (see note 2 below) • Roadway width	60 feet 28 feet	60 feet 24 feet
Width in all Zoning Districts R-4: • Street width (see note 2 below) • Roadway width	80 feet 26 feet	70 feet 24 feet
Intersections • Minimum intersection angle	70 degrees	70 degrees

• Minimum distance between entering streets not Directly opposite each other	275 feet	275 feet
Minimum radius:	25 feet	20 feet
○ Street sideline	32 feet	27 feet
○ Curb radius	See note 1 below	See note 1below
• Stopping Sight Distance		
Sidewalk Width	5 feet	5 feet
Dead-End Streets		
• Maximum length		500 feet
• Minimum length		225 feet
• Maximum radius of Cul-De-Sac:		
○ Street Sideline Radius		70 feet
• Minimum radius of Cul-De-Sac:		
○ Street Sideline Radius		60 feet
○ Curb Radius		45 feet
○ Island Radius		20 feet

Note1. Stopping sight distance, measured 25 feet from the edge of the intersection traveled way, shall be provided. The stopping sight distance requirement shall be calculated using a hypothetical travel speed that is 10 m.p.h greater than the posted or designed speed. A clear sight distance at 3.75 feet above pavement to 0.5 feet above pavement shall be maintained. Landscaping, fencing and other structures may not be sited where they could obstruct the required sight distances or could otherwise jeopardize safety.

Note 2. Right-of-way widths in excess of the standard street widths designated in Table 1, above, shall be required where, due to topography, additional width is necessary to provide adequate earth slopes. Such slopes shall not be in excess of four-to-one.

B. Property lines at residential street intersections shall be rounded or cut back to provide for a radius of at least 7 feet less than the curb radius.

C. The maximum grade for cul-de-sacs shall be four percent (4%).

D. The minimum pavement cross section shall be:

1. Local Streets: 1.5 inches of Top Course material placed on 2.5 inches of Binder Course material founded on 4 inches of Dense Graded Crushed Stone on 8 inches of Processed Gravel or Dense Graded Crushed Stone. This pavement structure shall be placed on the backfill.

2. Collector Streets: 2 inches of Top Course material placed on 4 inches of Binder Course material placed in two equal courses founded on 4 inches of Dense Graded Crushed Stone on 8 inches of Processed Gravel or Dense Graded Crushed Stone, with at least 4 inches of natural subbase.

3. Arterial Streets: 3 inches Modified Top Course material placed in two courses on one 5-inch course of Binder Course material founded on 4 inches of Dense Graded Crushed Stone on 8 inches of Processed Gravel or Dense Graded Crushed Stone with at least 4 inches of natural subbase.

5.2.2 Clearing (including excavating or stripping poor material)

A. All vegetation and debris shall be removed within the Right of Way unless specified by the DPW to remain. Then all muck (peat) and topsoil shall be entirely removed from the Right of Way. All material that does not conform to Special Borrow (MassDOT Standard Spec. M1.02.0) shall be removed to a depth of 16 inches below finish grade. No utilities shall be installed until this requirement is completed.

5.2.3 Subgrade

A. All fill areas within 4 feet of the proposed subgrade shall be filled with Special Borrow except it shall contain no stone larger than 6 inches in greatest dimension and shall be placed and compacted in layers not exceeding 12 inches in depth, compacted measurement.

1. Special borrow for fill shall conform to MassDOT Standard Spec. M1.02.0.
2. Processed gravel for subbase shall conform to MassDOT Standard Spec. M1.03.1.
3. Gravel borrow shall conform to MassDOT Standard Spec. M1.03.0, Type b.
4. Washed crushed stone for subbase shall range in size from ¾ inch to 1½ inch, conforming to MassDOT Standard Spec. M2.01.4 to M2.01.2 and shall be hard, durable and reasonably free from flat or laminated particles to furnish free draining material.

B. All cut areas shall be excavated to16 to 20 inches below finish grade, unless the material meets the standard for Gravel Borrow. Fill areas with a depth 4 feet or greater shall be filled with Special Borrow. All filled areas shall be rough graded and compacted to not less than 95 percent of the maximum dry density of the material as determined by the Standard AASHTO Test Designation T 99, Compaction Test Method C at optimum moisture content.

C. The subgrade shall be shaped to a true surface conforming to the proposed cross section of the roadway and compacted in accordance with the procedure stated above. All depressions and high spots shall be filled with special borrow or removed and compacted until smooth and satisfactorily compacted. A tolerance of 1/2 inch above or below the finish subgrade will be allowed provided that 1/2 inch above or below grade is not maintained for a distance longer than 50 feet and that the required grade is maintained in the subgrade. Any portion of the subgrade which is not accessible to a roller shall be compacted with mechanical tampers. The DPW shall approve subgrade construction before sub-base material and pavement is applied.

D. Before the gravel is spread, the subgrade shall be prepared as noted above and shaped to a true surface conforming to the proposed profile and cross section of the road. Gravel shall be spread and rolled true to lines and grades with an approved three-wheel roller or approved equal, weighing not less than ten (10) tons to yield an 8-inch depth after rolling. All sub-base layers shall be compacted to not less than ninety-five (95) percent of the maximum dry density of the material as determined by the Standard AASHTO T99 compaction test: method C at optimum moisture content. Any depression that appears during or after rolling shall be filled with gravel borrow or dense-graded crushed stone and compact until the surface is true and even. When required by the DPW, samples of the gravel to be used shall be tested for gradation by a sieve analysis and the compacted gravel shall be tested for compaction. All tests shall be paid for by the Contractor.

E. Dense graded crushed stone shall be placed and compacted to produce a 4-inch layer on top of the gravel sub-base in conformance with MassDOT Standard Spec. Section 402. Dense graded crushed stone for subbase shall conform to MassDOT Standard Spec. M2.01.7.

5.2.4 Pavement

A. Hot Mix Asphalt (HMA) shall conform to MassDOT Standard Section M 3.11.00.

B. Superpave shall conform to MassDOT Document 00717

C. The binder course material shall be applied to the prepared sub-base with a 3/8-inch pitch per foot from crown to gutter line. Tack coat shall be required between the binder course and top course as specified in the MassDOT Standard Sections 460 and M3.11.06. Hot Mix Asphalt placement shall conform to MassDOT Standard Section 460.

D. Pavement shall not be placed on frozen material or when weather conditions predict freezing temperatures. When binder course will be left over winter months, all castings shall be set to surface grade of the binder course of asphalt for the winter season and then reset before the top course of pavement is applied. No permanent asphalt pavement shall be laid after November 15th or before April 1st, unless approved by the DPW.

E. The setting of granite curbing, the installation of utilities, and any other construction that is required in a street shall be completed before the finish course of bituminous concrete is laid

5.2.5 Pavement Markings

A. To match existing pavement marking applications, pavement markings shall be white or yellow reflectorized thermoplastic, epoxy, or other matching material conforming to MassDOT Standard M7.01. For existing pavement marking applications, pavement markings shall be placed in conformance with MassDOT Standard Section 860

B. For all new roadway construction, pavement markings shall be white or yellow reflectorized epoxy pavement markings conforming to MassDOT Engineering Directive E-05-003, dated June 16, 2005 and to MassDOT Standard Section 860. New pavement markings shall be placed in conformance with MassDOT Engineering Directive E-05-003, dated June 16, 2005.

C. Traffic markings must be restored by end of day, either after removal or paving. Temporary markings are allowed.

5.2.6 Curbing

A. Curbing shall be installed in the gutter line of all proposed roadways. Curbing shall be set with a 7-inch reveal.

B. If constructed in the public right-of-way, the City has standardized on granite curbing. Granite curbing and inlets shall be type VA-4, conforming to the requirements of MassDOT Standard Specifications.

C. HMA or Bituminous Berm may be used as approved by the DPW. Hot mix asphalt (HMA) curbing shall be type 1, 2, or 3, conforming to the requirements of MassDOT Standard 106.2.0. HMA Berm shall conform to MassDOT Standard Section M3.11.0. HMA Curb shall conform to MassDOT Standard Section M3.12.0. Bituminous Berm shall conform to MassDOT Standard Section 470. Bituminous Curb shall conform to MassDOT Standard Section 501.

5.3 Driveways

A. Driveways and private entrances shall be designed, permitted and constructed to conform to City of Framingham Bylaw (Article VI, Section 8) and MassDOT standards. A plan stamped by a licensed professional engineer is required for commercial and industrial development. The engineer's plan must include calculated safe sight distances in each direction. Construction cannot begin until the plan is approved by the City Engineer.

B. Residential driveways (not on scenic roads) shall have a minimum width of 12 feet and a maximum width of 20 feet.

C. Driveway aprons and other sidewalk areas where vehicular traffic may reasonably be expected to occur shall be laid in one course, 6 inches thick, and shall be constructed to the same specifications as sidewalks and meet the proposed sidewalk grades.

D. Driveways shall be located a minimum of 25 feet from any intersecting street corner radius.

5.4 Guard Rail

A. Guard Rail shall be COR-TEN® with steel or wood posts in conformance with MassDOT Standard M8.07.0. Guard Rail shall be constructed in conformance with MassDOT Standard Section 601. See Construction Details for requirements.

5.5 Signs

A. Proposed sign locations shall be staked in the field for review and approval by the City prior to installation.

B. Street signs shall use only upper-case white letters with a blue background. Sign dimensions, material, colors, text and post height shall conform to the latest version of the MUTCD.

C. Traffic signs shall be reflectorized aluminum in conformance with MassDOT Standard Sections 828 and M9.30.0.

D. Traffic signs shall not be screen printed, with the exception of STOP, YIELD, and DO NOT ENTER signs. All should be of a vandal / graffiti proof type.

E. Sign orientation to roadway shall follow the latest version of the MUTCD.

5.6 Sidewalks

A. Sidewalks shall be a minimum width of five (5) feet.

B. Portland Cement Concrete for sidewalks shall conform to the applicable requirements of Section M4 and Section 701 of the MassDOT Standard Specifications. FIBERMESH fibers (100% virgin polypropylene, collated, fibrillated fibers) at a rate of 1.5 lb. per cubic yard of concrete shall be added for reinforcement. Installation shall be per manufacturer's recommendations.

C. Concrete shall be installed on an 8-inch gravel sub-base prepared in the same manner as for the traveled way with a minimum width of five feet six inches (5'6"). Satisfactory forms shall be installed to assist in securing proper alignment. The concrete walk surface shall be laid in one course to a finished depth of 4 inches. The walk shall have a cross slope of 1.5 percent toward the roadway to provide proper drainage.

D. Testing of grade shall be done with a 10-foot straight edge placed parallel to the center line of the course; there shall be no deviation from a true surface in excess 1/4 of an inch.

E. Sidewalks shall be broom finished prior to scoring. The sidewalk slab shall be scored to form 5-foot panels. Traverse preformed expansion joints shall be installed at 30-foot intervals.

F. Wheelchair ramps shall be 6 inches thick and shall be installed in strict compliance with the current AAB/ADA Rules and Standards. Wheelchair Ramps and brick red Detectable Warning Panels shall be installed in accordance with the "Rules and Regulations of the Architectural Access Board – 521 CMR."

G. Truncated dome warning panels shall be brick red in color.

5.7 Loam and Seed

A. Side slopes shall be constructed at a maximum slope of 4 feet horizontally to 1 foot vertically (4:1) from the edge of the street side lines to the existing ground surface. Slopes shall be covered with loam, 6 inches in compacted depth, and fertilized, limed and seeded.

B. The loam grassed areas shall be 6 inches thick. Fertilizer shall be applied to the loam at a rate of 0.2 pounds per square yard and worked into the seed bed with an application of lime, if needed to

achieve the required pH range. As soon as the seed is sown, it shall be covered with a thin layer of loam, rolled and watered. The grass strip shall be seeded at the rate of 3.6 pounds per 100 square yards. Grass shall grow to a satisfactory cover before being accepted by the City.

C. In locations where erosion is possible, erosion controls shall be in place until the vegetation has substantially rooted. Erosion, gullies and other damage will need to be reseeded as necessary until an adequate growth of grass is achieved

D. Loam Borrow shall conform to MassDOT Standard Spec. M1.05.0 or shall be the product of a commercial sand and gravel processing facility. It shall be uncontaminated by saltwater, foreign matter, or substances harmful to plant growth. The acidity range of the Loam Borrow shall be pH 5.5 to 7.0.

E. Fertilizer shall be of a 10-6-4 composition.

F. Seed composition shall be 60% Red Fescue, 20% Red Top, 20% Kentucky Blue. Seed shall be of the previous year's crop and in no case shall the weed seed content exceed 1% by weight.

5.8 Granite Bounds and Monuments

A. All existing roadway monumentation shall be inventoried and protected. Any and all proposed impacts shall be brought to the attention of the Engineering Division immediately.

B. The Engineering Division shall be notified immediately if any survey monuments are uncovered, exposed or damaged.

C. Bounds shall conform to MassDOT Standard Spec.M9/04.8. They shall be 4 feet in length. Granite bounds shall be of sound granite, the top and bottom faces parallel and the front and back shall be straight split. The bounds shall be cut to the dimensions shown on the detail and shall be plain or lettered as indicated on the plans or as directed. The stone shall be pointed on the top and on four sides and for a distance of not less than 6 inches below the top. The top shall be 6 inches square and shall have a drill hole in the center 1.5 inch in depth and 0.5 inch in diameter, with the bottom somewhat flared.

D. Any damage to roadway monuments prior to acceptance by the City shall be repaired in a manner satisfactory to the DPW and the full cost of such repair shall be paid by the Contractor. Any material used which does not meet the standards of the DPW shall be replaced by the Contractor at no cost to the City. The monumentation shall be replaced, realigned, and/or reset to its intended position and certified as to the correct location by a Massachusetts registered professional land surveyor. All proposed impacts shall immediately be brought to the attention of the Engineering Division. Bounds shall be of granite as directed and shall be set at points designated by the Engineer and in conformity with these specifications. Replacement or new bound installation shall be directly overseen by a Professional Land Surveyor licensed in the Commonwealth of Massachusetts. Surveyor’s notes and layout data shall be provided to the Engineering Division.

E. Bounds shall be set in conformance with MassDOT Standard Specification Section 710. The bounds shall be set at the depth and position as directed, and they shall not project above the ground more than 6 inches after final grading. Bounds located in lawns shall be set with the top of the bound 2 inches below the surface. Bounds located in sidewalks or drives shall be set with the top of the bound flush with the surface. Material for backfilling shall consist of suitable excavated material carefully placed about the bound and thoroughly tamped. When the excavation is in earth not suitable for backfilling, the Contractor shall furnish clean gravel or sand for backfill.

F. When the bound location falls on solid ledge and the use of a drill steel rod is directed by the Engineer, a 1.5 inch hole shall be drilled to a depth of 18 inches and a drill steel rod as specified under Subsection 710.40 shall be placed in the hole. The rod shall be set so that the hole is on the

bound point. The drill steel rod shall project above the ledge from 1 inch to 2 inches, and shall be grouted with a 1:1 mortar mix.

6 Trenches and Street Openings

6.1 General

A. Any contractor, corporation, public utility or person desiring to open a public way must comply with the City's Street Opening Permit (SOP) policy and the associated standard operating procedures. For further information, please refer to City of Framingham Web site link as follows: https://www.framinghamma.gov/207/Street-Opening-Obstruction-Trench-Permit.

E. All trench repair work must be guaranteed and bonded as required in the City's Street Opening Permit (SOP) policy. All trenches, whether on public or private property, that are at least 3 feet in depth and less than 15 feet in width, regardless of the length, shall be permitted throughout the City of Framingham as required by Massachusetts law, 520 CMR 14.00. All work shall be conducted in strict accordance with the latest OSHA regulations.

F. Work within public roadways is not permitted between November 15 and April 1, unless special approval is granted by the DPW.

E. No excavation shall remain open after working hours (7:00 a.m. to 5:00 p.m. or as specified in specific City requirements). All excavations shall be backfilled and paved, or covered with steel plates as approved by DPW at the end of work each day.

F. Workmanship:

1. The Contractor shall furnish all materials and conduct the job in an orderly, timely, quality controlled manner. Materials shall conform to the specifications in Section 5 Roadway of the City's Construction Standard.
2. The Contractor shall keep a competent foreman and sufficient competent employees to carry on the work with proper speed and in accordance with the requirements of law and other public authorities and to the reasonable satisfaction of the DPW.
3. The Contractor shall conduct the work in a manner that will not unreasonably interfere with other work being done by the City, by contract or otherwise. If deemed necessary by the DPW, the work done under these standards shall conform to the progress of said other work. The Contractor shall cooperate with the contractors or employees who may be doing work for the City, and with public service corporations affected by the work in arranging for storage places, temporary support for structures, repairs, etc.
4. All temporary repairs shall be properly maintained by the Contractor to assure good rideability conditions until the end of the guarantee period or until permanent restoration has been made, whichever first occurs.
5. Permanent pavement restoration accomplished by utility companies shall be properly maintained to assure good rideability conditions until acceptance by the DPW.
6. All existing roadway monumentation shall be inventoried and protected. Any and all impacts shall be brought to the attention of the Engineering Division immediately.

G. Disposal of removed pavement, concrete, soil, or other material shall comply with the DPW's Waste Management and Soil Management specifications. The disposal location and management plan shall be pre-approved by the DPW, prior to the start of any work.

H. All traffic devices, signs, pavement markings or traffic loops disturbed, damaged, altered or removed by the Contractor shall be promptly replaced by the Contractor, unless otherwise directed by the DPW, in accordance with City and State of Massachusetts rules and regulations at the

expense of the Contractor. The Contractor shall promptly repair all other damage caused by the work or activities. Street markings (centerlines, crosswalks, stop bars, lane markings, etc.) and traffic loops shall be replaced no later than thirty (30) days after completion of work or as may be directed by the City Engineer. If work disturbs centerlines or lane markings on primary streets, the Contractor shall place temporary reflective markers immediately after the pavement is placed. Traffic markings must be restored by end of day, either after removal or paving. Temporary markings are allowed.

I. A complete Street Opening Permit shall be submitted to and approved by the DPW prior to commencing work. The DPW requires that a traffic management plan be prepared and submitted for review and approval with the Street Opening Permit application.

6.2 Excavation

A. DIG SAFE shall be contacted to determine the location of all existing underground utilities prior to any excavation. Framingham Fire Department shall be contacted to mark out their lines.

B. The maximum length of open trench permissible at any time shall be two hundred (200 feet) feet, and no greater length shall be opened for pavement removal, excavation, construction, backfilling, repairing, or any other operation without the express written permission of the City.

C. Sections of sidewalks and curbs shall be removed to the nearest real joint or scored line.

D. Tunneling, boring or other methods may be required by the DPW to avoid or minimize pavement removal.

E. Removal of asphalt pavement:

1. All initial excavations into paved street surfaces shall be precut in a neat line with pavement breakers or saws. The initial cutting of the pavement shall be restricted to the area directly over the sidewalls of the proposed trench to be excavated, or as directed by the DPW.
2. Heavy duty pavement breakers may be prohibited by the City when the use endangers existing substructures or other property.
3. No irregular shapes will be allowed. No shape will be allowed that would prevent compaction equipment from adequately compacting all of the area. The shape of pavement cutouts shall be rectangular, or a combination of rectangular and square shapes unless otherwise agreed to by the City and Contractor.
4. Pavement edges shall be trimmed to a neat vertical face free of loose materials and neatly aligned with the centerline of the trench.
5. Unstable pavement shall be removed over cave outs and overbreaks and the subgrade shall be treated as the main trench.
6. The Contractor shall make every effort to avoid damage to existing pavement to remain. Any damage shall be promptly repaired by the Contractor.

F. Removal of concrete pavement:

1. Saw cutting of reinforced Portland cement concrete is required with the depth of the cut being the full depth of the pavement unless otherwise directed by the DPW to retain reinforcement. Sawcutting may be required by the DPW outside of the limits of the excavation over cave-outs, overbreaks and small floating sections.
2. Reinforced concrete pavement, to the extent possible, shall be removed without cutting the reinforcement. The bars or mesh, when cut, shall be severed as close to the center of the

trench as practicable and bent back to permit accomplishment of the work. When the pavement is ready to be permanently replaced, the reinforcement shall be bent back into position and reinforced with other bars or mesh which shall overlap the ends of existing reinforcement not less than twelve (12) inches and be securely wired together. Contact faces between new and existing concrete pavement shall be bonded using an approved epoxy binding agent installed and applied in accordance with the manufacturer's instructions, unless otherwise directed by the DPW.

G. All material excavated from trenches and piled adjacent to the trench or in any street shall be piled and maintained in a manner that will not endanger those working in the trench, pedestrians or users of the streets, and so that as little inconvenience and obstruction as possible is caused to those using streets and adjoining property. The excavated material shall be hauled away from the site by the end of each working day.

H. The Contractor shall secure the necessary permission and make all necessary arrangements for all required storage and disposal sites.

I. When excavated material is laid along the side of the trench, it shall be kept trimmed. Whenever necessary in order to expedite the flow of traffic or to abate the dirt or dust nuisance, toe boards or bins may be required by the DPW to prevent the spreading of dirt into traffic lanes. If any portion of the excavated material is allowed to be used as backfill, it shall be stockpiled separately from all other materials.

6.3 Steel Plates in Roadways

A. Steel plates shall not be used without DPW approval.

B. Steel plates shall not be used between November 15 and April 1 without DPW approval, or at any time when snow or freezing rain is forecasted.

A. Plates and supporting members shall be steel, either new or used.

1. All materials shall be sound and free of damage or deterioration that would adversely affect functions.
2. Load and deflection calculations shall be used on ASTM A36 / A36M steel unless Contractor provides evidence that all steel used for the plate systems will be a higher strength grade.

C. Steel plates in vehicular and pedestrian traffic areas shall be coated with an approved skid-resistant coating, if required by the DPW. Preparation of the surface and application of the coating shall be in accordance with all of the manufacturer's guidelines. Coatings shall be maintained on 100 percent of the surface of plates carrying vehicular and pedestrian traffic. Repairs shall be made to worn or deficient areas.

D. Design Requirements:

1. The Contractor shall select and design the temporary steel plate and supporting system. The design calculations and Drawings shall be prepared, signed, and stamped by a Professional Engineer registered in the Commonwealth of Massachusetts experienced in design of temporary traffic decking.
2. Design shall be in accordance with Loads and Design Criteria standard to the industry for this type of work, and with the following requirements:
    a. For vehicular ramps, limit maximum grade to 5 percent.
    b. For pedestrian ramps, limit maximum grade to 8 percent.
    c. Conform with Americans with Disabilities Act Accessibility Guidelines (ADAAG) at all pedestrian traffic locations.

d. Design of support members shall allow clearances for existing and relocated utilities.

e. Provide access to utilities, fire hydrants, and other facilities requiring unique access. Requirements at each site shall be obtained from the respective agencies affected.

E. Construction Methods:

1. Not more than two (2) steel plates shall be used at any time.
2. Steel plates shall be secured with pins and asphalt to prevent movement.
3. Plates shall overlap the trench width by at least 2 feet on each side.

F. Maintenance:

1. Inspect the condition of temporary steel plates at least once a day. Continuously maintain plates to conform to design requirements and construction requirements. Immediately repair defects such as broken, bent, or loose plate members, and protruding fasteners. Patch adjacent paving as potholes develop, and immediately re-secure and bed loose transition members, plates, and ramps to the existing pavement.
2. Maintain steel plates free of accumulations of snow, ice, water, mud, and debris.
3. Perform maintenance, repair, or replacement whenever there is noticeable deterioration of any material or component from its original conditions.

6.4 Backfill

A. In unpaved areas, excavations shall be backfilled as directed by the DPW with approved material conforming to MassDOT Spec M1.02.0.

1. Special borrow for fill shall conform to MassDOT Standard Spec. M1.02.0.
2. Processed gravel for subbase shall conform to MassDOT Standard Spec. M1.03.1.
3. Gravel borrow shall conform to MassDOT Standard Spec. M1.03.0, Type b.
4. Washed crushed stone for subbase shall range in size from ¾ inch to 1½ inch, conforming to MassDOT Standard Spec. M2.01.4 to M2.01.2 and shall be hard, durable and reasonably free from flat or laminated particles to furnish free draining material.

A. Special Borrow shall be thoroughly compacted in layers not to exceed twelve inches (12 inches) in thickness until flush with the surrounding ground surface. All backfill shall be rough graded and compacted to not less than 95 percent of the maximum dry density of the material as determined by the Standard AASHTO Test Designation T 99, Compaction Test Method C at optimum moisture content. If the backfilled material settles, additional approved materials shall be installed by the Contractor, as required, to keep the surface even. After settlement is completed, the excavated area shall be left by the Contractor in as good a condition as before the work was started.

B. Temporary sheeting and bracing used to support the side walls shall be removed, unless otherwise directed by the DPW, as backfilling progresses. When backfilling has reached the bottom of a brace, the latter and its horizontal ranger shall be removed, and this procedure shall be repeated throughout the backfilling operation. The sheeting shall be pulled in short increments, care being taken to avoid significant lateral movements of the sides of the trench. During and after pulling the sheeting, the backfill in the space formerly occupied by the sheeting shall be compacted.

C. Whenever water is found standing in the excavation area, the water shall be removed by pump or other means before backfilling operations may commence.

D. Backfilling shall be performed as soon as practicable so that the least possible subsequent settling will occur. In most cases backfilling shall occur on the same day as the excavation was begun. If this is not feasible due to the complex nature of work, emergency, or unpreventable conditions, the Contractor shall notify the DPW that same day, if not sooner, and take appropriate measures to protect public safety and infrastructure until work commences again the following day.

E. Backfill in paved areas shall be granular gravel borrow, processed gravel, sand or crushed stone material. At the City's discretion, in-situ material conforming to MassDOT Spec M1.02.0, Special Borrow may be used for trench backfill above the pipe bedding material and below the roadway foundation materials. The backfill shall be spread in layers not exceeding eight inches (8 inches) in loose depth and thoroughly compacted, up to the pavement subgrade surface. All backfill shall be rough graded and compacted to not less than 95 percent of the maximum dry density of the material as determined by the Standard AASHTO Test Designation T 99, Compaction Test Method C at optimum moisture content.

F. Broken pavement, large stones, roots and other debris shall not be used in backfill. Unused excavated material shall be removed from the jobsite and disposed of in a manner that will minimize interference and obstruction with pedestrian and vehicular traffic. No material shall be left within the right-of-way once the repair and/or installation is complete.

G. The City will allow, and may in some cases require under certain conditions, as an alternate, Controlled Density Fill (CDF) under the following conditions:

1. Only Type IE, Excavatable, Fill will be allowed.
2. This material shall not be used for bedding material or in situations that will cause floating of the utility lines, or in the presence of cast iron or steel pipes.
3. CDF placement in trenches shall be fully barricaded or police protected for a minimum of three (3) hours after the pour or until a set is reached that will prevent a hazard to animals or humans.
4. CDF shall be placed up to the pavement subgrade surface.
5. CDF shall be separated from gas lines with a minimum of six (6) inches of sand cover over the lines.
6. CDF shall be allowed to set up in accordance with manufacturer's recodmmendation before backfilling or paving.

6.5 Temporary Pavement

B. Temporary pavement shall be hot-mixed asphalt MassDOT Type I top course material conforming to MassDOT M3.01.0 and M3.11.07.

A. Upon the completion of proper backfilling, the Contractor shall install temporary pavement. The Contractor shall take all reasonable measures to complete temporary pavement on the same day excavation work was begun. If same day paving is not achievable due to complexity of work, emergency, or unpreventable conditions, the Contractor must notify the DPW as soon as practicable that same day and take appropriate measures to protect the public safety and infrastructure until work commences again the following day. The most stringent measures will be required on primary streets. Same day paving will typically be required if work is not expected to be continued the next day, regardless of location.

B. The Contractor shall notify the DPW 48 hours prior to beginning paving operations for inspection. All hot mixed asphalt paving must first be approved by the DPW or designee as to depth and materials; this *applies to both temporary and permanent paving activities*.

1. Receipt of notification of the anticipated timing of all paving activity must be acknowledged by the DPW.
2. Contractors shall endeavor to make a follow-up notification by 7:00 AM of each workday that paving is still anticipated. In the event of schedule changes or emergencies, the Contractor shall provide a minimum of one-hour notification to assure inspection availability.
3. If a City inspector is not able to be on site within 24 hours of the acknowledged anticipated start time of paving activity, the Contractor may be allowed to commence paving. Inspector may sample in-place material for specification compliance.
4. Contractors who do not provide proper notification of paving activities may be subject to required removal and replacement of pavement for the purpose of inspection.

C. The total thickness of the gravel base material and temporary pavement shall be of an adequate thickness to allow for the proper permanent roadway cross section. Extra gravel base may need to be installed.

D. All temporary pavement shall be hot mixed asphalt, conforming to MassDOT Standard Section 460, placed in two (2) inch compacted courses to a total depth of four (4) inches. If existing pavement depth is greater than eight (8) inches, temporary pavement shall be placed in two (2) inch compacted courses to a total depth of six (6) inches. If a layer of concrete, cobblestone, granite pavers, or other supporting material also exists, the Contractor shall install concrete to match that depth prior to installing temporary pavement.

E. If excavation (or pavement damage) occurs at or within twenty four (24) inches of the edge of trench, the Contractor shall place temporary pavement to the edge of existing sound pavement.

F. Hot mixed asphalt paving of trenches deemed by the DPW to be major excavation shall be paver applied, unless otherwise authorized by the DPW.

G. A pavement marker shall be installed. The markers will display the year the work was completed and identify the owner by color-coding. Color coding is as follows:

1. Water – BLUE
2. Sewer – GREEN
3. Highway/Drainage – WHITE
4. DPW capital project – PURPLE
5. Street Opening Permit – ORANGE (Temporary pavement remaining minimum 120 days) RED (Permanent pavement)

H. The Contractor shall maintain the temporary pavement and shall keep the temporary pavement in acceptable condition until the end of the guarantee period, or until permanent pavement is installed.

I. Refilling of bar holes made in the street or sidewalk shall immediately, upon completion of the work, be filled with compacted, granular material up to three (3) inches below the paved surface and the remaining three (3) inches filled with an approved asphalt plug.

J. All traffic control signs approved by the DPW for removal, relocation, or replacement shall be immediately replaced by the Contractor, unless otherwise directed by the City Engineer. No such traffic control sign shall be removed, relocated or replaced without the express approval of the DPW.

6.6 Permanent Pavement

A. Permanent pavement materials shall conform to the same MassDOT Standard Specifications as required for temporary pavement. Pavement markings shall conform to MassDOT Standard Section 860.

B. The existing pavement shall be saw cut a minimum of six (6) inches beyond the initial excavation limits to expose a six (6) inch width of undisturbed soil.

C. The temporary pavement, backfill and undisturbed soil shall be removed to the depth of the proposed pavement and disposed of offsite.

D. The permanent pavement shall be:

1. Local Streets: 1.5 inches of Top Course material placed on 2.5 inches of Binder Course material founded on 4 inches of Dense Graded Crushed Stone on 8 inches of Processed Gravel or Dense Graded Crushed Stone. This pavement structure shall be placed on the backfill.

2. Collector Streets: 2 inches of Top Course material placed on 4 inches of Binder Course material placed in two equal courses founded on 4 inches of Dense Graded Crushed Stone on 8 inches of Processed Gravel or Dense Graded Crushed Stone.

3. Arterial Streets: 3 inches Modified Top Course material placed in two courses on 5-inches of Binder Course material placed in two equal courses founded on 4 inches of Dense Graded Crushed Stone on 8 inches of Processed Gravel or Dense Graded Crushed Stone.

E. Trench backfill and roadway foundation materials shall be checked for compliance with 95 percent compaction requirement. If compaction is found to be less than 95 percent, trench shall be re-compacted before paving will be allowed.

F. In cases where the existing pavement adjoining a proposed excavation is in need of rehabilitation, the City and Contractor may enter into a mutual agreement such that the Contractor undertakes the pavement rehabilitation as part of their pavement restoration.

G. The Contractor will not be required to repair or replace damaged pavement existing prior to commencement of the work unless excavation operations result in small, unstable sections. These shall be removed and replaced as part of the work.

H. Mechanical compactors will be permitted for repairs less than 10 square yards. Repairs exceeding 10 square yards shall be rolled with an appropriately sized, power-driven, steel-wheeled roller to obtain specification density.

I. Hot-mixed asphalt materials shall be laid upon an approved clean, dry, compacted surface, spread and struck off to the established grade and elevation, giving regard to the loss in depth between loose and compacted mixtures. Immediately after the hot mix asphalt mixture has been spread, struck off, and surface irregularities adjusted, it shall be thoroughly and uniformly compacted.

J. Each course of hot-mixed asphalt shall be compacted separately, meeting the requirement of 92 percent minimum compaction of standard laboratory maximum theoretical density for the specific material.

K. Permanent pavement restorations shall not be allowed to commence until at least one hundred twenty (120) days have passed since the installation of approved temporary hot-mixed asphalt pavement.

L. All saw cut vertical faces of existing pavement shall be neat, free of loose materials, and tack coated with an approved asphalt emulsion by applying the emulsion material in conformance with

MassDOT Standard Specifications Section 460.62, to fully cover the surfaces prior to pavement installation.

M. A tack coat shall be applied to the sub-base surface, or previous course surface.

N. If two or more excavations are made for the same utility or Contractor in the same construction season and are within six (6) feet of each other, edge to edge, they shall be permanently restored as one trench, including the pavement between excavations.

O. Same requirement shall apply, if in a future season, an excavation for the same utility or Contractor occurs within six (6) feet and the first has not yet been permanently restored.

P. If an excavation for the same utility or Contractor falls within six (6) feet of another excavation already permanently restored, the permanent pavement of the second excavation shall include all surface pavement between both excavations.

K. A pavement marker shall be installed. The markers will display the year the work was completed and identify the owner by color-coding. Color coding is as follows:

1. Water – BLUE
2. Sewer – GREEN
3. Highway/Drainage – WHITE
4. DPW capital project – PURPLE
5. Street Opening Permit – ORANGE (Temporary pavement remaining minimum 120 days) RED (Permanent pavement)

Q. The Contractor shall perform the necessary restoration beyond the limits of the street pavement, including lawns, esplanades, shrubs, gardens, curbing, sidewalks, underdrains, separations fabrics, fences, walls, etc. Upon completion of the permanent repairs outside the limits of the street pavement, the Contractor shall notify the DPW in writing that the permanent repairs and/or replacements have been completed, setting forth the date of completion. The Contractor shall maintain the repaired area outside of the pavement for a period of three (3) years after completion, with the exception that once proper horticultural growth has been established, no further horticultural maintenance will be required.

7 Street Lighting Construction Standards

7.1 General

A. Main line electric, telephone, cable and fire alarm shall be meet the material and installation requirements of the respective utility owner. Secondary electric, telephone, cable television and fire alarm lines shall be placed in the grass strip or sidewalk inside the proposed public right of way, but outside of the traveled way on the opposite side of the centerline of the street as the water main. Conduit runs and handholes for street lights shall be placed in the sidewalk or grass areas abutting the roadway. Service pedestals and their connections shall be located on private property with easements.

B. References in this section to the "Standard Specifications" shall mean MassDOT's Highway Division Standard Specifications for Highways and Bridges dated 1988, and all Supplemental and amended Specifications.

C. All materials and work shall be designed to meet all requirements of the latest edition of the National Electric Code (NEC), and all local codes.

D. All street lighting materials and their installation shall fully meet the requirements of Eversource and be accepted by Eversource prior to the City accepting these facilities. Street light standard locations are subject to review by the City's DPW and Eversource (Electric) prior to their installation.

E. Wiring and connections shall be tested for continuity and ground before service conductors are connected and shall demonstrate insulation resistance by megger test as required at not less than 500 volts. Insulation resistance between conductors and grounds for secondary distribution systems shall meet National Electrical Code (NEC) requirements

F. Submittals required for street lighting projects include:

1. Materials List and Shop Drawings
2. As-built Plans
3. Recorded easements

7.2 Conduit

A. Conduit material for street lighting shall be Schedule 40 Polyvinyl Chloride (PVC) plastic and shall meet the requirements of UL 651, NEMA TC-2 and Eversource.

B. Conduit for the service connection from the Eversource system to the street lighting service pedestal shall be 2-inch in size. A spare 2-inch conduit shall also be provided for future use.

C. Conduit from service pedestal to street lights shall be 2 inches in size.

D. Conduits between street lights must run from handhole to handhole with laterals to street lights.

E. Minimum depth of conduits for street lighting shall be 2'-0" as measured from the finish grade. Conduit shall be deeper as necessary to avoid conflicts with other utilities.

F. All street lighting conduits shall be encased in 2,500 PSI, ¼-inch AGG cement concrete as shown in detail, whether in the public right of way or within easements on private property.

7.3 Handhole

A. Electrical handholes for street lighting shall be open bottom, precast polymer units. They shall have minimum nominal dimensions of 13-inch wide x 24-inch long x 18-inch deep and arranged for bottom conduit entry and include grounding rod and ground conductor. They shall be Quazite #PG1324BB18 or approved equal.

B. Handhole covers shall be bolt down type and labeled with notation to read "Street Lighting". Handholes shall be heavy duty type and rated for installation adjacent to traffic areas. They shall be Quazite #PG1324WA41 or approved equal.

C. Handhole covers shall be set flush with the top of sidewalk and shall be positioned no closer than 12 inches to the edge of the concrete sidewalk.

7.4 Light Standard Foundation

A. Street light standard foundations shall be constructed per the Standard Specifications and details. Any deviations must be submitted to the City for approval.

B. Cylindrical foundations shall be as specified by lighting manufacture, including number, type and location of anchor bolts. Pre Cast foundations shall be made of minimum 5,000 psi concrete (at 28 days) and have steel reinforcement meeting ASTM A-615, grade 60 (cover to steel, 1-inch minimum). Foundations shall have a minimum of two (2) 2-inch PVC conduits for lighting circuits, 180 degrees apart.

C. Foundations are to be installed flush with finished grade in sidewalk areas and 3 inches above finished grade in grass areas. Anchor bolts to be ¾-inch diameter by 30-inch long "j-hook" type galvanized steel (4 per foundation) or as otherwise required by the manufacturer.

D. Foundations shall be provided with 2-inch galvanized rigid metal conduit in foundation and coupling and 2-inch plastic type NM conduit stub out to adjacent handhole.

7.5 Wire & Splicing

A. Conductors shall be No. 12 through No. 8 AWG, NEC type THWN/THHN, meeting the requirements of UL 83. Conductors for power and lighting shall be no smaller than No. 12 AWG. Electrical wire shall have XHHW insulation.

B. All conductors shall be annealed copper, 98% conductivity, Class B stranded, except conductors used for power and lighting circuits No. 10 AWG and smaller which may be solid. All conductors should be rated for 600 volts or less, with a thermal rating of 90° C.

C. The outside covering of all wiring for power, lighting, grounding, and control uses shall be color coded to identify polarity.

D. Conductors shall be joined in handholes using back to back copper compression type single barrels lugs joined using durium bronze hardware and insulated using a Raychem Gel Cap water resistant stub splice cover as detailed.

7.6 Service Connection Underground

A. Electric service shall be coordinated with and conform to all current policies of the electric utility company.

B. Service connection shall include a three-wire single phase solid neutral service conductors, conduits, conduit riser or connection to utility company pad mounted transformer; all installed in

accordance with the Code and utility company. Meter shall be furnished and installed by the utility company.

7.7 Service Pedestal

A. Enclosure: Enclosure shall be a NEMA 3R rated UL: listed convection ventilated and consist of a cabinet and a gasketed door assembly, constructed from 5052-h32 sheet aluminum alloy (less than 0.02% copper) of at least 1/8-inch thickness. The enclosure shall be free of dents, cracks and other imperfections and shall be mounted on a concrete base.

B. Enclosure shall be provided with two (2) adjustable ”c” mounting channels on both side walls and back wall of the enclosure and an aluminum back panel. Enclosure shall be CP3A Slimline series as manufactured by MILBANK, or approved equal. The construction features and details shall comply with the manufacturer’s requirements.

C. Panel board: The branch circuit breakers frame shall be rated 100 amperes with a UL listed interrupting rating of 18,000 amperes symmetrical at 240 volts.16 circuit.

D. Receptacle: Receptacle shall be a specification grade NEMA 5-20R ground fault circuit interrupter type and stainless steel cover in a surface utility outlet box. Receptacle shall be manufactured by Hubbell, Leviton or Bryant.

E. Switch and Lighting Fixture: Switch shall be specification grade 120/277VAC 20amp switch and stainless steel cover in a utility outlet box. Lighting fixture shall be a surface mount LED.

F. Meter Socket: Meter socket shall be utility company approved UL listed 100 amp 240/120V 1 phase 3 wire outdoor type. Number of terminals, bypass release and other features shall be provided as to match utility meter.

G. Grounding Electrode: Grounding electrodes shall be ¾-inch diameter by 8-foot long copperweld rods. Rods shall be driven vertically. Coordinate with all existing conditions and follow “call before dig” procedures prior to driving the rods.

H. Location and orientation of the street lighting service pedestal shall be such as to ensure easy access to the cabinet for maintenance as well as to provide protection from damage including snow removal. The location shall not prohibit pedestrian travel. The location of pedestal shall be approved by the City Department of Public Works in advance of placement.

I. All branch circuitry originating from the cabinet shall be routed directly into the circuit breakers. Two (2) -2-inch stub outs shall be provided to street lighting handhole below grade. One active and one for future use.

J. Cabinet shall be installed per manufacturer’s requirements for a level and plumb installation. Provide touched up finish paint, as required for any blemishes.

K. Ground all systems and equipment in accordance with best industry practice and herein stated requirements.

7.8 Street Light Pole & Luminaire

A. Light Pole shall be manufactured by P&K Tubular Products Madison Series Cat. NO. RFT6M14MYS - 12 flute cross section with 3 ½-inch OD tenon BLACK and Madison BLACK decorative base.

B. Anchor bolts shall be supplied by the pole. Anchor bolt shall be completely hot-dip galvanized. Each anchor bolt shall have a hex nut, flat washers and lock washer. The anchor base shall conform to ASTM A36. Bolt circle diameter and length shall be per pole manufacturer's requirements.

C. Luminaire shall employ white, long life LED type lamps and IES Type III asymmetrical light distribution with cutoff vertical control to minimize uplight. Luminaire shall be King Luminaire K199 Series Cat. NO. K199R-B2AR-III-100(SSL)-1063-120:277-K18-SST-PEC-GFI-3K-BLACK - (100 WATTS - 7,157 LMS).

8 Landscaping and Tree Work

8.1 General

A. This Section specifies requirements for other utilities or work on City owned property that was not previously covered in the above sections.

B. Notification shall be provided to Tree Warden during the planning and specification development of projects where tree protection may be required. The Tree Warden may require that a City-approved certified arborist oversee construction activities related to tree protection.

C. A pre-construction meeting with the Tree Warden shall be conducted at least two weeks prior to construction to review tree protection procedures.

D. A written guarantee shall be provided to the City that trees planted in the City will thrive for a minimum of two (2) years.

8.2 Trees

A. All tree work shall be completed in accordance with the requirements of the Tree Warden and/or planning board as appropriate.

B. When specifying trees to be planted on or near the roadways in the City, specifications shall identify species and cultivar. The more disease resistant cultivars shall be recommended.

C. Trees shall be tagged with identification as to location of origin, species, and cultivar. Notification shall be provided to the Tree Warden to provide time for inspection and verification of tree species and cultivar.

D. When planted, an area around the trees shall be mulched for a minimum of 3 feet from the tree or twice the size of the root ball, whichever is greater. The area immediately around the tree trunk (within 2 inches of the trunk) shall remain un-mulched.

1. The planting hole shall be at least 2 times the width of the rootball, up to 5 times the rootball.
2. Burlap, twine, and wire baskets shall be entirely removed after planting.
3. Place the tree in the hole at both the appropriate upright angle and depth.
4. Replace the soil so that there is no excessive coverage to roots or contact above the root flare at the stem.
5. Add a two- to three-inch layer of mulch, not contacting the bark of the tree.
6. Immediately water the tree, with a plan for regular follow-up watering.
7. Provide a final quality-control check, where depth of the structural roots is verified, with the use of a chaining pin or other measuring implement.

E. Tree protection shall include the following.

1. Tree protection shall be provided for each tree within the work area.
2. The tree protection zone shall extend out from the center of the trunk to a radius of 1.5 feet per inch of DBH (DBH = diameter of trunk at 4.5 feet above ground).
3. Primary tree protection shall include 2” x 4” boards in 8-foot lengths vertically strapped around the trunk, at a maximum of 8 inches apart, on center. No penetration of the tree trunk shall be allowed except as approved by a certified arborist or the Tree Warden.

4. Secondary tree protection shall include fencing around the tree protection zone.
5. No storage of any materials or equipment shall be allowed within the tree protection zone.
6. No parking shall be allowed within the tree protection zone.
7. No roots greater than 2 inches shall be cut during construction activities.
8. Any pruning of tree limbs shall be done under the direction of a certified arborist.
9. During excavation, major roots as determined by the Tree Warden shall be exposed using an air spade and flagged for protection.
10. Vertical mulching shall be required if soil compaction levels exceeds 75% or more than 3 passes by heavy equipment are expected.
11. If travel is required within the tree protection area, a layer of at least 6 inches of wood chips, mulch, or other matting as approved by the Tree Warden shall be laid down to protect the roots. The matting shall be removed and the area restored to pre-construction conditions upon completion of the work.
12. For construction where trees roots may be damaged, only root pruning methods may be used for removal. The Tree Warden shall be notified and a plan submitted to the Tree Warden for approval.
13. Curb cuts should not be closer than five (5) feet from the trunk of any adjacent tree.

F. Trees that, in the judgment of the Engineer or the Tree Warden, have been irreparably damaged by the Contractor shall be replaced in kind and in size, or with a quantity of 2-inch caliper replacement trees (the quantity of which shall be determined by the Engineer) such that the cumulative caliper of the replacement trees will be up to the equivalent diameter of the lost tree at breast height. Cost of removal of a destroyed tree, including roots and stumps, as well as the cost of replacement trees, shall be paid for by the Contractor.

G. A written guarantee shall be provided to the City that trees planted in the City as per the contract will thrive for a minimum of two (2) years. The guarantee shall include replacement of trees that the Tree Warden has determined are not thriving. Replacements shall be required to have the same guarantees as the original trees.

8.3 Loam and Seed

A. Loam Borrow shall conform to MassDOT Standard Spec. M1.05.0 or shall be the product of a commercial sand and gravel processing facility. It shall be uncontaminated by saltwater, foreign matter, or substances harmful to plant growth. The acidity range of the Loam Borrow shall be pH 5.5 to 7.0.

B. Fertilizer shall be of a 10-6-4 composition.

C. Seed composition shall be 60% Red Fescue, 20% Red Top, 20% Kentucky Blue. Seed shall be of the previous year's crop and in no case shall the weed seed content exceed 1% by weight.

D. The loam shall be 6 inches thick. Fertilizer shall be applied to the loam at a rate of 0.2 pounds per square yard and worked into the seed bed with an application of lime, if needed to achieve the required pH range. As soon as the seed is sown, it shall be covered with a thin layer of loam, rolled and watered.

E. Areas shall be seeded at the rate of 3.6 pounds per 100 square yards. Grass shall grow to a satisfactory cover before being accepted by the City.

F. In locations where erosion is possible, erosion controls shall be in place until the vegetation has substantially rooted. Erosion, gullies and other damage will need to be reseeded as necessary until an adequate growth of grass is achieved

9 References

A. The following summarizes select standards applicable to these Design Standards. This list is not exclusive; other standards may apply. The latest revision of each standard shall be referenced.

B. All materials and execution shall conform to the highest applicable standards. If there is a conflict between other standards, or between other standards and these Design standards, then the most stringent criteria shall apply.

Standards	Title/Subject
29 CFR 1926	OSHA Safety and Health Regulations for Construction
29 CFR 1926.1101	OSHA Safety and Health Regulations for Construction, Sub Part Z, Toxic and Hazardous Substances: Asbestos
29 CFR 1010.1001	OSHA Occupational Safety and Health Standards, Subpart Z, Toxic and Hazardous Substances: Asbestos
248 CMR 10.00	Massachusetts Uniform State Plumbing Code 248 CMR 10.00
521 CMR	Rules and Regulations of the Architectural Access Board
AASHTO Section 30	Division II (General-Interim 1998)
AASHTO M 91	Sewer and Manhole Brick (Made from Clay or Shale)
AASHTO M 170	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
AASHTO M 199	Standard Specification for Precast Reinforced Concrete Manhole Sections (ASTM C478)
AASHTO M 252	Corrugated Polyethylene Drainage Pipe
AASHTO M 288	Standard Specification for Geotextile Specification for Highway Applications
AASHTO M 294	Corrugated Polyethylene Pipe, 300- to 1500-mm Diameter
AASHTO T 99	Standard Method of Test for the Moisture-Density Relations of Soils Using a 5.5-lb Rammer and a 12-in. Drop (Compaction Test Method C)
ADA	American with Disabilities Act
ATSSA	Guide to Temporary Traffic Control in Work Zones
ASTM A36 / A36M	Standard Specification for Carbon Structural Steel
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A513	Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing

ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A616	Standard Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement.
ASTM A74	Standard Specification for Cast Iron Soil Pipe and Fittings
ASTM A746	Standard Specification for Ductile Iron Gravity Sewer Pipe
ASTM A888	Grey Cast Iron, Cast Iron Class 20
ASTM B62	Standard Specification for Composition Bronze or Ounce Metal Castings
ASTM C32	Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale)
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C139	Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C270	Standard Specification for Mortar for Unit Masonry
ASTM C443	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C478	Standard Specification for Precast Reinforced Concrete Manhole Sections
ASTM C564	Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
ASTM C1244	Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3)
ASTM D1784	Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D207	Standard Specification for Shellac Varnishes
ASTM D2241	Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)

ASTM D2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity — Flow Applications
ASTM D2412	Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (USCS)
ASTM D2737	Standard Specification for Polyethylene (PE) Plastic Tubing
ASTM D3034	Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC)
ASTM D3139	Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM D3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D3350	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
ASTM D4101	Standard Specification for Polypropylene Injection and Extrusion Materials
ASTM D478	Standard Specification for Zinc Yellow (Zinc Chromate) Pigments
ASTM D5813-04	Standard Specification for Cured-In-Place Thermosetting Resin Sewer Piping Systems
ASTM D790	Test Methods for Flexural Properties of Un-reinforced and Reinforced Plastics and Insulating Materials
ASTM F1216	Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
ASTM F2561-11	Standard Practice for Rehabilitation of a Sewer Service Lateral and Its Connection to the Main Using a One Piece Main and Lateral Cured-In-Place Liner
ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F679	Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
ATSSA	Guide to Temporary Traffic Control in Work Zones
AWWA C104/ANSI 21.4.	American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C105/ANSI A21.5.	American Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems
AWWA C110/ANSI A21.10.	American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 Inch Through 48 Inch for Water

AWWA C111/ANSI A21.11.	American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C115/ANSI A21.15	Standard for Flanged Ductile-Iron Pipe With Threaded Flanges
AWWA C150/ANSI A21.50.	American National Standard for the Thickness Design of Ductile-Iron Pipe
AWWA C151/ANSI A21.51.	American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids
AWWA C153/ANSI A21.53.	American National Standard for Ductile-Iron Compact Fittings, 3 In. Through 64 In.
AWWA C502.	AWWA Standards for Dry-Barrel Fire Hydrants
AWWA C504	AWWA Standard for Rubber-Seated Butterfly Valves
AWWA C509.	AWWA Standard for Resilient-Seated Gate Valves for Water Supply Service
AWWA C515.	AWWA Standard for Reduced-Wall Resilient-Seated Gate Valves for Water Supply Service
AWWA C600.	AWWA Standard for the Installation of Ductile-Iron Water Mains and Their Appurtenances
AWWA C651.	AWWA Standard for Disinfecting Water Mains
AWWA C901.	Polyethylene (PE) Pressure Pipe and Tubing, ½ Inch – 3 Inch, for Water Service
City of Framingham	City of Framingham Standard Operating Procedures for the Management of ACM
Mass DLS	453 CMR 6. Current Asbestos Regulations
MassDEP	310 CMR 7.00. Air Pollution Control Regulations. Includes Section 7.09 *Dust Odor, Construction and Demolitions* and 7.15: *Asbestos*
MassDEP	Asbestos Cement Pipe Guidance Document (June 2011).
MassDEP	Guidelines for Public Water Systems (April 2014)
MassDEP	Stormwater Management Policy
MassDEP	Massachusetts Stormwater Handboook
MassDEP	310 CMR 10.00, Wetland Protection Act
MassDOT	Standard Specifications for Highways and Bridges, Construction and Traffic Standard Details (1996 et seq.)
MassDOT	Construction and Traffic Standard Details
MassDOT	Work Zone Safety Guidelines for Massachusetts Municipalities and Contractors

MUTCD	Manual of Uniform Traffic Control Devices (MUTCD)
NFPA 70	National Electrical Code with Massachusetts and amendments
NOAA	National Oceanographic and Atmospheric Administration: Technical Paper No. 40, May 19“1 "Rainfall Frequency Atlas of the United States"
US DOT	49 CFR 100-185. Hazardous Materials Transportation
USEPA	USEPA Region 1, MS4 Program
US EPA	National Emission Standards for Hazardous Air Pollutants (NESHAPS) Title 40, Part 61
US EPA	Guide to Respiratory Protection for the Asbestos Abatement Industry
US EPA	In a Guidance Letter dated July 17, 1991, identified as Control # C99 within the Agency Applicability Determination Index, the U.S. EPA determined that “the pumping of grout into buried lines is not a process which, in and of itself, would cause asbestos cement pipe to become regulated asbestos containing material.”

Appendix A
Plan Content Requirements

The following are required to be included on plans submitted to the DPW for advance project review, comment input and approval. Only plan submittals containing the proper level of information presented in the specified format will be plan reviewed and processed. Hence, to avoid rejections or delays the applicant should accurately prepare the appropriate Plan Submittal Package following the content items outlined below.

1. Drawing must be drawn to scale with the scale preference being 1"=20' including the depiction of a North Arrow. Orient such that North points towards the top of the sheet. The horizontal scale of the plan and profile shall be the same.
2. All drawing sheets shall have a border, title, and revision block that includes at a minimum:
    a. Engineering firm name and address/contact information including telephone and email
    b. Project name
    c. Property address and street name
    d. Drawing creation date
    e. Scale
    f. Revision block represented to facilitate the documentation of any follow-up revision plan submittals numbers/revision description/revision date with all revision information made on the drawing (layout or annotation) clearly cloud circled and each cloud noting the revision number
3. All existing vs. all proposed design construction conditions (drawing and annotation) must be distinguished by different line weight treatment as follows: Existing conditions depicted lighter or narrower and proposed design conditions shown heavier or bolder line weight representation.
4. Original Massachusetts Licensed Professional Engineer's or Professional Land Surveyor's stamp and signature on all drawings.
5. In addition to key dimensions and location ties, the size, material, and vintage must be shown for all existing and proposed infrastructure (mains and services or branches) needed to support the project be it City and/or public and/or private owned (i.e. Water, Sewer, Storm Water, Traffic Signal, Telecom, Electric, Gas, etc.)
6. Locus map showing the parcel in relation to the surrounding properties
7. Name of record owner(s) of land shown on the plan
8. Identification of parcel by sheet, block, and lot number of Assessors Maps.
9. Property lines, easements and/or other legal rights within the property lines. Locations of all existing and proposed easements. Locations of all existing and proposed roadway monumentation.
10. Location of all buildings and lot lines on the lot, including ownership of lots, and street lines, including intersections within 300 ft.
11. Boundaries and existing and proposed topography of the property, including contours at a 2-foot interval, using National Geodetic Vertical Datum 1929(NGVD29) as it may be updated from time to time and specifying NGVD29 on all elevation drawings, specifically indicating the areas on which the activity is proposed to occur, and clearly noting if the activity is on an area greater than 4,000 square feet or on Slopes 15% or greater
12. Dimensions of proposed buildings and structures, including gross floor area, floor area ratio, total lot coverage of building, and breakdown of indoor and outdoor floor area as to proposed use. Area dimensions to include Lot Coverage of Building, Paved Surface Coverage, and Landscaped Open Space and Other Open Space, with percentages of these items to be provided and to total 100 percent of the lot area.
13. Locations and dimensions, including total ground coverage, of all driveways, maneuvering spaces and aisles, parking stalls and loading facilities, and proposed circulation of traffic.

14. Location of pedestrian areas, walkways, flow patterns and access points, and provisions for handicapped parking.
15. Location, size, and type of materials for surface paving, curbing, and wheel stops.
16. Location, dimension, type and quantity of materials for open space, planting, and buffers where applicable.
17. Provisions for storm water drainage affecting the site and adjacent parcels, and snow disposal areas. Drainage computations and limits of floodways shall be shown where applicable.
18. Accurate depiction of rim and invert elevations for storm drainage and sanitary sewer, sanitary service wyes with distances to nearest structure, water line gates and water service valves
19. Cross sections, design details or profiles as appropriate
20. Curbing, sidewalk, driveway curb opening, parking areas, walkways, and road layout identified and dimensioned
21. Photometric plan showing the intensity of illumination expressed in foot-candles at ground level within the interior of the property and at the property boundaries; location, orientation, height, wattage, type, and style of outdoor luminaire.
22. Zoning Table to be located on both the front page of the submitted plans and on the Parking Plan/Site Plan page.
23. Water service, sewer, waste disposal, and other public utilities, accurately positioned, on and adjacent to the site.
24. The size and location of all existing and proposed buildings, structures, utilities, roads, driveways, parking areas, and areas of cut and fill on the site and the location of all structures on abutting properties within 100 feet of the property lines of the parcel
25. All wetlands and wetland resource areas as defined in M.G.L. Ch. 131, §40, and the Framingham Wetlands Protection Bylaw, Article V, §18 of the General By-laws, drainage patterns, and watershed boundaries. Also include a delineation of the 100-year floodplain and all bodies of water, including vernal pools, streams, ponds, and coastal waters within 125-feet of the project site/limit of work and the delineation of a 50-foot no-build and 30-foot no-cut/no alteration zone
26. Location of any rare and endangered species as mapped by the Massachusetts Natural Heritage Program
27. The location of any proposed stockpile locations
28. Detailed drawings and design calculations of all temporary and permanent stormwater management and Erosion and Sediment control structures and devices. Drawing Legend depicting all symbols and line types

As-built Plan Requirements

An as-built plan of project improvements (roadway, site work, and utilities), in both hardcopy and electronic formats, shall be submitted for review and approval. A stamped paper hardcopy of the as-built plan shall be submitted for review. Once approved, a stamped hard copy and electronic copies (AutoCAD and PDF) of the as-built plan shall be submitted for archival. All drawing sheets shall not exceed ARCH Size D (24" x 36") and shall be prepared at readable plan scale, preferably consistent with the design plan scale. Plans shall be prepared in monochrome format utilizing gray scale and line types to differentiate features (color as-built plans will not be accepted).

Electronic as-built information shall be in both AutoCAD 2008 and Acrobat PDF formats. The AutoCAD file shall conform to the current version of the MassGIS Standard for Digital Plan Submission. The electronic CD/DVD media shall be properly labeled with the Project Name, date, and all file names.

The as-built plan shall include:

1. North arrow, scale, and date.
2. Name of record owner(s) of land shown on plan.
3. Identification of parcel by sheet, block, and lot number of Assessor's Maps.
4. Property lines, easements, and/or legal rights within the property lines.
5. Location of all buildings and lot lines on the lot, including ownership of lost, and street limits
6. Boundaries and final topography of the property, including contours at a minimum 2 foot interval, using National Geodetic Vertical Datum 1929(NGVD 1929) and specifying NGVD on all elevation drawings.
7. Original Massachusetts licensed Professional Engineer's or Professional Land Surveyor's stamp and signature, and date stamped, on all drawings.
8. All drawing sheets shall have a border and a title block that include project name/street location, and Engineering Firm telephone contact numbers/address information.
9. Drawing Legend depicting all symbols and line types.
10. Utilities accurately positioned (Cable, Drainage, Electric, Gas, Telephone, Sewer, Water, Etc.) as applicable.
11. Size and materials identified for all new City utilities and service connections (Storm Drainage, Sanitary Sewer and Water).
12. Key dimensions (and ties) depicted for all new City utilities and service connections. Ties shall include dimensions from fixed objects to water valves, angle fittings, reducing fittings, sleeves, service taps, etc. and dimensions from fixed objects to sewer cleanouts, main taps, couplings, angle fittings, etc.
13. Rim and invert elevations for storm drainage and sanitary sewer. Ties to sanitary service wyes with distances from the main to nearest structure. Ties to water line gates and water service valves.
14. Cross sections, design details or profiles as appropriate.
15. Curbing, sidewalk, driveway curb opening, parking areas, walkways, and road layout identified and dimensioned
16. Wetland boundaries and restrictions (e.g. 30-foot No Disturb Zone), edge of buffer zone, location of riverfront and flood zones.

Appendix B
Construction Details

Detail Number	Detail Title
W-2.1.0	Typical Water Connection for 1” Service
W-2.1.1	Typical Water Connection for 1-1/2” to 2” Service
W-2.1.2	Typical Fire Service for 1 ½” to 2”
W-2.1.3	Typical Fire Service (Tapping Sleeve)
W-2.1.4	Typical Connection (Tapping Sleeve)
W-2.2.0	Typical Thrust Restraint Wedge Action Type Joints
W-.2.2.1	Typical Thrust Restraints Using Tie Rods and Friction Clamps
W-2.2.2	Typical Thrust Block Detail
W-2.3.0	Water Main Trench Detail
W-2.4.0	Gate Valve
W-2.4.1	Typical Anchor Tee Installation
W-2.4.2	Air Release Valve/Blow Off
W-2.4.3	Valve Location at Intersection
W-2.4.4	Water Gate Covers
W-2.4.5	Water Valve Box
W-2.5.0	Fire Hydrant Installation
W-2.6.0	Water Main Lowering Detail
W-2.6.1	Water Crossing Under Railroad
W-2.7.0	Detail of Cut and Remove of Water Connection 4” and Over
W-2.7.1	Detail of Cut and Capping of Water Connection 4” and Over
W-2.8.0	Meter Installation
S-3.1.0	Service Connection (Gravity)
S-3.1.1	Service Connection (Saddle)
S-3.1.2	Chimney
S-3.1.3	Service Connection (Grinder)
S-3.2.0	Above Grade Clean Out
S-3.3.0	Plug for Abandoning Sanitary Sewer
S-3.3.1	Plug for Sanitary Sewer
S-3.4.0	Typical Sewer Manhole
S-3.4.1	Typical Drop Manhole (Outside)
S-3.4.2	Force main Manhole
S-3.4.3	Sewer Manhole Cover
S-3.4.4	Manhole Seal
S-3.5.0	Sewer Crossing
S-3.6.0	Backwater Valve Assembly

Detail Number	Detail Title
S-3.7.0	Typical Grease Trap
S-3.7.1	Typical Grease Trap Sizing and Notes
D-4.1.0	Single Grate Catch Basin
D-4.1.1	Direct Inlet Catch Basin
D-4.1.2	Dual Grate Catch Basin
D-4.2.0	Drain Manhole
D-4.2.1	Eccentric Manhole
D-4.2.2	Sump Manhole
D-4.3.0	Manholes and Catch Basins General Notes and Dimensions
D-4.3.1	Raising Castings
D-4.4.0	Rip Rap Apron at Pipe Outfalls
D-4.5.0	Typical HDPE Pipe Trench Detail
D-4.6.0	Flared HDPE End Sections
R-5.1.0	Roadway Cross Section
R-5.1.1	Cut and Fill Slopes
R-5.1.2	Granite Curbs
R-5.1.3	Bituminous Berms
R-5.1.4	Pavement Transition
R-5.1.5	Roadway Widening and Overlay 6-Ft Wide or Greater
R-5.1.6	Roadway Widening and Overlay 6-Ft Wide or Less
R-5.1.7	Pavement Details for Trench Restoration
R-5.1.8	Continuous Zone Trench Restoration
R-5.2.0	Guard Rail
R-5.2.1	Guard Rail (Double Face)
R-5.3.0	Wheelchair Ramp Notes
R-5.3.1	Wheelchair Ramp Type A
R-5.3.2	Wheelchair Ramp Type B
R-5.3.3	Wheelchair Ramp Type C
R-5.3.4	Wheelchair Ramp Type D
R-5.3.5	Wheelchair Ramp Type E
R-5.3.6	Detectable Warning Panel
R-5.4.0	Typical Curb Cut Plan – Residential Driveways No Sidewalk
R-5.4.1	Full Depth Driveway Apron – Section No Sidewalk
R-5.4.2	Sidewalk Through Driveway
R-5.4.3	Full Depth Driveway – Section Cement Concrete Sidewalk Crossing
R-5.5.0	Cross Walk
R-5.5.1	Decorative Cross Walk
R-5.6.0	Steel Plate Installation

Detail Number	Detail Title
R-5.7.0	Traffic Sign Installation Notes
R-5.7.1	Traffic Sign Detail Sidewalk or Median Installation
R-5.7.2	Traffic Sign Detail Non-sidewalk Installation
R-5.7.3	Street Name Sign Installation Notes
R-5.7.4	Street Sign Detail Sidewalk Installation
R-5.7.5	Street Sign Detail Non-sidewalk Installation
R-5.7.6	Granite Bound Detail
R-5.8.0	Trench Detail for Communications Conduit
E-7.1.0	Primary Duct Bank Section in Roadway
E-7.2.0	20” Diameter Light Pole Base
E-7.3.0	Typical Pole Base, handhole and Pole Foundation
E-7.4.0	Lighting Load Center
E-7.5.0	Handhole and Conduit Detail
E-7.6.0	Pole with K199 Luminaire
E-7.7.0	Pole with D323 Luminaire

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APPENDIX C: Framingham Conservation Order of Conditions

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Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP:
158-1599
MassDEP File #

eDEP Transaction #

Framingham
City/Town

A. General Information

Please note: this form has been modified with added space to accommodate the Registry of Deeds Requirements

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.

1. From: Framingham
Conservation Commission

2. This issuance is for (check one): a. ☒ Order of Conditions b. ☐ Amended Order of Conditions

3. To: Applicant:

Robert — a. First Name
Marchesseault, P.E. — b. Last Name
City of Framingham Department of Public Works — c. Organization
110 Western Ave — d. Mailing Address
Framingham — e. City/Town
MA — f. State
01702 — g. Zip Code

4. Property Owner (if different from applicant):

a. First Name
b. Last Name
City of Framingham — c. Organization
150 Concord Street — d. Mailing Address
Framingham — e. City/Town
MA — f. State
01702 — g. Zip Code

5. Project Location:

730 Worcester Road — a. Street Address
Framingham — b. City/Town
101-63 — c. Assessors Map/Plat Number
0610-000 — d. Parcel/Lot Number

Latitude and Longitude, if known: d. Latitude e. Longitude

Massachusetts Department of Environmental Protection
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A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):

Middlesex South
a. County

b. Certificate Number (if registered land)

4633
c. Book

594
d. Page

7. Dates: 11/3/2021 (a. Date Notice of Intent Filed) 12/1/2021 (b. Date Public Hearing Closed) 12/22/2021 (c. Date of Issuance)

8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):

Worcester Road Sewer Pumping Station Replacement (Cover Sheet, G-1, C-1, C-2, C-3, CD-1, CD-2)

BETA Group
b. Prepared By

Alan J. Gunnison (Civil No. 51332)
c. Signed and Stamped by

10/28/2021
d. Final Revision Date

1" = 10'
e. Scale

f. Additional Plan or Document Title

g. Date

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:

a. ☒ Public Water Supply
b. ☐ Land Containing Shellfish
c. ☒ Prevention of Pollution
d. ☐ Private Water Supply
e. ☐ Fisheries
f. ☒ Protection of Wildlife Habitat
g. ☒ Groundwater Supply
h. ☒ Storm Damage Prevention
i. ☒ Flood Control

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

a. ☒ the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

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B. Findings (cont.)

Denied because:

b. ☐ the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**

c. ☐ the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**

3. ☐ Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310 CMR 10.02(1)(a) — a. linear feet

Inland Resource Area Impacts: Check all that apply below. (For Approvals Only)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. ☐ Bank	a. linear feet	b. linear feet	c. linear feet	d. linear feet
5. ☐ Bordering Vegetated Wetland	a. square feet	b. square feet	c. square feet	d. square feet
6. ☐ Land Under Waterbodies and Waterways	a. square feet	b. square feet	c. square feet	d. square feet
	e. c/y dredged	f. c/y dredged		
7. ☒ Bordering Land Subject to Flooding	4062 a. square feet	4062 b. square feet	4062 c. square feet	4062 d. square feet
Cubic Feet Flood Storage	0 e. cubic feet	0 f. cubic feet	0 g. cubic feet	0 h. cubic feet
8. ☐ Isolated Land Subject to Flooding	a. square feet	b. square feet		
Cubic Feet Flood Storage	c. cubic feet	d. cubic feet	e. cubic feet	f. cubic feet
9. ☒ Riverfront Area	9237 a. total sq. feet	9237 b. total sq. feet		
Sq ft within 100 ft	1588 c. square feet	1588 d. square feet	1588 e. square feet	1588 f. square feet
Sq ft between 100-200 ft	7649 g. square feet	7649 h. square feet	7649 i. square feet	7649 j. square feet

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B. Findings (cont.)

Coastal Resource Area Impacts: Check all that apply below. (For Approvals Only)

	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. ☐ Land Under the Ocean	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
12. ☐ Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. ☐ Coastal Beaches	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
14. ☐ Coastal Dunes	a. square feet	b. square feet	c. nourishment cu yd	d. nourishment cu yd
15. ☐ Coastal Banks	a. linear feet	b. linear feet		
16. ☐ Rocky Intertidal Shores	a. square feet	b. square feet		
17. ☐ Salt Marshes	a. square feet	b. square feet	c. square feet	d. square feet
18. ☐ Land Under Salt Ponds	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
19. ☐ Land Containing Shellfish	a. square feet	b. square feet	c. square feet	d. square feet
20. ☐ Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	a. c/y dredged	b. c/y dredged		
21. ☐ Land Subject to Coastal Storm Flowage	a. square feet	b. square feet		
22. ☐ Riverfront Area	a. total sq. feet	b. total sq. feet		
Sq ft within 100 ft	c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet

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B. Findings (cont.)

* **#23.** If the project is for the purpose of restoring or enhancing a wetland resource area in addition to the square footage that has been entered in Section B.5.c (BVW) or B.17.c (Salt Marsh) above, please enter the additional amount here.

23. ☐ Restoration/Enhancement *:

a. square feet of BVW | b. square feet of salt marsh

24. ☐ Stream Crossing(s):

a. number of new stream crossings | b. number of replacement stream crossings

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects.

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
   a. The work is a maintenance dredging project as provided for in the Act; or
   b. The time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
   c. If the work is for a Test Project, this Order of Conditions shall be valid for no more than one year.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order. An Order of Conditions for a Test Project may be extended for one additional year only upon written application by the applicant, subject to the provisions of 310 CMR 10.05(11)(f).
6. If this Order constitutes an Amended Order of Conditions, this Amended Order of Conditions does not extend the issuance date of the original Final Order of Conditions and the Order will expire on 12/22/2024 unless extended in writing by the Department.
7. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.

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C. General Conditions Under Massachusetts Wetlands Protection Act

8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.

9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.

10. A sign shall be displayed at the site not less then two square feet or more than three square feet in size bearing the words,

"Massachusetts Department of Environmental Protection" [or, "MassDEP"]

"File Number 158-1599 "

11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.

12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.

13. The work shall conform to the plans and special conditions referenced in this order.

14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.

15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.

16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.

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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.

18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

19. The work associated with this Order (the "Project")
    (1) ☒ is subject to the Massachusetts Stormwater Standards
    (2) ☐ is NOT subject to the Massachusetts Stormwater Standards

    If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:

    a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.

    b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:
    i. all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;
    ii. as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;
    iii. any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;

C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

iv. all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;

v. any vegetation associated with post-construction BMPs is suitably established to withstand erosion.

c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement) for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following:

i.) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and

ii.) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.

d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.

e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 18(f) through 18(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 18(f) through 18(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.

f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.

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C. General Conditions Under Massachusetts Wetlands Protection Act (cont.)

g) The responsible party shall:
1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.

h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.

i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.

j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.

k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.

l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

Special Conditions (if you need more space for additional conditions, please attach a text document):
See Page 13-16

20. For Test Projects subject to 310 CMR 10.05(11), the applicant shall also implement the monitoring plan and the restoration plan submitted with the Notice of Intent. If the conservation commission or Department determines that the Test Project threatens the public health, safety or the environment, the applicant shall implement the removal plan submitted with the Notice of Intent or modify the project as directed by the conservation commission or the Department.

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D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? ☒ Yes ☐ No

2. The Framingham Conservation Commission hereby finds (check one that applies):

   a. ☐ that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw, specifically:

   1. Municipal Ordinance or Bylaw | 2. Citation

   Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.

   b. ☒ that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:

   Framingham Wetlands Protection Ordinance (1. Municipal Ordinance or Bylaw) | Article V, Section 18 (2. Citation)

3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.
   The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document):
   See Page 13-16

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E. Signatures

This Order is valid for three years, unless otherwise specified as a special condition pursuant to General Conditions #4, from the date of issuance.

12/22/2021
1. Date of Issuance

Please indicate the number of members who will sign this form.
This Order must be signed by a majority of the Conservation Commission.

6
2. Number of Signers

The Order must be mailed by certified mail (return receipt requested) or hand delivered to the applicant. A copy also must be mailed or hand delivered at the same time to the appropriate Department of Environmental Protection Regional Office, if not filing electronically, and the property owner, if different from applicant.

Signatures:

Robert D. McArthur, Conservation Administrator
Duly authorized to sign by a vote recorded with the Middlesex South Registry of Deeds in Book 74510, Page 461.

☒ by hand delivery on
12/22/2021
Date

☐ by certified mail, return receipt requested, on
Date

F. Appeals

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request for Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order, or providing written information to the Department prior to issuance of a Superseding Order.

The request shall state clearly and concisely the objections to the Order which is being appealed and how the Order does not contribute to the protection of the interests identified in the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40), and is inconsistent with the wetlands regulations (310 CMR 10.00). To the extent that the Order is based on a municipal ordinance or bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

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G. Recording Information

Prior to commencement of work, this Order of Conditions must be recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land subject to the Order. In the case of registered land, this Order shall also be noted on the Land Court Certificate of Title of the owner of the land subject to the Order of Conditions. The recording information on this page shall be submitted to the Conservation Commission listed below.

Framingham
Conservation Commission

Detach on dotted line, have stamped by the Registry of Deeds and submit to the Conservation Commission.

To:

Framingham
Conservation Commission

Please be advised that the Order of Conditions for the Project at:

730 Worcester Road
Project Location

158-1599
MassDEP File Number

Has been recorded at the Registry of Deeds of:

Middlesex
County

Book

Page

for:
Property Owner

and has been noted in the chain of title of the affected property in:

Book

Page

In accordance with the Order of Conditions issued on:

Date

If recorded land, the instrument number identifying this transaction is:

Instrument Number

If registered land, the document number identifying this transaction is:

Document Number

Signature of Applicant

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 5 – Order of Conditions
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40 &
Framingham Wetlands Protection Bylaw, Article V, Section 18

Provided by MassDEP:
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Special Conditions Under The State Wetlands Protection Act and Framingham Wetlands Protection Ordinance 730 Worcester Road

Final Approved Plans and Other Documents:

1. *Notice of Intent, Worcester Road Sewer Pumping Station Improvements, 730 Worcester Road, Framingham, MA,* Prepared by BETA Group. Dated 11/3/2021
2. *Worcester Road Sewer Pumping Station Replacement, City of Framingham, MA, Department of Public Works.* Prepared by BETA Group. Dated 11/3/2021

Plan of Record Sheet	Sheet Title	Correct Revision Date	Stamped by Engineer	Stamped by Surveyor	Scale
Cover Sheet	Cover Sheet	10-28-2021	Alan J. Gunnison (Civil No. 51332)	N	none
G-1	Legend, General Notes & Index	September 2021	N/A	N	none
C-1	Existing Conditions Site Plan	September 2021	N/A	N	1" = 10'
C-2	Demolition, Proposed Piping, & Restoration Site Plans	September 2021	N/A	N	1" = 10'
C-3	Bypass Plans – Phase I & Phase II	September 2021	N/A	N	1" = 10'
CD-1	Construction Details - 1	September 2021	N/A	N	none
CD-2	Construction Details - 2	September 2021	N/A	N	none

Findings of Fact:

This project will consist of the rehabilitation of the Worcester Road Sewer Pumping Station (WRSPS) at 730 Worcester Road, as well as associated site improvements.

Approved activities include the demolition of the existing WRSPS, the construction of a new pumping station within the existing foundation footprint, installation of a new sewer bypass structure, reconfiguration of bituminous areas, management of contaminated soils in accordance with state and local regulations, and installation of fencing.

A Licensed Site Professional will be overseeing the excavation and dewatering activities to ensure that contamination is removed to the maximum extent practicable as outlined in the Release Abatement Measure Plan (RAM).

All excavated material and groundwater collected during the dewatering process shall be properly disposed of. Documentation shall be provided to the Conservation Commission confirming the proper disposal of contaminated soils and water prior to issuing the Certificate of Compliance (Special Condition #39 and 42).

Approved Alterations within Jurisdictional Areas

Work will take place in

- Riverfront Area (previously developed)
- Bordering Land Subject to Flooding
- 100-Foot Buffer Zone regulated under the State's Wetlands Protection Act
- 125-Foot Buffer Zone regulated under the City's Wetlands Protection Ordinance

Special Conditions

General Requirements

20. The findings of fact are incorporated as a special condition and given equal status as a special condition of this Order.
21. All Conditions (Sec. C. above) Under Massachusetts Wetlands Protection Act apply under the Framingham Wetlands Protection Bylaw.
22. The Commission or Agent of the Commission reserves the right to require additional conditions if deemed necessary to protect resource areas and interests as defined in MGL Chapter 131 Section 40 (310 CMR 10.00) and/or the Framingham Wetlands Protection By-Law (Article V, Section 18), or regulations promulgated thereunder.
23. This document shall be included in all construction contracts, subcontracts, and specifications dealing with the work proposed and shall supersede any conflicting contract requirements. The Applicant shall ensure that all contractors, subcontractor and other personnel performing the permitted work are fully aware of the permit's terms and conditions. Thereafter, the contractor will be held jointly liable for any violation of this Order resulting from failure to comply with its conditions. Nothing in this paragraph shall limit or restrict the liability of the Applicant for violations of this order.
24. This Order and a copy of approved drawings and plans shall be available at the project site at all times for easy reference.
25. Work orders associated with the Operations and Management Plan of stormwater features and utilities shall be retained by the property owner and available to the Commission and/or its Agents, by request. In addition, stormwater infrastructure shall be inspected quarterly and receipts of these inspections shall also be available to the Commission and/or its Agents by request.
26. To apprise the permittee, a Notice of Intent (NOI) for stormwater discharges associated with construction activity should be filed under the US EPA NPDES General Permit. In addition, the Permittee must prepare a Stormwater Pollution Prevention Plan (SWPPP) as required by the NPDES General Permit. This applies to projects that disturb one acre (1 Ac.) of land or more.

Prohibitions and Violations

27. No work, storage, or alterations of any kind are permitted before, during, or after construction within the 30 foot No Alteration Zone (defined in Section III. C. of the Framingham Wetland Regulations) up-gradient from the edge of wetland Resource Areas, unless otherwise approved at public hearings by the Conservation Commission and demarcated on the Plan of Record.
28. If unforeseen problems occur during construction which may affect the statutory interests of the Wetlands Protection Act, the Bylaw or regulations promulgated thereunder, the Commission shall immediately be notified, and an immediate meeting shall be held between the Commission or its Agent, the Applicant, and other concerned parties to determine the correct measures to be employed. The Applicant shall then act to correct the problems using the corrective measures agreed upon. Subsequent to resolution, the activity and resulting actions shall be documented in writing.
29. Any damage caused as a result of this project to any wetland resource areas, shall be the responsibility of the Applicant to repair, restore and/or replace. Sedimentation or erosion into these areas shall be considered damage to wetland resource areas. If sediment reaches these areas the Commission shall be contacted and a plan for abatement of the problem and proposed restoration/mitigation measures shall be submitted for approval and implementation by the Agent of the Commission.

30. Work shall be halted on the site if an Agent of the Commission or DEP determines that any of the work is not in compliance with this Order of Conditions.
31. Violation of any condition may result in fines (Section VI of the Framingham Wetland Regulations) and other enforcement actions.
32. Any changes to approved plans desired by the Applicant or Contractor must first be approved by the Conservation Commission or Agent of the Commission.

Conditions Prior to Construction

33. Within thirty (30) days of the issuance of this Order of Conditions, the applicant, property owner, project representative, or other applicable party must record the original copy of the Order with the Registry of Deeds. Proof of recording is required to be submitted to the Commission or Agent of the Commission prior to the Pre-Construction Meeting and commencement of work.
34. The applicant, representative, contractors and sub-contractors associated with this project shall sign an Order of Conditions Acknowledgement Form, stating that they have received and understand this Order of Conditions. This Form shall be submitted to the Commission during the pre-construction site visit. Should any of the aforementioned parties change after submitting said Form, then a new Order of Conditions Acknowledgement Form must be signed and submitted to the Agent of the Commission.
35. Prior to the commencement of any activity on this site, other than the marking of locations for erosion controls, there shall be a Pre-Construction Meeting between the project supervisor, the contractor responsible for the work, and a member of the Conservation Commission or its Agent. Please contact the Conservation Commission office at (508) 532-5460 at least seventy-two (72) hours prior to any activity to arrange for the pre-construction meeting. The meeting shall:
    a. Ensure that the requirements of the Order of Conditions are understood;
    b. Check administrative requirements (DEP file number sign, recording info, contact information, etc.);
    c. Adjust, if necessary, the erosion control line.
36. Based on the Agent's judgment rendered at the pre-construction site visit, a sedimentation barrier may be required and, if so, shall serve as the limit of work. No alterations shall be permitted beyond the installed siltation barrier.
37. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The Applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary.
38. The erosion controls shall be properly installed as shown on the Plan of Record. All erosion controls shall be invasive free (salt marsh hay, straw wattles, or other invasive-free product). No clearing of vegetation, including trees, or disturbance of soil shall occur prior to the Pre-Construction Meeting. Minimal disturbance of shrubs and herbaceous plants shall be allowed prior to the Pre-Construction Meeting if absolutely necessary in order to place erosion control stakes where required. Silt retention fabric must be staked and entrenched at least six (6") inches for maximum siltation control prior to any construction or site preparation.
39. If there is a need for de-watering, the applicant shall provide a detailed plan to be approved by the Commission or Agent of the Commission. All contaminated groundwater collected during the dewatering process shall be properly disposed of. Documentation shall be provided to the Conservation Commission confirming the proper disposal of contaminated water prior to issuing the Certificate of Compliance.

Conditions During Construction

40. All plantings within Areas Subject to Jurisdiction under the Framingham Wetlands Protection Bylaw shall be native species.
41. The applicant shall inspect and maintain all erosion controls including silt sacs within the catch basins on a weekly basis and after every storm event of a ½ inch of rain or more.

42. The applicant is responsible for the containment and proper relocation/disposal for all unearthed soils, clays and other organic debris as well as the construction waste associated with this project. Additionally, all contaminated groundwater collected during the dewatering process shall be properly disposed of. Documentation shall be provided to the Conservation Commission confirming the proper disposal of contaminated soils and water prior to issuing the Certificate of Compliance.

Final Site Stabilization and Removal of Erosion Controls

43. Once the site has been stabilized, the Applicant/Owner/Assign shall remove and properly dispose of all erosion controls.
44. The applicant shall place storm fencing or other suitable barriers on the lot to help prevent the migration of treated snow melt toward the wetlands.
45. The applicant shall retain all receipts for annual operation and maintenance activities on-site. Receipts shall be made available to the Conservation Commission and/or its Agents, upon request.
46. Prior to planting and seeding, final grades shall be surveyed by a licensed land surveyor to ensure that grades have been achieved as shown on the plan or as agreed to by the Commission to meet the performance based conditions subject to this Order. If any changes in grade elevations were amended, the Commission shall be notified of the purpose for the change for review and approval
47. Vegetation planted as part of mitigation, replication or restoration and in accordance with approved plans, shall be monitored and maintained for a period of two growing seasons and 75% of the plantings shall survive. If less than 75% of species planted survive, then they shall be replaced at the discretion of the Conservation Commission or Agent of the Commission.

Conditions related to Certificate of Compliance

48. Upon completion of construction and final stabilization, the Applicant/Owner/Assign shall submit the following to the Conservation Commission to request a Certificate of Compliance (COC):
    a. A completed Request for a Certificate of Compliance form (WPA Form 8A or other form if required by the Conservation Commission at the time of request);
    b. A stamped as-built plan and letter from a Registered Professional Engineer certifying compliance of the property with this Order of Conditions, and detailing any deviations from the approved plans, and their potential effect on the project. A statement that the work is in "substantial compliance" with no detailing of the deviations shall not be accepted.
49. Once items from 48a. and 48b. are submitted in full compliance, the Applicant, Contractor or Consultant shall schedule a site visit with the Conservation Administrator(s) to verify compliance with this Order of Conditions and affiliated documents.

Conditions in Perpetuity – None

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

Request for Departmental Action Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:

Provided by DEP

A. Request Information

1. Location of Project

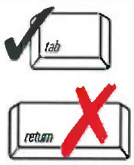
a. Street Address

b. City/Town, Zip

c. Check number

d. Fee amount

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



2. Person or party making request (if appropriate, name the citizen group's representative):

Name

Mailing Address

City/Town

State

Zip Code

Phone Number

Fax Number (if applicable)

3. Applicant (as shown on Determination of Applicability (Form 2), Order of Resource Area Delineation (Form 4B), Order of Conditions (Form 5), Restoration Order of Conditions (Form 5A), or Notice of Non-Significance (Form 6)):

Name

Mailing Address

City/Town

State

Zip Code

Phone Number

Fax Number (if applicable)

4. DEP File Number:

B. Instructions

1. When the Departmental action request is for (check one):

☐ Superseding Order of Conditions – Fee: $120.00 (single family house projects) or $245 (all other projects)

☐ Superseding Determination of Applicability – Fee: $120

☐ Superseding Order of Resource Area Delineation – Fee: $120

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

Request for Departmental Action Fee Transmittal Form

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number:

Provided by DEP

B. Instructions (cont.)

Send this form and check or money order, payable to the *Commonwealth of Massachusetts,* to:

Department of Environmental Protection
Box 4062
Boston, MA 02211

2. On a separate sheet attached to this form, state clearly and concisely the objections to the Determination or Order which is being appealed. To the extent that the Determination or Order is based on a municipal bylaw, and not on the Massachusetts Wetlands Protection Act or regulations, the Department has no appellate jurisdiction.

3. Send a **copy** of this form and a **copy** of the check or money order with the Request for a Superseding Determination or Order by certified mail or hand delivery to the appropriate DEP Regional Office (see http://www.mass.gov/eea/agencies/massdep/about/contacts/).

4. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant.

APPENDIX D: SCADA Panel Drawings

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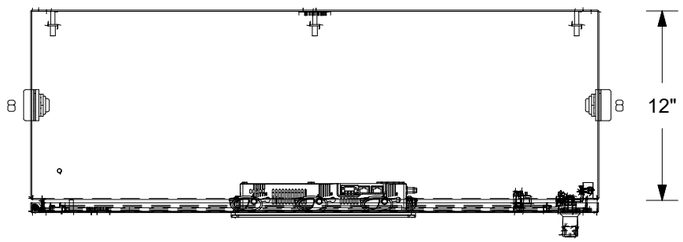
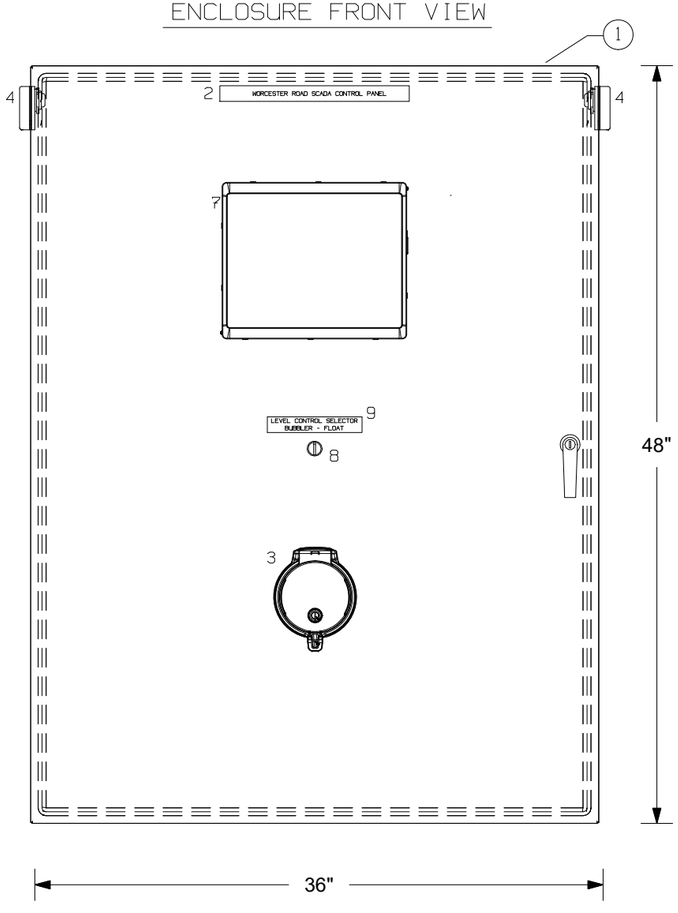
ENCLOSURE TOP VIEW



ENCLOSURE FRONT VIEW



ITEM	QTY	DESCRIPTION	MANUFACTURER	PART NUMBER
1	1	ENCLOSURE RATED NEMA 4 PAINTED ANSI-61 GRAY	HAMMOND	EN4SD483612GY
2	1	NAMEPLATE 1" X 12" ENGRAVED	ENGRAVING	CUSTOM
		"CITY OF FRAMINGHAM"		
		"WORCESTER ROAD SCADA CONTROL PANEL"		
3	1	DATA INTERFACE PORT	PANDUIT	DAP4BC-G3-6
4	2	ENCLOSURE VENTILATOR	SAGINAW	SCE-BV4XKIT
5	1	WARNING LABEL ARC FLASH AND SHOCK HAZARD	EMEDCO	QS3743
6	1	WARNING LABEL POWERED FROM SEVERAL SOURCES	EMEDCO	SQS110
7	1	OPERATOR INTERFACE TERMINAL(PANELVIEW PLUS 7	AUTOMATION DIRECT	C-MORE EA9-T15CL-R
8	1	3 POSITION SELECTOR SWITCH SPRINGBACK	ALLEN BRADLEY	800FP-SB32
	2	NORMALLY OPEN CONTACT BLOCK	ALLEN BRADLEY	800F-X10
	1	PLASTIC LATCH	ALLEN BRADLEY	800F-ALP
9	1	NAMEPLATE 1" X 6" ENGRAVED	ENGRAVING	CUSTOM
		"LEVEL CONTROL SELECTOR"		
		"BUBBLER - FLOAT"		
1	1	LITERATURE DATA POCKET(PROVIDED SEPARATELY)	HAMMOND	PKT1212

NOTE 1:
BILL OF MATERIAL LISTS MAJOR COMPONENTS ONLY.
MISC. ITEMS SUCH AS WIRE, WIRE MARKERS,
MOUNTING HARDWARE, SCREWS, TERMINAL
BLOCK JUMPERS, TERMINAL BLOCK MARKERS,
EQUIPMENT IDENTIFICATION LABELS, ETC. ARE NOT
SPECIFICALLY CALLED OUT BUT MUST BE SUPPLIED.
NOTE 2:
DESIGN IS BASED ON ALLEN BRADLEY EQUIPMENT.
SUPPLIED EQUIPMENT SHALL BE BASED ON THESE
DRAWINGS OR APPROVED EQUAL.
NOTE 3:
DOOR LAYOUTS ARE FOR ILLUSTRATIVE PURPOSES ONLY.
FINAL DOOR LAYOUT AND DESIGN SHALL BE SUBMITTED
FOR APPROVAL BY THE MANUFACTURER.
NOTE 4: ENTIRE CONTROL PANEL ASSEMBLY TO BE UL-508A LISTED.

PUMPING STATION SCADA RTU

ENCLOSURE DETAILS

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R.E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

NO.	REVISION	DATE

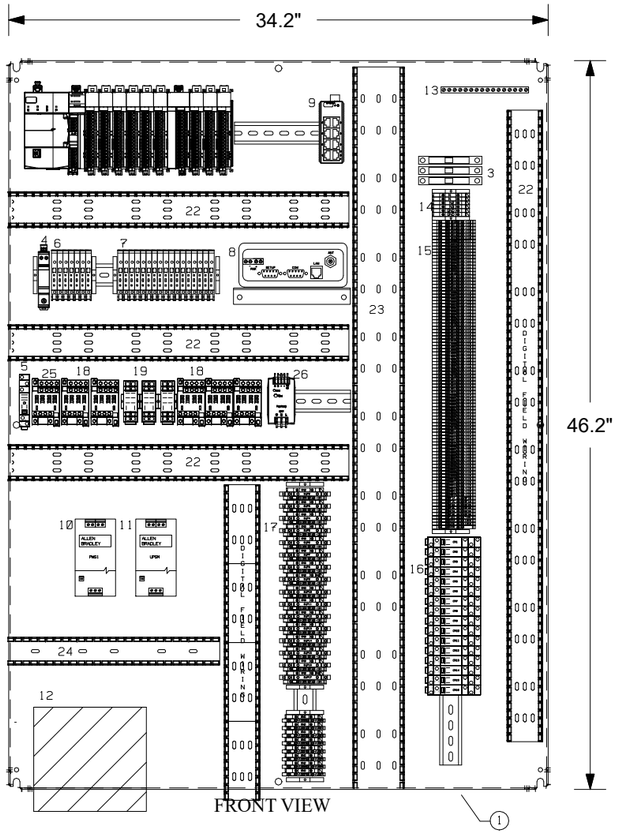
SCALE: NONE

DR. BY: LC

DATE: 10-05-2021

SHEET:
1 OF 14

DRAWING NO.
16692-001



ITEM	QTY	DESCRIPTION	MANUFACTURER	PART NUMBER
1	1	BACKPANEL STEEL PAINTED WHITE ENAMEL	HAMMOND	EP4836
2	1	PROGRAMMABLE LOGIC CONTROLLER COMPACTLOGIX L320ER	ALLEN BRADLEY	SEE DWG. 16692-004
3	3	CIRCUIT BREAKER 15 AMP SINGLE POLE	ALLEN BRADLEY	1489-M1C150
4	1	120 VAC SURGE PROTECTOR	PHOENIX CONTACT	2905348
5	1	RELAY 120VAC SPDT	ALLEN BRADLEY	700-HK36A1-4
	1	RELAY BASE	ALLEN BRADLEY	700-HN121
6	7	FUSEHOLDER	ALLEN BRADLEY	1492-H4
	1	FUSEBLOCK END BARRIER	ALLEN BRADLEY	1492-N37
	1	FUSEBLOCK SIDE JUMPERS 10 POLE	ALLEN BRADLEY	1492-N49
	1	FUSEBLOCK SIDE JUMPERS INSULATING SLEEVE	ALLEN BRADLEY	1492-SJS
	2	FUSE 1 AMP, 250V, FAST ACTING, FU2, FU6	BUSS	AGC-1
	3	FUSE 3 AMP, 250V, FAST ACTING, FU3, FU4, FU5	BUSS	AGC-3
	1	FUSE 5 AMP, 250V, TIME DELAY, FU1	BUSS	MDL-5
	1	FUSE 7 AMP, 250V, TIME DELAY, FU7	BUSS	MDL-7
7	17	FUSEHOLDER	ALLEN BRADLEY	1492-H5
	1	FUSEBLOCK END BARRIER	ALLEN BRADLEY	1492-N37
	2	FUSEBLOCK SIDE JUMPERS 10 POLE	ALLEN BRADLEY	1492-N49
	2	FUSEBLOCK SIDE JUMPERS INSULATING SLEEVE	ALLEN BRADLEY	1492-SJS
	9	FUSE 1 AMP, 250V, FAST ACTING, FU8-FU15, FU18	BUSS	AGC-1
	2	FUSE 2 AMP, 250V, FAST ACTING, FU16,FU17	BUSS	AGC-2
	3	FUSE 3 AMP, 250V, FAST ACTING, FU19,FU20,FU22	BUSS	AGC-3
8	1	RADIO LICENSED IP ROUTER	CAL AMP VIPER	EXISTING
		ANTENNA SURGE PROTECTOR (NOT SHOWN)	POLYPHASER	VHG50HN-B
		RADIO MOUNTING SHELF	CUSTOM	
9	1	ETHERNET SWITCH 8 PORT	MOXA	EDS-208
	2	CAT6 ETHERNET PATCH CORD 3 FT.	BLACK BOX	EVNSL641-0003
	2	CAT6 ETHERNET PATCH CORD 7 FT.	BLACK BOX	EVNSL641-0007
10	1	DUAL OUTPUT POWER SUPPLY WITH UPS FUNCTION	ALLEN BRADLEY	1606-XLE240EN
11	1	DC UPS MODULE	ALLEN BRADLEY	1606-XLS240-UPS
12	1	BATTERY SEALED LEAD ACID 12V, 18.0 AH	POWERSONIC	PS-12180NB
13	1	GROUNDING BAR	PANDUIT	UGB2-0-414-6
14	4	TERMINAL BLOCK 1 TIER TB1 (120VAC POWER)	ALLEN BRADLEY	1492-J4
	2	TERMINAL BLOCK GROUND TYPE TB1 (120VAC POWER)	ALLEN BRADLEY	1492-JG4
	2	TERMINAL BLOCK 1 TIER JUMPER 2 POLE	ALLEN BRADLEY	1492-CJJ6-2
	2	TERMINAL BLOCK END CLAMPS	ALLEN BRADLEY	1492-EAJ35
15	99	TERMINAL BLOCK 2 TIER TB1	ALLEN BRADLEY	1492-EBJD3
	3	TERMINAL BLOCK 2 TIER JUMPER 10 POLE	ALLEN BRADLEY	1492-CJJ5-10
	2	TERMINAL BLOCK END CLAMPS	ALLEN BRADLEY	1492-EAJ35
16	16	RELAY 24VDC SPDT	ALLEN BRADLEY	700-HK36Z24-4
	16	RELAY BASE	ALLEN BRADLEY	700-HN121
17	24	TERMINAL BLOCK 2 TIER TB2	ALLEN BRADLEY	1492-EBJD3
	24	TERMINAL BLOCK GROUND TYPE TB2	ALLEN BRADLEY	1492-JG3
	24	TERMINAL BLOCK END BARRIER 2 TIER TB2	ALLEN BRADLEY	1492-EBJD3
	4	TERMINAL BLOCK END CLAMPS	ALLEN BRADLEY	1492-EAJ35
	16	ANALOG LOOP SURGE PROTECTOR	PHOENIX	2906798
	16	ANALOG LOOP SURGE PROTECTOR END COVER	PHOENIX	2838995
	2	ANALOG LOOP SURGE PROTECTOR MARKING STRIP	PHOENIX	1051003
18	3	RELAY 24VDC DPDT WITH LED INDICATOR	ALLEN BRADLEY	700-HF32Z24-4
	3	RELAY BASE	ALLEN BRADLEY	700-HN116
19	5	RELAY 24VDC 4PDT WITH LED INDICATOR	ALLEN BRADLEY	700-HF34Z24-4
	5	RELAY BASE	ALLEN BRADLEY	700-HN139
20	A/R	DIN RAIL EQUIPMENT MOUNTING TRACK	ALLEN BRADLEY	1492-DR1
21	A/R	DIN RAIL EQUIPMENT MOUNTING TRACK RAISED	ALLEN BRADLEY	1492-DR6
22	A/R	WIREWAY 2.0"	PANDUIT	F2X3LG6
	A/R	WIREWAY COVER 2.0"	PANDUIT	C2LG6
23	A/R	WIREWAY 3.0"	PANDUIT	F3X3LG6
	A/R	WIREWAY COVER 3.0"	PANDUIT	C3LG6
24	A/R	WIREWAY 1.5"	PANDUIT	F1.5X3LG6
	A/R	WIREWAY COVER 1.5"	PANDUIT	C1.5LG6
25	1	RELAY 120VAC 4PDT WITH LED INDICATOR	ALLEN BRADLEY	700-HF34A1-4
	1	RELAY BASE	ALLEN BRADLEY	700-HN139
26	1	24VDC POWER SUPPLY 2.1 AMP	PULS	ML50.100

NOTE 1:
BILL OF MATERIAL LISTS MAJOR COMPONENTS ONLY. MISC. ITEMS SUCH AS WIRE, WIRE MARKERS, MOUNTING HARDWARE, SCREWS, TERMINAL BLOCK JUMPERS, TERMINAL BLOCK MARKERS, EQUIPMENT IDENTIFICATION LABELS, ETC. ARE NOT SPECIFICALLY CALLED OUT BUT MUST BE SUPPLIED.
NOTE 2:
DESIGN IS BASED ON ALLEN BRADLEY EQUIPMENT. SUPPLIED EQUIPMENT SHALL BE BASED ON THESE DRAWINGS OR APPROVED EQUAL.
NOTE 3:
FINAL BACKPANEL LAYOUT AND DESIGN SHALL BE SUBMITTED FOR APPROVAL BY THE MANUFACTURER.
NOTE 4: ENTIRE CONTROL PANEL ASSEMBLY TO BE UL-508A LISTED.

PUMPING STATION SCADA RTU

BACKPANEL LAYOUT

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R.E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

NO.	REVISION	DATE

SCALE: NONE

DR. BY: LC

DATE: 10-05-2021

SHEET: 2 OF 14

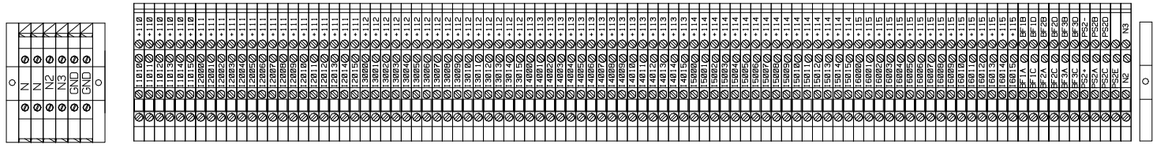
DRAWING NO. 16692-002

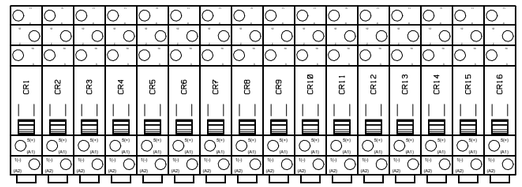
CUSTOMER SUPPLIED
120VAC POWER
NEUTRALS/GROUND

DIGITAL INPUT
FIELD WIRING

RELAY OUTPUT
FIELD WIRING

TB1



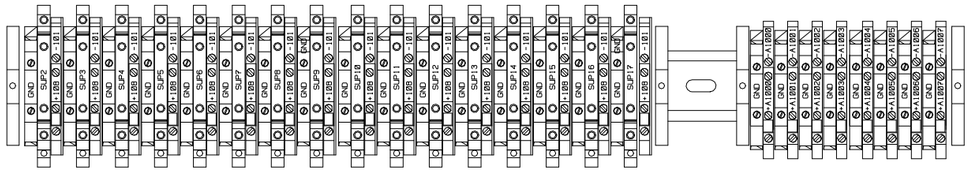


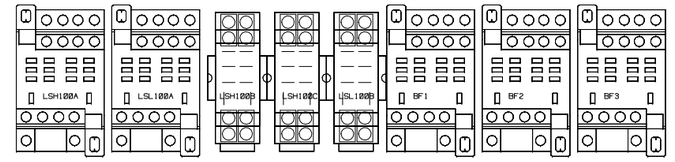
ANALOG INPUT FIELD WIRING

ANALOG OUTPUT FIELD WIRING

FLOAT CONTROL WIRING

TB2





PUMPING STATION SCADA RTU

TERMINAL BLOCK LAYOUT

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R.E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

NO.	REVISION	DATE

SCALE: NONE

DR. BY: LC

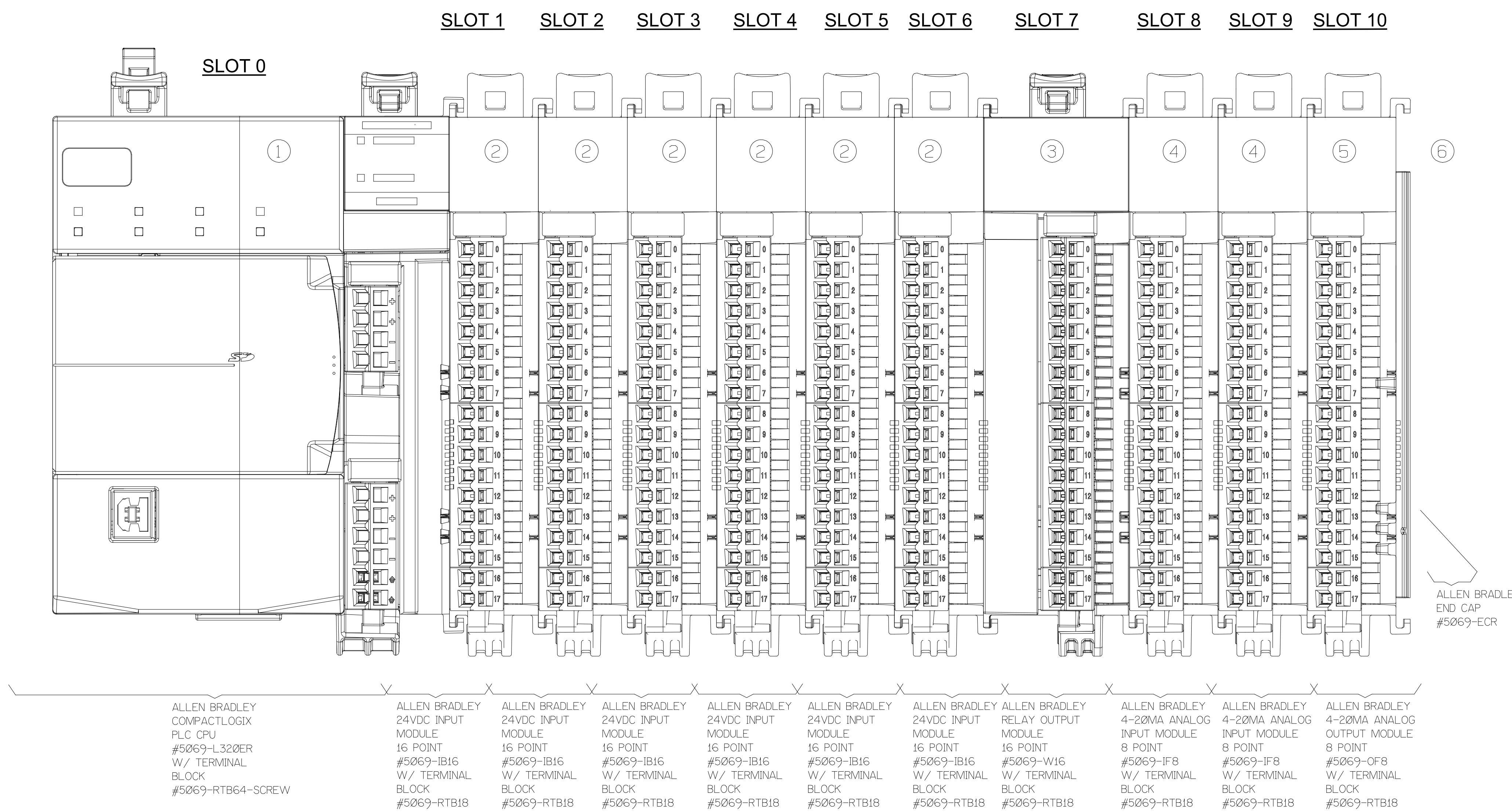
DATE: 10-05-2021

SHEET:
3 OF 14

DRAWING NO.
16692-003

ITEM	QTY	DESCRIPTION	MANUFACTURER	PART NUMBER
1	1	COMPACTLOGIX PLC PROCESSOR	ALLEN BRADLEY	5Ø69-L32ØER
	1	TERMINAL BLOCK SCREW TYPE MODULE	ALLEN BRADLEY	5Ø69-RTB64-SCREW
2	6	16 POINT 24VDC INPUT MODULE	ALLEN BRADLEY	5Ø69-IB16
	6	TERMINAL BLOCK SCREW TYPE MODULE	ALLEN BRADLEY	5Ø69-RTB18-SCREW
3	1	16 POINT RELAY OUTPUT MODULE	ALLEN BRADLEY	5Ø69-OW16
	1	TERMINAL BLOCK SCREW TYPE MODULE	ALLEN BRADLEY	5Ø69-RTB18-SCREW
4	2	8 CHANNEL ANALOG CURRENT INPUT MODULE	ALLEN BRADLEY	5Ø69-IF8
	2	TERMINAL BLOCK SCREW TYPE MODULE	ALLEN BRADLEY	5Ø69-RTB18-SCREW
5	1	8 CHANNEL ANALOG CURRENT OUTPUT MODULE	ALLEN BRADLEY	5Ø69-OF8
	1	TERMINAL BLOCK SCREW TYPE MODULE	ALLEN BRADLEY	5Ø69-RTB18-SCREW
6	1	RIGHT END CAP TERMINATOR	ALLEN BRADLEY	5Ø69-ECR

PROCESSOR I/O AND COMMUNICATIONS RACK

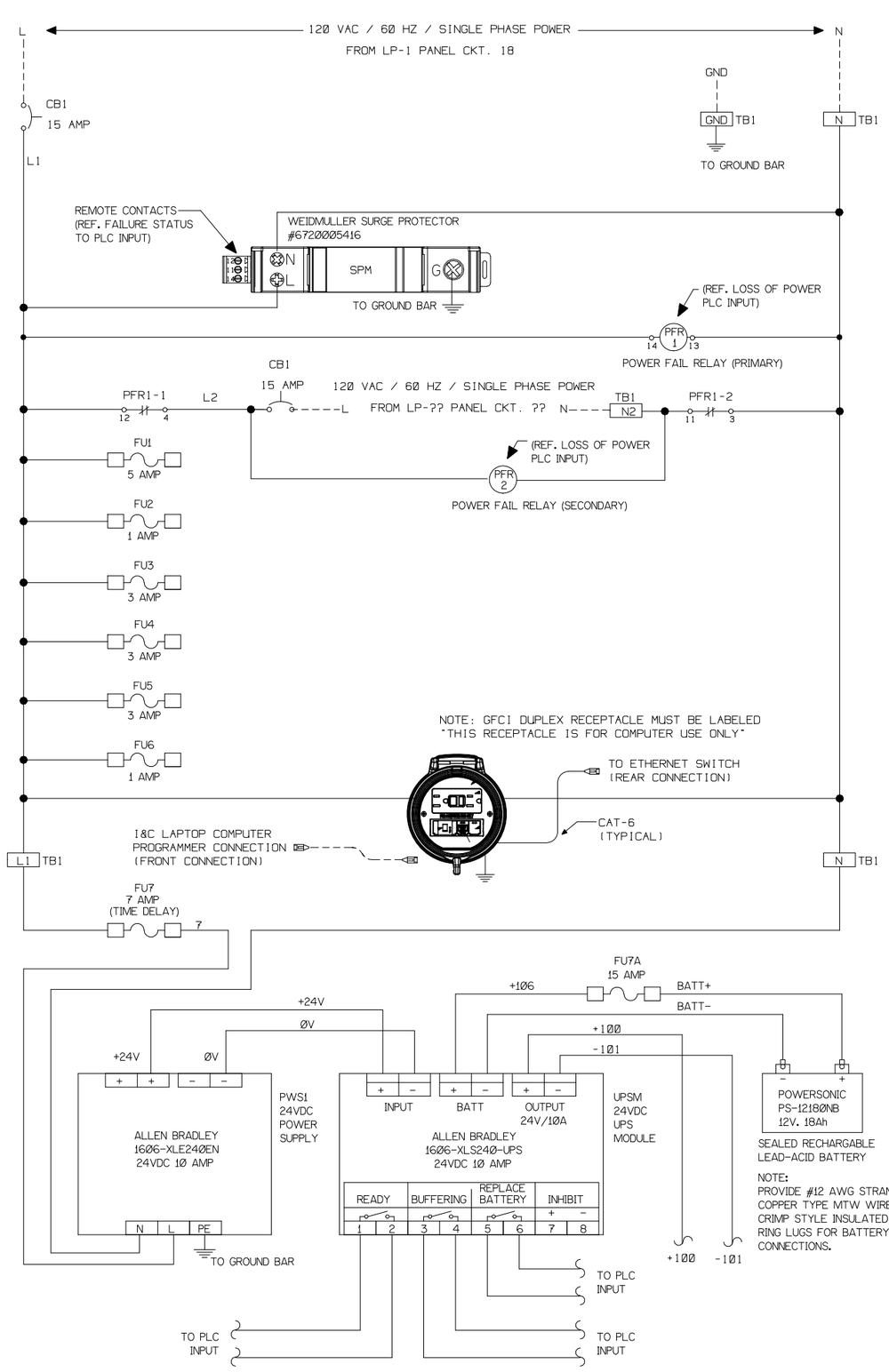


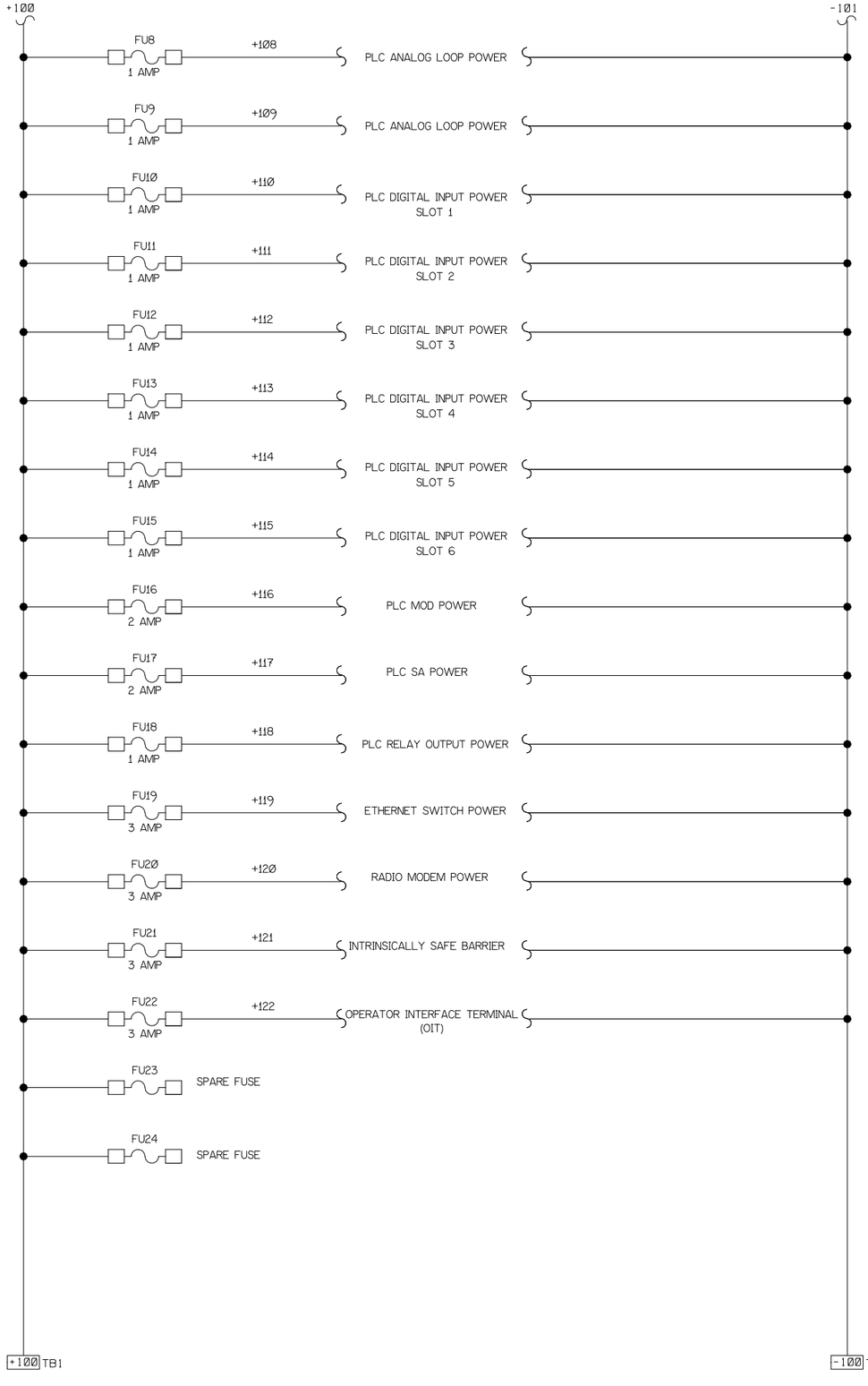
PUMPING STATION SCADA RTU
PLC RACK LAYOUT
WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R. E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

NO.	REVISION	DATE

SCALE: NONE
DR. BY: LC
DATE: 1Ø-Ø5-2Ø21
SHEET: 4 OF 14
DRAWING NO. 16692-ØØ4





PUMPING STATION SCADA RTU

ELECTRICAL WIRING SCHEMATIC

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R. E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

NO.	REVISION	DATE

SCALE: NONE

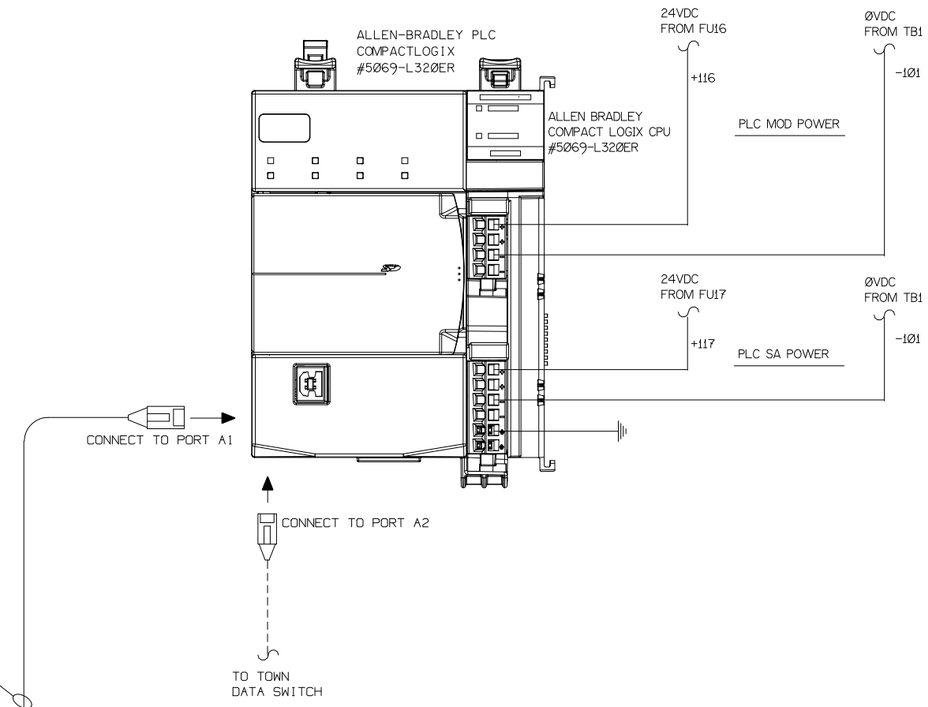
DR. BY: LC

DATE: 10-05-2021

SHEET: 5 OF 14

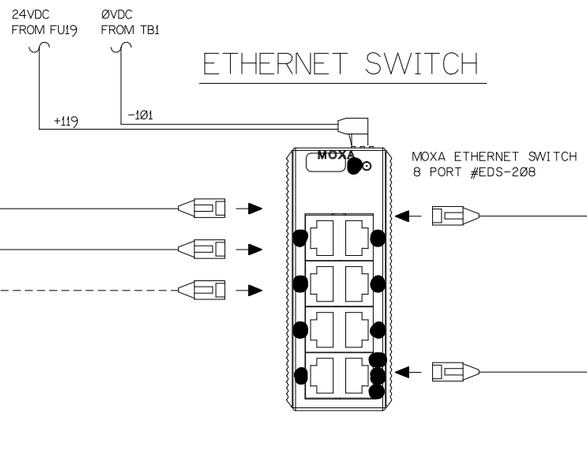
DRAWING NO. 16692-005

PLC



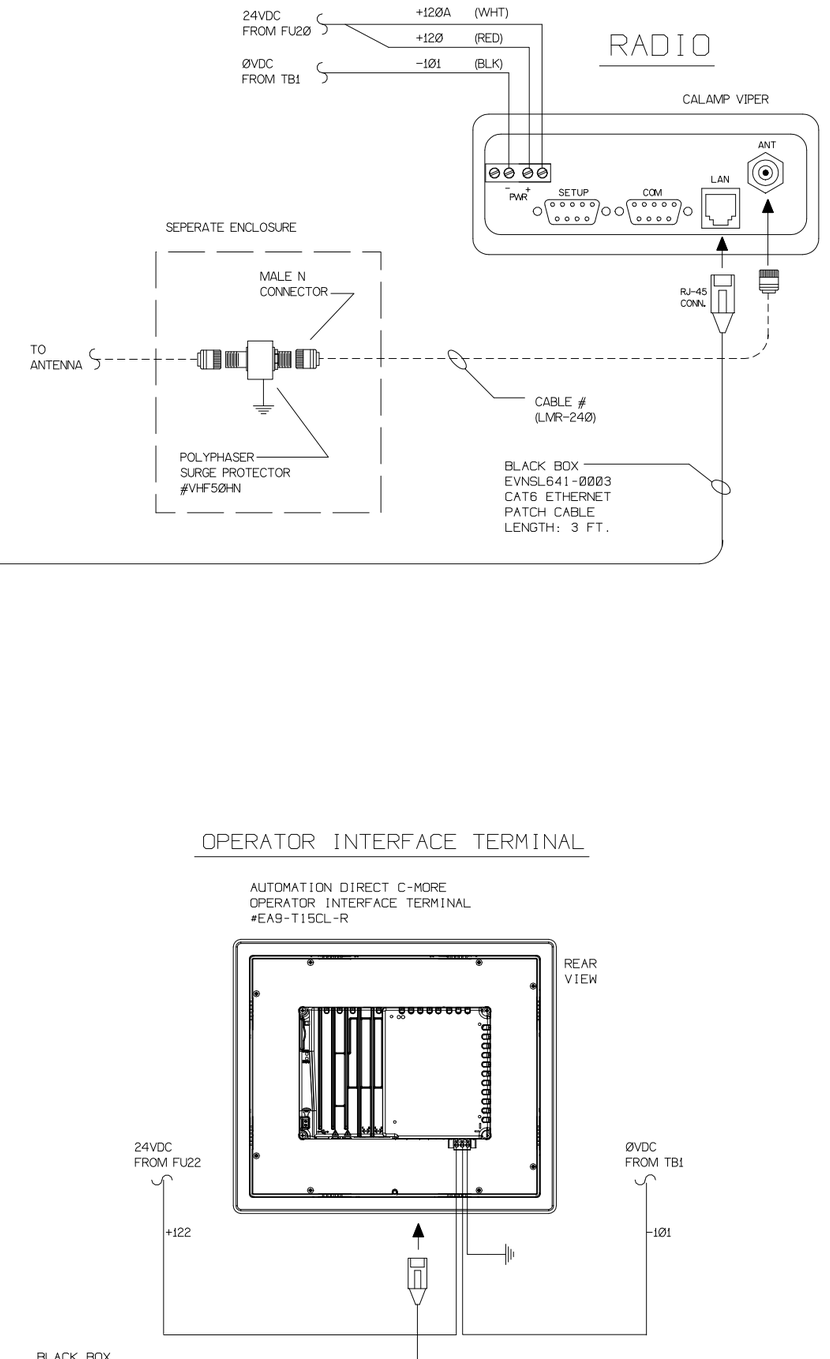
BLACK BOX
EVNSL641-0003
CAT6 ETHERNET
PATCH CABLE
LENGTH: 3 FT.

ETHERNET SWITCH

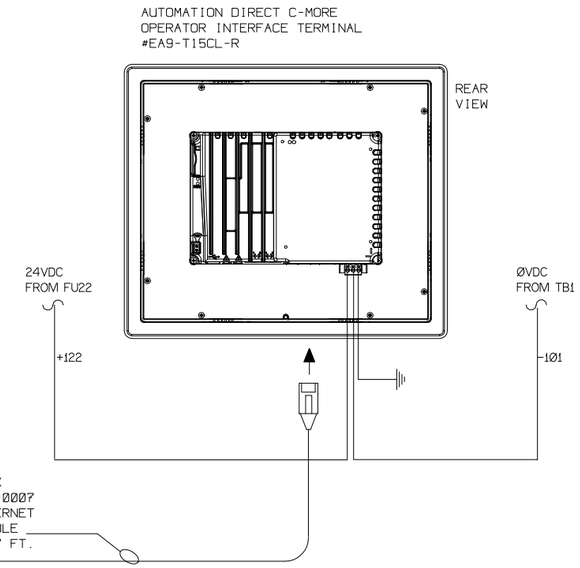


BLACK BOX
EVNSL641-0007
CAT6 ETHERNET
PATCH CABLE
LENGTH: 7 FT.

RADIO



OPERATOR INTERFACE TERMINAL



PUMPING STATION SCADA RTU

ELECTRICAL WIRING SCHEMATIC

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R. E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

NO.	REVISION	DATE

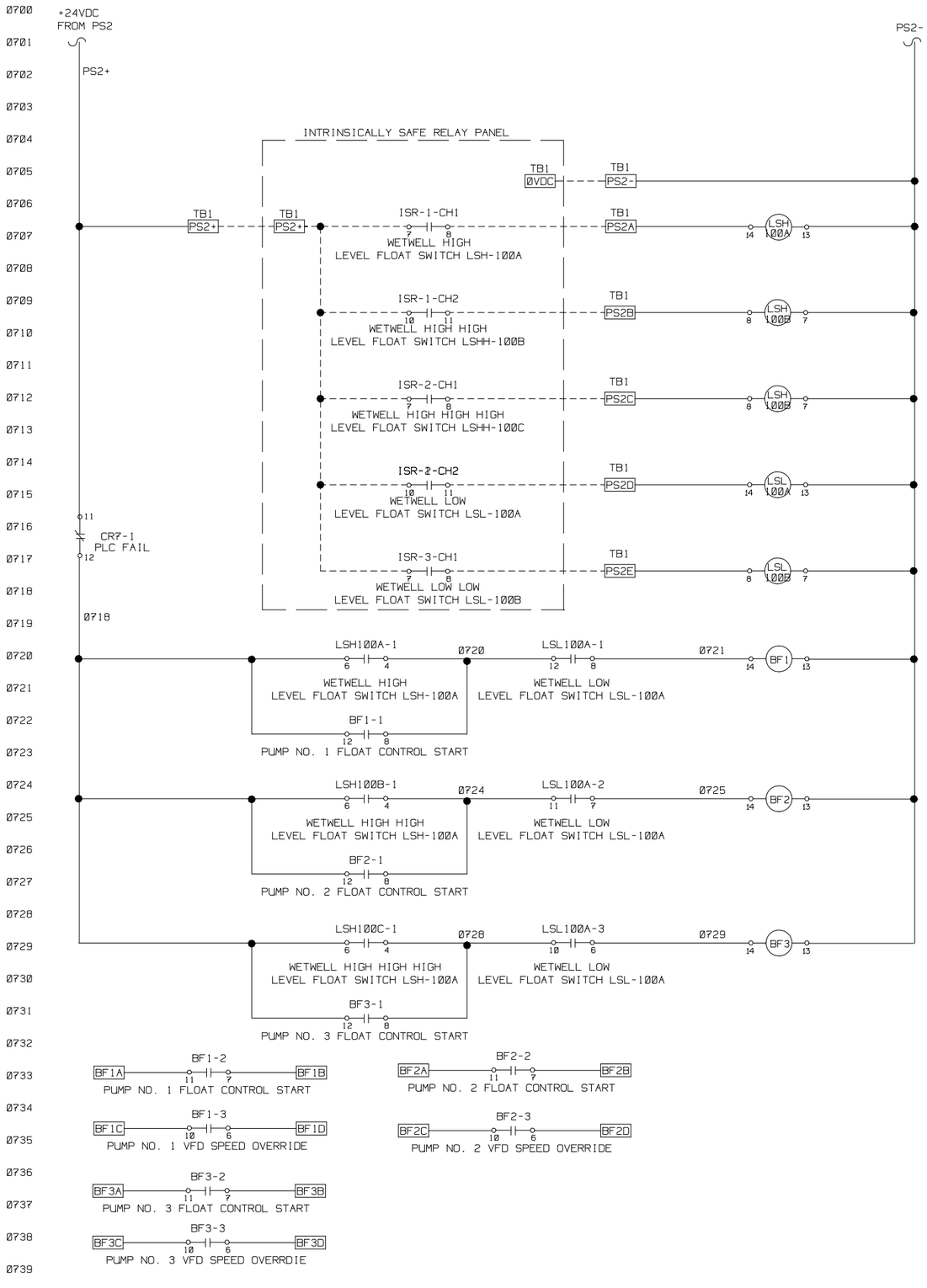
SCALE: NONE

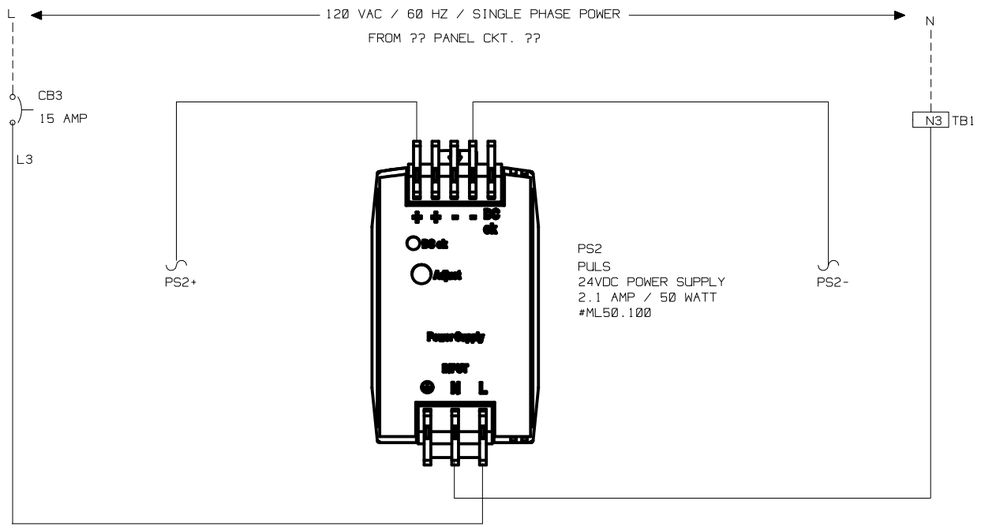
DR. BY: LC

DATE: 1Ø-Ø5-2Ø21

SHEET: 6 OF 14

DRAWING NO. 16692-ØØ6





NOTE: DOTTED WIRING BY OTHERS

PUMPING STATION SCADA RTU

ELECTRICAL WIRING SCHEMATIC

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R. E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
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NO.	REVISION	DATE

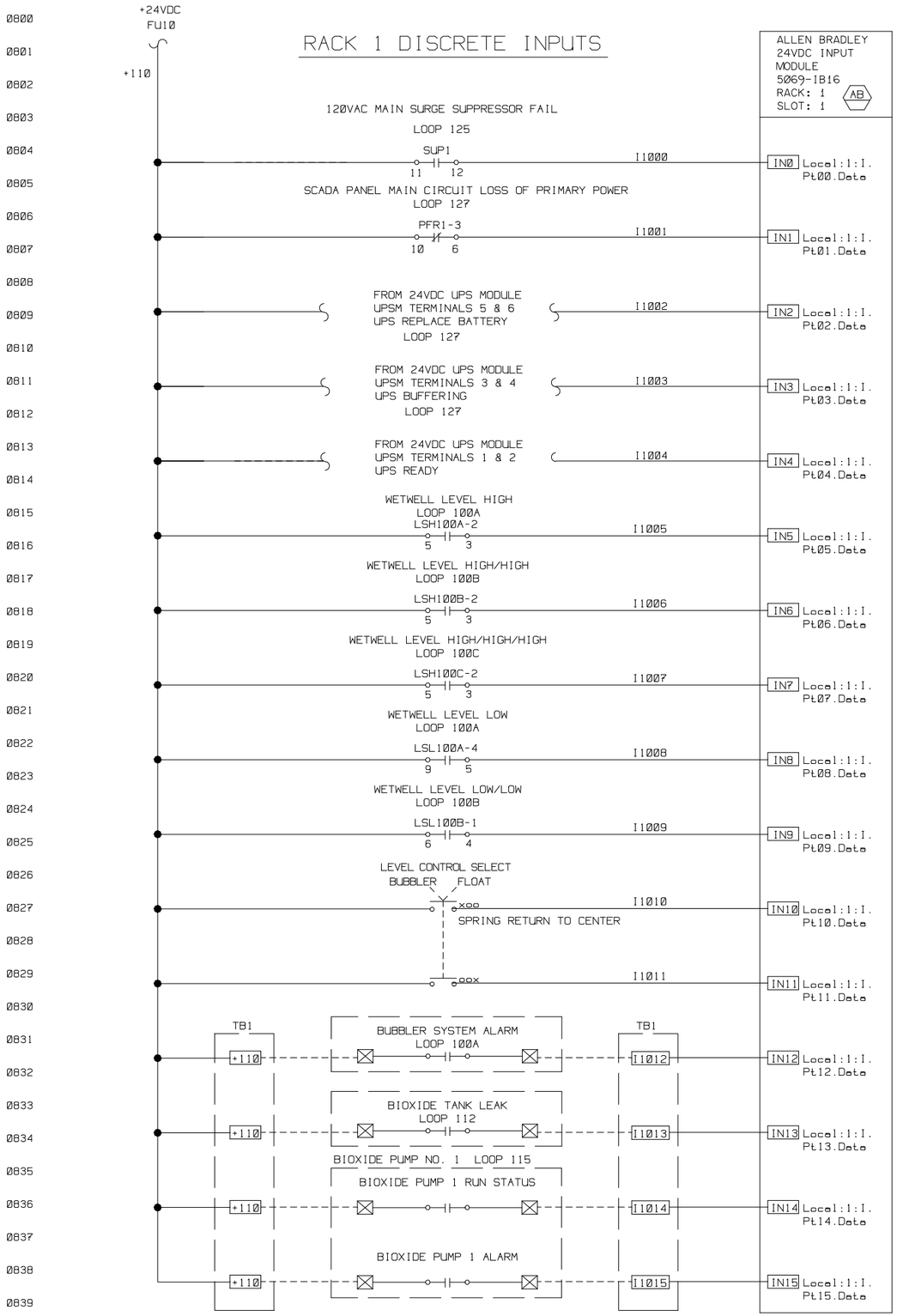
SCALE: NONE

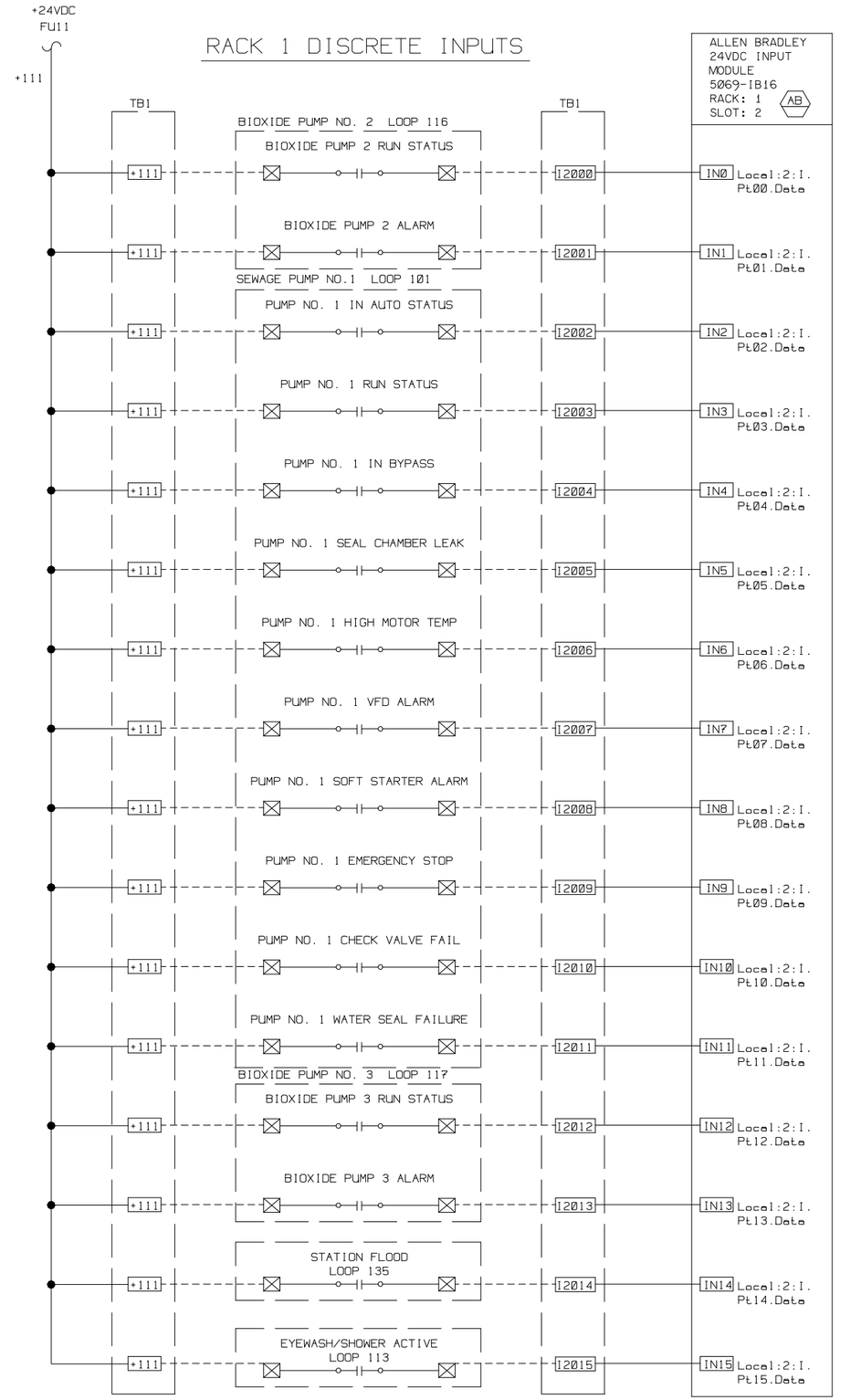
DR. BY: LC

DATE: 10-05-2021

SHEET: 7 OF 14

DRAWING NO. 16692-007





NOTE: DOTTED WIRING BY OTHERS

PUMPING STATION SCADA RTU

ELECTRICAL WIRING SCHEMATIC

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R. E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

NO.	REVISION	DATE

SCALE: NONE

DR. BY: LC

DATE: 10-05-2021

SHEET: 8 OF 14

DRAWING NO. 16692-008

PLC DISCRETE INPUTS

+24VDC
FU12
+112

ALLEN BRADLEY
24VDC INPUT
MODULE
5069-IB16
RACK: 1
SLOT: 3
AB

	TB1		TB1	
		SEWAGE PUMP NO.2 LOOP 102		
0904	+112	PUMP NO. 2 IN AUTO STATUS	I3000	IN0 Local:3:I. Pt00.Data
0906	+112	PUMP NO. 2 RUN STATUS	I3001	IN1 Local:3:I. Pt01.Data
0908	+112	PUMP NO. 2 IN BYPASS	I3002	IN2 Local:3:I. Pt02.Data
0911	+112	PUMP NO. 2 SEAL CHAMBER LEAK	I3003	IN3 Local:3:I. Pt03.Data
0913	+112	PUMP NO. 2 HIGH MOTOR TEMP	I3004	IN4 Local:3:I. Pt04.Data
0915	+112	PUMP NO. 2 VFD ALARM	I3005	IN5 Local:3:I. Pt05.Data
0917	+112	PUMP NO. 3 SOFT STARTER ALARM	I3006	IN6 Local:3:I. Pt06.Data
0919	+112	PUMP NO. 3 EMERGENCY STOP	I3007	IN7 Local:3:I. Pt07.Data
0921	+112	PUMP NO. 2 CHECK VALVE FAIL	I3008	IN8 Local:3:I. Pt08.Data
0923	+112	PUMP NO. 2 WATER SEAL FAILURE	I3009	IN9 Local:3:I. Pt09.Data
0925		HVAC RTU LOOP 140		
0926	+112	HVAC RTU RUNNING	I3010	IN10 Local:3:I. Pt10.Data
0928	+112	HVAC RTU COMMON ALARM	I3011	IN11 Local:3:I. Pt11.Data
0929	+112	SPARE DISCRETE INPUT	I3012	IN12 Local:3:I. Pt12.Data
0931	+112	SPARE DISCRETE INPUT	I3013	IN13 Local:3:I. Pt13.Data
0933	+112	SPARE DISCRETE INPUT	I3014	IN14 Local:3:I. Pt14.Data
0935	+112	SPARE DISCRETE INPUT	I3015	IN15 Local:3:I. Pt15.Data
0937				

PLC DISCRETE INPUTS

+24VDC
FU13
+113

ALLEN BRADLEY
24VDC INPUT
MODULE
5069-IB16
RACK: 1
SLOT: 4
AB

	TB1		TB1	
		SEWAGE PUMP NO.3 LOOP 103		
0942	+113	PUMP NO. 3 IN AUTO STATUS	I4000	IN0 Local:4:I. Pt00.Data
0944	+113	PUMP NO. 3 RUN STATUS	I4001	IN1 Local:4:I. Pt01.Data
0946	+113	PUMP NO. 3 IN BYPASS	I4002	IN2 Local:4:I. Pt02.Data
0949	+113	PUMP NO. 3 SEAL CHAMBER LEAK	I4003	IN3 Local:4:I. Pt03.Data
0951	+113	PUMP NO. 3 HIGH MOTOR TEMP	I4004	IN4 Local:4:I. Pt04.Data
0953	+113	PUMP NO. 3 VFD ALARM	I4005	IN5 Local:4:I. Pt05.Data
0955	+113	PUMP NO. 3 SOFT STARTER ALARM	I4006	IN6 Local:4:I. Pt06.Data
0957	+113	PUMP NO. 3 EMERGENCY STOP	I4007	IN7 Local:4:I. Pt07.Data
0959	+113	PUMP NO. 3 CHECK VALVE FAIL	I4008	IN8 Local:4:I. Pt08.Data
0961	+113	PUMP NO. 3 WATER SEAL FAILURE	I4009	IN9 Local:4:I. Pt09.Data
0963		SPARE DISCRETE INPUT		
0964	+113		I4010	IN10 Local:4:I. Pt10.Data
0966	+113	SPARE DISCRETE INPUT	I4011	IN11 Local:4:I. Pt11.Data
0968	+113	SPARE DISCRETE INPUT	I4012	IN12 Local:4:I. Pt12.Data
0970	+113	SPARE DISCRETE INPUT	I4013	IN13 Local:4:I. Pt13.Data
0972	+113	SPARE DISCRETE INPUT	I4014	IN14 Local:4:I. Pt14.Data
0974		SCADA PANEL MAIN CIRCUIT LOSS OF SECONDARY POWER LOOP 127		
0976	+113	PFR2 11 14	I4015	IN15 Local:4:I. Pt15.Data
0978				

NOTE: DOTTED WIRING BY OTHERS

PUMPING STATION SCADA RTU

ELECTRICAL WIRING SCHEMATIC

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R. E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

NO.	REVISION	DATE

SCALE: NONE

DR. BY: LC

DATE: 10-05-2021

SHEET:
9 OF 14

DRAWING NO.
16692-009

PLC DISCRETE INPUTS

+24VDC
FU14
+114

ALLEN BRADLEY
24VDC INPUT
MODULE
5069-IB16
RACK: 1
SLOT: 5

	TB1		TB1	
GENERATOR LOOP 120 / GENERATOR FAILURE	+114		I5000	IN0 Local:5:I. Pt00.Data
GENERATOR ALARM	+114		I5001	IN1 Local:5:I. Pt01.Data
GENERATOR LOW FUEL LEVEL	+114		I5002	IN2 Local:5:I. Pt02.Data
GENERATOR FUEL TANK LEAK	+114		I5003	IN3 Local:5:I. Pt03.Data
GENERATOR ON	+114		I5004	IN4 Local:5:I. Pt04.Data
GENERATOR NOT IN AUTO	+114		I5005	IN5 Local:5:I. Pt05.Data
TRANSFER SWITCH LOOP 121 / TRANSFER SWITCH NORMAL POSTION	+114		I5006	IN6 Local:5:I. Pt06.Data
TRANSFER SWITCH EMERGENCY POSITION	+114		I5007	IN7 Local:5:I. Pt07.Data
LOSS OF UTILITY POWER	+114		I5008	IN8 Local:5:I. Pt08.Data
FIRE/SECURITY PANEL LOOP 130 / STATION BUILDING INTRUSION	+114		I5009	IN9 Local:5:I. Pt09.Data
GENERATOR ENCLOSURE INTRUSION	+114		I5010	IN10 Local:5:I. Pt10.Data
STATION FIRE	+114		I5011	IN11 Local:5:I. Pt11.Data
STATION HELP CALL	+114		I5012	IN12 Local:5:I. Pt12.Data
SECURITY SYSTEM TROUBLE	+114		I5013	IN13 Local:5:I. Pt13.Data
SPARE DISCRETE INPUT	+114		I5014	IN14 Local:5:I. Pt14.Data
SPARE DISCRETE INPUT	+114		I5015	IN15 Local:5:I. Pt15.Data

PLC DISCRETE INPUTS

+24VDC
FU15
+115

ALLEN BRADLEY
24VDC INPUT
MODULE
5069-IB16
RACK: 1
SLOT: 6

	TB1		TB1	
SPARE DISCRETE INPUT	+115		I6000	IN0 Local:6:I. Pt00.Data
SPARE DISCRETE INPUT	+115		I6001	IN1 Local:6:I. Pt01.Data
SPARE DISCRETE INPUT	+115		I6002	IN2 Local:6:I. Pt02.Data
SPARE DISCRETE INPUT	+115		I6003	IN3 Local:6:I. Pt03.Data
SPARE DISCRETE INPUT	+115		I6004	IN4 Local:6:I. Pt04.Data
SPARE DISCRETE INPUT	+115		I6005	IN5 Local:6:I. Pt05.Data
SPARE DISCRETE INPUT	+115		I6006	IN6 Local:6:I. Pt06.Data
SPARE DISCRETE INPUT	+115		I6007	IN7 Local:6:I. Pt07.Data
SPARE DISCRETE INPUT	+115		I6008	IN8 Local:6:I. Pt08.Data
SPARE DISCRETE INPUT	+115		I6009	IN9 Local:6:I. Pt09.Data
SPARE DISCRETE INPUT	+115		I6010	IN10 Local:6:I. Pt10.Data
SPARE DISCRETE INPUT	+115		I6011	IN11 Local:6:I. Pt11.Data
SPARE DISCRETE INPUT	+115		I6012	IN12 Local:6:I. Pt12.Data
SPARE DISCRETE INPUT	+115		I6013	IN13 Local:6:I. Pt13.Data
SPARE DISCRETE INPUT	+115		I6014	IN14 Local:6:I. Pt14.Data
SPARE DISCRETE INPUT	+115		I6015	IN15 Local:6:I. Pt15.Data

NOTE: DOTTED WIRING BY OTHERS

PUMPING STATION SCADA RTU

ELECTRICAL WIRING SCHEMATIC

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R. E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

NO.	REVISION	DATE

SCALE: NONE

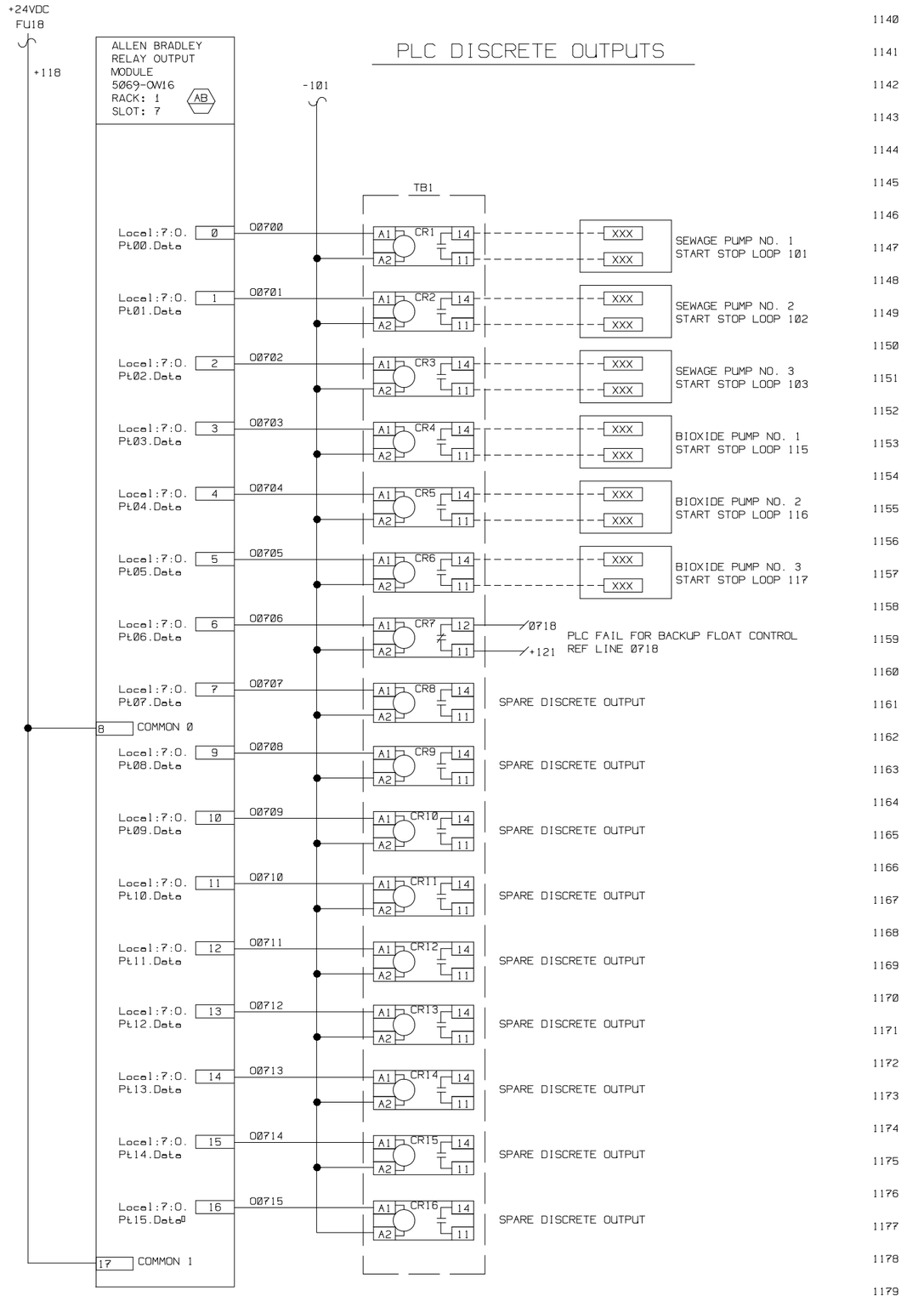
DR. BY: LC

DATE: 10-05-2021

SHEET: 10 OF 14

DRAWING NO. 16692-010

PLC DISCRETE OUTPUTS



NOTE: DOTTED WIRING BY OTHERS

PUMPING STATION SCADA RTU

ELECTRICAL WIRING SCHEMATIC

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R. E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

NO.	REVISION	DATE

SCALE: NONE

DR. BY: LC

DATE: 10-05-2021

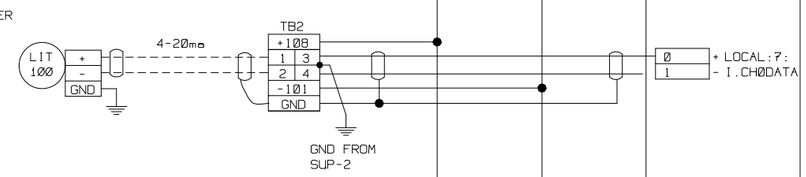
SHEET: 11 OF 14

DRAWING NO. 16692-011

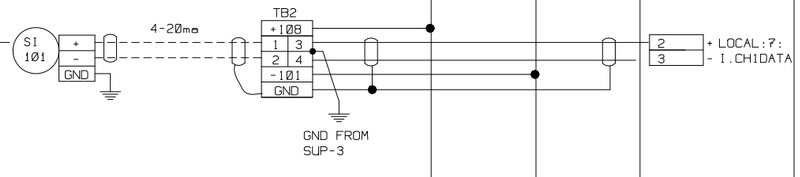
PLC ANALOG INPUTS

WETWELL LEVEL

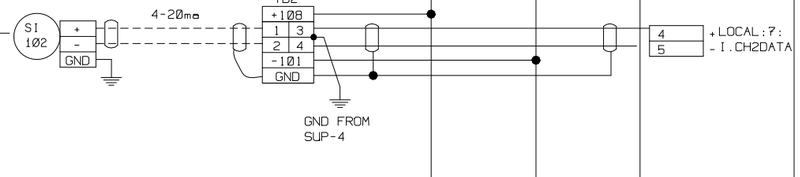
BUBBLER LEVEL TRANSMITTER
TAG: LIT-100
MANF:
MODEL:
RANGE: 0-20 FEET
LOOP #: 100



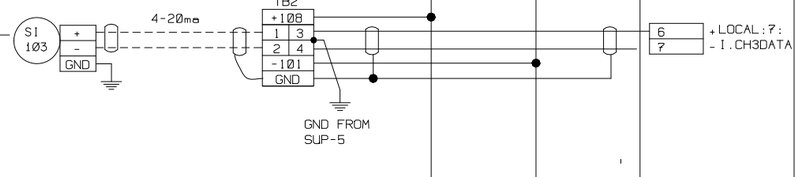
SEWAGE PUMP NO. 1 VFD SPEED FEEDBACK

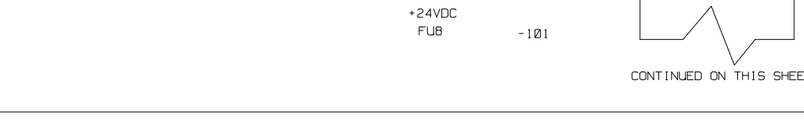


SEWAGE PUMP NO. 2 VFD SPEED FEEDBACK



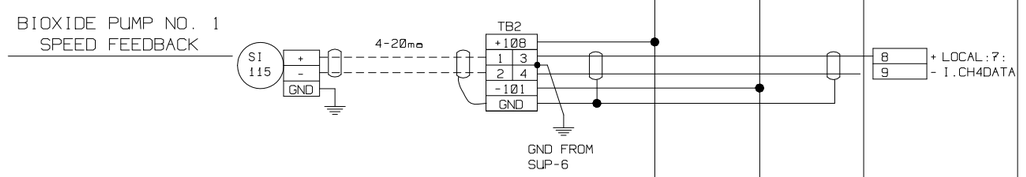
SEWAGE PUMP NO. 3 VFD SPEED FEEDBACK





PLC ANALOG INPUTS

BIOXIDE PUMP NO. 1 SPEED FEEDBACK



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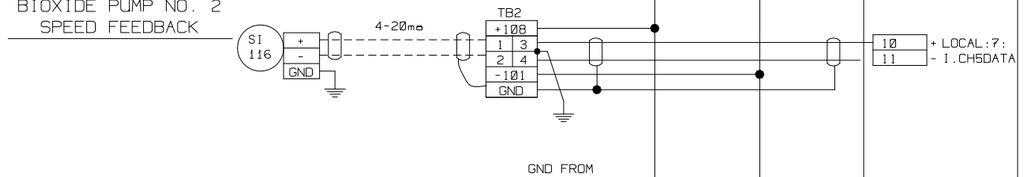

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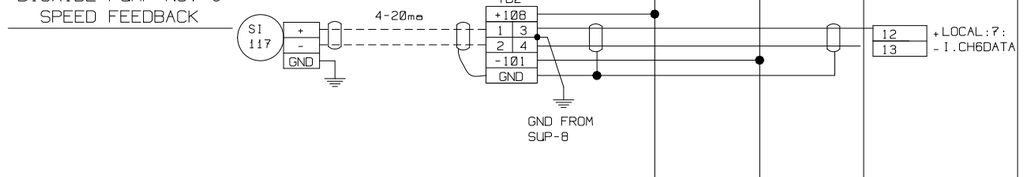
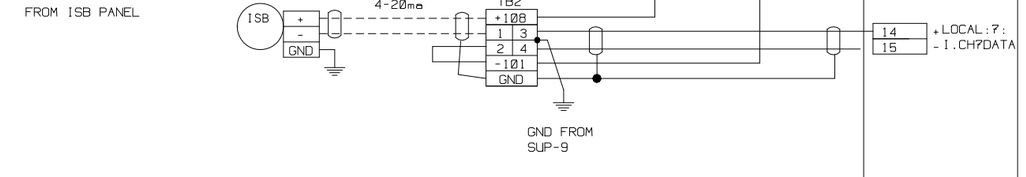


LEVEL TRANSDUCER (FUTURE)

FROM ISB PANEL



NOTE: DOTTED WIRING BY OTHERS

PUMPING STATION SCADA RTU

ELECTRICAL WIRING SCHEMATIC

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R. E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

NO.	REVISION	DATE

SCALE: NONE

DR. BY: LC

DATE: 10-05-2021

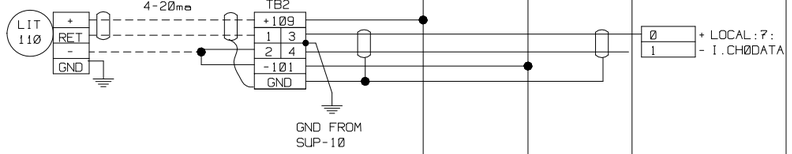
SHEET: 12 OF 14

DRAWING NO. 16692-011

PLC ANALOG INPUTS

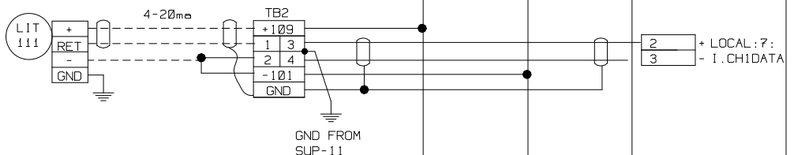
BIOXIDE TANK NO.1 LEVEL

LEVEL TRANSMITTER
TAG: LIT-110
MANF:
MODEL:
RANGE: 0-20 FEET
LOOP #: 110



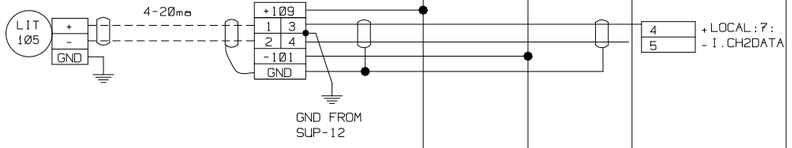
BIOXIDE TANK NO.2 LEVEL

LEVEL TRANSMITTER
TAG: LIT-111
MANF:
MODEL:
RANGE: 0-20 FEET
LOOP #: 111



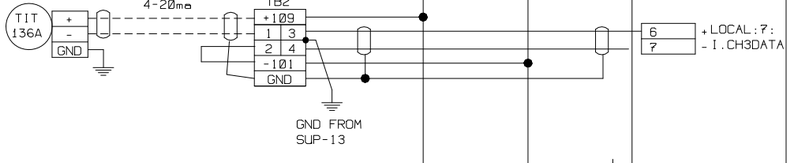
STATION EFFLUENT FLOW

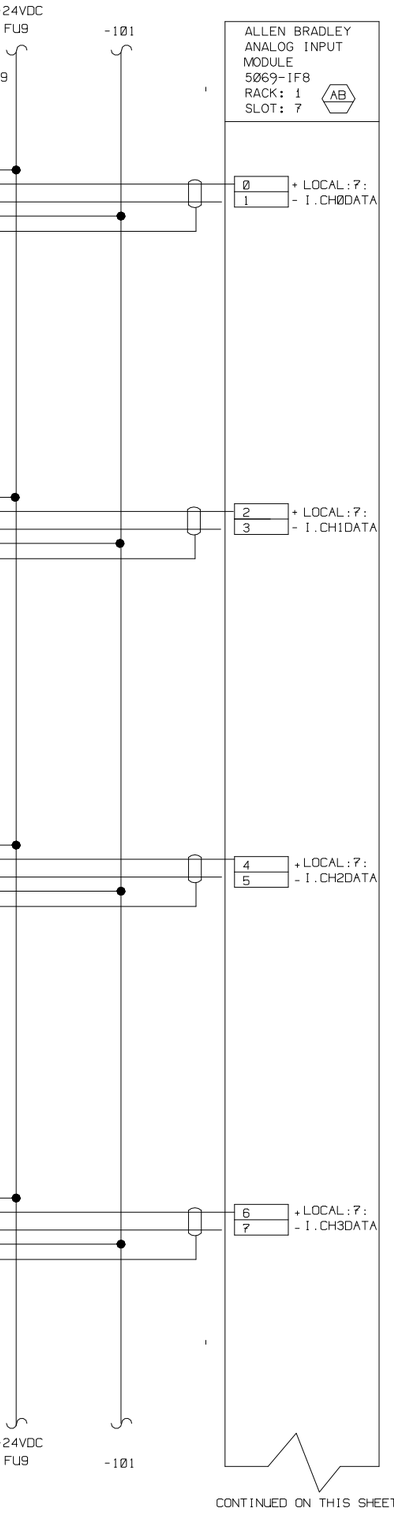
FLOW TRANSMITTER
TAG: FIT-105
MANF:
MODEL:
RANGE: 0-XX GPM
LOOP #: 105



STATION TEMPERATURE UPPER LEVEL

TEMPERATURE TRANSMITTER
TAG: TIT-136A
MANF:
MODEL:
RANGE: 0-100 DEG. F
LOOP #: 136A

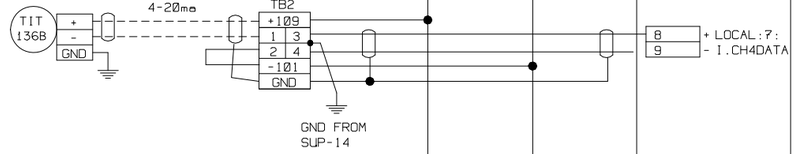




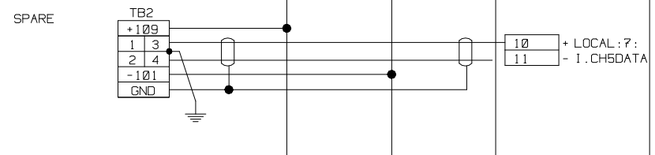
PLC ANALOG INPUTS

STATION TEMPERATURE LOWER LEVEL

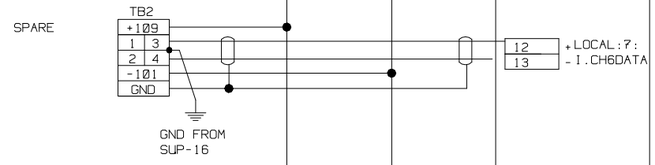
TEMPERATURE TRANSMITTER
TAG: TIT-136B
MANF:
MODEL:
RANGE: 0-100 DEG. F
LOOP #: 136B



SPARE



SPARE



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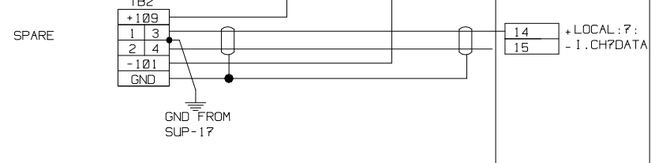

NOTE: DOTTED WIRING BY OTHERS

PUMPING STATION SCADA RTU

ELECTRICAL WIRING SCHEMATIC

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R. E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

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SCALE: NONE

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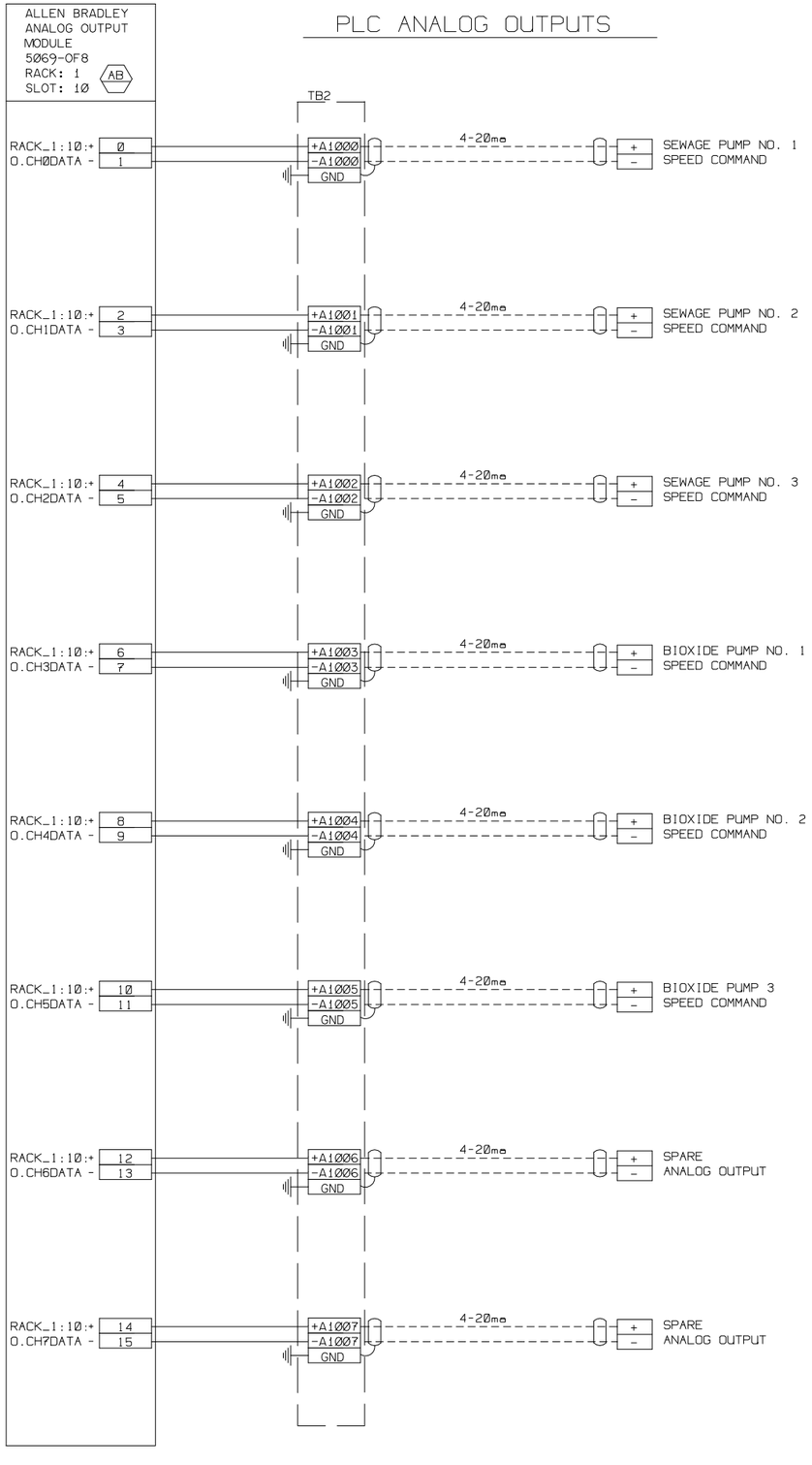
DATE: 10-05-2021

SHEET: 13 OF 14

DRAWING NO. 16692-013

PLC ANALOG OUTPUTS



NOTE: DOTTED WIRING BY OTHERS

PUMPING STATION SCADA RTU

ELECTRICAL WIRING SCHEMATIC

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

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SCALE: NONE

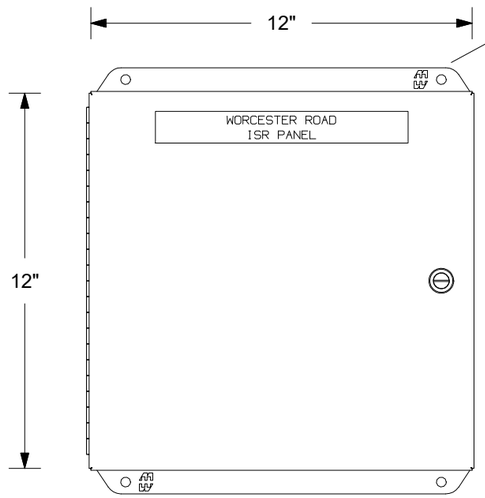
DR. BY: LC

DATE: 10-05-2021

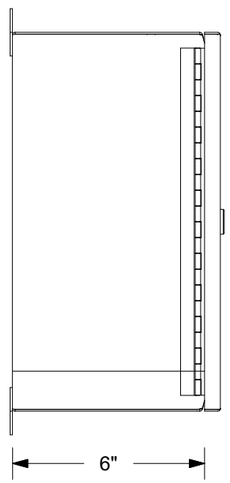
SHEET: 14 OF 14

DRAWING NO. 16692-014

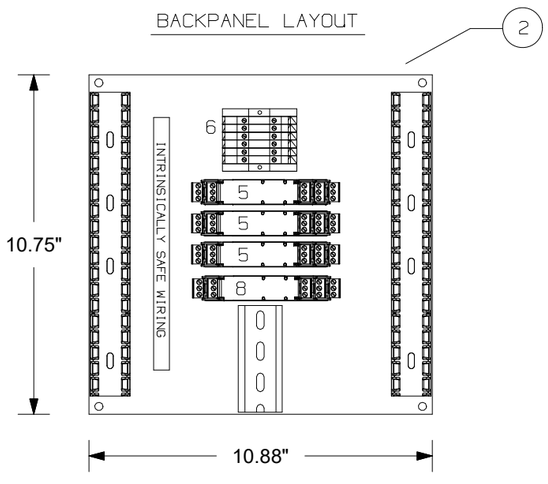
FRONT VIEW



SIDE VIEW



BACKPANEL LAYOUT



ITEM	QTY	DESCRIPTION	MANUFACTURER	PART NUMBER
1	1	ENCLOSURE NEMA 4X SS 12" X 12" X 6"	HAMMOND	EJ12126SS
2	1	BACKPANEL STEEL PAINTED WHITE ENAMEL 10.75"X10.88"	HAMMOND	WITH ENCLOSURE
3		NOT USED		
4	3	SWITCH ISOLATOR WITH RELAY OUTPUT	PEPPERL & FUCHS	KFD2-SR2-EX2.W
5	6	TERMINAL BLOCKS	ALLEN BRADLEY	1492-J4
	2	TERMINAL BLOCK END CLAMPS	ALLEN BRADLEY	1492-EAJ35
6	A/R	DIN RAIL EQUIPMENT MOUNTING TRACK	PHOENIX	0801733
7	A/R	WIREWAY 1" X 3" W/COVER	PANDUIT	F1X3LG6/C1LG6
8	1	INTRINSIC SAFETY BARRIER	PEPPERL & FUCHS	KFD2-STC4-EX1

NAMEPLATES

A	1	NAMEPLATE 1" X 8" ENGRAVED "WORCESTER ROAD ISR PANEL"

NOTE 1: ALL INTRINSICALLY SAFE WIRING SHALL BE SEPARATED FROM NON-INTRINSICALLY SAFE WIRING. REFER TO ARTICLE 504 OF THE NATIONAL ELECTRICAL CODE ANSI/NFPA 70 FOR INSTALLATION OF INTRINSICALLY SAFE WIRING.

INTRINSICALLY SAFE DEFINITION:
INTRINSICALLY SAFE EQUIPMENT AND WIRING IS EQUIPMENT AND WIRING WHICH IS INCAPABLE OF RELEASING SUFFICIENT ELECTRICAL OR THERMAL ENERGY UNDER NORMAL OR ABNORMAL CONDITIONS TO CAUSE IGNITION OF A SPECIFIC HAZARDOUS ATMOSPHERIC MIXTURE IN ITS MOST IGNITABLE CONCENTRATION. INTRINSICALLY SAFE TERMINATIONS AND WIRING MAY BE BROUGHT INTO ANY HAZARDOUS LOCATION OF ANY GROUP CLASSIFICATION FOR WHICH IT IS ACCEPTED WITHOUT REQUIRING EXPLOSION-PROOF HOUSING OR OTHER MEANS OF PROTECTION.
HAZARDOUS LOCATIONS ARE CLASSIFIED BY THE NATIONAL ELECTRICAL CODE ACCORDING TO THE LEVEL OF HAZARD THAT MAY EXIST IN THE AREA. A HAZARDOUS LOCATION IS DESIGNATED BY ITS CLASS, GROUP, AND DIVISION. THE CLASS AND GROUP SPECIFY THE SPECIFIC HAZARDOUS SUBSTANCES THAT MAY EXIST IN THE CLASSIFIED LOCATION.
- CLASS I, GROUPS A THROUGH D - FLAMMABLE GASSES
- CLASS II, GROUPS E THROUGH G - COMBUSTIBLE DUSTS
- CLASS III, EASILIY IGNITABLE FIBERS OR FLYINGS

THE DIVISION INDICATES THE CONDITIONS UNDER WHICH THE HAZARDOUS SUBSTANCE MAY BE PRESENT.
- DIVISION I - HAZARDOUS SUBSTANCES EXIST CONTINUOUSLY OR INTERMITTENTLY UNDER NORMAL OPERATING CONDITIONS.
- DIVISION II - HAZARDOUS SUBSTANCES EXIST WITHIN CLOSED CONTAINERS OR SYSTEMS FROM WHICH THEY CAN ESCAPE ONLY IN CASE OF ACCIDENTAL RUPTURE OR BREAKDOWN.

INTRINSICALLY SAFE RELAY PANEL ISRP

ENCLOSURE DETAILS

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R. E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

NO.	REVISION	DATE

SCALE: NONE

DR. BY: LC

DATE: 10-05-2021

SHEET: 1 OF 3

DRAWING NO. 16692-101

24VDC FROM PS2

24 VDC POWER FROM SCADA RTU

ØVDC FROM TB1

PS2+

ØVDC

WETWELL HIGH HIGH LEVEL FLOAT SWITCH LSHH-100B WIRING DETAIL

WETWELL HIGH HIGH LEVEL FLOAT SWITCH

FLOAT SWITCH
TAG: LSH-100B
MANF:
MODEL:
RANGE: N/A

SEE NOTES 1 & 2

(CONTACT CLOSES ON RISING LEVEL)

WETWELL HIGH HIGH LEVEL FLOAT SWITCH

FLOAT SWITCH CONTACT SHALL BE ANY NON-ENERGY STORING OR GENERATING MECHANICAL SWITCH TYPE DEVICE CONTAINING NO CAPACITANCE FOR INDUCTANCE.

ISR 1

14
15
4
6

PEPPERL & FUCHS INTRINSICALLY SAFE RELAY #KFD2-SR2-EX2.W

10
11

SCADA RTU

PS2A

WETWELL HIGH LEVEL FLOAT SWITCH LSH-100A WIRING DETAIL

WETWELL HIGH LEVEL FLOAT SWITCH

FLOAT SWITCH
TAG: LSH-100A
MANF:
MODEL:
RANGE: N/A

SEE NOTES 1 & 2

(CONTACT CLOSES ON RISING LEVEL)

WETWELL HIGH LEVEL FLOAT SWITCH

FLOAT SWITCH CONTACT SHALL BE ANY NON-ENERGY STORING OR GENERATING MECHANICAL SWITCH TYPE DEVICE CONTAINING NO CAPACITANCE FOR INDUCTANCE.

1
3
7
8

PS2B

PS2+

ØVDC

NOTE 1: MAXIMUM DISTANCE BETWEEN "IS"RELAY AND FIELD SWITCH IS 1000 FEET.
NOTE 2: ALL INTRINSICALLY SAFE WIRING SHALL BE SEPARATED FROM NON INTRINSICALLY SAFE WIRING. REFER TO NATIONAL ELECTRICAL CODE ANSI/NFPA 70 FOR INSTALLATION OF INTRINSICALLY SAFE WIRING.
NOTE 3: DOTTED WIRING BY OTHERS NOT BY R.E. ERICKSON CO.

PS2+

ØVDC

WETWELL LOW LEVEL FLOAT SWITCH LSL-100A WIRING DETAIL

WETWELL LOW LEVEL (PUMPS OFF) FLOAT SWITCH

FLOAT SWITCH
TAG: LSH-100D
MANF:
MODEL:
RANGE: N/A

SEE NOTES 1 & 2

(CONTACT CLOSES ON RISING LEVEL)

WETWELL LOW LEVEL FLOAT SWITCH

FLOAT SWITCH CONTACT SHALL BE ANY NON-ENERGY STORING OR GENERATING MECHANICAL SWITCH TYPE DEVICE CONTAINING NO CAPACITANCE FOR INDUCTANCE.

ISR 2

14
15
4
6

PEPPERL & FUCHS INTRINSICALLY SAFE RELAY #KFD2-SR2-EX2.W

PUMP CHAMBER HIGH LEVEL (LEAD ON) FLOAT SWITCH

10
11

SCADA RTU

PS2C

WETWELL HIGH HIGH HIGH LEVEL FLOAT SWITCH LSHH-100C WIRING DETAIL

WETWELL HIGH HIGH HIGH LEVEL FLOAT SWITCH

FLOAT SWITCH
TAG: LSH-100C
MANF:
MODEL:
RANGE: N/A

SEE NOTES 1 & 2

(CONTACT CLOSES ON RISING LEVEL)

WETWELL HIGH HIGH HIGH LEVEL FLOAT SWITCH

FLOAT SWITCH CONTACT SHALL BE ANY NON-ENERGY STORING OR GENERATING MECHANICAL SWITCH TYPE DEVICE CONTAINING NO CAPACITANCE FOR INDUCTANCE.

1
3
7
8

PS2D

PS2+

ØVDC

INTRINSICALLY SAFE RELAY PANEL ISRP

ELECTRICAL WIRING SCHEMATIC

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R. E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
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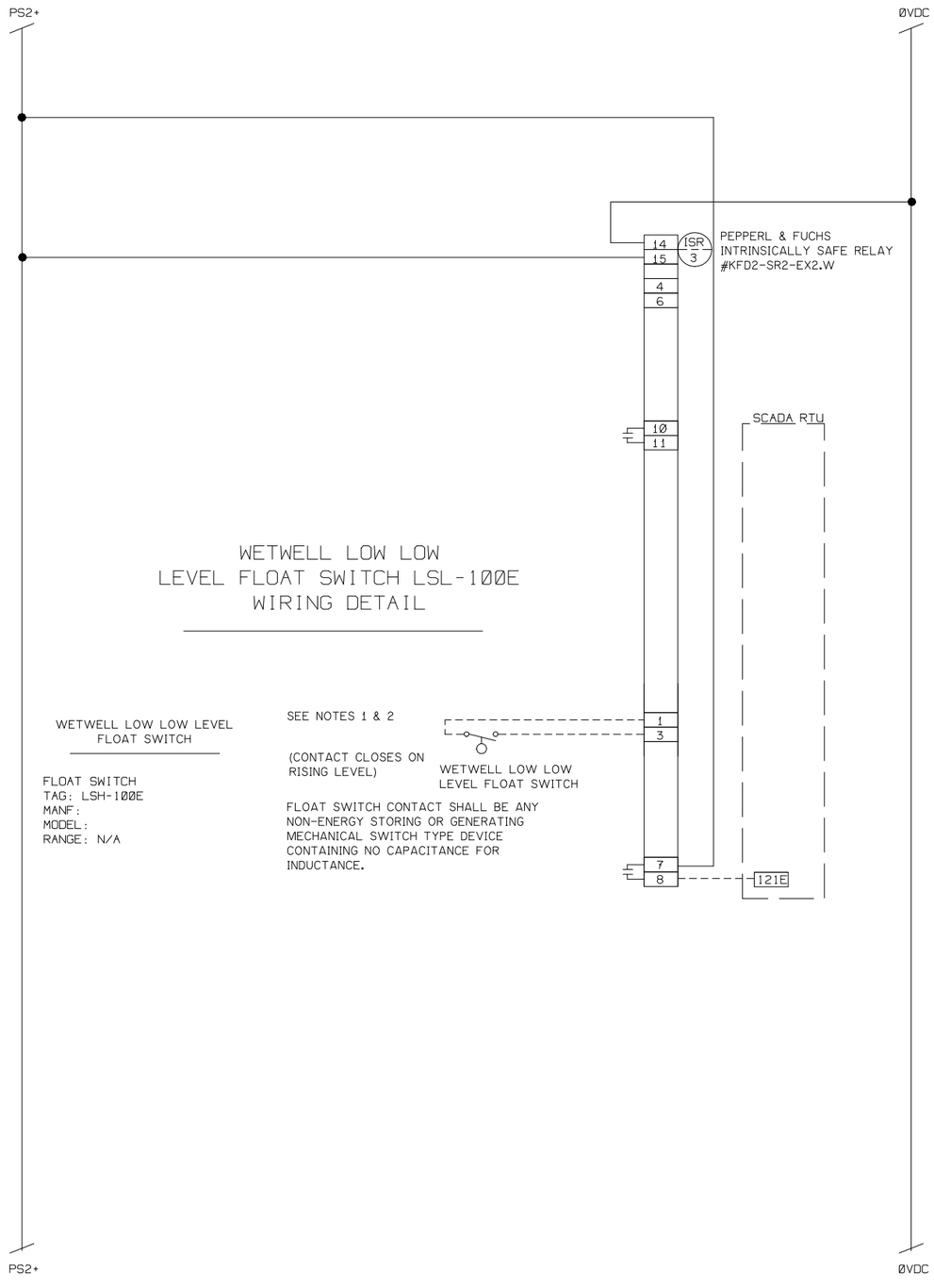
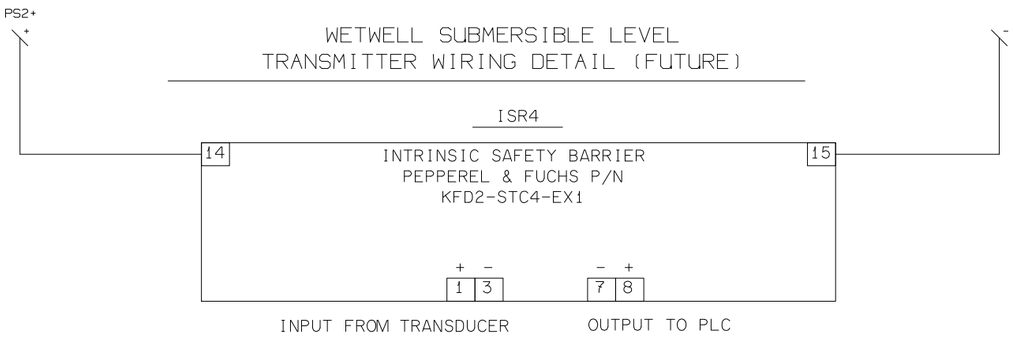
DATE: 10-05-2021

SHEET: 2 OF 3

DRAWING NO. 16692-102





NOTE 1: MAXIMUM DISTANCE BETWEEN "IS"RELAY AND FIELD SWITCH IS 1000 FEET.
NOTE 2: ALL INTRINSICALLY SAFE WIRING SHALL BE SEPARATED FROM NON INTRINSICALLY SAFE WIRING. REFER TO NATIONAL ELECTRICAL CODE ANSI/NFPA 70 FOR INSTALLATION OF INTRINSICALLY SAFE WIRING.
NOTE 3: DOTTED WIRING BY OTHERS NOT BY R.E. ERICKSON CO.

INTRINSICALLY SAFE RELAY PANEL ISRP

ELECTRICAL WIRING SCHEMATIC

WORCESTER ROAD SEWER PUMPING STATION / FRAMINGHAM, MASS

R. E. ERICKSON CO., INC.
595 PROVIDENCE HWY.
WALPOLE, MA. 02081 TEL. 508-668-9330

NO.	REVISION	DATE

SCALE: NONE

DR. BY: LC

DATE: 10-05-2021

SHEET:
3 OF 3

DRAWING NO.
16692-103

APPENDIX E: Geotechnical Report and Boring Logs

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GEI Consultants

Consulting Engineers and Scientists

February 17, 2022
Project 2200079

Mr. Alan Gunnison, PE
BETA Group, Inc.
701 George Washington Highway
Lincoln, Rhode Island

Dear Mr. Gunnison:

Re: Foundation Recommendations
Worcester Road Pumping Station
Framingham, Massachusetts

This letter report presents the results of our boring and our foundation recommendations for the proposed generator platform at the Worcester Road Pumping Station in Framingham.

Summary

As discussed below, the boring encountered about 12.5 feet of granular fill, overlying 14.5 feet of medium dense sand and silt, overlying glacial till. We recommend that the proposed generator support structure be supported on helical piles bearing in the glacial till.

Scope

We performed the following scope:

1. Reviewed logs of previous borings.
2. Performed one boring.
3. Prepared this letter report presenting the results of the boring, and our geotechnical recommendations.

Our work was authorized by the Agreement between BETA Group, Inc and GEI Consultants, Inc dated January 3, 2022.

Site Description

The pump station is located at 730 Worcester Road in Framingham, Massachusetts, as shown in Fig. 1. The site is located approximately 100 feet to the east of the Sudbury River and 150 feet to the north of a tributary of the river.

Based on the information you provided, the existing pump station is a one-story, approximately 1,200 square foot structure. It was constructed in the 1960s and has a basement that extends about 18 feet below the ground surface at the rear of the building and is supported on shallow foundations.

MassGIS shows the subsurface soils consist of sand and gravel with thin glacial till. There are floodplain alluvial deposits to the east of the site (indicating the river may have previously been located further east). MassGIS estimates the depth to bedrock to be within 50 feet of the ground

GEI Consultants, Inc.
400 Unicorn Park Drive, Woburn, MA 01801
781.721.4000

surface, but our boring extended to 50 ft and did not encounter bedrock. According to MassGIS, the bedrock underlying the site consists of Pelitic Metamorphic Rock from the Avalon Belt.

Project Description

We understand that the proposed generator is to be located directly east of the existing pumphouse, supported on an elevated steel frame platform. The approximate dimensions of the platform around the generator will be about 25 feet by 14 feet with a top elevation of 159.0 ft (NGVD29), which is as much as 4 feet higher than the existing ground surface.

At the time of writing this report, the frame has not been designed, but we understand the generator set with fuel weighs approximately 18,000 lbs. We understand the structural engineer requested that the proposed generator structure be supported on piles to avoid placing any lateral load on the basement walls of the existing pumphouse structure.

All elevations in this report are in feet and are referenced to National Geodetic Vertical Datum of 1929 (NGVD29).

Previous Borings

In 2016, Nobis Engineering contracted Technical Drilling Services to drill five geoprobe borings to depths of 15 feet in the vicinity of the site, including one boring (B-202) located ten feet east of the proposed generator (Fig. 2). SPT testing was not performed, so soil density cannot be estimated from these borings. Wells were installed within the borings upon completion. These boring logs are provided in Appendix B.

2022 Boring

Northern Drill Service, Inc. of Northborough, Massachusetts, drilled one boring (B-1) on January 28, 2022, with a Mobile B59 truck-mounted drill rig near the center of the proposed generator platform (Fig. 2). A GEI field engineer observed the drilling and logged the samples. The boring log is provided in Appendix A.

Based on spot elevations on drawings you provided, we estimate that the boring was drilled approximately at El. 156.

Prior to advancing the boring, the borehole was vacuum excavated to a depth of 6 feet to check for any existing utilities. Grab soil samples were taken during the vacuum excavation.

The boring was drilled to depth of 49.9 feet using flush-joint casing and rotary wash tooling. Standard Penetration Tests (SPTs) were performed and split-spoon soil samples were collected continuously from 6 to 12 feet and at standard 5-foot intervals after that using an automatic hammer.

Recovered split-spoon soil samples were placed in jars and sent to our Woburn, Massachusetts laboratory for verification of field classification. Individual sample descriptions are provided in the boring log in Appendix A.

Subsurface Conditions

The soil layers encountered in the borings are described below, starting at the ground surface. The soil conditions are known only at the boring locations. The subsurface conditions descriptions below were mostly from boring B-1 (2022), but also considered the nearest previous boring (B-202, 2016).

Asphalt – B-1 encountered 5 inches of asphalt at the ground surface. (B-202 encountered 3 inches.)

Fill – Below the asphalt a layer of granular fill was encountered. The fill layer was approximately 12.5 feet thick in B-1 (6 feet in B-202) and consisted of silty sand with varying amounts of gravel. Samples collected at 6 and 8 feet noted petroleum-like odors in B-1. Standard Penetration Test N-values (corrected for hammer energy) varied from 8 to 23 blows/foot, indicating loose to medium dense soil.

Sand and Silt – Sand and silt was encountered below the fill. The layer was approximately 15 feet thick in B-1. (B-202 terminated in this layer at a depth of 9 feet into the layer). The sand and silt layer varied from silty sand to silt. B-202 encountered an approximately 2.5-foot lens of clay and silt within this layer. Corrected N-values varied from 8 to 16 blows/foot, indicating loose to medium dense soil.

Glacial Till – A layer of glacial till was encountered below the sand and silt in B-1. The boring was terminated about 22.5 ft into the layer (at a total depth from ground surface of 49.9 feet). This soil consisted of widely graded gravel with silt and sand to silty sand with gravel. The fines content ranged from 5% to 20% nonplastic fines. Corrected N-values ranged from 63 to 100 blows per foot, indicating very dense soil.

Bedrock – The boring was not drilled deep enough to encounter bedrock.

Groundwater Conditions

Groundwater was measured in B-1 at the end of drilling. This water level reading was made on the same day as drilling (which included adding water to the borehole during the drilling process), so the reading may be higher than the actual groundwater level.

Wells were installed in the borings from 2016. We measured groundwater levels in four of the 2016 wells (B-200 to B-203) on January 28, 2022. Measured groundwater levels were:

Well No.	Approximate Ground Surface Elevation at Well Location (ft)	Measured Depth to Groundwater (ft)	Approximate Groundwater Elevation (ft)
B-1	156	7.3	148.7
B-200	154	4.3	149.7
B-201	154.5	4.5	150
B-202	155	5.2	149.8
B-203	154.5	4.5	150

The measured groundwater elevations ranged from El. 148.7 to El. 150. This is within the granular fill layer. Significantly different groundwater levels may occur at other times and locations.

Foundation Design

We recommend that the proposed steel platform for the generator be supported on helical piles bearing in the glacial till layer. Installation of helical piles should not disturb the nearby existing pumping station, and helical piles will not place additional load on the existing station. Helical piles are typically designed for vertical loads of 20 to 80 kips.

We recommend that helical piles be kept several feet away from the existing building to avoid potential interference with the existing foundations.

Generally, the specialty helical pile contractor designs the piles and submits the proposed design to the owner for review and approval. The contractor is responsible for providing a design that will satisfy a performance requirement. The vertical capacity of each helical pile is typically verified by measuring the torque resistance during installation, and a field load test should generally be performed to confirm the capacity.

We recommend that the following items be required, either in the specifications or as notes on the drawings.

- Helical pile designer to be a Massachusetts-registered Professional Engineer.
- Design piles in accordance with Section 1810.3.3.1.9 of the Building Code.
- Piles to extend at least to the top of the glacial till.
- Install the piles such that the upper helix is installed below elevation 138.0 (with no helices above this elevation), so no load is transferred to the existing foundation wall or footings.
- Provide hot-dip galvanizing on all surfaces of the piles.
- Use round shaft piles.
- Fill the inside of the shaft with grout.
- Install the helical piles in accordance with Section 1810.4.11 of the Building Code.
- Maintain an installation tolerance of 1 inch for plan location and 5 degrees for verticality.
- Monitor the torque using equipment that has been calibrated within the previous 6 months.
- Maintain an adequate crowd force, sufficient that the pile advances into the ground a distance of at least 80 percent of the blade pitch per revolution during normal advancement.

Settlement

We estimate that the total settlements will be less than 1 inch, and differential settlements will be less than ½ inch. Most of the settlement is expected to occur during construction.

The maximum estimated differential settlement between the existing building and the proposed platform is about 1 inch. We recommend that the connections between the structures be designed to accommodate this potential differential settlement.

Seismic Design

Based on Section 1806.4 of the Massachusetts Building Code, (Massachusetts amendments to the 2015 International Building Code) none of the soil samples are susceptible to liquefaction. Therefore, we conclude that the site does not have the potential to experience liquefaction if an earthquake occurs.

We recommend using Site Class D for seismic design, in accordance with Section 1613.2.5 of the Building Code. Corresponding design values, for Site Class D, for the site (per Massachusetts amendments to Chapter 16 of the IBC) are:

$S_S = 0.194$
$S_1 = 0.067$
$S_{DS} = 0.207$
$S_{D1} = 0.107$

Future Work

We recommend that GEI be engaged during construction to:

- Review earthwork specifications and foundation drawings from the structural engineer.
- Provide construction observation to observe helical pile installation and load tests.

Limitations

This letter was prepared for the use of BETA Group, exclusively. Our recommendations are based on the project information provided to us at the time of this report and may require modification if there are any changes in the nature, design, or location of the proposed structure. We cannot accept responsibility for designs based on our recommendations unless we are engaged to review the final plans and specifications to determine whether any changes in the project affect the validity of our recommendations and whether our recommendations have been properly implemented in the design.

It was not part of our scope to perform a detailed site history. Therefore, we have not explored for or researched the locations of buried utilities or other structures in the area of the proposed construction.

The recommendations in this report are based in part on the data obtained from the subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If variations from the anticipated conditions are encountered, it may be necessary to revise the recommendations in this report. We, therefore, recommend that GEI be engaged to make site visits during construction to: a) check that the subsurface conditions exposed during construction are in general conformance with our design assumptions and b) ascertain that, in general, the work is being performed in compliance with the contract documents.

Our professional services for this project have been performed in accordance with generally accepted engineering practices; no warranty, express or implied, is made.

We appreciate the opportunity to work with you on this project. Please call Matt Farren (781-721-4123) or Nick Mazzella (781-721-4139) if you have any questions.

Sincerely,

GEI CONSULTANTS, INC.

Nick Mazzella, P.E.
Project Manager

Matt Farren, P.E.
Senior Geotechnical Engineer

NEM:jam
Enclosures:

- Table 1 – Requirements for Structural Fill
- Table 2 – Requirements for Ordinary Fill
- Fig. 1 – Site Location Map
- Fig. 2 – As-Drilled Boring Location Plan
- Appendix A – Boring Log
- Appendix B – 2016 Borings

Tables

Table 1. Requirements for Structural Fill
Worcester Road Pumping Station
Framingham, Massachusetts

Structural Fill shall consist of hard, durable sand and gravel, free of clay, organic matter, surface coatings, and other deleterious materials. Soil finer than the No. 200 sieve (the "fines") shall be non-plastic. Structural Fill shall meet the following gradation requirements:

Sieve Size	Percent Passing by Weight
3 inches	100
½ inch	50 – 100
No. 4	35 – 85
No. 16	20 – 65
No. 50	5 – 40
No. 200 (fines)	0 – 8

Structural Fill shall be compacted in maximum 9-inch-thick, loose lifts to at least 95 percent of the maximum dry density determined in accordance with ASTM D1557 (Modified AASHTO Compaction).

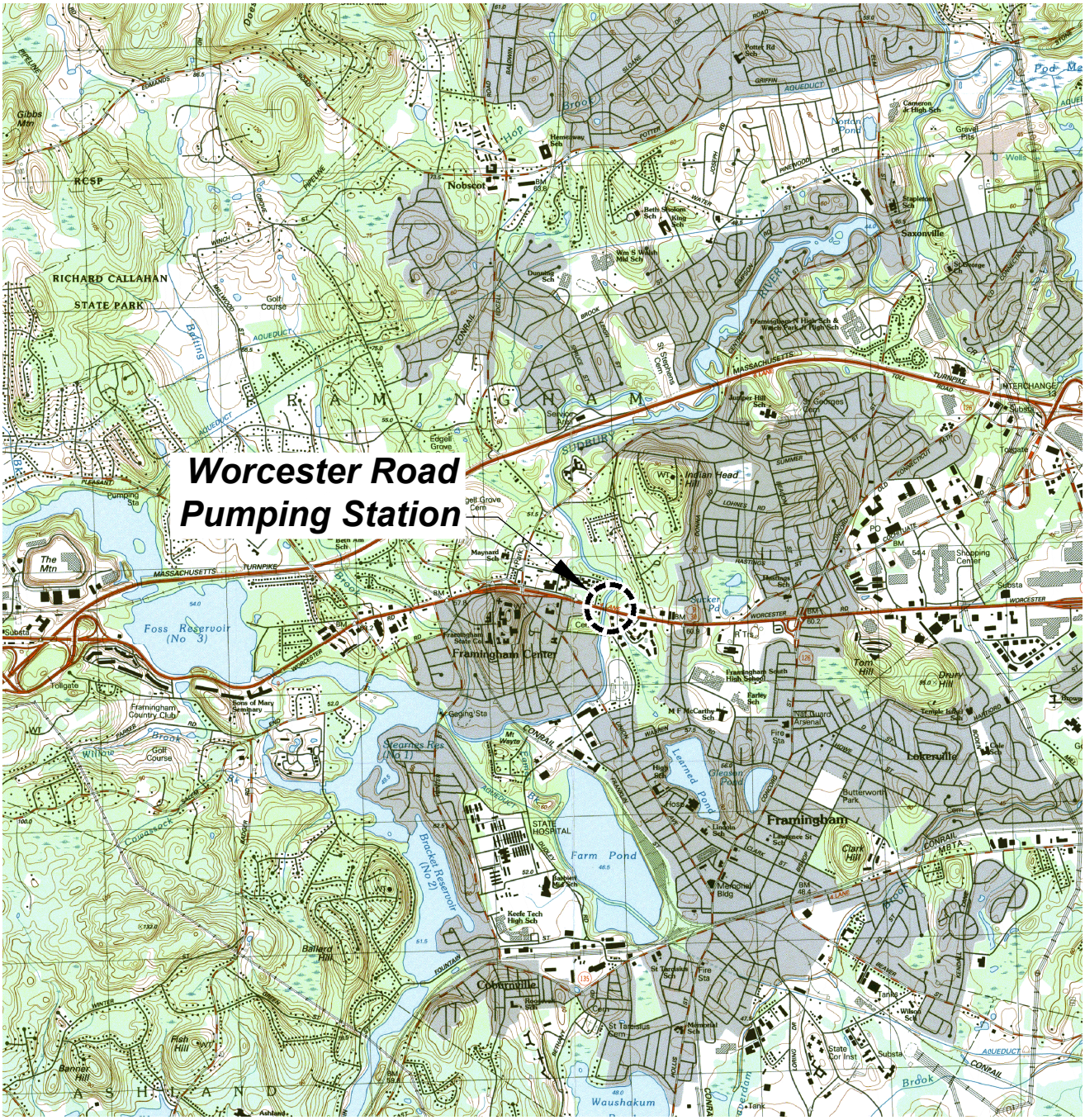
Table 2 - Requirements for Ordinary Fill
Worcester Road Pumping Station
Framingham, Massachusetts

Ordinary Fill shall consist of hard, durable sand and gravel, free of clay, organic matter, surface coatings, and other deleterious materials. Soil finer than the No. 200 sieve (the "fines") shall be nonplastic. Ordinary Fill shall meet the following gradation requirements:

Sieve Size	Percent Passing by Weight
6 inches	100
3 inches	80 – 100
No. 4	20 – 100
No. 200 (fines)	0 - 20

Ordinary Fill shall be compacted in maximum 12-inch-thick, loose lifts to at least 92 percent of the maximum dry density determined in accordance with ASTM D1557 (Modified AASHTO Compaction).

Figures



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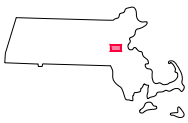
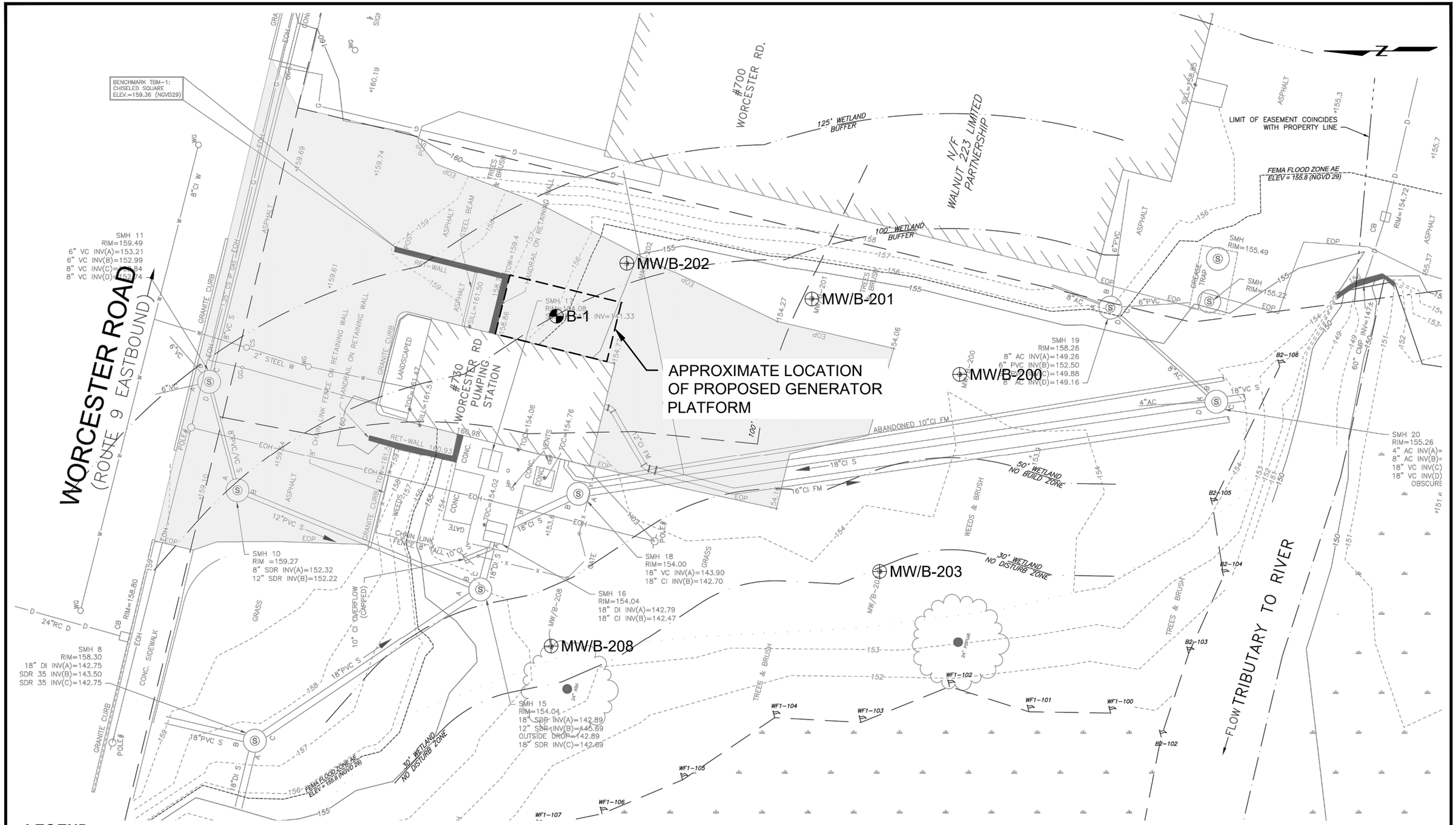
Contour Interval is 10 Feet.



MASSACHUSETTS
QUADRANGLE LOCATION

Worcester Road Pumping Station Foundation Recommendations Framingham, MA	GEI Consultants	SITE LOCATION MAP
BETA Group Lincoln, Rhode Island	Project 2200079	February 2022 Fig. 1

B:\Working\BETA GROUP\2200079 Framingham Pump Station Generator Pad\00_CAD\Figures\01 - site location



LEGEND:

- B-1 — 2022 GEI Boring Location
- MW/B-201 — 2016 Nobis Boring Location

SOURCE:

1. PLAN BASED ON MAP PREPARED BY BETA Group.

0 20 40

SCALE: 1" = 20'

Worcester Road Pumping Station Foundation Recommendations Framingham, MA	GEI Consultants	As-Drilled Boring Location Plan
BETA Group Lincoln, Rhode Island	Project 2200079	February 2022 — Fig. 2

Appendix A

Boring Log

BORING INFORMATION

LOCATION: Proposed Generator Location

GROUND SURFACE EL. (ft): 156 **DATE START/END:** 1/28/2022 - 1/28/2022

VERTICAL DATUM: NGVD29 **DRILLING COMPANY:** Northern Drill Service, Inc.

TOTAL DEPTH (ft): 49.9 **DRILLER NAME:** Z. Nader

LOGGED BY: E. Winter **RIG TYPE:** Mobile B-59 Truck Rig

BORING

B-1

DRILLING INFORMATION

HAMMER TYPE: Automatic **CASING I.D./O.D.:** 4 inch / 4.5 inch **CORE BARREL TYPE:**

AUGER I.D./O.D.: NA / NA **DRILL ROD O.D.:** NM **CORE BARREL I.D./O.D.** NA / NA

DRILLING METHOD: Drive and Wash

WATER LEVEL DEPTHS (ft): ▼ 7.3 1/28/2022

ABBREVIATIONS:

Pen. = Penetration Length
Rec. = Recovery Length
RQD = Rock Quality Designation = Length of Sound Cores>4 in / Pen.,%
WOR = Weight of Rods
WOH = Weight of Hammer

S = Split Spoon Sample
C = Core Sample
U = Undisturbed Sample
SC = Sonic Core
DP = Direct Push Sample
HSA = Hollow-Stem Auger

Qp = Pocket Penetrometer Strength
Sv = Pocket Torvane Shear Strength
LL = Liquid Limit
PI = Plasticity Index
PID = Photoionization Detector
I.D./O.D. = Inside Diameter/Outside Diameter

NA, NM = Not Applicable, Not Measured
Blows per 6 in.: 140-lb hammer falling 30 inches to drive a 2-inch-O.D. split spoon sampler.

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
155						Vacuum Excavated to 6 feet.	FILL	0" - 5": ASPHALT
		G1	2 to 2.5	6				G1: SILTY SAND (SM); ~75% fine to coarse sand, ~15% nonplastic fines, ~10% fine to coarse gravel, brown. Some gravel was too large to fit in driller's jar.
		G2	4 to 4.5	6				G2: Similar to G1.
150	5	S1	6 to 8	24/7	10-11-6-4			S1: SILTY SAND WITH GRAVEL (SM); ~60% fine to coarse sand, ~25% nonplastic fines, ~15% fine to coarse gravel, gray/brown. Slight petroleum odor.
		S2	8 to 10	24/6	4-4-2-2			S2: SILTY SAND WITH GRAVEL (SM); ~70% fine to coarse sand, ~15% nonplastic fines, ~15% fine to coarse gravel, brown. Rainbow like sheen. Slight petroleum odor.
145	10	S3	10 to 12	24/0	5-5-5-5			S3: No Recovery. Rock stuck in tip.
		S4	14 to 16	24/15	2-3-3-6		SAND AND SILT	S4: SILTY SAND (SM); ~65% fine to medium sand, ~35% nonplastic fines, brown.
140	15							
		S5	19 to 21	24/0	4-5-7-8	Redrove S5 with 3-Inch spoon from 19' - 21'. Drilled open hole from 19' to 29.5' to to take S5, S6, and S7.		S5: No Recovery. S5 REDRIVE: SILT (ML); ~85% slightly plastic fines, ~15% fine sand, tan.
135	20							

NOTES:

PROJECT NAME: Worcester Road Pumping Station

CITY/STATE: Framingham, Massachusetts

GEI PROJECT NUMBER: 2200079

GEI Consultants

LOCATION: Proposed Generator Location
GROUND SURFACE EL. (ft): 156 **DATE START/END:** 1/28/2022 - 1/28/2022
VERTICAL DATUM: NGVD29 **DRILLING COMPANY:** Northern Drill Service, Inc.

BORING B-1

Elev. (ft)	Depth (ft)	Sample Information: Sample No.	Sample Information: Depth (ft)	Sample Information: Pen./ Rec. (in)	Sample Information: Blows per 6 in. or RQD	Drilling Remarks/ Field Test Data	Layer Name	Soil and Rock Description
	25	S6	24 to 26	24/14	2-3-5-6		SAND AND SILT	S6: SILTY SAND (SM); ~85% fine to medium sand, ~15% nonplastic fines, light brown with orange staining.
130								
	30	S7	29 to 29.4	5/0	100/5"		TILL	S7: No Recovery.
125						Rig chatter from 32' to 33'.		
	35	S8	34 to 36	24/10	26-15-32-15	Advanced 4-Inch-ID casing to 34'.		S8: WIDELY GRADED GRAVEL WITH SAND AND SILT (GW-GM); ~50% fine to coarse subangular to angular gravel, ~40% fine to coarse sand, ~10% nonplastic fines, 0" -5" gray, 5" - 10" light brown.
120						Telescoped 3-Inch-ID casing.		
	40	S9	39 to 41	24/14	23-23-24-47	Advanced 3-Inch-ID casing to 39'.		S9: WIDELY GRADED SAND WITH SILT AND GRAVEL (SW-SM); ~50% fine to coarse sand, ~40% fine to coarse subangular gravel, ~10% nonplastic fines, light brown.
115								
	45	S10	44 to 44.9	11/11	56-100/5"			S10: SILTY SAND WITH GRAVEL (SM); ~45% fine to coarse sand, ~35% fine to coarse subangular to angular gravel, ~20% nonplastic fines, gray.
110								
	50	S11	49 to 49.9	11/11	71-100/5"			S11: WIDELY GRADED GRAVEL WITH SAND (GW); ~75% fine to coarse gravel, ~20% fine to coarse sand, ~5% nonplastic fines, gray.
105								Bottom of boring at 49.9'. Backfilled with cuttings and topped with an asphalt patch.
	55							

NOTES:

PROJECT NAME: Worcester Road Pumping Station

CITY/STATE: Framingham, Massachusetts

GEI PROJECT NUMBER: 2200079

GEI Consultants

Appendix B

2016 Boring Logs

BORING LOG

Nobis — Engineering a Sustainable Future

Project: Worcester Road Pump House Elimination

Location: Framingham, MA

Nobis Project No.: 86640.23

Boring No.: **B-200**

Boring Location: Worcester Road Pump House Property. See site plan.

Checked by:

Date Start: May 13, 2016

Date Finish: May 13, 2016

Contractor: Technical Drilling Services

Driller: T. Newton

Nobis Rep.: E. Rudomen

Rig Type / Model: Geoprobe 6620DT

Hammer Type: N/A

Hammer Hoist: N/A

Ground Surface Elev.: (+/-) 155

Datum: Site Plan Provided by Wright-Pierce

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	2	2
Advancement	Direct Push	Direct Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	SAMPLE INFORMATION Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	LITHOLOGY Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	NOTES
1	S-1	34	0-5						S-1A (22"): Brown, fine to medium SAND, trace Silt, trace Organics, crushed rock layer from 7-11 inches. dry.	
2					0.6					
3									S-1B (4"): Brown, Wood fragments. dry.	
4								Fill	S-1C (8"): Black, fine to coarse SAND, several Rubber and Brick fragments. dry.	
5					144					
6	S-2	47	5-10						S-2A (6"): Black, fine to coarse SAND, several Rubber and Brick fragments. moist.	
7					125				S-2B (11"): Black, SILT, few Rubber fragments. wet.	
8								Clay	S-2C (10"): Gray and brown, CLAY. wet.	
9					151				S-2D (20"): Gray, fine to coarse SAND, little Silt. wet.	
10										
11	S-3	51	10-15						S-3A (33"): Gray, fine to coarse SAND, little Silt. wet.	
12					47			Sand		
13										
14									S-3B (9"): Reddish brown, fine to coarse SAND, little Silt. wet.	
15					1.1				S-3C (9"): Brown, fine SAND. wet.	
16									Boring terminated at 15 feet.	
17										
18										

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

1) Collected sample at 5-7 feet below ground surface for laboratory analysis of EPH, VPH, and total lead.

Soil descriptions are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

Nobis — Engineering a Sustainable Future

Project: Worcester Road Pump House Elimination

Location: Framingham, MA

Nobis Project No.: 86640.23

Boring No.: **B-201**

Boring Location: Worcester Road Pump House Property. See site plan.

Checked by:

Date Start: May 13, 2016

Date Finish: May 13, 2016

Contractor: Technical Drilling Services

Driller: T. Newton

Nobis Rep.: E. Rudomen

Rig Type / Model: Geoprobe 6620DT

Hammer Type: N/A

Hammer Hoist: N/A

Ground Surface Elev.: (+/-) 155

Datum: Site Plan Provided by Wright-Pierce

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	2	2
Advancement	Direct Push	Direct Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	Sample Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	Graphic	Stratum Elev. / Depth (ft.)	Sample Description and Remarks (Classification System: Modified Burmister)
1	S-1	25	0-5						S-1: Brown and black, fine to coarse SAND, little Silt, little fine to coarse Gravel, few Glass and Wood fragments from 13-20". moist at 12".
2									
3					9.6			Fill	
4									
5									
6	S-2	32	5-10					Silt	S-2A (7"): Dark brown and black, SILT. wet. Petroleum odor.
7					172				S-2B (25"): Gray, fine to coarse SAND, little Silt, little fine to coarse Gravel. wet. Petroleum odor and sheen on soil.
8									
9					135				
10									
11	S-3	48	10-15					Sand	S-3A (24"): Gray, fine SAND. wet.
12					0.5				
13									S-3B (19"): Brown, fine to medium SAND, some Silt. wet.
14									
15					0.4			Silt and Clay	S-3C (5"): Brown, SILT & CLAY. wet.
16									Boring terminated at 15 feet.
17									
18									

WELL DETAIL: Cement Collar with Roadbox; Bentonite Seal; 2" PVC Riser; Sand Filter; 2" Slotted PVC

NOTES

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

1) Collected sample at 0-5 feet below ground surface for laboratory analysis of coal ash.
2) Collected sample at 5-7 feet below ground surface for laboratory analysis of EPH, VPH, and total lead.

Soil descriptions are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

Nobis — Engineering a Sustainable Future

Project: Worcester Road Pump House Elimination

Location: Framingham, MA

Nobis Project No.: 86640.23

Boring No.: **B-202**

Boring Location: Worcester Road Pump House Property. See site plan.

Checked by:

Date Start: May 13, 2016

Date Finish: May 13, 2016

Contractor: Technical Drilling Services

Driller: T. Newton

Nobis Rep.: E. Rudomen

Rig Type / Model: Geoprobe 6620DT

Hammer Type: N/A

Hammer Hoist: N/A

Ground Surface Elev.: (+/-) 157

Datum: Site Plan Provided by Wright-Pierce

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	2	2
Advancement	Direct Push	Direct Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	SAMPLE INFORMATION Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	LITHOLOGY Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)
1	S-1	35	0-5					Asphalt	S-1A (3"): Asphalt. S-1B (32"): Brown, fine to coarse SAND, some fine to coarse Gravel, crushed rock from 24-26". dry.
2									
3					0.6			Fill	
4									
5									
6	S-2	40	5-10						S-2A (7"): Brown, fine to coarse SAND, some fine to coarse Gravel. dry.
7					34				S-2B (18"): Gray, fine SAND & SILT. wet. Strong petroleum odor and black stianing at water table interface.
8									
9					70.4				S-2C (15"): Gray, fine SAND, some Silt. wet.
10								Sand	
11	S-3	57	10-15						S-3A (22"): Gray, fine to coarse SAND. wet.
12					8.8				
13									S-3B (35"): Brown, CLAY & SILT, fine Sand layer at 48-51". wet.
14					0.8			Clay and Silt	
15									Boring terminated at 15 feet.
16									
17									
18									

WELL DETAIL: Cement Collar with Roadbox; Bentonite Seal; 1" PVC Riser; Sand Filter; 1" Slotted PVC

NOTES

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

1) Collected sample at 6-10 feet below ground surface for laboratory analysis of EPH, VPH, and total lead.

Soil descriptions are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

Nobis — Engineering a Sustainable Future

Project: Worcester Road Pump House Elimination

Location: Framingham, MA

Nobis Project No.: 86640.23

Boring No.: **B-203**

Boring Location: Worcester Road Pump House Property. See site plan.

Checked by:

Date Start: May 13, 2016

Date Finish: May 13, 2016

Contractor: Technical Drilling Services

Driller: T. Newton

Nobis Rep.: E. Rudomen

Rig Type / Model: Geoprobe 6620DT

Hammer Type: N/A

Hammer Hoist: N/A

Ground Surface Elev.: (+/-) 154

Datum: Site Plan Provided by Wright-Pierce

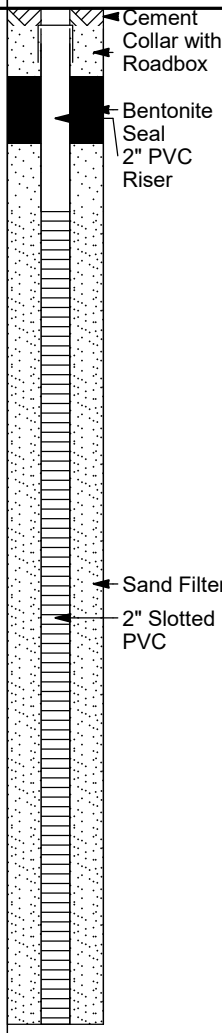
	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	2	2
Advancement	Direct Push	Direct Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	SAMPLE INFORMATION Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	LITHOLOGY Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)
1	S-1	42	0-5					Asphalt	S-1A (4"): Asphalt. dry. S-1B (6"): Brown, fine to medium SAND, some fine Gravel. dry.
2					1.8			Fill	S-1C (16"): Brown, SILT, some fine Sand. moist.
3									
4					13				S-1D (12"): Brown/dark brown, SILT, some fine Sand. moist.
5									S-1E (4"): Black, SILT. wet. Slight petroleum odor.
6	S-2	36	5-10						S-2A (2"): Black, SILT. wet. Slight petroleum odor. S-2B (13"): Gray, fine SAND and Silt. wet.
7					0.7				
8									S-2C (21"): Gray, fine to coarse SAND, some Silt, little fine to coarse Gravel. wet.
9					0.5				
10								Sand and Silt	
11	S-3	57	10-15						S-3A (32"): Gray, fine to coarse SAND, some Silt, little fine to coarse Gravel. wet.
12					0.3				
13									S-3B (25"): Olive, SILT, little fine Sand. wet.
14									
15					0.3				Boring terminated at 15 feet.
16									
17									
18									

WELL DETAIL



NOTES

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

1) Collected sample at 3-5 feet below ground surface for laboratory analysis of EPH, VPH, and total lead.

Soil descriptions are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

BORING LOG

Nobis — Engineering a Sustainable Future

Project: Worcester Road Pump House Elimination

Location: Framingham, MA

Nobis Project No.: 86640.23

Boring No.: **B-208**

Boring Location: Worcester Road Pump House Property. See site plan.

Checked by:

Date Start: May 13, 2016

Date Finish: May 13, 2016

Contractor: Technical Drilling Services

Driller: T. Newton

Nobis Rep.: E. Rudomen

Rig Type / Model: Geoprobe 6620DT

Hammer Type: N/A

Hammer Hoist: N/A

Ground Surface Elev.: (+/-) 155

Datum: Site Plan Provided by Wright-Pierce

	Drilling Method	Sampler
Type	Geoprobe	Macro-Core Liners
Size ID (in.)	2	2
Advancement	Direct Push	Direct Push

Groundwater Observations

Date	Time	Depth Below Ground (ft.)	Depth of Casing (ft.)	Depth to Bottom of Hole (ft.)	Stabilization Time

Depth (ft.)	SAMPLE INFORMATION Type & No.	Rec (in.)	Depth (ft.)	Blows/ 6 in.	PID (ppm)	Ground Water	LITHOLOGY Graphic	Stratum Elev. / Depth (ft.)	SAMPLE DESCRIPTION AND REMARKS (Classification System: Modified Burmister)	WELL DETAIL	NOTES
1	S-1	42	0-5						S-1A (10"): Brown, fine SAND & SILT, trace Organics. dry.	Cement Collar with Roadbox	
2					0.3				S-1B (20"): Brown/light brown, fine SAND, some Silt, little fine to coarse Gravel. moist.	Bentonite Seal; 2" PVC Riser	
3											
4									S-1C (8"): Gray/brown, fine SAND & SILT. moist.		
5					0.7				S-1D (4"): Black, SILT, several Wood fragments. moist.		
6	S-2	24	5-10						S-2A (6"): Brown, SILT, trace fine Sand. wet.		
7					0.4				S-2B (1"): Rock. wet. S-2C (4"): Gray, fine to medium SAND, little Silt. wet.		
8								Silt and Sand	S-2D (6"): Reddish gray, fine SAND & SILT. wet.		
9					0.4				S-2E (7"): Gray, SILT, little fine Sand. wet.	Sand Filter; 2" Slotted PVC	
10											
11	S-3	20	10-15						S-3A (8"): Brown, SILT, trace Clay. wet.		
12											
13									S-3B (12"): Brown, fine SAND. wet.		
14											
15									Boring terminated at 15 feet.		
16											
17											
18											

Soil	Percentage	Non-Soil
trace	5 - 10	very few
little	10 - 20	few
some	20 - 35	several
and	35 - 50	numerous

NOTES:

1) Collected sample at 5-7 feet below ground surface for laboratory analysis of EPH, VPH, and total lead.

Soil descriptions are based on visual classifications and should be considered approximate. Stratification lines are approximate boundaries between stratums; transitions may be gradual.

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-101**
SHEET: 1 OF 1
PROJECT NO.: 12-0660

PROJECT / CLIENT: PROPOSED WORCESTER RD PUMP STATION ELIMINATION / WRIGHT-PIERCE
LOCATION: FRAMINGHAM, MASSACHUSETTS
DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD

DATE START: 10/31/2013
DATE FINISH: 10/31/2013
ELEVATION: NOT AVAILABLE
SWC REP.: CJC

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	HW	4.0"		
SAMPLER:	SS	2"	140 lbs	30"
CORE BARREL:				

WATER LEVEL INFORMATION
WATER AT 6.2 FEET ON 10/31/2013

CASING BLOWS PER FOOT	SAMPLE NO.	SAMPLE PEN.	SAMPLE REC.	SAMPLE DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA	PID Results (ppm)
										DARK BROWN SILTY GRAVELLY SAND	
	1D	24"	12"	2.0'	15	17	20	35		WITH SOME ASPHALT PIECES (FILL)	ND
	2D	5"	3"	2.4'	50/5"	-	-	-		WOOD ENCOUNTERED FROM 3 TO 5 FEET	ND
										~DENSE~	
									5.0'		
										DARK BROWN SANDY SILT WITH ROOTLETS AND ORGANICS	
	3D	24"	18"	7.0'	1	1	1	1	7.0'	AND PETROLEUM ODOR ~LOOSE~	2.0
										DARK GRAY SILTY SAND WITH SOME GRAVEL	
	4D	24"	12"	9.0'	3	5	12	15		AND PETROLEUM ODOR	9.0
									10.0'	~MEDIUM DENSE~	
	5D	24"	20"	12.0'	4	7	9	7		GRAY / BROWN SAND AND GRAVEL WITH SOME SILT	ND
										WITH SLIGHT PETROLEUM ODOR	
										~MEDIUM DENSE~	
									15.0'		
	6D	24"	18"	17.0'	6	8	8	10		BROWN FINE SAND AND SILT	ND
										~MEDIUM DENSE~	
									20.0'		
										GRAY SILT AND FINE SAND	
	7D	24"	18"	22.0'	2	3	4	5	22.0'	~LOOSE~	ND
										BOTTOM OF EXPLORATION AT APPROXIMATELY 22 FEET	
										2 INCH DIAMETER MONITORING WELL SET AT 19.8 FT	
										WITH WELL SCREEN IN FILTER SAND BETWEEN 4.8 AND 19.8 FT	

SAMPLES:
D = SPLIT SPOON
C = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS: ppm= Parts per million, ND = Non-Detect, PID calibrated to 100 ppm isobutylene

STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: **B-101**

S.W.COLE ENGINEERING, INC.

BORING LOG

BORING NO.: **B-101A**
SHEET: 1 OF 1
PROJECT NO.: 12-0660

PROJECT / CLIENT: PROPOSED WORCESTER RD PUMP STATION ELIMINATION / WRIGHT-PIERCE
LOCATION: FRAMINGHAM, MASSACHUSETTS
DRILLING FIRM: GREAT WORKS TEST BORING, INC. DRILLER: PETE MICHAUD

DATE START: 10/31/2013
DATE FINISH: 10/31/2013
ELEVATION: NOT AVAILABLE
SWC REP.: CJC

	TYPE	SIZE I.D.	HAMMER WT.	HAMMER FALL
CASING:	SSA	4.0"		
SAMPLER:	SS	2"	140 lbs	30"
CORE BARREL:				

WATER LEVEL INFORMATION
SATURATED SOILS ENCOUNTERED AT
APPROXIMATELY 6.5 FEET

CASING BLOWS PER FOOT	SAMPLE NO.	PEN.	REC.	DEPTH @ BOT	SAMPLER BLOWS PER 6" 0-6	6-12	12-18	18-24	DEPTH	STRATA & TEST DATA	PID Results (ppm)
	1D	24"	12"	2.5'	5	10	14	17		BROWN SILTY GRAVELLY SAND (FILL) WITH FEW ASPHALT PIECES AND VERY FEW GLASS PIECES ~MEDIUM DENSE~	ND
	2D	24"	12"	4.5'	20	20	14	9	5.0'		ND
	3D	24"	16"	7.0'	1	1	4	4	6.5'	DARK BROWN SANDY SILT WITH ORGANICS AND WITH PETROLEUM ODOR ~LOOSE~	2.5
	4D	24"	14"	9.0'	3	3	4	8		DARK GRAY SILTY FINE TO MEDIUM SAND WITH PETROLEUM ODOR ~LOOSE~	2.7
	5D	24"	18"	12.0'	3	5	7	7	12.0'		ND
										BOTTOM OF EXPLORATION AT APPROXIMATELY 12 FEET	

SAMPLES:
D = SPLIT SPOON
C = 3" SHELBY TUBE
U = 3.5" SHELBY TUBE

SOIL CLASSIFIED BY:
[ ] DRILLER - VISUALLY
[X] SOIL TECH. - VISUALLY
[ ] LABORATORY TEST

REMARKS: ppm= Parts per million, ND = Non-Detect, PID calibrated to 100 ppm isobutylene

STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

BORING NO.: **B-101A**

APPENDIX F: City of Framingham Noise Ordinance

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FRAMINGHAM
MASSACHUSETTS

OFFICE OF THE MAYOR
FRAMINGHAM, MA.
2019 OCT 31 PM 1:05

150 Concord Street
Framingham, MA 01702
Ph: 508-532-5655
Fax: 508-532-5409
www.framinghamma.gov/CityCouncil

FRAMINGHAM CITY COUNCIL

ORDER NO. 2019-036-001
REQUEST OF THE ENVIRONMENT & SUSTAINABILITY SUBCOMMITTEE

UPON THE REQUEST OF THE ENVIRONMENT & SUSTAINABILITY SUBCOMMITTEE, THE CITY OF FRAMINGHAM, THROUGH THE FRAMINGHAM CITY COUNCIL, IT IS SO ORDERED:

That the City Council votes to amend the General Bylaws, Section V: Health and safety with a new Section 32: Nuisance Noise Ordinance. The full text of the Ordinance follows this Order.

FIRST READING
YEAS: Cannon, Giombetti, Grove, King, Richardson, Rossi, Shepard, Sisitsky, Steiner, Tully Stoll
NAYS: None
ABSTAIN: None
ABSENT: Torres
PASSED IN COUNCIL: OCTOBER 15, 2019

SECOND READING
YEAS: Cannon, Giombetti, Grove, King, Richardson, Rossi, Shepard, Sisitsky, Steiner, Torres, Tully Stoll
NAYS: None
ABSTAIN: None
PASSED IN COUNCIL: OCTOBER 29, 2019

A True Record, Attest:

10/30/19
Date Approved

Lisa A. Ferguson
Lisa A. Ferguson, City Clerk

11/8/19
Date Approved

Yvonne M. Spicer
Yvonne M. Spicer, Mayor

City of Framingham, Massachusetts

Article V: Health and Safety
Section 32 Nuisance Noise Ordinance

Effective January 1, 2020

32.01 Purpose

The Massachusetts Association of Health Boards finds that chronic or repeated exposure to excessive noise is recognized by public health experts as a hazard to both physical and mental health. It has been linked to a range of non-auditory health effects including annoyance, sleep disturbance, cardiovascular diseases, and impairment of cognitive performance in children. *(https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3988259/)*

The purpose of this Noise Ordinance is to allow the City of Framingham, Massachusetts (the City) to establish reasonable guidelines, restrictions and limitations to maintain acceptable noise conditions within the City.

This ordinance defines noise criteria limits and restrictions for the purposes of (1) maintaining acceptable existing conditions, equipment operations, social interactions, and avoidance of disruption of the peace, and (2) managing and controlling potential future noise conditions in the City stemming from development of new properties, equipment operations, and infrastructure.

This ordinance is not intended to define safe noise levels to protect people's hearing or avoid auditory damages from loud noises either within the workplace or from private activities. As such, this ordinance is not intended to maintain public health and safety with respect to noise.

To enforce this Ordinance, the City may seek civil penalties pursuant to M.G.L. c. 40, § 21D and/or misdemeanor criminal penalties permitted under M.G.L. c. 272, § 53, and may seek injunctions to prohibit current and future noise.

Therefore, it shall be unlawful for a person or persons to knowingly generate, or allow continued generation of noise levels which exceed the criteria limits found in Section 32.03, 32.04 32.05 or 32.06, except under conditions defined in Section 32.09, when measured at a receiving party's property line or at any location on the receiving property, as defined by the applicable Noise Determination methods found in Sections 32.07 and 32.08

32.02A Acoustical Terms Definitions

Community noise is generated by natural and man-made sources such as transportation systems, industrial processes, construction operations, building air handling systems, power generation, agricultural processes, landscaping machinery, human activities, meteorological conditions, etc. In general, noise can be quantified by its magnitudinal (loudness), tonal (frequency) and temporal (time) characteristics. The following are definitions of terms typically used to describe community noise:

SOUND DEFINITIONS

SOUND is a physical parameter which is produced when a vibrating surface transfers energy in the form of air pressure waves which fluctuate above and below barometric pressure to such a degree and within a frequency range that it can be perceived by the human auditory system (i.e. sound can be heard.)

SOUND LEVEL METER (SLM) – A sound level meter is a calibrated electrical device used to measure the loudness of noise. For the purposes of this bylaw, a SLM must be capable of measuring and expressing noise levels in A-weighted decibels using an RMS "slow" time constant in accordance with Type 2 or better accuracy requirements of ANSI Standard S1.4. In addition, an "integrating" SLM must be used if any time-averaged noise metrics (such as Leq or Ln percentiles) are to be reported.

AUDIBLE FREQUENCY RANGE (and A-weighting) – Human beings can perceive noise only if the fluctuating air pressure waves are within the so-called "audible frequency range" of about 20 Hz to 20,000 Hz (Hertz, or cycles-per-second). However, people do not hear noise equally well at all frequencies. As such, a frequency weighting adjustment has been standardized in ANSI Standard S1.42 to account for humans responding less sensitively to lower and higher frequency ranges. This frequency weighted adjustment is referred to as "A-weighting", with results expressed as A-weighted decibels, or dB(A).

DECIBELS (dB) – The magnitude or loudness of noise is expressed in units of decibels (dB). Decibels relate the actual fluctuating air pressure levels against a standardized reference air pressure level of 20 micro-pascals. Human beings can hear noise over a tremendously large range of air pressure so the use of a decibel scale (from about 0 dB to 140 dB) is used for convenience. Zero decibels represents the "threshold of hearing", while at the other extreme, pain and hearing damage can occur at noise levels of about 140 decibels.

EQUIVALENT SOUND LEVEL (Leq) – The Leq represents the energy-averaged noise level over some time period of interest. The Leq is expressed in dBA, and the time period over which the Leq value applies should also be stated, i.e., Leq (1min) represents a one-minute average; Leq (24h) represents a 24-hour average, etc.

PURE TONE – Any sound which can be distinctly heard as a single pitch or a set of single pitches. For the purposes of this chapter, a "pure tone" shall exist if an octave-band analysis indicates one octave-band or more over both the band above and below.

TONAL SOUND - Any sound that is judged by a listener to have the characteristics of a pure tone, whine, hum or buzz.

NOISE DEFINITIONS

NOISE is defined as "unwanted sound" which can occur when a source is either too loud, uncontrollable, conveys unwanted information, masks-out other desirable sound, occurs at unacceptable times, or has annoying characteristics.

BACKGROUND NOISE – is the prevailing or pre-existing noise conditions that can be measured at a given location of interest without the contribution the noise source of concern.

CLEARLY AUDIBLE - means any sound that can be detected by a person using his or her unaided hearing faculties. (As an example, if the sound source under investigation is a portable or personal vehicular sound amplification or reproduction device, the enforcement officer need not determine the title of a song, specific words, or the artist performing the song. The detection of the rhythmic bass component of the music is sufficient to constitute a clearly audible sound).

NOISE POLLUTION – A condition caused by a noise source that increases noise levels ten (10) dB(A) or more above background noise level except that it the noise source produces a tonal sound an increase at five (5) dB(A) or more above background noise level shall be considered sufficient to cause noise pollution.

NUISANCE NOISE – Nuisance typically exhibits aspects such as pure tone squealing or whining, loud impulsive noises, repetitive thumping, low-frequency airborne vibrations, etc. Nuisance noise is defined qualitatively by listing specific examples, as in Section 32.03 of this Ordinance.

STATIONERY NOISE SOURCE – Sources that emit noise on a continuous or repeatable basis and that are located in fixed positions. Example stationary noise sources would include, but are not limited to, building mechanical (HVAC) systems, power transformers, commercial processing machinery, etc.

32.02B General Definitions

CONSTRUCTION - Any and all activity necessary or incidental to the erection, assembling, altering, installing, repair or equipping of buildings, roadways, or utilities, including land clearing, grading, excavating and filling and paving.

COMMERCIAL SERVICE EQUIPMENT – All engine- or motor-powered equipment intended for infrequent service work in inhabited areas, typically requiring commercial or skilled operators. Examples: chain saws, log chippers, paving rollers, pavement breakers, pile drivers etc.

DAYTIME Weekdays: Monday - Friday - 7:00 a.m. to 6:00 p.m.
Weekends: Saturday and Sunday - 8:00 a.m. to 6:00 p.m.

DEMOLITION - Any dismantling, intentional destruction or removal of structures, utilities, public or private right-of-way surfaces, or similar property.

EVENING: Weekdays: Sunday - Thursday - 6:00 p.m. to 10:00 p.m.
Weekends: Friday and Saturday - 6:00 p.m. to 12:00 Midnight

EMERGENCY - An occurrence or set of circumstances requiring immediate action involving the restoration of public utilities or the restoration of property to a safe condition following a public calamity or the protection of persons or property from imminent exposure to danger.

EMERGENCY WORK - Work which must be performed to alleviate an emergency.

HEAVY MOTOR VEHICLE – shall be defined as all motor vehicles having a gross vehicle weight in excess of 10,000 pounds

HOMEOWNER'S LIGHT RESIDENTIAL OUTDOOR EQUIPMENT: All engine- or motor-powered garden or maintenance tools intended for repetitive use in residential areas, typically capable of being used by a homeowner. Examples of homeowner's light residential outdoor equipment are lawn mowers, garden tools, power tools, riding tractors, snow blowers, snowplows, etc.

MOTORCYLE: Any motor vehicle having a seat or saddle for the use of the rider and designed to travel on not more than three (3) wheels in contact with the ground, including any bicycle with a motor or driving wheel attached, except a tractor or a motor vehicle designed for carrying golf clubs and not more than four (4) persons, an industrial three-wheel truck, or a motor vehicle on which the operator and passengers ride within an enclosed cab.

MOTOR VEHICLE: Any vehicle which is propelled or drawn on land by a motor, such as, but not limited to, passenger cars, trucks, buses, truck-trailers, semi-trailers, campers, go-carts, snowmobiles, dune buggies, or racing vehicles, but not including motorcycles.

NIGHTTIME Weekdays: Sunday - Thursday - 10:00 p.m. to 7:00 a.m.
Weekends: Friday and Saturday - 12:00 Midnight to 8:00 a.m.

PERSON: Any individual, partnership, association, firm, syndicate, company, trust, corporation, department, bureau or agency, or any other entity recognized by law as the subject of rights and duties, including the city, its agencies and departments and any person, as herein defined, operating under a contractual arrangement or agreement with the city.

PAVEMENT BREAKER: Any hydraulically or pneumatically powered impact device intended to cut or trench pavement, subbase macadam, gravel, concrete or hard ground.

PILE DRIVER: An impact device designed or used for the driving of piles, columns and other supports into soil or other material by means of impact, vibrations, pressure or other means.

REASONABLE PERSON – Acting on behalf of the greater good of the pubic, a reasonable person is able-to judge in an unbiased manner the appropriateness of a given social situation. A reasonable person is appropriately informed, rational, capable, aware of the law, and fair-minded when applications of the law is sought, compatible with planning, working, or getting along with others. For the purpose of this Ordinance, a reasonable person shall be defined as a police officer of the City, as further described in Section 32.07

RESIDENTIAL AREA - For the purpose of this ordinance, a Residential Area will be defined as land used in which housing predominates within the boundary from street corner to street corner irrespective of any other Zoning Ordinance or By-Law. Housing may vary significantly between, and through, residential areas. These include single-family housing, multi-family residential, apartment complexes, mixed use, mixed use complexes, mobile homes, or any building who use includes human habitation. For the purpose of this ordinance, an apartment complex will be considered residential, not commercial.

32.03 Nuisance Noise Prohibitions

Noise which has the potential to annoy or disturb can be described as nuisance noise. Nuisance noise typically exhibits aspects such as pure tone squealing or whining, loud impulsive noises, repetitive thumping, low-frequency air-borne vibrations, etc.

Noise criteria limits in this ordinance are based on the type of noise being produced, the time of day during which the noise is generated, and the existing background noise level. For the purposes of this bylaw, nuisance noise shall be qualitatively defined by listing specific examples which are deemed to be annoying.

It is prohibited for persons or equipment to generate the following nuisance noises during the hours of 10:00 p.m. to 7:00 a.m. Sunday - Thursday and 11:00 p.m. to 8:00 a.m. on Friday and Saturday.

1. The use of loud music, radios, automobile sound systems (i.e. radios). public address systems, shouting, or other noises associated with communications or advertisement, that have the potential to disturb receiving party or parties.
2. The offering for sale or selling of anything by shouting or outcry within a residential area of the city by peddlers, or hawkers.
3. Operating or causing to be operated a public-address loudspeaker, whether mobile or stationary, without a permit granted by the permitting authority.
4. Operating, playing or permitting the operation or playing of any, radio, stereo, compact disc player, phonograph, television, musical instrument, public address system, loudspeaker, or sound amplifier from any source (including, but not limited to, smart phones, tablets, computers, musical instruments, etc.) or similar device which produces, reproduces or amplifies sound in a manner that makes it clearly audible across either a residential real property boundary or in the case of multi-unit dwellings, the receiving parties abode.
    a. Exemption: Activities open to the public, or special occasions, for which a proper permit has been granted.
    b. Any establishment granted a license for entertainment that is amplified by microphone, amplifier, or the like shall be subject to this provision with the extension of one (1) hour from 11:00 p.m. to 12:00 midnight on Friday and Saturday nights.
5. The use of loud amplified or non-amplified instruments, including, but not limited to, Brass (trumpet, trombone) Percussion (drums, cymbals) or any other instruments that have the potential to disturb nearby residents.
6. The unnecessary (i.e. false) sounding of vehicle security alarm systems.
7. The emptying and/or replacing of waste dumpsters.
8. The use of HOMEOWNER'S LIGHT RESIDENTIAL OUTDOOR EQUIPMENT such as but not limited to lawn mowers and leaf blowers.
9. The keeping of any animal or bird which frequently and for continued periods of time causes a condition of noise.
10. The loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects in a manner that causes a condition of noise pollution across a residential real property boundary.
11. No establishment granted a liquor license shall permit crowd noise to be audible beyond the premises that has the potential to disturb nearby residents.

12. Construction and/or demolition activities. It is understood that construction and demolition are inherently noisy activities which will likely be heard by adjacent residents and business operators. As such, the intent is to balance the needs for the construction contractors to perform the necessary work with the needs of the community for peace and quiet. (See **Table #2** - Construction Noise Criteria Limits - for Hours.)

32.04 Stationary Noise Sources

Stationary sources of noise may include, but are not limited to, building HVAC systems, power generation facilities, industrial equipment, water or sewage pump stations, railroad and subway lay-over facilities, electric power transformers, commercial factories and plants, truck depots, and recreational events. The noise level emitted by stationary noise sources shall not exceed the limits contained in **Table 1** when measured at the property line of the receiving property.

Table 1
Noise Criteria Limits from Stationary Noise Sources

Receiver Land-Use	Daytime Noise Limit (7 a.m. to 6 p.m.)	Evening Noise Limit (6 p.m. to 10 p.m.)	Nighttime Noise Limit (10 p.m. to 7 a.m.)
Residential: -including private residences, multi-family residences, apartment complexes, retirement homes, etc.	55 dBAs Leq (1 minute) or Background Leq (1 min), whichever is greater	50 dBAs Leq (1 minute) or Background Leq (1 min), whichever is greater	45 dBAs Leq (1 minute) or Background Leq (1 min), whichever is greater
Residential within Commercial: -mixed land-use, primarily commercial areas but with some residential development, hotel/motels, hospitals etc.	60 dBAs Leq (1 min) or Background Leq (1 min), whichever is greater	60 dBAs Leq (1 min) or Background Leq (1 min), whichever is greater	55 dBAs Leq (1 min) or Background Leq (1 min), whichever is greater
Commercial: -including retail stores, business offices, houses of worship, restaurants, libraries, theaters, public parks etc.	65 dBAs Leq (1 min) or Background Leq (1 min), whichever is greater	65 dBAs Leq (1 min) or Background Leq (1 min), whichever is greater	60 dBAs Leq (1 min) or Background Leq (1 min), whichever is greater

Note: Background Leq (1 min) noise levels should be measured without the noise source in question operating.
Average Noise levels measurements can be estimated if an integrating Leq noise meter is not available.

Section 32.05 Construction Noise Sources

In general, construction and/or demolition activities shall only be permitted to occur within the City during the hours of 7:00 a.m. to 6:00 p.m. However, it is understood that construction and demolition are inherently noisy activities which will likely be heard by adjacent residents and business operators during short periods of time. As such, the intent of this section is to balance the needs for the construction contractors to perform the necessary work with the needs of the community for peace and quiet.

Therefore, cumulative noise generated by construction and/or demolition activities and operations shall not exceed the limits contained in **Table 2** when evaluated at the property line of the receiving property, nor shall the noise emission level of any individual piece of construction equipment exceed the noise emission limits contained in Table 2 when measured at a distance of 50 feet from the loudest side of the piece of equipment.

Table 2
Construction Noise Criteria Limits

Receiver Land-Use	Daytime Noise Limit (7 a.m. to 6 p.m.)	Evening Noise Limit (6 p.m. to 10 p.m.)	Nighttime Noise Limit (10 p.m. to 7 a.m.)
Residential: - including private residences, multi-family residences, apartment complexes, retirement homes, etc	65 dBAs L10 or Bkgd L10 + 5 dBAs, whichever is great	60 dBAs L10 or Bkgd L10 + 5 dBAs, whichever is greater	N/A (*) Non-emergency construction and/or demolition activities are prohibited
Residential within Commercial: - mixed land-use, primarily commercial areas but with some residential development, hotel/motels, hospitals, etc.	75 dBAs L10 or Bkgd L10 + 5 dBAs, whichever is greater	70 dBAs L10 or Bkgd L10 + 5 dBAs, whichever is greater	N/A (*) Non-emergency construction and/or demolition activities are prohibited
Commercial: including retail stores, business offices, houses of worship, restaurants, libraries, theaters, public parks, etc.	80 dBAs L10 or Bkgd L10 + 5 dBAs, whichever is greater	75 dBAs L10 or Bkgd L10 + 5 dBAs, whichever is greater	N/A (*) Non-emergency construction and/or demolition activities are prohibited

Notes: Criteria approach taken from FHWA Roadway Construction Noise Handbook (FHWA, 2006).

1. L10 noise levels shall be measured over a period of 20 minutes.
2. Background (Bkgd) L10 noise levels should be measured prior to construction commencing in the field or without the noise source in question operating.
3. L10 noise levels measurements can be estimated if an integrating noise meter is not available by determining the average or Leq noise level plus 3 dBA.
4. Table 2 noise limits do not apply to roadway construction activities.

(*) Except when determined necessary by the City Council to protect public safety.

Section 32.06 Motor Vehicle Noise Sources

No person shall operate or cause to be operated a public or private motor vehicle or motorcycle on a public right-of-way at any time in such a manner that the sound level emitted by the vehicle exceeds the following limits measured at a distance of 50 feet or 15 meters from the center line of travel.

Table 3
Motor Vehicle and Motorcycle Noise Criteria Limits

Vehicle Class	Speed Limit 35 mph or Less	Speed Limit over 35 mph
Vehicles in excess of 10,00 pounds engaged in **interstate commerce** as permitted by 40 CFR 303 (EPA Noise emission standards)	86 dBAs	90 dBAs
All other vehicles if 10,000 pounds or more	86 dBAs	90 dBAs
Motorcycles	82 dBAs	86 dBAs

32.07 Nuisance Noises Determination

It shall be unlawful to knowingly generate, or allow continued generation of, noise as listed in Section 32.03.

To be applicable, the police officer must hear for him/herself the noise source in question. The police officer must take conditional, circumstantial and extenuating factors into account. Time of day is not to be considered an extenuating circumstance. The following are examples of extenuating circumstances:

1. The necessity of the noise source to continue to operate.
2. The quality of the noise, e.g., volume, pitch, and intensity of the noise complained of.
3. The duration of time that the noise is expected to continue.

32.08 Noise Compliance Measurements Determination

If fines do not result in compliance with this ordinance, or it becomes necessary to collect quantitative noise level measurements in order to demonstrate compliance or exceedance of the various noise criteria limits contained in this ordinance, they must be collected in accordance with accepted practices and procedures as recommended in ASTM Standards E1686-03, E1780-04, and E1014-84, using a sound level meter (SLM) capable of meeting or exceeding ANSI Standard S1.4 for Type 2 accuracy.

Noise data shall be collected using a calibrated SLM using a "slow" time constant with results expressed in A-weighted decibels (dBAs). The minimum information necessary to collect and report shall include the following:

1. The make and model of SLM and portable calibrator used for the noise readings
2. The date which the SLM was last certified by the manufacturer, or other independent calibration laboratory, as meeting ANSI S1.4 Standards for Type 2 or better accuracy requirements (should be within previous two years).
3. The SLM calibration readings obtained prior to, and immediately following, performing the compliance noise measurements.
4. The type of windscreen used to cover the microphone.
5. The height at which the noise readings were collected (should be at least 5 feet above ground), and an estimate of the distance (in feet) from the noise source to the SLM.
6. The time of day, date, and duration of noise data collected by the SLM.
7. An indication of the background noise level collected in the absence of the noise source in question.
8. A brief description of the meteorological conditions during the noise readings including wind speed and direction, air temperature, precipitation, and ground cover conditions.
9. A clear and concise comparison of the measured noise level data (expressed in dBAs) versus the applicable noise criteria limits contained in Tables 1, 2 and 3 of this Ordinance.
10. The findings and conclusions to be drawn from the noise compliance measurements taken.

32.09 Exceptions

The following cases shall be exceptions to the restrictions and criteria limits contained in this noise ordinance.

1. Grandfathering: All existing residential, commercial, industrial and/or agricultural stationary noise sources as described in Section 32.04, which have been operating on a lawful basis prior to the effective date of this ordinance, shall be allowed. However, this exception does not apply to any new or upgraded sources of noise subsequently brought into operation at an existing location.
2. Noise generated by transportation systems, such as aircraft overflights, commuter trains, public transit systems and buses, are generally not regulated by local ordinances, and as such, shall not be a part of this noise ordinance.
3. Noise emitted by State, utility or City service crews and equipment performing emergency repairs to restore supply of and/or operation of critical public utilities such as natural gas, electrical power, steam, potable water, telecommunications,

sewerage removal, etc., or when it is determined that non-emergency utility work at night is the preferred course of action due to vehicular traffic concerns.

4. Any noise emitted by public safety or emergency response vehicles while performing their intended duties. Specific examples of exempt emergency equipment include sirens, horns, generators, pumps, public address systems, created by schools, factory bells or whistles or governmental alerts, such as noon whistles or siren.
5. Noise generated by sources intended for public entertainment, when said sources are part of a legal activity such as, but not limited to, parades, sporting events, public concerts, fireworks display, etc. and which have been granted a permit from the permitting authority.
    a. Any establishment granted a license for entertainment that is amplified by microphone, amplifier, or the like will be subject to this Ordinance.
6. All snow clearance activities at any time of day, evening or night performed by the municipality.
7. Noise from snow blowers, snowplows, and other snow removal equipment during or immediately after a snowfall, and the use of power equipment necessary for emergency repairs or debris removal due to severe weather.
8. The performance of City-sponsored street sweeping operations at night on public ways which are otherwise inaccessible during daytime hours.

32.10 Enforcement

1. A noise complaint may be made by a resident or business owner, or, at any time at the discretion of the City in and of their own accord, to request a response and investigation by a representative of the Framingham Police Department, of the circumstances surrounding the noise issue.
2. In the case of a multi-unit dwelling, the front door of the closest unit to the unit being complained against by a properly designated investigating agent of his own accord.
3. The investigating agent shall collect all relevant information and prepare a written report summarizing their findings if the circumstances are determined to be a violation of Sections 32.03, 32.04, 32.05 or 32.06.
4. If the investigating agent's findings indicate a violation of Sections 32.03, 32.04, 32.05 or 32.06 said noise shall be found in violation of this Noise Ordinance and will be cited to a civil penalty consistent with the guidelines in Section 32.11 Penalties

32.11 Penalties

1. The first violation of this ordinance shall result in the issuance of a *written warning i*ndicating the reason(s) for the violation and stating, at the investigating

agent's discretion, a time period within which the offender(s), must cease production of the noise, or mitigate (reduce) the noise down to acceptable levels which will then comply with the restrictions and noise criteria limits in this ordinance.

2. The second violation of this ordinance stemming from the same noise issue within any 12-month period shall be punished by a fine of one hundred dollars ($100.00).
3. Further violations of this ordinance within any 12-month period shall be punished by a fine of three hundred dollars ($300.00).
4. Each such act in violation of this ordinance which either continues or occurs more than one hour after issuance of notice of violation of this ordinance shall be deemed a separate offense and shall be prosecuted as such.
5. If the violation occurs on the premises of rental property which is not owned by the offender, then in the interest of assisting property owners in exercising responsible property management, the City will notify the owner-of-record in writing that the violation has occurred, including the nature and circumstances of the violation.

32.12 Appeals

1. An offender who has been cited and/or fined under the terms and procedures of this noise ordinance can appeal the citation within 30 days after receiving it by presenting to the City appointed Hearing Officer any alternative information, situational evidence, noise measurement data, extenuating circumstances, or explanation to the contrary of the investigating agent's findings.
2. The Hearing Officer will serve in judgment of the appeal, and will have full discretion to reject, request additional details, reduce the severity of the penalties, continue, or enforce as issued the violation under appeal.
3. The Hearing Officer may allow an offender a reasonable amount of time, as determined by the chief of police, to come into compliance with this Ordinance, and may take into-account the time and cost of any required remediation efforts.
4. The ruling of the Hearing Officer shall be final and not subject to further appeals within the City's governance system.

32.13 Severability

If any provision of this ordinance shall be determined to be invalid or unenforceable by final judgment or order of a court of competent jurisdiction, the remaining provisions of this ordinance shall continue in effect to the fullest extent permitted by law.

APPENDIX G: PCB Risk Based Cleanup Plan

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Framingham, Massachusetts

Worcester Road Sewer Pump Station Rehabilitation

730 Worcester Road

August 2022

RISK-BASED PCB BULK PRODUCT WASTE DISPOSAL PLAN

701 George Washington Hwy
Lincoln, Rhode Island 02865
401.333.2382
www.BETA-Inc.com

Worcester Road Sewer Pump Station Rehabilitation

Framingham, Massachusetts

730 Worcester Road

RISK-BASED PCB BULK PRODUCT WASTE DISPOSAL PLAN

Prepared by: BETA GROUP, INC.
Prepared for: City of Framingham

August 2022

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1.0 PROJECT DESCRIPTION

On behalf of the City of Framingham Department of Public Works, BETA Group, Inc. (BETA) is submitting this Risk-Based Polychlorinated Biphenyls (PCB) Bulk Product Waste Disposal Plan for the rehabilitation of the Worcester Road Sewer Pumping Station (WRSPS) at 730 Worcester Road in Framingham (the Site). Proposed work associated with the Project includes the demolition of the upper portion of the existing WRSPS building, the construction of a new pumping station within the existing foundation footprint, installation of a new sewer bypass structure, reconfiguration of bituminous areas, management of contaminated soil in accordance with state and local regulations, and installation of fencing.

The purpose of the Project is to provide improved utility infrastructure to the residents of Framingham while minimizing Project costs and environmental impacts by reconstructing the WRSPS within its existing footprint. To accomplish this, a sewage bypass system consisting of a subsurface bypass structure, above-grade pumps, and above-grade high density polyethylene (HDPE) pipes will be constructed onsite for use during proposed demolition and reconstruction activities. The subsurface bypass structure will remain in place following the completion of the project in case future maintenance requirements arise.

Hazardous Material Surveys activities conducted to support the facility improvement plan documented the presence of PCBs at a concentration greater than or equal to 50 parts per million (ppm) in paint covering interior metal piping and equipment, concrete masonry units (CMUs), and concrete floors and walls of the existing pump station building. In accordance with the 2012 reinterpretation of the definition of PCB Bulk Product Waste (40 C.F.R. § 761.3), the City of Framingham proposes to dispose of the paint-coated interior metal piping and equipment, CMUs, and concrete to be removed during demolition as PCB bulk product waste. The remaining paint-coated surfaces will be sandblasted to remove all visible paint and then encapsulated to prevent the release of residual PCBs from the remaining substrates. Confirmatory surface wipe samples will be collected and analyzed for PCBs following encapsulation efforts. PCB bulk product waste disposal will be conducted in accordance with 40 C.F.R. § 761.62.

2.0 FACILITY DESCRIPTION AND HISTORY

2.1 SITE DESCRIPTION

The Site consists of the northern portion of the parcel located at 730 Worcester Road in Framingham, Massachusetts, generally south of Worcester Road (Route 9) and east of the Sudbury River (Figure 1 – Site Locus). The Site is bounded to the north by Route 9, to the west by the Sudbury River, to the south by undeveloped woodland, and to the east by commercial properties (Figure 2 – Existing Conditions Site Plan). Existing improvements at the Site consist of the WRSPS and associated utility infrastructure, a bituminous driveway, and fencing. The Site is associated with Release Tracking Numbers (RTNs) 3-33648 and 3-34122 issued by the Massachusetts Department of Environmental Protection (MassDEP) Bureau of Waste Site Cleanup. These RTNs are unrelated to this PCB Bulk Product Disposal Plan and are currently being managed in accordance with the Massachusetts Contingency Plan (MCP).

Potential receptors of PCB painted surfaces at the Site include the infrequent presence of adults (pump station workers or maintenance workers who visit the site for brief periods of time). City of Framingham employees do not work at the Site on a full-time basis. No children are considered present at the Site based on the current and future site usage as a sewer pump station. Exposure to PCB coated surfaces is considered minimal.

2.2 Site History

Available files (AECOM, 2017) indicate the WRSPS located at 730 Worcester Road in Framingham, MA was undeveloped until at least 1918. The property was granted to the Town of Framingham (Framingham became a city in 2017) for the sole purpose of a sewer station. The current sewer pump station was built in 1963.

2.3 Hazardous Materials Survey – PCBs

Several hazardous materials surveys involving testing for PCBs were previously conducted at the WRSPS. PCB testing results are briefly summarized in the table below. Other surveys were also historically conducted to evaluate the presence of asbestos-containing materials and lead-based paint. The results of those surveys are not discussed herein.

Table 1: Summary of PCB Sampling Events

Date	Consultant	Sample Media	Summary of Sampling Results
12/14/18	AECOM	Building materials (pipe penetration sealant, gray painted piping, black wall coating)	PCBS > 50 ppm in Lower Level • Gray paint - piping system
9/13/21	SWA	PCB Sampling - Suspect Paints	PCBs > 50 ppm in Lower Level • Green wall paint • Gray pipe paint • Gray duct paint • Gray stair paint • Gray floor paint PCBs > 50 ppm in Upper Level • White floor paint • Gray/red floor paint • Green motor paint
March 2022	BETA	Concrete Substrate & Miscellaneous Building Materials	PCBS > 50 ppm in Upper Level • Green paint on CMUs PCBS < 50 ppm in Upper/Lower Levels • All concrete substrate samples

Notes:
BETA - BETA Group, Inc.
SWA - Smith & Wessel Associates, Inc.
CMU - concrete masonry unit
ppm - parts per million

In 2018, AECOM conducted a limited pre-demolition hazardous building materials survey of the WRSPS. The survey included collection and testing of materials containing PCBs. PCB concentrations exceeding the 50 ppm threshold were detected in the samples collected from the gray paint on the piping system. PCB concentrations were reported as not detected in the samples collected from the black wall coating in the wet well and the white penetration sealant on the upper level of the pump station.

In 2021, Smith & Wessel Associates, Inc. (SWA) collected samples of paints throughout the WRSPS suspected of containing PCBs. Analytical results indicated PCB concentrations greater than 50 ppm in most of the paints tested (Smith & Wessel Associates, Inc, 2021).

In 2022, BETA collected samples of the concrete substrates on the upper and lower levels, green paint on the CMUs and foundation walls, exterior roof soffit paint, exterior window caulking, and exterior window glazing. The concrete samples were obtained following the guidance provided in the USEPA Region 1 *Standard Operating Procedure for Sampling Porous Surfaces for Polychlorinated Biphenyls (PCBs), Revision 4 (May 2011),* and in accordance with the Code of Federal Regulations (CFR) 40 CFR 761.

PCB concentrations in the green paint exceeded 50 ppm. All other samples collected contained PCB concentrations less than 50 ppm. PCB concentrations in the concrete wall and/or floor substrates, including upper and lower floor levels, ranged from non-detect to 37.5 ppm. The highest PCB concentration identified in lower level foundation concrete, which is being proposed to remain on-site following demolition of the upper level, was 32.4 ppm. This sample was collected from a concrete wall at a depth of approximately 0.5”-1.5”.

Copies of the hazardous material surveys conducted by AECOM, SWA, and BETA are included in Appendix A.

2.4 Planned Facility Improvements

The Project proposes to demolish the upper portion of the building and reconstruct the WRSPS while maintaining sewer pumping operations throughout the duration of work. Work associated with the Project includes the following activities:

- Demolition of upper portion of the existing WRSPS.
- Temporary onsite stockpiling of materials.
- Construction of a sewage bypass system, including a permanent subsurface structure and temporary pumps and above-grade HDPE pipes.
- Reconstruction of the WRSPS, including construction of a generator and replacing utilities.

The demolition of the WRSPS will be advanced in a way that preserves the underlying foundation, and the new WRSPS will be constructed on and within the footprint of the existing foundation.

The location and type of PCB-containing building materials to be demolished and managed as PCB bulk product waste is summarized in Table 2 below. Refer to Appendix B – Design Drawings.

Table 2: Summary of PCB-Containing Building Materials

Material Description (Paint Color)	Material Location	Substrate	PCB Concentration (ppm)	Action
Walls (Green)	Upper Level	Concrete Masonry Units	382	Dispose as PCB Bulk Product Waste.
Floors (Gray/Red)		Concrete	321	Sandblast and Encapsulate. Dispose as PCB Bulk Product Waste, if removed.
Motors (Green)		Metal	396	Dispose as PCB Bulk Product Waste.
Monorail Beams (Gray)		Metal	Presumed to Contain PCBs	Dispose as PCB Bulk Product Waste.

Material Description (Paint Color)	Material Location	Substrate	PCB Concentration (ppm)	Action
Foundation Walls (Green)[1]	Upper and Lower Levels	Concrete	35 - 906	Sandblast and Encapsulate. Dispose as PCB Bulk Product Waste, if removed.
Stairs (Gray)		Metal	454	Sandblast and Cover with Physical Barrier (Rubber Treads). Dispose as PCB Bulk Product Waste, if removed.
Duct (Gray)		Metal	163	Dispose as PCB Bulk Product Waste.
Piping (Gray)	Lower Level	Metal	371	Dispose as PCB Bulk Product Waste.
Pumps and piping (Gray)			720 - 820	Dispose as PCB Bulk Product Waste.
Spiral staircase (Gray)			Presumed to contain PCBs	Dispose of as PCB Bulk Product Waste or Sandblast and Install a Physical Barrier such as Rubber Treads.
Monorail Beams (Gray)			Presumed to Contain PCBs	Sandblast and Encapsulate. Dispose as PCB Bulk Product Waste, if removed.
Floors (Gray, White)		Concrete	128-312	Sandblast and Encapsulate. Dispose as PCB Bulk Product Waste if removed.
Concrete piping supports			Presumed to Contain PCBs	Remove and dispose as PCB Bulk Product Waste.
Concrete equipment pads			BRL[2] - 1.3	Remove and dispose as PCB Bulk Product Waste; repair existing floor.

Notes:

1. Facility improvements will require some coring and drilling of the concrete foundation, which will generate concrete dust that will also be managed and disposed of as PCB Bulk Product Waste.

2. BRL – Below Laboratory Reporting Limit.

Equipment and building materials to be removed and which are coated with paint presumed or confirmed to contain concentrations of PCBs greater than 50 ppm will be managed as PCB Bulk Product Waste. The remaining surfaces coated with paint assumed or confirmed to contain PCB concentrations greater than 50 ppm shall be sandblasted to remove all visible paint and encapsulated with an epoxy coating to prevent the release of residual PCBs from the remaining substrates. The building materials and equipment to be removed and disposed or encapsulated are shown in the design drawings included in Appendix B.

Post-demolition facility improvements in the lower level will include installation of new pump equipment, piping, piping supports, HVAC ducts, electrical utilities, a wall-mounted chemical metering pump control panel, etc. Many of these items will need to be secured to the concrete walls and/or floors with metal braces and anchors. Several new holes through the foundation walls will also be required for underground sewer pipe penetrations. Therefore, following sandblasting and removal of visible PCB paint from all walls and floors, but before encapsulation, the remaining concrete substrates will be disturbed in several locations by drilling / coring activities. Concrete powder generated during these activities will be managed as PCB Bulk Product Waste.

Proper health and safety procedures will be followed to ensure worker safety throughout this process. Following encapsulation activities, it may be necessary to again disturb small areas of concrete at some locations for additional drill holes during final construction of the new pump station. This work will be conducted in accordance with the same health and safety procedures as pre-encapsulation work.

The City of Framingham plans to put the WRSPS Rehabilitation Project out for public bid. A PCB abatement specification will be included in the contract documents. The contractor who is awarded the bid will be required to submit a PCB Work Plan that complies with this PCB Bulk Product Waste Disposal Plan, the bid specifications, applicable TSCA regulations for PCB disposal, and all other applicable federal and state regulations. The contractor's work plan will also include a site-specific Health & Safety Plan (HASP) detailing proper work practices, PCB handling procedures, monitoring activities, and personal protective equipment (PPE) necessary for this Project.

3.0 Risk-based Disposal Approval Request

BETA, on behalf of the City of Framingham, is requesting the approval to dispose of PCB Bulk Product Waste in a manner other than prescribed in paragraphs (a) or (b) of § 761.62.

3.1 Goals

The goals of the PCB Bulk Product Waste Risk-Based Disposal Plan are:

- Dispose of PCB Bulk Product Waste in a manner consistent with 40 C.F.R. § 761.62(c).
- Eliminate potential human exposure to building materials containing residual concentrations of PCBs exceeding 1 ppm on surfaces being reused as part of the WRSPS rehabilitation.
- Reduce material consumption, waste generation and project costs through reuse of materials (existing foundation).

3.2 Methods

PCB paint coated building materials and equipment will be managed through a combination of removal / off-Site disposal and sandblasting / encapsulation. PCB removal and encapsulation shall be completed by a remediation contractor qualified to perform PCB removal work utilizing Hazardous Waste Operations and Emergency Response (HAZWOPER) trained workers. The selected remediation contractor will be required to comply with all applicable regulations and submit a site-specific PCB Work Plan for the removal and disposal of PCB Bulk Product Waste generated during demolition of the existing WRSPS, sandblasting of the existing PCB paint on the building materials to remain in place, and encapsulation of the remaining building materials. The PCB Work Plan will include a site-specific HASP and will be reviewed and approved by the Project Team prior to the initiation of work. The work plan must comply with the PCB removal specifications including proper training, containment requirements, safety requirements, and cleanup requirements.

Epoxy paint will be used to encapsulate all building materials that are not removed during demolition, with the exception of the existing metal staircase, which will be covered by an alternative physical barrier (i.e. rubber treads) if it is not removed, as currently planned. Two coats of epoxy paint of two contrasting colors will be used on the walls, floors, and steel support beams. An Operations and Maintenance (O&M) Plan with an associated deed restriction will be implemented to ensure that the paint is maintained intact and that any damaged or worn areas are repainted. The deed restriction will remain in effect in perpetuity or until amended or terminated in accordance with all applicable laws and regulations. The effectiveness of the selected encapsulant will be confirmed through surface wipe testing.

BETA will collect surface wipe samples in accordance with the standard wipe test method as described in 40 CFR 761.123. A standard-size template (10 centimeters (cm) × 10 cm) will be used to delineate the area of cleanup. The wiping medium will be a gauze pad of known size which has been saturated with hexane. It is important that the wipe be performed very quickly after the hexane is exposed to air. The gauze will be prepared with hexane in the laboratory and stored in sealed glass jars until it is used for the wipe test. Post-encapsulant wipe test results and PCB Bulk Product Waste Disposal will be documented in a Completion Report provided to the EPA.

3.3 Protection of Human Health and Environment

Removal of PCB Bulk Product Waste and encapsulation of remaining substrates containing PCBs less than 50 ppm is considered protective of human health and the environment. PCB Bulk Product Waste removed as part of the proposed demolition of the WRSPS will be transported to a disposal facility permitted to accept the waste.

Encapsulation of the sandblasted surfaces containing no visible paint will function as a barrier to prevent the release of potential residual PCBs in the substrates to the interior of the pump station building, reducing potential human exposure. Encapsulation also provides the benefit of reuse of the existing foundation, minimizing material waste.

In addition, there are no sensitive receptors at the site such as children or others who are particularly susceptible to health effects due to low level exposure to a contaminant. The encapsulated PCBs in concrete substrates will be limited to the existing interior foundation wall of the sewer pump station. Potential exposure is limited to adults (City of Framingham Public Works employees), no children will be present at the site.

Based on the proposed methods of PCB Bulk Product Waste disposal and encapsulation, site usage, and potential receptors, the PCB Bulk Waste Disposal Plan does not pose an unreasonable risk of injury or harm to human health or the environment.

3.4 Feasibility of PCB Remediation to <1 ppm

PCB concentrations were identified in concrete wall and floor samples ranging from non-detect to 37.5 ppm. The highest PCB concentration identified in lower level foundation concrete that will remain on-site following demolition of the upper level was 32.4 ppm. This sample was collected from a concrete wall at a depth of approximately 0.5”-1.5”. PCB concentrations in samples collected from deeper intervals (2.0”-3.0”) ranged from non-detect to 0.4 ppm.

As part of the WRSPS replacement project, the City of Framingham intends to reuse the existing poured concrete building foundation for the new pump station. Other building components to be reused are one concrete pad in the lower level, one concrete containment wall in the lower level, the concrete upper level floor, a metal staircase, and several steel monorail support beams.

In order to remove all existing concrete building materials that contain greater than 1 ppm of PCBs, all wall and floor surfaces would have to be removed to a depth of at least 3 inches from the existing surface, based on the analytical data. Such a measure is not technically feasible because removal of that volume of concrete would weaken the foundation and compromise its structural integrity. The entire foundation would have to be demolished and replaced.

Removal of the concrete foundation materials is also not financially feasible. The costs of demolishing and replacing the entire foundation including the lower level, the upper level floor, the metal support beams, and the metal staircase far exceeds the projected costs of sandblasting and encapsulation.

4.0 Site-Specific Quality Assurance Project Plan (QAPP)

BETA Group, Inc. (BETA) has developed this Site-Specific QAPP Addendum in association with the EPA-approved Generic Quality Assurance Project Plan (QAPP), Rev. 1, March 2020, RFA 20005, which was prepared by BETA in accordance with EPA's Brownfields program. The Generic QAPP is based on U.S. EPA Region 1 guidelines set forth in Planning and Documenting Brownfields Projects – Generic Quality Assurance Project Plans, and Site-specific QAPP Addenda, March 2009.

BETA has incorporated the Site-Specific QAPP Addendum into this Risk-Based PCB Bulk Product Waste Disposal Plan in order to more efficiently manage the project planning documents and streamline EPA's review and approval process. This QAPP will follow the rules and regulations for Massachusetts including the Massachusetts Contingency Plan (MCP).

4.1 Sampling Design

Following demolition of the upper portions of the pump station and application of epoxy coating, BETA will collect confirmatory surface wipe samples from the remaining (encapsulated) concrete floors, concrete walls, metal staircase, and steel monorail support beams. BETA will collect surface wipe samples in accordance with the standard wipe test method as described in 40 CFR 761.123. A standard-size template (10 cm × 10 cm) will be used to delineate the area of cleanup. The wiping medium will be a gauze pad of known size which has been saturated with hexane. The gauze will be prepared with hexane in the laboratory and stored in sealed glass jars until it is used for the wipe test.

Figures 3 through 7 (attached) depict proposed locations of confirmatory PCB wipe samples. Approximately 30 wipe samples, not including quality control (QC) samples, will be submitted for laboratory analysis of PCBs using USEPA Method 8082.

4.2 Sampling and Analytical Methods Requirements

Table 3 lists the sampling and analytical requirements that will be used for this project. Refer to Appendix C for copies of laboratory standard operating procedures (SOPs).

Table 3: Sampling and Analytical Methods Requirements

Matrix	Parameter	Number of Samples (including field QC)	Sampling Procedure	Analytical SOP(s)	Analytical Methods	Sample Containers	Sample Preservation	Maximum Holding Time Requirements
Soil	PCBs	35	40 CFR 761.123	ESS 60_8082 or Alpha 2129 Method 8082A	8082A	4 oz Glass Container with Wipe	1:4 Acetone: Hexane Cool to 4ºC	365 days (Extraction)

Analytical services shall be provided by ESS Laboratory (ESS) of Cranston, RI and/or Alpha Analytical, Inc. (Alpha) of Westborough, MA. ESS and Alpha are currently accredited under the National Environmental Laboratory Accreditation Conference (NELAC) standards and have their own quality assurance manuals and SOPs that meet the NELAC standards.

ESS and Alpha are accredited for the specific matrix, method, and analyte for which testing is required and maintain their own separate quality assurance manuals. Samples will be analyzed utilizing USEPA Method 8082; Reference: SW-846, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, EPA SW-846, Update IV, 2007.

4.3 Sample Handling and Custody Requirements

A chain-of-custody (COC) program will be followed during sample handling activities from the field through laboratory operations. The COC program is designed to assure that each sample is accounted for at all times. In general, the objective of the COC identification and control system is to assure, to the extent practical, that all samples are uniquely identified, the correct samples are analyzed for the correct parameters, and samples are protected from loss or damage.

Containers used for collecting samples shall be compatible with the media being sampled and analysis to be performed. Containers shall be obtained from the analytical lab and shall be clean, free of contamination, and, if required, contain the proper preservative. Care shall be taken during sampling to ensure that material is not spilled onto the outer surface of containers, and that lids are placed on tightly after sampling. The volume sampled shall be in accordance with the analytical lab's requirements. Containers shall be labeled with the date and time sampled, sample location, collector's initials, sample number, project name or number, preservative, and any other pertinent information. Information shall be documented in field notebooks/worksheets and chain of custody forms, where applicable.

The Field Monitoring Task Manager will be responsible for maintaining field data sheets, COC records, and sample labels for each sample collected, as well as a detailed log of daily field activities. The COC form is signed by all individuals responsible for sampling, sample transport and laboratory receipt. A copy of the COC is kept by the Field Monitoring Task Leader, the laboratory manager and attached to the data package.

Samples will be identified using a descriptive system, such as an alpha-numeric system or equivalent. Sample IDs will be recorded on the sample container, and the sample location will be marked on a Site plan for reference. The samples will be kept on ice in a cooler at a temperature of 4ºC in a bottle with the appropriate preservatives until they are delivered to the laboratory.

4.4 Analytical Sensitivity and Project Criteria

Refer to Table 4 for an Analytical Method Sensitivity and Project Criteria Table for analytical methods that will be utilized for this project and are routinely performed by ESS and Alpha. The table includes routine analytes, method detection limits (MDLs), reportable detection limits (RDLs), regulatory standards, etc. As of the date of this site-specific QAPP addendum, the current state and/or federal standards have been incorporated into this table and the reporting limits and standards have been reviewed for accuracy.

Table 4: Analytical Method Sensitivity and Project Criteria Table

Cas Number	Analyte	Method	Units	MDL	MRL	MS/MSD	MS RPD	BS/BSD	BS RPD	SUR Recv
8082A Polychlorinated Biphenyls (PCBs)										
12674-11-2	Arochlor 1016	8082A	ug/wipe	0.1	1	40-140	30	40-140	30	
11104-28-2	Arochlor 1221	8082A	ug/wipe	0.1	1					
11141-16-5	Arochlor 1232	8082A	ug/wipe	0.1	1					
53469-21-9	Arochlor 1242	8082A	ug/wipe	0.1	1					
12672-29-6	Arochlor 1248	8082A	ug/wipe	0.1	1					
11097-69-1	Arochlor 1254	8082A	ug/wipe	0.1	1					
11096-82-5	Arochlor 1260	8082A	ug/wipe	0.1	1	40-140	30	40-140	30	
37324-23-5	Arochlor 1262	8082A	ug/wipe	0.1	1					
11100-14-4	Arochlor 1268	8082A	ug/wipe	0.1	1					
Surrogates										
2051-24-3	Decachlorobiphenyl	8082A								30-150
877-09-8	Tetrachoro-m-x	8082A								30-150

Notes:

1. MDL – Method Detection Limit

2. MRL – Method Reporting Limit

3. MS/MSD – Matrix Spike / Matrix Spike Duplicate

4. BS/BSD – Blank Spike / Blank Spike Duplicate

5. RPD – Relative Percent Difference

6. SUR Recv – Surrogate Recovery

4.5 Field Quality Control

Internal quality control (QC) checks will help monitor the performance of the field sampling and laboratory activities. This section describes the QC checks that will be implemented to ensure that the data generated in the monitoring program is of known quality. During sample collection activities, various field quality control samples may accompany the samples to the laboratory. These quality control samples include duplicates, spikes, and equipment blanks as shown in Table 5.

Blank samples provide a measure of contamination that has been introduced into a sample either in the field or in the laboratory. To prevent the inclusion of non-site related contaminants into the data assessment, chemical concentrations detected in the blanks are compared to the field samples collected. Results of blank sample analyses may contain common laboratory contaminants such as acetone, 2-butanone, methylene chloride, toluene, and phthalate esters. These chemicals are considered by the EPA as common laboratory contaminants.

Any reported concentrations of analytes from the equipment blank or trip blank will be evaluated by the laboratory and BETA. Concentrations will be compared to results of other samples collected and transported along with these quality control samples. If warranted, re-sampling or re-analysis may be required. Table 5 is a summary of Field Quality Control Requirements.

Table 5: Field Quality Control Requirements

QC Sample	Frequency	Acceptance Criteria	Corrective Action
Duplicate	Five percent (1/20) per analytical parameter/ matrix/ sampling team	= 50% Relative Percent Difference (RPD)	Review field notes and determine if re-analysis is required.
Matrix Spike/Matrix Spike Duplicate	Five percent (1/20) per analytical parameter/ matrix/ sampling team	= 50% RPD	Laboratory to reanalyze sample if RPD>50%.
Trip Blank	1 per site visit	No contaminants detected	Laboratory to reanalyze sample if contaminants are detected above RDLs

4.6 LABORATORY QUALITY CONTROL

Along with the field quality control requirements, the Massachusetts -certified laboratory being utilized maintains a quality control/quality assurance program. BETA will provide the laboratory with sufficient aliquots of each sampled media per field batch to serve as laboratory MS/MSDs in order to ensure project-specific QC data.

Relative Percent Difference (RPD) is a measure of precision and the percent surrogate recovery is a measure of accuracy. The objective of the laboratory concerning precision is to equal or exceed the precision demonstrated in the published analytical method on similar samples. RPD is calculated as follows:

$$RPD = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Mean of Sample and Duplicate Results}} \times 100$$

The objective of the laboratory concerning accuracy is to equal or exceed the accuracy demonstrated in the published analytical method on similar samples. Accuracy is determined on matrix spikes and/or blank spikes and is calculated as follows:

$$\text{Percent Recovery} = \frac{(\text{Observed} - \text{Sample}) \text{ Concentration} \times 100}{\text{Spiked Concentration}}$$

Precision is a measure of the reproducibility of the results. This quality control indicator is evaluated by examining the variability of results from field duplicates and laboratory duplicates. The precision objective for this investigation is to meet or exceed the criteria that have been established for the referenced analytical methodology. Corrective action will be implemented by the laboratory as necessary to correct any substantial deviations.

Accuracy is a measure of the closeness of the analytical result to the true concentration. The percent recovery of spiked samples and performance evaluation standards reflect whether the analytical result has a high or low bias. The accuracy objective for this investigation is to meet or exceed the criteria that have been established for the referenced analytical methodology. Corrective action will be implemented by the laboratory as necessary to correct any substantial deviations.

The SOPs provided in Appendix C contain the laboratory quality control procedures routinely performed for each parameter and matrix.

4.7 Data Management and Documentation

4.7.1 Field Documents and Records

Field notes will include project location, date of field activities, weather conditions, and the purpose of site visit. All entries on the field notes are made with permanent ink, and corrections are made using a single line through the mistake with the initials and date of the individual who made them. Field sketches and photographs may be used to document current site conditions. All field notes and site documentation will be scanned and filed electronically in the appropriate project folder. Field notes are reviewed by the BETA Project Manager. Field note review will consist of a comparison of data collection to the field sampling plan requirements to evaluate for completeness and accuracy.

For sample collection, data reporting will begin in the field and will be tightly interwoven with the chain-of-custody procedures. Upon collection of each sample, the sampling team will record in a field notebook the sample number, sampling location, date, and time of collection. Some of this information will also be recorded, as necessary, on the sample bottle label and on the chain-of-custody record. Field activities will be summarized in the text of the final report. Data collected (times, sample locations, sample depths, matrix, field and/or laboratory analysis performed) will be tabulated and provided in the final report.

Any corrections to the logbook or other written documentation shall be initialed and dated. All corrections shall be shown as a single line through the original. The unused bottom portion of each page shall be lined-out, initialed, and dated.

4.7.2 Laboratory Documents and Records

The laboratory data package includes a project narrative for the data, which will identify any problems or deviations with the samples or chain of custody. Following the project narrative, the data results sheets will show preparation and analysis dates, sample concentrations, units, reporting limits, and percent solids for soil/sediment samples. The laboratory data package also contains a laboratory quality control package documenting method blanks, surrogates, and laboratory control samples.

4.7.3 Post Laboratory Data Manipulation

Once the laboratory data is obtained, the sample results will be manually transferred into an Excel database. Data tables will be reviewed by the QA officer or Project Manager to detect and correct any errors and identify any non-conforming data. The output of the data validation effort will be a data usability report that will attest to the suitability of the data for its intended use. At a minimum, data summary tables, a data usability summary and laboratory reports will be provided electronically in the final report. Hardcopies will be provided as requested.

4.7.4 Project Files

All project files including field notes, Site plans, laboratory analytical reports, summaries of analytical data, and other miscellaneous information related to the project will be maintained in electronic project files and reviewed by the appropriate Project Manager to evaluate the usability of the data and assure compliance with the elements of this QAPP. Paper copies are scanned to the project file. BETA will keep all files related to the project for at least 10 years after the project has been completed. The data on the server is backed up daily.

4.8 Assessments and Response Actions

Throughout the course of the project, BETA will implement the following procedures to detect and correct any problems that may occur:

- Project management meetings;
- Peer reviews of all reports, documents, and correspondence;
- Project team meetings;
- Periodic field meetings during all site investigations; and
- Ongoing communication between BETA's project team, the client, and all subcontractors.

As warranted, problems that occur will be communicated through the issuance of project memoranda and telephone conversations. All correspondence will detail the problem encountered and any corrective actions taken. All memoranda and telephone notes will be maintained in dedicated project files.

All field sampling will be overseen by the Project Manager to ensure that the QAPP and sampling SOPs are followed. Any sampling problems will be immediately communicated to the Project Manager and documented in the field notes.

4.8.1 Corrective Actions

If the quality control detects unacceptable conditions or data, the Project Manager will be responsible for developing and initiating corrective action.

If additional assessment is planned it will be described in a site-specific sampling plan addendum and will be consistent with this Generic QAPP.

Corrective actions must be taken as soon as possible when data or field procedures are found to be of questionable quality. Any suspected problems shall be brought to the attention of the Project Manager and the QA Coordinator. The need for corrective action may be identified in many ways. The corrective action steps are:

- Identification and definition of the problem;
- Investigation of the problem;
- Determination of the cause of the problem and appropriate corrective action (this may include the need for additional training);
- Implementation of the corrective action;
- Verification that the problem has been corrected;
- Modification of procedures, as necessary, to prevent recurrence; and documentation of the events.

The Quality Assurance Officer will determine whether the nonconformance is significant or requires specialized expertise or remedial analyses. Corrective action may include the following:

- Reanalyzing samples (if holding times permit);
- Resampling and reanalyzing;
- Evaluation and amending sampling and analytical procedures;
- Accepting the data and acknowledging the level of uncertainty or inaccuracy by flagging the data and providing a qualifying explanation.

4.9 PROJECT REPORTS

Reports submitted for the project may include initial site assessment, status reports, and final reports. Status reports will be submitted every six months, unless otherwise noted.

The reports will be prepared by the field monitoring task manager, and then reviewed by both the quality assurance and project manager. Copies of all reports will be submitted to the assigned EPA and State contacts, as well as the client.

The final report will include a complete site history, summary of activities performed at the site including analytical results, any and conclusions/recommendations. Field sampling results will be summarized in tables and compared to applicable standards, with exceedances highlighted. Site plans and laboratory analytical reports will typically be included, as well as any other relevant information. The report will be submitted in hard copy format, with an electronic copy available if requested.

4.10 FIELD DATA EVALUATION

The field data evaluation will include a detailed review of all information obtained over the course of the project (field notes, photographs, field screening results, analytical results, etc.). The field data will be analyzed for trends and any discrepancies between the data. The final report will discuss information documented in field notes. Laboratory analytical reports and photographic logs will be included in the report as attachments. The report will also include tables summarizing results of all samples collected to date. Data will be compared to the appropriate State's regulatory reporting/characterization requirements. The field data evaluation will be performed by the designated quality control manager.

4.11 LABORATORY DATA EVALUATION

In order to ensure that the project data has met the objectives and requirements of this QAPP and that the results are technically valid, reliable, and usable, data shall be reviewed and compared with relevant documentation such as:

- Available Historical data;
- Laboratory MDL and RDL;
- Standards established by the MassDEP and EPA;
- Current MassDEP policies; and
- Other pertinent documents as needed.

For Massachusetts, the MassDEP *Compendium of Quality Control Requirements and Performance Standards for Selected Analytical Protocols* (CAM) (Policy #WSC-10-320) provides a series of required protocols for the acquisition, analysis, and reporting of analytical data in support of MCP decisions (a) to satisfy the broad quality assurance (QA) and quality control (QC) requirements of 310 CMR 40.0017 and 40.0191 regarding the scientific defensibility, precision and accuracy, and reporting of analytical data and (b) to meet the requirements and specifications for those parties who wish to obtain "Presumptive Certainty" for analytical data that may be used in a data usability and representativeness assessment, as required in 310 CMR 40.1056(2)(k) for Permanent Solution submittals, consistent with the guidance described in MassDEP Policy #WSC-07-350, *MCP Representativeness Evaluations and Data Usability Assessments*.

A final data evaluation will be performed by the designated quality assurance manager to verify the completeness of the laboratory data package and confirm that all requirements set forth in the QAPP have been met. Any questions or missing information will be addressed with the laboratory and any important information will be provided in the final report.

As part of the data evaluation procedure, chain of custodies, sample preservation, and holding time results will be reviewed. Any issues identified will be documented, and potential impacts to the sampling data will be recorded.

All field QC samples will then be evaluated, and relative percent differences will be calculated for the field duplicates. If any other field QC samples are submitted, the data will also be tabulated with appropriate recoveries. Laboratory QC results will also be evaluated and documented. Any observations, trends, and limitations observed in the field and/or laboratory QC data will be interpreted and documented in the final report.

4.12 Data Usability and Project Evaluation

Data usability will be based on meeting some or all, but not limited to the following criteria:

- Deviations from any standard operating procedures will be reviewed to identify potential limitations in the data. If a substantial deviation to standard operating procedure is identified, consideration may be given to either re-sampling or disregarding the sample result.

- The analytical methods chosen include method detection limits that are below applicable regulatory standards. This approach ensures that all data received can be directly compared to applicable regulatory standards. If a detection limit is at or above the concentration of concern, the detection limit may be lowered, and the sample may be reanalyzed if technically possible to do so.

- If concentrations of target analytes are at or near a RC, quality control data (blanks, spikes) will be scrutinized to determine the likelihood of false negatives and false positives. If QC data indicates that precision or accuracy is determined to be outside method specific criteria, then an evaluation of the data will be performed to determine where and how this QC issue affects the use of the data. The results of this evaluation will be presented in the final report along with a discussion of any limitations in the way the data should be used. If, after the evaluation, it is determined that the data is unusable, the data will be rejected, and possible corrective actions will be documented in the final report.

- A review of sample representativeness from field notes will be performed. A non-representative or non-homogeneous sample increases the potential for false negatives or false positives. Adherence to applicable field sample collection protocols, field QC measures, and transport and storage of sample to the laboratory will decrease the possibility of having a sample result that is not representative of true site conditions.

- Poor data quality or lost samples will decrease confidence in the data set. To ensure completeness, adherence to all field protocols, sample tracking procedures, and laboratory procedures shall be maintained. Completeness will be described in terms of the total number of samples that meet data validation requirements compared to the total number of samples that do not satisfy such requirements.

- At the completion of the project, an overall assessment of the project data (field and laboratory) will be performed to determine whether the goals and objectives of the project were met and whether there were any observations, trends, anomalies, or data gaps noted. The results of this assessment will be documented in the final report.

Data usability will be performed based on the Modified Tier I+ Validation, the above listed elements, actual field observations and conditions, and in accordance to EPA New England Environmental Data Review Program Guidance, dated June 2018. All results of the data usability will be summarized in the final Site assessment investigation report.

5.0 CONCLUSIONS

The proposed project will provide the improvements required at the WRSPS to allow the facility to continue to serve the City of Framingham's residents and protect human health and the environment while complying with TSCA regulations. The proposed PCB Bulk Product Waste Disposal Plan entails removal / off-site disposal of PCB Bulk Product Waste generated during site rehabilitation activities, sandblasting of surfaces coated with PCB paint, and encapsulation of the remaining building materials. Confirmatory surface wipe samples will be collected and analyzed for PCBs following encapsulation efforts. Encapsulation of the substrates containing no visible paint provides beneficial reuse of the existing WRSPS foundation, minimizing material waste. Access to the interior of the WRSPS is limited to City of Framingham Public Works employees on a part-time basis. An O&M Plan with an associated deed restriction will be implemented to ensure that the paint is maintained intact in perpetuity. The proposed plan does not pose an unreasonable risk of injury or harm to human health or the environment.

6.0 REFERENCES

AECOM. (2017). *Downgradient Property Status Opinion, Worcester Road Pump Station, Framingham.* Chelmsford: AECOM.

AECOM. (2018). *Limited Hazardous Building Materials Survey Summary Report.* Chelmsford: AECOM.

Smith & Wessel Associates, Inc. (2021, September 13). *Sampling of Suspect Paints to be analyzed for PCB concentrations at the Pump Station at 730 Worcester Road, Framingham, Massachusetts*.

USEPA Region 1 *Standard Operating Procedure for Sampling Porous Surfaces for Polychlorinated Biphenyls (PCBs), Revision 4 (May 2011)*

USEPA Region 1 *Planning and Documenting Brownfields Projects – Generic Quality Assurance Project Plans, and Site-Specific QAPP Addenda, Revision FINAL (March 2009)*

USEPA Region 1 EPA New England Environmental Data Review Program Guidance (June 2018)

USEPA PCB Spill Cleanup Policy – Wipe Sampling and Double Wash/Rinse Cleanup, June 23, 1987 (revised April 18, 1991)

FIGURES

BETA
IMPROVING COMMUNITIES TOGETHER

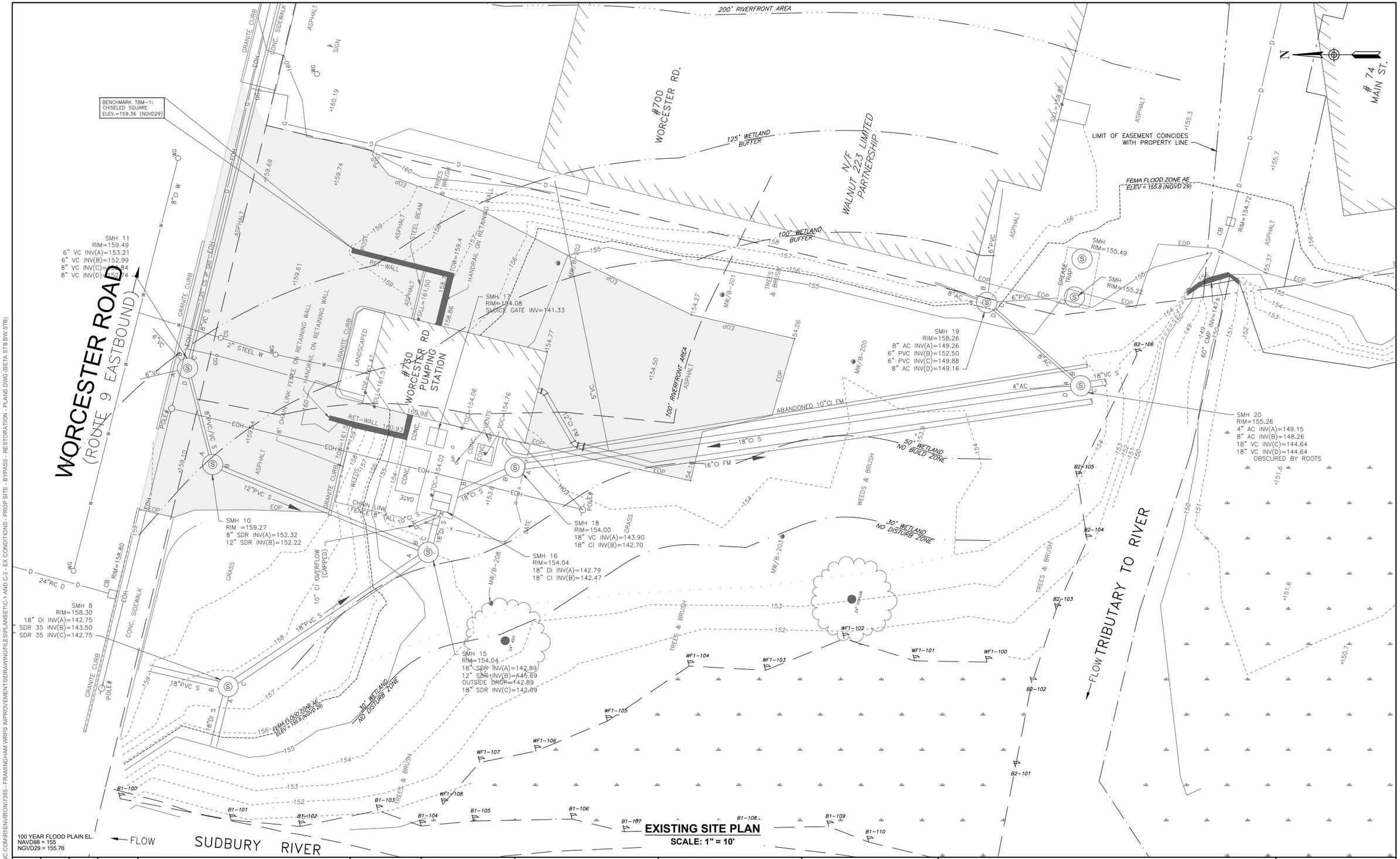
N
W E
S

0 1,000 2,000 Feet

1 inch = 1,000 feet

Figure 1
Site Locus
Worcester Road Sewer Pumping Station
Framingham, MA

Data Source: MassGIS USGS Topographic Quadrangle Images (2001)



EXISTING SITE PLAN
SCALE: 1" = 10'

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: RTG
DESIGNED BY: AJG
CHECKED BY: JRD

REGISTERED PROFESSIONAL
For Review Only

PREPARED BY
BETA
www.BETA-Inc.com

SUBCONSULTANT

SCALE
10 0 10 20
SCALE IN FEET: 1"=10'
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

TITLE
Worcester Road Sewer Pumping Station Replacement

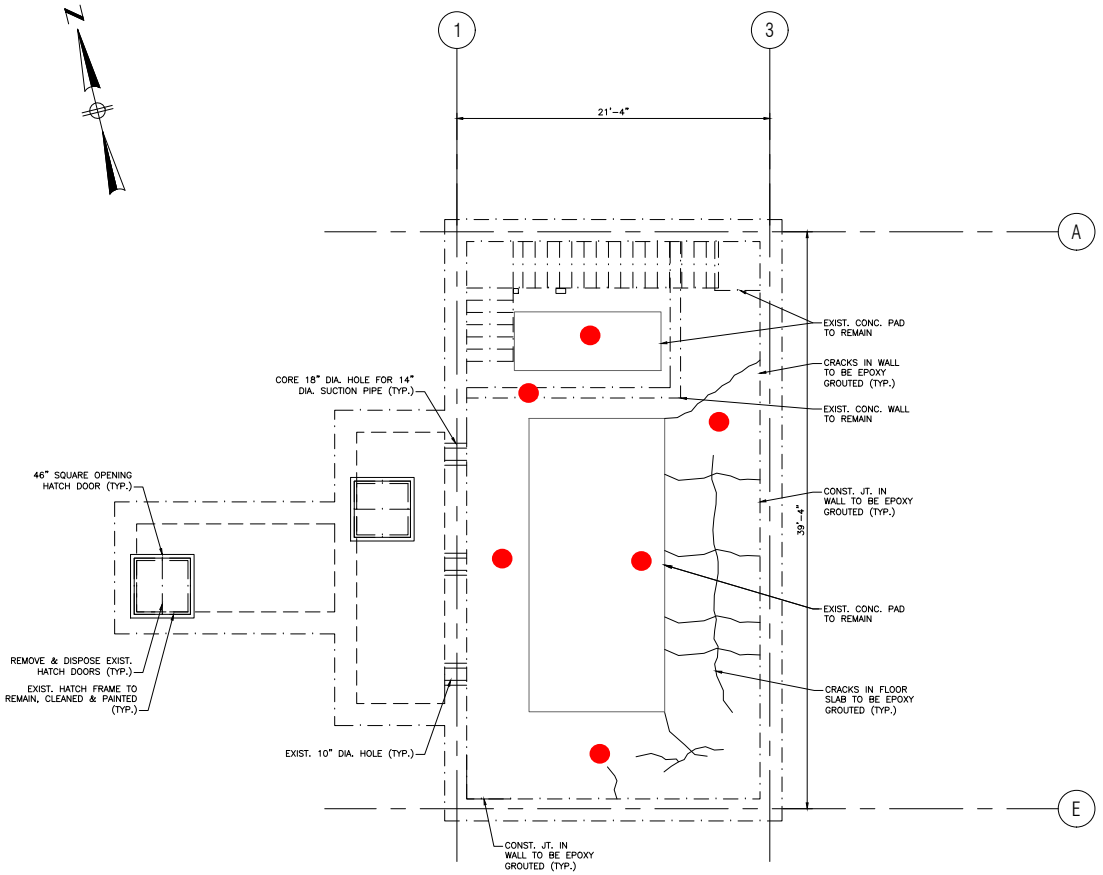
EXISTING CONDITIONS SITE PLAN

BETA JOB NO. 7385
ISSUE DATE SEPTEMBER 2021
SHEET NO. C-1

9/24/2021 12:43 PM \\BETA-INC.COM\RI\ENVIRON\7385 - FRAMINGHAM WRPS IMPROVEMENTS\DRAWINGFILES\PLANSET\C-1 AND C-2 - EX CONDITIONS - PROP SITE - BYPASS - RESTORATION - PLANS.DWG (BETA STB B.W.STB)

Legend

● Proposed Confirmatory Wipe Sample Location



LOWER LEVEL PLAN

SCALE: 1/4" = 1'-0"

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: JMR

DESIGNED BY:

CHECKED BY:

REGISTERED PROFESSIONAL: For Review Only

PREPARED BY: BETA www.BETA-Inc.com

SUBCONSULTANT:

SCALE: AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

Figure 3

Lower Level Floor Sample Locations

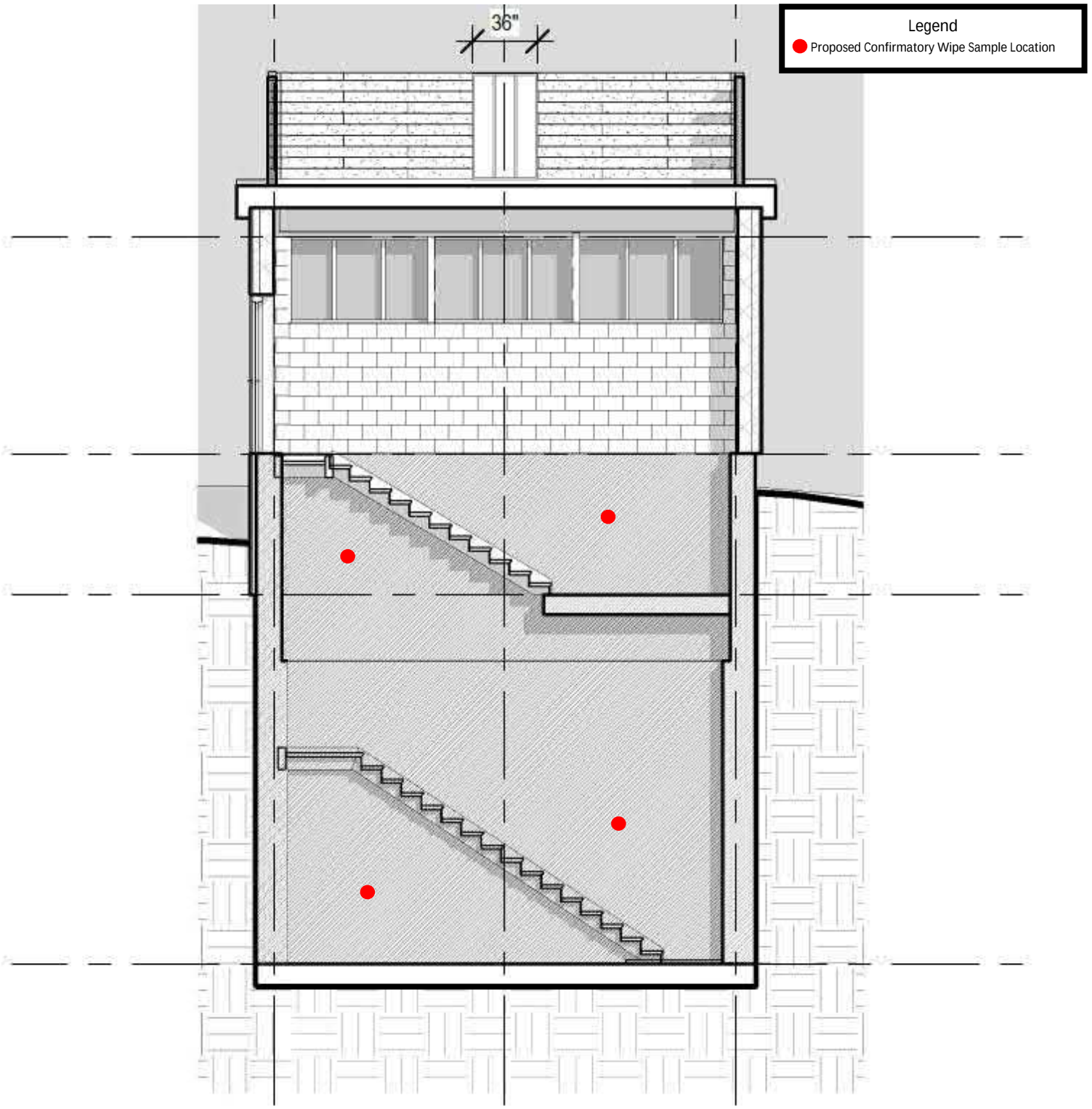
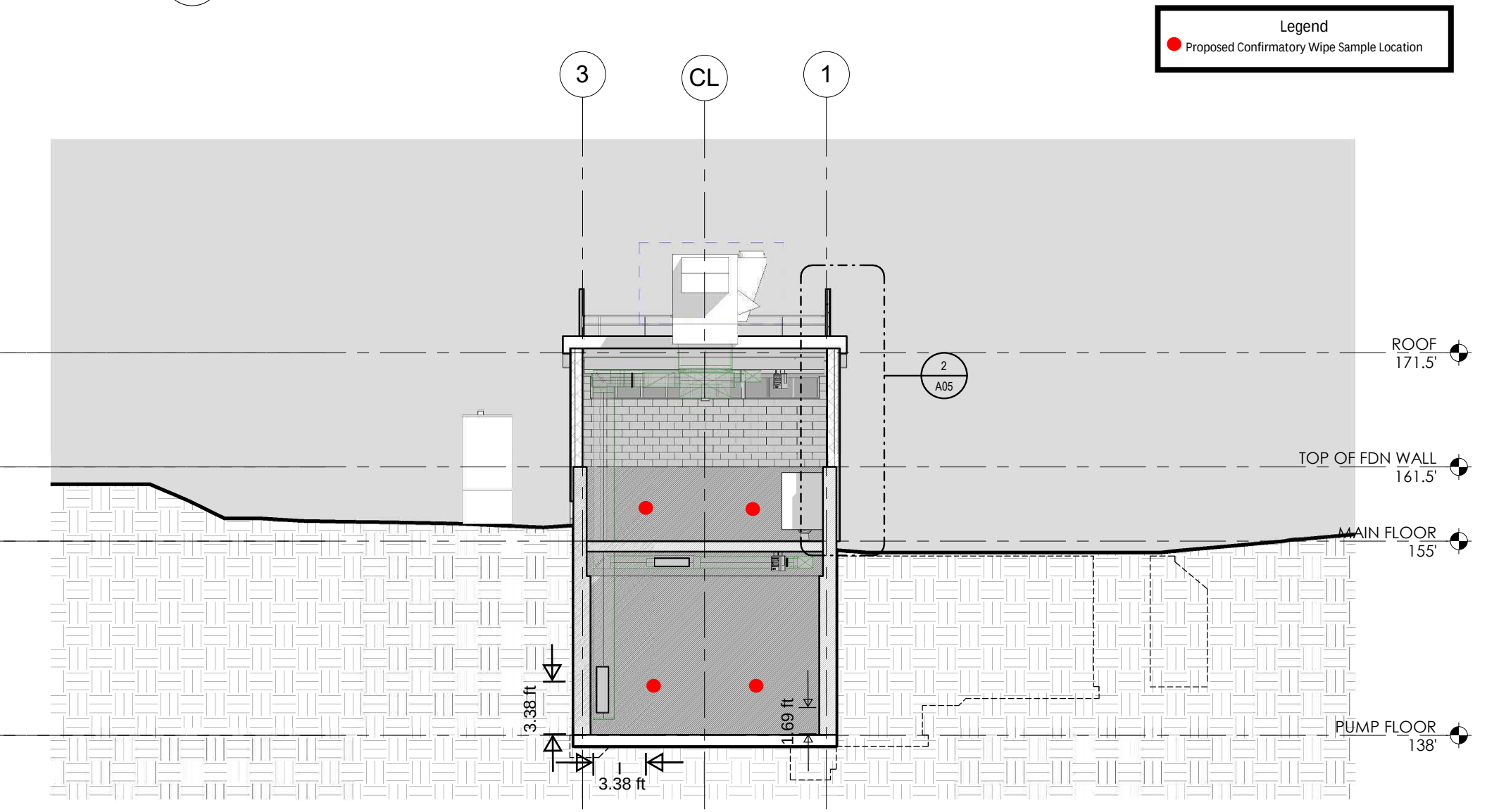


Figure 4
North Wall Sample Locations

4 BUILDING SECTION (N/S) LOOKING WEST

1/8" = 1'-0"

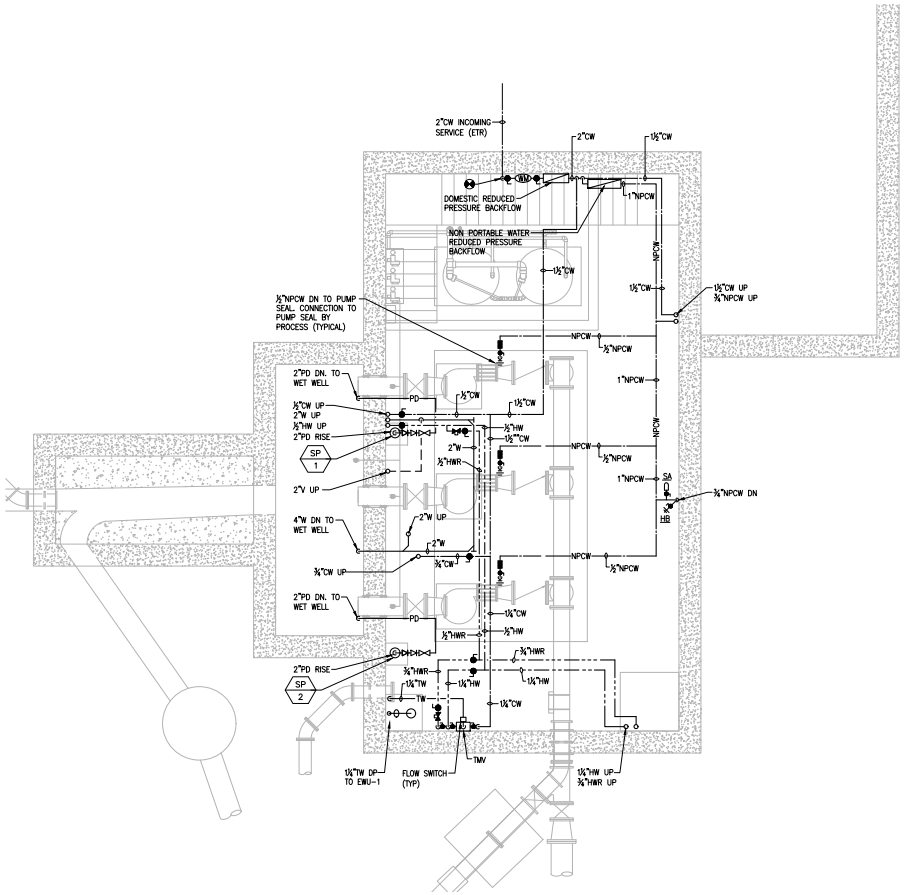


1 BUILDING SECTION (W/E) LOOKING SOUTH

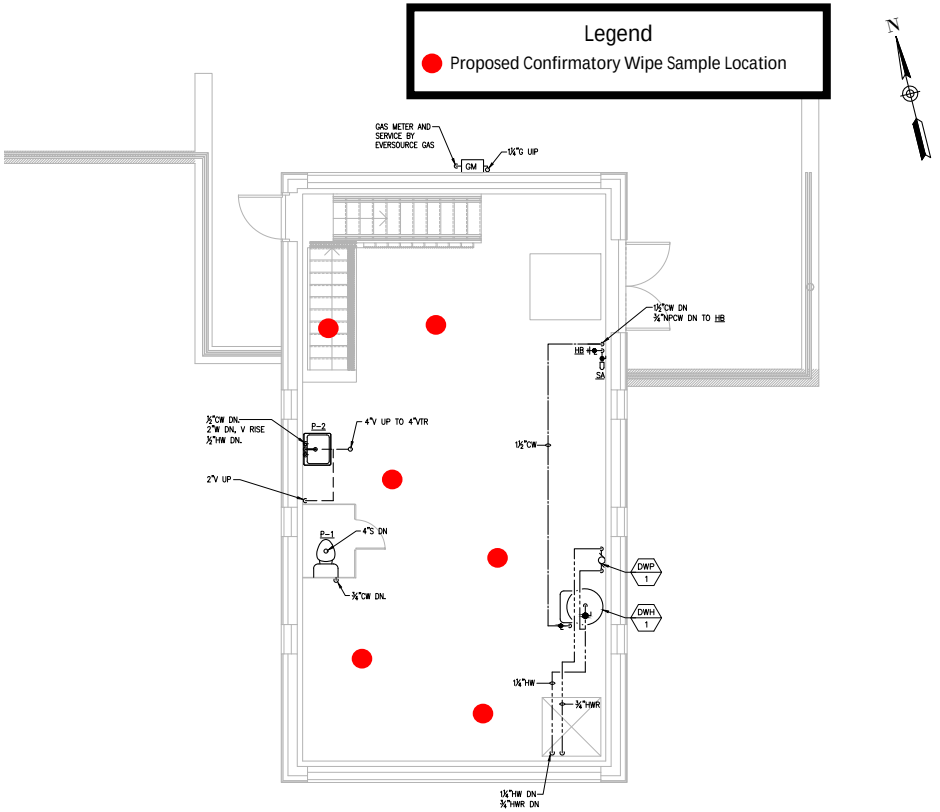
1/8" = 1'-0"

Figure 5
South Wall Sample Locations

SCALE	TITLE	DSK JOB NO.
	Worcester Road Sewer	20030.00



LOWER LEVEL - PLUMBING PLAN - PROPOSED
SCALE: 1/4" = 1'



UPPER LEVEL - PLUMBING PLAN - PROPOSED
SCALE: 1/4" = 1'

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: RLB
DESIGNED BY: RLB
CHECKED BY: JAL

REGISTERED PROFESSIONAL: For Review Only

PREPARED BY: BETA www.BETA-Inc.com

SUBCONSULTANT: SAR ENGINEERING, INC.
Mechanical/Electrical Engineers
150 Grossman Drive, Suite 309
Braintree, Massachusetts 02184
617 221-9220
web: www.sar.com

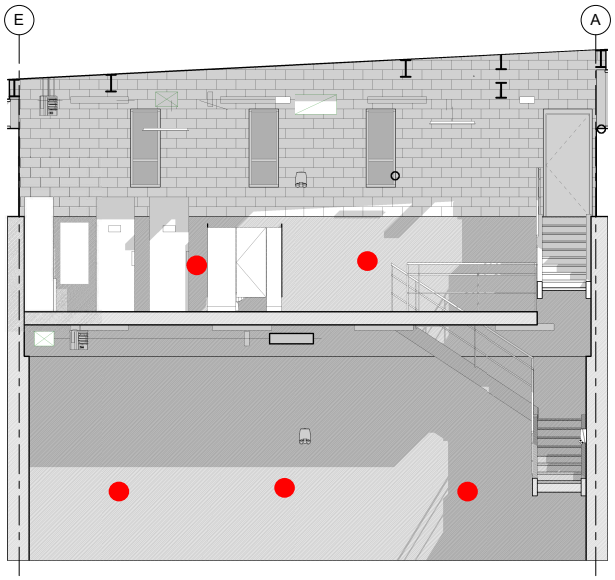
SCALE: AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

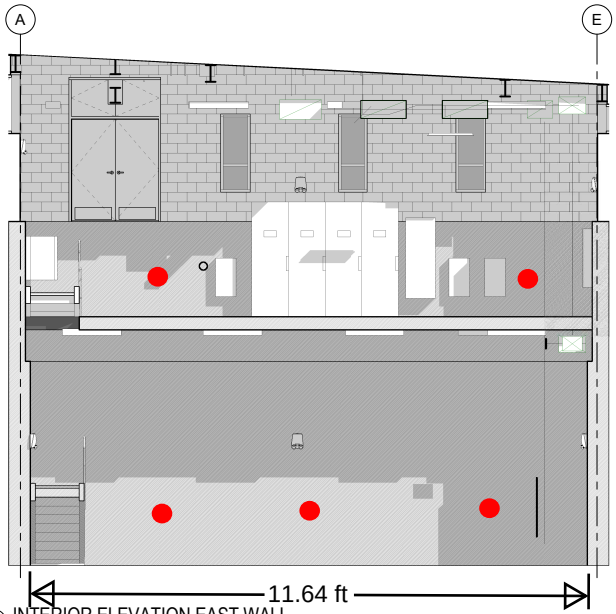
Figure 6
Upper Level Floor Sample Locations

Legend

Proposed Confirmatory Wipe Sample Location



1 INTERIOR ELEVATION WEST WALL
1/4" = 1'-0"



2 INTERIOR ELEVATION EAST WALL
1/4" = 1'-0"

P:\PROJECTS\15\10 NPS - NEWBURYPORT PUMP STATION\600-NPS-DWGS\600I-REVIT\FAMILIES\TITLEBLOCKS\KDG_Arch D 24x36 Vertical Title - BETA

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: ALK
DESIGNED BY: DSK
CHECKED BY: MPS

REGISTERED PROFESSIONAL: 90% DD

PREPARED BY: BETA www.BETA-Inc.com

SUBCONSULTANT: DSK Dewing Schmid Kearns ARCHITECTS + PLANNERS
30 Monument Square Suite 200B Concord, MA 01742 978.371.7500
280 Elm Street South Dartmouth, MA 02748 508.999.0440

SCALE: 1/4" = 1'-0"

Figure 7
Wall Sample Locations-East and West Walls

Appendix A: Previous Hazardous Material Surveys

Framingham, Massachusetts

Worcester Road Sewer Pump Station Rehabilitation

730 Worcester Road

March 2022

FOCUSED HAZARDOUS BUILDING MATERIALS SURVEY

701 George Washington Hwy
Lincoln, Rhode Island 02865
401.333.2382
www.BETA-Inc.com

Worcester Road Sewer Pump Station Rehabilitation

Framingham, Massachusetts

730 Worcester Road

FOCUSED HAZARDOUS BUILDING MATERIALS SURVEY

Prepared by: BETA GROUP, INC.
Prepared for: City of Framingham

March 2022

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1.0 INTRODUCTION

BETA Group, Inc. (BETA) has completed a Focused Hazardous Building Materials Survey for the rehabilitation of the Worcester Road Sewer Pumping Station (WRSPS) at 730 Worcester Road (the Site). The Site consists of the northern portion of the parcel located at 730 Worcester Road in Framingham, Massachusetts, generally south of Worcester Road (Route 9) and east of the Sudbury River. The Site is bounded to the north by Route 9, to the west by the Sudbury River, to the south by undeveloped woodland, and to the east by commercial properties. Existing improvements at the Site consist of the WRSPS (built in 1963) and associated utility infrastructure, a bituminous driveway, and fencing.

BETA's survey activities supplement previous hazardous materials sampling and analysis activities conducted at the Site by others. PCB concentrations were previously identified in several painted surfaces (on walls, floors, and equipment) at the Site in excess of 50 parts per million (ppm), which is the threshold concentration for characterization as a hazardous waste under the Environmental Protection Agency (EPA) Toxic Substances Control Act (TSCA). BETA's 2022 survey consisted of an evaluation of PCB concentrations in porous concrete substrates (i.e., poured concrete foundation walls, floors, and concrete masonry units [CMU]). The survey also included some additional sampling and analysis of miscellaneous paints and caulking materials.

Site survey activities are being conducted in support of the WRSPS rehabilitation project. Proposed work associated with the project includes the demolition of the existing WRSPS, the construction of a new pumping station within the existing foundation footprint, installation of a new sewer bypass structure, reconfiguration of bituminous areas, management of contaminated soils in accordance with state and local regulations, and installation of fencing.

2.0 PREVIOUSLY COMPLETED PCB TESTING

Several hazardous materials surveys involving testing for PCBs were previously conducted at the WRSPS. Hazardous material survey results are briefly summarized in the table below.

Table 1: Summary of PCB Sampling Events

Date	Consultant	Sample Media	Summary of Sampling Results
12/14/18	AECOM	Building materials (pipe penetration sealant, gray painted piping, black wall coating)	PCBS > 50 ppm in Lower Level • Gray paint - piping system
9/13/21	SWA	PCB Sampling - Suspect Paints	PCBs > 50 ppm in Lower Level • Green wall paint • Gray pipe paint • Gray duct paint • Gray stair paint • Gray floor paint PCBs > 50 ppm in Upper Level • White floor paint • Gray/red floor paint • Green motor paint

Notes:
SWA - Smith & Wessel Associates, Inc.
ppm - parts per million

In 2018, AECOM conducted a limited pre-demolition hazardous building materials survey of the WRSPS. The survey included collection and testing of materials containing PCBs. PCB concentrations exceeding the 50 parts per million (ppm) threshold were detected in the samples collected from the gray paint on the piping system. PCB concentrations were reported as not detected in the samples collected from the black wall coating in the wet well and the white penetration sealant on the upper level of the pump station.

In 2021, Smith & Wessel Associates, Inc. (SWA) collected samples of paints throughout the WRSPS suspected of containing PCBs. Analytical results indicated PCB concentrations greater than 50 ppm in most of the paints tested (Smith & Wessel Associates, Inc, 2021).

3.0 JANUARY TO MARCH 2022 SAMPLING & ANALYSIS ACTIVITIES

In January and March 2022, BETA collected samples of the concrete substrates on the upper and lower levels, green paint on the CMUs and foundation walls, exterior window caulking, and exterior window glazing. Figures 1 through 5 (attached) depict sampling locations. Refer to Appendix A for site photographs. The concrete samples were obtained following the guidance provided in the USEPA Region 1 *Standard Operating Procedure for Sampling Porous Surfaces for Polychlorinated Biphenyls (PCBs), Revision 4 (May 2011), EIASOP_POROUSSAMPLING* and in accordance with the Code of Federal Regulations (CFR) 40 CFR 761.

A rotary impact hammer equipped with a one-inch diameter carbide drill bit was used to generate a fine concrete powder, which was collected into appropriate containers provided by ESS Laboratory of Cranston, RI. Samples were collected at approximately one-inch intervals and six holes were generally required to obtain the required amount of concrete powder for laboratory quality assurance purposes. A total of 57 concrete samples were collected from upper and lower levels of the WRSPS and two additional field duplicate samples were collected, as noted in the chain of custody. 52 of the samples were collected at a depth of approximately 0.5”-1.5” below the surface of the concrete and 5 of the samples were collected at a deeper interval of approximately 2”-3”. The samples were submitted to ESS for laboratory analysis of PCBs (Soxhlet Extraction Method – SW846 3540C / 8082).

Disposable sampling equipment was discarded after completing the sampling task and was not reused. All non-disposable sampling equipment was decontaminated after each sample was collected according to the guidelines for decontamination provided in the *Standard Operating Procedure for Sampling Porous Surfaces for PCBs, Revision 4 (May 2011), EIASOP_POROUSSAMPLING* guidance. All rinse liquids generated during the decontamination process were stored in a 5-gallon bucket pending laboratory results. Two equipment blank samples, consisting of rinse water after the drill bit was decontaminated, were collected and submitted to ESS for laboratory analysis of PCBs (Soxhlet Extraction Method – SW846 3540C / 8082).

In addition to the concrete samples, BETA collected three samples of green paint from upper level interior walls, one sample of paint from exterior roof soffit, two exterior window frame caulking samples, and two exterior window glazing putty samples.

Laboratory analytical results revealed the following PCB concentrations:

- Lower Level Wall Concrete: 0.4 – 32.4 ppm
- Lower Level Floor Concrete: 0.2 – 1.3 ppm
- Lower Level Concrete Pads & Containment Berms: Below Lab Reporting Limit (BRL) – 1.3 ppm
- Upper Level Floor Concrete: 1.3 – 10.9 ppm
- Upper Level Walls (Poured Concrete): BRL – 37.5 ppm
- Upper Levels Walls (CMUs): BRL – 0.1 ppm
- Interior Green Paint: 26.2 – 382 ppm
- Exterior Soffit Paint: 3.9 ppm
- Window Frame Caulk: 3.0 ppm
- Window Glazing Putty: 8.1 – 23.1 ppm

Tables 2 through 4 (attached) summarize PCB concentrations in ppm or milligrams per kilogram (mg/kg). Refer to Appendix B for copies of the laboratory analytical reports.

Total PCB concentrations are equal to the sum of all Aroclors detected (only Aroclor 1254 was detected). Concentrations of total PCBs were detected in 31 of 32 concrete samples from the lower level and 18 of 29 samples collected from the upper level. None of the detected PCB concentrations in concrete exceeded the TSCA threshold for PCB Bulk Product Waste (50 mg/kg). PCB concentrations in the concrete wall and/or floor substrates, including upper and lower floor levels, ranged from non-detect to 37.5 ppm. PCB concentrations in the green interior wall paint exceeded 50 ppm. All other samples collected by BETA contained PCB concentrations less than 50 ppm.

4.0 CONCLUSIONS

Laboratory analytical results for porous concrete substrates indicate that PCB concentrations up to 37.5 ppm have leached from the PCB-containing paint into the concrete at shallow depths (up to 1.5" below the surface that is in contact with the paint). Analytical results for samples collected from 2.0"-3.0" from the surface did not reveal PCB concentrations exceeding 1 ppm.

Materials containing PCBs at concentrations greater than 50 mg/kg are considered to be a PCB Bulk Product Waste and should be disposed of according to TSCA regulations. Materials containing PCBs at concentrations greater than 1 mg/kg and less than 50 mg/kg are considered to be a Federally Excluded PCB Product if the total PCB concentration in the original material has not been modified by subsequent activities; however, this is not the case for the concrete because the PCBs originated from the paint. These materials must be removed for off-Site disposal or encapsulated to prevent human exposure to PCBs.

5.0 REFERENCES

AECOM. (2017). *Downgradient Property Status Opinion, Worcester Road Pump Station, Framingham.* Chelmsford: AECOM.

AECOM. (2018). *Limited Hazardous Building Materials Survey Summary Report.* Chelmsford: AECOM.

Smith & Wessel Associates, Inc. (2021, September 13). *Sampling of Suspect Paints to be analyzed for PCB concentrations at the Pump Station at 730 Worcester Road, Framingham, Massachusetts*.

USEPA Region 1 *Standard Operating Procedure for Sampling Porous Surfaces for Polychlorinated Biphenyls (PCBs), Revision 4 (May 2011), EIASOP_POROUSSAMPLING.*

TABLES

Table 2 - Summary of Concrete Analytical Results - Lower Level
Worcester Road Pump Station
Framingham, MA

SAMPLE ID	W-1	W-2	W-5	W-5 (2-3")	W-6	W-9	W-9 (2-3")	W-10	W-24 (LL)[6]	W-25 (LL)[7]	W-26 (LL)[8]	W-27 (LL)[9]
SAMPLE DATE	1/18/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022
SAMPLE LOCATION	East Wall-Lower Level	East Wall-Lower Level	East Wall-Lower Level	East Wall-Lower Level	East Wall-Lower Level	East Wall-Lower Level	East Wall-Lower Level	East Wall-Lower Level	West Wall-Lower Level	West Wall-Lower Level	North Wall-Lower Level	North Wall-Lower Level
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
PCBs												
Aroclor 1016	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1221	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1232	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1242	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1248	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1254	19.3	4.4	3.1	0.4	8.2	2.2	0.4	6.8	16.0	19.8	29.6	32.4
Aroclor 1260	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1262	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1268	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)

Notes:
1. BRL - Below laboratory method reporting limit
2. mg/kg - milligrams per kilogram or parts per million (ppm)
3. Materials containing PCBs at concentrations greater than or equal to 50 mg/kg are classified as PCB Bulk Waste and are regulated by TSCA
4. Materials containing PCBs at concentrations greater than 1 mg/kg and less that 50 mg/kg are considered to be a Federally Excluded PCB Product if the total PCB concentration in the original material has not been modified by subsequent activities
5. Materials containing PCBs at concentrations less than 1 mg/kg are not regulated and can be managed as general construction waste
6. Sample listed as W-24 with sample time of 13:20 on laboratory analytical report
7. Sample listed as W-25 with sample time of 13:25 on laboratory analytical report
8. Sample listed as W-26 with sample time of 13:35 on laboratory analyitcal report
9. Sample listed as W-27 with sample time of 11:30 on laboratory analytical report

Table 2 - Summary of Concrete Analytical Results - Lower Level
Worcester Road Pump Station
Framingham, MA

SAMPLE ID	W-28	W-29	W-30	F-1	F-2	F-3	F-4	F-5	F-6	Duplicate-1	F-7	F-8
SAMPLE DATE	3/3/2022	3/3/2022	3/3/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2021	3/3/2022
SAMPLE LOCATION	West Wall-Lower Level	West Wall-Lower Level	West Wall-Lower Level	Floor-Lower Level	Floor-Lower Level	Floor-Lower Level	Floor-Lower Level	Floor-Lower Level	Floor-Lower Level	Floor-Lower Level (F-6)	Floor-Lower Level	Floor-Lower Level
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
PCBs												
Aroclor 1016	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)
Aroclor 1221	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)
Aroclor 1232	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)
Aroclor 1242	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)
Aroclor 1248	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)
Aroclor 1254	15.3	10.8	28.0	1	0.5	0.6	0.4	0.2	0.3	0.6	1.0	1.3
Aroclor 1260	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)
Aroclor 1262	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)
Aroclor 1268	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)

Notes:
1. BRL - Below laboratory method reporting limit
2. mg/kg - milligrams per kilogram or parts per million (ppm)
3. Materials containing PCBs at concentrations greater than or equal to 50 mg/kg are classified as PCB Bulk Waste and are regulated by TSCA
4. Materials containing PCBs at concentrations greater than 1 mg/kg and less that 50 mg/kg are considered to be a Federally Excluded PCB Product if the total PCB concentration in the original material has not been modified by subsequent activities
5. Materials containing PCBs at concentrations less than 1 mg/kg are not regulated and can be managed as general construction waste
6. Sample listed as W-24 with sample time of 11:25 on laboratory analytical report
7. Sample listed as W-25 with sample time of 11:20 on laboratory analytical report
8. Sample listed as W-26 with sample time of 11:15 on laboratory analyitcal report
9. Sample listed as W-27 with sample time of 11:10 on laboratory analytical report

Table 2 - Summary of Concrete Analytical Results - Lower Level
Worcester Road Pump Station
Framingham, MA

SAMPLE ID	F-9	PP-1	PP-2	PP-2 (2-3")	TP-1	CB-1	CB-2	SP-1	Equip-Blank-1
SAMPLE DATE	3/3/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2022	1/18/2022
SAMPLE LOCATION	Floor-Lower Level	Pump Concrete Pad-Lower Level	Pump Concrete Pad-Lower Level	Pump Concrete Pad-Lower Level	Tank Pad	Containment Berm	Containment Berm	Stair Concrete Pad	NA
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/L
PCBs									
Aroclor 1016	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)
Aroclor 1221	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)
Aroclor 1232	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)
Aroclor 1242	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)
Aroclor 1248	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)
Aroclor 1254	0.6	1.2	1.3	BRL(<0.09)	0.6	0.7	0.5	1.3	BRL(<0.09)
Aroclor 1260	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)
Aroclor 1262	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)
Aroclor 1268	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)

Notes:

1. BRL - Below laboratory method reporting limit
2. mg/kg - milligrams per kilogram or parts per million (ppm)
3. Materials containing PCBs at concentrations greater than or equal to 50 mg/kg are classified as PCB Bulk Waste and are regulated by TSCA
4. Materials containing PCBs at concentrations greater than 1 mg/kg and less that 50 mg/kg are considered to be a Federally Excluded PCB Product if the total PCB concentration in the original material has not been modified by subsequent activities
5. Materials containing PCBs at concentrations less than 1 mg/kg are not regulated and can be managed as general construction waste
6. Sample listed as W-24 with sample time of 11:25 on laboratory analytical report
7. Sample listed as W-25 with sample time of 11:20 on laboratory analytical report
8. Sample listed as W-26 with sample time of 11:15 on laboratory analyitcal report
9. Sample listed as W-27 with sample time of 11:10 on laboratory analytical report

Table 3 - Summary of Concrete Analytical Results - Upper Level
Worcester Road Pump Station
Framingham, MA

SAMPLE ID	F-11	F-12	F-13	F-14	F-16	F-17	F-18	F-19	W-13	W-13 (2-3")	DUP-1	W-14	W-15
SAMPLE DATE	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022
SAMPLE LOCATION	Upper Level Floor	Upper Level Floor	Upper Level Floor	Upper Level Floor	Upper Level Floor	Upper Level Floor	Upper Level Floor	Upper Level Floor	Upper Level-East Wall	Upper Level-East Wall	Upper Level-East Wall (W-13 2-3")	Upper Level-East Wall	Upper Level-East Wall
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
PCBs													
Aroclor 1016	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1221	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1232	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1242	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1248	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1254	10.9	9.3	7.5	5.7	6.5	5.2	3.9	1.3	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	0.1	BRL(<0.1)
Aroclor 1260	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1262	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1268	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)

Notes:
1. BRL - Below laboratory method reporting limit
2. mg/kg - milligrams per kilogram or parts per million (ppm)
3. Materials containing PCBs at concentrations greater than or equal to 50 mg/kg are classified as PCB Bulk Waste and are regulated by TSCA
4. Materials containing PCBs at concentrations greater than 1 mg/kg and less that 50 mg/kg are considered to be a Federally Excluded PCB Product if the total PCB concentration in the original material has not been modified by subsequent activities
5. Materials containing PCBs at concentrations less than 1 mg/kg are not regulated and can be managed as general construction waste
6. Sample listed as W-24 with sample time of 11:25 on laboratory analytical report
7. Sample listed as W-25 with sample time of 11:20 on laboratory analytical report
8. Sample listed as W-26 with sample time of 11:15 on laboratory analyitcal report
9. Sample listed as W-27 with sample time of 11:10 on laboratory analytical report

Table 3 - Summary of Concrete Analytical Results - Upper Level
Worcester Road Pump Station
Framingham, MA

SAMPLE ID	W-15	W-16	W-17	W-18	W-19	W-20	W-21	W-22	W-23	W-24 (UL)[6]	W-25 (UL)[7]	W-26 (UL)[8]
SAMPLE DATE	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022
SAMPLE LOCATION	Upper Level-East Wall	Upper Level-East Wall	Upper Level-South Wall	Upper Level-North Wall	Upper Level-North CMU Wall	Upper Level-East CMU Wall	Upper Level-West CMU Wall	Upper Level-West Wall	Upper Level-West Wall	Upper Level-West Wall	Upper Level-West Wall	Upper Level-West Wall
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
PCBs												
Aroclor 1016	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1221	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1232	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1242	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1248	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1254	BRL(<0.1)	BRL(<0.1)	0.2	BRL(<0.1)	0.1	BRL(<0.1)	BRL(<0.1)	0.1	0.3	0.2	0.4	28.2
Aroclor 1260	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1262	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)
Aroclor 1268	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)	BRL(<0.1)

Notes:
1. BRL - Below laboratory method reporting limit
2. mg/kg - milligrams per kilogram or parts per million (ppm)
3. Materials containing PCBs at concentrations greater than or equal to 50 mg/kg are classified as PCB Bulk Waste and are regulated by TSCA
4. Materials containing PCBs at concentrations greater than 1 mg/kg and less that 50 mg/kg are considered to be a Federally Excluded PCB Product if the total PCB concentration in the original material has not been modified by subsequent activities
5. Materials containing PCBs at concentrations less than 1 mg/kg are not regulated and can be managed as general construction waste
6. Sample listed as W-24 with sample time of 11:25 on laboratory analytical report
7. Sample listed as W-25 with sample time of 11:20 on laboratory analytical report
8. Sample listed as W-26 with sample time of 11:15 on laboratory analyitcal report
9. Sample listed as W-27 with sample time of 11:10 on laboratory analytical report

Table 3 - Summary of Concrete Analytical Results - Upper Level
Worcester Road Pump Station
Framingham, MA

SAMPLE ID	W-27 (UL)[9]	W-27 (2-3")	Equip-Blank-1	RW-1
SAMPLE DATE	3/3/2022	3/3/2022	3/3/2022	3/3/2022
SAMPLE LOCATION	Upper Level-West Wall	Upper Level-West Wall	NA	Rinsate
UNITS	mg/kg	mg/kg	ug/L	ug/L
PCBs				
Aroclor 1016	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.09)
Aroclor 1221	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.09)
Aroclor 1232	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.09)
Aroclor 1242	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.09)
Aroclor 1248	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.09)
Aroclor 1254	37.5	2.2	BRL(<0.09)	0.78
Aroclor 1260	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.09)
Aroclor 1262	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.09)
Aroclor 1268	BRL(<0.1)	BRL(<0.1)	BRL(<0.09)	BRL(<0.09)

Notes:
1. BRL - Below laboratory method reporting limit
2. mg/kg - milligrams per kilogram or parts per million (ppm)
3. Materials containing PCBs at concentrations greater than or equal to 50 mg/kg are classified as PCB Bulk Waste and are regulated by TSCA
4. Materials containing PCBs at concentrations greater than 1 mg/kg and less that 50 mg/kg are considered to be a Federally Excluded PCB Product if the total PCB concentration in the original material has not been modified by subsequent activities
5. Materials containing PCBs at concentrations less than 1 mg/kg are not regulated and can be managed as general construction waste
6. Sample listed as W-24 with sample time of 11:25 on laboratory analytical report
7. Sample listed as W-25 with sample time of 11:20 on laboratory analytical report
8. Sample listed as W-26 with sample time of 11:15 on laboratory analyitcal report
9. Sample listed as W-27 with sample time of 11:10 on laboratory analytical report

Table 4 - Summary of Miscellaneous Building Material Analytical Results
Worcester Road Pump Station
Framingham, MA

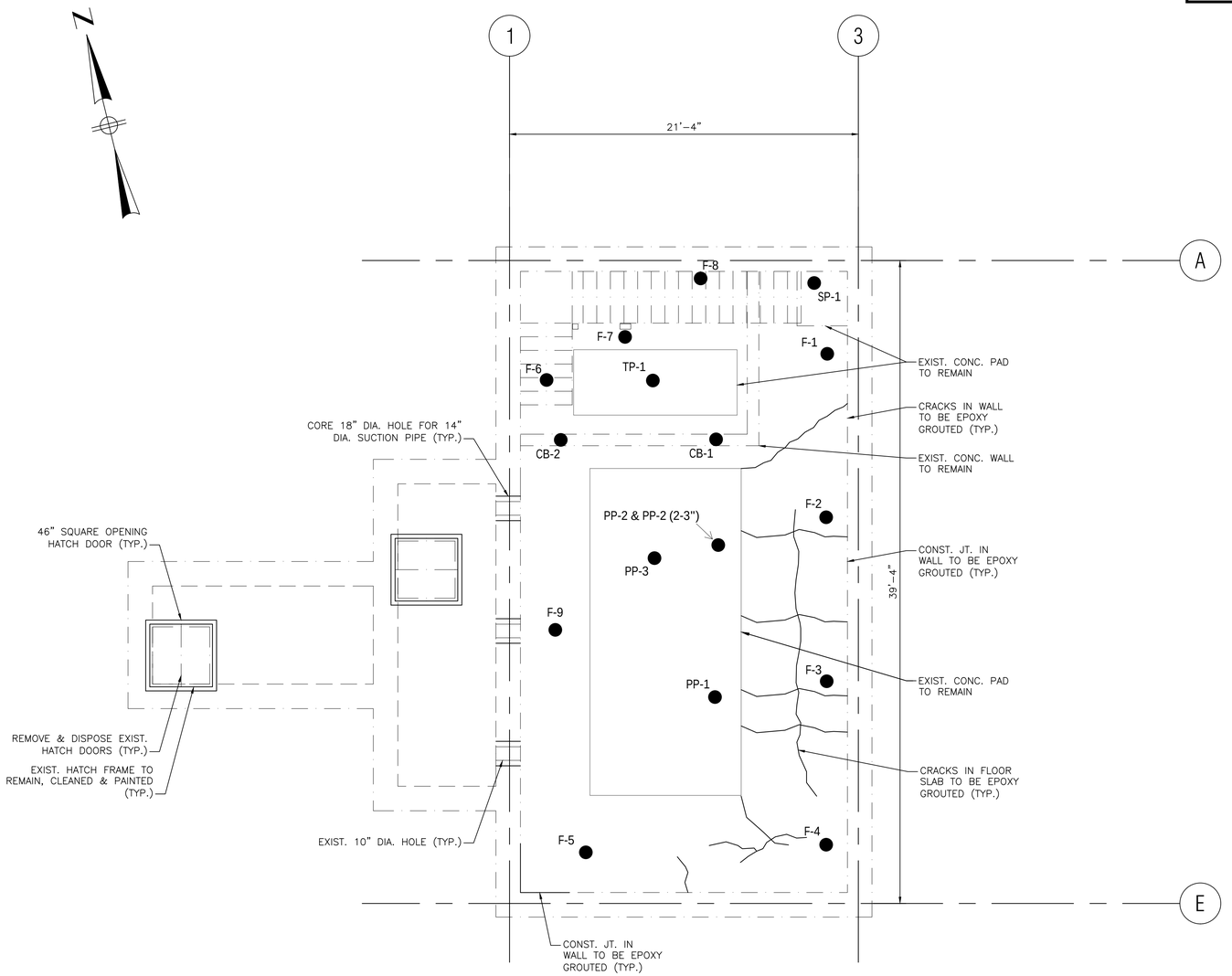
SAMPLE ID	WP-1	WP-2	WP-3	BM-1	BM-2	BM-3	BM-4	RP-1
SAMPLE DATE	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022	3/3/2022
SAMPLE LOCATION	Upper Level-North Wall-Green paint on CMU	Upper Level-North Wall-Green paint Foundation Wall	Upper Level-East Wall-Green Paint on Foundation Wall	Exterior Window Frame Caulking - West Window	Exterior Window Glazing Putty - West Window	Exterior Window Frame Caulking - North Window	Exterior Window Glazing Putty - North Window	Exterior Roof Overhang-North side- Paint
UNITS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
PCBs								
Aroclor 1016	BRL(<12.3)	BRL(<0.1)	BRL(<0.1)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)
Aroclor 1221	BRL(<12.3)	BRL(<0.1)	BRL(<0.1)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)
Aroclor 1232	BRL(<12.3)	BRL(<0.1)	BRL(<0.1)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)
Aroclor 1242	BRL(<12.3)	BRL(<0.1)	BRL(<0.1)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)
Aroclor 1248	BRL(<12.3)	BRL(<0.1)	BRL(<0.1)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)
Aroclor 1254	382	32.6	26.2	3.0	23.1	3.0	8.1	3.9
Aroclor 1260	BRL(<12.3)	BRL(<0.1)	BRL(<0.1)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)
Aroclor 1262	BRL(<12.3)	BRL(<0.1)	BRL(<0.1)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)
Aroclor 1268	BRL(<12.3)	BRL(<0.1)	BRL(<0.1)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)	BRL(<0.2)

Notes:
1. BRL - Below laboratory method reporting limit
2. mg/kg - milligrams per kilogram or parts per million (ppm)
3. Materials containing PCBs at concentrations greater than or equal to 50 mg/kg are classified as PCB Bulk Waste and are regulated by TSCA
4. Materials containing PCBs at concentrations greater than 1 mg/kg and less that 50 mg/kg are considered to be a Federally Excluded PCB Product if the total PCB concentration in the original material has not been modified by subsequent activities

FIGURES

Legend

● Location of Concrete Substrate Sample



LOWER LEVEL PLAN

SCALE: $\frac{1}{4}$" = 1'-0"

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: JMR

DESIGNED BY:

CHECKED BY:

REGISTERED PROFESSIONAL: For Review Only

PREPARED BY: BETA www.BETA-Inc.com

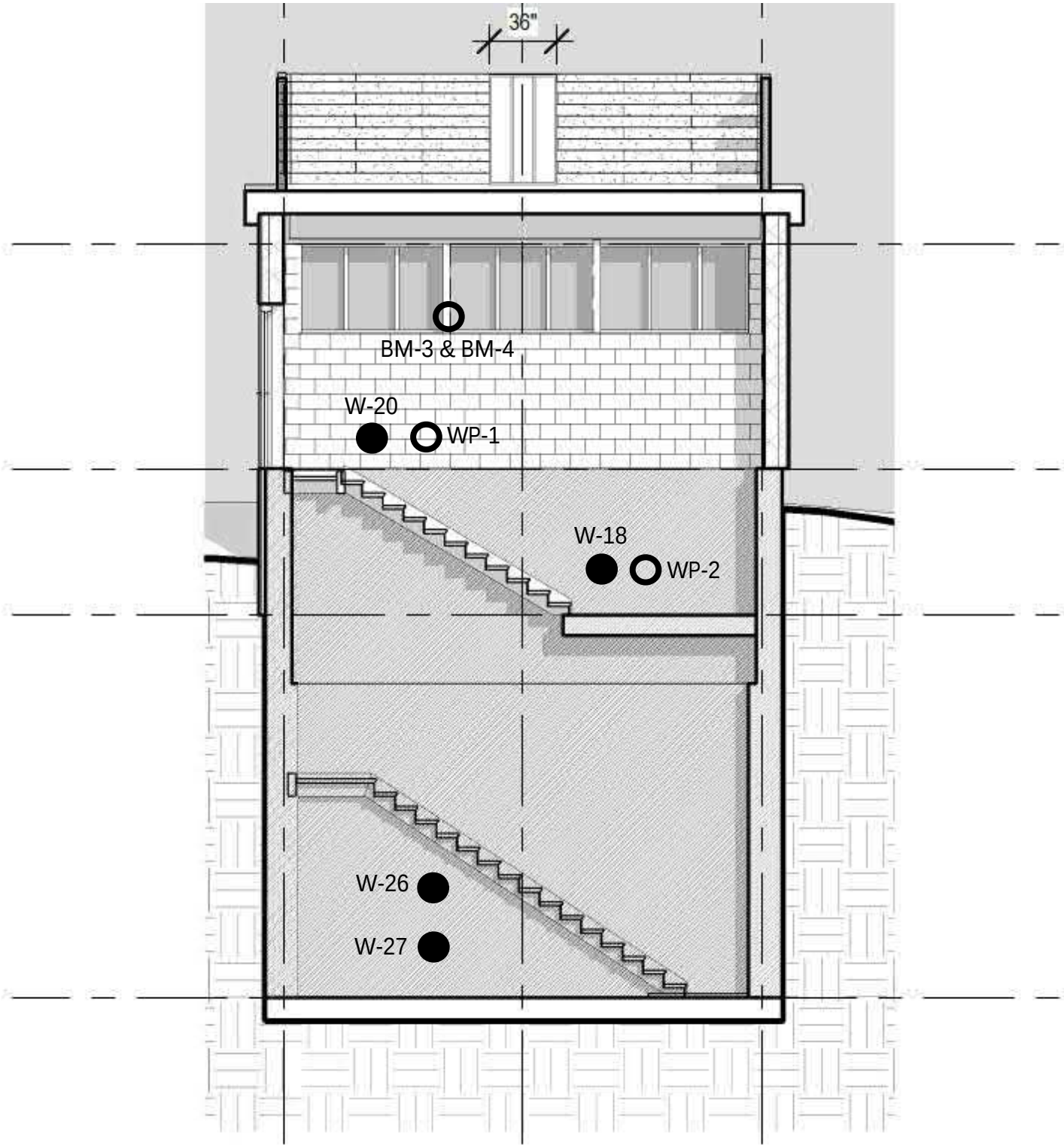
SUBCONSULTANT

SCALE: AS SHOWN

Figure 1

Lower Level Floor Sample Locations

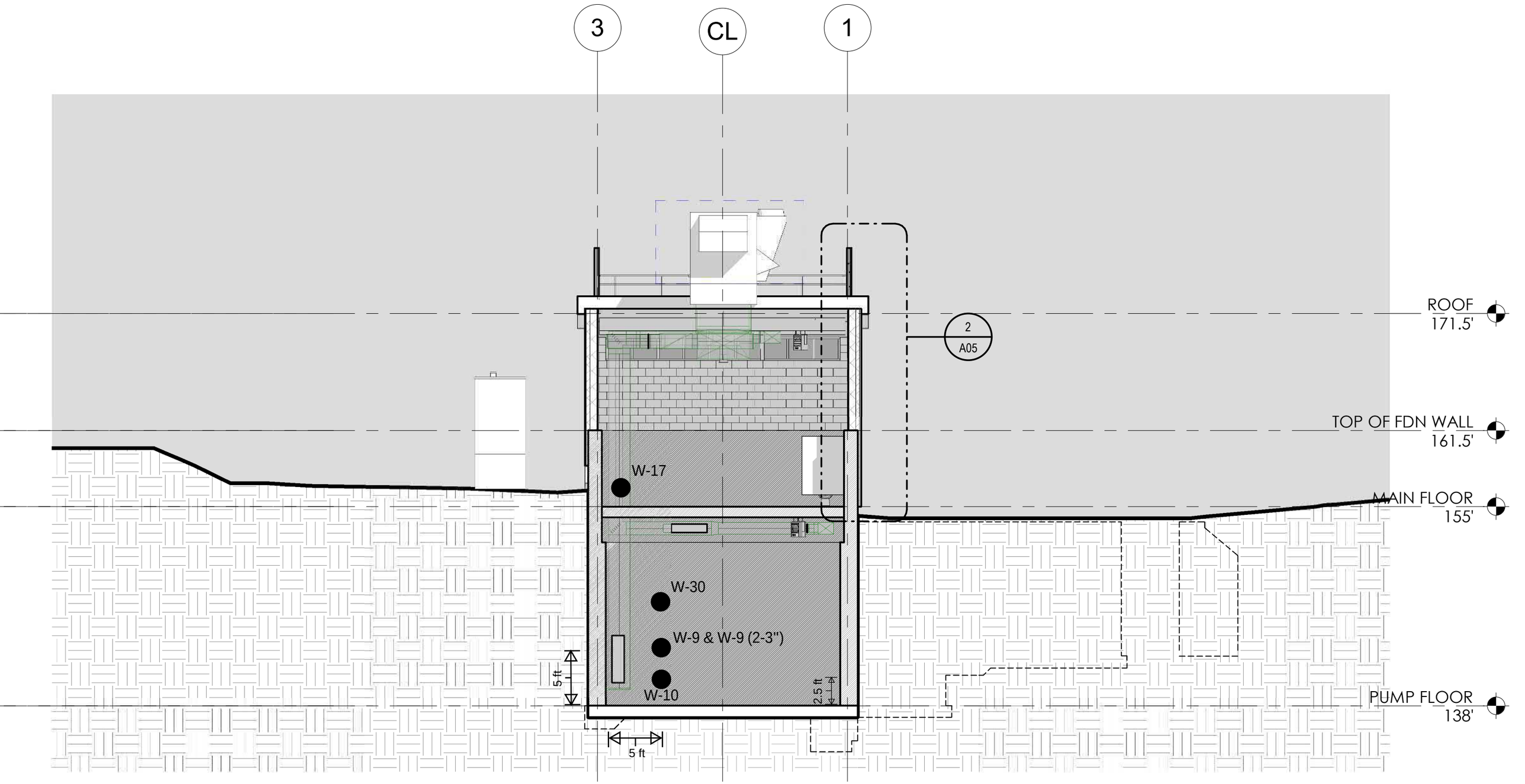
Figure 2 - North Wall Sampling Locations



Legend

- Location of Concrete Substrate Sample
- Location of Building Material Sample

Figure 3 - South Wall Sample Locations

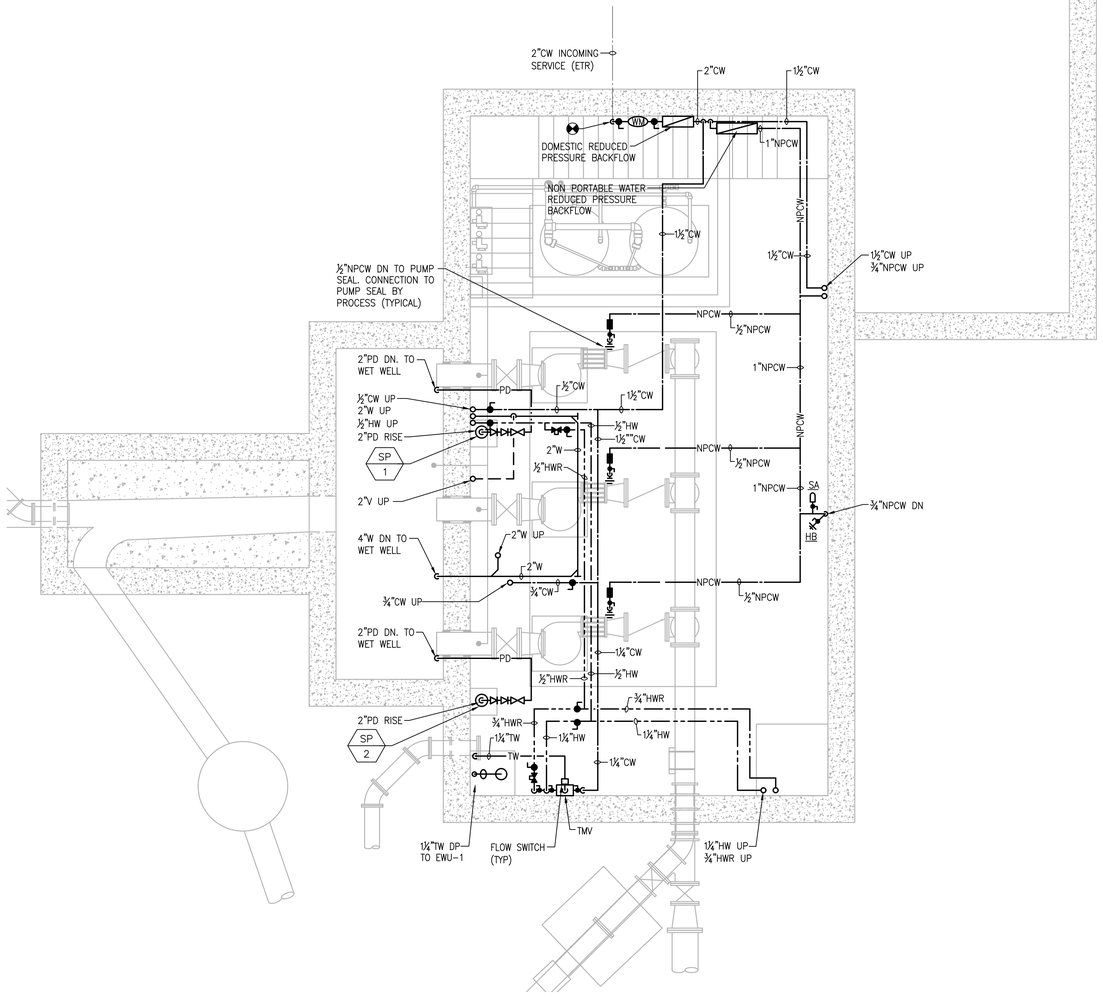


1 BUILDING SECTION (W/E) LOOKING SOUTH

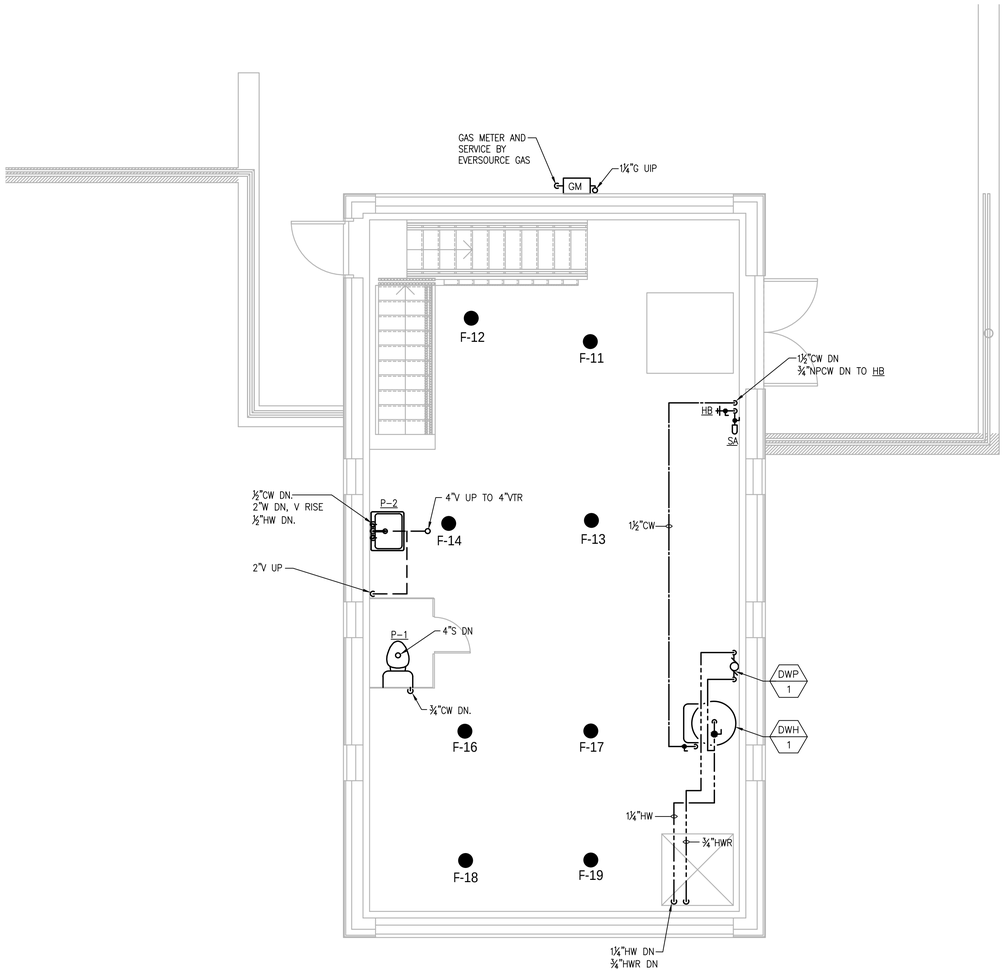
1/8" = 1'-0"

Legend

● Location of Concrete Substrate Sample



LOWER LEVEL - PLUMBING PLAN - PROPOSED
SCALE: 1/4" = 1'



UPPER LEVEL - PLUMBING PLAN - PROPOSED
SCALE: 1/4" = 1'

Legend

● Location of Concrete Substrate Sample

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: RLB
DESIGNED BY: RLB
CHECKED BY: JAL

REGISTERED PROFESSIONAL: For Review Only

PREPARED BY: BETA www.BETA-Inc.com

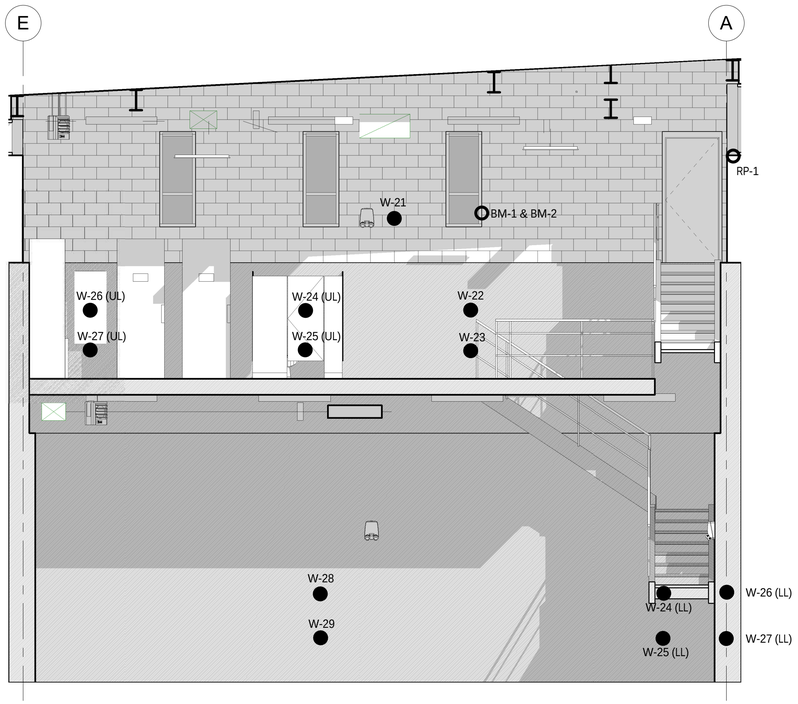
SUBCONSULTANT: SAR ENGINEERING, INC.
Mechanical/Electrical Engineers
150 Grossman Drive, Suite 309
Braintree, Massachusetts 02184
617 221-9220
web: www.sar.com

SCALE: AS SHOWN

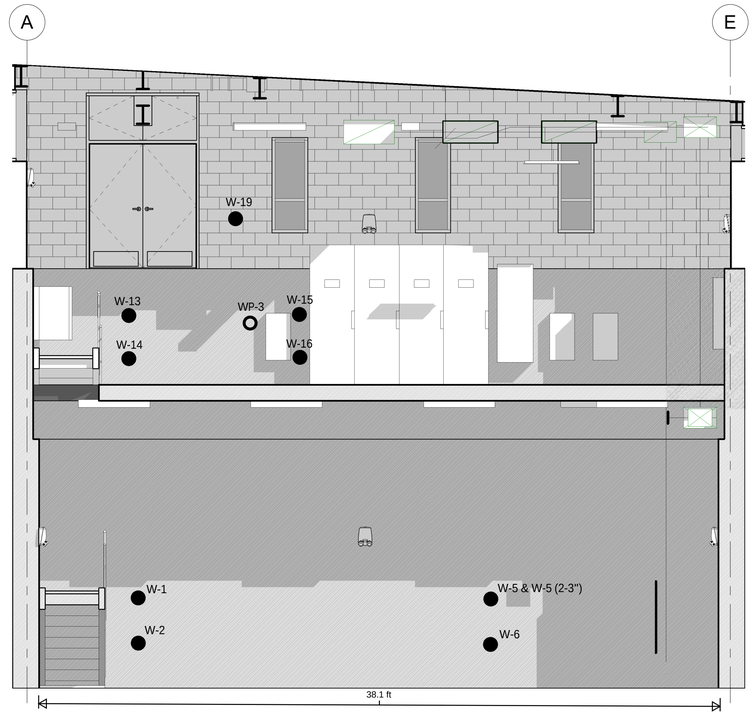
Figure 4
Upper Level Floor Sample Locations

Legend

- Location of Concrete Substrate Sample
- Location of Building Material Sample



1 INTERIOR ELEVATION WEST WALL
1/4" = 1'-0"



2 INTERIOR ELEVATION EAST WALL
1/4" = 1'-0"

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: ALK
DESIGNED BY: DSK
CHECKED BY: MPS

REGISTERED PROFESSIONAL
90% DD

PREPARED BY
BETA
www.BETA-Inc.com

SUBCONSULTANT
DSK Dewing Schmid Kearns
ARCHITECTS + PLANNERS
30 Monument Square
Suite 200B
Concord, MA
01742
978.371.7500
280 Elm Street
South Dartmouth, MA
02748
508.999.0440

SCALE
1/4" = 1'-0"

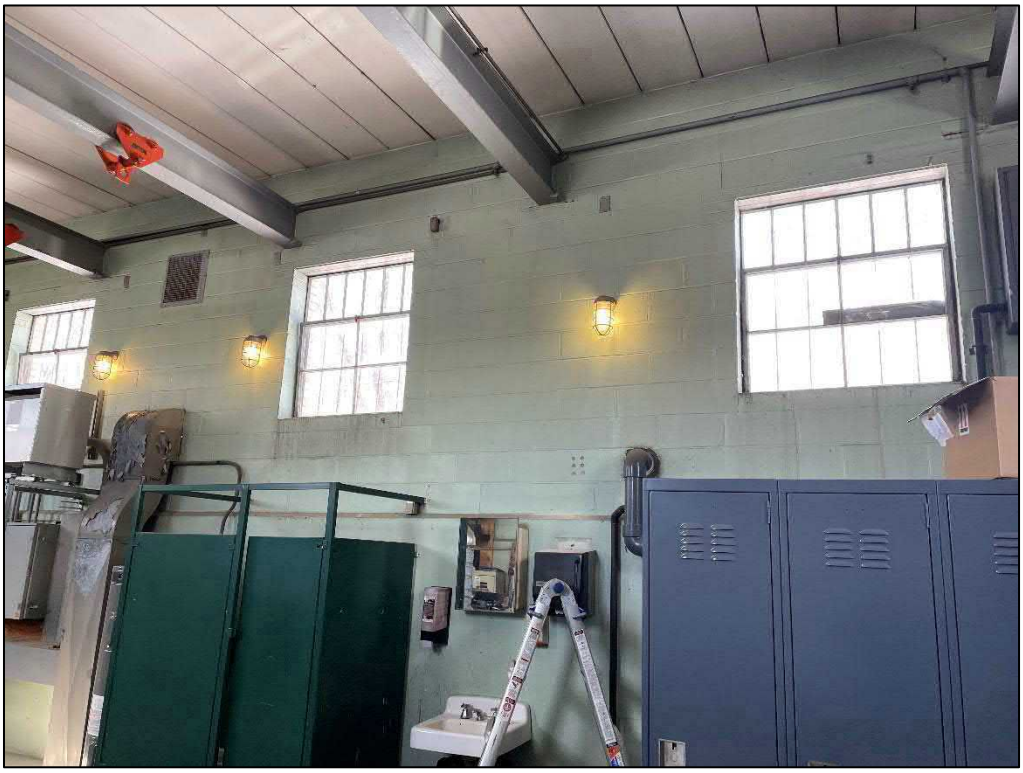
Figure 5
Wall Sample Locations-East and West Walls

P:\PROJECTS\1510 NPS - NEWBURYPORT PUMP STATION\600-NPS-DWGS\601-REVIT\FAMILIES\TITLEBLOCKS\KDG_Arch D 24x36 Vertical Title - BETA

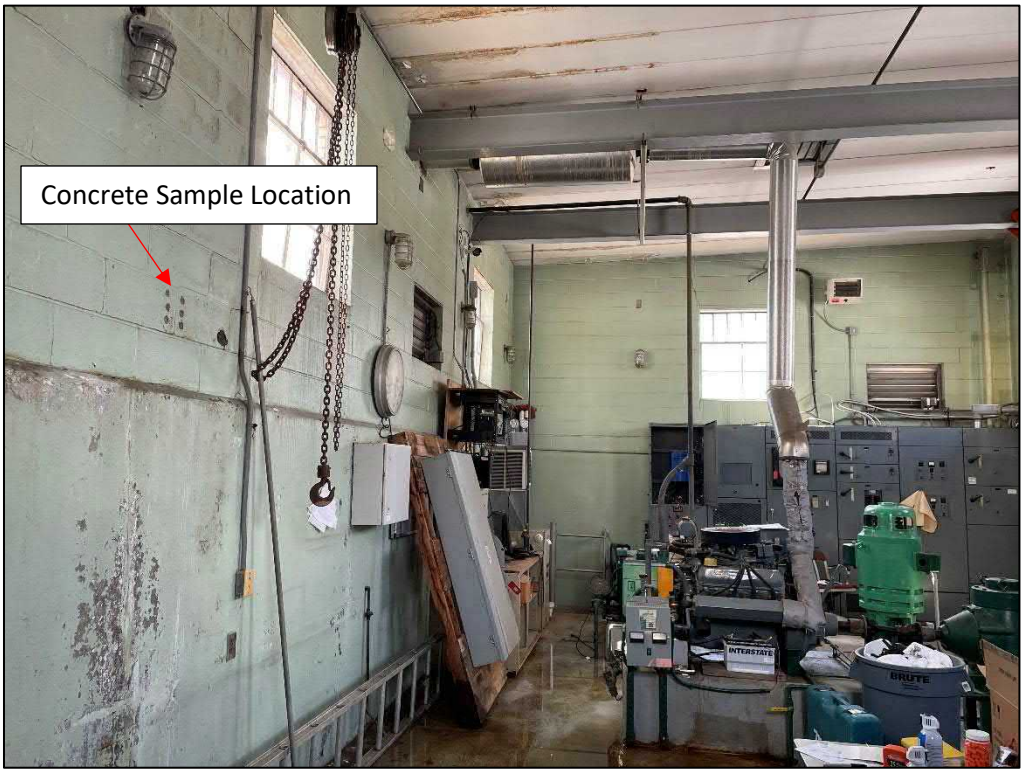
Appendix A: Photographic Documentation

Site building exterior, looking southeast

Site building exterior, looking southwest



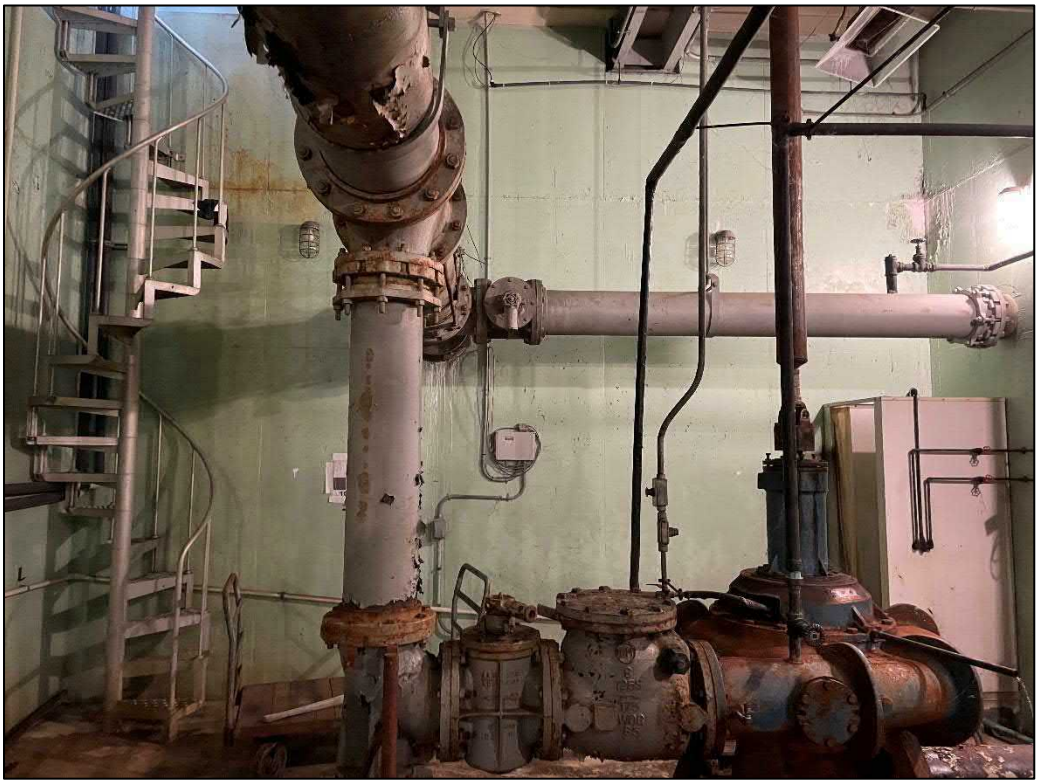
Green paint on interior walls, upper level



Green paint on interior walls, upper level

Metal staircase secured to wall, upper level

Gray paint on floor and green paint on equipment, upper level



Gray paint on piping and equipment, lower level

Gray paint on piping and equipment, lower level

Bioxide storage tanks (foreground), green wall paint and metal staircase (background), lower level

Green paint on interior walls, lower level

Appendix B: Laboratory Analytical Reports

CERTIFICATE OF ANALYSIS

Matt Alger
Beta Engineering
124 Main Street, Unit 2GG
Carver, MA 02330

RE: Framingham PS Improvements (7385)
ESS Laboratory Work Order Number: 22A0597

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 12:16 pm, Jan 27, 2022

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0597

SAMPLE RECEIPT

The following samples were received on January 20, 2022 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
22A0597-01	F-3	Solid	8082A
22A0597-02	F-2	Solid	8082A
22A0597-03	F-1	Solid	8082A
22A0597-04	PP-1	Solid	8082A
22A0597-05	PP-2	Solid	8082A
22A0597-06	PP-2 2-3in	Solid	8082A
22A0597-07	F-6	Solid	8082A
22A0597-08	F-7	Solid	8082A
22A0597-09	SP-1	Solid	8082A
22A0597-10	TP-1	Solid	8082A
22A0597-11	Duplicate-1	Solid	8082A
22A0597-12	CB-1	Solid	8082A
22A0597-13	CB-2	Solid	8082A

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0597

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

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Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0597

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-3
Date Sampled: 01/18/22 13:30
Percent Solids: 96
Initial Volume: 5.26
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0597
ESS Laboratory Sample ID: 22A0597-01
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 12:44		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 12:44		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 12:44		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 12:44		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 12:44		DA22002
Aroclor 1254 [2C]	**0.6** (0.1)		8082A		1	01/21/22 12:44		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 12:44		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 12:44		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 12:44		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*91 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*95 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*75 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*96 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-2
Date Sampled: 01/18/22 13:45
Percent Solids: 96
Initial Volume: 5.52
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0597
ESS Laboratory Sample ID: 22A0597-02
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.09)		8082A		1	01/21/22 13:03		DA22002
Aroclor 1221	ND (0.09)		8082A		1	01/21/22 13:03		DA22002
Aroclor 1232	ND (0.09)		8082A		1	01/21/22 13:03		DA22002
Aroclor 1242	ND (0.09)		8082A		1	01/21/22 13:03		DA22002
Aroclor 1248	ND (0.09)		8082A		1	01/21/22 13:03		DA22002
Aroclor 1254 [2C]	**0.5** (0.09)		8082A		1	01/21/22 13:03		DA22002
Aroclor 1260	ND (0.09)		8082A		1	01/21/22 13:03		DA22002
Aroclor 1262	ND (0.09)		8082A		1	01/21/22 13:03		DA22002
Aroclor 1268	ND (0.09)		8082A		1	01/21/22 13:03		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*96 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*99 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*81 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*102 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-1
Date Sampled: 01/18/22 14:00
Percent Solids: 96
Initial Volume: 5.04
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0597
ESS Laboratory Sample ID: 22A0597-03
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 13:23		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 13:23		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 13:23		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 13:23		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 13:23		DA22002
Aroclor 1254 [2C]	**1.0** (0.1)		8082A		1	01/21/22 13:23		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 13:23		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 13:23		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 13:23		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*105 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*107 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*88 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*107 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: PP-1
Date Sampled: 01/18/22 14:15
Percent Solids: 98
Initial Volume: 5.42
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0597
ESS Laboratory Sample ID: 22A0597-04
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.09)		8082A		1	01/21/22 13:42		DA22002
Aroclor 1221	ND (0.09)		8082A		1	01/21/22 13:42		DA22002
Aroclor 1232	ND (0.09)		8082A		1	01/21/22 13:42		DA22002
Aroclor 1242	ND (0.09)		8082A		1	01/21/22 13:42		DA22002
Aroclor 1248	ND (0.09)		8082A		1	01/21/22 13:42		DA22002
Aroclor 1254 [2C]	**1.2** (0.09)		8082A		1	01/21/22 13:42		DA22002
Aroclor 1260	ND (0.09)		8082A		1	01/21/22 13:42		DA22002
Aroclor 1262	ND (0.09)		8082A		1	01/21/22 13:42		DA22002
Aroclor 1268	ND (0.09)		8082A		1	01/21/22 13:42		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*91 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*96 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*81 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*101 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: PP-2
Date Sampled: 01/18/22 14:30
Percent Solids: 98
Initial Volume: 5.12
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0597
ESS Laboratory Sample ID: 22A0597-05
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 14:01		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 14:01		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 14:01		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 14:01		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 14:01		DA22002
Aroclor 1254 [2C]	**1.3** (0.1)		8082A		1	01/21/22 14:01		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 14:01		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 14:01		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 14:01		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*104 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*107 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*91 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*113 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: PP-2 2-3in
Date Sampled: 01/18/22 14:45
Percent Solids: 98
Initial Volume: 5.67
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0597
ESS Laboratory Sample ID: 22A0597-06
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.09)		8082A		1	01/21/22 14:21		DA22002
Aroclor 1221	ND (0.09)		8082A		1	01/21/22 14:21		DA22002
Aroclor 1232	ND (0.09)		8082A		1	01/21/22 14:21		DA22002
Aroclor 1242	ND (0.09)		8082A		1	01/21/22 14:21		DA22002
Aroclor 1248	ND (0.09)		8082A		1	01/21/22 14:21		DA22002
Aroclor 1254	ND (0.09)		8082A		1	01/21/22 14:21		DA22002
Aroclor 1260	ND (0.09)		8082A		1	01/21/22 14:21		DA22002
Aroclor 1262	ND (0.09)		8082A		1	01/21/22 14:21		DA22002
Aroclor 1268	ND (0.09)		8082A		1	01/21/22 14:21		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*104 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*102 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*77 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*101 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-6
Date Sampled: 01/18/22 15:00
Percent Solids: 95
Initial Volume: 5.44
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0597
ESS Laboratory Sample ID: 22A0597-07
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 14:40		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 14:40		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 14:40		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 14:40		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 14:40		DA22002
Aroclor 1254 [2C]	**0.3** (0.1)		8082A		1	01/21/22 14:40		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 14:40		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 14:40		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 14:40		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*85 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*85 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*69 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*84 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-7
Date Sampled: 01/18/22 15:15
Percent Solids: 96
Initial Volume: 5.83
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0597
ESS Laboratory Sample ID: 22A0597-08
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.09)		8082A		1	01/21/22 17:34		DA22002
Aroclor 1221	ND (0.09)		8082A		1	01/21/22 17:34		DA22002
Aroclor 1232	ND (0.09)		8082A		1	01/21/22 17:34		DA22002
Aroclor 1242	ND (0.09)		8082A		1	01/21/22 17:34		DA22002
Aroclor 1248	ND (0.09)		8082A		1	01/21/22 17:34		DA22002
Aroclor 1254 [2C]	**1.0** (0.09)		8082A		1	01/21/22 17:34		DA22002
Aroclor 1260	ND (0.09)		8082A		1	01/21/22 17:34		DA22002
Aroclor 1262	ND (0.09)		8082A		1	01/21/22 17:34		DA22002
Aroclor 1268	ND (0.09)		8082A		1	01/21/22 17:34		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*107 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*107 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*95 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*106 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: SP-1
Date Sampled: 01/18/22 15:30
Percent Solids: 98
Initial Volume: 5.07
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0597
ESS Laboratory Sample ID: 22A0597-09
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 17:53		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 17:53		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 17:53		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 17:53		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 17:53		DA22002
Aroclor 1254 [2C]	**1.3** (0.1)		8082A		1	01/21/22 17:53		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 17:53		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 17:53		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 17:53		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*92 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*91 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*68 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*84 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: TP-1
Date Sampled: 01/18/22 15:45
Percent Solids: 98
Initial Volume: 5.01
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0597
ESS Laboratory Sample ID: 22A0597-10
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 18:12		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 18:12		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 18:12		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 18:12		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 18:12		DA22002
Aroclor 1254 [2C]	**0.6** (0.1)		8082A		1	01/21/22 18:12		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 18:12		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 18:12		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 18:12		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*112 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*112 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*88 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*101 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: Duplicate-1
Date Sampled: 01/18/22 16:00
Percent Solids: 95
Initial Volume: 5.31
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0597
ESS Laboratory Sample ID: 22A0597-11
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 18:31		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 18:31		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 18:31		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 18:31		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 18:31		DA22002
Aroclor 1254 [2C]	**0.6** (0.1)		8082A		1	01/21/22 18:31		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 18:31		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 18:31		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 18:31		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*99 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*101 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*104 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*99 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: CB-1
Date Sampled: 01/18/22 16:15
Percent Solids: 99
Initial Volume: 5.3
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0597
ESS Laboratory Sample ID: 22A0597-12
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 18:51		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 18:51		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 18:51		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 18:51		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 18:51		DA22002
Aroclor 1254 [2C]	**0.7** (0.1)		8082A		1	01/21/22 18:51		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 18:51		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 18:51		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 18:51		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*91 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*92 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*75 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*88 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: CB-2
Date Sampled: 01/18/22 16:30
Percent Solids: 99
Initial Volume: 5.04
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0597
ESS Laboratory Sample ID: 22A0597-13
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 19:10		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 19:10		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 19:10		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 19:10		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 19:10		DA22002
Aroclor 1254 [2C]	**0.5** (0.1)		8082A		1	01/21/22 19:10		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 19:10		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 19:10		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 19:10		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*101 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*102 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*87 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*100 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0597

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DA22002 - 3540C										
Blank										
Aroclor 1016	ND	0.02	mg/kg wet							
Aroclor 1016 [2C]	ND	0.02	mg/kg wet							
Aroclor 1221	ND	0.02	mg/kg wet							
Aroclor 1221 [2C]	ND	0.02	mg/kg wet							
Aroclor 1232	ND	0.02	mg/kg wet							
Aroclor 1232 [2C]	ND	0.02	mg/kg wet							
Aroclor 1242	ND	0.02	mg/kg wet							
Aroclor 1242 [2C]	ND	0.02	mg/kg wet							
Aroclor 1248	ND	0.02	mg/kg wet							
Aroclor 1248 [2C]	ND	0.02	mg/kg wet							
Aroclor 1254	ND	0.02	mg/kg wet							
Aroclor 1254 [2C]	ND	0.02	mg/kg wet							
Aroclor 1260	ND	0.02	mg/kg wet							
Aroclor 1260 [2C]	ND	0.02	mg/kg wet							
Aroclor 1262	ND	0.02	mg/kg wet							
Aroclor 1262 [2C]	ND	0.02	mg/kg wet							
Aroclor 1268	ND	0.02	mg/kg wet							
Aroclor 1268 [2C]	ND	0.02	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.0241*		mg/kg wet	*0.02500*		*96*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0244*		mg/kg wet	*0.02500*		*98*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0179*		mg/kg wet	*0.02500*		*72*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0224*		mg/kg wet	*0.02500*		*90*	*30-150*			
LCS										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		76	40-140			
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		82	40-140			
Aroclor 1260	0.4	0.02	mg/kg wet	0.5000		82	40-140			
Aroclor 1260 [2C]	0.5	0.02	mg/kg wet	0.5000		94	40-140			
Surrogate: Decachlorobiphenyl	*0.0223*		mg/kg wet	*0.02500*		*89*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0227*		mg/kg wet	*0.02500*		*91*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0188*		mg/kg wet	*0.02500*		*75*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0210*		mg/kg wet	*0.02500*		*84*	*30-150*			
LCS Dup										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		85	40-140	12	30	
Aroclor 1016 [2C]	0.5	0.02	mg/kg wet	0.5000		92	40-140	12	30	
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		93	40-140	12	30	
Aroclor 1260 [2C]	0.5	0.02	mg/kg wet	0.5000		106	40-140	12	30	
Surrogate: Decachlorobiphenyl	*0.0249*		mg/kg wet	*0.02500*		*100*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0252*		mg/kg wet	*0.02500*		*101*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0207*		mg/kg wet	*0.02500*		*83*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0239*		mg/kg wet	*0.02500*		*95*	*30-150*			

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements ESS Laboratory Work Order: 22A0597

Notes and Definitions

U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0597

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

Shipped/Delivered Via: ESS Courier

ESS Project ID: 22A0597
Date Received: 1/20/2022
Project Due Date: 1/27/2022
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: 0.1 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / NA
10. Were any analyses received outside of hold time? Yes / No

11. Any Subcontracting needed? Yes / No
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / No
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA
13. Are the samples properly preserved? Yes / No
    a. If metals preserved upon receipt: Date: Time: By:
    b. Low Level VOA vials frozen: Date: Time: By:

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / No
    a. Was there a need to contact the client? Yes / No
    Who was contacted? Date: Time: By:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	251796	Yes	N/A	Yes	4 oz. Jar	NP	
2	251797	Yes	N/A	Yes	4 oz. Jar	NP	
3	251798	Yes	N/A	Yes	4 oz. Jar	NP	
4	251799	Yes	N/A	Yes	4 oz. Jar	NP	
5	251800	Yes	N/A	Yes	4 oz. Jar	NP	
6	251801	Yes	N/A	Yes	4 oz. Jar	NP	
7	251802	Yes	N/A	Yes	4 oz. Jar	NP	
8	251803	Yes	N/A	Yes	4 oz. Jar	NP	
9	251804	Yes	N/A	Yes	4 oz. Jar	NP	
10	251805	Yes	N/A	Yes	4 oz. Jar	NP	
11	251806	Yes	N/A	Yes	4 oz. Jar	NP	
12	251807	Yes	N/A	Yes	4 oz. Jar	NP	
13	251808	Yes	N/A	Yes	4 oz. Jar	NP	

2nd Review
Were all containers scanned into storage/lab? Initials

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

ESS Project ID: 22A0597

Date Received: 1/20/2022

Are barcode labels on correct containers?	Yes / No
Are all Flashpoint stickers attached/container ID # circled?	Yes / No / NA
Are all Hex Chrome stickers attached?	Yes / No / NA
Are all QC stickers attached?	Yes / No / NA
Are VOA stickers attached if bubbles noted?	Yes / No / NA

Completed By: [signature] Date & Time: 1/20/22 1632

Reviewed By: [signature] Date & Time: 1/20/22 1641

185 Frances Avenue
Cranston, RI 02921
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 22A0597 | Page 2 of 3

Turn Time: ☐ >5 ☒ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: MA Criteria: S-1

Is this project for any of the following?: ☐ CT RCP ☐ MA MCP ☐ RGP ☐ Permit ☐ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF): ☐ Limit Checker ☐ State Forms ☐ EQuIS ☐ Excel ☐ Hard Copy ☐ Enviro Data ☐ CLP-Like Package ☐ Other (Specify) → DCP

CLIENT INFORMATION

Client: Beta Group
Address: 701 George Washington Hwy, Lincoln, RI
Phone: 401.333.2382
Email Distribution List: coien@Beta-Inc.com
MAlger@Beta-Inc.com

PROJECT INFORMATION

Project Name: Framingham PS Improvements
Project Location: Framingham
Project Number: 7385
Project Manager: Matt Alger
Bill to: Stacy Wildanger
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	PCB (soxhlet extr.)	Total Number of Bottles
1	1-18-22	13:30	Grab	Solid	F-3	X	1
2	1-18-22	13:45			F-2	X	1
3	1-18-22	14:00			F-1	X	1
4	1-18-22	14:15			PP-1	X	1
5	1-18-22	14:30			PP-2	X	1
6	1-18-22	14:45			PP-2(2-3")	X	1
7	1-18-22	15:00			F-6	X	1
8	1-18-22	15:15			F-7	X	1
9	1-18-22	15:30			SP-1	X	1
10	1-18-22	15:45			TP-1	X	1

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial

Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*

Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*

Sampled by: C. Oien

Chain needs to be filled out neatly and completely for on time delivery.

Laboratory Use Only
Cooler Temperature (°C): 0.1 Iced

Comments: * Please specify "Other" preservative and containers types in this space

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration ☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	1-18-22	17:00	Lincoln Fridge	Andrea Hoke	15:14		1/20/22 15:14
1/20/22		16:07					

185 Frances Avenue
Cranston, RI 02921
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 22A0597 | Page 3 of 3

Turn Time: ☐ >5 ☒ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: MA Criteria: S-1

Is this project for any of the following?: ☐ CT RCP ☐ MA MCP ☐ RGP ☐ Permit ☐ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF): ☐ Limit Checker ☐ State Forms ☐ EQuIS ☐ Excel ☐ Hard Copy ☐ Enviro Data ☐ CLP-Like Package ☐ Other (Specify) →

CLIENT INFORMATION

Client: Beta Group
Address: 701 George Washington Hwy, Lincoln, RI
Phone: 401.333.2382
Email Distribution List: coien@Beta-Inc.com
MAlger@Beta-Inc.com

PROJECT INFORMATION

Project Name: Framingham PS Improvements
Project Location: Framingham
Project Number: 7385
Project Manager: Matt Alger
Bill to:
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	PCB (soxhlet extract)	Total Number of Bottles
11	1-18-22	16:00	Grab	Solid	Duplicate-1	X	1
12	1-18-22	16:15	Grab	Solid	CB-1	X	1
13	1-18-22	16:30	Grab	Solid	CB-2	X	1
—	1-18-22	12:00	Grab	Water	Equip-Blank-1	X	2

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial

Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*

Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAcc, NaOH 9-NH4Cl 10-DI H2O 11-Other*

Sampled by: C. Oien

Chain needs to be filled out neatly and completely for on time delivery.

Laboratory Use Only — Cooler Temperature (°C): 0.1 <1.0

Comments: * Please specify "Other" preservative and containers types in this space

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration: ☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	1-18-22	17:00	Lincoln Fridge	Fridge 1/20/22	15:14		1/20/22 15:14
Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
1/20/22		16:00	Taylor Davis				

CERTIFICATE OF ANALYSIS

Matt Alger
Beta Engineering
124 Main Street, Unit 2GG
Carver, MA 02330

RE: Framingham PS Improvements (7385)
ESS Laboratory Work Order Number: 22A0598

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 4:20 pm, Jan 27, 2022

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0598

SAMPLE RECEIPT

The following samples were received on January 20, 2022 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
22A0598-01	W-1	Solid	8082A
22A0598-02	W-2	Solid	8082A
22A0598-03	W-5	Solid	8082A
22A0598-04	W-5 2-3in	Solid	8082A
22A0598-05	W-6	Solid	8082A
22A0598-06	W-9	Solid	8082A
22A0598-07	W-9 2-3in	Solid	8082A
22A0598-08	W-10	Solid	8082A
22A0598-09	F-5	Solid	8082A
22A0598-10	F-4	Solid	8082A

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0598

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0598

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-1
Date Sampled: 01/18/22 11:15
Percent Solids: 98
Initial Volume: 5.31
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0598
ESS Laboratory Sample ID: 22A0598-01
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 19:29		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 19:29		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 19:29		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 19:29		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 19:29		DA22002
Aroclor 1254 [2C]	**19.3** (1.0)		8082A		10	01/26/22 7:48		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 19:29		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 19:29		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 19:29		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*102 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*103 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*76 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*94 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-2
Date Sampled: 01/18/22 11:30
Percent Solids: 97
Initial Volume: 5.02
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0598
ESS Laboratory Sample ID: 22A0598-02
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 19:48		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 19:48		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 19:48		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 19:48		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 19:48		DA22002
Aroclor 1254 [2C]	**4.4** (0.2)		8082A		2	01/26/22 8:07		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 19:48		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 19:48		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 19:48		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*93 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*92 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*73 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*88 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-5
Date Sampled: 01/18/22 11:45
Percent Solids: 98
Initial Volume: 5.29
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0598
ESS Laboratory Sample ID: 22A0598-03
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 20:08		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 20:08		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 20:08		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 20:08		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 20:08		DA22002
Aroclor 1254 [2C]	**3.1** (0.1)		8082A		1	01/21/22 20:08		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 20:08		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 20:08		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 20:08		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*93 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*93 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*69 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*87 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-5 2-3in
Date Sampled: 01/18/22 12:00
Percent Solids: 97
Initial Volume: 5.33
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0598
ESS Laboratory Sample ID: 22A0598-04
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 20:27		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 20:27		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 20:27		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 20:27		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 20:27		DA22002
Aroclor 1254 [2C]	**0.4** (0.1)		8082A		1	01/21/22 20:27		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 20:27		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 20:27		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 20:27		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*101 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*100 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*75 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*94 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-6
Date Sampled: 01/18/22 12:15
Percent Solids: 98
Initial Volume: 5.1
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0598
ESS Laboratory Sample ID: 22A0598-05
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 20:46		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 20:46		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 20:46		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 20:46		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 20:46		DA22002
Aroclor 1254 [2C]	**8.2** (0.5)		8082A		5	01/26/22 8:26		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 20:46		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 20:46		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 20:46		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*93 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*92 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*72 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*89 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-9
Date Sampled: 01/18/22 12:15
Percent Solids: 98
Initial Volume: 5.63
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0598
ESS Laboratory Sample ID: 22A0598-06
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.09)		8082A		1	01/21/22 21:05		DA22002
Aroclor 1221	ND (0.09)		8082A		1	01/21/22 21:05		DA22002
Aroclor 1232	ND (0.09)		8082A		1	01/21/22 21:05		DA22002
Aroclor 1242	ND (0.09)		8082A		1	01/21/22 21:05		DA22002
Aroclor 1248	ND (0.09)		8082A		1	01/21/22 21:05		DA22002
Aroclor 1254 [2C]	**2.2** (0.09)		8082A		1	01/21/22 21:05		DA22002
Aroclor 1260	ND (0.09)		8082A		1	01/21/22 21:05		DA22002
Aroclor 1262	ND (0.09)		8082A		1	01/21/22 21:05		DA22002
Aroclor 1268	ND (0.09)		8082A		1	01/21/22 21:05		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*94 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*96 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*71 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*87 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-9 2-3in
Date Sampled: 01/18/22 12:30
Percent Solids: 97
Initial Volume: 5.02
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0598
ESS Laboratory Sample ID: 22A0598-07
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/20/22 17:10

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/21/22 21:25		DA22002
Aroclor 1221	ND (0.1)		8082A		1	01/21/22 21:25		DA22002
Aroclor 1232	ND (0.1)		8082A		1	01/21/22 21:25		DA22002
Aroclor 1242	ND (0.1)		8082A		1	01/21/22 21:25		DA22002
Aroclor 1248	ND (0.1)		8082A		1	01/21/22 21:25		DA22002
Aroclor 1254 [2C]	**0.4** (0.1)		8082A		1	01/21/22 21:25		DA22002
Aroclor 1260	ND (0.1)		8082A		1	01/21/22 21:25		DA22002
Aroclor 1262	ND (0.1)		8082A		1	01/21/22 21:25		DA22002
Aroclor 1268	ND (0.1)		8082A		1	01/21/22 21:25		DA22002

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*100 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*99 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*77 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*94 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-10
Date Sampled: 01/18/22 12:45
Percent Solids: 98
Initial Volume: 5.03
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0598
ESS Laboratory Sample ID: 22A0598-08
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/24/22 20:05

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/26/22 23:07		DA22404
Aroclor 1221	ND (0.1)		8082A		1	01/26/22 23:07		DA22404
Aroclor 1232	ND (0.1)		8082A		1	01/26/22 23:07		DA22404
Aroclor 1242	ND (0.1)		8082A		1	01/26/22 23:07		DA22404
Aroclor 1248	ND (0.1)		8082A		1	01/26/22 23:07		DA22404
Aroclor 1254 [2C]	**6.8** (0.5)		8082A		5	01/27/22 14:47		DA22404
Aroclor 1260	ND (0.1)		8082A		1	01/26/22 23:07		DA22404
Aroclor 1262	ND (0.1)		8082A		1	01/26/22 23:07		DA22404
Aroclor 1268	ND (0.1)		8082A		1	01/26/22 23:07		DA22404

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*94 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*93 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*79 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*95 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-5
Date Sampled: 01/18/22 13:00
Percent Solids: 96
Initial Volume: 5.13
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0598
ESS Laboratory Sample ID: 22A0598-09
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/24/22 20:05

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/26/22 23:26		DA22404
Aroclor 1221	ND (0.1)		8082A		1	01/26/22 23:26		DA22404
Aroclor 1232	ND (0.1)		8082A		1	01/26/22 23:26		DA22404
Aroclor 1242	ND (0.1)		8082A		1	01/26/22 23:26		DA22404
Aroclor 1248	ND (0.1)		8082A		1	01/26/22 23:26		DA22404
Aroclor 1254 [2C]	**0.2** (0.1)		8082A		1	01/26/22 23:26		DA22404
Aroclor 1260	ND (0.1)		8082A		1	01/26/22 23:26		DA22404
Aroclor 1262	ND (0.1)		8082A		1	01/26/22 23:26		DA22404
Aroclor 1268	ND (0.1)		8082A		1	01/26/22 23:26		DA22404

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*97 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*97 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*76 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*92 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-4
Date Sampled: 01/18/22 13:15
Percent Solids: 96
Initial Volume: 5.17
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22A0598
ESS Laboratory Sample ID: 22A0598-10
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 1/24/22 20:05

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	01/26/22 23:46		DA22404
Aroclor 1221	ND (0.1)		8082A		1	01/26/22 23:46		DA22404
Aroclor 1232	ND (0.1)		8082A		1	01/26/22 23:46		DA22404
Aroclor 1242	ND (0.1)		8082A		1	01/26/22 23:46		DA22404
Aroclor 1248	ND (0.1)		8082A		1	01/26/22 23:46		DA22404
Aroclor 1254 [2C]	**0.4** (0.1)		8082A		1	01/26/22 23:46		DA22404
Aroclor 1260	ND (0.1)		8082A		1	01/26/22 23:46		DA22404
Aroclor 1262	ND (0.1)		8082A		1	01/26/22 23:46		DA22404
Aroclor 1268	ND (0.1)		8082A		1	01/26/22 23:46		DA22404

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*90 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*91 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*75 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*92 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0598

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DA22002 - 3540C										
Blank										
Aroclor 1016	ND	0.02	mg/kg wet							
Aroclor 1016 [2C]	ND	0.02	mg/kg wet							
Aroclor 1221	ND	0.02	mg/kg wet							
Aroclor 1221 [2C]	ND	0.02	mg/kg wet							
Aroclor 1232	ND	0.02	mg/kg wet							
Aroclor 1232 [2C]	ND	0.02	mg/kg wet							
Aroclor 1242	ND	0.02	mg/kg wet							
Aroclor 1242 [2C]	ND	0.02	mg/kg wet							
Aroclor 1248	ND	0.02	mg/kg wet							
Aroclor 1248 [2C]	ND	0.02	mg/kg wet							
Aroclor 1254	ND	0.02	mg/kg wet							
Aroclor 1254 [2C]	ND	0.02	mg/kg wet							
Aroclor 1260	ND	0.02	mg/kg wet							
Aroclor 1260 [2C]	ND	0.02	mg/kg wet							
Aroclor 1262	ND	0.02	mg/kg wet							
Aroclor 1262 [2C]	ND	0.02	mg/kg wet							
Aroclor 1268	ND	0.02	mg/kg wet							
Aroclor 1268 [2C]	ND	0.02	mg/kg wet							
Surrogate: Decachlorobiphenyl	*ND*		mg/kg wet	*0.02500*		*96*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*ND*		mg/kg wet	*0.02500*		*98*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*ND*		mg/kg wet	*0.02500*		*72*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*ND*		mg/kg wet	*0.02500*		*90*	*30-150*			
LCS										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		76	40-140			
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		82	40-140			
Aroclor 1260	0.4	0.02	mg/kg wet	0.5000		82	40-140			
Aroclor 1260 [2C]	0.5	0.02	mg/kg wet	0.5000		94	40-140			
Surrogate: Decachlorobiphenyl	*0.0223*		mg/kg wet	*0.02500*		*89*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0227*		mg/kg wet	*0.02500*		*91*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0188*		mg/kg wet	*0.02500*		*75*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0210*		mg/kg wet	*0.02500*		*84*	*30-150*			
LCS Dup										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		85	40-140	12	30	
Aroclor 1016 [2C]	0.5	0.02	mg/kg wet	0.5000		92	40-140	12	30	
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		93	40-140	12	30	
Aroclor 1260 [2C]	0.5	0.02	mg/kg wet	0.5000		106	40-140	12	30	
Surrogate: Decachlorobiphenyl	*0.0249*		mg/kg wet	*0.02500*		*100*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0252*		mg/kg wet	*0.02500*		*101*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0207*		mg/kg wet	*0.02500*		*83*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0239*		mg/kg wet	*0.02500*		*95*	*30-150*			
Batch DA22404 - 3540C										

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0598

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DA22404 - 3540C										
Blank										
Aroclor 1016	ND	0.02	mg/kg wet							
Aroclor 1016 [2C]	ND	0.02	mg/kg wet							
Aroclor 1221	ND	0.02	mg/kg wet							
Aroclor 1221 [2C]	ND	0.02	mg/kg wet							
Aroclor 1232	ND	0.02	mg/kg wet							
Aroclor 1232 [2C]	ND	0.02	mg/kg wet							
Aroclor 1242	ND	0.02	mg/kg wet							
Aroclor 1242 [2C]	ND	0.02	mg/kg wet							
Aroclor 1248	ND	0.02	mg/kg wet							
Aroclor 1248 [2C]	ND	0.02	mg/kg wet							
Aroclor 1254	ND	0.02	mg/kg wet							
Aroclor 1254 [2C]	ND	0.02	mg/kg wet							
Aroclor 1260	ND	0.02	mg/kg wet							
Aroclor 1260 [2C]	ND	0.02	mg/kg wet							
Aroclor 1262	ND	0.02	mg/kg wet							
Aroclor 1262 [2C]	ND	0.02	mg/kg wet							
Aroclor 1268	ND	0.02	mg/kg wet							
Aroclor 1268 [2C]	ND	0.02	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.0239*		mg/kg wet	*0.02500*		*95*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0231*		mg/kg wet	*0.02500*		*93*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0195*		mg/kg wet	*0.02500*		*78*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0235*		mg/kg wet	*0.02500*		*94*	*30-150*			
LCS										
Aroclor 1016	0.5	0.02	mg/kg wet	0.5000		90	40-140			
Aroclor 1016 [2C]	0.5	0.02	mg/kg wet	0.5000		94	40-140			
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		97	40-140			
Aroclor 1260 [2C]	0.5	0.02	mg/kg wet	0.5000		106	40-140			
Surrogate: Decachlorobiphenyl	*0.0246*		mg/kg wet	*0.02500*		*98*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0238*		mg/kg wet	*0.02500*		*95*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0221*		mg/kg wet	*0.02500*		*88*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0247*		mg/kg wet	*0.02500*		*99*	*30-150*			
LCS Dup										
Aroclor 1016	0.5	0.02	mg/kg wet	0.5000		91	40-140	0.6	30	
Aroclor 1016 [2C]	0.5	0.02	mg/kg wet	0.5000		94	40-140	0.2	30	
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		98	40-140	1	30	
Aroclor 1260 [2C]	0.5	0.02	mg/kg wet	0.5000		106	40-140	0.2	30	
Surrogate: Decachlorobiphenyl	*0.0245*		mg/kg wet	*0.02500*		*98*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0239*		mg/kg wet	*0.02500*		*95*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0213*		mg/kg wet	*0.02500*		*85*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0238*		mg/kg wet	*0.02500*		*95*	*30-150*			

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements ESS Laboratory Work Order: 22A0598

Notes and Definitions

U	Analyte included in the analysis, but not detected
D	Diluted.
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0598

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

Shipped/Delivered Via: ESS Courier

ESS Project ID: 22A0598
Date Received: 1/20/2022
Project Due Date: 1/27/2022
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: 0.1 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / (NA)
10. Were any analyses received outside of hold time? Yes / (No)

11. Any Subcontracting needed? Yes / (No)
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / (No)
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? (Yes) / No
    a. If metals preserved upon receipt: Date: Time: By:
    b. Low Level VOA vials frozen: Date: Time: By:

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / (No)
    a. Was there a need to contact the client? Yes / (No)
    Who was contacted? Date: Time: By:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	251816	Yes	N/A	Yes	4 oz. Jar	NP	
2	251817	Yes	N/A	Yes	4 oz. Jar	NP	
3	251818	Yes	N/A	Yes	4 oz. Jar	NP	
4	251819	Yes	N/A	Yes	4 oz. Jar	NP	
5	251820	Yes	N/A	Yes	4 oz. Jar	NP	
6	251821	Yes	N/A	Yes	4 oz. Jar	NP	
7	251822	Yes	N/A	Yes	4 oz. Jar	NP	
8	251823	Yes	N/A	Yes	4 oz. Jar	NP	
9	251824	Yes	N/A	Yes	4 oz. Jar	NP	
10	251825	Yes	N/A	Yes	4 oz. Jar	NP	

2nd Review
Were all containers scanned into storage/lab? Initials
Are barcode labels on correct containers? Yes / No
Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA
Are all Hex Chrome stickers attached? Yes / No / NA
Are all QC stickers attached? Yes / No / NA

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

ESS Project ID: 22A0598

Date Received: 1/20/2022

Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: Taylor Dawe Date & Time: 1/20/22 1634

Reviewed By: [signature] Date & Time: 1/20/22 1640

CHAIN OF CUSTODY

185 Frances Avenue
Cranston, RI 02921
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

ESS Lab # 22A0598 | Page 1 of 3

Turn Time: ☐ >5 ☒ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: MA Criteria: S-1

Is this project for any of the following?: ☐ CT RCP ☐ MA MCP ☐ RGP ☐ Permit ☒ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF)
☐ Limit Checker ☐ State Forms ☐ EQuIS
☐ Excel ☐ Hard Copy ☐ Enviro Data
☐ CLP-Like Package ☐ Other (Specify) → pdf

CLIENT INFORMATION

Client: Beta Group
Address: 701 George Washington Hwy
Lincoln, RI
Phone: 401.333.2382
Email Distribution List: coien@Beta-Inc.com
MAlger@Beta-Inc.com

PROJECT INFORMATION

Project Name: Framingham PS Improvements
Project Location: Framingham
Project Number: 7385
Project Manager: Matt Alger
Bill to: Stacy Wildanger
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	PCB (Soxhlet extraction)	Total Number of Bottles
1	1-18-22	11:15	Grab	Solid	W-1	X	1
2	1-18-22	11:30			W-2	X	1
3	1-18-22	11:45			W-5	X	1
4	1-18-22	12:00			W-5 (2-3")	X	1
5	1-18-22	12:15			W-6	X	1
6	1-18-22	12:15			W-9	X	1
7	1-18-22	12:30			W-9 (2-3")	X	1
8	1-18-22	12:45			W-10	X	1
9	1-18-22	13:00			F-5	X	1
10	1-18-22	13:15			F-4	X	1
						5	9
						1	

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial

Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*

Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAcc, NaOH 9-NH4Cl 10-DI H2O 11-Other*

Sampled by: C.Oien

Chain needs to be filled out neatly and completely for on time delivery.

Laboratory Use Only
Cooler Temperature (°C): 0.1

Comments: * Please specify "Other" preservative and containers types in this space

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration
☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	1-18-22	17:00	Lincoln Fridge	Fri 1/20/22 15:14			15:14
Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
1/20/22		16:00					

CERTIFICATE OF ANALYSIS

Matt Alger
Beta Engineering
124 Main Street, Unit 2GG
Carver, MA 02330

RE: Framingham PS Improvements (7385)
ESS Laboratory Work Order Number: 22A0599

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 1:34 pm, Jan 27, 2022

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0599

SAMPLE RECEIPT

The following samples were received on January 20, 2022 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
22A0599-01	Equip Blank-1	Aqueous	8082A

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0599

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0599

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: Equip Blank-1
Date Sampled: 01/18/22 12:00
Percent Solids: N/A
Initial Volume: 1070
Final Volume: 1
Extraction Method: 3510C

ESS Laboratory Work Order: 22A0599
ESS Laboratory Sample ID: 22A0599-01
Sample Matrix: Aqueous
Units: ug/L
Analyst: JLG
Prepared: 1/21/22 11:44

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.09)		8082A		1	01/26/22 7:09		DA22001
Aroclor 1221	ND (0.09)		8082A		1	01/26/22 7:09		DA22001
Aroclor 1232	ND (0.09)		8082A		1	01/26/22 7:09		DA22001
Aroclor 1242	ND (0.09)		8082A		1	01/26/22 7:09		DA22001
Aroclor 1248	ND (0.09)		8082A		1	01/26/22 7:09		DA22001
Aroclor 1254	ND (0.09)		8082A		1	01/26/22 7:09		DA22001
Aroclor 1260	ND (0.09)		8082A		1	01/26/22 7:09		DA22001
Aroclor 1262	ND (0.09)		8082A		1	01/26/22 7:09		DA22001
Aroclor 1268	ND (0.09)		8082A		1	01/26/22 7:09		DA22001

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*46 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*48 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*78 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*90 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0599

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DA22001 - 3510C										
Blank										
Aroclor 1016	ND	0.05	ug/L							
Aroclor 1016 [2C]	ND	0.05	ug/L							
Aroclor 1221	ND	0.05	ug/L							
Aroclor 1221 [2C]	ND	0.05	ug/L							
Aroclor 1232	ND	0.05	ug/L							
Aroclor 1232 [2C]	ND	0.05	ug/L							
Aroclor 1242	ND	0.05	ug/L							
Aroclor 1242 [2C]	ND	0.05	ug/L							
Aroclor 1248	ND	0.05	ug/L							
Aroclor 1248 [2C]	ND	0.05	ug/L							
Aroclor 1254	ND	0.05	ug/L							
Aroclor 1254 [2C]	ND	0.05	ug/L							
Aroclor 1260	ND	0.05	ug/L							
Aroclor 1260 [2C]	ND	0.05	ug/L							
Aroclor 1262	ND	0.05	ug/L							
Aroclor 1262 [2C]	ND	0.05	ug/L							
Aroclor 1268	ND	0.05	ug/L							
Aroclor 1268 [2C]	ND	0.05	ug/L							
Surrogate: Decachlorobiphenyl	*ND*		ug/L	*0.05000*		*73*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*ND*		ug/L	*0.05000*		*77*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*ND*		ug/L	*0.05000*		*66*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*ND*		ug/L	*0.05000*		*86*	*30-150*			
LCS										
Aroclor 1016	0.75	0.05	ug/L	1.000		75	40-140			
Aroclor 1016 [2C]	0.83	0.05	ug/L	1.000		83	40-140			
Aroclor 1260	0.82	0.05	ug/L	1.000		82	40-140			
Aroclor 1260 [2C]	0.95	0.05	ug/L	1.000		95	40-140			
Surrogate: Decachlorobiphenyl	*0.0401*		ug/L	*0.05000*		*80*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0421*		ug/L	*0.05000*		*84*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0326*		ug/L	*0.05000*		*65*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0396*		ug/L	*0.05000*		*79*	*30-150*			
LCS Dup										
Aroclor 1016	0.75	0.05	ug/L	1.000		75	40-140	0.5	20	
Aroclor 1016 [2C]	0.83	0.05	ug/L	1.000		83	40-140	0.6	20	
Aroclor 1260	0.83	0.05	ug/L	1.000		83	40-140	2	20	
Aroclor 1260 [2C]	0.97	0.05	ug/L	1.000		97	40-140	2	20	
Surrogate: Decachlorobiphenyl	*0.0401*		ug/L	*0.05000*		*80*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0413*		ug/L	*0.05000*		*83*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0304*		ug/L	*0.05000*		*61*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0375*		ug/L	*0.05000*		*75*	*30-150*			

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements ESS Laboratory Work Order: 22A0599

Notes and Definitions

U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22A0599

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

Shipped/Delivered Via: ESS Courier

ESS Project ID: 22A0599
Date Received: 1/20/2022
Project Due Date: 1/27/2022
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: 0.1 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / (NA)
10. Were any analyses received outside of hold time? Yes / (No)

11. Any Subcontracting needed? Yes / (No)
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / (No)
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? (Yes) / No
    a. If metals preserved upon receipt: Date: Time: By:
    b. Low Level VOA vials frozen: Date: Time: By:

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / (No)
    a. Was there a need to contact the client? Yes / (No)
    Who was contacted? Date: Time: By:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	251814	Yes	N/A	Yes	1L Amber	NP	
1	251815	Yes	N/A	Yes	1L Amber	NP	

2nd Review
Were all containers scanned into storage/lab? Initials TS
Are barcode labels on correct containers? (Yes) / No
Are all Flashpoint stickers attached/container ID # circled? Yes / No / (NA)
Are all Hex Chrome stickers attached? Yes / No / (NA)
Are all QC stickers attached? Yes / No / (NA)
Are VOA stickers attached if bubbles noted? Yes / No / (NA)

Completed By: [signature] Date & Time: 1/20/22 1628
Reviewed By: [signature] Date & Time: 1/20/22 1636

ESS LABORATORY
185 Frances Avenue
Cranston, RI 02921
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 22A0599 Page 3 of 3

Turn Time: ☐ >5 ☒ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: MA Criteria: S-1

Is this project for any of the following?: ☐ CT RCP ☐ MA MCP ☐ RGP ☐ Permit ☐ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF)

☐ Limit Checker ☐ State Forms ☐ EQuIS
☐ Excel ☐ Hard Copy ☐ Enviro Data
☐ CLP-Like Package ☐ Other (Specify) →

CLIENT INFORMATION

Client: Beta Group
Address: 701 George Washington Hwy, Lincoln, RI
Phone: 401.333.2382
Email Distribution List: colen@Beta-Inc.com MAlger@Beta-Inc.com

PROJECT INFORMATION

Project Name: Framingham PS Improvements
Project Location: Framingham
Project Number: 7385
Project Manager: Matt Alger
Bill to:
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES: PCB (soxhlet extract)

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	PCB (soxhlet extract)
1	1-18-22	16:00	Grab	Solid	Duplicate-1	X
2	1-18-22	16:15	Grab	Solid	CB-1	X
3	1-18-22	16:30	Grab	Solid	CB-2	X
4	1-18-22	12:00	Grab	Water	Equip-Blank-1	X

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial — AG
Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other* — 9
Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other* — 1

Sampled by: C. Olen

Chain needs to be filled out neatly and completely for on time delivery.

Laboratory Use Only
Cooler Temperature (°C): 0.1 Iced

Comments: * Please specify "Other" preservative and containers types in this space

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration ☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
[signature]	1-18-22	17:00	Lincoln Fridge	[signature] 1/20/22 15:14			[signature] 1/20/22 15:14
[signature] 1/20/22		16:00	Taylor Davis				

CERTIFICATE OF ANALYSIS

Joe McLoughlin
Beta Engineering
701 George Washington Hwy 2nd FL
Lincoln, RI 02865

RE: Framingham PS Improvements (10173.05)
ESS Laboratory Work Order Number: 22C0181

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 5:44 pm, Mar 11, 2022

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0181

SAMPLE RECEIPT

The following samples were received on March 04, 2022 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
22C0181-01	WP-1	Solid	8082A
22C0181-02	WP-2	Solid	8082A
22C0181-03	WP-3	Solid	8082A
22C0181-04	F-12	Solid	8082A
22C0181-05	F-11	Solid	8082A
22C0181-06	F-13	Solid	8082A
22C0181-07	F-14	Solid	8082A
22C0181-08	F-17	Solid	8082A
22C0181-09	F-16	Solid	8082A
22C0181-10	F-19	Solid	8082A
22C0181-11	F-18	Solid	8082A
22C0181-12	W-17	Solid	8082A
22C0181-13	BM-1	Solid	8082A
22C0181-14	BM-2	Solid	8082A
22C0181-15	W-27	Solid	8082A
22C0181-16	W-27 2-3in	Solid	8082A
22C0181-17	W-26	Solid	8082A
22C0181-18	W-25	Solid	8082A
22C0181-19	BM-3	Solid	8082A
22C0181-20	BM-4	Solid	8082A

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements ESS Laboratory Work Order: 22C0181

PROJECT NARRATIVE

8082A Polychlorinated Biphenyls (PCB)

22C0181-01 **Surrogate recovery(ies) diluted below the MRL (SD).**
Decachlorobiphenyl (% @ 30-150%), Decachlorobiphenyl [2C] (% @ 30-150%), Tetrachloro-m-xylene (% @ 30-150%), Tetrachloro-m-xylene [2C] (% @ 30-150%)

22C0181-02 **Surrogate recovery(ies) outside of criteria due to matrix (UCM/coelution/matrix is present) (SM).**
Decachlorobiphenyl (210% @ 30-150%), Decachlorobiphenyl [2C] (226% @ 30-150%)

22C0181-03 **Surrogate recovery(ies) outside of criteria due to matrix (UCM/coelution/matrix is present) (SM).**
Decachlorobiphenyl (202% @ 30-150%), Decachlorobiphenyl [2C] (218% @ 30-150%)

22C0181-13 **Percent difference between primary and confirmation results exceeds 40% (P).**
Aroclor 1254 [2C]

22C0181-13 **Surrogate recovery(ies) below lower control limit (S-).**
Tetrachloro-m-xylene (24% @ 30-150%)

22C0181-19 **Percent difference between primary and confirmation results exceeds 40% (P).**
Aroclor 1254 [2C]

No other observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0181

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: WP-1
Date Sampled: 03/03/22 09:30
Percent Solids: N/A
Initial Volume: 2.03
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-01
Sample Matrix: Solid
Units: mg/kg wet
Analyst: JLG
Prepared: 3/7/22 13:03

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (12.3)		8082A		50	03/11/22 12:21		DC20714
Aroclor 1221	ND (12.3)		8082A		50	03/11/22 12:21		DC20714
Aroclor 1232	ND (12.3)		8082A		50	03/11/22 12:21		DC20714
Aroclor 1242	ND (12.3)		8082A		50	03/11/22 12:21		DC20714
Aroclor 1248	ND (12.3)		8082A		50	03/11/22 12:21		DC20714
Aroclor 1254 [2C]	**382** (12.3)		8082A		50	03/11/22 12:21		DC20714
Aroclor 1260	ND (12.3)		8082A		50	03/11/22 12:21		DC20714
Aroclor 1262	ND (12.3)		8082A		50	03/11/22 12:21		DC20714
Aroclor 1268	ND (12.3)		8082A		50	03/11/22 12:21		DC20714

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	%	SD	30-150
Surrogate: Decachlorobiphenyl [2C]	%	SD	30-150
Surrogate: Tetrachloro-m-xylene	%	SD	30-150
Surrogate: Tetrachloro-m-xylene [2C]	%	SD	30-150

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: WP-2
Date Sampled: 03/03/22 09:35
Percent Solids: N/A
Initial Volume: 4.15
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-02
Sample Matrix: Solid
Units: mg/kg wet
Analyst: JLG
Prepared: 3/7/22 13:03

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/10/22 16:08		DC20714
Aroclor 1221	ND (0.1)		8082A		1	03/10/22 16:08		DC20714
Aroclor 1232	ND (0.1)		8082A		1	03/10/22 16:08		DC20714
Aroclor 1242	ND (0.1)		8082A		1	03/10/22 16:08		DC20714
Aroclor 1248	ND (0.1)		8082A		1	03/10/22 16:08		DC20714
Aroclor 1254 [2C]	**32.6** (1.2)		8082A		10	03/11/22 12:41		DC20714
Aroclor 1260	ND (0.1)		8082A		1	03/10/22 16:08		DC20714
Aroclor 1262	ND (0.1)		8082A		1	03/10/22 16:08		DC20714
Aroclor 1268	ND (0.1)		8082A		1	03/10/22 16:08		DC20714

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*210 %*	*SM*	*30-150*
Surrogate: Decachlorobiphenyl [2C]	*226 %*	*SM*	*30-150*
Surrogate: Tetrachloro-m-xylene	*70 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*87 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: WP-3
Date Sampled: 03/03/22 09:40
Percent Solids: N/A
Initial Volume: 4.97
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-03
Sample Matrix: Solid
Units: mg/kg wet
Analyst: JLG
Prepared: 3/7/22 13:03

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/10/22 16:28		DC20714
Aroclor 1221	ND (0.1)		8082A		1	03/10/22 16:28		DC20714
Aroclor 1232	ND (0.1)		8082A		1	03/10/22 16:28		DC20714
Aroclor 1242	ND (0.1)		8082A		1	03/10/22 16:28		DC20714
Aroclor 1248	ND (0.1)		8082A		1	03/10/22 16:28		DC20714
Aroclor 1254 [2C]	**26.2** (1.0)		8082A		10	03/11/22 13:01		DC20714
Aroclor 1260	ND (0.1)		8082A		1	03/10/22 16:28		DC20714
Aroclor 1262	ND (0.1)		8082A		1	03/10/22 16:28		DC20714
Aroclor 1268	ND (0.1)		8082A		1	03/10/22 16:28		DC20714

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*202 %*	*SM*	*30-150*
Surrogate: Decachlorobiphenyl [2C]	*218 %*	*SM*	*30-150*
Surrogate: Tetrachloro-m-xylene	*83 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*82 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-12
Date Sampled: 03/03/22 10:00
Percent Solids: 99
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-04
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/08/22 22:48		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/08/22 22:48		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/08/22 22:48		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/08/22 22:48		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/08/22 22:48		DC20715
Aroclor 1254	**9.3** (0.5)		8082A		5	03/09/22 19:56		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/08/22 22:48		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/08/22 22:48		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/08/22 22:48		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*83 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*75 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*73 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*79 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-11
Date Sampled: 03/03/22 10:10
Percent Solids: 99
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-05
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/08/22 23:08		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/08/22 23:08		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/08/22 23:08		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/08/22 23:08		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/08/22 23:08		DC20715
Aroclor 1254	**10.9** (0.5)		8082A		5	03/09/22 20:16		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/08/22 23:08		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/08/22 23:08		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/08/22 23:08		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*94 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*86 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*89 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*95 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-13
Date Sampled: 03/03/22 10:20
Percent Solids: 99
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-06
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/08/22 23:28		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/08/22 23:28		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/08/22 23:28		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/08/22 23:28		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/08/22 23:28		DC20715
Aroclor 1254	**7.5** (0.5)		8082A		5	03/09/22 20:35		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/08/22 23:28		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/08/22 23:28		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/08/22 23:28		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*88 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*79 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*74 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*79 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-14
Date Sampled: 03/03/22 10:30
Percent Solids: 99
Initial Volume: 5.01
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-07
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/08/22 23:48		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/08/22 23:48		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/08/22 23:48		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/08/22 23:48		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/08/22 23:48		DC20715
Aroclor 1254	**5.7** (0.2)		8082A		2	03/09/22 20:55		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/08/22 23:48		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/08/22 23:48		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/08/22 23:48		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*93 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*84 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*76 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*78 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-17
Date Sampled: 03/03/22 10:35
Percent Solids: 96
Initial Volume: 5.02
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-08
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 0:07		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 0:07		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 0:07		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 0:07		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 0:07		DC20715
Aroclor 1254	**5.2** (0.2)		8082A		2	03/09/22 21:15		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 0:07		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 0:07		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 0:07		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*82 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*74 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*76 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*83 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-16
Date Sampled: 03/03/22 10:40
Percent Solids: 99
Initial Volume: 5.01
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-09
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 0:27		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 0:27		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 0:27		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 0:27		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 0:27		DC20715
Aroclor 1254	**6.5** (0.2)		8082A		2	03/09/22 21:35		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 0:27		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 0:27		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 0:27		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*89 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*78 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*80 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*89 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-19
Date Sampled: 03/03/22 10:50
Percent Solids: 98
Initial Volume: 5.05
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-10
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 0:47		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 0:47		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 0:47		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 0:47		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 0:47		DC20715
Aroclor 1254 [2C]	**1.3** (0.1)		8082A		1	03/09/22 0:47		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 0:47		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 0:47		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 0:47		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*75 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*67 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*68 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*77 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-18
Date Sampled: 03/03/22 10:55
Percent Solids: 99
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-11
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 1:07		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 1:07		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 1:07		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 1:07		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 1:07		DC20715
Aroclor 1254	**3.9** (0.1)		8082A		1	03/09/22 1:07		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 1:07		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 1:07		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 1:07		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*83 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*75 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*72 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*79 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-17
Date Sampled: 03/03/22 11:00
Percent Solids: 99
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-12
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 1:26		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 1:26		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 1:26		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 1:26		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 1:26		DC20715
Aroclor 1254	**0.2** (0.1)		8082A		1	03/09/22 1:26		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 1:26		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 1:26		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 1:26		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*89 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*81 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*70 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*78 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: BM-1
Date Sampled: 03/03/22 11:00
Percent Solids: N/A
Initial Volume: 2.07
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-13
Sample Matrix: Solid
Units: mg/kg wet
Analyst: JLG
Prepared: 3/7/22 13:03

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.2)		8082A		1	03/10/22 16:48		DC20714
Aroclor 1221	ND (0.2)		8082A		1	03/10/22 16:48		DC20714
Aroclor 1232	ND (0.2)		8082A		1	03/10/22 16:48		DC20714
Aroclor 1242	ND (0.2)		8082A		1	03/10/22 16:48		DC20714
Aroclor 1248	ND (0.2)		8082A		1	03/10/22 16:48		DC20714
Aroclor 1254 [2C]	**P 3.0** (0.2)		8082A		1	03/10/22 16:48		DC20714
Aroclor 1260	ND (0.2)		8082A		1	03/10/22 16:48		DC20714
Aroclor 1262	ND (0.2)		8082A		1	03/10/22 16:48		DC20714
Aroclor 1268	ND (0.2)		8082A		1	03/10/22 16:48		DC20714

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*65 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*79 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*24 %*	*S-*	*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*82 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: BM-2
Date Sampled: 03/03/22 11:05
Percent Solids: N/A
Initial Volume: 2.14
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-14
Sample Matrix: Solid
Units: mg/kg wet
Analyst: JLG
Prepared: 3/7/22 13:03

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.2)		8082A		1	03/10/22 17:08		DC20714
Aroclor 1221	ND (0.2)		8082A		1	03/10/22 17:08		DC20714
Aroclor 1232	ND (0.2)		8082A		1	03/10/22 17:08		DC20714
Aroclor 1242	ND (0.2)		8082A		1	03/10/22 17:08		DC20714
Aroclor 1248	ND (0.2)		8082A		1	03/10/22 17:08		DC20714
Aroclor 1254 [2C]	**23.1** (1.2)		8082A		5	03/11/22 13:20		DC20714
Aroclor 1260	ND (0.2)		8082A		1	03/10/22 17:08		DC20714
Aroclor 1262	ND (0.2)		8082A		1	03/10/22 17:08		DC20714
Aroclor 1268	ND (0.2)		8082A		1	03/10/22 17:08		DC20714

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*83 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*89 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*48 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*88 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-27
Date Sampled: 03/03/22 11:05
Percent Solids: 98
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-15
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 1:46		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 1:46		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 1:46		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 1:46		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 1:46		DC20715
Aroclor 1254	**37.5** (1.0)		8082A		10	03/09/22 21:55		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 1:46		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 1:46		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 1:46		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*93 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*78 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*79 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*90 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-27 2-3in
Date Sampled: 03/03/22 11:10
Percent Solids: 98
Initial Volume: 5.05
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-16
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 2:06		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 2:06		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 2:06		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 2:06		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 2:06		DC20715
Aroclor 1254 [2C]	**2.2** (0.1)		8082A		1	03/09/22 2:06		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 2:06		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 2:06		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 2:06		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*44 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*41 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*37 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*42 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-26
Date Sampled: 03/03/22 11:15
Percent Solids: 98
Initial Volume: 5.07
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-17
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 2:26		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 2:26		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 2:26		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 2:26		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 2:26		DC20715
Aroclor 1254	**28.2** (1.0)		8082A		10	03/09/22 22:14		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 2:26		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 2:26		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 2:26		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*81 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*69 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*66 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*73 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-25
Date Sampled: 03/03/22 11:20
Percent Solids: 98
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-18
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 2:46		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 2:46		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 2:46		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 2:46		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 2:46		DC20715
Aroclor 1254	**0.4** (0.1)		8082A		1	03/09/22 2:46		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 2:46		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 2:46		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 2:46		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*100 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*91 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*84 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*95 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: BM-3
Date Sampled: 03/03/22 11:10
Percent Solids: N/A
Initial Volume: 2.04
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-19
Sample Matrix: Solid
Units: mg/kg wet
Analyst: JLG
Prepared: 3/7/22 13:03

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.2)		8082A		1	03/10/22 17:27		DC20714
Aroclor 1221	ND (0.2)		8082A		1	03/10/22 17:27		DC20714
Aroclor 1232	ND (0.2)		8082A		1	03/10/22 17:27		DC20714
Aroclor 1242	ND (0.2)		8082A		1	03/10/22 17:27		DC20714
Aroclor 1248	ND (0.2)		8082A		1	03/10/22 17:27		DC20714
Aroclor 1254 [2C]	**P 3.0** (0.2)		8082A		1	03/10/22 17:27		DC20714
Aroclor 1260	ND (0.2)		8082A		1	03/10/22 17:27		DC20714
Aroclor 1262	ND (0.2)		8082A		1	03/10/22 17:27		DC20714
Aroclor 1268	ND (0.2)		8082A		1	03/10/22 17:27		DC20714

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*68 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*120 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*37 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*85 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: BM-4
Date Sampled: 03/03/22 11:15
Percent Solids: N/A
Initial Volume: 2.05
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0181
ESS Laboratory Sample ID: 22C0181-20
Sample Matrix: Solid
Units: mg/kg wet
Analyst: JLG
Prepared: 3/7/22 13:03

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.2)		8082A		1	03/10/22 17:47		DC20714
Aroclor 1221	ND (0.2)		8082A		1	03/10/22 17:47		DC20714
Aroclor 1232	ND (0.2)		8082A		1	03/10/22 17:47		DC20714
Aroclor 1242	ND (0.2)		8082A		1	03/10/22 17:47		DC20714
Aroclor 1248	ND (0.2)		8082A		1	03/10/22 17:47		DC20714
Aroclor 1254	**8.1** (0.2)		8082A		1	03/10/22 17:47		DC20714
Aroclor 1260	ND (0.2)		8082A		1	03/10/22 17:47		DC20714
Aroclor 1262	ND (0.2)		8082A		1	03/10/22 17:47		DC20714
Aroclor 1268	ND (0.2)		8082A		1	03/10/22 17:47		DC20714

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*84 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*87 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*63 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*101 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0181

Quality Control Data

8082A Polychlorinated Biphenyls (PCB)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch DC20714 - 3540C										
Blank										
Aroclor 1016	ND	0.02	mg/kg wet							
Aroclor 1016 [2C]	ND	0.02	mg/kg wet							
Aroclor 1221	ND	0.02	mg/kg wet							
Aroclor 1221 [2C]	ND	0.02	mg/kg wet							
Aroclor 1232	ND	0.02	mg/kg wet							
Aroclor 1232 [2C]	ND	0.02	mg/kg wet							
Aroclor 1242	ND	0.02	mg/kg wet							
Aroclor 1242 [2C]	ND	0.02	mg/kg wet							
Aroclor 1248	ND	0.02	mg/kg wet							
Aroclor 1248 [2C]	ND	0.02	mg/kg wet							
Aroclor 1254	ND	0.02	mg/kg wet							
Aroclor 1254 [2C]	ND	0.02	mg/kg wet							
Aroclor 1260	ND	0.02	mg/kg wet							
Aroclor 1260 [2C]	ND	0.02	mg/kg wet							
Aroclor 1262	ND	0.02	mg/kg wet							
Aroclor 1262 [2C]	ND	0.02	mg/kg wet							
Aroclor 1268	ND	0.02	mg/kg wet							
Aroclor 1268 [2C]	ND	0.02	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.0215*		mg/kg wet	*0.02500*		*86*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0200*		mg/kg wet	*0.02500*		*80*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0193*		mg/kg wet	*0.02500*		*77*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0213*		mg/kg wet	*0.02500*		*85*	*30-150*			
LCS										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		88	40-140			
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		84	40-140			
Aroclor 1260	0.4	0.02	mg/kg wet	0.5000		89	40-140			
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		85	40-140			
Surrogate: Decachlorobiphenyl	*0.0231*		mg/kg wet	*0.02500*		*92*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0213*		mg/kg wet	*0.02500*		*85*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0228*		mg/kg wet	*0.02500*		*91*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0225*		mg/kg wet	*0.02500*		*90*	*30-150*			
LCS Dup										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		85	40-140	3	30	
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		81	40-140	3	30	
Aroclor 1260	0.4	0.02	mg/kg wet	0.5000		87	40-140	2	30	
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		81	40-140	4	30	
Surrogate: Decachlorobiphenyl	*0.0226*		mg/kg wet	*0.02500*		*90*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0209*		mg/kg wet	*0.02500*		*84*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0224*		mg/kg wet	*0.02500*		*90*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0224*		mg/kg wet	*0.02500*		*90*	*30-150*			
Batch DC20715 - 3540C										

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0181

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DC20715 - 3540C										
Blank										
Aroclor 1016	ND	0.02	mg/kg wet							
Aroclor 1016 [2C]	ND	0.02	mg/kg wet							
Aroclor 1221	ND	0.02	mg/kg wet							
Aroclor 1221 [2C]	ND	0.02	mg/kg wet							
Aroclor 1232	ND	0.02	mg/kg wet							
Aroclor 1232 [2C]	ND	0.02	mg/kg wet							
Aroclor 1242	ND	0.02	mg/kg wet							
Aroclor 1242 [2C]	ND	0.02	mg/kg wet							
Aroclor 1248	ND	0.02	mg/kg wet							
Aroclor 1248 [2C]	ND	0.02	mg/kg wet							
Aroclor 1254	ND	0.02	mg/kg wet							
Aroclor 1254 [2C]	ND	0.02	mg/kg wet							
Aroclor 1260	ND	0.02	mg/kg wet							
Aroclor 1260 [2C]	ND	0.02	mg/kg wet							
Aroclor 1262	ND	0.02	mg/kg wet							
Aroclor 1262 [2C]	ND	0.02	mg/kg wet							
Aroclor 1268	ND	0.02	mg/kg wet							
Aroclor 1268 [2C]	ND	0.02	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.0227*		mg/kg wet	*0.02500*		*91*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0211*		mg/kg wet	*0.02500*		*84*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0211*		mg/kg wet	*0.02500*		*84*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0233*		mg/kg wet	*0.02500*		*93*	*30-150*			
LCS										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		87	40-140			
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		87	40-140			
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		92	40-140			
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		83	40-140			
Surrogate: Decachlorobiphenyl	*0.0246*		mg/kg wet	*0.02500*		*98*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0225*		mg/kg wet	*0.02500*		*90*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0252*		mg/kg wet	*0.02500*		*101*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0247*		mg/kg wet	*0.02500*		*99*	*30-150*			
LCS Dup										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		86	40-140	2	30	
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		84	40-140	4	30	
Aroclor 1260	0.4	0.02	mg/kg wet	0.5000		88	40-140	4	30	
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		81	40-140	2	30	
Surrogate: Decachlorobiphenyl	*0.0234*		mg/kg wet	*0.02500*		*94*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0214*		mg/kg wet	*0.02500*		*86*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0234*		mg/kg wet	*0.02500*		*93*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0231*		mg/kg wet	*0.02500*		*92*	*30-150*			

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements ESS Laboratory Work Order: 22C0181

Notes and Definitions

U	Analyte included in the analysis, but not detected
SM	Surrogate recovery(ies) outside of criteria due to matrix (UCM/coelution/matrix is present) (SM).
SD	Surrogate recovery(ies) diluted below the MRL (SD).
S-	Surrogate recovery(ies) below lower control limit (S-).
P	Percent difference between primary and confirmation results exceeds 40% (P).
D	Diluted.
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0181

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

Shipped/Delivered Via: ESS Courier

ESS Project ID: 22C0181
Date Received: 3/4/2022
Project Due Date: 3/11/2022
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: 0.1 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / NA
10. Were any analyses received outside of hold time? Yes / No

11. Any Subcontracting needed? Yes / No
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / No
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA
13. Are the samples properly preserved? Yes / No
    a. If metals preserved upon receipt: Date: Time: By:
    b. Low Level VOA vials frozen: Date: Time: By:

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / No
    a. Was there a need to contact the client? Yes / No
    Who was contacted? Date: Time: By:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	263252	Yes	N/A	Yes	4 oz. Jar	NP	
2	263253	Yes	N/A	Yes	4 oz. Jar	NP	
3	263254	Yes	N/A	Yes	4 oz. Jar	NP	
4	263255	Yes	N/A	Yes	4 oz. Jar	NP	
5	263256	Yes	N/A	Yes	4 oz. Jar	NP	
6	263257	Yes	N/A	Yes	4 oz. Jar	NP	
7	263258	Yes	N/A	Yes	4 oz. Jar	NP	
8	263259	Yes	N/A	Yes	4 oz. Jar	NP	
9	263260	Yes	N/A	Yes	4 oz. Jar	NP	
10	263261	Yes	N/A	Yes	4 oz. Jar	NP	
11	263262	Yes	N/A	Yes	4 oz. Jar	NP	
12	263263	Yes	N/A	Yes	4 oz. Jar	NP	
13	263264	Yes	N/A	Yes	4 oz. Jar	NP	
14	263265	Yes	N/A	Yes	4 oz. Jar	NP	
15	263266	Yes	N/A	Yes	4 oz. Jar	NP	
16	263267	Yes	N/A	Yes	4 oz. Jar	NP	

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

ESS Project ID: 22C0181

Date Received: 3/4/2022

17	263268	Yes	N/A	Yes	4 oz. Jar	NP
18	263269	Yes	N/A	Yes	4 oz. Jar	NP
19	263270	Yes	N/A	Yes	4 oz. Jar	NP
20	263271	Yes	N/A	Yes	4 oz. Jar	NP

2nd Review

Were all containers scanned into storage/lab? Initials

Are barcode labels on correct containers? Yes / No

Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA

Are all Hex Chrome stickers attached? Yes / No / NA

Are all QC stickers attached? Yes / No / NA

Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: Date & Time: 3.4.22 1606

Reviewed By: Date & Time: 3/4/22 1621

185 Frances Avenue
Cranston, RI 02910
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 22C0181 | Page 1 of 45

Turn Time (Days) ☐ > 5 ☒ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: MA Criteria:

Is this project for any of the following?:

☐ CT RCP ☐ MA MCP ☐ RGP ☐ Permit ☐ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF)

☐ Limit Checker ☐ State Forms ☐ EQuIS
☐ Excel ☐ State Upload ☐ Enviro Data
☐ CLP-Like Package ☐ Other (Specify) →

CLIENT INFORMATION

Client: BETA Group, Inc.
Address: 701 George Washington Highway
Phone: 401.333.2382
Email Distribution List: Coien@BETA-Inc.com; Malger@BETA-Inc.com; Jmcloughlin@BETA-Inc.com

PROJECT INFORMATION

Project Name: Framingham PS Improvements
Project Location: Framingham
Project Number: 10173.05
Project Manager: Joe McLoughlin
Bill to:
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	PCB (soxhlet extract)	Total Number of Bottles
1	3-3-22	9:30	Grab	Solid	WP-1	X	1
2		9:35			WP-2	X	1
3		9:40			WP-3	X	1
4		10:00			F-12	X	1
5		10:10			F-11	X	1
6		10:20			F-13	X	1
7		10:30			F-14	X	1
8		10:35			F-17	X	1
9		10:40			F-16	X	1
10		10:50			F-19	X	1

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial
Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*
Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*

Sampled by : C. Oien + Matt Alger

Chain needs to be filled out neatly and completely for on time delivery.

Laboratory Use Only
Cooler Temperature (°C): 0.1

Comments: * Please specify "Other" preservative and containers types in this space

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration
☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	3-3-22	16:00	Lincoln Fridge		3/4/22	10:45	3/4/22 10:45
Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
3/4/22		15:10					

185 Frances Avenue
Cranston, RI 02910
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 22C0181 | Page 2 of 4 (5)

Turn Time (Days): ☐ > 5 ☒ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: MA Criteria:

Is this project for any of the following?: ☐ CT RCP ☐ MA MCP ☐ RGP ☐ Permit ☐ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF)
☐ Limit Checker ☐ State Forms ☐ EQuIS
☐ Excel ☐ State Upload ☐ Enviro Data
☐ CLP-Like Package ☐ Other (Specify) →

CLIENT INFORMATION

Client: BETA Group, Inc.
Address: 701 George Washington Highway
Phone: 401.333.2382
Email Distribution List: Coien@BETA-Inc.com; Malger@BETA-Inc.com; Jmcloughlin@BETA-Inc.com

PROJECT INFORMATION

Project Name: Framingham PS Improvements
Project Location: Framingham
Project Number: 10173.05
Project Manager: Joe McLoughlin
Bill to:
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	PCB (soxhlet extract)	Total Number of Bottles
11	3-3-22	10:55	Grab	Solid	F-18	X	1
12		11:00			W-17	X	1
13		11:00			BM-1	X	1
14		11:05			BM-2	X	1
15		11:05			W-27	X	1
16		11:10			W-27(2-3")	X	1
17		11:15			W-26	X	1
18		11:20			W-25	X	1
19		11:10			BM-3	X	1
20		11:15			BM-4	X	1

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial
Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*
Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*

Sampled by :

Chain needs to be filled out neatly and completely for on time delivery.

Laboratory Use Only
Cooler Temperature (°C): 0.1

Comments: * Please specify "Other" preservative and containers types in this space

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration
☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	3-3-22	16:00	Lincoln Fridge		3/4/22	10:45	3/4/22 10:45
Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
3/4/22		15:00					

CERTIFICATE OF ANALYSIS

Joe McLoughlin
Beta Engineering
701 George Washington Hwy 2nd FL
Lincoln, RI 02865

RE: Framingham PS Improvements (10173.05)
ESS Laboratory Work Order Number: 22C0182

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 5:48 pm, Mar 11, 2022

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0182

SAMPLE RECEIPT

The following samples were received on March 04, 2022 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
22C0182-01	W-24	Solid	8082A
22C0182-02	W-21	Solid	8082A
22C0182-03	W-23	Solid	8082A
22C0182-04	W-22	Solid	8082A
22C0182-05	RP-1	Solid	8082A
22C0182-06	F-9	Solid	8082A
22C0182-07	W-29	Solid	8082A
22C0182-08	F-8	Solid	8082A
22C0182-09	W-30	Solid	8082A
22C0182-10	W-28	Solid	8082A
22C0182-11	W-26	Solid	8082A
22C0182-12	DUP-1	Solid	8082A
22C0182-13	W-18	Solid	8082A
22C0182-14	W-20	Solid	8082A
22C0182-15	W-24	Solid	8082A
22C0182-16	W-25	Solid	8082A
22C0182-17	W-27	Solid	8082A
22C0182-18	W-13 2-3in	Solid	8082A
22C0182-19	W-13	Solid	8082A
22C0182-20	W-14	Solid	8082A

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0182

PROJECT NARRATIVE

8082A Polychlorinated Biphenyls (PCB)
22C0182-05 **Percent difference between primary and confirmation results exceeds 40% (P).**
Aroclor 1254 [2C]

No other observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0182

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-24
Date Sampled: 03/03/22 11:25
Percent Solids: 98
Initial Volume: 5.04
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-01
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 5:05		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 5:05		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 5:05		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 5:05		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 5:05		DC20715
Aroclor 1254	**0.2** (0.1)		8082A		1	03/09/22 5:05		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 5:05		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 5:05		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 5:05		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*89 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*80 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*77 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*81 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-21
Date Sampled: 03/03/22 11:30
Percent Solids: 100
Initial Volume: 5.06
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-02
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 5:24		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 5:24		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 5:24		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 5:24		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 5:24		DC20715
Aroclor 1254 [2C]	ND (0.1)		8082A		1	03/09/22 5:24		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 5:24		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 5:24		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 5:24		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*80 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*75 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*69 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*73 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-23
Date Sampled: 03/03/22 11:35
Percent Solids: 99
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-03
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 5:44		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 5:44		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 5:44		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 5:44		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 5:44		DC20715
Aroclor 1254 [2C]	**0.3** (0.1)		8082A		1	03/09/22 5:44		DC20715
Aroclor 1260 [2C]	ND (0.1)		8082A		1	03/09/22 5:44		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 5:44		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 5:44		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*91 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*84 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*81 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*92 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-22
Date Sampled: 03/03/22 11:40
Percent Solids: 98
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-04
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 6:04		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 6:04		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 6:04		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 6:04		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 6:04		DC20715
Aroclor 1254	**0.1** (0.1)		8082A		1	03/09/22 6:04		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 6:04		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 6:04		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 6:04		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*92 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*84 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*74 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*80 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: RP-1
Date Sampled: 03/03/22 14:40
Percent Solids: N/A
Initial Volume: 2.34
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-05
Sample Matrix: Solid
Units: mg/kg wet
Analyst: JLG
Prepared: 3/7/22 13:03

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.2)		8082A		1	03/10/22 18:07		DC20714
Aroclor 1221	ND (0.2)		8082A		1	03/10/22 18:07		DC20714
Aroclor 1232	ND (0.2)		8082A		1	03/10/22 18:07		DC20714
Aroclor 1242	ND (0.2)		8082A		1	03/10/22 18:07		DC20714
Aroclor 1248	ND (0.2)		8082A		1	03/10/22 18:07		DC20714
Aroclor 1254 [2C]	**P 3.9** (0.2)		8082A		1	03/10/22 18:07		DC20714
Aroclor 1260	ND (0.2)		8082A		1	03/10/22 18:07		DC20714
Aroclor 1262	ND (0.2)		8082A		1	03/10/22 18:07		DC20714
Aroclor 1268	ND (0.2)		8082A		1	03/10/22 18:07		DC20714

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*87 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*102 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*67 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*97 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-9
Date Sampled: 03/03/22 14:00
Percent Solids: 96
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-06
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/9/22 15:15

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/10/22 17:52		DC20913
Aroclor 1221	ND (0.1)		8082A		1	03/10/22 17:52		DC20913
Aroclor 1232	ND (0.1)		8082A		1	03/10/22 17:52		DC20913
Aroclor 1242	ND (0.1)		8082A		1	03/10/22 17:52		DC20913
Aroclor 1248	ND (0.1)		8082A		1	03/10/22 17:52		DC20913
Aroclor 1254	**0.6** (0.1)		8082A		1	03/10/22 17:52		DC20913
Aroclor 1260	ND (0.1)		8082A		1	03/10/22 17:52		DC20913
Aroclor 1262	ND (0.1)		8082A		1	03/10/22 17:52		DC20913
Aroclor 1268	ND (0.1)		8082A		1	03/10/22 17:52		DC20913

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*89 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*92 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*91 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*102 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-29
Date Sampled: 03/03/22 13:45
Percent Solids: 98
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-07
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 6:44		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 6:44		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 6:44		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 6:44		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 6:44		DC20715
Aroclor 1254 [2C]	**10.8** (0.5)		8082A		5	03/09/22 22:34		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 6:44		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 6:44		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 6:44		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*92 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*84 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*85 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*92 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: F-8
Date Sampled: 03/03/22 13:40
Percent Solids: 96
Initial Volume: 5.03
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-08
Sample Matrix: Solid
Units: mg/kg dry
Analyst: DMC
Prepared: 3/7/22 12:51

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 7:03		DC20715
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 7:03		DC20715
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 7:03		DC20715
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 7:03		DC20715
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 7:03		DC20715
Aroclor 1254 [2C]	**1.3** (0.1)		8082A		1	03/09/22 7:03		DC20715
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 7:03		DC20715
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 7:03		DC20715
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 7:03		DC20715

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*85 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*78 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*75 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*87 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-30
Date Sampled: 03/03/22 13:15
Percent Solids: 98
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-09
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 4:01		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 4:01		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 4:01		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 4:01		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 4:01		DC20716
Aroclor 1254	**28.0** (1.0)		8082A		10	03/09/22 18:19		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 4:01		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 4:01		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 4:01		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*82 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*81 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*88 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*96 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-28
Date Sampled: 03/03/22 13:40
Percent Solids: 99
Initial Volume: 5.01
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-10
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 4:20		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 4:20		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 4:20		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 4:20		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 4:20		DC20716
Aroclor 1254	**15.3** (1.0)		8082A		10	03/09/22 18:38		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 4:20		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 4:20		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 4:20		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*83 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*81 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*85 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*92 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-26
Date Sampled: 03/03/22 13:35
Percent Solids: 98
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-11
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 4:40		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 4:40		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 4:40		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 4:40		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 4:40		DC20716
Aroclor 1254	**29.6** (1.0)		8082A		10	03/09/22 18:58		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 4:40		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 4:40		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 4:40		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*86 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*85 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*87 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*93 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: DUP-1
Date Sampled: 03/03/22 12:20
Percent Solids: 98
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-12
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 4:59		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 4:59		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 4:59		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 4:59		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 4:59		DC20716
Aroclor 1254 [2C]	ND (0.1)		8082A		1	03/09/22 4:59		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 4:59		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 4:59		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 4:59		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*80 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*79 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*84 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*93 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-18
Date Sampled: 03/03/22 12:15
Percent Solids: 98
Initial Volume: 5.05
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-13
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 5:18		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 5:18		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 5:18		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 5:18		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 5:18		DC20716
Aroclor 1254 [2C]	ND (0.1)		8082A		1	03/09/22 5:18		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 5:18		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 5:18		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 5:18		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*73 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*71 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*77 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*85 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-20
Date Sampled: 03/03/22 12:20
Percent Solids: 99
Initial Volume: 5.06
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-14
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 5:38		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 5:38		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 5:38		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 5:38		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 5:38		DC20716
Aroclor 1254	ND (0.1)		8082A		1	03/09/22 5:38		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 5:38		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 5:38		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 5:38		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*78 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*76 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*87 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*94 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-24
Date Sampled: 03/03/22 13:20
Percent Solids: 98
Initial Volume: 5.02
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-15
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 5:57		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 5:57		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 5:57		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 5:57		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 5:57		DC20716
Aroclor 1254 [2C]	**16.0** (1.0)		8082A		10	03/09/22 19:17		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 5:57		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 5:57		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 5:57		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*51 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*50 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*51 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*57 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-25
Date Sampled: 03/03/22 13:25
Percent Solids: 98
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-16
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 6:17		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 6:17		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 6:17		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 6:17		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 6:17		DC20716
Aroclor 1254	**19.8** (1.0)		8082A		10	03/09/22 19:37		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 6:17		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 6:17		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 6:17		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*74 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*73 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*73 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*79 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-27
Date Sampled: 03/03/22 13:30
Percent Solids: 98
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-17
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 6:36		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 6:36		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 6:36		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 6:36		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 6:36		DC20716
Aroclor 1254 [2C]	**32.4** (1.0)		8082A		10	03/09/22 19:56		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 6:36		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 6:36		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 6:36		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*82 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*80 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*88 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*96 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-13 2-3in
Date Sampled: 03/03/22 12:10
Percent Solids: 98
Initial Volume: 5.03
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-18
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 6:55		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 6:55		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 6:55		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 6:55		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 6:55		DC20716
Aroclor 1254	ND (0.1)		8082A		1	03/09/22 6:55		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 6:55		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 6:55		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 6:55		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*78 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*77 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*74 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*81 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-13
Date Sampled: 03/03/22 12:05
Percent Solids: 98
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-19
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 7:15		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 7:15		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 7:15		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 7:15		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 7:15		DC20716
Aroclor 1254	ND (0.1)		8082A		1	03/09/22 7:15		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 7:15		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 7:15		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 7:15		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*87 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*86 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*81 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*87 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-14
Date Sampled: 03/03/22 12:00
Percent Solids: 99
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0182
ESS Laboratory Sample ID: 22C0182-20
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 14:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 7:34		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 7:34		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 7:34		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 7:34		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 7:34		DC20716
Aroclor 1254	**0.1** (0.1)		8082A		1	03/09/22 7:34		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 7:34		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 7:34		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 7:34		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*79 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*78 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*70 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*77 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0182

Quality Control Data

8082A Polychlorinated Biphenyls (PCB)

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch DC20714 - 3540C										
Blank										
Aroclor 1016	ND	0.02	mg/kg wet							
Aroclor 1016 [2C]	ND	0.02	mg/kg wet							
Aroclor 1221	ND	0.02	mg/kg wet							
Aroclor 1221 [2C]	ND	0.02	mg/kg wet							
Aroclor 1232	ND	0.02	mg/kg wet							
Aroclor 1232 [2C]	ND	0.02	mg/kg wet							
Aroclor 1242	ND	0.02	mg/kg wet							
Aroclor 1242 [2C]	ND	0.02	mg/kg wet							
Aroclor 1248	ND	0.02	mg/kg wet							
Aroclor 1248 [2C]	ND	0.02	mg/kg wet							
Aroclor 1254	ND	0.02	mg/kg wet							
Aroclor 1254 [2C]	ND	0.02	mg/kg wet							
Aroclor 1260	ND	0.02	mg/kg wet							
Aroclor 1260 [2C]	ND	0.02	mg/kg wet							
Aroclor 1262	ND	0.02	mg/kg wet							
Aroclor 1262 [2C]	ND	0.02	mg/kg wet							
Aroclor 1268	ND	0.02	mg/kg wet							
Aroclor 1268 [2C]	ND	0.02	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.0215*		mg/kg wet	*0.02500*		*86*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0200*		mg/kg wet	*0.02500*		*80*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0193*		mg/kg wet	*0.02500*		*77*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0213*		mg/kg wet	*0.02500*		*85*	*30-150*			
LCS										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		88	40-140			
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		84	40-140			
Aroclor 1260	0.4	0.02	mg/kg wet	0.5000		89	40-140			
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		85	40-140			
Surrogate: Decachlorobiphenyl	*0.0231*		mg/kg wet	*0.02500*		*92*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0213*		mg/kg wet	*0.02500*		*85*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0228*		mg/kg wet	*0.02500*		*91*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0225*		mg/kg wet	*0.02500*		*90*	*30-150*			
LCS Dup										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		85	40-140	3	30	
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		81	40-140	3	30	
Aroclor 1260	0.4	0.02	mg/kg wet	0.5000		87	40-140	2	30	
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		81	40-140	4	30	
Surrogate: Decachlorobiphenyl	*0.0226*		mg/kg wet	*0.02500*		*90*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0209*		mg/kg wet	*0.02500*		*84*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0224*		mg/kg wet	*0.02500*		*90*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0224*		mg/kg wet	*0.02500*		*90*	*30-150*			
Batch DC20715 - 3540C										

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0182

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DC20715 - 3540C										
Blank										
Aroclor 1016	ND	0.02	mg/kg wet							
Aroclor 1016 [2C]	ND	0.02	mg/kg wet							
Aroclor 1221	ND	0.02	mg/kg wet							
Aroclor 1221 [2C]	ND	0.02	mg/kg wet							
Aroclor 1232	ND	0.02	mg/kg wet							
Aroclor 1232 [2C]	ND	0.02	mg/kg wet							
Aroclor 1242	ND	0.02	mg/kg wet							
Aroclor 1242 [2C]	ND	0.02	mg/kg wet							
Aroclor 1248	ND	0.02	mg/kg wet							
Aroclor 1248 [2C]	ND	0.02	mg/kg wet							
Aroclor 1254	ND	0.02	mg/kg wet							
Aroclor 1254 [2C]	ND	0.02	mg/kg wet							
Aroclor 1260	ND	0.02	mg/kg wet							
Aroclor 1260 [2C]	ND	0.02	mg/kg wet							
Aroclor 1262	ND	0.02	mg/kg wet							
Aroclor 1262 [2C]	ND	0.02	mg/kg wet							
Aroclor 1268	ND	0.02	mg/kg wet							
Aroclor 1268 [2C]	ND	0.02	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.0227*		mg/kg wet	*0.02500*		*91*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0211*		mg/kg wet	*0.02500*		*84*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0211*		mg/kg wet	*0.02500*		*84*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0233*		mg/kg wet	*0.02500*		*93*	*30-150*			
LCS										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		87	40-140			
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		87	40-140			
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		92	40-140			
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		83	40-140			
Surrogate: Decachlorobiphenyl	*0.0246*		mg/kg wet	*0.02500*		*98*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0225*		mg/kg wet	*0.02500*		*90*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0252*		mg/kg wet	*0.02500*		*101*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0247*		mg/kg wet	*0.02500*		*99*	*30-150*			
LCS Dup										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		86	40-140	2	30	
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		84	40-140	4	30	
Aroclor 1260	0.4	0.02	mg/kg wet	0.5000		88	40-140	4	30	
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		81	40-140	2	30	
Surrogate: Decachlorobiphenyl	*0.0234*		mg/kg wet	*0.02500*		*94*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0214*		mg/kg wet	*0.02500*		*86*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0234*		mg/kg wet	*0.02500*		*93*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0231*		mg/kg wet	*0.02500*		*92*	*30-150*			
Batch DC20716 - 3540C										

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0182

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DC20716 - 3540C										
Blank										
Aroclor 1016	ND	0.02	mg/kg wet							
Aroclor 1016 [2C]	ND	0.02	mg/kg wet							
Aroclor 1221	ND	0.02	mg/kg wet							
Aroclor 1221 [2C]	ND	0.02	mg/kg wet							
Aroclor 1232	ND	0.02	mg/kg wet							
Aroclor 1232 [2C]	ND	0.02	mg/kg wet							
Aroclor 1242	ND	0.02	mg/kg wet							
Aroclor 1242 [2C]	ND	0.02	mg/kg wet							
Aroclor 1248	ND	0.02	mg/kg wet							
Aroclor 1248 [2C]	ND	0.02	mg/kg wet							
Aroclor 1254	ND	0.02	mg/kg wet							
Aroclor 1254 [2C]	ND	0.02	mg/kg wet							
Aroclor 1260	ND	0.02	mg/kg wet							
Aroclor 1260 [2C]	ND	0.02	mg/kg wet							
Aroclor 1262	ND	0.02	mg/kg wet							
Aroclor 1262 [2C]	ND	0.02	mg/kg wet							
Aroclor 1268	ND	0.02	mg/kg wet							
Aroclor 1268 [2C]	ND	0.02	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.0195*		mg/kg wet	*0.02500*		*78*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0193*		mg/kg wet	*0.02500*		*77*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0210*		mg/kg wet	*0.02500*		*84*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0226*		mg/kg wet	*0.02500*		*90*	*30-150*			
LCS										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		89	40-140			
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		86	40-140			
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		92	40-140			
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		85	40-140			
Surrogate: Decachlorobiphenyl	*0.0204*		mg/kg wet	*0.02500*		*81*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0201*		mg/kg wet	*0.02500*		*80*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0232*		mg/kg wet	*0.02500*		*93*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0234*		mg/kg wet	*0.02500*		*94*	*30-150*			
LCS Dup										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		90	40-140	0.09	30	
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		86	40-140	0.1	30	
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		90	40-140	1	30	
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		85	40-140	0.03	30	
Surrogate: Decachlorobiphenyl	*0.0201*		mg/kg wet	*0.02500*		*80*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0197*		mg/kg wet	*0.02500*		*79*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0231*		mg/kg wet	*0.02500*		*93*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0234*		mg/kg wet	*0.02500*		*94*	*30-150*			
Batch DC20913 - 3540C										

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0182

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DC20913 - 3540C										
Blank										
Aroclor 1016	ND	0.02	mg/kg wet							
Aroclor 1016 [2C]	ND	0.02	mg/kg wet							
Aroclor 1221	ND	0.02	mg/kg wet							
Aroclor 1221 [2C]	ND	0.02	mg/kg wet							
Aroclor 1232	ND	0.02	mg/kg wet							
Aroclor 1232 [2C]	ND	0.02	mg/kg wet							
Aroclor 1242	ND	0.02	mg/kg wet							
Aroclor 1242 [2C]	ND	0.02	mg/kg wet							
Aroclor 1248	ND	0.02	mg/kg wet							
Aroclor 1248 [2C]	ND	0.02	mg/kg wet							
Aroclor 1254	ND	0.02	mg/kg wet							
Aroclor 1254 [2C]	ND	0.02	mg/kg wet							
Aroclor 1260	ND	0.02	mg/kg wet							
Aroclor 1260 [2C]	ND	0.02	mg/kg wet							
Aroclor 1262	ND	0.02	mg/kg wet							
Aroclor 1262 [2C]	ND	0.02	mg/kg wet							
Aroclor 1268	ND	0.02	mg/kg wet							
Aroclor 1268 [2C]	ND	0.02	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.0216*		mg/kg wet	*0.02500*		*86*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0214*		mg/kg wet	*0.02500*		*85*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0216*		mg/kg wet	*0.02500*		*86*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0231*		mg/kg wet	*0.02500*		*92*	*30-150*			
LCS										
Aroclor 1016	0.5	0.02	mg/kg wet	0.5000		92	40-140			
Aroclor 1016 [2C]	0.5	0.02	mg/kg wet	0.5000		90	40-140			
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		96	40-140			
Aroclor 1260 [2C]	0.5	0.02	mg/kg wet	0.5000		91	40-140			
Surrogate: Decachlorobiphenyl	*0.0224*		mg/kg wet	*0.02500*		*90*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0219*		mg/kg wet	*0.02500*		*87*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0239*		mg/kg wet	*0.02500*		*96*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0240*		mg/kg wet	*0.02500*		*96*	*30-150*			
LCS Dup										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		85	40-140	8	30	
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		82	40-140	10	30	
Aroclor 1260	0.4	0.02	mg/kg wet	0.5000		89	40-140	7	30	
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		85	40-140	7	30	
Surrogate: Decachlorobiphenyl	*0.0208*		mg/kg wet	*0.02500*		*83*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0204*		mg/kg wet	*0.02500*		*82*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0215*		mg/kg wet	*0.02500*		*86*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0214*		mg/kg wet	*0.02500*		*86*	*30-150*			

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements ESS Laboratory Work Order: 22C0182

Notes and Definitions

U	Analyte included in the analysis, but not detected
P	Percent difference between primary and confirmation results exceeds 40% (P).
D	Diluted.
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0182

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

Shipped/Delivered Via: ESS Courier

ESS Project ID: 22C0182
Date Received: 3/4/2022
Project Due Date: 3/11/2022
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: 0.1 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / NA
10. Were any analyses received outside of hold time? Yes / No

11. Any Subcontracting needed? Yes / No
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / No
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA
13. Are the samples properly preserved? Yes / No
    a. If metals preserved upon receipt: Date: Time: By:
    b. Low Level VOA vials frozen: Date: Time: By:

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / No
    a. Was there a need to contact the client? Yes / No
    Who was contacted? Date: Time: By:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	263272	Yes	N/A	Yes	4 oz. Jar	NP	
2	263273	Yes	N/A	Yes	4 oz. Jar	NP	
3	263274	Yes	N/A	Yes	4 oz. Jar	NP	
4	263275	Yes	N/A	Yes	4 oz. Jar	NP	
5	263276	Yes	N/A	Yes	4 oz. Jar	NP	
6	263277	Yes	N/A	Yes	4 oz. Jar	NP	
7	263278	Yes	N/A	Yes	4 oz. Jar	NP	
8	263279	Yes	N/A	Yes	4 oz. Jar	NP	
9	263280	Yes	N/A	Yes	4 oz. Jar	NP	
10	263281	Yes	N/A	Yes	4 oz. Jar	NP	
11	263282	Yes	N/A	Yes	4 oz. Jar	NP	
12	263283	Yes	N/A	Yes	4 oz. Jar	NP	
13	263284	Yes	N/A	Yes	4 oz. Jar	NP	
14	263285	Yes	N/A	Yes	4 oz. Jar	NP	
15	263286	Yes	N/A	Yes	4 oz. Jar	NP	
16	263287	Yes	N/A	Yes	4 oz. Jar	NP	

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

ESS Project ID: 22C0182
Date Received: 3/4/2022

17	263288	Yes	N/A	Yes	4 oz. Jar	NP
18	263289	Yes	N/A	Yes	4 oz. Jar	NP
19	263290	Yes	N/A	Yes	4 oz. Jar	NP
20	263291	Yes	N/A	Yes	4 oz. Jar	NP

2nd Review

Were all containers scanned into storage/lab? Initials [AC]
Are barcode labels on correct containers? Yes / No
Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA
Are all Hex Chrome stickers attached? Yes / No / NA
Are all QC stickers attached? Yes / No / NA
Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: [KZ] Date & Time: 3-4-22 1604

Reviewed By: [DH] Date & Time: 3/4/22 1624

185 Frances Avenue
Cranston, RI 02910
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 22C0182 | Page 3 X of 14 | 5

Turn Time (Days): ☐ >5 ☒ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: MA Criteria:

Is this project for any of the following?: ☐ CT RCP ☐ MA MCP ☐ RGP ☐ Permit ☐ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF)
☐ Limit Checker ☐ State Forms ☐ EQuIS
☐ Excel ☐ State Upload ☐ Enviro Data
☐ CLP-Like Package ☐ Other (Specify) →

CLIENT INFORMATION

Client: BETA Group, Inc.
Address: 701 George Washington Highway
Phone: 401.333.2382
Email Distribution List: Coien@BETA-Inc.com; Malger@BETA-Inc.com; Jmcloughlin@BETA-Inc.com

PROJECT INFORMATION

Project Name: Framingham PS Improvements
Project Location: Framingham
Project Number: 10173.05
Project Manager: Joe McLoughlin
Bill to:
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	PCB (Soxhlet extract)	Total Number of Bottles
1	3-3-22	11:25	Grab	Solid	W-24	X	1
2		11:30			W-21	X	1
3		11:35			W-23	X	1
4		11:40			W-22	X	1
5		14:40			RP-1	X	1
6		14:00			F-9	X	1
7		13:45			W-29	X	1
8		13:40			F-8	X	1
9		13:15			W-30	X	1
10		13:40			W-28	X	1

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial
Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*
Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*

Sampled by :

Chain needs to be filled out neatly and completely for on time delivery.

Laboratory Use Only
Cooler Temperature (°C): 0.1 1.4

Comments: * Please specify "Other" preservative and containers types in this space

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration
☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	3-3-22	16:00	Lincoln Fridge	[signature] 3/4/22	10:45		[signature] 3/4/22 10:45
[signature] 3/4/22		15:10	[signature]				

185 Frances Avenue
Cranston, RI 02910
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 22C0182 | Page 3 & 4 of 5 & 4

Turn Time (Days): ☐ > 5 ☒ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: MA Criteria:

Is this project for any of the following?: ☐ CT RCP ☐ MA MCP ☐ RGP ☐ Permit ☐ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF)
☐ Limit Checker ☐ State Forms ☐ EQuIS
☐ Excel ☐ State Upload ☐ Enviro Data
☐ CLP-Like Package ☐ Other (Specify) →

CLIENT INFORMATION

Client: BETA Group, Inc.
Address: 701 George Washington Highway
Phone: 401.333.2382
Email Distribution List: Coien@BETA-Inc.com; Malger@BETA-Inc.com; Jmcloughlin@BETA-Inc.com

PROJECT INFORMATION

Project Name: Framingham PS Improvements
Project Location: Framingham
Project Number: 10173.05
Project Manager: Joe McLoughlin
Bill to:
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	PCB (soxhlet extract)	Total Number of Bottles
11	3-3-22	13:35	Grab	Solid	W-26	X	1
12		12:20			DUP-1	X	1
13		12:15			W-18	X	1
14		12:20			W-20	X	1
15		13:20			W-24	X	1
16		13:25			W-25	X	1
17		13:30			W-27	X	1
18		12:10			W-13(2-3")	X	1
19		12:05			W-13	X	1
20		12:00			W-14	X	1

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial
Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*
Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*

Sampled by :

Chain needs to be filled out neatly and completely for on time delivery.

Laboratory Use Only
Cooler Temperature (°C): 0.1

Comments: * Please specify "Other" preservative and containers types in this space

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration
☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	3-3-22	16:00	Lincoln Fridge		3/4/22 10:45		3/4/22 10:45
Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
3/4/22		15:10					

CERTIFICATE OF ANALYSIS

Matt Alger
Beta Engineering
124 Main Street, Unit 2GG
Carver, MA 02330

RE: Framingham PS Improvements (10173.05)
ESS Laboratory Work Order Number: 22C0183

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 2:11 pm, Mar 11, 2022

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0183

SAMPLE RECEIPT

The following samples were received on March 04, 2022 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
22C0183-01	W-16	Solid	8082A
22C0183-02	W-15	Solid	8082A
22C0183-03	W-19	Solid	8082A

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0183

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0183

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-16
Date Sampled: 03/03/22 11:55
Percent Solids: 98
Initial Volume: 5.06
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0183
ESS Laboratory Sample ID: 22C0183-01
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 2:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 9:50		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 9:50		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 9:50		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 9:50		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 9:50		DC20716
Aroclor 1254	ND (0.1)		8082A		1	03/09/22 9:50		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 9:50		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 9:50		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 9:50		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*81 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*80 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*75 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*81 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-15
Date Sampled: 03/03/22 11:45
Percent Solids: 98
Initial Volume: 5
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0183
ESS Laboratory Sample ID: 22C0183-02
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 2:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 10:09		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 10:09		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 10:09		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 10:09		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 10:09		DC20716
Aroclor 1254	ND (0.1)		8082A		1	03/09/22 10:09		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 10:09		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 10:09		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 10:09		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*83 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*81 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*83 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*89 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: W-19
Date Sampled: 03/03/22 11:50
Percent Solids: 97
Initial Volume: 5.01
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 22C0183
ESS Laboratory Sample ID: 22C0183-03
Sample Matrix: Solid
Units: mg/kg dry
Analyst: JLG
Prepared: 3/7/22 2:00

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.1)		8082A		1	03/09/22 10:29		DC20716
Aroclor 1221	ND (0.1)		8082A		1	03/09/22 10:29		DC20716
Aroclor 1232	ND (0.1)		8082A		1	03/09/22 10:29		DC20716
Aroclor 1242	ND (0.1)		8082A		1	03/09/22 10:29		DC20716
Aroclor 1248	ND (0.1)		8082A		1	03/09/22 10:29		DC20716
Aroclor 1254	**0.1** (0.1)		8082A		1	03/09/22 10:29		DC20716
Aroclor 1260	ND (0.1)		8082A		1	03/09/22 10:29		DC20716
Aroclor 1262	ND (0.1)		8082A		1	03/09/22 10:29		DC20716
Aroclor 1268	ND (0.1)		8082A		1	03/09/22 10:29		DC20716

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*76 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*74 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*84 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*90 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0183

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DC20716 - 3540C										
Blank										
Aroclor 1016	ND	0.02	mg/kg wet							
Aroclor 1016 [2C]	ND	0.02	mg/kg wet							
Aroclor 1221	ND	0.02	mg/kg wet							
Aroclor 1221 [2C]	ND	0.02	mg/kg wet							
Aroclor 1232	ND	0.02	mg/kg wet							
Aroclor 1232 [2C]	ND	0.02	mg/kg wet							
Aroclor 1242	ND	0.02	mg/kg wet							
Aroclor 1242 [2C]	ND	0.02	mg/kg wet							
Aroclor 1248	ND	0.02	mg/kg wet							
Aroclor 1248 [2C]	ND	0.02	mg/kg wet							
Aroclor 1254	ND	0.02	mg/kg wet							
Aroclor 1254 [2C]	ND	0.02	mg/kg wet							
Aroclor 1260	ND	0.02	mg/kg wet							
Aroclor 1260 [2C]	ND	0.02	mg/kg wet							
Aroclor 1262	ND	0.02	mg/kg wet							
Aroclor 1262 [2C]	ND	0.02	mg/kg wet							
Aroclor 1268	ND	0.02	mg/kg wet							
Aroclor 1268 [2C]	ND	0.02	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.0195*		mg/kg wet	*0.02500*		*78*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0193*		mg/kg wet	*0.02500*		*77*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0210*		mg/kg wet	*0.02500*		*84*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0226*		mg/kg wet	*0.02500*		*90*	*30-150*			
LCS										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		89	40-140			
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		86	40-140			
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		92	40-140			
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		85	40-140			
Surrogate: Decachlorobiphenyl	*0.0204*		mg/kg wet	*0.02500*		*81*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0201*		mg/kg wet	*0.02500*		*80*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0232*		mg/kg wet	*0.02500*		*93*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0234*		mg/kg wet	*0.02500*		*94*	*30-150*			
LCS Dup										
Aroclor 1016	0.4	0.02	mg/kg wet	0.5000		90	40-140	0.09	30	
Aroclor 1016 [2C]	0.4	0.02	mg/kg wet	0.5000		86	40-140	0.1	30	
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		90	40-140	1	30	
Aroclor 1260 [2C]	0.4	0.02	mg/kg wet	0.5000		85	40-140	0.03	30	
Surrogate: Decachlorobiphenyl	*0.0201*		mg/kg wet	*0.02500*		*80*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0197*		mg/kg wet	*0.02500*		*79*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0231*		mg/kg wet	*0.02500*		*93*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0234*		mg/kg wet	*0.02500*		*94*	*30-150*			

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements ESS Laboratory Work Order: 22C0183

Notes and Definitions

U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0183

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

Shipped/Delivered Via: ESS Courier

ESS Project ID: 22C0183
Date Received: 3/4/2022
Project Due Date: 3/11/2022
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: 0.1 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / NA
10. Were any analyses received outside of hold time? Yes / No

11. Any Subcontracting needed? Yes / No
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / No
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? Yes / No
    a. If metals preserved upon receipt: Date: Time: By:
    b. Low Level VOA vials frozen: Date: Time: By:

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / No
    a. Was there a need to contact the client? Yes / No
    Who was contacted? Date: Time: By:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	263292	Yes	N/A	Yes	4 oz. Jar	NP	
2	263293	Yes	N/A	Yes	4 oz. Jar	NP	
3	263294	Yes	N/A	Yes	4 oz. Jar	NP	

2nd Review
Were all containers scanned into storage/lab? Initials TB Yes / No
Are barcode labels on correct containers? Yes / No / NA
Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA
Are all Hex Chrome stickers attached? Yes / No / NA
Are all QC stickers attached? Yes / No / NA
Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: Date & Time: 3/4/22 15:54
Reviewed By: Date & Time: 3/4/22 1601

185 Frances Avenue
Cranston, RI 02921
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 22C0183 | Page 5 of 5

Turn Time: ☐ >5 ☒ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: Criteria:

Is this project for any of the following?:

☐ CT RCP ☐ MA MCP ☐ RGP ☐ Permit ☒ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF)

☐ Limit Checker ☐ State Forms ☐ EQuIS
☐ Excel ☐ Hard Copy ☐ Enviro Data
☐ CLP-Like Package ☐ Other (Specify) →

CLIENT INFORMATION

Client: Beta Group
Address:
Phone:
Email Distribution List:

PROJECT INFORMATION

Project Name: Framingham PS Improvements
Project Location: Framingham
Project Number: 10173.05
Project Manager:
Bill to:
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	PCBs (solvent extract)	Total Number of Bottles
1	3-3-22	11:55	~~Soil~~ Grab	Solid	W-16	X	1
2	3-3-22	11:45	Grab	Solid	W-15	X	1
3	3-3-22	11:50	Grab	Solid	W-19	X	1
→	3-3-22	9:30	~~Wat~~ Grab	Water	Equip-Blank-1	X	2
←		14:30	Grab	Water	RW-1	X	1

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial

Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*

Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*

Sampled by :

Chain needs to be filled out neatly and completely for on time delivery.

Laboratory Use Only

Cooler Temperature (°C): 0.1

Comments: * Please specify "Other" preservative and containers types in this space

only one 1x liter amber for RW-1.

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration ☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	3-3-22	16:00	Lincoln Fridge		3/4/22	10:45	3/4/22 10:45
Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
3/4/22		15:10	Taylor Davis				

CERTIFICATE OF ANALYSIS

Matt Alger
Beta Engineering
124 Main Street, Unit 2GG
Carver, MA 02330

RE: Framingham PS Improvements (10173.05)
ESS Laboratory Work Order Number: 22C0184

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 2:17 pm, Mar 11, 2022

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0184

SAMPLE RECEIPT

The following samples were received on March 04, 2022 for the analyses specified on the enclosed Chain of Custody Record.

Lab Number	Sample Name	Matrix	Analysis
22C0184-01	Equip Blank - 1	Aqueous	8082A
22C0184-02	RW-1	Aqueous	8082A

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0184

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0184

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: Equip Blank - 1
Date Sampled: 03/03/22 09:30
Percent Solids: N/A
Initial Volume: 1070
Final Volume: 1
Extraction Method: 3510C

ESS Laboratory Work Order: 22C0184
ESS Laboratory Sample ID: 22C0184-01
Sample Matrix: Aqueous
Units: ug/L
Analyst: JLG
Prepared: 3/7/22 14:30

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.09)		8082A		1	03/07/22 21:25		DC20724
Aroclor 1221	ND (0.09)		8082A		1	03/07/22 21:25		DC20724
Aroclor 1232	ND (0.09)		8082A		1	03/07/22 21:25		DC20724
Aroclor 1242	ND (0.09)		8082A		1	03/07/22 21:25		DC20724
Aroclor 1248	ND (0.09)		8082A		1	03/07/22 21:25		DC20724
Aroclor 1254	ND (0.09)		8082A		1	03/07/22 21:25		DC20724
Aroclor 1260	ND (0.09)		8082A		1	03/07/22 21:25		DC20724
Aroclor 1262	ND (0.09)		8082A		1	03/07/22 21:25		DC20724
Aroclor 1268	ND (0.09)		8082A		1	03/07/22 21:25		DC20724

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*67 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*66 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*69 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*74 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements
Client Sample ID: RW-1
Date Sampled: 03/03/22 14:30
Percent Solids: N/A
Initial Volume: 100
Final Volume: 1
Extraction Method: 3510C

ESS Laboratory Work Order: 22C0184
ESS Laboratory Sample ID: 22C0184-02
Sample Matrix: Aqueous
Units: ug/L
Analyst: JLG
Prepared: 3/7/22 14:30

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.50)		8082A		1	03/07/22 21:44		DC20724
Aroclor 1221	ND (0.50)		8082A		1	03/07/22 21:44		DC20724
Aroclor 1232	ND (0.50)		8082A		1	03/07/22 21:44		DC20724
Aroclor 1242	ND (0.50)		8082A		1	03/07/22 21:44		DC20724
Aroclor 1248	ND (0.50)		8082A		1	03/07/22 21:44		DC20724
Aroclor 1254 [2C]	**0.78** (0.50)		8082A		1	03/07/22 21:44		DC20724
Aroclor 1260	ND (0.50)		8082A		1	03/07/22 21:44		DC20724
Aroclor 1262	ND (0.50)		8082A		1	03/07/22 21:44		DC20724
Aroclor 1268	ND (0.50)		8082A		1	03/07/22 21:44		DC20724

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*30 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*30 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*51 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*55 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0184

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DC20724 - 3510C										
Blank										
Aroclor 1016	ND	0.05	ug/L							
Aroclor 1016 [2C]	ND	0.05	ug/L							
Aroclor 1221	ND	0.05	ug/L							
Aroclor 1221 [2C]	ND	0.05	ug/L							
Aroclor 1232	ND	0.05	ug/L							
Aroclor 1232 [2C]	ND	0.05	ug/L							
Aroclor 1242	ND	0.05	ug/L							
Aroclor 1242 [2C]	ND	0.05	ug/L							
Aroclor 1248	ND	0.05	ug/L							
Aroclor 1248 [2C]	ND	0.05	ug/L							
Aroclor 1254	ND	0.05	ug/L							
Aroclor 1254 [2C]	ND	0.05	ug/L							
Aroclor 1260	ND	0.05	ug/L							
Aroclor 1260 [2C]	ND	0.05	ug/L							
Aroclor 1262	ND	0.05	ug/L							
Aroclor 1262 [2C]	ND	0.05	ug/L							
Aroclor 1268	ND	0.05	ug/L							
Aroclor 1268 [2C]	ND	0.05	ug/L							
Surrogate: Decachlorobiphenyl	*0.0306*		ug/L	*0.05000*		*61*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0300*		ug/L	*0.05000*		*60*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0272*		ug/L	*0.05000*		*54*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0289*		ug/L	*0.05000*		*58*	*30-150*			
LCS										
Aroclor 1016	0.76	0.05	ug/L	1.000		76	40-140			
Aroclor 1016 [2C]	0.74	0.05	ug/L	1.000		74	40-140			
Aroclor 1260	0.83	0.05	ug/L	1.000		83	40-140			
Aroclor 1260 [2C]	0.79	0.05	ug/L	1.000		79	40-140			
Surrogate: Decachlorobiphenyl	*0.0386*		ug/L	*0.05000*		*77*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0380*		ug/L	*0.05000*		*76*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0354*		ug/L	*0.05000*		*71*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0354*		ug/L	*0.05000*		*71*	*30-150*			
LCS Dup										
Aroclor 1016	0.80	0.05	ug/L	1.000		80	40-140	6	20	
Aroclor 1016 [2C]	0.79	0.05	ug/L	1.000		79	40-140	6	20	
Aroclor 1260	0.85	0.05	ug/L	1.000		85	40-140	3	20	
Aroclor 1260 [2C]	0.82	0.05	ug/L	1.000		82	40-140	3	20	
Surrogate: Decachlorobiphenyl	*0.0375*		ug/L	*0.05000*		*75*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0370*		ug/L	*0.05000*		*74*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0372*		ug/L	*0.05000*		*74*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0371*		ug/L	*0.05000*		*74*	*30-150*			

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements ESS Laboratory Work Order: 22C0184

Notes and Definitions

U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: Beta Engineering
Client Project ID: Framingham PS Improvements

ESS Laboratory Work Order: 22C0184

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Beta Engineering - ML/TB

Shipped/Delivered Via: ESS Courier

ESS Project ID: 22C0184
Date Received: 3/4/2022
Project Due Date: 3/11/2022
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: 0.1 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / NA
10. Were any analyses received outside of hold time? Yes / No

11. Any Subcontracting needed? Yes / No
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / No
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? Yes / No
    a. If metals preserved upon receipt: Date: Time: By:
    b. Low Level VOA vials frozen: Date: Time: By:

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / No
    a. Was there a need to contact the client? Yes / No
    Who was contacted? Date: Time: By:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	263305	Yes	N/A	Yes	1L Amber	NP	
1	263306	Yes	N/A	Yes	1L Amber	NP	
2	263307	Yes	N/A	Yes	1L Amber	NP	

2nd Review
Were all containers scanned into storage/lab? Initials
Are barcode labels on correct containers? Yes / No
Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA
Are all Hex Chrome stickers attached? Yes / No / NA
Are all QC stickers attached? Yes / No / NA
Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: Date & Time: 3/4/22 15:59
Reviewed By: Date & Time: 3/4/22 1602

185 Frances Avenue
Cranston, RI 02921
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS Lab # 220184 | Page 5 of 5

Turn Time: ☐ >5 ☒ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: Criteria:

Is this project for any of the following?: ☐ CT RCP ☐ MA MCP ☐ RGP ☐ Permit ☐ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF)

☐ Limit Checker ☐ State Forms ☐ EQuIS
☐ Excel ☐ Hard Copy ☐ Enviro Data
☐ CLP-Like Package ☐ Other (Specify) →

CLIENT INFORMATION

Client: Beta Group
Address:
Phone:
Email Distribution List:

PROJECT INFORMATION

Project Name: Framingham PS Improvements
Project Location: Framingham
Project Number: 10173.85
Project Manager:
Bill to:
PO#:
Quote#:

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	PCB (synthetic extract)	Total Number of Bottles
—	3-3-22	11:55	Grab	Solid	W-16	X	1
—	3-3-22	11:45	Grab	solid	W-15	X	1
—	3-3-22	11:50	Grab	Solid	W-19	X	1
1	3-3-22	9:30	Grab	Water	Equip-Blank-1	X	2
2		14:30	Grab	Water	RW-1	X	1

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial

Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*

Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*

Sampled by :

Chain needs to be filled out neatly and completely for on time delivery.

Laboratory Use Only

Cooler Temperature (°C): 0.1

Comments: * Please specify "Other" preservative and containers types in this space

only one 1x liter amber for RW-1.

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration: ☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
	3-3-22	16:00	Lincoln Bridge		3/4/22	10:45	
	3/4/22	15:10					

SMITH & WESSEL ASSOCIATES, INC.
HAZARDOUS BUILDING MATERIALS AND AIR QUALITY SPECIALISTS

September 13, 2021

Mr. Joseph McLoughlin II, LSP, LEP
Senior Project Manager
Beta Group, Inc.
6 Blackstone Valley Place # 101
Lincoln, RI 02865-1112

Re: Sampling of Suspect Paints to be analyzed for PCB concentrations at the Pump Station at 730 Worcester Road, Framingham, Massachusetts

Dear Mr. McLoughlin:

On September 1, 2021, Smith & Wessel Associates, Inc. (SWA) was on-site at the Water Pump Station located at 730 Worcester Road in Framingham, Massachusetts. The purpose of the site visit was to collect samples of suspect paints throughout the structure to be analyzed for the presence of polychlorinated biphenyls (PCBs). Previously, in December of 2018, limited PCB bulk sampling was conducted by AECOM Environment of Chelmsford, Massachusetts.

The suspect paints were submitted to New England Testing Laboratory, Inc. (NETLAB) of Warwick, Rhode Island to be analyzed for PCB concentrations. NETLAB analyzed the samples via EPA Method 3540C-8082A Soxhlet.

Analytical results indicate PCB concentrations are present in majority of paints tested exceeding the EPA Regulatory standard of 50 ppm or greater that deems a material a hazardous PCB waste. Only the green wall paint and white ceiling paint were determined to contain PCBs at concentrations <50 ppm.

Results of PCB Sampling

Material sampled/#	**Location** *(estimated quantity)*	**Result (ppm)**
Green wall paint (0901-01)	Basement east wall *(est. 1,860 sf)*	906
Gray pipe paint (0901-02)	Basement middle *(90 lf @ 8' x 12' dia.)*	371
Gray duct paint (0901-03)	Basement at west wall *(11 sf)*	163
Gray stair paint (0901-04)	Basement main north stairs *(1 ea.)*	454
Gray floor paint (0901-05)	Basement near main stairs *(600 sf)*	128
White floor/lip paint (06)	Basement N/W chemical tank section *(245 sf)*	312
Green wall paint (0901-07)	Floor 1 east wall *(1,740 sf)*	35

188 GREENVILLE STREET
SPENCER, MA 01562
TELEPHONE: (978) 346-4800
FAX: (978) 346-7265

Results of PCB Sampling		
Material sampled/#	**Location** *(estimated quantity)*	**Result (ppm)**
Gray/red floor paint (0901-08)	Floor 1 near floor grate *(500 sf)*	321
Green motor paint (0901-09)	Floor 1 middle section *(2 motors)*	396
White ceiling paint (0901-10)	Floor 1 N/E ceiling section *(600 sf)*	20

Any materials containing PCBs equal to or greater than 50 parts per million (ppm) are regulated under the Toxic Substance Control Act and the PCB regulation found at 40 CFR Part 761. Building materials containing PCBs at concentrations greater than 50 ppm are not authorized for use in building products and must be removed and properly disposed of. Further, because PCBs may have leached into surrounding substrates, such as brick, CMU, and cement, or may have degraded and contaminated adjacent soil, assessment of masonry and soils is necessary to determine the extent of PCB contamination. All regulated PCB materials must be disposed in accordance with EPA PCB Regulation 40 CFR part 761, Subpart D. Typically, building materials with low level PCB concentrations also require special handling and disposal in a landfill permitted to accept such waste.

Should you have any questions or require further information, please do not hesitate to contact me.

Respectfully submitted,
Smith & Wessel Associates Inc.

Ted Sherry
Project Manager

APPENDIX A

Certificates of Analysis for PCBs

New England Testing Laboratory, Inc.
(401) 353-3420

REPORT OF ANALYTICAL RESULTS

NETLAB Work Order Number: 1I02023
Client Project: 21381 - 730 Worcester Rd, Framingham

Report Date: 09-September-2021

Prepared for:

Ted Sherry
Smith & Wessel Associates
515 Wildlife Glen
Bradenton, FL 34209

Richard Warila, Laboratory Director
New England Testing Laboratory, Inc.
59 Greenhill Street
West Warwick, RI 02893
rich.warila@newenglandtesting.com

Samples Submitted :

The samples listed below were submitted to New England Testing Laboratory on 09/02/21. The group of samples appearing in this report was assigned an internal identification number (case number) for laboratory information management purposes. The client's designations for the individual samples, along with our case numbers, are used to identify the samples in this report. This report of analytical results pertains only to the sample(s) provided to us by the client which are indicated on the custody record. The case number for this sample submission is 1I02023. Custody records are included in this report.

Lab ID	Sample	Matrix	Date Sampled	Date Received
1I02023-01	0901-01	Solid (Misc)	09/01/2021	09/02/2021
1I02023-02	0901-02	Solid (Misc)	09/01/2021	09/02/2021
1I02023-03	0901-03	Solid (Misc)	09/01/2021	09/02/2021
1I02023-04	0901-04	Solid (Misc)	09/01/2021	09/02/2021
1I02023-05	0901-05	Solid (Misc)	09/01/2021	09/02/2021
1I02023-06	0901-06	Solid (Misc)	09/01/2021	09/02/2021
1I02023-07	0901-07	Solid (Misc)	09/01/2021	09/02/2021
1I02023-08	0901-08	Solid (Misc)	09/01/2021	09/02/2021
1I02023-09	0901-09	Solid (Misc)	09/01/2021	09/02/2021
1I02023-10	0901-10	Solid (Misc)	09/01/2021	09/02/2021

Request for Analysis

At the client's request, the analyses presented in the following table were performed on the samples submitted.

0901-01 (Lab Number: 1I02023-01)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-02 (Lab Number: 1I02023-02)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-03 (Lab Number: 1I02023-03)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-04 (Lab Number: 1I02023-04)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-05 (Lab Number: 1I02023-05)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-06 (Lab Number: 1I02023-06)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-07 (Lab Number: 1I02023-07)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-08 (Lab Number: 1I02023-08)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-09 (Lab Number: 1I02023-09)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

0901-10 (Lab Number: 1I02023-10)

Analysis	Method
PCBs (Soxhlet)	EPA 8082A

Method References

Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, USEPA

Case Narrative

Sample Receipt:

The samples associated with this work order were received in appropriately cooled and preserved containers. The chain of custody was adequately completed and corresponded to the samples submitted.

Exceptions: None

Analysis:

All samples were prepared and analyzed within method specified holding times and according to NETLAB's documented standard operating procedures. The results for the associated calibration, method blank and laboratory control sample (LCS) were within method specified quality control requirements and allowances. Results for all soil samples, unless otherwise indicated, are reported on a dry weight basis. Samples were extracted via EPA 3540C - Soxhlet.

Exceptions:
PCB: Samples "0901-07" and "0901-09" were reported without surrogates due to matrix pattern coelution in retention window of interest.

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-01

Lab Number: 1I02023-01 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1254	**906000**		79900	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		79900	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		79900	ug/kg	09/03/21	09/08/21
PCBs (Total)	**906000**		79900	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*64.7%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*79.9%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-02

Lab Number: 1I02023-02 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1254	**371000**		39300	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		39300	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		39300	ug/kg	09/03/21	09/08/21
PCBs (Total)	**371000**		39300	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*69.6%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*64.6%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-03

Lab Number: 1I02023-03 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1254	**163000**		18800	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		18800	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		18800	ug/kg	09/03/21	09/08/21
PCBs (Total)	**163000**		18800	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*52.8%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*61.8%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-04

Lab Number: 1I02023-04 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1254	**454000**		20400	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		20400	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		20400	ug/kg	09/03/21	09/08/21
PCBs (Total)	**454000**		20400	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*71.8%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*75.7%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-05

Lab Number: 1I02023-05 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1254	**128000**		17800	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		17800	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		17800	ug/kg	09/03/21	09/08/21
PCBs (Total)	**128000**		17800	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*57.5%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*68.3%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-06

Lab Number: 1I02023-06 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1254	**312000**		16700	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		16700	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		16700	ug/kg	09/03/21	09/08/21
PCBs (Total)	**312000**		16700	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*50.0%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*70.9%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-07

Lab Number: 1I02023-07 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1254	**35100**		19400	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		19400	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		19400	ug/kg	09/03/21	09/08/21
PCBs (Total)	**35100**		19400	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-08

Lab Number: 1I02023-08 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1254	**321000**		20300	ug/kg	09/03/21	09/08/21
Aroclor-1260	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		20300	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		20300	ug/kg	09/03/21	09/08/21
PCBs (Total)	**321000**		20300	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*59.4%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*92.2%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-09

Lab Number: 1I02023-09 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		15100	ug/kg	09/03/21	09/08/21
Aroclor-1221	ND		15100	ug/kg	09/03/21	09/08/21
Aroclor-1232	ND		15100	ug/kg	09/03/21	09/08/21
Aroclor-1242	ND		15100	ug/kg	09/03/21	09/08/21
Aroclor-1248	ND		15100	ug/kg	09/03/21	09/08/21
Aroclor-1254	**48800**		15100	ug/kg	09/03/21	09/08/21
Aroclor-1260	**347000**		15100	ug/kg	09/03/21	09/08/21
Aroclor-1262	ND		15100	ug/kg	09/03/21	09/08/21
Aroclor-1268	ND		15100	ug/kg	09/03/21	09/08/21
PCBs (Total)	**396000**		15100	ug/kg	09/03/21	09/08/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*%*	*30-105*	09/03/21	09/08/21

Results: Polychlorinated Biphenyls (PCBs)

Sample: 0901-10

Lab Number: 1I02023-10 (Non-soil solid, as received basis)

Analyte	Result	Qual	Reporting Limit	Units	Date Prepared	Date Analyzed
Aroclor-1016	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1221	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1232	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1242	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1248	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1254	**19900**		1020	ug/kg	09/03/21	09/09/21
Aroclor-1260	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1262	ND		1020	ug/kg	09/03/21	09/09/21
Aroclor-1268	ND		1020	ug/kg	09/03/21	09/09/21
PCBs (Total)	**19900**		1020	ug/kg	09/03/21	09/09/21

Surrogate(s)	Recovery%	Limits		
2,4,5,6-Tetrachloro-m-xylene (TCMX)	*64.8%*	*30-100*	09/03/21	09/08/21
Decachlorobiphenyl (DCBP)	*65.0%*	*30-105*	09/03/21	09/08/21

Quality Control

Polychlorinated Biphenyls (PCBs)

Analyte	Result	Qual	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch: B1I0140 - EPA 3540C										
Blank (B1I0140-BLK1)					Prepared: 09/03/21 Analyzed: 09/07/21					
Aroclor-1016	ND		200	ug/kg						
Aroclor-1221	ND		200	ug/kg						
Aroclor-1232	ND		200	ug/kg						
Aroclor-1242	ND		200	ug/kg						
Aroclor-1248	ND		200	ug/kg						
Aroclor-1254	ND		200	ug/kg						
Aroclor-1260	ND		200	ug/kg						
Aroclor-1262	ND		200	ug/kg						
Aroclor-1268	ND		200	ug/kg						
PCBs (Total)	ND		200	ug/kg						
Surrogate: 2,4,5,6-Tetrachloro-m-xylene (TCMX)			*38.3*	ug/kg	*80.0*		*47.9*	*30-100*		
Surrogate: Decachlorobiphenyl (DCBP)			*42.0*	ug/kg	*80.0*		*52.5*	*30-105*		
LCS (B1I0140-BS1)					Prepared: 09/03/21 Analyzed: 09/07/21					
Aroclor-1016	691		200	ug/kg	1000		69.1	64-112		
Aroclor-1260	817		200	ug/kg	1000		81.7	59.4-124		
Surrogate: 2,4,5,6-Tetrachloro-m-xylene (TCMX)			*48.7*	ug/kg	*80.0*		*60.9*	*30-100*		
Surrogate: Decachlorobiphenyl (DCBP)			*58.6*	ug/kg	*80.0*		*73.2*	*30-105*		
LCS Dup (B1I0140-BSD1)					Prepared: 09/03/21 Analyzed: 09/07/21					
Aroclor-1016	738		200	ug/kg	1000		73.8	64-112	6.50	20
Aroclor-1260	832		200	ug/kg	1000		83.2	59.4-124	1.79	20
Surrogate: 2,4,5,6-Tetrachloro-m-xylene (TCMX)			*49.5*	ug/kg	*80.0*		*61.9*	*30-100*		
Surrogate: Decachlorobiphenyl (DCBP)			*54.8*	ug/kg	*80.0*		*68.5*	*30-105*		

Notes and Definitions

Item	Definition
Wet	Sample results reported on a wet weight basis.
ND	Analyte NOT DETECTED at or above the reporting limit.

Site: Worcester Rd Pump Station

730 Worcester Rd, Framingham, MA Project # 21381

		Location
0901-01	Green Wall Paint	Basement - East Wall
0901-02	Gray Pipe Paint	Basement - Middle
0901-03	Gray Duct Paint	Basement - At west wall
0901-04	Gray Stair Paint	Basement - Main Stairs (North)
0901-05	Gray Floor Paint	Basement - Near Main Stairs
0901-06	White Floor/Lip Paint	Basement - Chem Tank section
0901-07	Green Wall Paint	Floor 1 - East wall
0901-08	Gray/Red Floor Paint	Floor 1 - Near Floor grate
0901-09	Green Motor Paint	Floor 1 - Middle Section
0901-10	White Ceiling Paint	Floor 1 - N/E ceiling section

Chain-of-custody

Relinquished by Ted Sherry Date 9/2/21 Time 7AM

Received by Bill Wood Date 9-2-21 Time 1115

Bill Wood 9.2.21/1400

Analysis requested: *

Turnaround time 5-Day

Total # of samples 10

* **Analysis for PCBs via EPA's SW-846 Method 3540C/8082 SOXHLET Extraction**

MassDEP Analytical Protocol Certification Form

Laboratory Name: New England Testing Laboratory, Inc. Project #: 21381

Project Location: Framingham, MA RTN:

This Form provides certifications for the following data set: list Laboratory Sample ID Number(s): 1I02023

Matrices: ☐ Groundwater/Surface Water ☐ Soil/Sediment ☐ Drinking Water ☐ Air ☒ Other: Solid

CAM Protocol (check all that apply below):

8260 VOC CAM II A ☐	7470/7471 Hg CAM III B ☐	MassDEP VPH (GC/PID/FID) CAM IV A ☐	8082 PCB CAM V A ☒	9014 Total Cyanide/PAC CAM VI A ☐	6860 Perchlorate CAM VIII B ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	MassDEP VPH (GC/MS) CAM IV C ☐	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	MassDEP APH CAM IX A ☐
6010 Metals CAM III A ☐	6020 Metals CAM III D ☐	MassDEP EPH CAM IV B ☐	8151 Herbicides CAM V C ☐	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐

Affirmative Responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☒ Yes ☐ No
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	☒ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☒ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	☒ Yes ☐ No
E	VPH, EPH, APH, and TO-15 only a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	☒ Yes ☐ No

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☒ Yes ☐ No[1]

***Data User Note:** Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.*

H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	☒ Yes ☐ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☒ Yes ☐ No[1]

[1] *All negative responses must be addressed in an attached laboratory narrative.*

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, is accurate and complete.

Signature: _____ **Position:** Laboratory Director

Printed Name: Richard Warila **Date**: 9/9/2021

APPENDIX B

Photographs

Worcester Road Pumping Station – Framingham, MA

	
Pump Station view	Gray duct paint
	
Gray pipe paint	Gray stair system paint
	
Chemical tank section	Floor 1 floor paint & general view

Worcester Road Pumping Station – Framingham, MA

Floor 1 green motor paint

Floor 1 white painted ceiling

Basement general view

Environment

Prepared for:
Framingham DPW
110 Western Avenue
Framingham, MA 01702

Prepared by:
AECOM
250 Apollo Drive
Chelmsford, MA 01824

December 14, 2018

AECOM Project: 60588483

Limited Hazardous Building Materials Survey Summary Report

Worcester Road Pumping Station
730 Worcester Road
Framingham, Massachusetts 01702

Table of Contents

Figures

Tables

Appendices

1.0 INTRODUCTION

1.1 General

AECOM Technical Services, Inc. (AECOM) conducted a limited pre-demolition hazardous building materials survey of select target areas at the Worcester Road Pumping Station located in Framingham, Massachusetts (the "Facility") to support future selective demolition as part of the Walnut Street Pump Station and Sewers – Project I. The survey was completed on October 31, 2018 and included an assessment of accessible suspect asbestos-containing materials (ACM) and polychlorinated biphenyl-(PCB) containing materials located in targeted interior and exterior areas of the Facility.

1.2 Statement of Purpose

The purpose of this assessment was to explore for the presence of building materials potentially containing asbestos and PCBs that will require proper removal, handling, and disposal prior to upcoming planned selective demolition. The extent of the exploration is identified on **Figure 1,** Sample Location Plan. An inventory of the materials identified and sampled was also developed. This report documents the findings of the limited hazardous materials survey associated with the selective demolition of the Facility.

1.3 Methodology and Limiting Conditions

The Facility was operational at the time of the exploration. Findings and opinions presented in this report reflect the observations of accessible suspect hazardous building materials present on the date of the exploration.

During AECOM's survey, reasonable efforts were made to locate and sample building materials representative of the Facility that are proposed to be affected by the upcoming selective demolition activities; however, the potential exists for unique or concealed hazardous building materials or debris to be present. The survey conducted by AECOM consisted of a walkthrough of targeted areas, including visual observations of materials subject to proposed selective demolition activities, as well as the collection of building material samples suspected of containing asbestos and PCBs. AECOM's survey was limited to specific components proposed for selective demolition, if such components were suspected of containing asbestos or PCBs. This included collecting samples representative of the following: painted surfaces of wastewater piping and pumping components, observed coatings on the interior surfaces of the wetwell, and sealants around one pipe opening (chemical tank vent pipe through exterior wall). The survey did not include factory coatings since industry practice at the time precluded use of PCB-containing paint. Since wall, ceiling and floor paint, window and other caulking and other building materials are not part of selective demolition, such areas were not sampled for asbestos and PCBs, but may contain these and other hazardous components.

The City of Framingham, Massachusetts should be aware that it is common practice to collect additional bulk samples during actual abatement or demolition activities when hidden suspect hazardous building materials are encountered. Should non-sampled suspect hazardous building materials be identified during future demolition or renovation activities, these materials should be sampled and tested to determine proper handling and disposal requirements.

2.0 ASBESTOS-CONTAINING MATERIAL SURVEY

2.1 Survey Description

On October 31, 2018, AECOM's Massachusetts-licensed Asbestos Inspector conducted a survey of accessible wetwell interior coating material as suspect ACM in general accordance with U.S. Environmental Protection Agency's (USEPA) National Emission Standard for Hazardous Air Pollutants (NESHAP) and Asbestos Hazard Emergency Response Act (AHERA) sampling protocols. AECOM

collected a total of two (2) bulk samples using stainless steel hand tools and wet methods. The wetwell interior coating samples were placed in a polyethylene sample bag, sealed, and labeled. Sampling tools were decontaminated after use with wet wipes and dry cloths. Collected samples were submitted under chain-of-custody procedures to Optimum Analytical and Consulting (Optimum) of Salem, New Hampshire for asbestos fiber analysis via polarized light microscopy (PLM) with dispersion staining (PLM/DS) techniques in accordance with EPA Method 600/M4-82-020 with visual area estimate (VAE) techniques (EPA 600/R-93/116). The approximate locations of suspect ACM samples collected for asbestos analysis are depicted on **Figure 1.**

Optimum is fully accredited to perform bulk asbestos sample analysis under the National Voluntary Laboratory Accreditation Program (NVLAP) administered by the National Institute of Standards and Technology (NIST). Samples were handled and stored in a manner so as to maintain their integrity and are routinely retained for a period of 90 days after results are reported to allow for any desired analytical follow-up and/or re-analysis. Site photographs are provided in **Appendix A**.

2.2 Findings

The Commonwealth of Massachusetts has established a level equal to or greater than one percent (≥1%) asbestos content for a material to be considered to be asbestos-containing. PLM analysis results did not identify any asbestos-containing materials in the wetwell coating sample.

A summary of observed suspect ACM and laboratory analysis results are presented in **Table 1,** and a copy of the laboratory analytical data report is provided in **Appendix B**.

3.0 POLYCHLORINATED BIPHENYLS SURVEY

3.1 PCB Sealant and Coating Survey

On October 31, 2018, AECOM performed a survey for polychlorinated biphenyls (PCBs) in building materials at select portions of the Facility which are proposed to be affected by the upcoming selective demolition work. These materials were observed for color, composition, and location to evaluate the number of different material types present. Three potential PCB-containing materials were identified: pipe penetration sealant, gray painted piping and a black wall coating. Two samples were collected from each of the suspect homogenous materials, for a total of six samples. The approximate locations of samples collected for PCB analysis are depicted on **Figure 1.**

The samples collected during the field survey were delivered under chain-of-custody protocol to Con-Test Analytical Laboratory (Con-Test) of East Longmeadow, Massachusetts for analysis of PCBs using EPA Methods SW-846 3540C/8082. A limited data quality review was conducted of the laboratory PCB results, which confirmed that the data may be used for decision-making purposes. Site photographs are provided in **Appendix A.**

3.2 Findings

PCBs are regulated under the federal Toxic Substances Control Act (TSCA) 40 CFR §761. Under TSCA 40 CFR§761.62, PCBs present in building material products (i.e., materials intentionally manufactured with PCBs) at concentrations greater than 50 milligram per kilogram (mg/kg) are classified as *PCB Bulk Product Waste* (BPW). There are regulatory requirements pertaining to management and disposal of BPW, and abatement may be required prior to demolition.

PCBs were detected in two of the six samples submitted for analysis. PCBs were detected at 720 mg/kg and 820 mg/kg in the two samples representing the gray paint on the piping system located on the Pump Level. As these concentrations exceed 50 mg/kg, this material is classified as BPW.

Building material sample results are presented on **Table 2** and analytical laboratory reports are provided in **Appendix C**.

4.0 CONCLUSIONS

AECOM provided services to explore the presence of asbestos and PCBs in building materials representative of the Facility that are proposed to be affected by the upcoming selective demolition activities. AECOM's conclusions are provided below.

4.1 Asbestos-Containing Materials (ACM)

Laboratory results did not identify materials containing greater than one percent asbestos in the wetwell coating sample.

4.2 Polychlorinated Biphenyls (PCBs)

PCBs in building materials are regulated under the federal Toxic Substances Control Act (TSCA) 40 § CFR 761.62. PCB building material containing ≥ 50 mg/kg PCBs is regulated as BPW and cannot be left in-place (it is not an authorized use under 40 CFR §761.30). Laboratory results indicated that one of the building materials tested (gray paint on piping) contained regulated levels of PCBs which classifies this material as BPW. The sampling results are provided in **Table 2**.

Based on the results of this survey, it is AECOM's opinion that the following items be addressed as part of any future selective demolition activities at the Facility that could potentially disturb regulated PCB-containing building materials (gray painted piping):

1. Remediate Site PCB BPW in accordance with the TSCA *Performance-Based Disposal* (40 CFR§761.62).

2. Identified PCB-containing waste materials must be properly disposed of at a disposal facility that is permitted, licensed, or registered by a state or EPA to accept this waste. The selected receiving facility must be notified of the presence and levels of PCBs in the waste material. The receiving facility will likely require Toxicity Characteristic Leaching Procedure (TCLP) testing of the waste stream.

3. Concrete pads and concrete piping supports to be removed that are in contact with PCB-containing building materials should be disposed as presumptive BPW.

4. PCB-containing building materials should be removed from piping and appurtenances to remain and properly disposed. This would include, but not be limited to the portions of piping from the wall face to proposed watertight caps.

5. Completion of a summary report documenting the PCB BPW abatement is required, which includes a narrative of the project activities; photo documentation; characterization and waste profile sampling results; laboratory reports; an estimate of the waste volume disposed; copies of manifests and/or bills of lading; and copies of certificates of disposal issued by the receiving facility. This summary document is for the clients' records and should be retained by the City of Framingham for at least 5 years, per 40 CFR§761.125(c) (Spill Cleanup Policy), as cited in 40 CFR§761.61(a)(9).

6. Since the survey completed by AECOM was limited to components subject to selective demolition and did not include widespread sampling of painted surfaces, caulking and other building materials, the City of Framingham should complete a more comprehensive investigation as part of future plans to renovate or repurpose the existing pump station building and appurtenances.

AECOM appreciates the opportunity to assist the City of Framingham with this project. If you have any questions, please do not hesitate to contact Project Manager, Mr. Joe Boccadoro at (978) 905-2127.

Sincerely,
AECOM Technical Services, Inc.

Patrick Guglielmo
Scientist IV – Safety, Health & Environment

Marybeth Hayes
Project Manager, TSCA Lead

Joseph M. Boccadoro, PE
Project Manager

AECOM

FIGURE 1

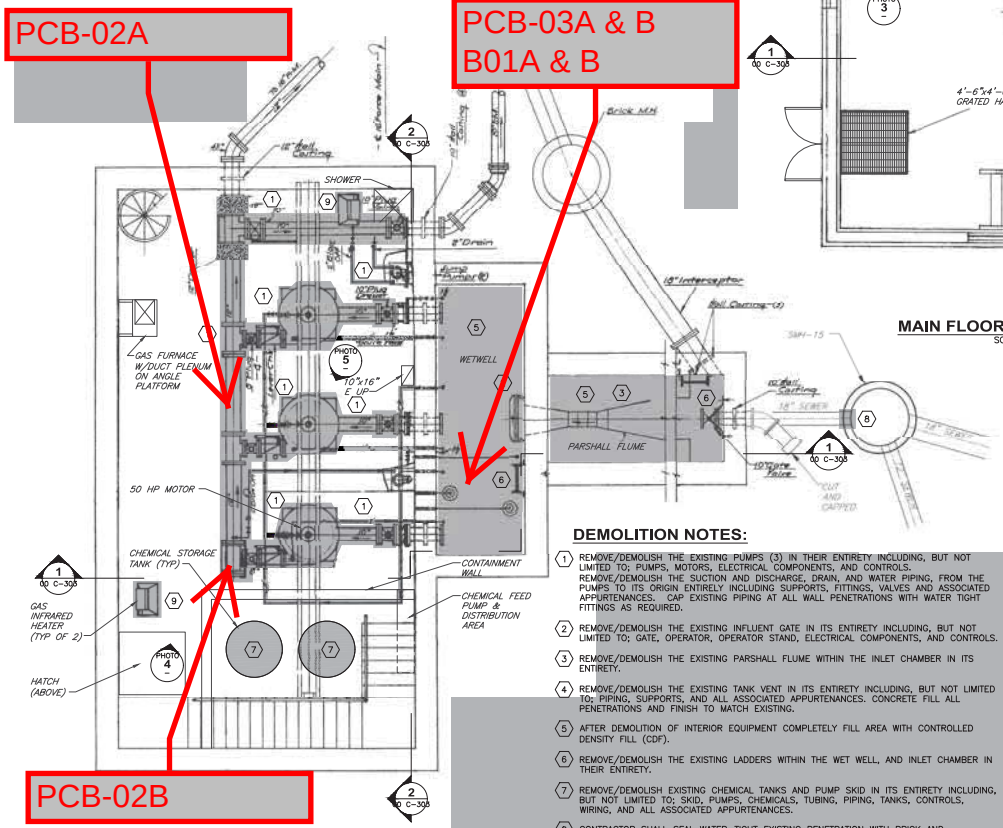
PHOTO 1 PR-3
PARSHALL FLUME

PHOTO 2 –
MAIN FLOOR
EXISTING CONDITIONS

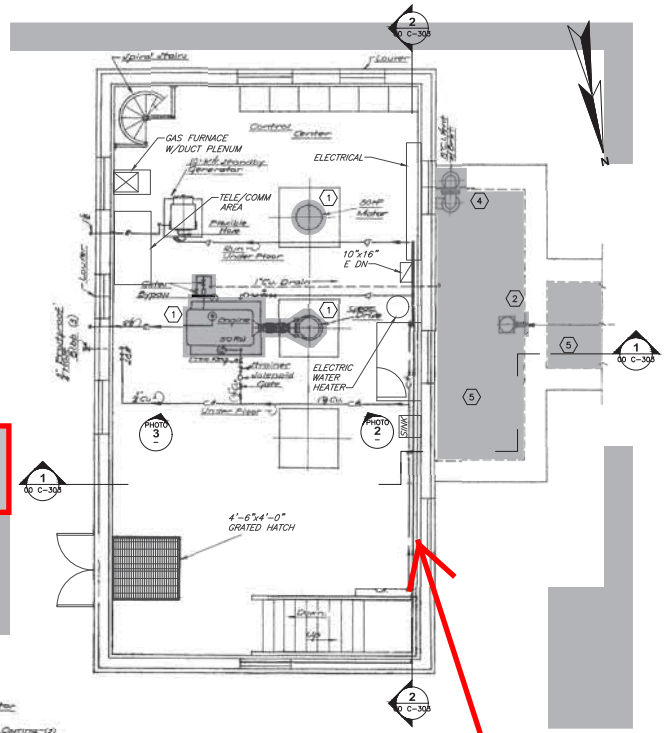
PHOTO 3 –
MAIN FLOOR
EXISTING CONDITIONS

PHOTO 4 –
PUMP LEVEL
EXISTING CONDITIONS

PHOTO 5 –
PUMP LEVEL
EXISTING CONDITIONS



PUMP LEVEL DEMOLITION PLAN
SCALE: SCANNED



MAIN FLOOR DEMOLITION PLAN
SCALE: SCANNED

DEMOLITION NOTES:

1. REMOVE/DEMOLISH THE EXISTING PUMPS (3) IN THEIR ENTIRETY INCLUDING, BUT NOT LIMITED TO; PUMPS, MOTORS, ELECTRICAL COMPONENTS, AND CONTROLS. REMOVE/DEMOLISH THE SUCTION AND DISCHARGE, DRAIN, AND WATER PIPING, FROM THE PUMPS TO ITS ORIGIN ENTIRELY INCLUDING SUPPORTS, FITTINGS, VALVES AND ASSOCIATED APPURTENANCES. CAP EXISTING PIPING AT ALL WALL PENETRATIONS WITH WATER TIGHT FITTINGS AS REQUIRED.
2. REMOVE/DEMOLISH THE EXISTING INFLUENT GATE IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO; GATE, OPERATOR, OPERATOR STAND, ELECTRICAL COMPONENTS, AND CONTROLS.
3. REMOVE/DEMOLISH THE EXISTING PARSHALL FLUME WITHIN THE INLET CHAMBER IN ITS ENTIRETY.
4. REMOVE/DEMOLISH THE EXISTING TANK VENT IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO; PIPING, SUPPORTS, AND ALL ASSOCIATED APPURTENANCES. CONCRETE FILL ALL PENETRATIONS AND FINISH TO MATCH EXISTING.
5. AFTER DEMOLITION OF INTERIOR EQUIPMENT COMPLETELY FILL AREA WITH CONTROLLED DENSITY FILL (CDF).
6. REMOVE/DEMOLISH THE EXISTING LADDERS WITHIN THE WET WELL, AND INLET CHAMBER IN THEIR ENTIRETY.
7. REMOVE/DEMOLISH EXISTING CHEMICAL TANKS AND PUMP SKID IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO; SKID, PUMPS, CHEMICALS, TUBING, PIPING, TANKS, CONTROLS, WIRING, AND ALL ASSOCIATED APPURTENANCES.
8. CONTRACTOR SHALL SEAL WATER-TIGHT EXISTING PENETRATION WITH BRICK AND NON-SHRINK GROUT.
9. REMOVE/DEMOLISH EXISTING GAS INFRARED HEATER IN ITS ENTIRETY INCLUDING, BUT NOT LIMITED TO; HEATER, SUPPORTS, PIPING, VALVES, WIRING, CONDUIT, AND ALL ASSOCIATED APPURTENANCES.

NOTES:

1. FOR GENERAL NOTES, LEGEND, AND ABBREVIATIONS REFER TO DWG 00 C-001.
2. CONTRACTOR TO NOTE A SCANNED IMAGE OF THE EXISTING CONTRACT DRAWINGS HAS BEEN USED FOR WORCESTER ROAD PUMP STATION DEMOLITION. EXISTING INFORMATION HAS BEEN FADED BACK FOR CLARITY. CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO BIDDING AND/OR COMMENCING CONSTRUCTION. FOR INFORMATION PERTAINING TO EXISTING CONTRACT DRAWINGS, REFER TO THE DEMOLITION GENERAL NOTES DRAWING 00 C-301.
3. FOR ADDITIONAL DEMOLITION, REFER TO CIVIL DRAWINGS.
4. EXISTING PIPING THAT IS TO BE ABANDONED IN PLACE SHALL BE FILLED WITH CLSM.
5. THE PAINT ON PUMPS AND PIPING CONTAINS LEAD. REMOVAL AND DISPOSAL SHALL BE IN ACCORDANCE WITH ALL FEDERAL, STATE & LOCAL REGULATIONS.
6. THE EXISTING BUILDING HAS ASBESTOS IN THE FOLLOWING LOCATIONS:
   - 6.1. WINDOW GLAZING AND CAULKING
   - 6.2. VENT COVER CAULKING
   - 6.3. ROOFING MATERIALS

   THESE AREAS ARE NOT TO BE DISTURBED DURING CONSTRUCTION.

AECOM

PROJECT
WORCESTER ROAD PUMP STATION ELIMINATION

CLIENT
City of Framingham, MA

CONSULTANT
AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

Figure 1
Sample
Location Plan

REGISTRATION

60% SUBMITTAL
PRELIMINARY COPY
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ISSUE/REVISION

I/R	DATE	DESCRIPTION

PROJECT NUMBER
60545792

Designed By:	A. ANGLES
Drawn By:	M. CURRAN
Dept Check:	C. BENZIGER
Proj Check:	J. BOCCADORO
Date:	JULY 2018
Scale:	AS NOTED

DISCIPLINE
CIVIL
SHEET TITLE
WORCESTER ROAD PUMP STATION DEMOLITION PLAN
SHEET NUMBER
00 C-302

PATH/FILENAME: P:\60545792 - WORCESTER ROAD PS ELIMINATION\PROJECT\SHEETS\00\00 C-302.DWG
LAST UPDATE: Monday, July 16, 2018 2:05:30 PM
PLOT DATE: Tuesday, July 17, 2018 2:04:13 PM

TABLES

Table 1: Bulk Sample Summary of Suspect Asbestos-Containing Materials Worcester Road Pumping Station - Framingham, Massachusetts 01702		
Sample ID	**Material Description / Location**	**Results**
B01A	Black Wall Coating / Interior Wall of Wet Well	ND
B01B	Black Wall Coating / Interior Wall of Wet Well	ND

ND - No Asbestos Detected (<1% Asbestos Fibers)

Table 2: Summary of PCB Concentrations in Sealant and Coating Samples
Worcester Road Pumping Station - Framingham, Massachusetts 01702

Sample ID	Material Description / Location	Total PCB Concentration (mg/kg)	Action Level (mg/kg)*
PCB-01A	White Pipe Penetration Sealant / Main Floor, Northwest Area	ND (<0.78)	50
PCB-01B	White Pipe Penetration Sealant / Main Floor, Northwest Area	ND (<0.71)	50
PCB-02A	Gray Paint / Pump Level, Pump System Piping	**820**	50
PCB-02B	Gray Paint / Pump Level, Pump System Piping	**720**	50
PCB-03A	Black Wall Coating / Interior Wall of Wet Well	ND (<0.97)	50
PCB-03B	Black Wall Coating / Interior Wall of Wet Well	ND (<0.91)	50

* - TSCA Criteria: A building material product such as sealant or paint containing ≥ 50 mg/kg total PCBs is classified as PCB Bulk Product Waste and is regulated under EPA TSCA regulations (40 CFR 761.62). Sealant or paint containing <50 mg/kg total PCBs is classified as Excluded PCB Product and is not regulated by TSCA.

ND – Not detected at specified quantitation limit.

Values shown in Bold and Shaded exceed the listed action level.

mg/kg - milligrams per kilogram

APPENDICES

APPENDIX A

SITE PHOTOGRAPHS

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Town of Framingham, Massachusetts	730 Worcester Road, Framingham, MA 01702	60588483

Photo No.	Date:
1	10-31-18

Direction Photo Taken:

Southeast

Description:

Main Entrance

Photo No.	Date:
2	10-31-18

Direction Photo Taken:

West

Description:

White Pipe Penetration Sealant

Sample:
PCB-01A & B

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Town of Framingham, Massachusetts	730 Worcester Road, Framingham, MA 01702	60588483

Photo No.	Date:
3	10-31-18

Direction Photo Taken:

West

Description:

White Pipe Penetration Sealant

Sample:
PCB-01A & B

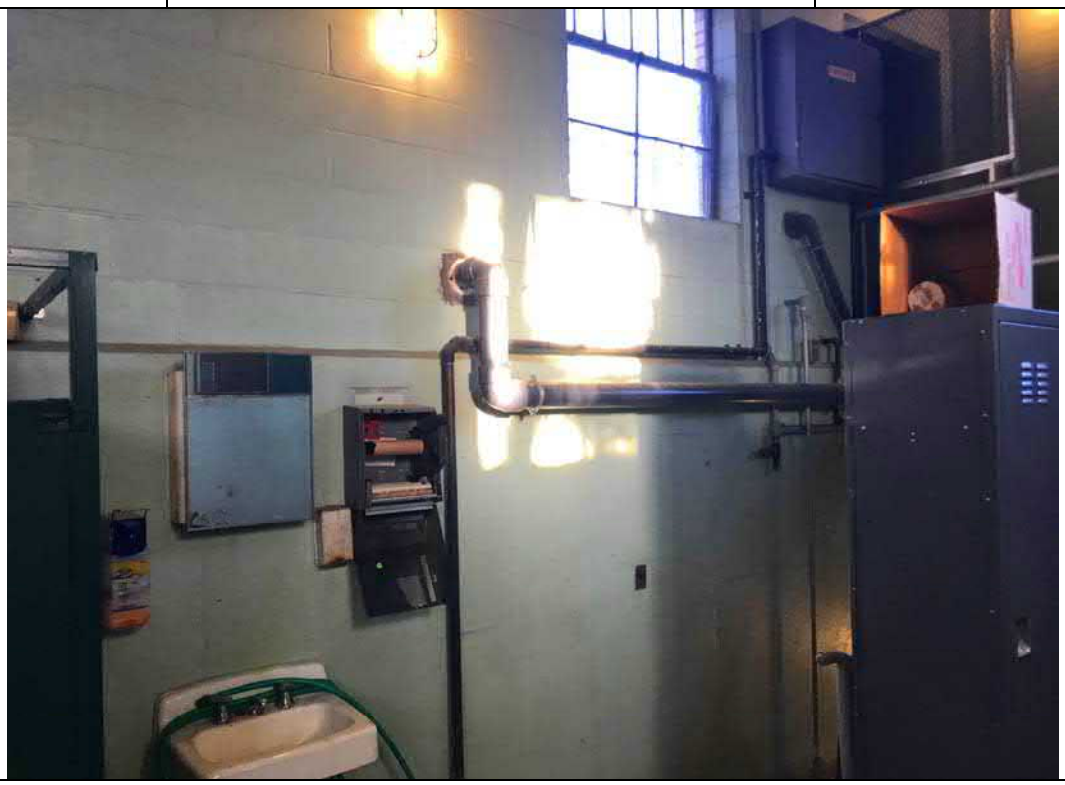

Photo No.	Date:
4	10-31-18

Direction Photo Taken:

West

Description:

Gray Paint

Pump Level, Pump System Piping

Sample:
PCB-02A

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Town of Framingham, Massachusetts	730 Worcester Road, Framingham, MA 01702	60588483

Photo No.	Date:
5	10-31-18

Direction Photo Taken:

West

Description:

Gray Paint

Pump Level, Pump System Piping

Sample:
PCB-02A

Photo No.	Date:
6	10-31-18

Direction Photo Taken:

West

Description:

Gray Paint

Pump Level, Pump System Piping

Sample:
PCB-02B

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Town of Framingham, Massachusetts	730 Worcester Road, Framingham, MA 01702	60588483

Photo No.	Date:
7	10-31-8

Direction Photo Taken:

West

Description:

Gray Paint

Pump Level, Pump System Piping

Sample:
PCB-02B

Photo No.	Date:
8	10-31-18

Direction Photo Taken:

East

Description:

Exterior, Wet Well

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Town of Framingham, Massachusetts	730 Worcester Road, Framingham, MA 01702	60588483

Photo No.	Date:
9	10-31-18

Direction Photo Taken:

West

Description:

Exterior, Wet Well, Looking Inside

Sample:
PCB-03A & B
BO1A & B (Asbestos)

Photo No.	Date:
10	10-31-18

Direction Photo Taken:

West

Description:

Exterior, Wet Well, Looking Inside

Sample:
PCB-03A & B
BO1A & B (Asbestos)

APPENDIX B

ANALYTICAL DATA REPORT
SUSPECT BULK SAMPLES FOR ASBESTOS

OPTIMUM
Analytical and Consulting, LLC

85 Stiles Road, Suite 201
Salem, NH 03079
603-458-5247

Brian Vailancourt
AECOM
1155 Elm St. Suite 401
Manchester NH 03101

Project Reference:	60588483-Task 10
Laboratory Batch #:	1827436
Date Samples Received:	11/01/2018
Date Samples Analyzed:	11/05/2018
Date of Final Report:	11/05/2018

SAMPLE IDENTIFICATION:

Two (2) samples from Worcester Road Pumping Station; 730 Worcester Rd., Framingham, MA project were submitted by Patrick Guglielmo on 11/01/2018

This bulk sample(s) was delivered to Optimum Analytical Consulting, LLC (Optimum) located in Salem, New Hampshire for asbestos content determination.

ANALYTICAL METHOD:

Analytical procedures were performed in accordance with the U.S. Environmental Protection Agency (EPA) Recommended Method for the Determination of Asbestos in Bulk Samples by Polarized Light Microscopy and Dispersion Staining (PLM/DS)(EPA-600/M4-82-020, EPA-600/ R-93-116). This report relates only to those samples analyzed, and may not be indicative of other similar appearing materials existing at this, or other sites. Quantification of asbestos content was determined by Calibrated Visual Estimation. Optimum is not responsible for sample collection activities or analytical method limitations. The laboratory is not responsible for the accuracy of results when requested to physically separate and analyze layered samples.

In any given material, fibers with a small diameter (<0.25µm) may not be detected by the PLM method. Floor tile and other resinously bound material may yield a false negative if the asbestos fibers are too small to be resolved using PLM. Additional analytical methods may be required. Optimum recommends using Transmission Electron Microscopy (TEM) for a more definitive analysis.

Optimum will retain all samples for a minimum of three months. Further analysis or return of samples must be requested within this three month period to guarantee their availability. This report may not be reproduced except in full, without the written approval of Optimum Analytical and Consulting, LLC.

Use of the NVLAP and AIHA Logo in no way constitutes or implies product certification, approval, or endorsement by the National Institute of Standards and Technology or the American Industrial Hygiene Association.

Detection Limit <1%, Reporting Limits: CVES = 1%, 400 Point Count = .25%, 1000 Point Count = 0.1%; Present or Absent are observations made during a qualitative analysis.

This report is considered preliminary until signed by both the Laboratory Analyst and Laboratory Director or Supervisor. If you have any questions regarding this report, please do not hesitate to contact us.

Jamie L. Noel
Laboratory Director

Kristina Scaviola
Laboratory Supervisor

NVLAP Lab ID#: 101433-0

OPTIMUM
Analytical and Consulting, LLC
85 Stiles Road, Suite 201, Salem, NH 03079 Phone: (603)-458-5247

BULK SAMPLE ANALYSIS REPORT POLARIZED LIGHT MICROSCOPY

PLM (EPA-600/M4-82-020, EPA-600/ R-93-116) NVLAP Lab Code: 101433-0

CLIENT:	AECOM	**ORDER #:**	1827436
ADDRESS:	1155 Elm St. Suite 401	**PROJECT #:**	60588483-Task 10
CITY / STATE / ZIP:	Manchester NH 03101	**DATE COLLECTED:**	10/31/2018
CONTACT:	Brian Vailancourt	**COLLECTED BY:**	Patrick Guglielmo
DESCRIPTION:	PLM Analysis	**DATE RECEIVED:**	11/01/2018
LOCATION:	Worcester Road Pumping Station; 730 Worcester Rd., Framingham, MA	**ANALYSIS DATE:**	11/05/2018
		REPORT DATE:	11/05/2018
		ANALYST:	Lauren Oakes

REPORT OF ANALYSIS

Laboratory ID Sample No.	Sample Location Description	Layer No. Layer %	Asbestos Type	(%)	Non-Asbestos Components	(%)
1827436-001 B01A	Interior Wall of Wet Well Wall Coating, Black	LAYER 1 100%	None Detected		Cellulose Fiber Non-Fibrous Material	2% 98%
		Total % Asbestos:	No Asbestos Detected		**Total % Non-Asbestos:**	100.0%
1827436-002 B01B	Interior Wall of Wet Well Wall Coating, Black	LAYER 1 100%	None Detected		Cellulose Fiber Non-Fibrous Material	2% 98%
		Total % Asbestos:	No Asbestos Detected		**Total % Non-Asbestos:**	100.0%

Analyst Signatory: Lauren Oakes

Lauren Oakes

NVLAP® Lab Code: 101433-0

OPTIMUM
Analytical and Consulting, LLC
85 Stiles Road, Suite 201, Salem, NH 03079 Phone: (603)-458-5247

BULK SAMPLE ANALYSIS REPORT
POLARIZED LIGHT MICROSCOPY

PLM (EPA-600/M4-82-020, EPA-600/ R-93-116) NVLAP Lab Code: 101433-0

CLIENT:	AECOM
ADDRESS:	1155 Elm St. Suite 401
CITY / STATE / ZIP:	Manchester NH 03101
CONTACT:	Brian Vailancourt
DESCRIPTION:	PLM Analysis
LOCATION:	Worcester Road Pumping Station; 730 Worcester Rd., Framingham, MA

ORDER #:	1827436
PROJECT #:	60588483-Task 10
DATE COLLECTED:	10/31/2018
COLLECTED BY:	Patrick Guglielmo
DATE RECEIVED:	11/01/2018
ANALYSIS DATE:	11/05/2018
REPORT DATE:	11/05/2018
ANALYST:	Lauren Oakes

1827436

AECOM

AECOM TECHNICAL SERVICES, INC.
ASBESTOS BULK CHAIN OF CUSTODY

Date: 10/31/18

PROJECT NAME: Worcester Road Pumping Station
PROJECT NUMBER: 60588483, Task 10
SITE ADDRESS: 730 Worcester Road, Framingham, MA
REPORT TO: Patrick.Guglielmo@AECOM.com
PROJECT MANAGER: Brian Vailancourt
SAMPLER: Patrick Guglielmo
SAMPLER LICENSE: On File
TAT: ASAP 3Hour 24 Hour (48 Hour) Standard
POSITIVE STOP: (YES) NO

SAMPLE ID	SAMPLE DESCRIPTION	SAMPLE LOCATION	QUANTITY
B01A	Black Wall Coating	Interior wall of Wet Well	
B01B	↓	↓	

RELINQUISHED BY: (SIGNATURE)	TIME:	DATE:	RECEIVED BY: (SIGNATURE)	TIME:	DATE:
	4:05P	11/1/18		8:00	11/1/18
RELINQUISHED BY (SIGNATURE)	TIME:	DATE:	RECEIVED BY: (SIGNATURE)	TIME:	DATE:

1 Of 1

APPENDIX C

ANALYTICAL DATA REPORT
PCB SAMPLE RESULTS

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

November 9, 2018

Joe Boccadoro
AECOM - NH
1155 Elm Street, Suite 401
Manchester, NH 03101

Project Location: 730 Worcester Rd., Framingham, MA
Client Job Number:
Project Number: 605884.83.Task 10 - Worcester Rd. Pump Station
Laboratory Work Order Number: 18J1531

Enclosed are results of analyses for samples received by the laboratory on October 31, 2018. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Aaron L. Benoit
Project Manager

Table of Contents

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

AECOM - NH
1155 Elm Street, Suite 401
Manchester, NH 03101
ATTN: Joe Boccadoro

REPORT DATE: 11/9/2018

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 605884.83.Task 10 - Worcester Rd. Pump Statio

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 18J1531

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: 730 Worcester Rd., Framingham, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
PCB-01A	18J1531-01	Caulk	white pipe penetration sealant	SW-846 8082A	
PCB-01B	18J1531-02	Caulk	white pipe penetration sealant	SW-846 8082A	
PCB-02A	18J1531-03	Paint	gray paint/pump piping	SW-846 8082A	
PCB-02B	18J1531-04	Paint	gray paint/pump piping	SW-846 8082A	
PCB-03A	18J1531-05	Product/Solid	black tank coating interior	SW-846 8082A	
PCB-03B	18J1531-06	Product/Solid	black tank coating interior	SW-846 8082A	

con-test® ANALYTICAL LABORATORY

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

SW-846 8082A

Qualifications:

DL-03

Elevated reporting limit due to matrix.

Analyte & Samples(s) Qualified:

18J1531-05[PCB-03A], 18J1531-06[PCB-03B]

O-32

A dilution was performed as part of the standard analytical procedure.

Analyte & Samples(s) Qualified:

18J1531-01[PCB-01A], 18J1531-02[PCB-01B]

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

Decachlorobiphenyl
18J1531-03[PCB-02A], 18J1531-04[PCB-02B]

Decachlorobiphenyl [2C]
18J1531-03[PCB-02A], 18J1531-04[PCB-02B]

Tetrachloro-m-xylene
18J1531-03[PCB-02A], 18J1531-04[PCB-02B]

Tetrachloro-m-xylene [2C]
18J1531-03[PCB-02A], 18J1531-04[PCB-02B]

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Tod E. Kopyscinski
Laboratory Director

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 730 Worcester Rd., Framingham, Sample Description: white pipe penetration sealant Work Order: 18J1531

Date Received: 10/31/2018

Field Sample #: PCB-01A Sampled: 10/31/2018 08:05

Sample ID: 18J1531-01

Sample Matrix: Caulk

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1221 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1232 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1242 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1248 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1254 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1260 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1262 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG
Aroclor-1268 [1]	ND	0.78	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 15:50	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	90.7	30-150		11/8/18 15:50
Decachlorobiphenyl [2]	97.4	30-150		11/8/18 15:50
Tetrachloro-m-xylene [1]	86.5	30-150		11/8/18 15:50
Tetrachloro-m-xylene [2]	92.7	30-150		11/8/18 15:50

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 730 Worcester Rd., Framingham, Sample Description: white pipe penetration sealant Work Order: 18J1531

Date Received: 10/31/2018

Field Sample #: PCB-01B Sampled: 10/31/2018 08:05

Sample ID: 18J1531-02

Sample Matrix: Caulk

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1221 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1232 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1242 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1248 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1254 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1260 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1262 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG
Aroclor-1268 [1]	ND	0.71	mg/Kg	4		SW-846 8082A	11/6/18	11/8/18 16:08	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	77.4	30-150		11/8/18 16:08
Decachlorobiphenyl [2]	82.1	30-150		11/8/18 16:08
Tetrachloro-m-xylene [1]	72.7	30-150		11/8/18 16:08
Tetrachloro-m-xylene [2]	77.2	30-150		11/8/18 16:08

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 730 Worcester Rd., Framingham, Sample Description: gray paint/pump piping Work Order: 18J1531

Date Received: 10/31/2018

Field Sample #: PCB-02A Sampled: 10/31/2018 09:15

Sample ID: 18J1531-03

Sample Matrix: Paint

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1221 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1232 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1242 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1248 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1254 [1]	820	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1260 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1262 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL
Aroclor-1268 [1]	ND	46	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 22:53	WAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	11/6/18 22:53
Decachlorobiphenyl [2]	*	30-150	S-01	11/6/18 22:53
Tetrachloro-m-xylene [1]	*	30-150	S-01	11/6/18 22:53
Tetrachloro-m-xylene [2]	*	30-150	S-01	11/6/18 22:53

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 730 Worcester Rd., Framingham, Sample Description: gray paint/pump piping Work Order: 18J1531

Date Received: 10/31/2018

Field Sample #: PCB-02B Sampled: 10/31/2018 09:30

Sample ID: 18J1531-04

Sample Matrix: Paint

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1221 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1232 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1242 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1248 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1254 [1]	720	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1260 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1262 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL
Aroclor-1268 [1]	ND	47	mg/Kg	100		SW-846 8082A	11/1/18	11/6/18 23:11	WAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	*	30-150	S-01	11/6/18 23:11
Decachlorobiphenyl [2]	*	30-150	S-01	11/6/18 23:11
Tetrachloro-m-xylene [1]	*	30-150	S-01	11/6/18 23:11
Tetrachloro-m-xylene [2]	*	30-150	S-01	11/6/18 23:11

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 730 Worcester Rd., Framingham, Sample Description: black tank coating interior Work Order: 18J1531

Date Received: 10/31/2018

Field Sample #: PCB-03A Sampled: 10/31/2018 10:00

Sample ID: 18J1531-05

Sample Matrix: Product/Solid

Sample Flags: DL-03

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1221 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1232 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1242 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1248 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1254 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1260 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1262 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH
Aroclor-1268 [1]	ND	0.97	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:11	AYH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	79.8	30-150		11/6/18 20:11
Decachlorobiphenyl [2]	110	30-150		11/6/18 20:11
Tetrachloro-m-xylene [1]	72.4	30-150		11/6/18 20:11
Tetrachloro-m-xylene [2]	78.2	30-150		11/6/18 20:11

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Project Location: 730 Worcester Rd., Framingham, Sample Description: black tank coating interior Work Order: 18J1531

Date Received: 10/31/2018

Field Sample #: PCB-03B Sampled: 10/31/2018 10:00

Sample ID: 18J1531-06

Sample Matrix: Product/Solid

Sample Flags: DL-03

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1221 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1232 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1242 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1248 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1254 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1260 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1262 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH
Aroclor-1268 [1]	ND	0.91	mg/Kg	10		SW-846 8082A	11/2/18	11/6/18 20:24	AYH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	85.6	30-150		11/6/18 20:24
Decachlorobiphenyl [2]	137	30-150		11/6/18 20:24
Tetrachloro-m-xylene [1]	90.6	30-150		11/6/18 20:24
Tetrachloro-m-xylene [2]	94.8	30-150		11/6/18 20:24

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Sample Extraction Data

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J1531-01 [PCB-01A]	B216457	0.513	10.0	11/06/18
18J1531-02 [PCB-01B]	B216457	0.563	10.0	11/06/18

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J1531-03 [PCB-02A]	B216229	0.218	10.0	11/01/18
18J1531-04 [PCB-02B]	B216229	0.212	10.0	11/01/18

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J1531-05 [PCB-03A]	B216277	2.06	10.0	11/02/18
18J1531-06 [PCB-03B]	B216277	2.19	10.0	11/02/18

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B216229 - SW-846 3540C										
Blank (B216229-BLK1)				Prepared: 11/01/18 Analyzed: 11/06/18						
Aroclor-1016	ND	0.50	mg/Kg							
Aroclor-1016 [2C]	ND	0.50	mg/Kg							
Aroclor-1221	ND	0.50	mg/Kg							
Aroclor-1221 [2C]	ND	0.50	mg/Kg							
Aroclor-1232	ND	0.50	mg/Kg							
Aroclor-1232 [2C]	ND	0.50	mg/Kg							
Aroclor-1242	ND	0.50	mg/Kg							
Aroclor-1242 [2C]	ND	0.50	mg/Kg							
Aroclor-1248	ND	0.50	mg/Kg							
Aroclor-1248 [2C]	ND	0.50	mg/Kg							
Aroclor-1254	ND	0.50	mg/Kg							
Aroclor-1254 [2C]	ND	0.50	mg/Kg							
Aroclor-1260	ND	0.50	mg/Kg							
Aroclor-1260 [2C]	ND	0.50	mg/Kg							
Aroclor-1262	ND	0.50	mg/Kg							
Aroclor-1262 [2C]	ND	0.50	mg/Kg							
Aroclor-1268	ND	0.50	mg/Kg							
Aroclor-1268 [2C]	ND	0.50	mg/Kg							
Surrogate: Decachlorobiphenyl	*9.54*		mg/Kg	10.0		95.4	30-150			
Surrogate: Decachlorobiphenyl [2C]	*10.1*		mg/Kg	10.0		101	30-150			
Surrogate: Tetrachloro-m-xylene	*9.57*		mg/Kg	10.0		95.7	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*9.78*		mg/Kg	10.0		97.8	30-150			
LCS (B216229-BS1)				Prepared: 11/01/18 Analyzed: 11/06/18						
Aroclor-1016	2.3	0.50	mg/Kg	2.50		93.0	40-140			
Aroclor-1016 [2C]	2.6	0.50	mg/Kg	2.50		102	40-140			
Aroclor-1260	2.5	0.50	mg/Kg	2.50		99.9	40-140			
Aroclor-1260 [2C]	2.5	0.50	mg/Kg	2.50		98.4	40-140			
Surrogate: Decachlorobiphenyl	*9.66*		mg/Kg	10.0		96.6	30-150			
Surrogate: Decachlorobiphenyl [2C]	*10.1*		mg/Kg	10.0		101	30-150			
Surrogate: Tetrachloro-m-xylene	*9.69*		mg/Kg	10.0		96.9	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*9.90*		mg/Kg	10.0		99.0	30-150			
LCS Dup (B216229-BSD1)				Prepared: 11/01/18 Analyzed: 11/06/18						
Aroclor-1016	2.4	0.50	mg/Kg	2.50		96.5	40-140	3.74	30	
Aroclor-1016 [2C]	2.7	0.50	mg/Kg	2.50		107	40-140	4.96	30	
Aroclor-1260	2.4	0.50	mg/Kg	2.50		96.4	40-140	3.63	30	
Aroclor-1260 [2C]	2.5	0.50	mg/Kg	2.50		101	40-140	2.22	30	
Surrogate: Decachlorobiphenyl	*9.49*		mg/Kg	10.0		94.9	30-150			
Surrogate: Decachlorobiphenyl [2C]	*10.1*		mg/Kg	10.0		101	30-150			
Surrogate: Tetrachloro-m-xylene	*9.76*		mg/Kg	10.0		97.6	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*9.89*		mg/Kg	10.0		98.9	30-150			

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B216277 - SW-846 3540C										
Blank (B216277-BLK1)				Prepared: 11/02/18 Analyzed: 11/06/18						
Aroclor-1016	ND	0.10	mg/Kg							
Aroclor-1016 [2C]	ND	0.10	mg/Kg							
Aroclor-1221	ND	0.10	mg/Kg							
Aroclor-1221 [2C]	ND	0.10	mg/Kg							
Aroclor-1232	ND	0.10	mg/Kg							
Aroclor-1232 [2C]	ND	0.10	mg/Kg							
Aroclor-1242	ND	0.10	mg/Kg							
Aroclor-1242 [2C]	ND	0.10	mg/Kg							
Aroclor-1248	ND	0.10	mg/Kg							
Aroclor-1248 [2C]	ND	0.10	mg/Kg							
Aroclor-1254	ND	0.10	mg/Kg							
Aroclor-1254 [2C]	ND	0.10	mg/Kg							
Aroclor-1260	ND	0.10	mg/Kg							
Aroclor-1260 [2C]	ND	0.10	mg/Kg							
Aroclor-1262	ND	0.10	mg/Kg							
Aroclor-1262 [2C]	ND	0.10	mg/Kg							
Aroclor-1268	ND	0.10	mg/Kg							
Aroclor-1268 [2C]	ND	0.10	mg/Kg							
Surrogate: Decachlorobiphenyl	*0.999*		mg/Kg	1.00		99.9	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.983*		mg/Kg	1.00		98.3	30-150			
Surrogate: Tetrachloro-m-xylene	*0.929*		mg/Kg	1.00		92.9	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.948*		mg/Kg	1.00		94.8	30-150			
LCS (B216277-BS1)				Prepared: 11/02/18 Analyzed: 11/06/18						
Aroclor-1016	1.1	0.10	mg/Kg	1.00		109	40-140			
Aroclor-1016 [2C]	1.1	0.10	mg/Kg	1.00		108	40-140			
Aroclor-1260	1.1	0.10	mg/Kg	1.00		107	40-140			
Aroclor-1260 [2C]	1.1	0.10	mg/Kg	1.00		106	40-140			
Surrogate: Decachlorobiphenyl	*1.03*		mg/Kg	1.00		103	30-150			
Surrogate: Decachlorobiphenyl [2C]	*1.01*		mg/Kg	1.00		101	30-150			
Surrogate: Tetrachloro-m-xylene	*0.966*		mg/Kg	1.00		96.6	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.984*		mg/Kg	1.00		98.4	30-150			
LCS Dup (B216277-BSD1)				Prepared: 11/02/18 Analyzed: 11/06/18						
Aroclor-1016	1.1	0.10	mg/Kg	1.00		109	40-140	0.751	30	
Aroclor-1016 [2C]	1.1	0.10	mg/Kg	1.00		108	40-140	0.00137	30	
Aroclor-1260	1.1	0.10	mg/Kg	1.00		105	40-140	1.35	30	
Aroclor-1260 [2C]	1.1	0.10	mg/Kg	1.00		105	40-140	0.997	30	
Surrogate: Decachlorobiphenyl	*0.984*		mg/Kg	1.00		98.4	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.967*		mg/Kg	1.00		96.7	30-150			
Surrogate: Tetrachloro-m-xylene	*0.945*		mg/Kg	1.00		94.5	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.967*		mg/Kg	1.00		96.7	30-150			

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B216457 - SW-846 3540C										
Blank (B216457-BLK1)				Prepared: 11/06/18 Analyzed: 11/08/18						
Aroclor-1016	ND	0.19	mg/Kg							
Aroclor-1016 [2C]	ND	0.19	mg/Kg							
Aroclor-1221	ND	0.19	mg/Kg							
Aroclor-1221 [2C]	ND	0.19	mg/Kg							
Aroclor-1232	ND	0.19	mg/Kg							
Aroclor-1232 [2C]	ND	0.19	mg/Kg							
Aroclor-1242	ND	0.19	mg/Kg							
Aroclor-1242 [2C]	ND	0.19	mg/Kg							
Aroclor-1248	ND	0.19	mg/Kg							
Aroclor-1248 [2C]	ND	0.19	mg/Kg							
Aroclor-1254	ND	0.19	mg/Kg							
Aroclor-1254 [2C]	ND	0.19	mg/Kg							
Aroclor-1260	ND	0.19	mg/Kg							
Aroclor-1260 [2C]	ND	0.19	mg/Kg							
Aroclor-1262	ND	0.19	mg/Kg							
Aroclor-1262 [2C]	ND	0.19	mg/Kg							
Aroclor-1268	ND	0.19	mg/Kg							
Aroclor-1268 [2C]	ND	0.19	mg/Kg							
Surrogate: Decachlorobiphenyl	*3.15*		mg/Kg	3.86		81.6	30-150			
Surrogate: Decachlorobiphenyl [2C]	*3.26*		mg/Kg	3.86		84.6	30-150			
Surrogate: Tetrachloro-m-xylene	*2.95*		mg/Kg	3.86		76.6	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*2.88*		mg/Kg	3.86		74.6	30-150			
LCS (B216457-BS1)				Prepared: 11/06/18 Analyzed: 11/08/18						
Aroclor-1016	2.5	0.18	mg/Kg	3.61		68.8	40-140			
Aroclor-1016 [2C]	2.6	0.18	mg/Kg	3.61		71.3	40-140			
Aroclor-1260	2.5	0.18	mg/Kg	3.61		69.8	40-140			
Aroclor-1260 [2C]	2.6	0.18	mg/Kg	3.61		72.5	40-140			
Surrogate: Decachlorobiphenyl	*2.85*		mg/Kg	3.61		79.0	30-150			
Surrogate: Decachlorobiphenyl [2C]	*2.96*		mg/Kg	3.61		82.0	30-150			
Surrogate: Tetrachloro-m-xylene	*2.70*		mg/Kg	3.61		74.8	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*2.62*		mg/Kg	3.61		72.5	30-150			
LCS Dup (B216457-BSD1)				Prepared: 11/06/18 Analyzed: 11/08/18						
Aroclor-1016	2.2	0.19	mg/Kg	3.73		59.8	40-140	10.6	30	
Aroclor-1016 [2C]	2.3	0.19	mg/Kg	3.73		62.1	40-140	10.5	30	
Aroclor-1260	2.3	0.19	mg/Kg	3.73		60.9	40-140	10.3	30	
Aroclor-1260 [2C]	2.3	0.19	mg/Kg	3.73		62.5	40-140	11.5	30	
Surrogate: Decachlorobiphenyl	*2.47*		mg/Kg	3.73		66.1	30-150			
Surrogate: Decachlorobiphenyl [2C]	*2.56*		mg/Kg	3.73		68.6	30-150			
Surrogate: Tetrachloro-m-xylene	*2.39*		mg/Kg	3.73		64.1	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*2.35*		mg/Kg	3.73		62.9	30-150			

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

PCB-02A

Lab Sample ID: 18J1531-03 Date(s) Analyzed: 11/06/2018 11/06/2018

Instrument ID (1): ECD4 Instrument ID (2): ECD4

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1254	1	0.000	0.000	0.000	820	
	2	0.000	0.000	0.000	760	7.6

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

PCB-02B

Lab Sample ID: 18J1531-04 Date(s) Analyzed: 11/06/2018 11/06/2018

Instrument ID (1): ECD4 Instrument ID (2): ECD4

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1254	1	0.000	0.000	0.000	720	
	2	0.000	0.000	0.000	690	4.3

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B216229-BS1 Date(s) Analyzed: 11/06/2018 11/06/2018

Instrument ID (1): ECD4 Instrument ID (2): ECD4

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	2.3	
	2	0.000	0.000	0.000	2.6	12.2
Aroclor-1260	1	0.000	0.000	0.000	2.5	
	2	0.000	0.000	0.000	2.5	0.0

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B216229-BSD1 Date(s) Analyzed: 11/06/2018 11/06/2018

Instrument ID (1): ECD4 Instrument ID (2): ECD4

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	2.4	
	2	0.000	0.000	0.000	2.7	11.8
Aroclor-1260	1	0.000	0.000	0.000	2.4	
	2	0.000	0.000	0.000	2.5	4.1

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B216277-BS1 Date(s) Analyzed: 11/06/2018 11/06/2018

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	1.1	
	2	0.000	0.000	0.000	1.1	0.0
Aroclor-1260	1	0.000	0.000	0.000	1.1	
	2	0.000	0.000	0.000	1.1	0.0

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B216277-BSD1 Date(s) Analyzed: 11/06/2018 11/06/2018

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	1.1	
	2	0.000	0.000	0.000	1.1	0.0
Aroclor-1260	1	0.000	0.000	0.000	1.1	
	2	0.000	0.000	0.000	1.1	0.0

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B216457-BS1 Date(s) Analyzed: 11/08/2018 11/08/2018

Instrument ID (1): ECD1 Instrument ID (2): ECD1

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	2.5	
	2	0.000	0.000	0.000	2.6	3.9
Aroclor-1260	1	0.000	0.000	0.000	2.5	
	2	0.000	0.000	0.000	2.6	3.9

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B216457-BSD1 Date(s) Analyzed: 11/08/2018 11/08/2018

Instrument ID (1): ECD1 Instrument ID (2): ECD1

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	2.2	
	2	0.000	0.000	0.000	2.3	4.4
Aroclor-1260	1	0.000	0.000	0.000	2.3	
	2	0.000	0.000	0.000	2.3	0.0

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
DL-03	Elevated reporting limit due to matrix.
O-32	A dilution was performed as part of the standard analytical procedure.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8082A in Product/Solid	
Aroclor-1016	CT,NH,NY,ME,NC,VA
Aroclor-1016 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1221	CT,NH,NY,ME,NC,VA
Aroclor-1221 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1232	CT,NH,NY,ME,NC,VA
Aroclor-1232 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1242	CT,NH,NY,ME,NC,VA
Aroclor-1242 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1248	CT,NH,NY,ME,NC,VA
Aroclor-1248 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1254	CT,NH,NY,ME,NC,VA
Aroclor-1254 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1260	CT,NH,NY,ME,NC,VA
Aroclor-1260 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1262	NY,NC,VA
Aroclor-1262 [2C]	NY,NC,VA
Aroclor-1268	NY,NC,VA
Aroclor-1268 [2C]	NY,NC,VA

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	03/1/2020
MA	Massachusetts DEP	M-MA100	06/30/2019
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2019
NY	New York State Department of Health	10899 NELAP	04/1/2019
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2019
RI	Rhode Island Department of Health	LAO00112	12/30/2018
NC	North Carolina Div. of Water Quality	652	12/31/2018
NJ	New Jersey DEP	MA007 NELAP	06/30/2019
FL	Florida Department of Health	E871027 NELAP	06/30/2019
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2019
ME	State of Maine	2011028	06/9/2019
VA	Commonwealth of Virginia	460217	12/14/2018
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2019
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2019
NC-DW	North Carolina Department of Health	25703	07/31/2019

18J1531

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ALB

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Fax: 413-525-6405
Email: info@contestlabs.com

http://www.contestlabs.com

CHAIN OF CUSTODY RECORD

Doc # 381 Rev 1_03242017

39 Spruce Street
East Longmeadow, MA 01028

Page 1 of 1

Company Name: AECOM
Address: 1155 Elm St, Suite 401, Manchester, NH
Phone: 603-812-6803
Project Name: Worcester Road (Cutler) Pumping Station
Project Location: 730 Worcester Road, Framingham, MA
Project Number: 60588483, Task 10
Project Manager: Joe Boccadoro
Con-Test Quote Name/Number:
Invoice Recipient: Joe.Boccadoro@AECOM.com
Sampled By: Patrick Guglielmo

Requested Turnaround Time
7-Day [X] 10-Day [ ]
Due Date:

Rush-Approval Required
1-Day [ ] 3-Day [ ]
2-Day [ ] 4-Day [ ]

Data Delivery
Format: PDF [X] EXCEL [X]
Other:
CLP Like Data Pkg Required: [ ]
Email To: Joe.Boccadoro@AECOM.com
Fax To #:

# of Containers: 1
Preservation Code: I
Container Code: A

ANALYSIS REQUESTED: PCBs

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	Composite	Grab	Matrix Code	Conc Code	PCBs
1	PCB-01A-White pipe penetration sealant	10/3/18	8:05A		X	SOL	U	X
2	01B-	↓	8:05A		X	SOL	U	X
3	02A-Gray paint/Pump Piping	↓	9:15A		X	O	U	X
4	02B-	↓	9:30A		X	O	U	X
5	03A-Black tank coating interior	↓	10:00A		X	SOL	U	X
6	03B-	↓	10:00A		X	SOL	U	X

Comments:
~~Hold "B" samples pending results of "A" samples & authorization from AECOM.~~
-Also Email Results to Patrick.Guglielmo@AECOM.com

Relinquished by: (signature) [signature] 10/3/18	Date/Time: 2:00p
Received by: (signature) [signature]	Date/Time: 1400 10-31-18
Relinquished by: (signature) [signature]	Date/Time: 10-31-18 1640
Received by: (signature) [signature] 2.4	Date/Time: 10-31-18 1640
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

[1] **Matrix Codes:**
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define) Paint

[2] **Preservation Codes:**
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

[3] **Container Codes:**
A = Amber Glass
G = Glass
P = Plastic
ST = Sterile
V = Vial
S = Summa Canister
T = Tedlar Bag
O = Other (please define)

Please use the following codes to indicate possible sample concentration within the **Conc Code** column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

Detection Limit Requirements
MA
CT
Other

Special Requirements
[ ] MA MCP Required
MCP Certification Form Required
[ ] CT RCP Required
RCP Certification Form Required
[ ] MA State DW Required
PWSID #

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NELAC and AIHA-LAP, LLC Accredited

Project Entity
[ ] Government [ ] Municipality [ ] MWRA [ ] WRTA
[ ] Federal [ ] 21 J [ ] School
[ ] City [ ] Brownfield [ ] MBTA

Other
[ ] Chromatogram
[ ] AIHA-LAP, LLC

PCB ONLY
[X] Soxhlet
[ ] Non Soxhlet

I Have Not Confirmed Sample Container Numbers With Lab Staff Before Relinquishing Over Samples_____

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Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client AECOM

Received By LR Date 10-31-18 Time 1640

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____ Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 557 Actual Temp - 2.4 By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? NA Were Samples Tampered with? NA

Was COC Relinquished ? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all pertinent Information? Client T Project T Analysis T ID's T Sampler Name T Collection Dates/Times T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F Who was notified? _____

Are there Rushes? F Who was notified? _____

Are there Short Holds? F Who was notified? _____

Is there enough Volume? T

Is there Headspace where applicable? NA MS/MSD? F

Proper Media/Containers Used? T Is splitting samples required? F

Were trip blanks received? F On COC? F

Do all samples have the proper pH? NA Acid _____ Base _____

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	6
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

May 30, 2013
File No. 86640.03

Mr. Kevin Olson, PE
Wright-Pierce
40 Shattuck Road Suite 305
Andover, MA 01810

Re: Hazardous Materials Inspection Report
Worcester Road Pump Station, Framingham, Massachusetts

Dear Mr. Olson:

Nobis Engineering, Inc. (Nobis) prepared this Inspection Report to identify asbestos containing materials (ACM) and lead based paint (LBP) at the pump station buildings located on Kittredge Road and Worcester Road in Framingham, Massachusetts. Nobis understands that the stations will be decommissioned as part of a new pump station construction project.

The Kittredge Road pump station is an underground "tin can" style pump station located approximately 20 feet below ground surface. Access to the pump station is gained from an entrance tube with a permanent ladder. This station is a confined space.

The Worcester Road pump station is a two-story (ground floor and basement) concrete and brick building with a flat tar and gravel roof and basement. The wet well and weir associated with this station is located and is accessed from outside of the pump station structure.

SCOPE OF WORK

Inspection activities were outlined in the Hazardous Materials Survey proposal submitted to Wright-Pierce on March 13, 2013. This survey was designed to assess the presence of ACM and LBP located throughout the pump stations. Inspection tasks included the following:

- Locate, quantify, and assess the general condition of ACM located throughout the Site buildings and collect bulk samples of suspect ACM for laboratory for testing.

- Locate, quantify, and assess the general condition of LBP located throughout the buildings by paint chip sampling and testing as required by the Occupational Safety and Health Administration (OSHA) regulations for demolition and worker safety characterization.

Nobis Engineering, Inc.
585 Middlesex Street
Lowell, MA 01851
T (978) 683-0891

The following scope of work limitations are noted for the inspection:

- Nobis did not excavate soil cover to inspect the exterior of the tin can type pump station.
- Roofing materials were sampled from a ladder on the ground. Nobis did not climb onto the roof; therefore Nobis did not collect samples of materials that were inaccessible from the ladder (i.e. possible vent sealants, etc).
- Nobis did not inspect the interior of equipment, controls, or electrical banks.
- Nobis did not inspect interior areas of the wet well. Observations of the wet well were made from the manway on the ground surface.
- At the request of the client, Nobis did not core through the roof to identify all possible roofing layers. Nobis did however sample two layers of roofing material accessible from the ladder without causing damage to the roof structure.
- Additional inspection, sampling, or analysis of air, water, soil, PCBs, or any other regulated or hazardous materials was beyond the scope of this inspection.

Additional limitations to this report are included as Appendix A.

INSPECTION ACTIVITIES

Nobis was on-site May 8, 2013 to perform the inspection activities listed above. Nobis subcontracted EFI Global of Wilmington, Massachusetts to conduct the lead inspection and paint chip sampling at both pump stations. Due to the confined space nature of the tin can pump station, Nobis contracted EFI Global to perform the ACM inspection at the Kittredge Road pump station as well.

Nobis inspected the Worcester Road pump station for the presence of ACM. Results of the inspection are presented in the following sections.

Asbestos Containing Materials (ACM) Inspection Results

Massachusetts regulations require that multiple samples be collected from homogeneous areas identified throughout the buildings to properly identify asbestos content in suspect ACM. Homogeneous areas consist of areas which appear to be similar with regards to material color, texture, and date of installation or application. Homogeneous bulk samples were analyzed using the “hit-stop” procedure. According to this procedure, additional duplicate samples collected from identical homogeneous areas are not required to be analyzed if asbestos is detected in one of the samples.

Kittredge Road Pump Station

EFI Global did not observe suspect ACM at this location; therefore, ACM samples were not collected from the Kittredge Road pump station.

Worcester Road Pump Station

Massachusetts-certified asbestos inspector Jeff Brunelle (AI00090) collected 35 bulk samples from suspect ACM identified throughout the Worcester Road pump station building. Samples were analyzed by polarized light microscopy (PLM) in accordance with the United States Environmental Protection Agency (EPA) "Method for Determination of Asbestos in Bulk Material"; EPA/600/R-93/116 (July 1993). Bulk samples were transmitted under a chain-of-custody to EMSL Analytical, Inc., an accredited Massachusetts-certified laboratory located at 7 Constitution Way, Suite 107 in Woburn, Massachusetts.

29 bulk samples of suspect ACM were analyzed by PLM (6 samples were omitted by the hit-stop procedure). Asbestos was detected in three of the samples submitted for PLM analysis.

Five non-organically bound (NOB) materials (roofing, mastics, caulking) that tested negative for asbestos by PLM were submitted for TEM analysis to confirm analytical results. Asbestos was detected in one of the NOB samples submitted for TEM analysis, but with results less than 1 percent asbestos (trace). Massachusetts regulations state that materials with trace amounts of asbestos do not have specific abatement needs; however, regulations require proper disposal of materials with any level of asbestos.

In addition, Massachusetts Policy #BWP-96-012 specifically details removal, handling, and disposal exemptions for asphalt based roofing material. If policy conditions are met, abatement of the asphalt based roofing may be exempt from certain MassDEP regulations, including abatement notification and some special handling requirements.

Asbestos samples that tested positive for the presence of asbestos are presented in Table 1. Asbestos samples that returned negative results for the presence of asbestos are presented in Table 2. Figure 1 depicts sampling locations. Laboratory analytical data for asbestos bulk sampling is included as Appendix B.

Lead Based Paint Survey Results

EFI Global completed a lead paint screening of painted surfaces located throughout both pump stations. Lead screening results are used to calculate worker exposure levels for OSHA compliance and to assess lead levels for proper handling and disposal during demolition.

Building components were tested for LBP by collecting paint chip samples from representative painted/coated building components for analysis of lead by Atomic Absorption Spectrometry using EPA Method 7420. Paint chip sampling results are presented in units of percent lead by

weight and compared to the EPA residential standard of 0.50 percent lead. According to EPA, concentrations of lead detected above this standard are considered LBP, however the OSHA Lead in Construction Standard (29 CFR 1926.62) considers any detectable level of lead to be a potential for exposure to workers if dust is generated from the disturbance of surfaces coated with paint containing lead. Therefore, any painted surfaces containing lead at any concentration that will be disturbed during renovation or demolition activities must be handled as LBP.

Paint chip sampling results are presented in Table 3. Refer to EFI's Hazardous Materials Consulting Services report in Appendix C for specific screening values for each building component tested.

Kittredge Road Pump Station

Lead was not detected above 0.50 percent by weight in any of the samples collected from the Kittredge Road tin can pump station.

Worcester Road Pump Station

Lead was detected above 0.50 percent by weight in one sample collected from the Worcester Road Pump Station. This sample was collected from the basement equipment (pumps and associated piping). Other materials screened during the inspection returned results less than 0.50 percent lead by weight.

CONCLUSIONS AND RECOMMENDATIONS

On May 8, 2013, Nobis performed an ACM and LBP inspection of the Kittredge Road and Worcester Road pump stations. The objective of these inspections was to identify building materials containing ACM or LBP to determine the requirements for proper disposal of demolition debris. Photographs taken during the inspection are included in Appendix D. An abatement cost estimate is included in Table 4.

Asbestos Containing Materials

ACM was not identified at the Kittredge Road pump station.

ACM was detected at the Worcester Road pump station in window glazing and caulking and in caulking around the exterior louvered vents. Trace levels of ACM were detected in the roofing composite sample. Refer to Tables 1 and 2 for results of the asbestos inspection. Quantities are estimated based on survey observations. Actual quantities and costs should be confirmed by the abatement/disposal company prior to bidding and performing work.

Any suspect asbestos-containing materials discovered during demolition or renovation activities that were not identified during the survey should be sampled and analyzed for asbestos content prior to removal.

Demolition activities that will affect ACM will require asbestos abatement and disposal in accordance with local, State, and Federal regulations. EPA and Massachusetts regulations require a 10-day notification, and asbestos notification forms must be filed prior to the commencement of any asbestos abatement work. As stated above, Massachusetts regulations do not require abatement of materials that are less than 1 percent asbestos; however, regulations do require that any amount of ACM is handled and disposed of properly.

Asbestos abatement must be conducted in accordance with the Commonwealth of Massachusetts Department of Labor and Workforce Development Chapter 453, Section 6.00 of the Code of Massachusetts Regulations (453 CMR 6.00), "The Removal, Containment, or Encapsulation of Asbestos;" and MassDEP 310 CMR 7.15 "Air Pollution Control Regulations," 310 CMR 18.00 and 19.00, "Solid Waste Regulations".

Abatement activities must be conducted in accordance with Federal, State, and local regulations and protocols, and by a certified asbestos abatement contractor. A Massachusetts certified Asbestos Project Monitor must provide abatement oversight, background/ambient air sampling, a final visual inspection, and final clearance air sampling during and at the completion of abatement activities.

Lead Based Paint

LBP was not identified at the Kittredge Road pump station.

LBP was identified on basement equipment (pumps and associated piping) at the Worcester Road pump station. Refer to Table 3 for a summary of lead paint screening results for materials sampled during the survey.

LBP demolition/renovation is required to be performed by a contractor in compliance with the OSHA Rules for Occupational Health and Environmental Controls for Lead 29 CFR 1926.62, including implementation of a written worker protection program, personal air monitoring, and respiratory protection program.

Representative samples of any LBP waste generated during demolition should be collected for toxicity characteristic leaching procedure (TCLP) lead analysis in accordance with 40 CFR Part 261 prior to material disposal.

Under the Resource Conservation and Recovery Act (RCRA), the acceptable level of lead (i.e. not hazardous waste) in demolition debris is 5 milligrams per liter (mg/L) by TCLP. If demolition debris exceeds 5 mg/L of lead by TCLP, it must be disposed of as hazardous waste. Sampling and TCLP analysis of materials with low to mid-range results may be used to establish lower limits under which materials can be disposed of as non-hazardous waste. If metal building components are to be recycled, lead abatement may not be necessary.

Thank you for the opportunity to be of service. Should you require additional information, please do not hesitate to contact us.

Sincerely,

NOBIS ENGINEERING, INC.

Jeff Brunelle
Project Geologist

Stephen Vetere, PE, LSP
Senior Project Manager

Attachments: Table 1 – Summary of Positive Asbestos Bulk Sampling Analytical Results
Table 2 – Summary of Negative Asbestos Bulk Sampling Analytical Results
Table 3 – Summary of Lead Paint Sampling Results
Table 4 – Abatement Cost Estimate
Figure 1 – Building Layout and Asbestos Sampling Locations
Appendix A – Limitations
Appendix B – Laboratory Analytical Data for Asbestos Bulk Samples
Appendix C – EFI Global Hazardous Materials Consulting Services Report
Appendix D – Photographs

c: File No. 86640.03 (w/attach.)

TABLES

Table 1
Summary of Positive Asbestos Bulk Sampling Analytical Results
Worcester Road Pump Station
Framingham, Massachusetts

Sample ID	Descript	Room/Location	Color	Int/Ext	% Asbestos	Quantity
1A-C	Window Glazing - Metal to Glass	First Floor	Grey	Exterior	2% Chrysotile	1134 LF
2A-C	Window Caulking - Frame to Wall	First Floor	Grey	Exterior	3% Chrysotile	266 LF
9A-C	Vent Cover Caulking	First Floor	Tan	Exterior	3% Chrysotile	20 LF
10A, 11A, 12A Composite	Roofing Materials	N/A	Black	Exterior	0.72% Chrysotile (trace)	819 SF

Notes:
1. Quantities are estimated and should be confirmed by the abatement contractor prior to bidding/removal.
2. LF = linear feet
3. Materials with less than 1% asbestos do not need abatement; however, ACM will require proper disposal.
4. Window glazing and caulking quantities are for all window sets. Window sets will likely be abated as one structure.

Table 2
Summary of Negative Asbestos Bulk Sampling Analytical Results
Worcester Road Pump Station
Framingham, Massachusetts

Sample ID	Description	Color	Location	Int/Ext	% Asbestos	TEM Confirmation
3A-C	Caulking	Clear	Around Electrical Box on East Side of Building	Exterior	ND	--
4A-C	Exhaust Packing/Insulation	Grey	Ford Motor Exhaust Horizontal and Vertical Sections	Interior	ND	ND
5A-C	Soft Caulking	Brown	2-Inch Pipe/Wall Penentration Near Door	Interior	ND	--
6A-C	Soft Caulking	White	6-Inch Pipe/Wall Penentration	Interior	ND	--
7A-B	Fiber Exhaust Wrap	White	Ford Motor Exhaust Vertical Section	Interior	ND	ND
8A-C	Window Caulking	White	Center Window, West Side - Metal to Glass	Exterior	ND	--
10A-C	Flat Roof	Black	Lower Roof Layer	Exterior	ND	Trace (0.72%)
11A-C	Black glazing with Sample 10	Black	Roof	Exterior	ND	
12A-C	Flat Roof	Black	Upper Roof Layer	Exterior	ND	

Notes:
1. ND - None Detected
2. -- Not Tested/Not Required
3. Composite Sample of roofing material (10, 11, 12) submitted for TEM analysis.

Table 3
Summary of Lead Paint Sampling Results
Kittredge and Worcester Road Pump Stations
Framingham, Massachusetts

Sample ID	Pump Station	Sample Description	Analytical Results (% lead by weight)
Pb-01	Kittredge	Light green masonry walls	0.025
Pb-02	Kittredge	Concrete floor	0.021
Pb-03	Kittredge	HVAC Duct	0.018
PC-01	Worcester	Light green masonry walls	0.031
PC-02	Worcester	Concrete floor	0.111
PC-03	Worcester	HVAC duct	0.257
PC-04	Worcester	Mechanical equipment	<0.008 (<RL)
PC-05	**Worcester**	**Basement pumping equipment**	**1.952**
PC-06	Worcester	Basement masonry	0.211
PC-07	Worcester	Exterior green railing	0.040
PC-08	Worcester	Window exterior	0.145

Notes:
1. RL - Reporting Limit

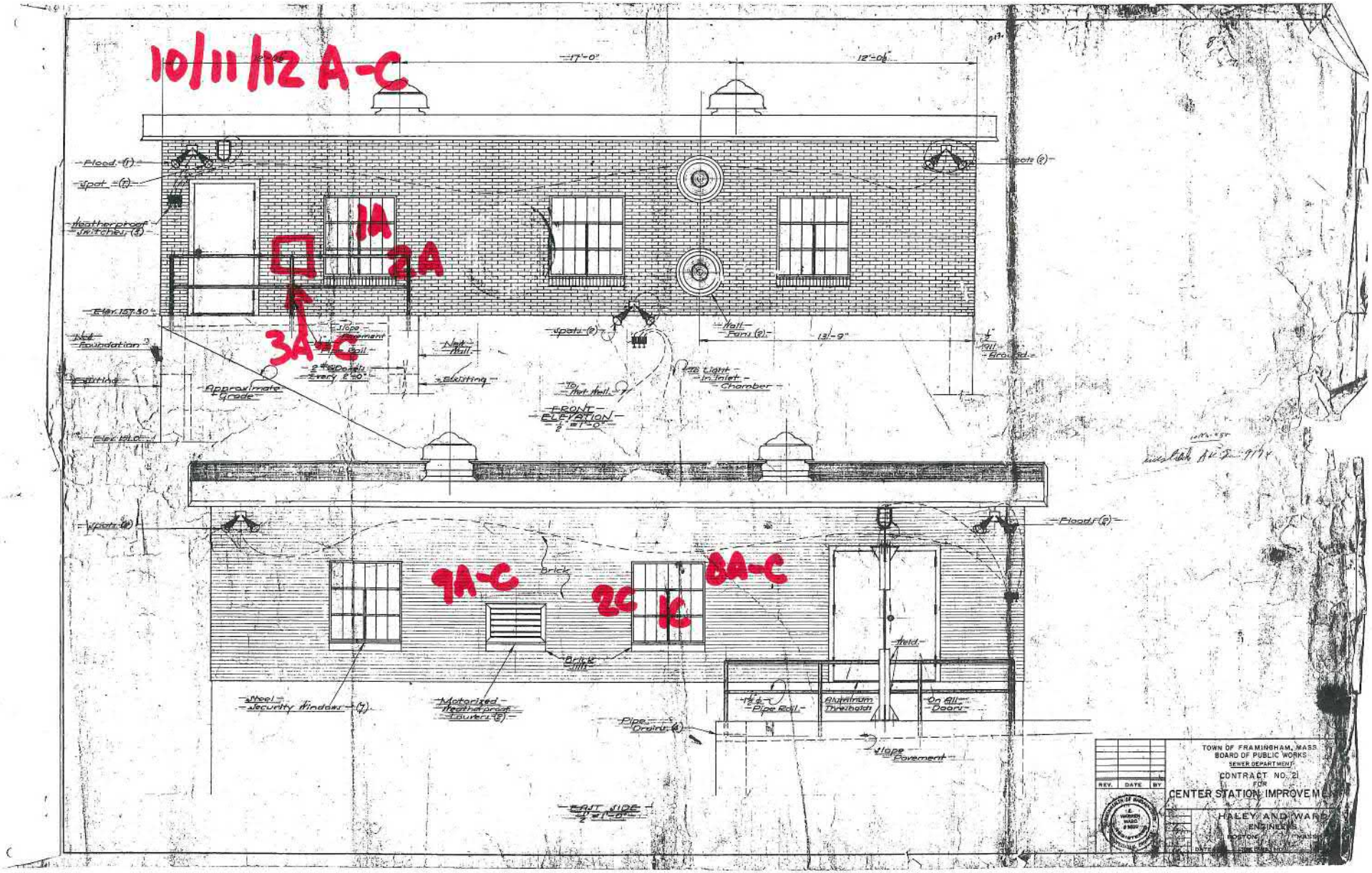
Table 4
Abatement Cost Estimate
Worcester Road Pump Station
Framingham, Massachusetts

ITEM	QUANTITY	PRICE PER UNIT	UNITS	DISPOSAL COST
CONFIRMED ACM				
Window Sets	7	$ 500.00	each	$ 3,500.00
Vent Louver Caulking (2 vents)	20	$ 25.00	LF	$ 500.00
			Subtotal	$ 4,000.00
PROJECT MONITOR - ABATEMENT CLEARANCE/OVERSIGHT/SAMPLING				
Project Monitor Oversight/Clearance Sampling	8	$ 85.00	hour	$ 680.00
Air Sample Cassettes (case)	1	$ 50.00	each	$ 50.00
Equipment/Consumables	1	$ 75.00	each	$ 75.00
Final Results/Report	1	$ 800.00	LS	$ 800.00
			Subtotal	$ 1,605.00
			Grand Total	$ 5,605.00

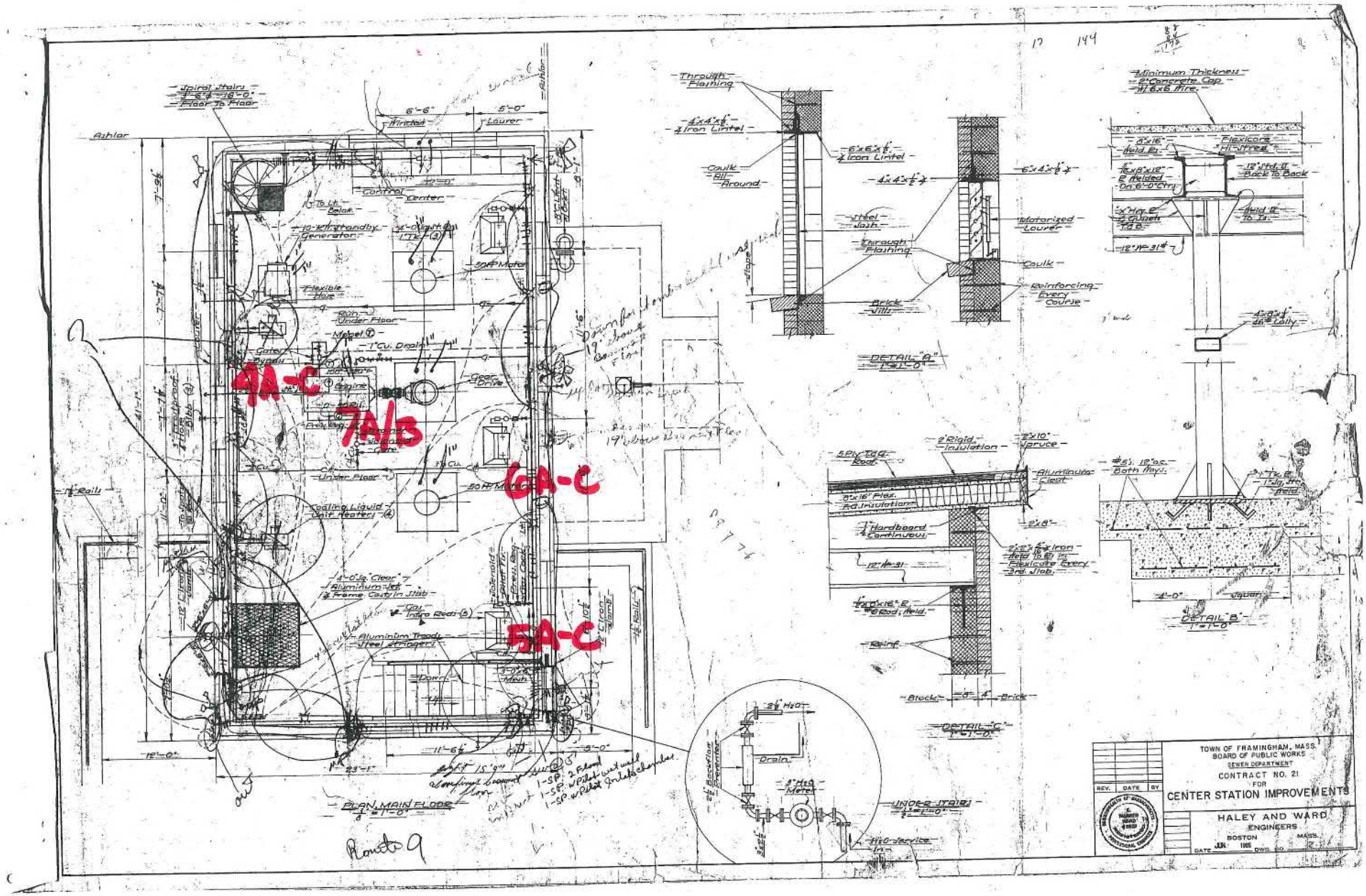
Notes:
1. Quantities are estimated based on survey observations. Actual quantities should be confirmed by the abatement/disposal company prior to bidding and performing work.
2. Abatement costing is based on current market pricing. Actual pricing should be confirmed by the abatement/disposal company prior to bidding and performing work.

FIGURES

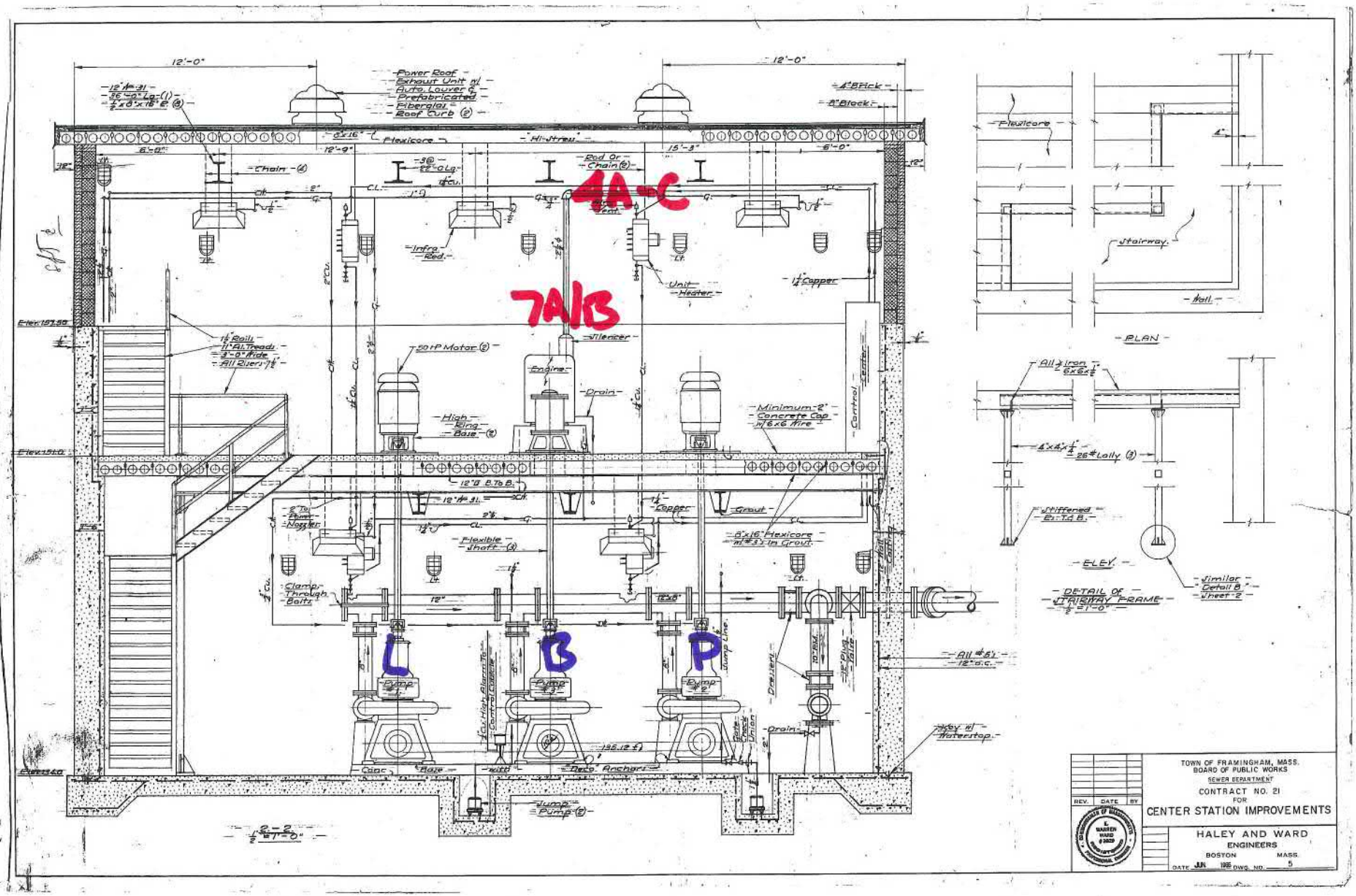
FIGURE 1



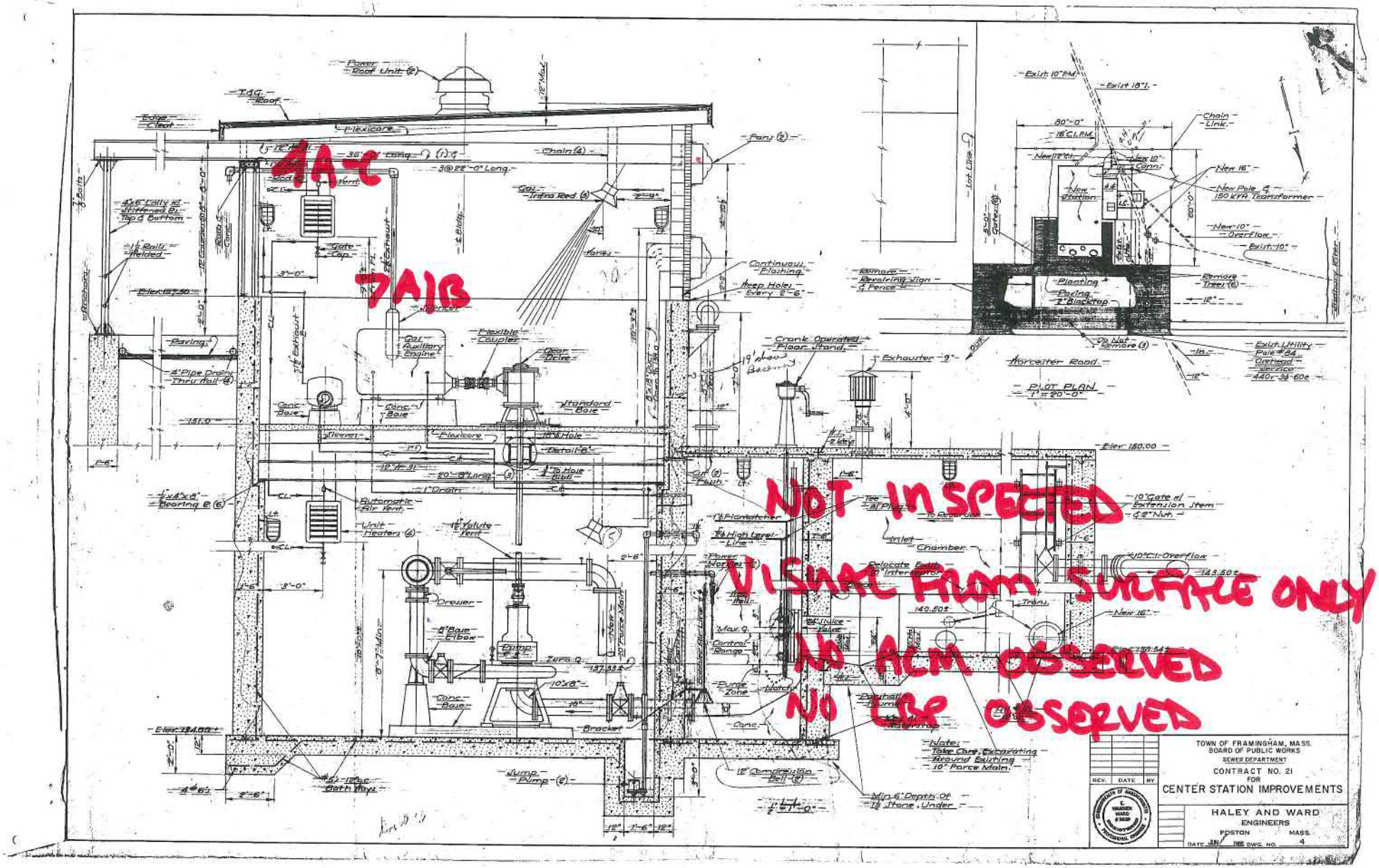
1A = ACM SAMPLE LOCATION


4A-C
7A/B
6A-C
5A-C
PLAN, MAIN FLOOR
DETAIL "A"
DETAIL "B"
DETAIL "C"
Route 9
TOWN OF FRAMINGHAM, MASS.
BOARD OF PUBLIC WORKS
SEWER DEPARTMENT
CONTRACT NO. 21
FOR
CENTER STATION IMPROVEMENTS
HALEY AND WARD
ENGINEERS
BOSTON
MASS.
REV.
DATE
BY

(2)



LBP = LEAD BASED PAINT


AAC
7A1B
NOT INSPECTED
VISUAL FROM SURFACE ONLY
NO ACM OBSERVED
NO PBC OBSERVED
PLOT PLAN
1" = 20'-0"
Worcester Road
TOWN OF FRAMINGHAM, MASS.
BOARD OF PUBLIC WORKS
SEWER DEPARTMENT
CONTRACT NO. 21
FOR
CENTER STATION IMPROVEMENTS
HALEY AND WARD
ENGINEERS
BOSTON MASS.
DATE JAN 1985 DWG. NO. 4

APPENDIX A

LIMITATIONS

APPENDIX A - LIMITATIONS

1) This hazardous materials survey was performed in accordance with generally accepted practices of other consultants undertaking similar work at the same time and in the same geographical area. The results of this survey are based on our professional judgment and are not scientific certainties. Specifically, Nobis Engineering, Inc. does not and cannot represent that the site contains no hazardous materials or other latent conditions beyond those observed during this inspection. No other warranty, express or implied, is made.

2) The observations and conclusions presented in this report were made solely on the basis of conditions described thereon and not on scientific tasks or procedures beyond the scope of described services or the budgetary and time constraints imposed by the client. The work described in this report was performed in accordance with the terms and conditions described in our agreement.

3) During the Site inspection, observations were made of the site building. Where access to portions of the site building were unavailable, limited, or unsafe, Nobis Engineering, Inc. renders no opinion as to the presence of asbestos, lead, or other hazardous materials in those portions of the site.

4) No property boundary, site feature or topographic surveys of the site were performed by Nobis Engineering, Inc.

5) Our services did not include assessments for the presence of lead in drinking water, PCBs, pesticides, herbicides, urea-formaldehydes, or radon, nor any air quality monitoring, or any chemical analyses of soil, surface water, groundwater, or any other materials at the site beyond which is included in the report.

6) The purpose of this report was to inspect the site buildings for the presence of suspect asbestos-containing materials and lead based paint within the context of applicable Occupational Safety and Health Administration (OSHA), USEPA (EPA), the Massachusetts Department of Environmental Protection (MassDEP), and the Massachusetts Division of Labor Services (DLS) regulations. This report does not in any manner or form constitute a Management Plan or Abatement Design within the context of OSHA, EPA, MassDEP, and DLS regulations. No attempt was made to check the compliance of present or past owners of the site with federal, state or local laws.

7) This summary report has been prepared for the exclusive use of Wright-Pierce. This report shall not, in whole or in part, be conveyed to any other party without prior written consent of Nobis Engineering, Inc.

APPENDIX B

LABORATORY ANALYTICAL DATA FOR ASBESTOS BULK SAMPLES

EMSL Analytical, Inc.
7 Constitution Way, Suite 107, Woburn, MA 01801
Phone/Fax: (781) 933-8411 / (781) 933-8412
bostonlab@emsl.com

EMSL Order:	131301889
CustomerID:	NOBI51
CustomerPO:	
ProjectID:	

Attn: **Jeff Brunelle**
Nobis Engineering, Inc.
585 Middlesex Street
Lowell, MA 01851

Phone:	(978) 683-0891
Fax:	(978) 683-0966
Received:	05/08/13 1:45 PM
Analysis Date:	5/15/2013
Collected:	5/8/2013

Project: **Framingham Pump Stations**

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 and/or EPA 600/M4-82-020 Method(s) using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
1A *131301889-0001*	Metal to Glass - White Window Glaze	Gray Non-Fibrous Homogeneous		98% Non-fibrous (other)	**2% Chrysotile**
1B *131301889-0002*	Metal to Glass - White Window Glaze				**Stop Positive (Not Analyzed)**
1C *131301889-0003*	Metal to Glass - White Window Glaze				**Stop Positive (Not Analyzed)**
2A *131301889-0004*	Window Frame to Wall - Grey Caulking	Gray Fibrous Homogeneous		97% Non-fibrous (other)	**3% Chrysotile**
2B *131301889-0005*	Window Frame to Wall - Grey Caulking				**Stop Positive (Not Analyzed)**
2C *131301889-0006*	Window Frame to Wall - Grey Caulking				**Stop Positive (Not Analyzed)**
3A *131301889-0007*	Around Box - Clear Caulking	Clear Non-Fibrous Homogeneous		100% Non-fibrous (other)	**None Detected**
3B *131301889-0008*	Around Box - Clear Caulking	Clear Non-Fibrous Homogeneous		100% Non-fibrous (other)	**None Detected**

Analyst(s)

Frank Dicrescenzo (9)
Juli Patel (20)

Renaldo Drakes, Laboratory Manager
or other approved signatory

Initial report from 05/15/2013 09:52:33

EMSL Analytical, Inc.
7 Constitution Way, Suite 107, Woburn, MA 01801
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Project: **Framingham Pump Stations**

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 and/or EPA 600/M4-82-020 Method(s) using Polarized Light Microscopy

			Non-Asbestos		Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**	**% Non-Fibrous**	**% Type**
3C *131301889-0009*	Around Box - Clear Caulking	Clear Non-Fibrous Homogeneous		100% Non-fibrous (other)	**None Detected**
4A *131301889-0010*	Ford Motor - Exhaust Packing @ Ceiling	Gray Fibrous Homogeneous	5% Cellulose 5% Min. Wool Limited material	90% Non-fibrous (other)	**None Detected**
4B *131301889-0011*	Ford Motor - Exhaust Packing @ Ceiling	Gray Fibrous Homogeneous	5% Cellulose 5% Min. Wool 25% Glass Recommend TEM	65% Non-fibrous (other)	**None Detected**
4C *131301889-0012*	Ford Motor - Exhaust Packing @ Ceiling	Brown Fibrous Homogeneous	20% Cellulose	80% Non-fibrous (other)	**None Detected**
5A *131301889-0013*	Pipe @ Door to Wall - Grey Soft Caulking	Brown Non-Fibrous Homogeneous		100% Non-fibrous (other)	**None Detected**
5B *131301889-0014*	Pipe @ Door to Wall - Grey Soft Caulking	Brown Non-Fibrous Homogeneous		100% Non-fibrous (other)	**None Detected**
5C *131301889-0015*	Pipe @ Door to Wall - Grey Soft Caulking	Brown Non-Fibrous Homogeneous		100% Non-fibrous (other)	**None Detected**

Analyst(s)

Frank Dicrescenzo (9)
Juli Patel (20)

Renaldo Drakes, Laboratory Manager
or other approved signatory

Initial report from 05/15/2013 09:52:33

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Lowell, MA 01851

Phone:	(978) 683-0891
Fax:	(978) 683-0966
Received:	05/08/13 1:45 PM
Analysis Date:	5/15/2013
Collected:	5/8/2013

Project: **Framingham Pump Stations**

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 and/or EPA 600/M4-82-020 Method(s) using Polarized Light Microscopy

			Non-Asbestos			Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**		**% Non-Fibrous**	**% Type**
6A *131301889-0016*	6" Pipe to Wall - White Soft Caulking	White Non-Fibrous Homogeneous			100% Non-fibrous (other)	**None Detected**
6B *131301889-0017*	6" Pipe to Wall - White Soft Caulking	White Non-Fibrous Homogeneous			100% Non-fibrous (other)	**None Detected**
6C *131301889-0018*	6" Pipe to Wall - White Soft Caulking	White Non-Fibrous Homogeneous			100% Non-fibrous (other)	**None Detected**
7A *131301889-0019*	- White Fiber Exhaust Wrap	White Fibrous Homogeneous	98%	Glass	2% Non-fibrous (other)	**None Detected**
7B *131301889-0020*	- White Fiber Exhaust Wrap	White Fibrous Homogeneous	95%	Glass	5% Non-fibrous (other)	**None Detected**
8A *131301889-0021*	Glass to Metal Frame Middle Lft Side Window - White Window Caulking	White Non-Fibrous Homogeneous			100% Non-fibrous (other)	**None Detected**
8B *131301889-0022*	Glass to Metal Frame Middle Lft Side Window - White Window Caulking	White Non-Fibrous Homogeneous			100% Non-fibrous (other)	**None Detected**

Analyst(s)

Frank Dicrescenzo (9)
Juli Patel (20)

Renaldo Drakes, Laboratory Manager
or other approved signatory

Initial report from 05/15/2013 09:52:33

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bostonlab@emsl.com

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Attn: **Jeff Brunelle**
Nobis Engineering, Inc.
585 Middlesex Street
Lowell, MA 01851

Phone:	(978) 683-0891
Fax:	(978) 683-0966
Received:	05/08/13 1:45 PM
Analysis Date:	5/15/2013
Collected:	5/8/2013

Project: **Framingham Pump Stations**

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 and/or EPA 600/M4-82-020 Method(s) using Polarized Light Microscopy

			Non-Asbestos			Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**		**% Non-Fibrous**	**% Type**
8C *131301889-0023*	Glass to Metal Frame Middle Lft Side Window - White Window Caulking	White Non-Fibrous Homogeneous			100% Non-fibrous (other)	**None Detected**
9A *131301889-0024*	Exterior - Tan Vent Cover Caulking	Tan/White Non-Fibrous Homogeneous			97% Non-fibrous (other)	**3% Chrysotile**
9B *131301889-0025*	Exterior - Tan Vent Cover Caulking					**Stop Positive (Not Analyzed)**
9C *131301889-0026*	Exterior - Tan Vent Cover Caulking					**Stop Positive (Not Analyzed)**
10A *131301889-0027*	- Lower Roof Layer	Black Fibrous Homogeneous	50%	Cellulose	50% Non-fibrous (other)	**None Detected**
10B *131301889-0028*	- Lower Roof Layer	Black Fibrous Homogeneous	50%	Cellulose	50% Non-fibrous (other)	**None Detected**
10C *131301889-0029*	- Lower Roof Layer	Black Fibrous Homogeneous	50%	Cellulose	50% Non-fibrous (other)	**None Detected**
11A *131301889-0030*	- Shiny Black Glazing w/ 10	Black Non-Fibrous Homogeneous			100% Non-fibrous (other)	**None Detected**

Analyst(s)

Frank Dicrescenzo (9)
Juli Patel (20)

Renaldo Drakes, Laboratory Manager
or other approved signatory

Initial report from 05/15/2013 09:52:33

EMSL Analytical, Inc.
7 Constitution Way, Suite 107, Woburn, MA 01801
Phone/Fax: (781) 933-8411 / (781) 933-8412
bostonlab@emsl.com

EMSL Order:	131301889
CustomerID:	NOBI51
CustomerPO:	
ProjectID:	

Attn: **Jeff Brunelle**
Nobis Engineering, Inc.
585 Middlesex Street
Lowell, MA 01851

Phone:	(978) 683-0891
Fax:	(978) 683-0966
Received:	05/08/13 1:45 PM
Analysis Date:	5/15/2013
Collected:	5/8/2013

Project: **Framingham Pump Stations**

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 and/or EPA 600/M4-82-020 Method(s) using Polarized Light Microscopy

			Non-Asbestos			Asbestos
Sample	**Description**	**Appearance**	**% Fibrous**		**% Non-Fibrous**	**% Type**
11B *131301889-0031*	- Shiny Black Glazing w/ 10	Black Non-Fibrous Homogeneous			100% Non-fibrous (other)	**None Detected**
11C *131301889-0032*	- Shiny Black Glazing w/ 10	Black Non-Fibrous Homogeneous			100% Non-fibrous (other)	**None Detected**
12A *131301889-0033*	- Upper Roof Layer	Black Fibrous Homogeneous	40%	Cellulose	60% Non-fibrous (other)	**None Detected**
12B *131301889-0034*	- Upper Roof Layer	Black Fibrous Homogeneous	40%	Cellulose	60% Non-fibrous (other)	**None Detected**
12C *131301889-0035*	- Upper Roof Layer	Brown/Black Fibrous Homogeneous	50%	Cellulose	50% Non-fibrous (other)	**None Detected**

Analyst(s)

Frank Dicrescenzo (9)
Juli Patel (20)

Renaldo Drakes, Laboratory Manager
or other approved signatory

Initial report from 05/15/2013 09:52:33

EMSL Analytical, Inc.
7 Constitution Way, Suite 107, Woburn, MA 01801
Phone/Fax: (781) 933-8411 / (781) 933-8412
bostonlab@emsl.com

EMSL Order:	131301889
CustomerID:	NOBI51
CustomerPO:	
ProjectID:	

Attn: **Jeff Brunelle**
Nobis Engineering, Inc.
585 Middlesex Street
Lowell, MA 01851

Phone:	(978) 683-0891
Fax:	(978) 683-0966
Received:	05/08/13 1:45 PM
Analysis Date:	5/22/2013
Collected:	5/8/2013

Project: **Framingham Pump Stations**

Test Report: Asbestos Analysis of Non-Friable Organically Bound Materials by TEM via EPA/600/R-93/116 Section 2.5.5.1

SAMPLE ID	DESCRIPTION	APPEARANCE	% MATRIX MATERIAL	% NON-ASBESTOS FIBERS	ASBESTOS TYPES
4B *131301889-0011*	Ford Motor - Exhaust Packing @ Ceiling	White Non-Fibrous Homogeneous	100	None	No Asbestos Detected
7A *131301889-0019*	- White Fiber Exhaust Wrap	White Non-Fibrous Heterogeneous	100	None	No Asbestos Detected
10A,11A,12A Comp *131301889-0035A*	- Composite of samples 10A/11A/12A	Black Non-Fibrous Heterogeneous	99.3	None	0.72% Chrysotile

Analyst(s)

Chris Little (3)

Renaldo Drakes, Laboratory Manager
or other approved signatory

Initial report from 05/23/2013 09:18:56

131301889

Asbestos Chain of Custody

EMSL Order Number *(Lab Use Only)*:

131301889

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

EMSL ANALYTICAL, INC.
7 CONSTITUTION WAY
SUITE 101
WOBURN, MA 01801
PHONE: 781-[illegible]
FAX: 781-[illegible]

Company: NOBIS ENGINEERING		**EMSL-Bill to:** ☑ Same ☐ Different If Bill to is Different note instructions in Comments** *Third Party Billing requires written authorization from third party*	
Street: 585 MIDDLESEX ST			
City: LOWELL	**State/Province:** MA	**Zip/Postal Code:** 01851	**Country:** USA
Report To (Name): J BRUNELLE		**Fax #:**	
Telephone #: 978-683-0891		**Email Address:** JBrunelle@nobis-eng.com	
Project Name/Number: FRAMINGHAM PUMP STATIONS			
Please Provide Results: ☐ Fax ☑ Email	**Purchase Order:**	**U.S. State Samples Taken:** MA	

Turnaround Time (TAT) Options* – Please Check

☐ 3 Hour ☐ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☑ 1 Week ☐ 2 Week

*For TEM Air 3 hr through 6 hr, please call ahead to schedule.*There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.*

PCM - Air
- ☐ NIOSH 7400
- ☐ w/ OSHA 8hr. TWA

PLM - Bulk (reporting limit)
- ☑ PLM EPA 600/R-93/116 (<1%) SU 5/8/13
- ☐ PLM EPA NOB (<1%)

Point Count
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)

Point Count w/Gravimetric
- ☐ 400 (<0.25%) ☐ 1000 (<0.1%)
- ☐ NYS 198.1 (friable in NY)
- ☐ NYS 198.6 NOB (non-friable-NY)
- ☐ NIOSH 9002 (<1%)

TEM – Air ☐ **4-4.5hr TAT** (AHERA only)
- ☐ AHERA 40 CFR, Part 763
- ☐ NIOSH 7402
- ☐ EPA Level II
- ☐ ISO 10312

TEM - Bulk
- ☐ TEM EPA NOB
- ☐ NYS NOB 198.4 (non-friable-NY)
- ☐ Chatfield SOP
- ☐ TEM Mass Analysis-EPA 600 sec. 2.5

TEM – Water: EPA 100.2
- Fibers >10µm ☐ Waste ☐ Drinking
- All Fiber Sizes ☐ Waste ☐ Drinking

TEM- Dust
- ☐ Microvac - ASTM D 5755
- ☐ Wipe - ASTM D6480
- ☐ Carpet Sonication (EPA 600/J-93/167)

Soil/Rock/Vermiculite
- ☐ PLM CARB 435 - A (0.25% sensitivity)
- ☐ PLM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - B (0.1% sensitivity)
- ☐ TEM CARB 435 - C (0.01% sensitivity)
- ☐ EPA Protocol (Semi-Quantitative)
- ☐ EPA Protocol (Quantitative)

Other:
- ☐

☑ **Check For Positive Stop – Clearly Identify Homogenous Group**

Samplers Name: **Samplers Signature:**

	Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
1	1A	WHITE WINDOW GLAZE - METAL TO GLASS		5.8.13
2	1B	"		
3	1C	"		
4	2A	GREY CAULKING, WINDOW FRAME TO BRICK WALL		
5	2B	"		
6	2C	"		
7	3A	CLEAR CAULKING AROUND BOX		
8	3B	"		

Client Sample # (s): - **Total # of Samples:** 35

Relinquished (Client): [signature] **Date:** 5.8.13 **Time:**

Received (Lab): **Date:** **Time:**

Comments/Special Instructions:

RECEIVED
MAY 08 2013
By SPC 1345 walk-in

131301889

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Asbestos Chain of Custody

EMSL Order Number *(Lab Use Only)*:

131301889

EMSL ANALYTICAL, INC.
7 CONSTITUTION WAY
SUITE 107
WOBURN, MA 01801
PHONE: 781-933-8411
FAX: 781-933-8412

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

	Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
9	3C	CLEAR CAULKING AROUND BOX		5.8.13
10	4A	EXHAUST PACKING @ CEILING - FORD MOTOR		
11	4B	" "		
12	4C	" @ FLUE - " "		
13	5A	GREY SOFT CAULKING - PIPE @ DOOR TO WALL		
14	5B	" "		
15	5C	" "		
16	6A	WHITE SOFT CAULKING - 6" PIPE TO WALL		
17	6B	" "		
18	6C	" "		
19	7A	WHITE FIBER EXHAUST WRAP		
20	7B	" "		
21	8A	WHITE WINDOW CAULKING TO GLASS TO METAL FRAME, MIDDLE LEFT SIDE WINDOW		
22	8B	"		
23	8C	"		
24	9A	TAN WEST COVER CAULKING - EXTERIOR		↓

*Comments/Special Instructions:

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MAY 08 2013
By SPC 1345

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EMSL ANALYTICAL, INC.
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Asbestos Chain of Custody

EMSL Order Number *(Lab Use Only)*:

131301889

EMSL ANALYTICAL, INC.
7 CONSTITUTION WAY
SUITE 107
WOBURN, MA 01801
PHONE: 781-933-8411
FAX: 781-933-8412

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

	Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
25	9B	TAN VENT COVER CAULKING - EXTERIOR		5.8.13
26	9C	" " "		
27	10A	BOWED ROOF LAYER		
28	10B	"		
29	10C	"		
30	11A	TINY BLACK GLAZING W/10		
31	11B	"		
32	11C	"		
33	12A	BOWED ROOF LAYER		
34	12B	"		
35	12C	"		
	13A	WHITE CAULKING METAL FRAME TO WINDOW LEFT SIDE OF GLASS SIDE		
	13B	"		
	13C	"		

*Comments/Special Instructions:

RECEIVED
MAY 08 2013
By SPG 1345

APPENDIX C

EFI GLOBAL HAZARDOUS MATERIALS CONSULTING SERVICES REPORT

187 Ballardvale St, Ste A215
Wilmington, MA 01887
Tel: 978-688-3736
Tel: 800-659-1202
Fax: 978-688-5494
www.efiglobal.com

May 29, 2013

Mr. Stephen A. Vetere, PE, CEM, LSP, LEP
Senior Project Manager
Nobis Engineering, Inc.
585 Middlesex Street
Lowell, MA 01851

Re: Hazardous Materials Consulting Services
Pump House & Pump Station, Kittredge Road, Massachusetts
EFI Project No.: 98350-03652

Dear Mr. Vetere:

On May 8, 2013, EFI Global, Inc. (EFI) performed hazardous materials consulting services for asbestos-containing materials and lead paint at the property located on Kittredge Road in Framingham, Massachusetts (Site). These services were performed in preparation for the demolition of the Pump House and Pump Station buildings at the Site.

The Pump House is a masonry structure with a basement. The Pump Station is a "tin can" type station located below grade. The Pump Station and Pump House are both part of the sewage system for the City of Framingham. Both locations contain pumping equipment and are not occupied by personnel. The construction dates are unknown.

Asbestos Evaluation

Within the Pump Station "tin can" structure, EFI conducted an inspection for suspect asbestos-containing materials, but none were observed and therefore no samples were collected.

EFI recommends that if any suspect asbestos-containing materials are uncovered within the Pump Station "tin can" structure during demolition or renovation activities that were not identified during the survey, that the materials be sampled and analyzed for asbestos content prior to removal.

Lead Paint Screening

On May 8, 2013 EFI performed a lead paint screening of the Site buildings. During the screening, EFI collected paint chip samples from representative painted/coated building components for analysis via Atomic Absorption Spectrometry using method SW846-7420. Samples were analyzed by Schneider Laboratories Global, Inc. of Richmond, Virginia.

Summary of Findings

The paint screening revealed that one of the paint chip samples collected from the Pump House contained levels of lead paint greater than the EPA residential standard of 0.50% lead by weight. The results of the samples ranged from below the laboratory reporting limit to 1.952% lead by weight. However, the Occupational Health and Safety Administration (OSHA) Lead in Construction Standard 29 CFR 1926.62 considers any detectable level of lead to be a potential for exposure if dust is generated from disturbances of surfaces coated with paint containing lead.

Lead Paint Sample Results

Pump House

Sample ID	Sample Description	Analytical Results (% lead by weight)
PC-01	Light green masonry walls	0.031
PC-02	Concrete floor	0.111
PC-03	HVAC Duct	0.257
PC-04	Mechanical equipment	<0.008 (<RL)
PC-05	**Basement pumping equipment**	**1.952**
PC-06	Basement masonry	0.211
PC-07	Exterior green railing	0.040
PC-08	Window exterior	0.145

<RL=Below laboratory reporting limit

Pump Station

Sample ID	Sample Description	Analytical Results (% lead by weight)
Pb-01	Light green masonry walls	0.025
Pb-02	Concrete floor	0.021
Pb-03	HVAC Duct	0.018

Regulatory Implications and Regulations

Worker Protection

OSHA defines any detectable concentration of lead in paint as a potential lead exposure hazard to workers doing construction/demolition-type work on these surfaces as even small concentrations of lead can result in unacceptable employee exposures depending upon the method of removal and other workplace conditions. Since these conditions can vary greatly, the lead-in-construction standard was written to require exposure monitoring or the use of historical or objective data to ensure that employee exposures do not exceed the Action Level of 30 micrograms per cubic meter of air (µg/m3). Historical data may be applied to some construction tasks involving lead.

OSHA requires that if coated surfaces with paint containing lead are impacted during demolition, then lead exposure monitoring must be performed by the contractor. Contractors and employers of staff who may disturb these materials are obligated to perform a 'negative exposure assessment' in accordance with OSHA regulations in order to document that, although minimal

levels of lead are present in these materials, exposure to lead does not exceed the aforementioned OSHA Action Level.

OSHA states that until the employer performs an exposure assessment (or can supply prior data regarding the same type of work which may exempt them from the standard) and documents that employees are not exposed above the permissible exposure limit (PEL) of greater than 50 µg/m3 of air, the employer must treat employees as if they were exposed above the PEL for the following operations:

- manual demolition of structures, manual scraping, manual sanding, and use of heat gun where lead-containing coatings or paints are present;
- abrasive blasting enclosure movement and removal;
- power tool cleaning;
- lead burning;
- using lead-containing mortar or spray painting with lead-containing paint;
- abrasive blasting, rivet busting, or welding, cutting, or burning on any structure where lead-containing coatings or paint are present;
- cleanup activities where dry expendable abrasive are used; and
- any other task the employer believes may cause exposure in excess of the PEL.

The contractor must provide respiratory protection, protective work clothing and equipment, change areas, hand washing facilities, biological monitoring, and training until an exposure assessment has determined that the work activity will result in an exposure below the PEL. Additional requirements under this standard include a written compliance program as well as record keeping.

Recommendations

Due to the presence of lead paint at the site EFI makes the following recommendation:

1. Lead Paint: Paint containing lead was found on surfaces on the interior of the Pump House. The handling and disposal of this material must be performed in accordance with the health and safety measures outlined in the OSHA Lead in Construction Standard. Contractors should be informed lead containing paint exists on the premises. In addition, in accordance with the USEPA Resource Conservation Recovery Act regulations, waste streams that may be coated with paint containing lead, such as concrete and wood, must be characterized for disposal using the toxicity characteristic leaching procedure (TCLP).

Limitations

This report has been prepared to assist the client in evaluating the presence of asbestos and lead paint at the above referenced site. EFI provided these services consistent with the level and skill ordinarily exercised by members of the profession currently practicing under similar conditions. This statement is in lieu of other statements either expressed or implied. This report is intended for the sole use of the client.

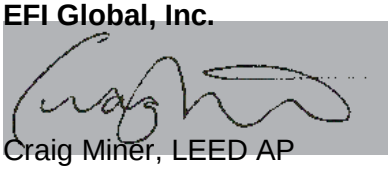
This report is not intended to serve as a bidding document nor as a project specification document and actual site conditions and quantities should be field verified. The scope of

services performed in execution of this evaluation may not be appropriate to satisfy the needs of other users, and use or re-use of this document, the findings, conclusions, or recommendations is at the risk of said user. Although a reasonable attempt has been made to identify environmental issues in the areas inspected, the inspection was limited by the techniques used and areas inspected.

Additionally, the passage of time may result in a change in the environmental characteristics at this site. This report does not warrant against future operations or conditions that could affect the recommendations made. The results, findings, conclusions, and recommendations expressed in this report are based only on conditions that were observed during the inspection of the site.

We appreciate the opportunity to assist Nobis Engineering, Inc. with this project. If you have any questions or require any additional information, please do not hesitate to contact us at (978) 688-3736.

Sincerely,
EFI Global, Inc.



Craig Miner, LEED AP
Senior Project Manager

Keith Pokorny, LEED AP
Regional Vice President

Attachments: Analytical Laboratory Results

420785

SCHNEIDER LABORATORIES GLOBAL

INCORPORATED
2512 W. Cary Street • Richmond, Virginia • 23220-5117
804-353-6778 • 800-785-LABS (5227) • (FAX) 804-359-1475
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AIHA/ELLAP 100527, ISO/IEC 17025, NVLAP 101150-0, NYELAP 11413, VELAP/NELAC 460135

LABORATORY ANALYSIS REPORT

Lead Analysis based on EPA 7000B Method
Using Preparation Method EPA 3050B

ACCOUNT #: 4406-13-68

DATE RECEIVED: 5/9/2013
DATE ANALYZED: 5/9/2013
DATE REPORTED: 5/9/2013

PROJECT NAME: Pump House
JOB LOCATION: 18 Ballard Vale St
PROJECT NO.: Suite A215
PO NO.:

Sample Type: PAINT

SLI Sample No.	Client Sample No.	Collection Date	Sample Description	Sample Wt (mg)	Total Lead (µg)	Lead Conc (% by wt)	Lead Conc PPM
31878501	PC-01	5/8/2013	Light Green A Walls	302	94.7	0.031	313
31878502	PC-02	5/8/2013	Concrete Floor	301	334.5	0.111	1,111
31878503	PC-03	5/8/2013	HVAC Duct	303	780.2	0.257	2,575
31878504	PC-04	5/8/2013	Mechanical Equipment	128	< 10.0	< 0.008	< 78
	Sample weight below method guidelines.						
31878505	PC-05	5/8/2013	Basement Equipment	303	5,915.6	1.952	19,523
31878506	PC-06	5/8/2013	Basement Masonry	303	638.2	0.211	2,106
31878507	PC-07	5/8/2013	Exterior Green Railing	303	121.5	0.040	401
31878508	PC-08	5/8/2013	Window Exterior	303	440.0	0.145	1,452

Analysis Run ID: 51664

Analyst: Ryan Smith
Total Number of Pages in Report: 1
Results relate only to samples as received by the laboratory.

Reviewed By **Mohammed Eltilib, Metals Team Leader**
Visit www.slabinc.com for current certifications.

Minimum Reporting Limit: 10.0 µg. Lead Based Paint contains 0.5% lead by weight per Federal statute. The OSHA Lead in Construction Standard, 29 CFR 1926.62, is invoked if any lead is present in the sample. Lead-free paint is defined as <0.009% by weight (CPSC). All internal QC parameters were met. Unusual sample conditions, if any, are described.

4406 13 68

Relinquished by: [signature] Date/Time: 5-8-13 16:07
Received by: _____ Date/Time: _____
Relinquished by: _____ Date/Time: _____
Received by: _____ Date/Time: _____

Client Name: EFI Global Phone: _____
Client Address: 18 Ballard Vale St. Suite A215 Wilmington MA.
Project: Pump House
Proj. Address: Near 700 Worcester Rd Framingham State (Required): MA

Page 1 of 1

BULK SAMPLE CHAIN OF CUSTODY

Analysis: ☐ PLM ☐ Positive Stop ☐ Qualitative ☐ Point Count ☐ NOB Prep ☐ TEM Chat ☒ Lead ☐ PCB

Turnaround Time: ☐ RUSH ☐ 24 Hour ☒ 48 Hour ☐ 3 Day ☐ 5 Day

Sampled By: G. Hatch
Date: 5/8/13
Results to (PM): G Hatch

Verbal Results: Y (N)
Cell #: _____
Name: _____

AEC Laboratories ID: _____

Special Instructions: _____

LAB ID	FIELD ID	LOCATION	SAMPLE DESCRIPTION	Homogenous Area	Material Type
	PC-01	1st Subfloor Masonry light green/walls	light green paint		
	PC-02	Concrete floor	green/red paint		
	PC-03	HVAC Duct	gray paint		
	PC-04	Mechanical equipment	green paint		
	PC-05	Basement equipment	gray/black paint		
	PC-06	Basement masonry/ceiling	beige/white paint		
	PC-07	Exterior green paint siding	green paint		
	PC-08	Window exterior	gray paint		

WorkOrderKey V: 1952 \ 952607

RECEIVED APR - 9 2013

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LABORATORY ANALYSIS REPORT

Lead Analysis based on EPA 7000B Method
Using Preparation Method EPA 3050B

ACCOUNT #: 4406-13-66

DATE RECEIVED: 5/9/2013
DATE ANALYZED: 5/9/2013
DATE REPORTED: 5/9/2013

PROJECT NAME: Kittridge St Pump
JOB LOCATION: Pump Station
PROJECT NO.: 03652
PO NO.:

Sample Type: PAINT

SLI Sample No.	Client Sample No.	Collection Date	Sample Description	Sample Wt (mg)	Total Lead (µg)	Lead Conc (% by wt)	Lead Conc PPM
31878308	Pb01	5/8/2013	Equiptment Ladder & Stairs	301	75.5	0.025	251
	Sample contains substrate which may affect the calculation of weight percent.						
31878309	Pb02	5/8/2013	Pump Station Floor	301	62.0	0.021	206
	Sample contains substrate which may affect the calculation of weight percent.						
31878310	Pb03	5/8/2013	Pump Station Walls	302	54.4	0.018	180
	Sample contains substrate which may affect the calculation of weight percent.						

Analysis Run ID: 51664

Analyst: Ryan Smith
Total Number of Pages in Report: 1
Results relate only to samples as received by the laboratory.

Reviewed By **Mohammed Eltilib, Metals Team Leader**
Visit www.slabinc.com for current certifications.

Minimum Reporting Limit: 10.0 µg. Lead Based Paint contains 0.5% lead by weight per Federal statute. The OSHA Lead in Construction Standard, 29 CFR 1926.62, is invoked if any lead is present in the sample. Lead-free paint is defined as <0.009% by weight (CPSC). All internal QC parameters were met. Unusual sample conditions, if any, are described.

4406-13-66

Relinquished by: Michael McAffrey Date/Time: 5-8-13 - 1600
Received by: _____ Date/Time: _____
Relinquished by: _____ Date/Time: _____
Received by: _____ Date/Time: _____

Client Name: EFT Global Phone: _____
Client Address: 18 Ballardvale St Suite A215 Wilmington MA
Project: Kittridge St Pump Station
Proj. Address: Kittridge St. Pump Station Framingham State (Required): MA

Page 1 of 1
BULK SAMPLE CHAIN OF CUSTODY

Analysis: ☐ PLM ☐ Positive Stop ☐ Qualitative ☐ Point Count ☐ NOB Prep ☐ TEM Chat ☐ PCB
Turnaround Time: ☐ RUSH ☐ 24 Hour ☐ 3 Day ☐ 5 Day
Sampled By: Michael McAffrey
Date: 5-8-13
Results to (PM):
Verbal Results: Y / N
Cell #:
Name:

AEC Laboratories ID:
Special Instructions:
EFT Job # 03652
Client Nobis Engineering

LAB ID	FIELD ID	LOCATION	SAMPLE DESCRIPTION	Homogenous Area	Material Type
	Pb 01	In Pump Station on equipment, Ladder, and stairs	Green Paint		
	Pb 02	Pump Station Floor	Green Paint		
	Pb 03	Pump Station Walls	White Paint		

WorkOrderKey V: \952\952616

RECEIVED
APR - 9 2013
BY: TINA DLAGRAU

Bulk COC Version 3.1 (3/26/10) AEC Labs Bulk COC_Version 3_2.xls

APPENDIX D

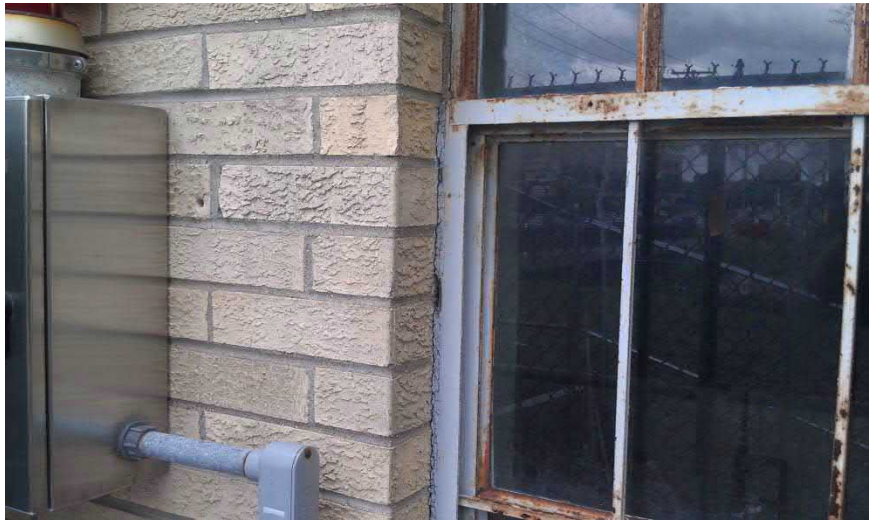
PHOTOGRAPHS

Kittredge Road Pump Station

Kittredge Road Pump Station Access

Worcester Road Pump Station

Asbestos Window Glazing



Asbestos Window Caulking

ACM – Window and Louvered Vent Caulking

ACM – Window and Louvered Vent Caulking

LBP on Basement Pump Equipment

Roofing with Trace Asbestos

Roofing with Trace Asbestos

Appendix B: Design Drawings

LEGEND

EXISTING

- CURB OR BERM (TYPE AS NOTED)
- EOP — EDGE OF PAVEMENT
- CB — CATCH BASIN
- T — TELEPHONE MANHOLE
- W — WATER MANHOLE
- S — SEWER MANHOLE
- GG — GAS GATE
- CS — CURB STOP
- WG — WATER GATE
- HYD — HYDRANT
- VP — VENT PIPE
- POLE#6 — UTILITY POLE
- SIGN / POST
- MONITORING WELL
- D — DRAIN PIPE
- S — SEWER MAIN
- G — GAS MAIN
- W — WATER MAIN
- EOH — ELECTRICAL OVERHEAD
- PROPERTY LINE
- EASEMENT LINE
- DECIDUOUS TREE
- TREE LINE
- X — X — X — CHAIN LINK FENCE
- B1–100 — EDGE OF WETLAND W/ FLAGGED NUMBER
- EDGE OF RIVER/STREAM LINE
- 30–FT. NO ALTERATION ZONE
- 100–FT. WETLAND BUFFER
- 125–FT. WETLAND BUFFER
- 200–FT RIVER FRONT LIMIT
- 195 — CONTOUR – MAJOR (5FT)
- 196 — CONTOUR – MINOR (1FT)
- WETLANDS
- BUILDING
- PAVEMENT

PROPOSED

- EOP — EDGE OF PAVEMENT
- SEWER MANHOLE
- S — SEWER MAIN
- SEWER MAIN BYPASS PIPE
- SEWER MAIN BYPASS PUMP
- W — WATER SERVICE
- CS — CURB STOP
- SEWER PIPE CAP
- X — X — X — CHAIN LINK FENCE
- SAW CUT LINE
- TP-1 — TEST PIT
- EROSION CONTROL BARRIER/STRAW WATTLES
- PROPOSED SEWER YARD PIPING
- PROPOSED PAVEMENT

GENERAL NOTES

1. VERTICAL DATUM = NGVD 29
2. FEMA MAP NUMBER 25017C0516F EFFECTIVE JULY 7, 2014 INDICATES THE PUMP STATION IS LOCATED IN BOTH A ZONE X AREA OF MINIMAL FLOOD HAZARD AND A SPECIAL FLOOD HAZARD AREA ZONE AE WITH BASE FLOOD ELEVATION OF 155.8 (NGVD 29).
3. THE MOST CURRENT VERSION OF THE FRAMINGHAM DEPARTMENT OF PUBLIC WORKS CONSTRUCTION STANDARDS SHALL CONTROL, EXCEPT WHERE OTHERWISE SPECIFIED OR SHOWN IN THE CONTRACT DOCUMENTS.
4. EXISTING BUILDING CONDITIONS DIGITIZED/SCANNED FROM 'CENTER STATION IMPROVEMENTS' RECORD DRAWINGS, 1965 (HALEY AND WARD ENGINEERS), A FIELD SURVEY BY DGT ASSOCIATES COMPLETED IN FEBRUARY OF 2021, MASSACHUSETTS GIS INFORMATION, AND FIELD EDITS BY BETA GROUP, INC.
5. THE LIMIT OF WORK SHOWN IS WITHIN PROPERTY OWNED BY THE CITY OF FRAMINGHAM, MA., ASSESSOR'S PARCEL 101–63–0610. CONTRACTOR RESPONSIBLE FOR ALL REQUIRED PERMITS AND/OR FEES ASSOCIATED WITH WORK. CONTRACTOR SHALL NOT WORK OUTSIDE LIMITS OF PROPOSED WORK WITHOUT WRITTEN PERMISSION OF THE PROPERTY OWNER AND THE CITY.
6. EXISTING UTILITIES HAVE BEEN PLOTTED FROM THE BEST AVAILABLE DATA AND AS APPROXIMATE ONLY. THE CONTRACTOR MUST NOTIFY DIG SAFE PRIOR TO ANY EXCAVATION, DEMOLITION ORK IN PUBLIC OR PRIVATE WAYS OR UTILITY COMPANY RIGHT OF WAY OR EASEMENT (PUBLIC AND PRIVATE). THE LOCATION, SIZE, AND MATERIAL OF EXISTING PIPES, DUCTS, CONDUITS AND OTHER UNDERGROUND STRUCTURES AND/OR UTILITIES SHOWN ON THESE PLANS ARE FROM THE BEST SOURCES AVAILABLE AT PRESENT AND ARE NOT WARRANTED TO BE EXACT, NOR IS IT WARRANTED THAT ALL UNDERGROUND PIPES, UTILITIES OR STRUCTURES ARE SHOWN. EXACT LOCATIONS TO BE DETERMINED IN THE FIELD BY THE CONTRACTOR.
7. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED TO THE ENGINEER FOR THE RESOLUTION OF THE CONFLICT.
8. THE CONTRACTOR SHALL ALTER THE MASONRY OF THE TOP SECTION OF ALL EXISTING DRAINAGE AND SANITARY STRUCTURES AS NECESSARY FOR THE CHANGES IN GRADE, AND RESET ALL WATER, AND DRAINAGE FRAMES, GRATES AND BOXES TO THE PROPOSED FINISH SURFACE GRADE. REQUIRED NEW MASONRY SHALL BE CLAY BRICK CONFORMING TO MASSACHUSETTS STANDARDS, OR APPROVED ALTERNATE MATERIAL.
9. THE CONTRACTOR SHALL MAKE ALL ARRANGEMENTS FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE, CABLE TV, FIRE ALARM AND ANY OTHER PRIVATE UTILITIES BY THE UTILITY COMPANIES.
10. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION OR BETTER AT THE CONTRACTOR'S EXPENSE.
11. THE TERM "PROPOSED" (PROP.) MEANS WORK TO BE CONSTRUCTED USING NEW MATERIALS OR, WHERE APPLICABLE, RE–USING EXISTING MATERIALS IDENTIFIED AS "REMOVE AND RESET" (R&R).
12. SHOULD TRENCH DEWATERING BE REQUIRED FOR THIS WORK, DISCHARGE OF FINES OR SEDIMENTS IS NOT PERMITTED.
13. WHERE EXISTING MATERIALS ARE ENCOUNTERED WHICH, IN THE OPINION OF THE OWNER/ENGINEER ARE UNSUITABLE FOR BEDDING, BACK FILLING OR OTHER INTENDED USE, SUCH MATERIALS SHALL BE REMOVED AS DIRECTED AND REPLACED BY THE CONTRACTOR WITH SUITABLE CRUSHED STONE OR BORROW, AS DIRECTED BY THE OWNER/ENGINEER.
14. JOINTS BETWEEN NEW BITUMINOUS CONCRETE ROADWAY PAVEMENT AND SAWCUT EXISTING PAVEMENT SHALL BE SEALED WITH BITUMEN AND BACKSANDED.
15. CATCH BASIN AND MANHOLE FRAMES AND GRATES/COVERS SHALL CLEARLY ALIGN WITH THE OPENINGS IN THE PRECAST STRUCTURES AND THE GRADE OF THE ROADWAY.
16. IN NO CASE, EXCEPT MAXIMUM LENGTH HIGH SIDE TRANSITIONS, SHALL ANY TRANSITION SLOPE OF ANY RAMP EXCEED 7.5%. PROPOSED RAMP SLOPES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO POURING OF CONCRETE, AND ADJUSTED, IF NECESSARY, AT THE DIRECTION OF THE ENGINEER.
17. CONTRACTOR SHALL VERIFY EXISTING GRADE ELEVATIONS. IF ANY ADJUSTMENT IS REQUIRED DUE TO DIFFERENT EXISTING GRADES FOUND IN THE FIELD, THE CONTRACTOR SHALL NOTIFY AND SEEK THE APPROVAL OF THE ENGINEER PRIOR TO PERFORMING THE WORK.
18. EXCEPT WHERE NOTED BY PROPOSED CONTOUR LINES AND/OR SPOT GRADES, ALL FINAL CONTOUR LINE ELEVATIONS SHALL BE THE SAME AS EXISTING CONTOUR LINE ELEVATIONS.

PCB DEMOLITION NOTES:

1. REFER TO SPECIFICATION SECTION _____.
2. SEE PCB BULK PRODUCT WASTE DISPOSAL PLAN.
3. PCB CONCENTRATIONS EXCEEDING 50 PPM IDENTIFIED IN THE LOWER LEVEL - GRAY PAINT (PUMPS AND PIPING, FLOOR, STAIRS, AND DUCT), GREEN PAINT (FOUNDATION WALLS)
4. PCB CONCENTRATIONS EXCEEDING 50 PPM IDENTIFIED IN THE UPPER LEVEL: WHITE FLOOR PAINT, GRAY FLOOR PAINT, GRAY/RED FLOOR PAINT, GREEN MOTOR PAINT, GREEN PAINT ON CONCRETE MASONRY UNITS, GREEN PAINT ON FOUNDATION WALLS
5. PAINT COATED SURFACES WITH UNKNOWN PCB CONCENTRATIONS SHALL BE CONSIDEDER PCB BULK PRODUCT WASTE IF REMOVED OR ENCAPSULATED WITH EPOXY COATING IF REMAINING
6. ALL PCB BULK PRODUCT WASTE SHALL BE DISPOSED IN ACCORDANCE WITH TSCA REGULATIONS (40 C.F.R. § 761.62).
7. ALL DEMOLITION AND DISPOSAL OF PCB-PAINT COATED MATERIALS (PIPING, PUMPS, DUCT, CONCRETE MASONRY UNITS, CONCRETE SURFACES, ETC.) TO BE CONDUCTED IN ACCORDANCE WITH THE EPA-APPROVED PCB BULK PRODUCT WASTE DISPOSAL PLAN.
8. SANDBLASTED SURFACES TO REMAIN SHALL BE ENCAPUSLATED IN ACCORDANCE WITH THE EPA-APPROVED PCB BULK PRODUCT WASTE DISPOSAL PLAN.

CONSTRUCTION NOTES

1. THE INSTALLATION, TESTING, FUEL, AND MAINTENANCE OF THE BYPASS PUMPING SYSTEM SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL COORDINATE ALL CONSTRUCTION OPERATIONS AND MAINTENANCE ACTIVITIES ASSOCIATED WITH THE BYPASS AND BYPASS CONTROLS WITH THE CITY. THE BYPASS SYSTEM DEPICTED ON THE CONTRACT PLANS IS FOR GENERAL INFORMATION ONLY. THE DESIGN AND LAYOUT IS THE RESPONSIBILITY OF THE CONTRACTOR. SUBMIT DETAILED SHOP DRAWINGS OF THE SPECIFIED BYPASS PUMPS, PIPING, FLOW METER, AND APPURTENANCES FOR THE BYPASS PUMPING SYSTEM IN ACCORDANCE WITH SECTION 01300 – SUBMITTALS AND SECTION 11280 – MAINTAINING EXISTING FLOW. INCLUDE CAPACITY DATA AND CONTROL SYSTEM DESCRIPTION FOR THE PUMPS.
2. CONTRACTOR SHALL SUBMIT DESCRIPTIONS OF THE PROCEDURES FOR INSTALLING THE BYPASS SYSTEM AND FOR OPERATING THE BYPASS PUMPING ARRANGEMENT. REFER TO SPECIFICATION SECTION 11280. THE OWNER, ENGINEER, AND CONTRACTOR SHALL BE PRESENT FOR TESTING AND CUT OVER OF BYPASS CONTROLS AND BYPASS PUMPING.
3. THE BYPASS SYSTEM, INCLUDING PUMPS, PIPING, AUTOMATIC LEVEL CONTROL AND ALARM ANNUNCIATION, SHALL BE IN PLACE, TESTED, AUTOMATICALLY OPERATED FOR UP TO THREE DAYS AND APPROVED BY THE CITY PRIOR TO COMMENCING WORK IN THE STATION.
4. ALL CITY OF FRAMINGHAM OWNED VALVES AND HYDRANTS ARE TO BE OPERATED BY CITY OF FRAMINGHAM PERSONNEL ONLY. ENGINEER TO COORDINATE WITH FRAMINGHAM DPW FOR ALL VALVE OPERATIONS.
8. THROUGHOUT BYPASS PUMPING, THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR MAINTAINING EXISTING FLOWS, OPERATING AND MAINTAINING THEIR BYPASS SYSTEM.
9. DISTURBED AREAS SHALL BE RESTORED AT NO ADDITIONAL COST TO THE OWNER.
10. DISTURBED GRASSED AREAS SHALL BE RESTORED IN ACCORDANCE WITH SPECIFICATION SECTION 02930.
11. DISTURBED PAVED AREAS SHALL BE RESTORED IN ACCORDANCE WITH SPECIFICATION SECTION 02500 AND DETAIL SHOWN ON CD–1.
12. THE CONTRACTOR SHALL PROTECT EXISTING MONITORING WELLS PRESENT ON THE SITE. DAMAGED MONITORING WELLS WILL BE REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER..

ENVIRONMENTAL NOTES

1. SITE IS LISTED UNDER MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION RELEASE TRACKING NUMBERS 3–33648 AND 3–34122.
2. WORK WILL BE CONDUCTED UNDER UTILITY–RELATED ABATEMENT MEASURE PLAN TO BE PREPARED BY BETA.
3. SOIL CONTAMINATION INCLUDES PETROLEUM, POLYNUCLEAR AROMATIC HYDROCARBONS, AND LEAD.
4. SOIL WILL REQUIRE APPROPRIATE HANDLING AND STOCKPILING MEASURES AND EXCESS SOIL WILL REQUIRE CHARACTERIZATION AND PROPER OFF–SITE DISPOSAL.
5. GROUNDWATER CONTAMINATION INCLUDES PETROLEUM, CADMIUM, AND ZINC.
6. GROUNDWATER WILL REQUIRE APPROPRIATE TREATMENT PRIOR TO DISCHARGE.
7. REFER TO SPECIFICATION SECTIONS:
   –01069 FOR HEALTH AND SAFETY REQUIREMENTS
   –02076 FOR ASBESTOS CEMENT PIPE REQUIREMENTS
   –02080 FOR SOIL MANAGEMENT AND DISPOSAL REQUIREMENTS
   –02140 FOR DEWATERING REQUIREMENTS

YARD PIPING NOTES

1. INVERTS AND DIRECTIONS OF PIPES AND CONDUITS ARE SHOWN FOR THE PURPOSE OF INDICATING THE BASIC PARAMETERS USED DURING THE DESIGN. HOWEVER, MINOR CHANGES IN HORIZONTAL AND VERTICAL LOCATIONS MAY BE REQUIRED DURING CONSTRUCTION AS FIELD CONDITIONS WARRANT. FINAL LOCATIONS OF OTHER PIPES AND/OR CONDUITS SHALL BE DETERMINED IN THE FIELD. ANY CHANGES SHALL BE APPROVED BY THE ENGINEER.
2. CONTRACTOR SHALL CONDUCT TEST PITS AS SHOWN AND AT ALL LOCATIONS WHERE NEW PIPING IS TO BE CONNECTED TO EXISTING PIPING AND STRUCTURES, TO FIELD VERIFY THE EXACT SIZE, MATERIAL, LOCATION, INVERT ELEVATION AND ALIGNMENT (VERTICAL AND HORIZONTAL) OF EXISTING UNDERGROUND PIPES AND STRUCTURES.
3. THE CONTRACTOR SHALL MAKE TEST PITS AS REQUIRED IN ORDER TO ASCERTAIN THE EXACT LOCATION OF EXISTING UNDERGROUND UTILITIES.
4. UNLESS NOTED ON THE PLANS WITH SPECIFIC ELEVATIONS, ALL PIPES EXITING STRUCTURES SHALL BE BROUGHT TO MINIMUM COVER AS SOON AS POSSIBLE.
5. UNLESS OTHERWISE NOTED, MINIMUM COVER FOR PIPES AND/OR DUCTS SHALL BE AS FOLLOWS: WATER 5'–0"; SEWER 4'–6"; DRAIN 4'–0"; GAS 3'–6"; ELECTRIC 2'–6". ANY PIPE AND/OR DUCT WITH LESS THAN 2'–0" OF COVER SHALL HAVE AN ADDITIONAL 6" OF CONCRETE ENCASEMENT ON THE UPPER PORTION.
6. EXISTING PIPES RETAINED, BUT WHICH MUST BE REMOVED IN ORDER TO INSTALL NEW PIPES, SHALL BE REINSTALLED OR REPLACED IN KIND.
7. ALL PIPING SHALL BE PROVIDED WITH FLEXIBLE CONNECTIONS WHERE EXITING OR ENTERING STRUCTURES AND BUILDINGS. FLEXIBLE CONNECTIONS SHALL BE COORDINATED WITH PIPE MANUFACTURER AND APPROVED BY THE ENGINEER.
8. ALL NEW PIPING REQUIRED TO BE INSTALLED UNDER THIS CONTRACT IS SHOWN IN BOLD LINES. ALL EXISTING PIPING IS SCREENED.
9. ALL NEW AND EXISTING PIPING BEING INSTALLED SHALL BE SUITABLY SUPPORTED AND BRACED AT ALL TIMES BY THE CONTRACTOR.
10. THE CONTRACTOR SHALL PROVIDE CONCRETE THRUST BLOCKS FOR ALL UNDERGROUND PIPING, BENDS AND TEES IN PRESSURE LINES.
11. CONCRETE CLOSURE COLLARS, FIELD FABRICATED ELBOWS AND/OR SPECIAL BENDS ROTATED AS NECESSARY SHALL BE INSTALLED TO ALIGN NEW PIPING WITH EXISTING PIPING
12. PROVIDE SEPARATION BETWEEN SEWER/DRAIN/WATER TO THE MAXIMUM EXTENT FEASIBLE IN ACCORDANCE WITH THE CITY OF FRAMINGHAM'S CONSTRUCTION STANDARDS.

PLAN INDEX

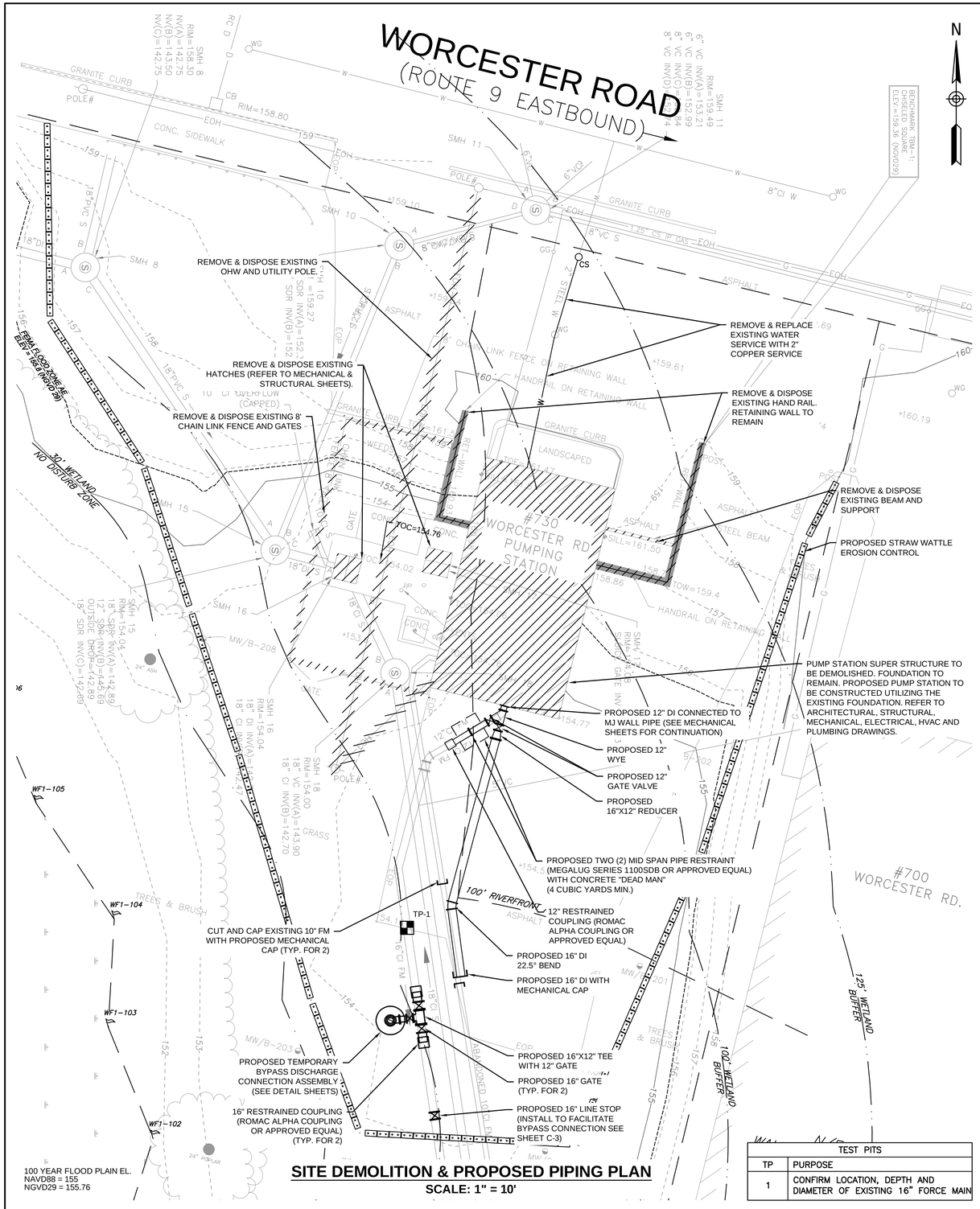
NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: RTG
DESIGNED BY: AJG
CHECKED BY: JRD
REGISTERED PROFESSIONAL
PREPARED BY: BETA www.BETA-Inc.com
SUBCONSULTANT
SCALE: NONE
UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

TITLE
Worcester Road Sewer Pumping Station Replacement

LEGEND, GENERAL NOTES & INDEX

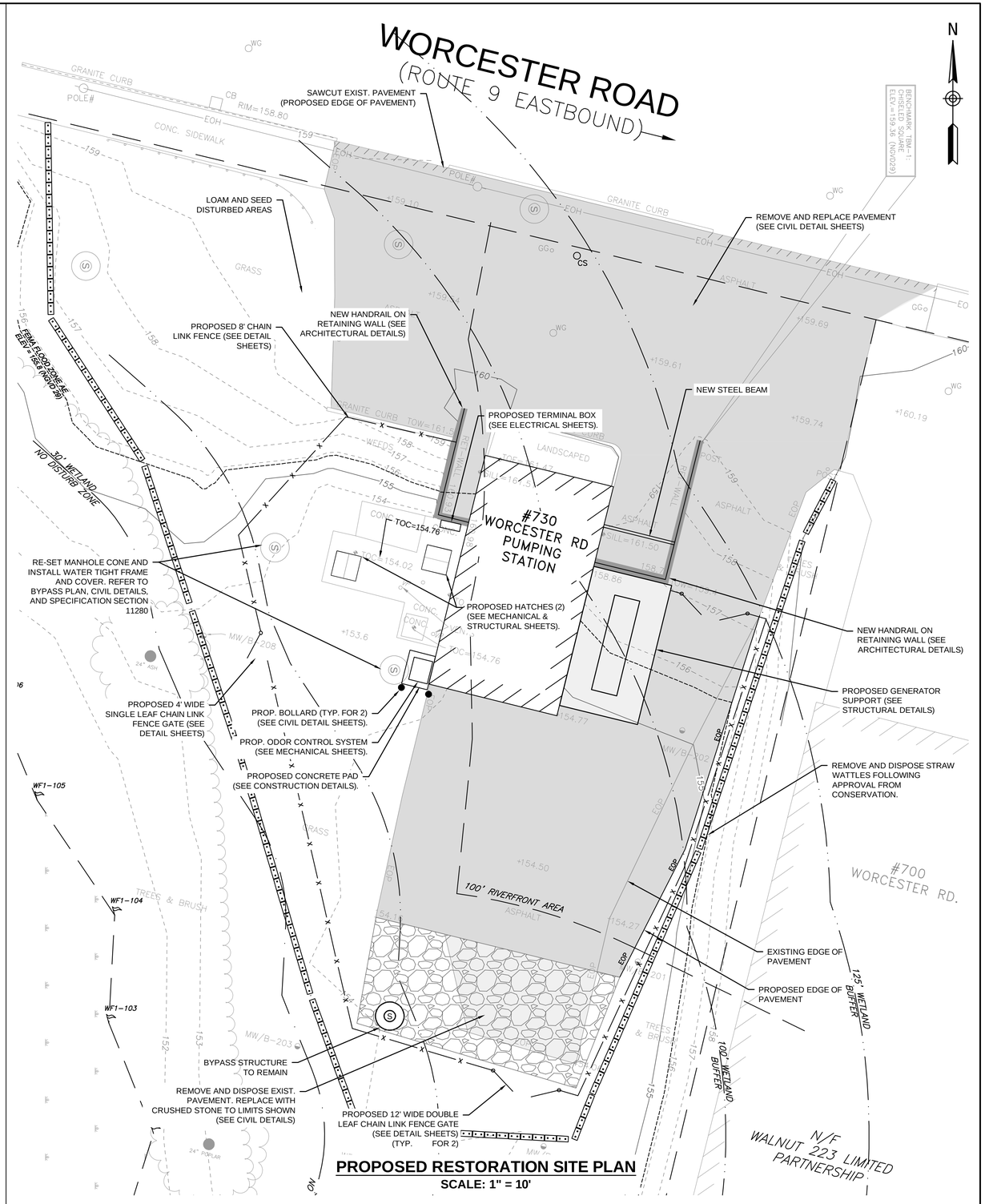
BETA JOB NO. 7385
ISSUE DATE SEPTEMBER 2021
SHEET NO. G-1



SITE DEMOLITION & PROPOSED PIPING PLAN

SCALE: 1" = 10'

TEST PITS	
TP	PURPOSE
1	CONFIRM LOCATION, DEPTH AND DIAMETER OF EXISTING 16" FORCE MAIN



PROPOSED RESTORATION SITE PLAN

SCALE: 1" = 10'

					DRAWN BY: RTG	REGISTERED PROFESSIONAL: For Review Only	PREPARED BY: BETA www.BETA-Inc.com
					DESIGNED BY: AJG		
					CHECKED BY: JRD		
NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS			

SUBCONSULTANT

SCALE: 10 0 10 20 — SCALE IN FEET: 1"=10'

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

TITLE

Worcester Road Sewer Pumping Station Replacement

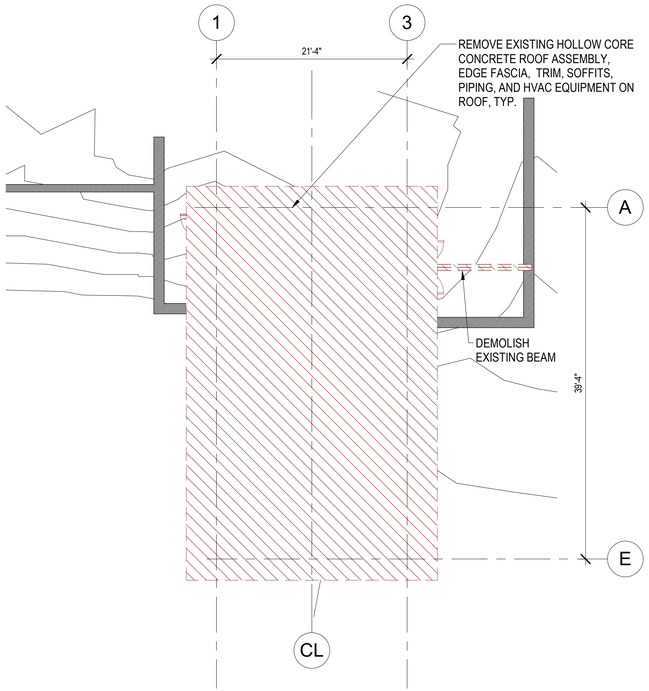
DEMOLITION, PROPOSED PIPING, & RESTORATION SITE PLANS

BETA JOB NO. 7385

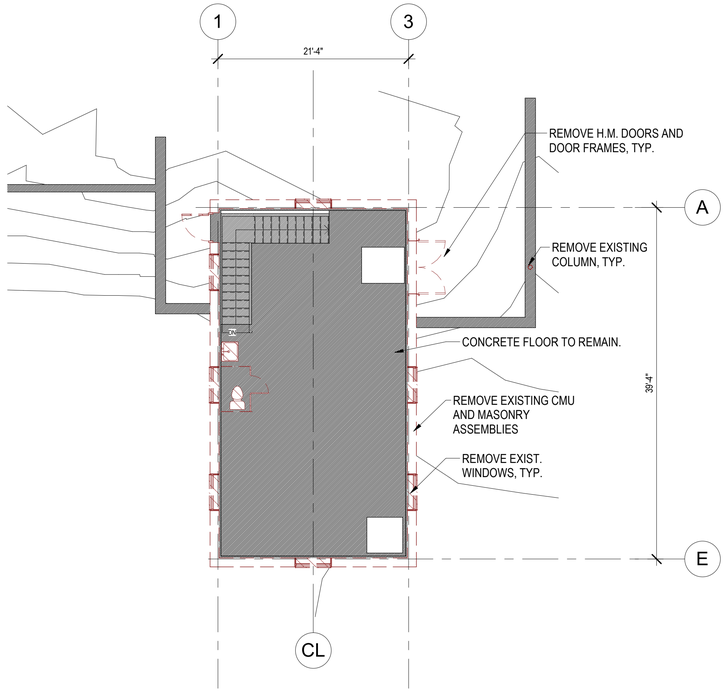
ISSUE DATE SEPTEMBER 2021

SHEET NO. C-2

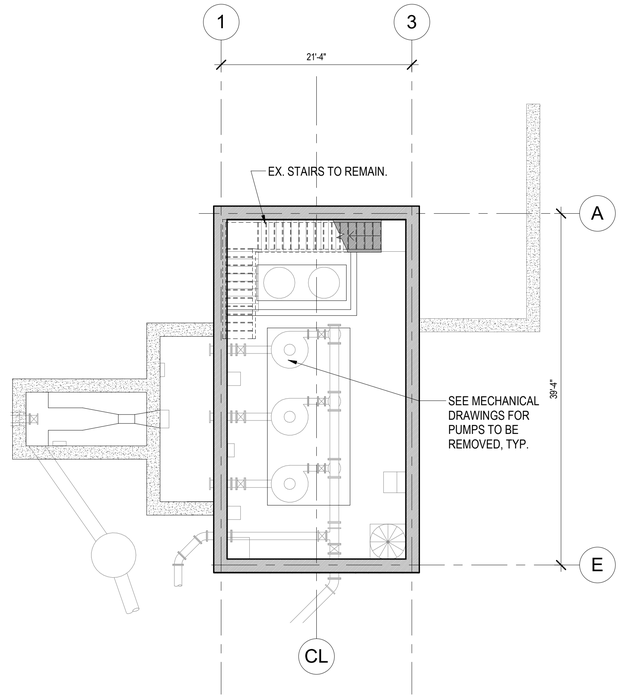
DEMOLITION LEGEND	
WINDOW - TO BE DEMOLISHED	WALL - EXISTING TO REMAIN
	WALL - TO BE DEMOLISHED
DOOR - TO BE DEMOLISHED	



3 ROOF DEMOLITION PLAN
1/8" = 1'-0"



2 02 UPPER LEVEL DEMO PLAN
1/8" = 1'-0"



1 LOWER LEVEL DEMOLITION PLAN
1/8" = 1'-0"

N

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: ALK
DESIGNED BY: DSK
CHECKED BY: MPS

REGISTERED PROFESSIONAL
90% DD

PREPARED BY
BETA
www.BETA-Inc.com

SUBCONSULTANT
DSK Dewing Schmid Kearns
ARCHITECTS + PLANNERS
30 Monument Square
Suite 200B
Concord, MA
01742
978.371.7500
280 Elm Street
South Dartmouth, MA
02748
508.999.0440

SCALE
As indicated

TITLE
Worcester Road Sewer Pumping Station Replacement
DEMOLITION PLANS

DSK JOB NO. 20030.00
ISSUE DATE 9/17/21
SHEET NO. AD01

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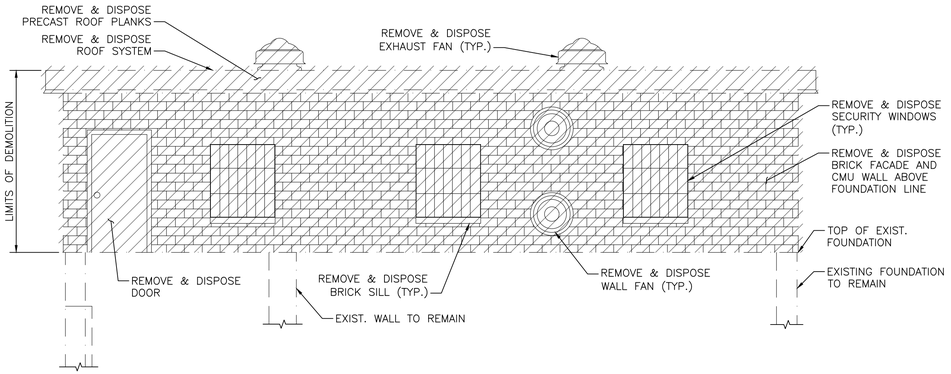
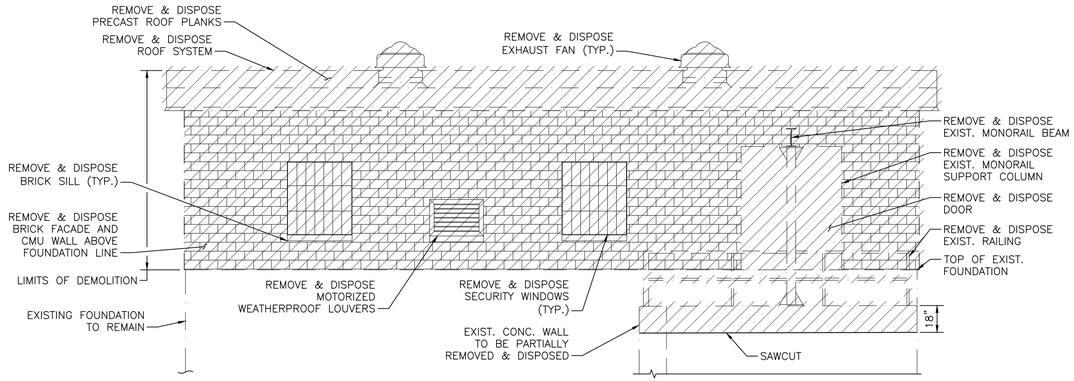


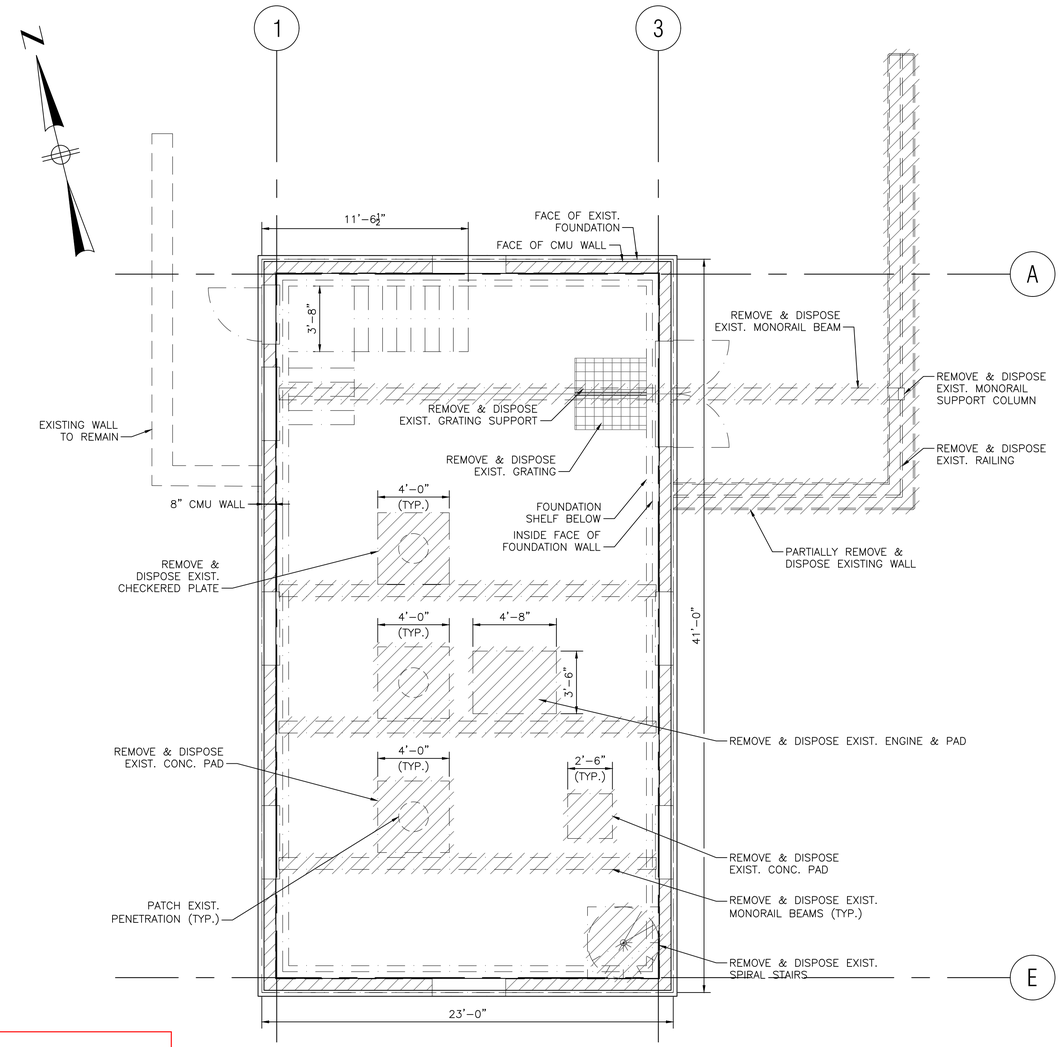
WEST DEMO ELEVATION

SCALE: $\frac{1}{4}$" = 1'–0"



EAST DEMO ELEVATION

SCALE: $\frac{1}{4}$" = 1'–0"



FIRST FLOOR DEMO PLAN

SCALE: $\frac{1}{4}$" = 1'–0"

PCB DEMOLITION NOTES:

1. REFER TO SPECIFICATION SECTION _____.
2. SEE PCB BULK PRODUCT WASTE DISPOSAL PLAN.
3. PCB CONCENTRATIONS EXCEEDING 50 PPM IDENTIFIED IN THE LOWER LEVEL - GRAY PAINT (PUMPS AND PIPING, FLOOR, STAIRS, AND DUCT), GREEN PAINT (FOUNDATION WALLS)
4. PCB CONCENTRATIONS EXCEEDING 50 PPM IDENTIFIED IN THE UPPER LEVEL: WHITE FLOOR PAINT, GRAY FLOOR PAINT, GRAY/RED FLOOR PAINT, GREEN MOTOR PAINT, GREEN PAINT ON CONCRETE MASONRY UNITS, GREEN PAINT ON FOUNDATION WALLS
5. PAINT COATED SURFACES WITH UNKNOWN PCB CONCENTRATIONS SHALL BE CONSIDEDER PCB BULK PRODUCT WASTE IF REMOVED OR ENCAPSULATED WITH EPOXY COATING IF REMAINING
6. ALL PCB BULK PRODUCT WASTE SHALL BE DISPOSED IN ACCORDANCE WITH TSCA REGULATIONS (40 C.F.R. § 761.62).
7. ALL DEMOLITION AND DISPOSAL OF PCB-PAINT COATED MATERIALS (PIPING, PUMPS, DUCT, CONCRETE MASONRY UNITS, CONCRETE SURFACES, ETC.) TO BE CONDUCTED IN ACCORDANCE WITH THE EPA-APPROVED PCB BULK PRODUCT WASTE DISPOSAL PLAN.
8. SANDBLASTED SURFACES TO REMAIN SHALL BE ENCAPUSLATED IN ACCORDANCE WITH THE EPA-APPROVED PCB BULK PRODUCT WASTE DISPOSAL PLAN.

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

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CHECKED BY:

REGISTERED PROFESSIONAL: For Review Only

PREPARED BY: BETA www.BETA-Inc.com

SUBCONSULTANT

SCALE: AS SHOWN

TITLE: **Worcester Road Sewer Pumping Station Replacement**

DEMOLITION DETAILS

BETA JOB NO. 7385
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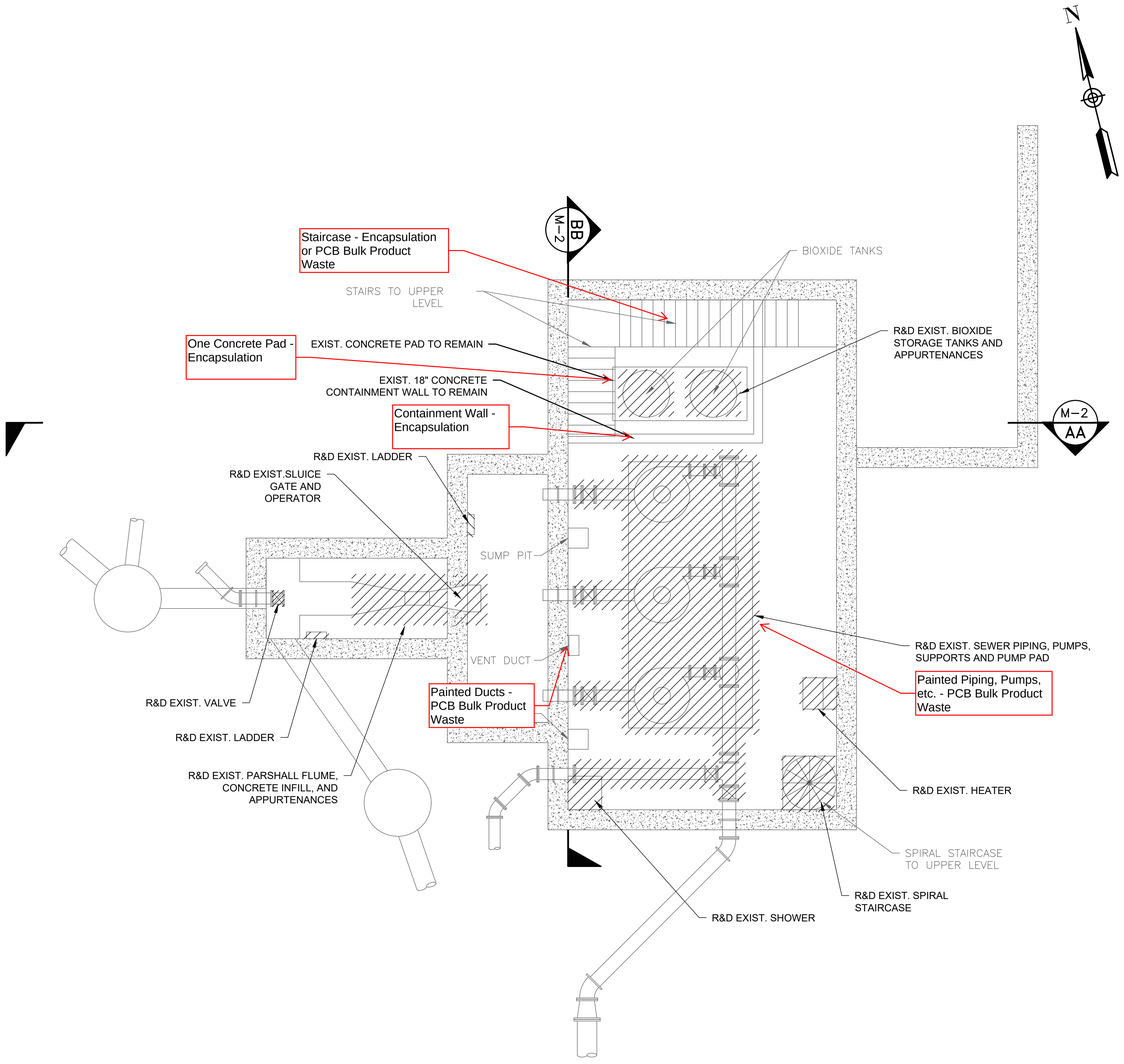

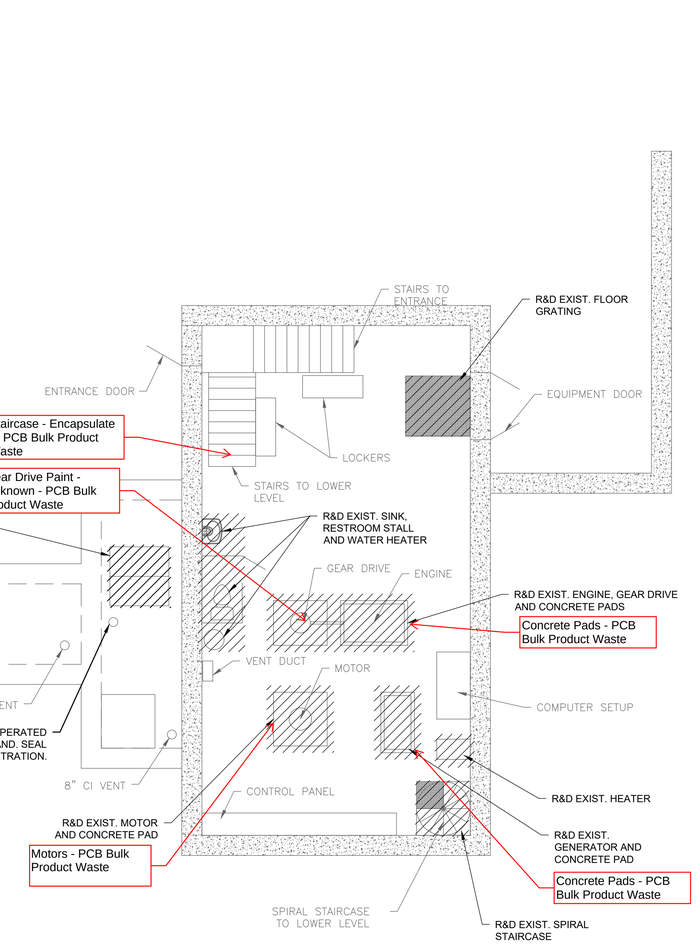

LOWER LEVEL - MECHANICAL PIPING PLAN - DEMOLITION

SCALE: 3/16" = 1'-0"

UPPER LEVEL - MECHANICAL PIPING PLAN - DEMOLITION

SCALE: 3/16" = 1'-0"

PCB DEMOLITION NOTES:

1. REFER TO SPECIFICATION SECTION _____.
2. SEE PCB BULK PRODUCT WASTE DISPOSAL PLAN.
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8. SANDBLASTED SURFACES TO REMAIN SHALL BE ENCAPUSLATED IN ACCORDANCE WITH THE EPA-APPROVED PCB BULK PRODUCT WASTE DISPOSAL PLAN.

MECHANICAL DEMOLITION NOTES:

1. REFER TO SPECIFICATION SECTION 02050.
2. DEMOLITION CANNOT BEGIN UNTIL THE TEMPORARY BYPASS SYSTEM HAS BEEN INSTALLED, STARTED UP, TESTED AND ACCEPTED BY THE OWNER/ENGINEER IN ACCORDANCE WITH SPECIFICATION SECTION 11280.
3. ALL DEMOLITION AND REMOVAL OF EXISTING STRUCTURES, UTILITIES, EQUIPMENT AND APPURTENANCES SHALL BE ACCOMPLISHED WITHOUT DAMAGING THE INTEGRITY OF TE EXISTING STRUCTURES TO REMAIN, UTILITIES, EQUIPMENT AND APPURTENANCES THAT ARE TO REMAIN. EQUIPMENT TO BE SALVAGED SHALL BE REMOVED AND DELIVERED BY THE CONTRACTOR TO AN AREA AT THE CITY OF FRAMINGHAM DPW, INDICATED BY THE ENGINEER.
4. ALL DEMOLITION MATERIAL INCLUDING CONCRETE, PIPE AND BRICK THAT WAS IN CONTACT WITH SEWAGE SHALL BE CLEANED IN ACCORDANCE WITH MADEP REQUIREMENTS AND DISPOSED OF ACCORDINGLY. ONCE CLEANED, DEMOLITION MATERIALS SHALL NOT BE CONSIDERED SPECIAL WASTE.
5. MATERIALS TO BE REMOVED THAT ARE NOT DESIGNATED TO BE SALVAGED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED OFF-SITE AND DISPOSED OF AT THE CONTRACTOR'S EXPENSE AND IN ACCORDANCE WITH ALL STATE AND LOCAL REQUIREMENTS.
6. THE CONTRACTOR IS RESPONSIBLE FOR THE LEGAL AND PROPER DISPOSAL OF ALL DEMOLITION MATERIAL ACCORDING TO ANY RELEVANT LAWS OF THE CITY OF FRAMINGHAM AND STATE OF MASSACHUSETTS.
7. ADDITIONAL DEMOLITION WORK IS SHOWN ON THE CIVIL, STRUCTURAL, ARCHITECTURAL, HVAC, I&C, PLUMBING, AND ELECTRICAL DRAWINGS.
8. PLANS OF THE EXISTING FACILITY WERE BASED ON EXISTING DRAWINGS. THE DRAWINGS SHOW OVERALL DIMENSIONS OF THE STRUCTURES, AND THE LOCATION OF MAJOR EQUIPMENT AND PIPING. MISCELLANEOUS EQUIPMENT, PIPING, CONCRETE EQUIPMENT PADS, PIPE SUPPORTS AND MATERIALS ARE NOT NECESSARILY SHOWN BUT MAY BE INCLUDED IN THE DEMOLITION. THE CONTRACTOR SHALL INSPECT FACILITY DURING THE BIDDING PHASE OF THE PROJECT TO FAMILIARIZE THEMSELVES WITH THE EXTENT OF THE DEMOLITION WORK REQUIRED.

NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

DRAWN BY: RTG
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SUBCONSULTANT:

SCALE: AS SHOWN

TITLE: **Worcester Road Sewer Pumping Station Replacement**

DEMOLITION PLANS

BETA JOB NO. 7385
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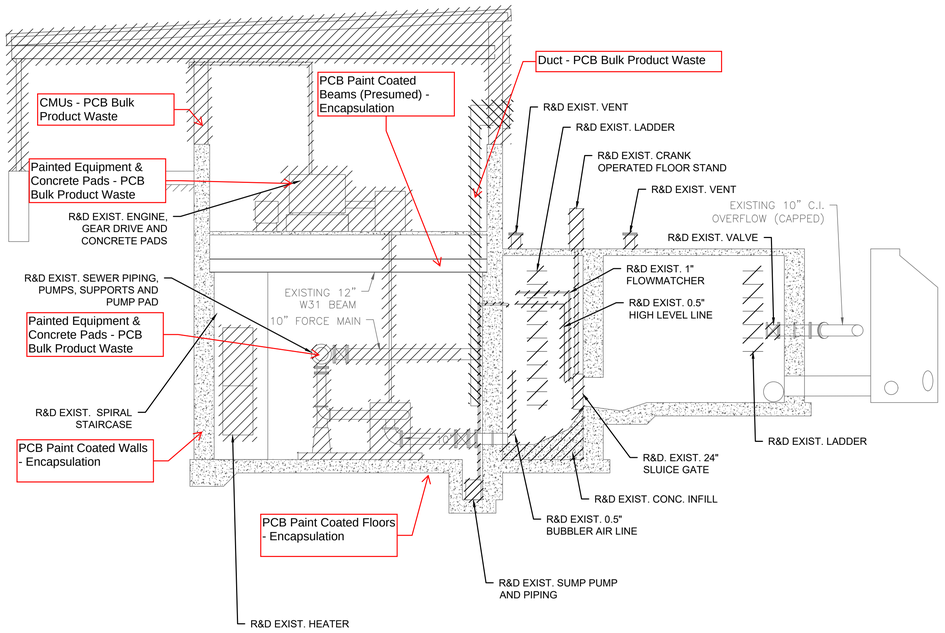
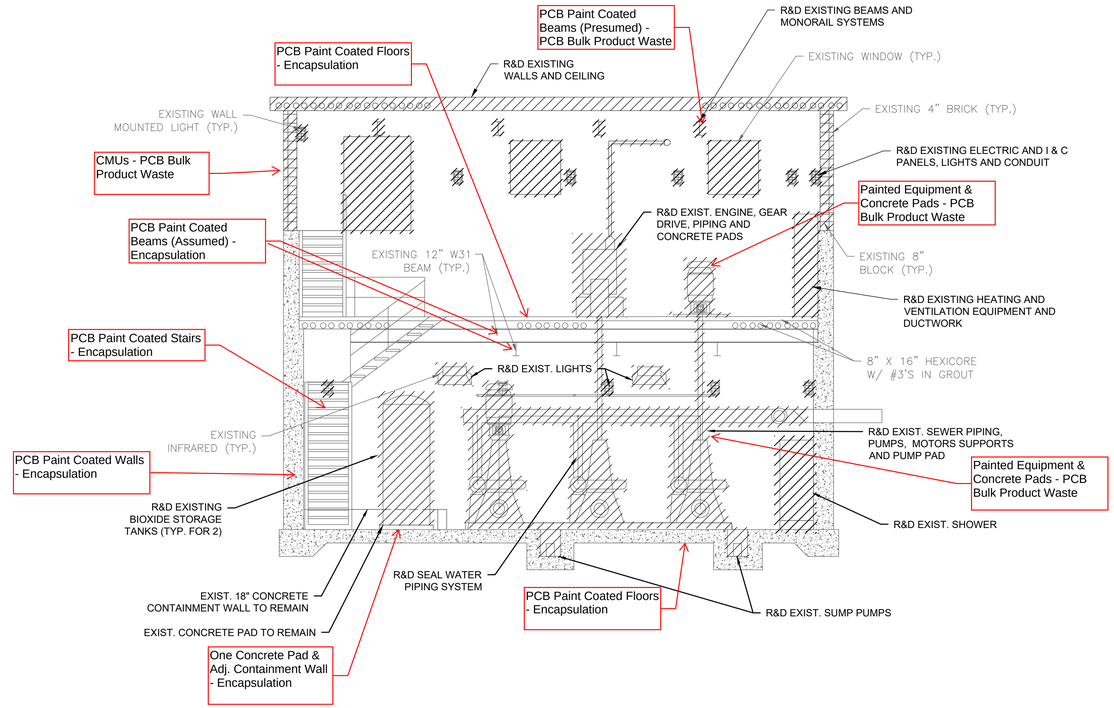


SECTION A-A - DEMOLITION

SCALE: 3/16" = 1'-0"



SECTION B-B - DEMOLITION

SCALE: 3/16" = 1'-0"

PCB DEMOLITION NOTES:

1. REFER TO SPECIFICATION SECTION _____.
2. SEE PCB BULK PRODUCT WASTE DISPOSAL PLAN.
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NUMBER	DATE	MADE BY	CHECKED BY	REVISIONS

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DESIGNED BY: AJG
CHECKED BY: JRD

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PREPARED BY: BETA www.BETA-Inc.com

SUBCONSULTANT:

SCALE: AS SHOWN

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

TITLE: **Worcester Road Sewer Pumping Station Replacement**

DEMOLITION SECTIONS

BETA JOB NO. 7385
ISSUE DATE SEPTEMBER 2021
SHEET NO. M-2

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Appendix C: Standard Operating Procedures

ESS Laboratory
Division of Thielsch Engineering
Cranston, RI

SOP NO. 60_8082

ORGANOCHLORINE PCB's AS AROCLORS BY GAS CHROMATOGRAPHY: CAPILLARY COLUMN TECHNIQUE (EPA Method 608.3 and SW-846 METHOD 8082A)

APPROVED BY:

Operation Manager — Date 2/12/18

QA Manager — Date 1/24/18

Laboratory Director — Date 2/12/18

MASTER

ORGANOCHLORINE PCB's AS AROCLORS BY GAS CHROMATOGRAPHY: CAPILLARY COLUMN TECHNIQUE (EPA Method 608.3 and SW-846 METHOD 8082A)

1.0 SCOPE AND APPLICATION

1.1 This procedure is used to determine the concentrations of various organochlorine polychlorinated biphenyls (PCBs) as Aroclors, in extracts from solid, aqueous and waste matrices. Open-tubular, capillary columns were employed with electron capture detectors (ECD).

1.2 Although performance data are presented for many of the compound chemicals, it is unlikely that all of them could be determined in a single analysis. This limitation results because the chemical and chromatographic behavior of many of these chemicals can result in co-elution. Several cleanup/fractionation schemes are provided in this procedure. Any compound is a potential method interferent when it is not a target analyte.

1.3 Several multi-component mixtures (i.e., Aroclors) are listed as target compounds. When samples contain more that one multi-component analyte, a higher level of analyst expertise is required to attain acceptable levels of qualitative and quantitative analysis. The same is true of multi-component analytes that have been subjected to environmental degradation or degradation by treatment technologies. These result in "weathered" Aroclors (or any other multi-component mixtures) that may have significant differences in peak patterns than those of standards. In these cases, individual congener analyses may be preferred over total mixture analyses.

1.4 Compound identification (single component compounds) based on single column analysis should be confirmed on a second column, or should be supported by at least one other qualitative technique. This procedure describes analytical conditions for a second gas chromatographic column that can be used to confirm the measurements made with the primary column. GC/MS is also recommended as a confirmation technique if sensitivity permits.

1.5 This procedure has a reporting limit of 0.5 ug/L for aqueous samples and 50 ug/Kg for solid and waste samples. Lower detection limits are achievable by further concentration of sample extract upon request. Mass CAM required reporting limits are 0.25ug/L for aqueous samples (achieved with a 1ml final volume) and 100 ug/Kg soil (Assuming 100% solids).

1.6 This method is performance-based. It may be modified to improve performance (e.g., to overcome interferences or improve the accuracy of results) provided all performance requirements are met. Examples of allowed method modifications for 608.3 are described at 40 CFR 136.6.

2.0 METHOD SUMMARY

2.1 A measured volume or weight of sample (approximately 1 L for liquids, 2 g to 30 g for solids) is extracted using the appropriate sample extraction technique. Liquid samples are extracted at neutral pH with methylene chloride using a separatory funnel (SOP 50_3510). Solid samples are extracted with hexane-acetone (1:1) or methylene chloride-acetone (1:1) using either Soxhlet extraction (SOP 50_3540) or the Microwave Extraction method (SOP 50_3546). A variety of cleanup steps may be applied to the extract, depending on (1) the nature of the co-extracted matrix interferences and (2) the target analytes. After cleanup, the extract is analyzed by injecting a 1-ul sample into a gas chromatograph with a narrow- or wide-bore fused silica capillary column and electron capture detector (GC/ECD).

3.0 HEALTH AND SAFETY

3.1 Each employee has been trained and has acknowledged being trained in the safe use and handling of chemicals being used in the laboratory. This training has been performed according to the ESS Training SOP 80_0016 and by the Chemical Hygiene Plan, SOP No. 90_0001, in conjunction with the Safety orientation.

3.2 All sample and material handling should be done in a hood while using proper protective equipment to minimize exposure to liquid or vapor. Minimum personnel protective equipment includes the use of laboratory safety glasses, a lab coat or apron, and protective gloves.

3.3 The MSDs for the concentrated chemicals used in the area are kept on file in a central location that is available for the employees for review.

4.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING AND STORAGE

4.1 Aqueous samples are collected in 1 Liter borosilicate glass jars with Teflon lined caps. The samples are stored in a dark walk-in cooler at 4° C. Two liters should be provided so samples can be re-extracted when necessary. ***Aqueous samples must be extracted within 7 days from date sampled.*** . If the samples will not be extracted within 72 hours of collection, the sample should be adjusted to a pH range of 5.0-9.0 with sodium hydroxide solution or sulfuric acid. Record the volume of acid or base used.

4.2 Use potassium iodide starch paper to check each water sample for residual chlorine. If chlorine is detected, add sodium thiosulfate to remove the chlorine. Add 1-mL 10% sodium thiosulfate solution per liter. Addition of sodium thiosulfate solution to the sample container may be performed in the laboratory or prior to field use. The paper will react to free Iodine/Chlorine and peroxides in solution. Lower levels react with strip at 5 - 10 ppm. Chlorine reacts immediately. Initial reactions show a slight

blue color, while higher concentrations turn the strip from dark blue to purple. Upper limits for chlorine are between 400 to 450 ppm. If the paper indicates the presence of chlorine sodium thiosulfate is added. If no chlorine is detected no sodium thiosulfate is added.

4.3 Soil / sediment samples are collected in 4 - 8 ounce jars with Teflon lined caps. The samples are stored in a dark walk-in cooler at 4° C. Thirty grams of sample is required for extraction and ten grams is required to determine the percent solids. One hundred grams should be provided so samples can be re-extracted when necessary. ***Soil / Sediment samples must be extracted within 14 days of date sampled (One year for MCP samples; indefinite for SW-846 samples)***.

4.4 All extracts are stored in 2ml Teflon capped vials in the extract storage refrigerator located in the SVOA lab. These extracts are stored at 4°C and must be analyzed within 40 days of date extracted.

5.0 INTERFERENCES AND POTENTIAL PROBLEMS

5.1 Sources of interference in this method can be grouped into three broad categories: (1) contaminated solvents, reagents or sample processing hardware; (2) contaminated GC carrier gas, parts, column surfaces or detector surfaces; and (3) the presence of co-eluting compounds in the sample matrix to which the ECD will respond. Interferences co-extracted from the samples will vary considerably from waste to waste. While general cleanup techniques are referenced or provided as part of this method, unique samples may require additional cleanup approaches to achieve desired degrees of discrimination and quantitation.

5.2 Interferences by phthalate esters introduced during sample preparation can pose a major problem in PCBs determinations. Common flexible plastics contain varying amounts of phthalate esters that are easily extracted or leached from such materials during laboratory operations. Cross-contamination of clean glassware routinely occurs when plastics are handled. Avoiding contact with any plastic materials and checking all solvents and reagents for phthalate contamination can best minimize interferences from phthalate esters.

5.3 Glassware must be scrupulously cleaned as soon as possible after use by rinsing with the last solvent used. Follow by detergent washing with hot water and rinses with tap water. Rinse with methanol and drain. Store dry glassware in a clean environment.

5.4 Cleanup by acid partitioning (SOPs 50_3665A/3665M) is suggested for PCB samples that are extremely contaminated with particulate and oxidizable organics.

5.5 It may be difficult to quantitate Aroclor patterns and single component PCBs together. Guidance on the identification of PCBs is given in Section 8.0.

6.0 EQUIPMENT/APPARATUS

6.1 **Gas chromatograph**: an analytical system complete with gas chromatograph suitable for on-column and split/split-less injection and all required accessories including syringes, analytical columns, gases, electron capture detectors (ECD) and DOS based PC system interfaced to the GC with HP Chemstation ND EnviroQuant software.

6.1.1 **Wide-bore Columns**:

6.1.1.1 **Column 1**: RTX-CL Pesticide column I. 30 m x 0.32 mm ID (or 0.53 mm ID, if needed; GCs -3, -6, -7) fused silica capillary column.

6.1.1.2 **Column 2**: RTX-CL Pesticide II column. 30 m x 0.32 mm ID (or 0.53 mm ID, if needed; GCs -3, -6, -7) fused silica capillary column.

6.1.1.3 Other 0.32mm ID column combinations may be used including a DB-608 with a DB-XLB.

6.1.2 **Miscellaneous Instrument Parts**:

6.1.2.1 Single Goose-neck glass liners from either HP or Restek.
6.1.2.2 Gold Seals and Washers (HP 05971-27305)
6.1.2.3 Graphite Ferrules (0.53mm.)
6.1.2.4 O-rings (HP #5180-4182)
6.1.2.5 HP ceramic tiles for cutting columns.

6.2 **10 ul** Glass bore Injector **Syringe**.

6.3 **Volumetric flasks** – Class A.

6.4 **Class A pipettes** – 5 ml, 8 ml, 25 ml.

6.5 **Sample vials**: glass with Teflon-lined crimp tops, 2.0ml.

6.6 **Syringes** -25 ul, 100 ul, 500 ul, and 1000 ul .

6.7 Teflon-lined crimp tops, 2.0ml

6.8 **Data system**:

6.8.1 **Computers** Computers: Computer systems are networked to a Windows 2012 R2 server. Daily backups to disk are done at 3:45 AM. Full backups are per-formed on Saturday and differential backups Sunday through Friday. We keep 14 disk backups on disk. Full disk backups are copied to tape on Sundays. We keep the weekly tapes for 4 weeks, the monthly tapes for 4 months, the quarterly tapes for 4 quarters, and the yearly tapes for 10 years.

6.9 **Software:** HP/Agilent Environmental Chemstation - The software is interfaced to an electron capture detector and allows the continuous acquisition and storage on machine-readable media of chromatograms obtained throughout the instrument program. The software integrates the abundance in any EICP between specified times. Current versions SVOA ECD5:G1045A 01.00, SVOA ECD1/3:G1045A C.01.00 and SVOA ECD6:G1701DA D.00.01.27.

7.0 REAGENTS AND STANDARDS

7.1 **Reagents**: All reagents should be reagent grade or pesticide grade for this analysis. Unless otherwise indicated it is intended that all reagents shall conform to specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

7.2 **Solvents**:
- 7.2.1 N-hexane
- 7.2.2 Methylene Chloride
- 7.2.3 Acetone

7.3 **Standards**: Store the standard solutions (stock, composite, calibration and surrogate) at 4° C in Teflon-sealed containers in the dark, with the exception of the primary surrogate, which is stored at room temperature to prevent crystallization. In the latter case, it has been determined that the rate of surrogate standards usage is such that no loss of analytes is experienced.

7.3.1 **Primary Standards**: Expiration dates of unopened/opened primary standards are as stated in SOP 50.0006 or as stated by the manufacturer,, whichever is earlier. Copies of the certificates of analysis are on file. These certificates detail the compounds in each of the mixes. Certificates are kept on file in the laboratory. The following primary standard solutions are purchased as certified solutions.Other vendors may be used.

Primary Standard	Manufacturer	Catalog #	Conc. (ug/ml)	Secondary Standard	Manufacturer	Catalog #	Conc. (ug/ml)
Aroclor 1016	Ultra	EPA-1282	1000	Aroclor 1016	Supelco	DP4 - 8097	1000
Aroclor 1221	Ultra	EPA-1292	1000	Aroclor 1221	Supelco	DP4 - 8098	1000
Aroclor 1232	Ultra	PP-301	100	Aroclor 1232	Supelco	DP4 - 4805	1000
Aroclor 1242	Ultra	PP-311	100	Aroclor 1242	Supelco	DP4 -4806	1000
Aroclor 1248	Ultra	PP-341	100	Aroclor 1248	Supelco	DP4 - 4807	1000
Aroclor 1254	Ultra	PP-351	100	Aroclor 1254	Supelco	DP4 - 4808	1000
Aroclor 1260	Ultra	EPA-1362	1000	Aroclor 1260	Supelco	DP4 -4809	1000
Aroclor 1262	Ultra	EPA-1372	1000	Aroclor 1262	Accustandard	C-262S-H-10X	1000
Aroclor 1268	Ultra	EPA-1382	1000	Aroclor 1268	Accustandard	C-268S-H-10X	1000
TMX/DCB Surr	Accustandard	CLP-032-R	200				

7.3.2 **Stock standards** are used to prepare multi-component standards. These are stored in 40 ml glass vials with Teflon lined caps for a maximum of one year from the date of preparation.

7.3.2.1 **Stock 1660 (1016/1260)**: 500 µl of each primary standard (Aroclor 1016 and 1260 from Ultra) and 100 µl of the surrogate mixture, are added to a 10 ml volumetric flask and diluted to the 10 ml mark with hexane.

7.3.2.2 **Second Source Stock 1660 (1016/1260)**: 50 µl of each primary standard (Aroclor 1016 and 1260 from Supelco) and 10 µl of the surrogate mixture, are added to a 50 ml volumetric flask and diluted to the 50 ml mark with hexane (Final Conc 1016/1260 is 50,000µg/L & Surrogate is 2000 µg/L).

7.3.2.3 **Stock 1221, 1232, 1242, 1248, 1254, 1262, and 1268**: Each stock is prepared separately as follows: 0.5 ml of the primary standard (for 1221, 1262 and 1268 use 100µl) and 10 µl of the surrogate mixture are added to a 50 ml volumetric flask and diluted to 50 ml with hexane (Final Conc Arochlors is 1000µg/L & Surrogate is 40 µg/L).

7.3.2.4 **Second Source Stock 1221, 1232, 1242, 1248, 1254, 1262, and 1268**: Each stock standard is prepared separately as follows: 50 uL of the secondary standard and 10 ul of the surrogate mixture are added to a 50 ml volumetric flask and diluted to 50 ml with hexane. (Final Conc Arochlors is 1000µg/L & Surrogate is 40 µg/L).

7.3.2.5 **Surrogate Stock TCX/DCB**: 0.5 ml of primary standard (TCX/ DCB Pest. /PCB Surrogate from Accustandard), are added to a

200 ml volumetric flask and diluted to the 200 ml mark with acetone. Final concentration of 0.5 ug/ml. Used as the surrogate spiking solution.

7.3.3 **Aroclor Working standards:** Store standards in 15 ml glass vials (2 ml target vials when 1 ml prepared) with Teflon lined caps. Standards expiration is six months. Concentrations should correspond to the expected range of concentrations found in real samples and bracket the linear range of the detector. They are used for the initial calibration procedure.

7.3.3.1 **Aroclor 1016 and 1260 (1660) Initial Calibration Standards**: The concentrations should correspond to the expected range of concentrations found in real samples and bracket the linear range of the detector. They are used for the initial calibration procedure. A set of 6 levels is prepared in volumetric glassware and diluted to mark with hexane. Working standards are prepared from the stock 1660 standard (7.3.2.1).

Level	Standard used	Initial Conc.	Amount added	Final volume	Final Conc.
1	stock 1660	Aroclor 50,000ug/L Surr. 2000 ug/L	25 ul	25.0 ml	Aroclor 50ug/L Surr. 2 ug/L
2	Stock 1660	Aroclor 50,000ug/L Surr. 2000 ug/L	50 ul	25.0 ml	Aroclor 100ug/L Surr. 4 ug/L
3	Stock 1660	Aroclor 50,000ug/L Surr. 2000 ug/L	250 ul	25.0 ml	Aroclor 500ug/L Surr. 20 ug/L
4	Stock 1660	Aroclor 50,000ug/L Surr. 2000 ug/L	1000 ul	50.0 ml	Aroclor 1000ug/L Surr. 40 ug/L
5	Stock 1660	Aroclor 50,000ug/L Surr. 2000 ug/L	800 ul	25.0 ml	Aroclor 1600ug/L Surr. 64 ug/L
6	Stock 1660	Aroclor 50,000ug/L Surr. 2000 ug/L	1000 ul	25.0 ml	Aroclor 2000ug/L Surr. 80 ug/L

7.3.4 **ICV/BS/BSD/MS/MSD Solution**: The spike solutions are prepared in Acetone as follows.

Analyte	Vendor	Initial Conc.	Amount Added	Final Volume	Final Conc.
Aroclor 1016 Aroclor 1260 or project specific Aroclor	Supelco	1000 ug/ml	2 ml each	200 ml	10 ug/ml

7.3.4.1 Surrogate solution (7.3.2.3) is added to each sample, method blank, blank spike, blank spike duplicate, matrix spike and matrix spike

duplicate with a 1 ml calibrated syringe. See the appropriate extraction method for volumes.

7.3.4.2 The PCB ICV/BS/BSD/MS/MSD spike solution (7.3.4) is added to each blank spike, blank spike duplicate, matrix spike, and matrix spike duplicate with a 1 ml calibrated syringe. Unless otherwise requested by the client, ESS Laboratory uses the Aroclor 1660 spike mix. See the appropriate extraction method for volumes.

8.0 PROCEDURE

8.1 Extraction:

8.1.1 In general, water samples are extracted at a neutral pH (5.0-9.0; adjust as needed) with methylene chloride as a solvent using a separatory funnel (SOP 50_3510). Extract solid samples with methylene chloride-acetone (1:1) using the Soxhlet extraction (50_3540) or microwave extraction (SOP 50_3546) procedures. Oil samples are diluted with Hexane using the waste dilution extraction procedure (50_3580).

NOTE: 1:1 Hexane/acetone (replacing 1:1 methylene chloride-acetone) may be more effective as an extraction solvent for organochlorine PCBs in some environmental and waste matrices than is methylene chloride/acetone. Use of hexane/acetone generally reduces the amount of co-extracted interferences and improves signal/noise.

8.1.2 Spiked samples are used to verify the applicability of the chosen extraction technique to each new sample type. Each sample type must be spiked with the compounds of interest to determine the percent recovery and the limit of detection for that sample. See section 10.0 for guidance on demonstration of initial method proficiency as well as guidance on matrix spikes for routine sample analysis.

8.2 Cleanup/Fractionation:

8.2.1 Cleanup procedures may not be necessary for a relatively clean sample matrix, but most extracts from environmental and waste samples will require additional preparation before analysis. The specific cleanup procedure used will depend on the nature of the sample to be analyzed and the data quality objectives for the measurements.

8.2.1.1 When PCBs are to be measured in a sample, Acid Partitioning (SOPs 50_3665A/3665M) is recommended. This is followed with Sulfur Cleanup by Copper (SOP 50_3660) or GPC (SOP No. 50_3640A).

8.3 **Instrument Set Up**:

8.3.1 Typical operating conditions are as follows:

Inlet	EPC	Split/Splitless
Carrier gas	Helium	Hydrogen
Make-up gas	Nitrogen	Nitrogen
Head Pressure	6-7 psi	9 psi
Total Flow	70-100 ml/min	70-100 ml/min
Column Flow (0.32 column)	2-3 ml/min	2-3 ml/min
Detector Makeup Pressure	45-50 psi	45-50 psi
Detector Makeup Flow	50-60 ml/min	50-60 ml/min
Temperature program:		
Injector temperature	250°C	250°C
Detector temperature	320°C	320°C
Initial temperature/Time	130°C for 1 min	130°C for 1 min
Ramp	18°C/min	18°C/min
Final temperature/Time	310°C for 4 min	310°C for 4 min

Conditions may change; e.g. GC-5 uses Methane/Argon as a detector makeup gas.

8.4 **Initial Calibration**:

NOTE: When PCBs are to be quantitatively determined as Aroclors, the initial calibration consists of two parts:

1) A standard containing a mixture of Aroclors 1016/1260 (1660) will include many of the peaks represented in the other seven Aroclor mixtures. Consequently, such a standard is used to demonstrate the linearity of the detector and that a sample does not contain peaks that represent any one of the Aroclors. This standard is also used to determine the concentrations of either Aroclor 1016 or 1260 when present in a sample. Therefore, an initial 6-point calibration is performed using the mixture of Aroclors 1660.

2) Standards of the other seven Aroclors are necessary for pattern recognition. These standards are also used to establish a single-point calibration factor for each Aroclor, after the Aroclor 1660 mixture has been used to describe the detector response. The standards for these seven Aroclors should be analyzed before the analysis of any samples, and may be analyzed before or after the analysis of the six 1660 standards.

8.4.1 ESS Laboratory's policy is that the audit trail on the Chemstation/Enviroquant software is always on. This ensures that any changes made to the instrument operating method be documented through the audit trail.

8.4.2 All acceptance criteria for initial and continuing calibration apply to both the primary and secondary columns.

8.4.3 **Priming the Column**: Once the chromatographic system operating conditions have been established, calibration may begin. Because of the low concentration of PCB standards injected on a GC/ECD, column adsorption may be a problem when the GC has not been used for a day or more. Therefore, the GC column may be primed or de-activated by injecting a PCB standard mixture approximately 20 times more concentrated than the mid concentration standard. Inject this standard mixture prior to beginning the initial calibration or calibration verification.

CAUTION: Carryover may be observed in the injection just following this system priming. Always run an acceptable blank prior to running any standards or samples.

8.4.4 **Loading the instrument**: All standards and samples are transferred with disposable pipettes into 2 ml target vials designed to fit the HP auto-sampler. The target vials are labeled with the ID of the standard or sample using a fine point marker. The tray on the auto-sampler is numbered 1-100. The instrument is set up with two independent injection systems, which means that the contents of one vial can not be injected into both injection ports at the same time. The 6-level standards are placed in slots 1-6. This is the standard setup for the calibration standards. Vials can be placed in different slots as long as the slot number is written in the logbook.

8.4.5 **Log Book**: All samples set up on the instrument must be entered into the run logbook. All logbook entries are done prior to sample analysis. Logbooks consist of excel spreadsheets stored on the network. The logbook must be filled out completely with the date, vial number (slot number), computer file number, method number, ESS lab ID, and the initials of the analyst setting up the instrument.

8.4.5.1 Date includes the day, month, and year.

8.4.5.2 Vial number: This field has to be filled in for each entry.

8.4.5.3 Computer file ID is an abbreviation of the path and file associated with a particular vial number. (e.g. vial #3 analyzed on 3/12/05 has a computer file ID of 031205003)

8.4.5.4 The ESS Lab ID includes the ID of the standards, samples and all QC samples.

8.4.5.5 The Initials are signed by the analyst setting up the instrument.

8.4.5.6 The Comment section is a summary of calibration results, dilution information, and any unusual observations. (Ex.: carry over information into the sample, retention time shift, calibration standard is less than 15% Recovery, dilution information, CCV injection time, etc...)

8.4.5.7 The Method section is the method in the chromatographic software used to operate the instrument. All 6-level standards are injected like the sample using the instrument set-up criteria in section 8.3.

8.4.6 **Starting a run with Chemstation Software**: The GC is controlled through Chemstation. The methods are set up with the instrument set-up information from section 8.3. All of the operating parameters are saved in Chemstation under method file ID's. The P8082 method operates the front and rear injectors. These methods are saved in the C:\HPCHEM\ directory. A copy of the Chemstation method is in **Attachment** A. To run the instrument:

8.4.6.1 Open the Chemstation icon. From the Chemstation Menu select Sequence.

8.4.6.2 In Initial Setup type the name of the directory where data will be stored. The directory file is Q:\SVOA\Instr\Data\MMYY\Date. (e.g. If samples were set up to run on 9/8/05 on GC5 then the directory would be called Q:\SVOA\GC5_gg\Data\gg0905\gg090805)

8.4.6.3 In Analytical Sequence, type in the vial numbers that correspond to when the front and rear injectors will start and stop analyzing.

8.4.6.4 In the Sample List type in the IDs of the samples and standards next to the corresponding vial numbers.

8.4.6.5 Select Save to save the newly created sequence. Save the sequence with the day created or the ID. (e.g.: A sequence saved on Monday is saved as Mon.s. Sequences do not have to be saved and can be

easily recreated. Saving a sequence can save time if for any reason the analytical sequence needs to be restarted due to an instrument or computer malfunction.

8.4.6.6 Start the analysis by selecting RUN Analytical Sequence.

8.4.6.7 A Chemstation data file will be created for each sample and standard. These files will be stored in the directory C:\HPCHEM\1\data.

8.4.7 Reviewing the Initial Calibration Data: All GC Chemstation Data is reduced with the EnviroQuant software. (Refer to EnviroQuant Operator's Manual).

8.4.7.1 Setting up an EnviroQuant Method: All PCB methods are set up as documented in **Attachment** A. With each new calibration, the response and absolute retention times are updated. The absolute retention times are from the **Aroclor level 4 standards**.

8.4.7.2 Updating a New Initial Calibration:

8.4.7.2.1 Load the Aroclor method with parameters set according to 8.4.7.1.

8.4.7.2.2 Save the method using a unique identification such as 8082AD (the next initial calibration will be saved as 8082AE, then 8082AF, etc.). Note that the ID of this new method is written in the Method column of the RUN log next to the Initial Calibration Standard ID's)

8.4.7.2.3 Convert all Chemstation Files to EnviroQuant files.

8.4.7.2.4 Load **the Level -4** standard file for the 1660. Go into QEDIT and correctly integrate all of the peaks. Three to five peaks must be integrated for each Aroclor. Choose peaks that are at least 25% of the height of the largest Aroclor peak.Qdelete any false positives. Go into the initial calibration and update the absolute retention times and responses. Each of the Aroclors must resemble the patterns of chromatograms in **Attachment** C. If the pattern of an Aroclor does not match then refer to the following table:

8.4.7.2.5

Problem	Corrective Action
Wrong standard injected	Check sequence: setup section 8.4.6. Make sure standards are correctly placed on tray.
Contaminated standard	Inject another aliquot of standard. If that doesn't work, remake standard.
Standard prepared incorrectly	Remake standard
A dirty injection port	Perform maintenance. Refer to section 18.0

8.4.7.2.6 For Standards levels 1,2,3,5,6 only update responses.

8.4.7.2.7 The software calculates the average response factor from the 6-level curve. (See calculations 9.0) The %RSD of the response factor in each of the 6-levels is calculated and must be less than 20%. A minimum of 5 levels must be used for method 8082. (must be less than 10% in Method 608 with a minimum of 3 levels.) The lowest level used must be at or below the reporting limit. If any of the PCBs are outside of this criterion, check the data setup in the EnviroQuant software and review the integration of each of the 6-levels and make sure all responses were correctly updated. If manual integrations need to be made, update responses again.

8.4.7.2.8 When updating responses, all peaks in each level should fall within the retention time windows established according to section 8.5. If the peaks have drifted outside of the retention time windows then the initial calibration is not acceptable. This peak drift is usually due to a carrier gas leak or clog in a gas line. Most leaks come from the injection port. To correct a leak, start by tightening all connections, including the column nut, gold seal and insert retainer nut. If this doesn't work, go to section 18.0 and replace the ferrule, the septa, and the o-ring with a new one. In some cases, the gooseneck liner will get clogged with a piece of septa. Inspect the liner for pieces of septa. If the problem persists, consult with supervisor or a service representative. Once the problem has been corrected, reanalyze the entire initial calibration

8.4.7.2.9 For those analytes of interest which are greater than 20% RSD (20% for Method 608.3), use a linear calibration. The linear calibration is a regression equation that does

not pass through zero. See Calculations in section 9.0. The instrument response is treated as the dependent variable (y) and the concentration as the independent variable (x). The regression will produce the slope and intercept terms for a linear equation in the form:

$$y = ax + b$$

Where:

y= instrument response (peak area)
a= Slope
x= Concentration
b= intercept

8.4.7.2.10 The regression calculation generates a linear least squares regression ($r \geq 0.995$) or a non-linear regression ($r^2 \geq 0.99$) In the latter case, a six point minimum calibration shall be used for second order and a seven point minimum calibration shall be used for third order.

8.4.7.2.11 Once all integrations are correct, the %RSD is less than 20%, $r \geq 0.995$ or $r^2 \geq 0.99$ and all standards are within the RT windows, resave the method.

8.4.7.2.12 Evaluate quantitation at the low standard. This is the standard at the reporting limit. Typically PCB aroclors are reported to the 100 ppb standard. Make a copy of the low standard file and requant the copy. Requanting the low standard should produce results within 70-130% of the true value. The calibration range, switching between an average and linear calibration, the standards, and the condition of the instrument will affect this result. If these criteria are not met, make the appropriate corrections (ie maintainance) and recalibrate.

8.4.7.2.13 Document all maintenance performed in the instrument maintenance log.

8.4.7.2.14 After the 1660 initial calibration curve has been established the analyst will analyze a 1000 ug/L second source standard to confirm the calibration. The second source must be within 20% (Method 608) of the known value. The acceptance criterion for MADEP CAM is 20%.

8.4.7.2.15 Each of the remaining 7 Aroclor stock standards are analyzed to establish a one point calibration with the corresponding second source for each used for confirmation. These Aroclor methods will be used to quantitate samples until the next 1660 initial calibration.

8.4.7.2.16 Use this new method to analyze samples and continuing calibration standards (calculate and generate report).

8.5 Retention Time Windows

8.5.1 Retention time windows are central to the identification of 3 to 5 peaks used to identify an Aroclor. Absolute retention times are used for compound identification in all GC and HPLC external standard methods. Retention time windows are established to compensate for minor shifts in absolute retention times as a result of sample loadings and normal chromatographic variability. The width of the retention time window should be carefully established to minimize the occurrence of both false positive and false negative results.

8.5.2 Determining Retention Time Windows:

8.5.2.1 Before establishing retention time windows, make sure that the chromatographic system is operating reliably and that the system conditions are optimized for the target analytes and surrogates in the sample matrix to be analyzed.

8.5.2.2 Make three injections of the mid-range CCV Aroclor over the course of a 72-hour period. Serial injections or injections over a period of less than 72 hours may result in retention time windows that are too tight.

8.5.2.3 Record the retention time in minutes for each peak used for quantitation and surrogate to three decimal places. Calculate the mean and standard deviation of the three absolute retention times for three to five peaks used for calibration or identification and each surrogate.

8.5.2.4 If the standard deviation of the retention times for any peak used for calibration is 0.000 (i.e., no difference between the absolute retention times), then use a default standard deviation of 0.01 minutes. The width of the retention time window for three to five peaks used for calibration or identification and surrogates is defined as ± 3 times the

standard deviation of the mean absolute retention time established during the 72-hour period or 0.03 minutes, whichever is greater.

8.5.2.5 Establish the center of the retention time window for each Aroclor peak and surrogate by using the absolute retention time for each peak and surrogate from the mid-range CCV (Level 4 standard) at the beginning of each analytical shift. For samples run during the same shift as an initial calibration, use the retention time of the mid-point standard of the initial calibration.

8.5.2.6 Absolute retention time windows must be calculated for each Aroclor peak and surrogate on each chromatographic column and instrument used.

8.5.2.7 New retention time windows must be established when a new GC column is installed or when GC column has been shortened during maintenance.

8.5.2.8 Typically all PCB extracts are acid washed prior to analysis. In cases where an acid wash is not performed, a DDT/DDD/DDE standard must be analyzed to ensure that no aroclor peaks interfere with these analytes. If aroclor peak coelute with DDT,DDE or DDE adjust GC conditions to obtain better resolution.

8.6 Surrogates are added to each sample, blank, QC sample and calibration standard. Surrogate retention times in the calibration standards are useful in tracking retention time shifts. Whenever the observed retention time of a surrogate is outside of the established retention time window for standards, the analyst is advised to determine the cause and correct the problem before continuing analyses.

8.7 **Sample Analysis**: Once the initial calibration has passed all of the quality control criteria. Sample analysis may begin. All samples and standards must be run under the same conditions as the initial calibration.

8.7.1 **Sequence of Analysis:** Prior to sample analysis, calibration verification (CCV) standards are analyzed. The CCV is the AR1660 Level 4 standard. ESS Laboratory analyzes four most common Aroclors, (**AR1242, AR1248, AR1254, and AR1660**) at the level 4 standard concentration. AR1660 is used to verify the initial calibration. The other Aroclors are analyzed for pattern recognition. Samples are immediately analyzed after the standards. Samples include the method blank, blank spike, blank spike duplicate, samples, matrix spikes, and matrix spike duplicates. Samples cannot be analyzed more than 12 hours after the first standard is injected and no more than 20 samples can be analyzed within that 12 hour period.

The calibration must also be verified at the end of each analytical sequence. The continuing calibration verification consists of the same four stock standards. The continuing calibration verification at the end of each analytical sequence consists of the Aroclor 1660 stock to verify detector response. If samples contain AR1221, AR1232, AR1262 or AR1268, samples must be re-analyzed and bracketed with the appropriate standards.

NOTE: Analysis of a second source calibration verification standard is performed immediately after initial calibration in place of the CCV.

NOTE: It is not acceptable practice to group QC samples together and/or to analyze QC samples on one instrument and their associated samples on another instrument. Analyst must try to analyze batch QC samples, as capacity allows, along with their associated field samples.

8.7.2 **Loading calibration standards and samples**: See section 8.4.3.

8.7.3 **Log Book entries**: See section 8.4.4.

8.7.4 **Running Continuing Calibration Standards and Samples with Chemstation Software:** See section 8.4.5

8.7.5 **Reviewing Continuing Calibration Standard and Sample data:** The AR1660 CCV is quantitated using the average response factor from the 6-point calibration. The calibration factor for each peak *should* not exceed a ±20 percent difference/drift when compared to the initial calibration curve (20% for CAM). For method 608.3 the average %D of 3-5 peaks from each Aroclor ***must*** not exceed ±20 %D. For the remaining Aroclors a single point (mid-level) standard is analyzed. All GC Chemstation data is reduced with the Enviroquant Software. NOTE: % Difference is used when average response factors are used in the initial calibration and % Drift is used for linear regression. (Refer to Hewlett Packard's EnviroQuant Operators Manual)

8.7.5.1 Update the AR1660 Method with the initial AR1660 Continuing Calibration standards:

8.7.5.1.1 Open the Enviroquant Icon on the computer connected to the instrument that ran the samples and standards.

8.7.5.1.2 Load the method with the initial calibration data that corresponds to the time and place where the samples and

standards ran. See section 8.5.6. Usually this is the last method entered into the logbook.

8.7.5.1.3 Convert all Chemstation files to Enviroquant Files

8.7.5.1.4 Load the appropriate Aroclor standard that ran just prior to the first sample set up in the analytical sequence. Go into QEDIT and correctly integrate all of the peaks. Qdelete any false positives. Go into the initial calibration and update the absolute retention times only. **Do not update responses!** If the pattern of the Aroclor does not match the corresponding pattern in **Attachment** C then refer to the table in section 8.5.6.2.4.

8.7.5.1.5 Save the updated method according to section 8.5.6.2.2.

8.7.5.1.6 Perform the same procedure (8.7.5.1.1-8.7.5.1.5) for the other Aroclors as needed (only update retention times).

8.7.5.2 Reviewing the Continuing Calibration Standards:

8.7.5.2.1 Use the method updated in section 8.7.5.1.5 to analyze (calculate and generate report) the AR1660 calibration standards which ran before and after the samples of interest.

8.7.5.3 If the retention times have shifted, see section 8.4.6.2.7. All of the retention times must also be within the established Retention Time windows (see section 8.5.6.1.1). When these criteria are exceeded, inspect the gas chromatographic system to determine the cause and perform whatever maintenance is necessary before verifying calibration and proceeding with sample analysis. (See section 8.3) If routine maintenance does not return the instrument performance to meet the QC requirements based on the last initial calibration, then a new initial calibration must be performed.

8.7.6 Sample injection may continue for as long as the calibration verification standards and standards interspersed with the samples meet the QC requirements. The sequence ends when the standards which follow a set of samples have been injected or when qualitative and/or quantitative QC criteria are exceeded.

8.7.6.1 Each sample analysis must be bracketed with an acceptable initial calibration and ICV or calibration verification standard(s) (each 12

hour shift), followed by another set of calibration standards. All samples that were injected after the standard that last met the QC criteria must be re-injected.

8.8 Sample Data Reduction:

8.8.1 All samples bracketed within acceptable AR1660 calibration standards are analyzed by the same method used to analyze the standards. If Aroclors other than 1016 or 1260 are present, single point calibration standards analyzed just prior to the samples. The initial calibration generated with the current 1660 initial calibration is used for quantitation. Through EnviroQuant, a quantitation report and chromatogram is generated for each sample.

8.8.2 The EnviroQuant software will tentatively identify Aroclor 1016 or 1260 only when a peak from a sample extract falls within the daily retention time windows.

8.8.3 The analyst must carefully review the chromatograms to ensure that all peaks were identified correctly. If there is interference in the sample and the chromatograms are not very clean, the analyst must go into Qedit section of the software to review the integrations.

8.8.3.1 Each blank, blank spike, blank spike duplicate, sample, matrix spike, and matrix spike duplicate should have surrogates identified. If the surrogate has not been identified, go into Qedit and integrate the peak in the surrogate retention time window. In some cases, surrogates can not be identified due to interferences from unknown components that elute at the same time as the surrogate. This must be noted in the case narrative. If the surrogates are outside the retention time window, then the retention times have shifted. This is either due to a gas leak, a clog in the gas line, or the sample matrix. When this happens, the sample must be re-analyzed. Oily samples can cause retention time shifts. The analyst may need to dilute sample to aid in identification (reduce matrix affect) but to meet reporting limit of 1 ppm, the sample result must be quantitated on the undiluted sample.

8.8.3.2 The analyst must also review the baseline on all sample and standard chromatograms. A baseline rise will result from contamination of the injection port and column. When the baseline interferes with sample and standard analysis, samples and standards must be re-analyzed. Attempt to isolate the sample or samples that contaminated the

system. These samples should be cleaned with florisil or re-analyzed with a dilution.

8.8.3.3 Late eluting compounds can carryover from sample to sample or sample to standard. Large unresolved peaks in a sample are a good indication of carryover. If carryover occurs, first identify the sample, which is potentially carrying over. Rerun samples with carryover contamination. Run instrument blanks, consisting of clean hexane, after the sample that carried over until carryover is eliminated. In cases when carryover is too great, the sample may need to be cleaned up further or diluted.

8.8.4 The on-column concentration of each Aroclor peak for Aroclor 1016 and 1260 in the sample is provided on the quantitation report along with the surrogate concentrations. The concentration is in ng/ml. If there are no peaks that resemble an Aroclor according to the sample chromatogram then Aroclors are not present in the sample

8.8.5 If there is a group of peaks that resemble an Aroclor in **Attachment** C then that Aroclor standard must be analyzed before and after the sample. To quantitate an Aroclor, first make sure all of the major peaks for the specific Aroclor are present. All major peaks are specified in **Attachment** C. Next compare the pattern of the peaks in the sample to the corresponding standard which was analyzed just prior. The ratio of area counts of two major peaks in the sample should be equal to the ratios of the same peaks in the standard. In some cases the ratios will not match due to interferences from other components in the sample. Identifying interferences is the analyst's judgement. If the sample is mixed in with a difficult matrix with much interference then more than one analyst should attempt to identify the PCB. Once the analyst is convinced that the PCB is present, the Aroclor can be quantitated; otherwise, report as ND and narrate. When the match is unclear and reported as ND, the potential presence of PCB must be narrated. In this case chromatograms should be provided. Use three-five peaks for quantitation. The peaks with the least amount of interference should be used for quantitation. The ratio between the three-five peaks should also come close to matching the standard. The software is set up to quantitate each peak individually. The ratio is comparable when the quantitation of each peak generates the same value. If the average Aroclor concentration is below the calibration range then it cannot be reported as detected.

8.8.6 If the average Aroclor concentration is above the MDL and below the level 6 concentration, then the result is tentative and must be confirmed.

8.8.7 If the average Aroclor concentration is above the level 6 concentration, then the sample needs to be diluted to bring the concentration of the analyte to within the level 1 and level 6 ranges.

8.8.8 A PCB Aroclor is confirmed by performing the same analysis on a different column. If the sample was initially analyzed on an RTX-CL Pesticide column I and there was an analyte detected above the method detection limit, the sample must be confirmed on an RTX-CL Pesticide Column II. The reverse also holds true.

8.8.9 The final result is determined by comparing the initial analysis with the confirmation analysis.

8.8.9.1 If, on the confirmation analysis, the sample is at a concentration less than the method detection limit (MDL), then the result is reported as not detected (ND) above the method reporting limit (MRL). The MRL is based on the level 1 calibration standard concentration. **Discussion to be included in project narrative.**

8.8.9.2 If the confirmation result is within calibration range, the result has been confirmed. The initial result is compared to the confirmation result and if the RPD< 40%, then the higher result is reported. If the RPD > 40%, the analyst must evaluate the chromatogram for co-eluting peaks. If no co-elution is detected and all other QC is within criteria, report the higher result (lower result for Method 608.3). If co-elution was present, the analyst is to report the result without co-elution and an explanation is to be added to the case narrative.

8.8.9.3 If the confirmation results are at a concentration greater than the level 6 standard, then a dilution must be made. Dilutions should be 60-80% of the highest standard. The sample dilution is analyzed. The criterion stated in 8.7.9.2 is applied to the two results.

NOTE: ESS Laboratory normally uses level 2 to determine the MRL of soil samples but reserves the option of utilizing the level 1 standard.

9.0 CALCULATIONS

9.1 Calculate PCB soils as follows:

$$\text{PCB Result ug/Kg} = \frac{\text{(Avg Concentration of 3-5 Peaks ppb)(Extract Volume ml)(Dilution)}}{\text{(\% Solid/100)(Weight of Sample Measured g)}}$$

9.2 Calculate PCB aqueous as follows:

PCB Result ug/L = (Avg Concentration of 3-5 Peaks ppb)(Extract Volume ml)(Dilution)
Volume of Sample in ml

9.3 Calculate PCB matrix spike recoveries as follows:

9.3.1 Matrix spike added is calculated as follows:

Matrix Spike Added = (Conc. of Spike)(Volume of Spike Added)
Initial Volume

NOTE: Initial volume can be in liters or grams. If it is a soil make sure to multiply initial volume by % solids/100.

9.3.2 Matrix spike % recovery is calculated as follows:

% Recovery = Matrix Spike Result X 100
Matrix Spike Added

9.4 For surrogate recoveries, % RSD and all other calculations done by the computer's software refer to Hewlett Packard © 1992 printed in USA 11/92 Part No. HP G1032-90020.

9.5 Calibration Factor (CF)

CF = Peak Area / Mass of Compound Injected

9.6 Percent Relative Standard Deviation:

% RSD = (SD / Average CF) x 100%

Where: SD = standard deviation (o-1)

9.7 Percent Difference: % D = ((CFv – CF ave) / CF ave) x 100%

Where:
CFv = Calibration Factor of the verification standard.
CF ave = The mean calibration factor from the initial calibration.

9.8 Percent Drift:

% Drift = Calculated Concentration – Theoretical Concentration x 100%
Theoretical Concentration

10.0 QUALITY ASSURANCE/QUALITY CONTROL

10.1 Immediately after the initial calibration, a second source standard (ICV) is analyzed. This standard is prepared at the level 4 concentration. The percent recovery between the Level 4 in the initial calibration and the second source must be 80-120%. If the percent recovery is outside criterion, then prepare and re-analyze the ICV. If the second consecutive ICV is still outside criterion, then a new initial calibration must be performed with freshly prepared calibration standards. Maintain instrument when necessary. Sample analysis cannot begin until a valid second source has been analyzed.

10.2 **Accuracy and Precision**: All laboratory personnel must demonstrate initial proficiency for each sample preparation method/matrix that he/she performs. All new employees must successfully demonstrate initial proficiency prior to independently performing analysis on real samples. This must be accomplished by generating data of acceptable accuracy and precision for target analytes in a clean matrix. The initial proficiency results will become part of each employee's training file

10.2.1 QC Sample Preparation: Four QC samples must be prepared from a spiking solution with the analytes of interest. The spiking solution must be made using standards **prepared independently from those used for calibration**. The samples must be prepared at a concentration that would result in data falling at the mid-level standard of the calibration curve. In most cases the blank spike solution is used. Prep: The samples are prepared in a clean matrix (DI water for aqueous samples and Ottawa sand or Sodium sulfate for soil/solids).

10.2.2 Sample Analysis: The four QC samples must be analyzed within the criteria of the method being evaluated. The QC samples must be handled in exactly the same manner as actual samples.

10.2.3 Accuracy Calculation: Accuracy is defined as the closeness of agreement between an observed value and an accepted reference value. Each of the four spiked samples will be calculated for percent recovery. The average of the percent recovery values is the accuracy result.

10.2.4 Precision Calculation: Precision is defined as the agreement of a set of replicate measurements without assumption of knowledge of the true value. Precision is estimated by the relative standard deviation (RSD) of the four QC samples.

$$\%RSD = (s / \bar{x})\ 100\ \%$$

to Attachment G for MADEP CAM criteria. If recovery is not within limits, the following are required:

10.6.1 Confirm that there are no errors in calculations, surrogate solutions and internal standards. Also, check instrument performance.

10.6.2 Examine chromatograms for interfering peaks and for integrated areas.

10.6.3 Recalculate the data and/or re-analyze the extract if any of the above checks reveal a problem.

10.6.4 If the same surrogate is outside limits on both columns, re-extract the sample. If both surrogates are outside limit on only one column, re-analyze the sample. A case narrative should be filled out in order to inform client.

10.7 Continuing calibration verification (CCV) must be performed at the beginning, after every 20 samples (10 field samples Method 608.3) and at the end of each analytical sequence. The response factors for the calibration should be within ±20 % difference/drift of the initial calibration (***Refer to Attachment F for 608.3 criteria; refer to Attachment F for MADEP CAM criteria***). (+/- 15% for method 608) When a CCV is out of this acceptance window, re-prep and/or re-analyze the CCV. If corrective action does not produce a second consecutive (immediate) CCV within acceptance limits, then the analyst may demonstrate the initial calibration is valid by analyzing two consecutive CCVs at two concentrations. If CCV criteria are not acceptable, then a new initial calibration must be performed. All samples analyzed after the last acceptable CCV must be re-analyzed with the following exceptions:

10.7.1 For CCVs that are exceeded high, samples with results that are non-detect may be reported. It has been shown that results would have been detected.

10.7.2 For CCVs that are exceeded low, samples with results above a regulatory limit may be reported

10.8 A matrix spike and matrix spike duplicate are analyzed with every batch of 20 samples. An MS/MSD is required on 10% of samples extracted for 608. (The acceptance limits 40-140% Recovery and ± 50% RPD for Aroclors. (MAMCP RPD <20% waters, <30% Soils) If the blank spike (BS) results are acceptable and the matrix spike/matrix spike duplicate results are outside of QC limits, note in case narrative.

10.9 Control charts are generated quarterly for blank spikes (BS) on both Soil and Water.

10.10 MDLs are determined in reagent water and Ottawa sand/sodium sulfate and verified annually. See SOP 110_0013 for complete MDL study instructions. (Project-

specific requirements may require that an MDL study be performed in the site-specific matrix.).

11.0 DATA VALIDATION

11.1 Data validation will be accomplished by reviewing all of the quality control parameters and assuring that they are within recommended ranges by completing the Data Review Checklist for GC/ECD PCB. The only exceptions made to ranges would be the following:

11.1.1 For MS/MSD, the RPD should be ≤ 50% (MA MCP RPD <20% waters, <30% Soils) (Table 1 and Attachment E). However, there are cases where duplicates may not work. If this is the case, inform client in narrative concerning sample non-homogeneity.

11.1.2 For matrix spikes, the % Recovery should be 40-140% (***Table 1 and Attachment E)***. If the matrix spike is outside criterion, check the BS/BSD. If the BS/BSDs are within limits, matrix interferences are present and should be noted in the narrative. **See Attachment F for Method 608.3 criteria.**

11.1.3 Analytical batches with Method blanks greater than or equal to the MRL will be re-prepped and re-analyzed with the following exceptions:

11.1.3.1 Samples that are that are at least twenty times higher than the method blank may be reported.

11.1.3.2 If the analyte is found in the method blank at or above the MRL, but is not in any of the associated samples, no corrective action is needed.

11.1.3.3 Any results that are reported with method blank contamination must be B-flagged and narrated.

11.1.4 For the BS/BSD, the % Recovery should be 40-140%. ***Refer to Attachment E for 608.3 criteria; refer to Attachment F for MADEP CAM criteria***. If the BS/BSD is outside this criterion, the analytical batch will be re-extracted and re-analyzed with the following exceptions:

11.1.4.1 For BS/BSDs greater than the upper control limit, samples with results below the MRL may be reported. It has been shown that the results above MRL would have been detected.

11.1.4.2 In some instances there may be insufficient sample to re-extract. The client is to be contacted for instructions on how to proceed

11.1.4.3 Any samples that are reported with invalid BS/BSD data must have a notation in the case narrative.

11.2 All unusual observations and method deviations will be noted in the narrative accompanying the data report presented to the client.

11.3 A second analyst reviews all data for accuracy. Results of this review are noted on the SVOA Sequence Log in the second level review field and in the comment section.

12.0 REFERENCES

12.1 Method 8082, Test Methods for the Analysis of Solid Waste, Third Edition, Update III.

12.2 HP GC EnviroQuant User's Guide, HPG1045A.

12.3 HP Environmental Data Analysis User's Guide HPG0032C.

12.4 HP 5890 Series II /HP 6890 GC Operations Manuals.

12.5 TNI Standard: Volume 1, Module 2 and Volume 1, Module 4.

12.5 Massachusetts DEP WSC-CAM IIA

12.6 EPA Method 608.3 (2016)

13.0 POLLUTION PREVENTION and WASTE MANAGEMENT

13.1 ESS Laboratory's policies on pollution prevention and waste management are covered in SOP 90_0002, Hazardous Waste Contingency and Emergency Response Plan. All employees are trained in the requirements of the SOP.

14.0 METHOD PERFORMANCE

14.1 Precision and Accuracy data must be generated by all employees before performing this analysis on client samples. The data is generated by analyzing a method blank and four blank spike samples. Acceptance criteria are 60-130% Recovery and %RSD of $\leq$ 30%.

14.2 The precision and accuracy data in Table 1 were developed using the Soxtherm extraction method. Values are in ug/L.

15.0 TABLES, DIAGRAMS, FLOWCHARTS, AND VALIDATION DATA

15.1 Typical Precision and Accuracy data generated 6/1/2005 using the Soxtherm extraction method (3541).

Compound	Spk	Avg	%RSD	%Rec
Aroclor 1016	5	4.68	5.9	93.5
Aroclor 1260	5	4.45	8.4	89.0

16.0 DEFINITIONS

16.1 **Accuracy**: The closeness of agreement between an observed value and an accepted reference value. When applied to a set of observed values, accuracy will be a combination of a random component and of a common systematic error (or bias) component.

16.2 **Batch**: A group of samples which behave similarly with respect to the sampling or the testing procedures being employed and which are processed as a unit. For QC purposes, if the number of samples in a group is greater than 20, then each group of 20 samples or less will all be handled as a separate batch.

16.3 **Bias**: The deviation due to matrix effects of the measured value (x_s - x_u) from a known spiked amount, where x_s is the spiked sample and x_u is the un-spiked sample. Bias can be assessed by comparing a measured value to an accepted reference value in a sample of known concentration or by determining the recovery of a known amount of contaminant spiked into a sample (matrix spike).

16.4 **Control Sample**: A QC sample introduced into a process to monitor the performance of the system.

16.5 **Equipment Blank**: A sample of analyte-free media which has been used to rinse the sampling equipment. It is collected after completion of decontamination and prior to sampling. This blank is useful in documenting adequate decontamination of sampling equipment.

16.6 **Method Reporting Limit**: The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The MRL is generally 5 to 10 times the MDL. ESS Laboratory sets the MRL to the lowest non-zero standard in the calibration curve or higher.

16.7 **Field Duplicates**: Independent samples which are collected as close as possible to the same point in space and time. They are two separate samples taken from the

same source, stored in separate containers, and analyzed independently. These duplicates are useful in documenting the precision of the sampling process.

16.8 **Blank Spike (BS)**: A known matrix spiked with compound(s) representative of the target analytes. This is used to document laboratory performance.

16.9 **Matrix**: The component or substrate (e.g., surface water, drinking water) which contains the analyte of interest.

16.10 **Matrix Duplicate**: An intralaboratory split sample which is used to document the precision of a method in a given sample matrix.

16.11 **Matrix Spike**: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

16.12 **Matrix Spike Duplicates**: Intralaboratory split samples spiked with identical concentrations of target analyte(s). The spiking occurs prior to sample preparation and analysis. They are used to document the precision and bias of a method in a given sample matrix.

16.13 **Method Blank**: An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank is carried through the complete sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process.

16.14 **Method Detection Limit (MDL)**: The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte. See SOP 110_0013 for further explanation.

16.15 **Organic-Free Reagent Water**: All references to water in the method refer to water in which an interferent is not observed in the method blank for the compounds of interest. A water purification system is used to generate organic-free deionized water.

16.16 **Surrogate**: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples.

17.0 PERSONNEL QUALIFICATIONS

17.1 Analysts who perform this analysis must have a working knowledge or quantitative and qualitative analysis, instrumental methods of analysis, chemical laboratory methods, and equipment.

17.2 All analysts, before performing any analysis, participate in the ESS Laboratory training program (SOP80_0016). The training process consists of reading the Standard Operating Procedure, gaining instruction on the procedure from an experienced analyst, and performing the initial demonstration of capability.

18.0 TROUBLESHOOTING

18.1 **Instrument Maintenance**: The following procedure is performed when the instrument is initially set up, on a weekly basis to ensure optimum performance, or when a continuing calibration has failed the QC criteria.

18.1.1 Set the GC system to room temperature.

18.1.2 Turn off oven.

18.1.3 Remove column by unscrewing the column in the injection port.

18.1.4 Remove septum nut and septa. Discard septa.

18.1.5 Remove insert retainer nut. This will expose the O-ring and glass liner. Using a set of tweezers, remove O-ring and liner. If O-ring is not distorted then set aside for later use. Otherwise, replace O-ring. Remove the glass liner. Rinse liner with methanol and scrub with a cotton swab. If the liner is visibly stained, then replace with a new one.

18.1.6 With cotton swab dipped in methanol, clean the injection port and insert retainer nut.

18.1.7 Remove the gold seal nut located on the bottom of the injection port. With a cotton swab and methanol, clean the gold seal.

18.1.8 Replace all parts in the following order:

18.1.8.1 Gold seal nut. Hand tighten and 1/4 turn with wrench.

18.1.8.2 Insert clean or new glass liner.

18.1.8.3 Place O-ring over liner. Slide O-ring over and down the liner until it fits snug against the injection port.

18.1.8.4 Replace insert retainer nut.

18.1.8.5 Place new green septa into insert retainer nut.

18.1.8.6 Replace septum nut. **Only hand tighten!**

18.1.8.7 Slide column nut and a new graphite ferrule over column.

18.1.8.8 Using a ceramic tile, cut 3-6 inches of the column. The cut must be square with no jagged edges.

18.1.8.9 Connect column to injection port by inserting 3 mm. of column into the injection port and hand-tighten column nut then adding 1/4 turn with a wrench.

18.1.9 Make sure all gases are flowing. (Measure flows with bubble meter.) The flow should be between 5 and 6 ml/min.

18.1.10 Turn on injection port temperature.

18.1.11 Set oven temperature to 120 ^{0}C and allow the system to stabilize. Bake out the oven at 320°C for an hour. Reset back to 120°C.

18.2 Record all maintenance in the instrument's maintenance logbook.

19.0 DATA MANAGEMENT AND RECORDS

19.1 **Data Management** - ESS Laboratory's utilizes the Promium Element LIMS system as part of its Data Management system. Client sample information is entered into ELEMENT LIMS and analyses are assigned to each sample. The LIMS allows EPA hold times, minimum batch QC requirements, and QC criteria to be assigned to each analysis. Standards can be entered and assigned to QC samples through the LIMS. Once analysis has been performed, data is imported using DataTool avoiding manual errors. In conjunction with Crystal Reports, the ELEMENT system allows for a wide variety of reporting formats.

19.2 **Records** – The specific retention periods required in the NELAC Standards, EPA-CFR and state and local statutes are followed or exceeded. At a minimum, data records are retained for ten years from last use (10 years for drinking water is mandatory). If there is a question about whether a record should be retained or disposed because no specific requirement could be found, the record is retained until such time as a retention period is specified. Records are stored in specified-labeled locations and are easily retrievable. All raw data associated with testing is

also retained including; computer printouts, chromatograms, review forms, and logbooks.

20.0 ATTACHMENTS

20.1 DELETED

20.2 Figure 1 – DELETED.

20.3 Attachment A – Chemstation/Enviroquant Method

20.4 Attachment B – DELETED.

20.4 Attachment C – Chromatograms of Arochlor PCBs

20.5 Attachment E - Summary of Method Quality Objectives

20.6 Attachment F – Specific QC Requirements for Method 608.3

20.7 Attachment G – Specific QC Requirements for WSC-CAM-V B

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Attachment A – Chemstation/Enviroquant Method

Method: Q:\SVOA\GC3_GE\METHODS\8082BS.MTH

Run Time Checklist

Pre-Run Program:	none
Name:	
Parameter:	
Data Acquisition:	On
Use Barcode Labels:	Off
Data Analysis:	On
Sig. 2 Mth:	none
Post-Run Program:	none
Name:	
Parameter:	

Injector Information

Injection Source:	Auto
Injection Location:	Front
Front:	
Sample Washes:	2
Sample Pumps:	3
Sample Volume:	2 stops
Viscosity Delay:	3 sec.
Solvent A Washes:	2
Solvent B Washes:	2
On-Column:	No

Purge A/B:

	Init Value	On Time (Min.)	Off Time (Min.)
A (Valve 3)	Off	0.50	0.00
B (Valve 4)	On	0.50	0.00

A - Splitless Injection:	No
B - Splitless Injection:	No

Temperature Information

Zone Temperatures:

	Set point
Inl. A	250 C.
Inl. B	250 C.
Det. A	320 C.
Det. B	320 C.
Aux.	Off

Oven Parameters:

Oven Equib. Time:	0.20 Min.
Oven Max:	340 C.
Oven	On
Cryo	Off
Ambient:	25 C.
Cryo Blast	Off

Method: Q:\SVOA\GC3_GE\METHODS\8082BS.MTH

Oven Program:

	Set Point
Initial Temp:	130 C.
Initial Time:	1.00 Min.

Level	Rate (C./Min.)	Final Temp. (C.)	Final Time. (Min.)
1	18.0	310	3.00
2(A)	0.00		
3(B)			

Next Run Time: 14.00 Min.

Signal Information

Save Data: Both

Signal 1

Source:	Det. A
Peak Width:	0.053 Min.
Data Rate:	5.000 Hz.
Start Data:	3.00 Min.
Stop Data:	29.25 Min.

Signal 2

Source:	Det. B
Peak Width:	0.053 Min.
Data Rate:	5.000 Hz.
Start Data:	3.00 Min.
Stop Data:	29.25 Min.

Valves/Relays Information

Initial Setpoints:

5890 Valves:

Valve 1:	Off
Valve 2:	Off
Valve 3 (Purge A):	Off
Valve 4 (Purge B):	On

Detector Information

Detector	Type	State
A	ECD	On
B	ECD	On

Timed Events:

Events:	Value:	Time:
Signal Switch	OFF	0.00
Signal Switch	ON	0.00

Sequence Recalibration Table

Cal. Line	Cal. Level	Update Response Factor	Update Retention Times	Recalib Interval

Signal Plot Information

Signal	Attn. (2^)	Offset (%)	Time (Min.)
1	4	10	5
2	4	10	5

Integration Events

Events:	Value:	Time:
Initial Area Reject	1	INITIAL
Initial Peak Width	0.040	INITIAL
Shoulder Detection	OFF	INITIAL
Initial Threshold	0	INITIAL

Report Specification

Destination: Report to Screen
Based on: Area
Calculations: Percent
Printer Output: None
Report Header: None

Graphics Options

Title: Vertical
Include:
- Axes Units: On
- Peak Names: Off
- Retention Times: On
- Baselines: On
- Tick Marks: On

Peak Labels Font: Default 12

Calibration Table Empty

No Calibration Settings

Method: C:\HPCHEM\1\METHODS\8082BP.MTH

Run Time Checklist

Pre-Run Program:	none
Name:	
Parameter:	
Data Acquisition:	On
Use Barcode Labels:	Off
Data Analysis:	On
Sig. 2 Mth:	none
Post-Run Program:	none
Name:	
Parameter:	

Injector Information

Injection Source:	Auto
Injection Location:	Front
Front:	
Sample Washes:	2
Sample Pumps:	3
Sample Volume:	2 stops
Viscosity Delay:	3 sec.
Solvent A Washes:	2
Solvent B Washes:	2
On-Column:	No

Purge A/B:

	Init Value	On Time (Min.)	Off Time (Min.)
A (Valve 3)	Off	0.50	0.00
B (Valve 4)	On	0.50	0.00

A - Splitless Injection:	No
B - Splitless Injection:	No

Temperature Information

Zone Temperatures:

	Set point
Inl. A	250 C.
Inl. B	200 C.
Det. A	320 C.
Det. B	320 C.
Aux.	Off

Oven Parameters:

Oven Equib. Time:	0.20 Min.
Oven Max:	360 C.
Oven	On
Cryo	Off
Ambient:	25 C.
Cryo Blast	Off

Method: C:\HPCHEM\1\METHODS\8082BP.MTH

Oven Program:

	Set Point
Initial Temp:	130 C.
Initial Time:	1.00 Min.

Level	Rate (C./Min.)	Final Temp. (C.)	Final Time. (Min.)
1	18.0	310	4.00
2(A)	0.00		
3(B)			

Next Run Time: 15.00 Min.

Signal Information

Save Data: Both

Signal 1

Source:	Det. A
Peak Width:	0.053 Min.
Data Rate:	5.000 Hz.
Start Data:	3.00 Min.
Stop Data:	29.25 Min.

Signal 2

Source:	Det. B
Peak Width:	0.053 Min.
Data Rate:	5.000 Hz.
Start Data:	3.00 Min.
Stop Data:	29.25 Min.

Valves/Relays Information

Initial Setpoints:

5890 Valves:

Valve 1:	Off
Valve 2:	Off
Valve 3 (Purge A):	Off
Valve 4 (Purge B):	On

Detector Information

Detector	Type	State
A	ECD	On
B	ECD	On

Timed Events:

Events:	Value:	Time:
Signal Switch	OFF	0.00
Signal Switch	ON	0.00

Sequence Recalibration Table

Cal. Line	Cal. Level	Update Response Factor	Update Retention Times	Recalib Interval

Signal Plot Information

Signal	Attn. (2^)	Offset (%)	Time (Min.)
1	4	10	7
2	4	10	7

Integration Events

Events:	Value:	Time:
Initial Area Reject	1	INITIAL
Initial Peak Width	0.040	INITIAL
Shoulder Detection	OFF	INITIAL
Initial Threshold	0	INITIAL

Report Specification

Destination:	Report to Screen
Based on:	Area
Calculations:	Percent
Printer Output:	None
Report Header:	None

Graphics Options

Title:	Vertical
Include:	
Axes Units:	On
Peak Names:	Off
Retention Times:	On
Baselines:	On
Tick Marks:	On
Peak Labels Font:	Default 12

Calibration Table Empty

No Calibration Settings

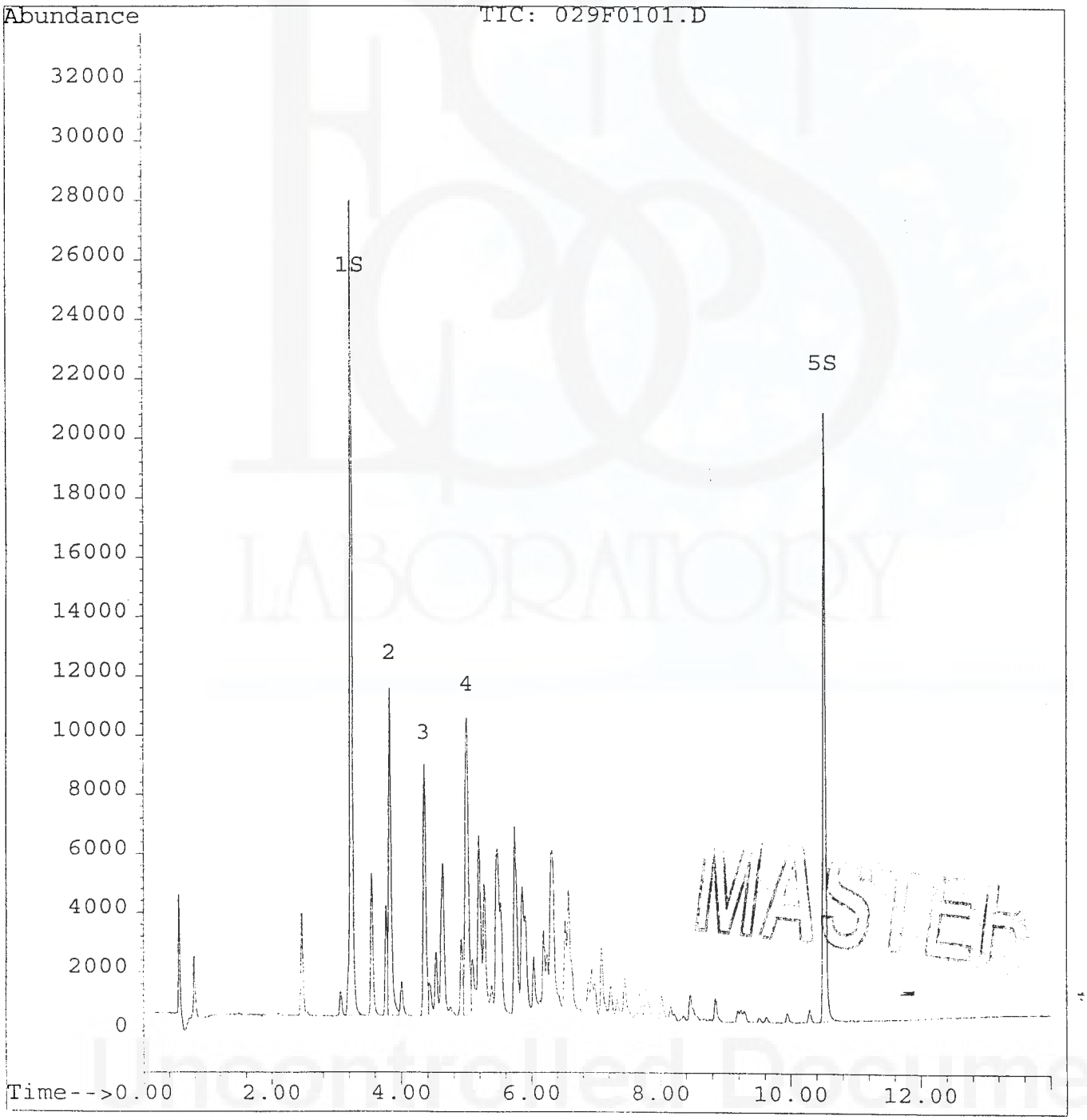
Attachment C – Chromatograms of Arochlors

Quantitation Report

Data File : C:\HPCHEM\1\DATA\GE08209A\029F0101.D Vial: 29
Acq On : 21 Aug 98 08:12 AM Operator: [GC]MS
Sample : A32-3 Inst : GC 3
Misc : Multiplr: 1.00
Quant Time: Aug 21 10:11 1998

Method : C:\HPCHEM\1\METHODS\A32F0820.M
Title :
Last Update : Fri Aug 21 10:13:49 1998
Response via : Multiple Level Calibration

Volume Inj. : 1 uL
Signal Phase : RTX-CLPESTICIDE
Signal Info : 0.53

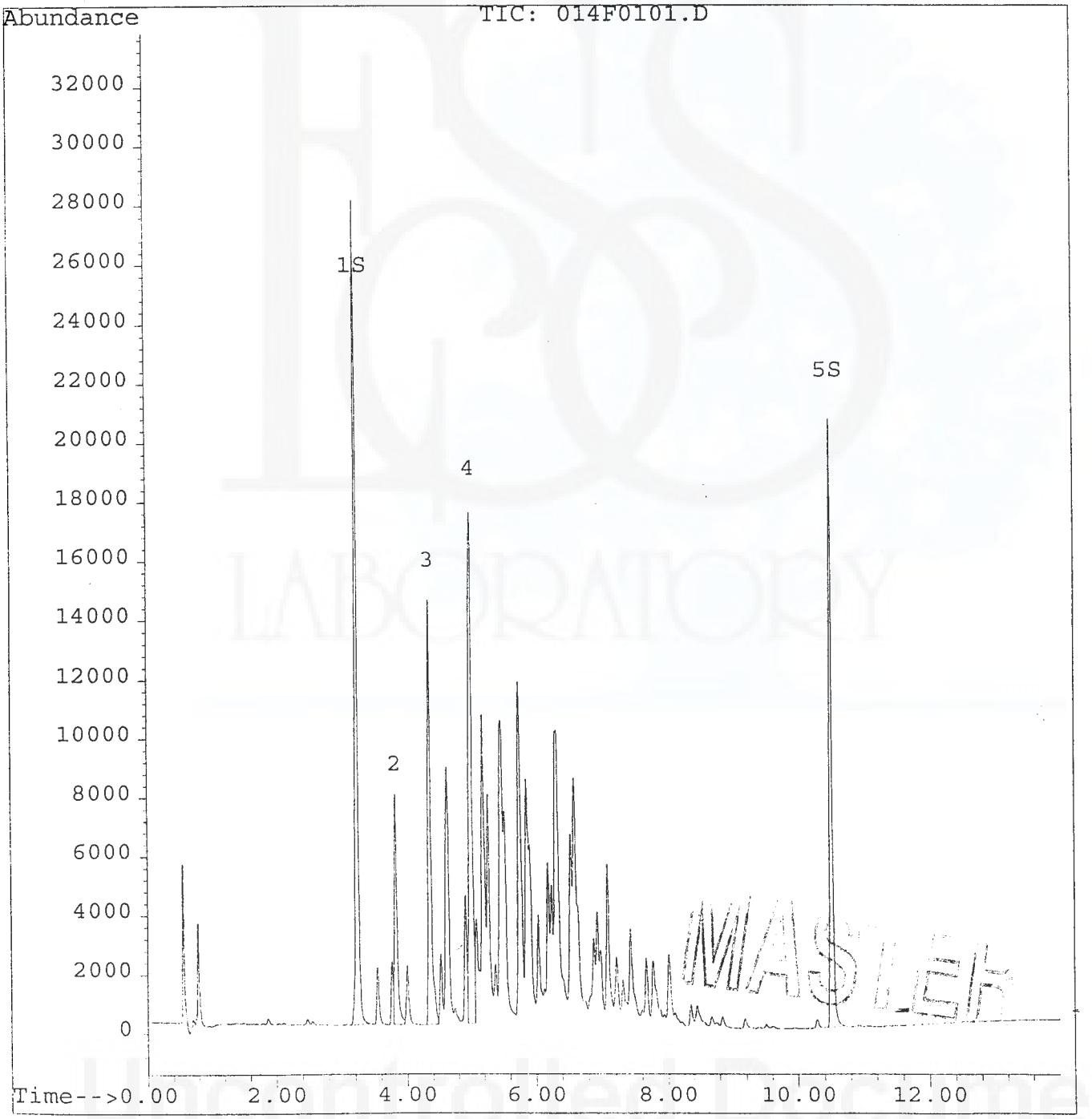


Quantitation Report

Data File : C:\HPCHEM\1\DATA\GE08209A\014F0101.D Vial: 14
Acq On : 20 Aug 98 07:04 PM Operator: [GC]MS
Sample : A42-3 Inst : GC 3
Misc : Multiplr: 1.00
Quant Time: Aug 21 9:42 1998

Method : C:\HPCHEM\1\METHODS\A42F0820.M
Title :
Last Update : Fri Aug 21 09:48:46 1998
Response via : Multiple Level Calibration

Volume Inj. : 1 uL
Signal Phase : RTX-CLPESTICIDE
Signal Info : 0.53



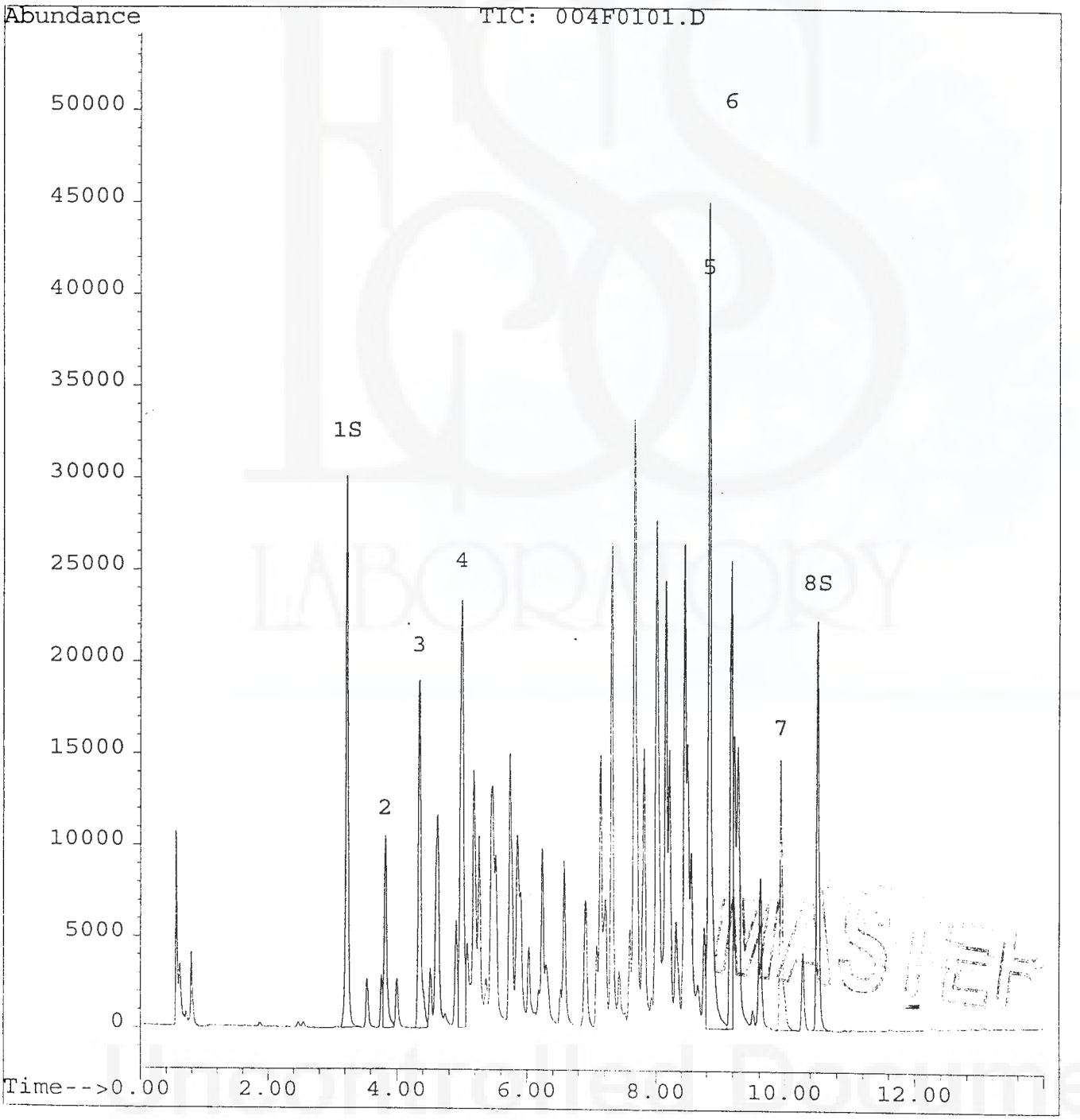
Quantitation Report

Data File : C:\HPCHEM\1\DATA\GE08209A\004F0101.D
Acq On : 20 Aug 98 04:18 PM
Sample : A60-3
Misc :
Quant Time: Aug 21 9:13 1998

Vial: 4
Operator: [GC]MS
Inst : GC 3
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\A60F0820.M
Title :
Last Update : Fri Aug 21 09:23:30 1998
Response via : Multiple Level Calibration

Volume Inj. : 1 uL
Signal Phase : RTX-CLPESTICIDE
Signal Info : 0.53



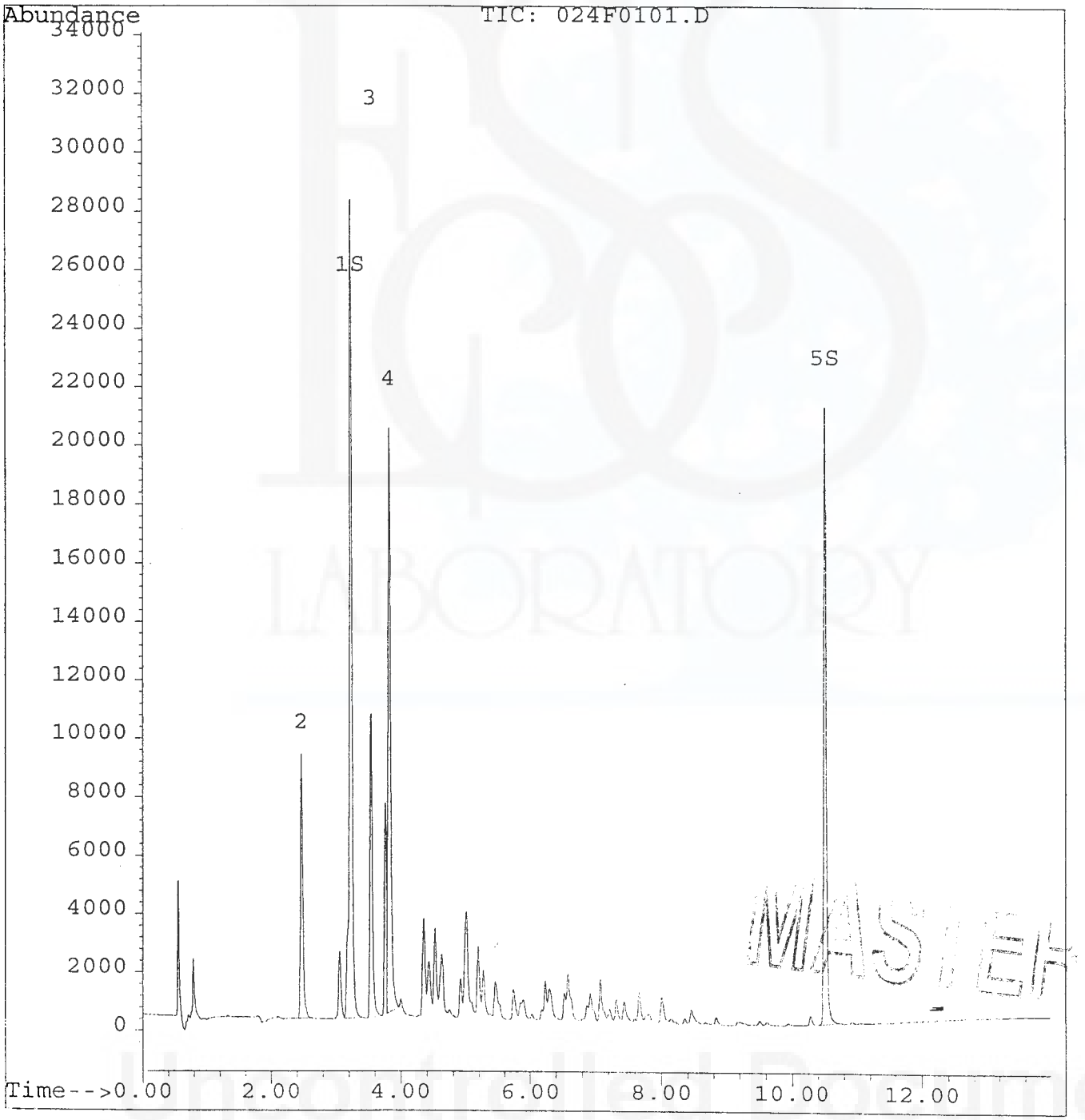
Quantitation Report

Data File : C:\HPCHEM\1\DATA\GE08209A\024F0101.D
Acq On : 20 Aug 98 09:50 PM
Sample : A21-3
Misc :
Quant Time: Aug 21 10:01 1998

Vial: 24
Operator: [GC]MS
Inst : GC 3
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\A21F0820.M
Title :
Last Update : Fri Aug 21 10:04:00 1998
Response via : Multiple Level Calibration

Volume Inj. : 1 uL
Signal Phase : RTX-CLPESTICIDE
Signal Info : 0.53



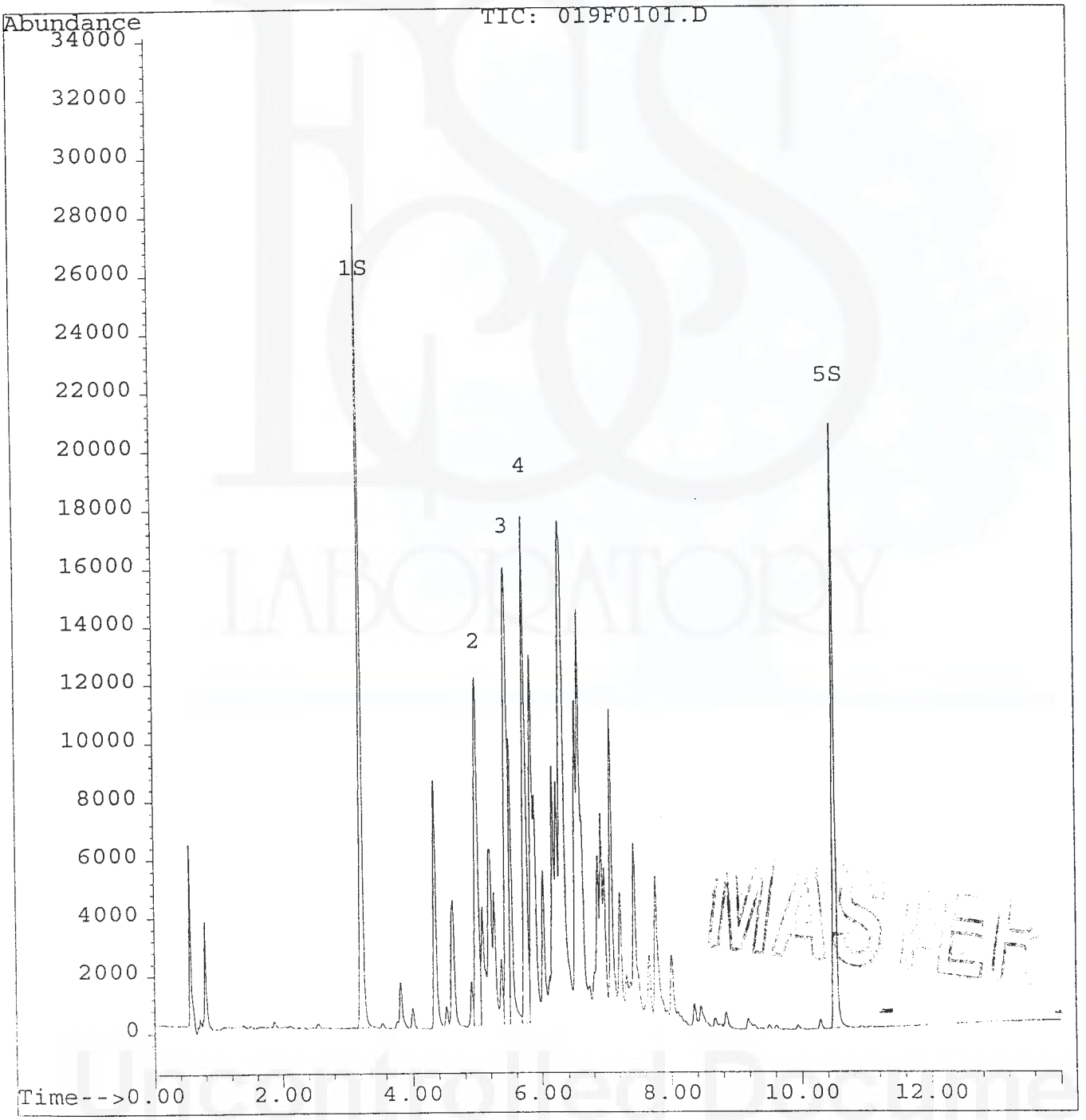
Quantitation Report

Data File : C:\HPCHEM\1\DATA\GE08209A\019F0101.D
Acq On : 20 Aug 98 08:27 PM
Sample : A48-3
Misc :
Quant Time: Aug 21 9:54 1998

Vial: 19
Operator: [GC]MS
Inst : GC 3
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\A48F0820.M
Title :
Last Update : Fri Aug 21 09:56:52 1998
Response via : Multiple Level Calibration

Volume Inj. :
Signal Phase :
Signal Info :



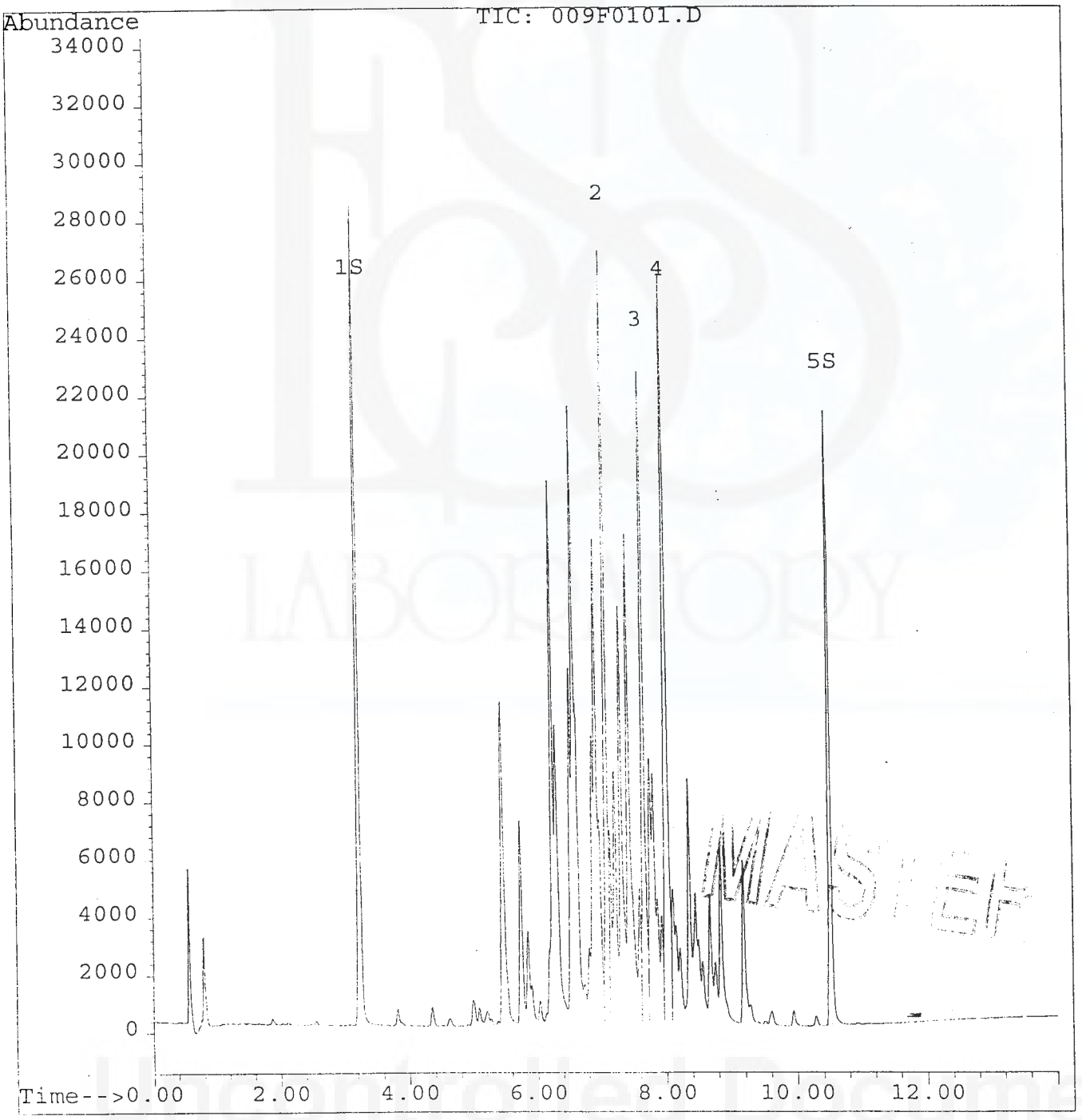
Quantitation Report

Data File : C:\HPCHEM\1\DATA\GE08209A\009F0101.D
Acq On : 20 Aug 98 05:41 PM
Sample : A54-3
Misc :
Quant Time: Aug 21 9:36 1998

Vial: 9
Operator: [GC]MS
Inst : GC 3
Multiplr: 1.00

Method : C:\HPCHEM\1\METHODS\A54F0813.M
Title :
Last Update : Fri Aug 21 09:37:37 1998
Response via : Multiple Level Calibration

Volume Inj. : 1 uL
Signal Phase : RTX-CLPESTICIDE
Signal Info : 0.53



ATTACHMENT E

Summary of Method Quality Objectives for Method 8082 Polychlorinated Biphenyls

QC Element	Frequency	Acceptance Criteria	Corrective Action
Initial Calibration	Instrument set up. Each time the ICV or CCV cannot meet criteria.	***Arochlor1016/1260*** • Minimum of 5 standards and contains all analytes • Low standard ≤ MRL • RSD≤20%, r≥0.995 (Do not force through zero). ***All other Arochlors*** • Single analysis at the reporting limit. • Evaluate quantitation at the low standard. Requanting the low standard should produce results within 70-130% of the true value.	• No allowance. Perform maintenance and recalibrate.
ICV – Second source verification standard	Immediately following initial calibration.	• %Rec = 80-120%. (MAMCP: 80-120%)	• If criteria are exceeded then remake and re-analyze ICV. If second consecutive ICV is within acceptable criteria then calibration is accepted, otherwise re-calibrate. (Option 2: re-analyze 2 consecutive CCV at 2 concentrations.)
CCV	Prior to sample analysis, every 12 hours and every 20 samples and at the end of each analytical sequence.	***Arochlor 1016/1260*** • Concentration level near midpoint of curve. • Percent difference or percent drift must be 80-120%. Performed routinely for 1242/1254, all others must be analyzed within 12 hours of sample analysis.	• If criteria are exceeded then remake and re-analyze CCV. If second consecutive CCV is within criteria then calibration is verified, otherwise re-calibrate system and re-analyze any sample analyzed after the last valid CCV. Also, Option 2 from above is allowed. ***Exception: If CCV is exhibiting high bias (concentration is higher than upper limit) then any samples that are non-detect for that analyte may be reported.***

Method Blank	One per analytical batch of 20 or fewer samples.	• Matrix specific • Analytes < MRL	• Report exceedance in the project narrative. • Any samples that are non-detect for that analyte may be reported. • Samples with concentrations that are 20x higher than the method blank may be reported. • Samples reported with a contaminated blank must be "B" flagged. • Re-extract if the above exceptions do not apply. If re-extract is within hold, report just the re-extracted data. If re-extract is outside hold then report both sets of data to client.
Blank spike/ Blank spike duplicate	One per analytical batch of 20 or fewer samples.	• Use standard source different than used for initial calibration • Concentration level should be between low and mid-level standard • Matrix specific • Percent recoveries between 40-140% and 30%RPD • Laboratories must develop in-house limits that are within above criteria.	• Report exceedance in the project narrative. • If the BS/BSD exhibits high bias and the samples are non-detect, then the samples may be reported with no corrective action needed. • Re-extract if the above exceptions do not apply. If re-extract is within hold, report just the re-extracted data. If re-extract is outside hold then report both sets of data to client.
Matrix Spike/ Matrix Spike duplicate	One per analytical batch of 20 or fewer samples	• Prepared using the same source as the blank spike • Concentration between low and mid-level standard • Matrix specific • Percent recoveries between 40-140. Laboratories should develop in-house limits. • RPD should be ≤ 50% • (MAMCP RPD <20 waters, <30 Soils)	• Check BS, if recoveries are acceptable then note exceedance in project narrative.

Surrogates	Added to all samples and standards.	• Use a minimum of 2 surrogates. • Percent recovery of 30-150 • MCP requires that both columns and both surrogates be within criterion and reported.	• If the same surrogate is outside of limits on both columns, re-extract samples. If both surrogates are outside criteria on one column only, re-analyze extract • If a surrogate is diluted to a concentration below the lowest standard, then no corrective action is needed. • If surrogates are outside criteria for re-extract, report both sets of data. • If re-extract is within hold and within criteria, report just the re-extracted data. If re-extract is outside hold then report both sets of data to client. • Note exceedance in project narrative. If sample is not re-analyzed due to obvious interference (e.g., UCM), the chromatogram is to be included in the final report.
Identification and Quantitation		• Secondary column analysis: Laboratory must utilize a second dissimilar column to confirm positive pesticide results. • The lab must report the higher of the two results. • All QA/QC requirements must be met on secondary column as well. • Analytes must fall within retention time windows.	• Flag data that is >40% RPD between two columns. • IF high RPD can be attributed to interference on one of the two columns, the lab should report the lower value and provide a discussion in the case narrative that this approach was employed.

ATTACHMENT F - Specific Requirements for Method 608.3

QC Element	Frequency	Criteria	Corrective Action
Initial Calibration	Instrument set up. Each time the ICV or CCV cannot meet criteria.	• Minimum of 3 standards and contains all analytes • Low standard ≤ MRL • RSD≤20%, r≥0.995,r^2≥0.99	• No allowance. Perform maintenance and recalibrate.
ICV – second source verification standard	Immediately following initial calibration.	• %Rec = 80-120% • Must contain all target analytes. • No allowances	• If criteria are exceeded then remake and re-analyze ICV. If second consecutive ICV is within acceptable criteria then calibration is accepted, otherwise recalibrate. • Report exceedance in narrative
CCV	Prior to sample analysis, every 12 hours and every 10 field samples and at the end of each analytical sequence.	• Concentration level near midpoint of curve • Must contain all target analytes. • Percent difference or percent drift must be ≤ 15%	• If criteria are exceeded then remake and re-analyze CCV. If second consecutive CCV is within criteria then calibration is verified, otherwise re-calibrate system and re-analyze any sample analyzed after invalid CCV.
Method Blank	One per analytical batch of 20 or fewer samples.	• Matrix specific • Analytes < ½ MRL (meets the following) If any analyte of interest is found in the blank at a concentration greater than the MDL for the analyte, at a concentration greater than one-third the regulatory compliance limit, or at a concentration greater than one-tenth the concentration in a sample in the batch, whichever is greatest, analysis of samples must be halted and samples in the batch must be re-extracted and the extracts reanalyzed.	• Report exceedance in the project narrative. • Any samples that are non-detect for that analyte may be reported. • Samples with concentrations that are 20x higher than the method blank may be reported. • Samples reported with a contaminated blank must be "B" flagged. • Re-extract if the above exceptions do not apply. If re-extract is within hold, report just the re-extracted data. If re-extract is outside hold then report both sets of data to client.
Blank spike/ Blank spike duplicate	Prior to sample analysis, every 12 hours and every 10 field samples and at the end	• Prepared using standard source different than used for initial calibration • Concentration level should be between low and	• Report exceedance in the project narrative. • Re-extract if the above exceptions do not apply.

PCBs

By Capillary Column Gas Chromatography

Reference Methods: Method 8082A SW-846, Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, EPA SW-846, Update IV, 2007.

Quality Control Requirements and Performance Standards for Analysis of Polychlorinated Biphenyls (PCBs) by Gas Chromatography (GC) in Support of Response Action under the Massachusetts Contingency Plan (MCP), Revision No.1, July 1, 2010.

State of Connecticut, Department of Environmental Protection, RRCP, Version 2.0, July 2006.

1. Scope and Application

Method 8082A is used to determine the concentrations of Polychlorinated Biphenyls (PCBs) as Aroclors in extracts from solid and liquid matrices. This SOP details the analysis for PCBs using fused-silica, open-tubular, capillary columns with electron capture detectors (ECD).
Matrices: Extracts from solid and liquid matrices.

Definitions: See Alpha Laboratories Quality Manual Appendix A

Regulatory Parameter List: The standard compounds listed below are determined by this method.

Parameter	CAS#
Aroclor 1016	12674-11-2
Aroclor 1221	11104-28-2
Aroclor 1232	11141-16-5
Aroclor 1242	53469-21-9
Aroclor 1248	12672-29-6
Aroclor 1254	11097-69-1
Aroclor 1260	11096-82-5
Aroclor 1262	37324-23-5
Aroclor 1268	11100-14-4

The data report packages present the documentation of any method modification related to the samples tested. Depending upon the nature of the modification and the extent of intended use, the laboratory may be required to demonstrate that the modifications will produce equivalent results for the matrix. Approval of all method modifications is by one of the following laboratory personnel before performing the modification: Area Supervisor, Laboratory Director, or Quality Assurance Officer.
This method is restricted to use by or under the supervision of analysts experienced in the operation of the gas chromatograph (GC) and in the interpretation of gas chromatograms. Each analyst must demonstrate the ability to generate acceptable results with this method by performing an initial demonstration of capability (see section 13.2).

2. Summary of Method

A measured volume or weight of sample (volumes and weights can vary but approximately 1L or 125 mls (LVI – Low Volume Initiative) for liquids, 15g to 30g for solids) is extracted using the appropriate matrix-specific sample extraction technique.

Liquid samples are extracted at neutral pH with methylene chloride using Method 3510C (separatory funnel), or other appropriate technique. See extraction SOP for details.

Solid samples are extracted with methylene chloride: acetone (1:1) using Method 3540C (Soxhlet), or other appropriate technique. Solid samples may also be extracted with hexane:acetone (1:1) using Method 3546 (microwave). See extraction SOP for details.

Wipe samples are extracted with methylene chloride: acetone (1:1) using Method 3540C (Soxhlet) or other appropriate technique. See extraction SOP for details.

Oil samples are diluted with hexane following the procedure outlined in the extraction SOP.

Sulfuric acid cleanup (Method 3665A), Copper cleanup (Method 3660B) and Silica Gel cleanup (Method 3630) are utilized for PCB extracts. See extraction SOP for details.

After cleanup, the extract is analyzed by injecting 1µL into a gas chromatograph equipped with narrow- or wide-bore fused silica capillary columns and electron capture (GC/ECD) detectors.

2.1 Method Modifications from Reference

Not applicable.

3. Reporting Limits

The reporting limits for this method as outlined is as follows:

- Aqueous samples: 0.25 ug/L / Aroclor (based on a 1L extraction or 125 ml LVI extraction)
- Soil Samples: 33.3 ug/kg / Aroclor (based on a 15g extraction)
- Solid of Difficult Matrices (i.e Caulking, Concrete, etc. are logged using the Alpha Low Level 8082 products): based on a 15g extraction
    - Aroclors 1016, 1221, 1232, 1242, 1254: 20 ug/kg
    - Aroclors 1248, 1260: 13.3 ug/kg
    - Aroclors 1262, 1268: 6.67 ug/kg

4. Interferences

4.1 Instrumental

4.1.1 Only high purity gases are used in the GC system to eliminate this source of possible contamination. Both the helium (carrier gas – 99.999%) and argon-methane (detector make-up gas) are certified by the gas supplier.

4.1.2 Preventive instrument maintenance is performed routinely, and whenever highly contaminated extracts are analyzed that could result in chromatographic interferences or result in degradation of system performance. Section 10.5 details the maintenance steps.

4.1.3 Glassware must be scrupulously cleaned. This procedure is detailed in the Organic Extraction Cleaning and Handling SOP/1953. Store dry glassware in a clean environment.

4.2 Parameters

4.2.1 All solvents used are pesticide grade or equivalent, and reagents are purchased as certified contaminant free. All of these materials are routinely determined to be free of interferences by analysis of extraction blanks with every extraction batch performed.

4.2.2 Certain compounds (i.e. phthalates) can be extracted from the sample matrix and be detected by the ECD that could possibly result in false positive results or complicate the data interpretation. The use of the cleanup procedures detailed in the extraction SOP minimizes these possible interferences. Analyst experience is also crucial in making compound determinations.

4.2.3 Interferences co-extracted from the samples will vary considerably from waste to waste. While a general cleanup technique is referenced or provided as part of the method, unique samples may require additional cleanup approaches to achieve desired degrees of discrimination and quantitation.

5. Health and Safety

The toxicity or carcinogenicity of each reagent and standard used in this method is not fully established; however, each chemical compound must be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. A reference file of material data handling sheets is available to all personnel involved in the chemical analysis. PCBs have been tentatively classified as known or suspected human or mammalian carcinogens. Additional references to laboratory safety are available in the Chemical Hygiene Plan.
All personnel handling environmental samples known to contain or to have been in contact with municipal waste must follow safety practices for handling known disease causative agents.

5.1 Lab coats, safety glasses, and gloves must be worn when handling samples, extracts, standards or solvents.

5.2 All solvent and extract transfers must be handled in the vented bench area in the GC laboratory.

5.3 All stock standards, working standards, and vialed sample extracts must be placed into the waste bucket in the lab, for future disposal by the Hazardous Waste Manager. The container must be labeled properly with hazard warning labels indicating the container contents.

5.4 Bottles containing flammable solvents must be stored in the flammables cabinet.

6. Sample Collection, Preservation, Shipping and Handling

6.1 Sample Collection

Aqueous samples are collected in two 1L or two 125 ml (LVI) amber glass jars with teflon-lined lids. Solid samples are collected in one 250 mL wide-mouth glass jar with a teflon-lined lid. All containers are purchased pre-cleaned and certified from commercial vendors.

6.2 Sample Preservation

Both aqueous and solid samples are then preserved by packing in coolers with ice or ice packs, to maintain a temperature of 4 ± 2° C. Upon receipt at the laboratory, the samples are transferred into sample storage refrigerators to maintain at a temperature of 4 ± 2° C.

6.3 Sample Handling

Aqueous samples must be extracted within 7 days of sample collection, solid samples within 14 days of collection. Once extracted, the samples must be analyzed within 40 days of the extraction date.

7. Equipment and Supplies

7.1 Gas Chromatograph, Agilent 6890, 7890: An analytical system complete with gas chromatograph configured for split-splitless injection and all required accessories including syringes, analytical columns, gases, electron capture detectors (ECD), and data system.

7.2 GC Columns: Alpha utilizes dual-column analyses. The dual-column approach involves either a single injection that is split between two columns that are mounted in a single gas chromatograph. Typical column pair used is listed below. Other columns may be used as long as method performance criteria can be met.

Column pair:

RTX-CLP: Cat. #11141 from Restek or equivalent; 30m, 0.32mm, 0.32µm

RTX-CLPII Cat. #11324 from Restek or equivalent; 30m, 0.32mm, 0.25µm

7.3 Guard Column: Cat. #10027 from Restek or equivalent; 5m, 0.32mm

7.4 Class "A" Volumetric Flasks: 10mL and 25mL (and other volumes), for standards preparation

7.5 Microsyringes/Wiretrol syringes: 10 µL – 1000 µL

7.6 Gooseneck splitless injecton liner, Cat #20799-214.5 from Restek or equivalent

7.7 Universal "Y" Press-tight tee split: Cat. #20406 from Restek or equivalent / **Siltek MXT Connector:** Cat. #21388 from Restek or equivalent

8. Reagents and Standards

Reagent grade or pesticide grade chemicals are used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficient high purity to permit its use without lessening the accuracy of the determination.
NOTE: Store the standard solutions (stock, composite, calibration, internal, and surrogate) at 4 ± 2° C in Teflon(R)-sealed containers in the dark. When a Lot of standards is prepared, aliquots of that Lot are stored in individual small vials. All stock standard solutions must be replaced after one year or sooner if routine QC tests indicate a problem. All other standard solutions must be replaced after six months or sooner if routine QC indicates a problem.

8.1 n-Hexane: Pesticide quality or equivalent.

8.2 Acetone: Pesticide quality or equivalent.

8.3 Organic-free Reagent Water: All references to water in this method refer to organic-free reagent water from Alpha's RO water treatment system.

8.4 Stock Standard Solutions: All stock standard solutions are purchased from commercial vendors as ampulated certified solutions. When an ampulated stock solution is opened, it is transferred to a labeled amber screw-cap vial. The expiration date of the stock solution is either the vendor specified expiration date, or 1 year from the date the ampule was opened, whichever is sooner.

8.5 Calibration Standards: Calibration standards are prepared volumetrically by diluting the appropriate stock standard(s) with hexane. Calibration standards expire 6 months from the date of preparation, or on the earliest expiration date of any of the stock solutions used to prepare the calibration standard. Calibrations are performed at the 6 concentration levels listed in Table 1. The list of ampulated calibration standards are obtain from **Ultra**:

- Aroclor 1016, Cat. #PP-282, at 100ug/ml
- Aroclor 1260, Cat. #PP-361, at 100ug/ml
- Aroclor 1262, Cat. #PP-371, at 100ug/ml
- Aroclor 1268, Cat. #PP-382, at 100ug/ml
- Aroclor 1221, Cat. #PP-292, at 100ug/ml
- Aroclor 1232, Cat. #PP-302, at 100ug/ml
- Aroclor 1242, Cat. #PP-312, at 100ug/ml
- Aroclor 1248, Cat. #PP-342, at 100ug/ml
- Aroclor 1254, Cat. #PP-351, at 100ug/ml

8.6 Second Source Standards: (ICV/CCAL) Continuing Calibration standards are prepared volumetrically by diluting the appropriate stock standard(s) with hexane. Continuing Calibration standards expire 6 months from the date of preparation, or on the earliest expiration date of any of the stock solutions used to prepare the standard. The list of ampulated standards are obtain from **Accustandard**:

- Aroclor 1016, Cat. #C-216S-H-10X, at 1000ug/ml
- Aroclor 1260, Cat. #C-260S-H-10X, at 1000ug/ml
- Aroclor 1262, Cat. #C-262S-H-10X, at 1000ug/ml
- Aroclor 1268, Cat. #C-268S-H-10X, at 1000ug/ml
- Aroclor 1221, Cat. #C-221S-H-10X, at 1000ug/ml
- Aroclor 1232, Cat. #C-232S-H-10X, at 1000ug/ml
- Aroclor 1242, Cat. #C-242S-H-10X, at 1000ug/ml
- Aroclor 1248, Cat. #C-248S-H-10X, at 1000ug/ml
- Aroclor 1254, Cat. #C-254S-H-10X, at 1000ug/ml

8.7 Internal Standard Solution: 1-Bromo-2-nitrobenzene (Ultra, Cat. #PPS-351) is used as the internal standard, and is added to all single-component calibration standards and sample extracts to achieve a concentration of 0.25µg/mL. For LVI, this solution is diluted 10X more, achieving a concentration of 0.025µg/mL.

8.8 Surrogate Standards: Tetrachloro-m-xylene (TCMX) and Decachlorobiphenyl (DCB) are used as surrogates for Aroclor analysis. They are added to the calibration standards at the concentrations listed in Table 1, Continuing Calibration Standards and are spiked into all samples and QC samples prior to extraction.

- **ICAL Surrogates Stock:** is prepared by diluting of 500ul of Pesticides Surrogates Standard Spiking Solution (Ultra, Cat. #ISM-320-1) and 500ul of Decachlorobiphenyl (Accustandard, Cat. #CLP-032-R-01) to 20ml of Hexane to achieve concentration of TCMX at 5ug/ml and DCB at 10ug/ml. For LVI, this solution is diluted 10X more, achieving a concentration of 0.5 ug/ml for TCMX and 0.1 ug/ml for DCB.
- **CCAL Surrogates Stock:** is prepared by diluting of 1ml of TCMX&DCB (Accustandard, Cat. #CLP-032-R) and 1ml of Decachlorobiphenyl (Accustandard, Cat. #CLP-032-R-01) to 20ml of Hexane to achieve concentration of TCMX at 10ug/ml and DCB at 20ug/ml. For LVI, this solution is diluted 10X more, achieving a concentration of 1 ug/ml for TCMX and 2 ug/ml for DCB.
- **Extraction Surrogates Stock:** is prepared by diluting of 10ml of TCMX&DCB (Accustandard, Cat. #CLP-032-R) to 1000ml of Acetone to achieve concentration of TCMX and DCB at 2ug/ml. For LVI, this solution is diluted 10X more, achieving a concentration of 0.2 ug/ml for both TCMX and DCB.

8.9 LCS/MS Spiking Solutions: The LCS/MS spiking solution is prepared by diluting of 6.25ml of Arochlor 1016/1260 (Restek, Cat. #32039) to 500ml of Acetone to achieve concentration of Arochlor 1016/1260 at 12.5ug/ml. For LVI, 1.25 ml of the stock solution is diluted to 500 mls of Acetone to achieve a concentration of Aroclor 1016/1260 at 2.5 ug/ml.

9. Quality Control

The laboratory must maintain records to document the quality of data that is generated. Ongoing data quality checks are compared with established performance criteria to determine if the results of analyses meet the performance characteristics of the method.

9.1 Blank(s)

A Method Blank is an aliquot of a clean reference matrix (reagent water for water samples or Ottawa sand for soil/sediment samples) that is carried through the entire analytical procedure. Extraction blanks are performed with each extraction batch of 20 or less samples, according to the extraction SOPs. The extraction blank must not contain any of the reportable analytes above the reporting limit. If any reportable analytes are detected in the blank, the entire extraction batch is suspect and re-extraction of all associated samples is required, unless the associated samples are non-detect or concentration of the analyte in the samples is 10 times greater than the concentration of this analyte in the blank. The surrogate recoveries must also be within the acceptance criteria listed in Table 2. If surrogate acceptance criteria are exceeded, the extraction batch must be evaluated to determine if re-extraction or re-analysis is necessary.

9.2 Laboratory Control Sample (LCS)

A Laboratory Control Sample (LCS)/ Laboratory Control Sample Duplicate (LCSD) pair is extracted with each analytical batch. The LCS/LCSD consist of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume. For Aroclor analysis, the LCS/LCSD are spiked with a mixture of Aroclor 1016 and 1260. The recovery acceptance criteria are listed in Table 2. If any recovery criteria are not met, the extract may be re-analyzed. If the criteria are still not met, the **entire batch is re-extracted**, unless the recoveries are high and the associated samples are non-detect. If this is not possible, due to insufficient sample or holding time exceedances, the analyst must narrate the failure in the LIMS for inclusion in the client report.

9.3 Initial Calibration Verification (ICV)

Refer to Section 10.2.7.

9.4 Continuing Calibration Verification (CCV)

Refer to Section 10.4.

9.5 Matrix Spike

Upon client request, a matrix spike and matrix spike duplicate pair are extracted and analyzed with each batch of 20 or less samples. The MS/MSD pair is extracted and analyzed for standard PCB analysis. The recovery acceptance criteria are listed in Table 2. If the recovery criteria are not met, but are met in the LCS, the failure may be attributed to sample matrix effects and must be narrated for inclusion in the client report.

9.6 Laboratory Duplicate

Upon client request, a Laboratory Duplicate is extracted and analyzed with each batch of 20 or less samples. The relative percent difference (RPD) acceptance criteria are listed in Table 2. If the RPD criteria are not met, the failure may be attributed to matrix effect and must be narrated for inclusion in the client report.

9.7 Surrogates

All extracted samples and associated QC are spiked with Extraction Surrogates Stock to achieve concentration of TCMX and DCB at 0.5ug/ml (0.2 ug/ml for LVI). The laboratory must evaluate surrogate recovery data from individual samples and QC samples versus the surrogate control limits listed in Table 2. If the surrogate limits are not met, the extract may be reanalyzed to determine if the failure was due to an instrument problem. If the criteria are still not met, the affected samples must be re-extracted to confirm that the failure was due to sample matrix, unless the surrogate recovery is high and the associated sample is non-detect. If matrix effect is confirmed, this must be noted on a narrative sheet for inclusion in the client report.

9.8 Method Sequence

Typical Initial calibration (each level to identified with the standard lot number)

1. Prime
2. Blank
3. Standard Level 1
4. Standard Level 2
5. Standard Level 3

6. Standard Level 4
7. Standard Level 5
8. Standard Level 6
9. Initial Calibration Verification Standard (ICV)

Repeat steps 3 – 9 as needed for each Aroclor necessary for calibration.

NOTE: If multiple calibration mixtures are analyzed, it is acceptable to analyze appropriate ICVs after all calibration standards have been injected.

Typical Daily Sequence

1.1016/1260 Continuing Calibration Standard **(identified with the standard lot number)**
2. Extraction Blank
3. Laboratory Control Sample
4. Matrix Spike / Matrix Spike Duplicate (if requested by Client)
5. Duplicate (if included with batch QC)
6. Samples up to 16
7. Repeat 1 – 6 as needed.

10. Procedure

10.1 Equipment Set-up

10.1.1 GC Conditions:

The dual-column / dual-detector approach involves the use of the columns listed in section 7.2. The columns are connected to an injection tee or dual injection GC, and separate electron capture detectors. Alpha typical GC conditions are listed below, but may be altered as long as method performance criteria are met.

Temperature1: 120 ºC	Injector temerature: 250ºC
Time1: 0 minutes	Injector mode: Pulsed Split
Ramp1: 45ºC/minute	1.4:1 split, 0.20 min pulse
Temperature2: 200ºC	Injector Flow: 5.7 ml/min split flow
Time2: 0 minutes	Detector temperature: 350ºC
Ramp2: 15ºC/minute	Carrier gas: Helium
Temperature3: 230ºC	Carrier flow: 20ml/min
Time3: 0 minutes	Carrier mode: Constant flow
Ramp3: 30ºC/minute	Makeup gas: Argon/methane (P5)
Final temperature 330ºC	Total detector flow: 55ml/min
Final time: 2 minutes	Injection Volume: 1 µL

10.2 Initial Calibration

10.2.1 Prepare calibration standards using the standards listed in Section 8.5 to achieve the concentrations from Table 1. Alternatively, a standard containing a mixture of Aroclor 1016 and Aroclor 1260 will include many of the peaks represented in the other five Aroclor mixtures. As a result, a multi-point initial calibration employing a mixture of Aroclors 1016 and 1260 at five concentrations should be sufficient to demonstrate the linearity of the detector response without the necessity of performing multi-point initial calibrations for each of the seven Aroclors. In addition, such a mixture can be used as a standard to demonstrate that a sample does not contain peaks that represent any one of the Aroclors. Single standards of each of the other seven Aroclors are required to aid the analyst in pattern recognition. Assuming that the Aroclor 1016/1260 standards have been used to demonstrate the linearity of the detector, these single standards of the remaining seven Aroclors also may be used to determine the calibration factor for each Aroclor when a linear calibration model through the origin is chosen. Prepare a standard for each of the other Aroclors. The concentrations should generally correspond to the mid-point of the linear range of the detector, but lower concentrations may be employed.

10.2.2 Establish the GC operating conditions by loading the appropriate GC method. Typical instrument conditions are listed in section 10.1.1. The same operating conditions are used for calibrations and sample analyses. Create the analytical sequence using the Agilent Chemstation data acquisition software. Record the calibration standard, unique lot number (PP#) and analyst's initials in the analytical sequence list.

10.2.3 A 1µL injection volume of each calibration standard is typically used. Other injection volumes may be employed, provided that the analyst can demonstrate adequate sensitivity for the compounds of interest. The same injection volume must be used for all standards and samples.

10.2.4 Column adsorption may be a problem when the GC has not been used for a day or more or after system maintenance. The GC column may be primed (or deactivated) by injecting a PCB standard mixture approximately 20 times more concentrated than the mid-concentration standard. Inject this standard mixture prior to beginning the initial calibration or calibration verification.

Alternately, the system may be primed by baking at the final analytical temperature for approximately 30 minutes.

Several analytes may be observed in the injection just following system priming. Always run an instrument blank after system priming.

10.2.5 **Calibration Factor:** Internal standard calibration techniques are employed in this method.

10.2.5.1 Internal Standard Procedure. In each standard, calculate the response factor (RF) for each analyte, the average RF, and the relative standard deviation (RSD) of the RFs, using the Enviroquant data processing software. The calculations are performed automatically, using the formula listed in Alpha's Quality Manual.

Alternatively, standards of the other seven Aroclors are necessary for pattern recognition. When employing the traditional model of a linear calibration through the origin, these standards are also used to determine a single-point calibration factor for each Aroclor, assuming that the Aroclor 1016/1260 mixture has been

used to describe the detector response. The standards for these seven Aroclors should be analyzed before the analysis of any samples with hits above the RL. For example, an Aroclor 1254 standard should be analyzed before a sample with a hit of Aroclor 1254.

10.2.6 Initial Calibration Criteria

- If the **RSD for an analyte is < 20%**, then the response of the instrument for this compound is considered linear over the range and the mean calibration factor can be used to quantitate sample results.
- If the **RSD for any analyte is > 20%**, then linearity through the origin cannot be assumed. The mean response factor cannot be used for quantitation. An alternative calculation may be done by the use of **linear regression** or **quadratic regression** (minimum of six ICAL points are needed and regression must be weighted inversely proportional to concentration) as long as the correlation coefficient is **>0.990**. If both of these quantitation methods fail criteria for any compound in the initial calibration, then the system must be reevaluated and a new calibration curve must be analyzed. If quadratic regression is used for calibration, this must be noted in the laboratory narrative.
- **MCP requirement**: minimum of five unique peaks must be evaluated for Aroclors 1016 and 1260.
- **MCP requirement:** If linear or non-linear regression is used, RL must to be verified by recalculating concentrations in the lowest calibration standard using the final calibration curve. Recoveries must be **70-130%.**
- **MCP requirement:** Minimum of five standards (or six if non-linear regression used) must be used.

Initial Calibration Verification

An initial calibration verification standard must be run immediately after each initial calibration, near the midpoint of the curve. The standard must be prepared using a second source that is different than the source used for the initial calibration. (Standards listed in Section 8.6). The **%D** has to be within **20%** (**15% for CT RCP**) when compared to the mean response factor from the initial calibration.

10.2.7 Retention Time Window

10.2.7.1 The retention time window used for the identification of target analytes is ± 0.07 minutes. These criteria have been adopted from the EPA CLP Statement of Work (OLM04.2). It has been found that these limits work well, being wide enough to eliminate false-negatives while being tight enough to eliminate false-positives. Windows that are calculated using the procedure recommended in Method 8000 tend to be very narrow, creating the risk of false negative results.

10.2.7.2 The windows listed above are used as guidance; however the experience of the analyst weighs heavily in the interpretation of the chromatograms. For example, it has been observed that certain oil matrices can cause the retention times to shift more dramatically.

10.3 Sample Processing

The determination of PCB Aroclors is accomplished by comparing the sample chromatogram to that of the most similar Aroclor standard. The use of PCB overlays is extremely helpful, either by using hardcopies of chromatograms or by utilizing the Enviroquant software. A choice must be made as to which Aroclor is most similar and whether that standard is truly representative of the PCB in the sample. Both retention time and pattern are important when determining PCBs in a sample.

Samples that contained weathered PCB present special analytical challenges. Weathering could alter the Aroclor pattern to the extent that different peaks have to be selected for quantitation. Samples that contained more than one Aroclor present similar problems. For these samples, the Analyst may have to consider selecting the earlier eluting peaks for the lower boiling Aroclor and selecting the later eluting peaks for the higher boiling Aroclors to minimize overlapping peaks. Minimum of 3 peaks must be chosen for each Aroclor. In these instances, the Analyst may need request the assistance of someone with more expertise in determining the presence of PCB Aroclor.

If compound identification or quantitation is precluded due to interference (e.g., broad, rounded peaks or ill-defined baselines are present) cleanup of the extract may be needed. If instrument problems are suspected, rerun the extract on another instrument to determine if the problem results from analytical hardware or the sample matrix. Refer to the extraction SOPs for the procedures to be followed in sample cleanup.

The laboratory must report the ***HIGHER*** of the two results unless obvious interference is present on of the columns.

10.4 Continuing Calibration

10.4.1 Verify calibration each **12-hours** shift by injecting calibration verification standards prior to conducting any sample analyses. A calibration standard must also be injected at intervals of not less than **once every twenty injections**. A bracketing CCV is not required with the use of internal standard calibration (Method 8082A 11.6.8) with the exception of samples ran under CT RCP method. For Aroclor analysis, the calibration verification standard should be a mixture of Aroclor 1016 and 1260. The calibration verification process does not require analysis of the other Aroclor standards used for pattern recognition (Method 8082A 11.6.2). However, if the one-point calibration is used for the seven other Aroclor, a calibration standard must be analyzed before the sample for any hits.

10.4.2 The response factor (for internal standard compounds) for each analyte to be quantitated must not exceed a **± 20% difference** when compared to the initial calibration curve (**± 15% for CT RCP**). The Target data processing software automatically calculates the %D for all analytes according to the formulae in Alpha's Quality Manual. A retention time shift >30 seconds for the internal standard necessitates reanalysis of all affected samples.

10.5 Internal Standard

The use of internal standard calibration does not require that all sample results be bracketed with CCV standard. However, when internal standard calibration is used, the

retention times of internal standards and the area response of internal standards should be checked for each analysis.

10.5.1 **IS in CCAL** – The measured area of the internal standard must be no more than ± 50% different from the average area calculated during initial calibration **(-50 to 150%).**

10.5.2 **IS in samples** - The measured area of the internal standard must be no more than -50% to +100% different from the area calculated from opening CCV **(-50 to 200%)**

Retention time shifts of more than 30 sec from the retention time of the most recent calibration standard are cause for concern and must be investigated.

10.6 Preventive Maintenance

10.6.1 **Preventive Maintenance:** Routine preventive maintenance is performed to maintain GC system performance. This includes periodic replacement of injector septa, replacement of injector liner(s), and replacement of injector seals.

10.6.2 **Other Maintenance:** ECD detectors may become contaminated, requiring bake out at elevated temperatures, (no greater than 375°C) or repair by the manufacturer.

11. Data Evaluation, Calculations and Reporting

11.1 Quantitation of Aroclors

Per Method 8082A, quantitation is based on the use of a minimum of 3 of the major peaks present in the analyte, although the use of 5 of the major peaks is recommended. Each of these peaks is individually calibrated with a **minimum of five calibration points** based on average response factors. The %RSD must meet the criteria of ≤20% for the ICAL. The five major peaks are calculated as described below. After individual calculation meets criteria, the average of the peaks selected for quantitation is used to determine the final concentration.

11.1.1 Aqueous samples

$$\text{Concentration } (\mu g/L) = \frac{C \times DF \times Vf \times 1000}{Vo}$$

where:

C = Extract concentration (µg/mL), **NOTE**: ng on column = ng/injection volume = ng/uL = ug/mL

DF = Dilution factor

Vf = Final extract volume (mL)
Vo = Sample volume (mL)

11.1.2 Soil/sediment samples

$$\text{Concentration (µg/Kg, dry weight)} = \frac{C \times DF \times Vf \times 1000}{W\ (gm)} \div \%S$$

where:
C = Extract concentration (µg/mL), **NOTE**: ng on column = ng/injection volume = ng/uL = ug/mL
DF = Dilution factor
Vf = Final extract volume (mL)
W = Weight of the sample extracted (10g for high, 30g for low)
%S = Percent solids, as a decimal value

11.1.3 Reporting Results

11.1.3.1 After performing technical data review, validating that all QC criteria have been met and confirming all positive hits, the data report is sent electronically to the LIMS computer for generation of the client report. There are two levels of review of the data in the LIMS system prior to release of data. These reviews must be done by two separate individuals.

11.1.3.2 Reporting Results for PCBs in Caulk Samples

If in the screen sample Aroclor concentration as calculated above is **> 20000ppm**, the Client is contacted by a Customer Service Representative and these results are sent to the LIMS and reported to the Client.

If the sample concentration as calculated above for any Aroclor is **< 20000ppm**, the sample is sent for re-extraction by Method 3540C (Alpha SOP/1954).

11.1.3.3 Summation Rules

"TOTAL" concentrations are calculated for **ALL samples and Quality Control Samples** (i.e. LCS, MS, DUP, BLK).

TOTAL = sum of "reportable" Aroclors

Reportable- all Aroclors reported for associated project.

For dual-column analysis, Total is reported as part of column "A" data, unless all individuals are reported from "B" column. "Total" is calculated based on the associated "Report List". See Work Instruction #14335 for details.

12. Contingencies for Handling Out-of-Control Data or Unacceptable Data

Holding time exceedance and/or improper preservation are noted on the nonconformance report form.

Perform instrument maintenance as described throughout this SOP as needed when instrument calibration criteria are not met. Record all maintenance in the instrument logbook.

All batch and sample specific QC criteria outlined in Section 10 are evaluated by the analyst prior to approval of the data. When any QC criteria fail, the cause for the failure must be identified and corrected. This may include instrument recalibration followed by sample reanalysis, sample cleanup, or sample re-extraction. If it is determined that the failure is due to sample matrix effects, a project narrative report is written into the LIMS by the analyst for inclusion in the data report. If there is insufficient sample volume to perform the re-analysis for confirmation, this is also noted in the narrative and included in the client report.

13. Method Performance

13.1 Method Detection Limit Study (MDL) / Limit of Detection Study (LOD) / Limit of Quantitation (LOQ)

The laboratory follows the procedure to determine the MDL, LOD, and/or LOQ as outlined in Alpha SOP/1732. These studies performed by the laboratory are maintained on file for review.

13.2 Demonstration of Capability Studies

Refer to Alpha SOP/1739 for further information regarding IDC/DOC Generation.

13.2.1 Initial (IDC)

The analyst must make an initial, one-time, demonstration of the ability to generate acceptable accuracy and precision with this method, prior to the processing of any samples.

13.2.2 Continuing (DOC)

The analyst must make a continuing, annual, demonstration of the ability to generate acceptable accuracy and precision with this method

14. Pollution Prevention and Waste Management

Refer to Alpha's Chemical Hygiene Plan and Waste Management and Disposal SOP for further pollution prevention and waste management information.

15. Referenced Documents

Chemical Hygiene Plan

SOP/1732 MDL/LOD/LOQ Generation

SOP/1739 IDC/DOC Generation

SOP/1728 Waste Management and Disposal SOP

16. Attachments

Table 1: STANDARD SOLUTIONS

Table 2: QC ACCEPTANCE CRITERIA

TABLE 1

STANDARD SOLUTIONS – Suggested Concentrations

STANDARD SOLUTIONS	Stock solution (ug/mL)	Level 1 (ug/mL)	Level 2 (ug/mL)	Level 3 (ug/mL)	Level 4 (ug/mL)	Level 5 (ug/mL)	Level 6 (ug/mL)	Spike Solution (ug/mL)	LCS Solution (ug/mL)
PCB									
Aroclor 1016/1260	100	0.1	0.5	1	2.5	5	10	12.5	12.5
Aroclors 1221, 1232, 1242, 1254, 1262, 1268	100	0.1	0.5	1	2.5	5	10		
LVI		0.01	0.05	0.1	0.25	0.5	1	2.5	2.5
Internal Standard									
1-Bromo-2-Nitrobenzene	5000	0.25	0.25	0.25	0.25	0.25	0.25		
LVI		0.025	0.025	0.025	0.025	0.025	0.025		
Surrogates:									
Tetrachloro-m-xylene	2.0	0.0064	0.032	0.064	0.16	0.32	0.64	2	2
Decachlorobiphenyl	2.0	0.0126	0.064	0.128	0.32	0.64	1.28	2	2
LVI – 10X less								0.2	0.2

LVI is spiked 10X lower

APPENDIX H: MassDOT Access Permit

Massachusetts Department of Transportation Application for Permit to Access State Highway

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ENGINEERING SUCCESS **TOGETHER**

August 18, 2022

Barry Lorion
MassDOT District 3, Director
499 Plantation Parkway
Worcester, MA 01605

Attention: Christopher Chambers, Permit Engineer

Re: Proposed Sewer Pump Station Replacement – Worcester Road (Route 9)
Access Permit Application No. 3-2022-0424
Framingham, Massachusetts

Dear Director Lorion:

BETA Group, Inc. (BETA) in cooperation with the City of Framingham has been retained to prepare the necessary documentation for a MassDOT Access Permit, required for a property along Route 9 in the City of Framingham. The proposed project is a replacement of a sewer pump station which requires the installation of a utility pole within state highway layout and associated driveway and sidewalk improvements as well as gas service relocation.

75%/100% Submission documents have been prepared in accordance with MassDOT's requirements for a Category I Access Permit submission. The submittal documents have been uploaded to the SHAPS site and consist of the following:

1. 75/100% Plans
2. Responses to 25% comments (completed on SHAPS site)

If you have any questions, please do not hesitate to contact our office.

Very truly yours,
BETA Group, Inc.

Matthew Shute, PE
Senior Associate

cc: Robert Marchesseault, PE, City of Framingham

BETA GROUP, INC.
701 George Washington Highway, Lincoln, RI 02865
P: 401.333.2382 | F: 401.333.9225 | W: www.BETA-Inc.com

APPENDIX I: Draft Utility Related Abatement Measure

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DRAFT
Utility-Related Abatement Measure Plan

--

Release Tracking Number
<To be provided by MassDEP upon reporting>

Worcester Road Pump Station
730 Worcester Road
Framingham, Massachusetts

September 30, 2022

Prepared for:

City of Framingham
100 Western Avenue
Framingham, Massachusetts 01702

Prepared by:

701 George Washington Highway, Lincoln, RI 02865

DRAFT
Utility-Related Abatement Measure Plan

Worcester Road Pump Station

Release Tracking Number
To Be Determined

730 Worcester Road
Framingham, Massachusetts

Prepared for:

City of Framingham
100 Western Avenue
Framingham, Massachusetts 01702

Prepared by:

BETA Group, Inc.
701 George Washington Highway
Lincoln, RI 02865

Joseph R. McLoughlin II, LSP, LEP
Associate

September 30, 2022

1. Introduction

BETA Group, Inc. (BETA) has prepared this Utility-Related Abatement Measure (URAM) Plan on behalf of the City of Framingham to address utility work associated with a portion of the "Worcester Road Sewer Pumping Station Replacement" project in Framingham, Massachusetts. The area covered by this URAM is at the Worcester Road Pump Station at 730 Worcester Road in Framingham (the Site). Refer to Figure 1 for the location of the Site.

On <Date to be determined once the contractor schedule is known >, BETA, on behalf of the City of Framingham, notified the Massachusetts Department of Environmental Protection (MassDEP) of the City's intent to conduct URAM activities at the Site. MassDEP assigned release tracking number (RTN) <To be provided by MassDEP upon reporting> for the URAM work. BETA has prepared this URAM report to meet the requirements set forth by the Massachusetts Department of Environmental Protection (MassDEP) in the applicable sections of 310 CRM 40.0000, the Massachusetts Contingency Plan.

1.1 Site Description

The area covered by this URAM consists of a portion of the 730 Worcester Road property from Worcester Road south to a drainage ditch and from the eastern property line west to the Sudbury River. A Downgradient Property Status (DPS), for RTN 3-33648, was filed in April 2017. Section 1.3 below provides further information on this filing. Figure 2 depicts the work area. BETA has identified this area based on conditions encountered. This URAM specifically covers, and is limited to, utility installation-related work at the pump station within the above-referenced area.

1.2 Project Description

The " Worcester Road Sewer Pumping Station Replacement" project includes, but is not limited to:

- Installation of approximately 60 linear feet of new 16-inch sewer force main and appurtenances;
- Installation of a sewer force main bypass connection;
- Installation of temporary structures for installation of a sewer bypass system;
- Installation of a line stop;
- Installation electric duct bank;
- Remove and replace site pavement; and,
- Installation of gravel parking are.

1.3 Downgradient Property Status

AECOM stated the following in their April 28, 2017 "Downgradient Property Status Opinion" prepared for the Site:

> "The City submitted a Release Notification Form (RNF), BWSC-103 to the Massachusetts Department of Environmental Protection (MassDEP) on June 27, 2016, as a result of detected concentrations of EPH fractions, 2-methylnaphthalene, and lead in soil samples that exceed MassDEP's Reportable Concentration (RC) S-1 standards in the Massachusetts Contingency Plan regulations (310 CMR 40.0000). The RCS-1 reportable concentrations are applicable to the property because it is within 500 feet of a residential dwelling, although the property is relatively isolated from the residential area due to the Sudbury River to the west, commercial areas and Route 9 to the north and east, and densely wooded areas in the south portion of the property and beyond the property line. As a result of the submission of the RNF, the 730 Worcester Road property was assigned Release Tracking Number (RTN) 3-33648. The "Site" is defined as the portion of the property where petroleum fractions and associated organic compounds and metals have come to be located in the subsurface soil and/or groundwater, and appears to be migrating in the groundwater from the adjacent, upgradient property at 700 Worcester Road, based on the data collected to date. There are no indications that the impacts are associated with past or current activities on the City's property. Based on the information available, the contamination does not extend to the Sudbury River based on groundwater samples collected.
>
> A second RTN was assigned to the property on March 2, 2017, as a result of AECOM providing notification to MassDEP on behalf of the City related to the discovery of 0.5 inches of Non-Aqueous Phase Liquid (NAPL) in monitoring well B-101 on March 1, 2017 [a 72-hour Immediate Response Action (IRA) condition under the MCP regulations]. This monitoring well and several other monitoring wells on the property were being sampled as part of design data collection efforts, and also to collect data to support the filing of this DPS submittal. This new notification was assigned RTN 3-34122 by MassDEP. MassDEP verbally approved an assessment-only IRA consisting of a month of regular gauging of B-101 and other wells at the property for the presence of NAPL, and inspection of the Sudbury River and a stormwater drainage channel that bisects the property. AECOM performed this monitoring weekly for the month of March, and these inspections indicate that the NAPL thickness is stable and not increasing. No NAPL has appeared in other wells, the thickness has not changed measurably, and there has been no evidence of impact to the Sudbury River or the drainage channel to date."

AECOM stated the following in their December 26, 2017 "Immediate Response Action Completion Report" prepared for the Site:

> "Over the period of the IRA (May through October 2017), there has been little change observed in NAPL thickness in monitoring wells at the site. Petroleum (as NAPL) was first discovered at the site in one out of the five monitoring wells present; this well (MW-

B101) is on the upgradient, eastern side of the property. The only new observation since the initial NAPL measurement in March 2017 is that NAPL has appeared in two additional wells, also along the up gradient, eastern side of the City's property, which adjoins the property at 700 Worcester Road. At no time since the initial notification has a NAPL thickness of 0.5 inches or greater been observed in any well. The NAPL observed in the three wells was typically a trace film that appeared on the probe, and there was no measureable thickness. NAPL has not been observed in the two downgradient monitoring wells on the property, adjacent to the Sudbury River, and there were no detectable petroleum concentrations in the groundwater samples from those two wells. No sheens have been observed in the Sudbury River or the on-site drainage channel. The condition that led to the initial notification of an IRA condition is no longer present, and has not been present since the initial notification. No Imminent Hazard condition or Critical Exposure Pathway was ever present, and the NAPL appears stable because it has not substantially changed in over six months of monitoring.

Additional Comprehensive Response Actions are needed for this release; however, the City does not plan to conduct further Comprehensive Response Actions. The City filed a DPS Submittal with MassDEP in April 2017, as discussed above; the DPS document supports the City's conclusion that the petroleum/NAPL release is from an upgradient property (700 Worcester Road) that abuts the City's property to the east. Therefore, the owner of the 700 Worcester Road property (Walnut 223 LP/Hamilton Realty Co.) is responsible for conducting the necessary Comprehensive Response Actions, if the release originates from that property."

1.4 Additional Groundwater Sampling

On March 3, 2021, BETA collected groundwater samples from monitoring wells MW-202 and MW-208. Samples were submitted to Alpha Analytical, Inc. (Alpha) for analysis of volatile organic compounds (VOCs) by EPA Method 8260, total and dissolved thirteen metals by various EPA methods, and extractable petroleum hydrocarbons (EPH) with target polynuclear aromatic hydrocarbons (PAHs) and volatile petroleum hydrocarbons (VPH) with target VOCs both by the MassDEP method. Alpha identified concentrations of C19-C36 Aliphatics and total and dissolved barium in the sample from MW-202. These concentrations were below the MassDEP RCGW-1 and RCGW-2 reportable concentrations. Appendix C contains a summary table and the laboratory certificates of analysis.

On October 28, 2021, BETA collected groundwater samples from monitoring wells MW-101, MW-201, and MW-203. The samples were submitted to Alpha for analysis of VOCs by EPA Method 8260, total and dissolved thirteen metals by various EPA methods, and EPH with target PAHs and VPH with target VOCs both by the MassDEP method. Alpha identified concentrations of C19-C36 Aliphatics, total arsenic, and total zinc in the sample from MW-101. Alpha identified concentrations of total and dissolved arsenic, total and dissolved zinc, total copper, and total lead in the sample from MW-201. Alpha identified concentrations of total copper in the sample from MW-203. The concentration of

total arsenic in the sample from MW-201 exceeded the MassDEP's RCGW-1 standard but was below the applicable RCGW-2 standards. The remaining concentrations of contaminants were below the MassDEP RCGW-1 and RCGW-2 reportable concentrations. The concentrations of total metals are likely due to silt entrained in the samples. Appendix C contains a summary table and the laboratory certificates of analysis.

2. Applicability of URAM

This URAM Plan is being submitted on behalf of the City of Framingham. As required by 310 CMR 40.0461(1), the activities described in this URAM Plan will be conducted by the City of Framingham, the Public Authority that is overseeing or is directly responsible for the utility construction activities. The City has retained a contractor to conduct the work associated with this URAM and the sewer project and has retained BETA to oversee all work associated with this project.

In accordance with 310 CMR 40.0461(2), the URAM will be conducted on City-owned property to respond to and properly manage contamination that will be encountered during the sewer system work at the property. This project is being administered by the City of Framingham.

In accordance with 310 CMR 40.0462(4), a URAM is required because the project is anticipated to require the handling of greater than 100 cubic yards of soil contaminated by a release of petroleum substances and metals at concentrations greater than applicable reportable concentrations. The project will also involve treatment and discharge of contaminated groundwater.

3. General Provisions

The following sections detail the general provisions of the URAM as required by 310 CMR 40.0461 et seq. BETA has designed this URAM to meet these provisions.

3.1 Absence of 2- or 72-hour Reporting Conditions

BETA has not identified any Site conditions that would require notification to MassDEP within 2 or 72-hours. In accordance with 310 CMR 40.0461(3), if such Site conditions are encountered, URAM activities will cease and approval from MassDEP for further response actions under an Immediate Response Action (IRA) will be obtained.

3.2 LSP-of-Record

As required by 310 CMR 40.0461(4), the City of Framingham has retained an LSP, Mr. Joseph R. McLoughlin II, as the LSP-of-record to supervise this URAM.

3.3 Evaluation of Nature and Extent of Contamination

In accordance with the requirements of 310 CMR 40.0461(7), the nature and extent of the area of suspected contamination has been sufficiently evaluated for the purposes of the sewer replacement project. Refer to Section 1.3 for a description of past assessment and evaluation of the known and suspected contaminants in the area of the proposed utility excavation. BETA has not delineated the extent of the disposal site as such delineation is the responsibility of the Potentially Responsible Party (PRP) for the upgradient disposal site(s).

3.4 Evaluation of Scope and Expense of Mitigation Actions

In accordance with the requirements of 310 CMR 40.0461(7) an evaluation of the scope and expense of mitigation actions has been performed for this project. Mitigation during the project may consist of:

- Treatment and infiltration of groundwater, or obtain a Dewatering and Remediation General Permit for dewatering activities required as part of this project or obtain approval for discharge of pumped groundwater into the Framingham Sewer System;
- Temporary storage of excavated soil, prior to on-Site reuse as project backfill; and
- Off-site disposal of excess soil at appropriate disposal facilities and/or locations.

The City of Framingham has included the cost of these mitigation requirements in the construction budget for this project.

3.5 Evaluation of Benefits and Limitations of Alternatives

In accordance with the requirements of 310 CMR 40.0461(7), an evaluation of benefits and limitations of alternatives has been performed for this project. The sewer work at 730 Worcester Road is part of the "Worcester Road Sewer Pumping Station Replacement." The purpose of this project is to replace the Worcester Road pump station with a new pump station and install associated sewer pipe and appurtenances. No preferable alternative has been identified by the City.

3.6 Health and Safety Plan

In accordance with the requirements of 310 CMR 40.0464(2), the City of Framingham is requiring any and all contractors at the Site to prepare and adhere to a Health and Safety Plan (HASP) in accordance with applicable OSHA requirements. The HASP for BETA's staff is included in Appendix A.

4. Excavation of Contaminated Soil

The excavation for the project within the URAM area is estimated to displace approximately 300 cubic yards of material that may require on- or off-Site management. This material will be handled by a combination of the following:

- On-site reuse as project backfill;
- Excavation and on-site stockpiling (or live loading, if possible) followed by transportation to an asphalt recycling facility;
- Excavation and on-site stockpiling (or live loading, if possible) followed by transportation to an unlined landfill;
- Excavation and on-site stockpiling (or live loading, if possible) followed by transportation to a lined landfill; and/or
- Off-site reuse in accordance with 310 CMR 40.0032(3).

Excavation will be performed in accordance with applicable local, state, and federal requirements.

4.1 Soil Characterization

Soil will be excavated and stockpiled at the City's Arthur Street storage area at 229 Arthur Street based on the results of prior sampling and based on on-Site observations and field screening of excavated soil. At this time, it is likely that there will be one stockpile of excess soil from the work at 730 Worcester Road. This soil will not be combined with soil from any other areas of the project. BETA will collect representative composite samples from the stockpile to determine the appropriate on- or off-Site soil management destination prior to off-site shipment.

Stockpile samples will be analyzed for Total Petroleum Hydrocarbons (TPH) by EPA Method 8100M, Volatile Organic Compounds (VOCs) by EPA Method 8260, Semi-volatile Organic Compounds (SVOCs) by EPA Method 8270, Polychlorinated biphenyls (PCBs) by EPA method 8082, fifteen metals by various EPA methods, total pesticides by EPA Method 8081B, total herbicides by EPA Method 8151A, pH, conductivity, flashpoint, ignitability, conductivity, and reactive cyanide and sulfide

4.2 On-Site Reuse

Excavated soil will be reused as backfill to the extent possible. The re-use of this soil will depend on the geotechnical suitability of this material.

4.3 Off-Site Disposal

Excess soil will be temporarily stockpiled prior to shipment at an appropriate disposal facility. At this time, BETA estimates that approximately 300 cubic yards of soil will require off-site disposal. The appropriate off-site disposal facility will be determined based on the results of the stockpile sampling discussed in Section 4.1 above.

4.4 DPS Requirements

Pursuant to 310 CMR 40.0185, the City has met and/or will meet the following requirements to maintain the DPS:

- The proposed work will not cause a release, contribute to the release, or cause the release to become worse than it otherwise would be;
- The City, to the extent possible, will provide reasonable access to the upgradient property owner and their agents;
- The City will undertake reasonable steps to prevent the exposure of human and environmental receptors to oil and/or hazardous materials at the Site;
- The City is submitting this URAM to undertake response actions at the Site;
- The City has identified the upgradient property as the likely source of the contamination at the Site; and
- The City will not engage in any activity that could prevent or impede the implementation of reasonably likely response actions in the future.

During the construction, BETA will observe and monitor the work activities to determine if the above DPS requirements are met.

5. Dewatering

Based on the observations and measurements made from the soil borings and monitoring wells, dewatering will be required to install the sewer pipe at the Site. Based on the laboratory data from previous groundwater sampling, the contractor will be required to provide appropriate treatment prior to discharge of the dewatering effluent to meet the requirements of the Dewatering and Remediation General Permit (DRGP). Water removed from the excavation will be treated prior to discharge. The discharge of treated water will consist of either infiltration on site, discharge to a surface water in accordance with a DRGP, or discharge to the sewer system. The discharge of water will be performed in a manner that will not cause erosion, flooding, damage to existing facilities, completed work or adjacent property, improved or otherwise.

6. Schedule & Reporting

The project construction schedule anticipates that URAM activities will occur between approximately ??, 2019 and ??, 2019 <dates and duration to be determined based on the Contractor's schedule>, and should be completed within approximately ?? months <dates and duration to be determined based on the Contractor's schedule>. If required, BETA will submit a URAM Status Report to MassDEP 120 days following MassDEP's receipt of this URAM Plan and every six months thereafter, as necessary. Any significant changes in the URAM schedule will be provided to MassDEP in the appropriate URAM Status Report.

BETA will submit a URAM Completion Report to MassDEP within 60 days of the completion of all response actions associated with this URAM.

Since active treatment of groundwater will occur, BETA will additionally submit a Remedial Monitoring Report (RMR) to MassDEP.

7. Performance Standards

It is the intention of the City of Framingham to conduct the URAM in compliance with all applicable requirements of 310 CMR 40.0460, including the performance standards at 310 CMR 40.0464:

- Contamination at the disposal site shall not be exacerbated as a result of Utility-related abatement measures or as a result of structures placed within an area of identified contamination;
- Construction workers, surrounding human populations and environmental receptors shall be reasonably protected from exposure to oil and/or hazardous material during and following construction activities; and
- Contaminated soil, contaminated groundwater, and other Remediation Wastes removed from the disposal site and construction area shall be managed in compliance with the provisions of 310 CMR 40.0030 (General Provision for the Management of Remediation Waste) and all applicable federal, state, and local laws.

URAM activities will be terminated upon discovery of a "Two Hour" or "72 Hour" reporting condition. Any continued work will only be continued subsequent to obtaining MassDEP approval for Immediate Response Action activities.

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Appendix B

BWSC Transmittal Forms