DRAINAGE REPORT

For

SMC MANAGEMENT CORPORATION

Real Estate Investment • Development • Asset Management

PROPOSED

"Residences at Table Talk Square"

120 Washington Street
Worcester, Massachusetts
Worcester County

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BOHLER

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I. EXECUTIVE SUMMARY

This report examines the changes in drainage that can be expected as the result of the redevelopment of the existing facility located on Spruce Street in the City of Worcester, Massachusetts. The master development property contained approximately 3.91± acres of land, consisting of an existing industrial building, formerly occupied by Table Talk Pies, and associated site features. However, a ±1.26 acre portion of the existing site, located to the north of Spruce Street has been subdivided and is hereafter referred to as Parcel 3A and/or the "Site". The Parcel 3A portion of the master development proposes to redevelop approximately 1.26± acres of the property, denoted as Lot 3A on the "Approval Not Required Plan of Land" prepared by Control Point Associates, Inc., dated December 11th, 2024, and parcel 05-005-00015.

As part of this assessment, we have reviewed plans entitled "Approval Not Required Plan of Land" prepared by Control Point Associates, Inc., dated December 11th, 2024, "Approval Not Required Plan of Land" prepared by Control Point Associates, Inc., dated April 4th, 2022, "As-Built Survey", prepared by Control Point Associates, Inc., dated May 22nd, 2024, "Title Review Survey", prepared by Control Point Associates, Inc., dated October 6th, 2020. In addition to this report, we have also submitted the plans entitled "Proposed Site Plan Documents", prepared by Bohler, dated December 12, 2024.

The redevelopment of Parcel 3A includes the construction of a residential-use building that consists of seven levels in total. The proposed building will provide residential units on the top five levels and parking spaces located below on the bottom two garage levels. Utility connections are mainly proposed to connect utilities within Spruce Street which were constructed as part of a separate phase of the overall redevelopment of the original 3.91± acre parcel. Demolition of the existing Table Talk Pies building and associate site features that were located on the Site was completed as part of a previous phase of the project. However, given this project is part of the larger redevelopment project, the existing condition utilized in the pre-development analysis the existing buildings and site features are still located on the parcel.

This Stormwater Report provides a brief overview of the pre- and post-development site stormwater conditions for Parcel 3 of the development. Additionally, this report provides a brief analysis of the anticipated stormwater conveyance/management system as illustrated within the accompanying "Proposed Site Plan Documents" prepared by Bohler. The project will also provide erosion and sedimentation controls during the demolition and construction periods, as well as long term stabilization of the site.

For the purposes of this analysis the pre- and post-development drainage conditions were analyzed at one (1) "design point" where stormwater runoff currently drains to under existing conditions. These design points are described in further detail in **Section II** below. A summary of the existing and proposed conditions peak runoff rates and volumes for the 2-, 10-, 25-, and 100-year storms can be found in **Table 1.1** and **Table 1.2** below. In addition, the project has been designed to meet or exceed the Stormwater Management Standards as detailed herein.

Table 1.1: Design Point Peak Runoff Rate Summary

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
DP1	5.31	5.12	**-0.19**	8.35	8.17	**-0.18**	10.78	10.61	**-0.17**	14.90	14.74	**-0.16**

**Flows are represented in cubic feet per second (cfs)*

Table 1.2: Design Point Volume Summary

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
DP1	0.426	0.408	**-0.018**	0.682	0.661	**-0.021**	0.887	0.864	**-0.023**	1.235	1.210	**-0.025**

**Volumes are represented in acre-feet (af)*

II. EXISTING SITE CONDITIONS

The existing Site consists of approximately ±1.26 acres of land, located at 120 Washington Street in the city of Worcester, MA. The site was historically used as part of the overall Table Talk Pies facility and is entirely composed of impervious pavement and/or roof coverage.

Existing Site Description

On Site elevations range from approximately 488 at the high point located within Ash Street to 465 on the southern corner of the site adjacent to Washington Street. Additionally, on site slopes vary in an approximate range from 0-30%.

On-Site Soil Information

Soils within the analyzed area consist of the following as classified by the Natural Resource Conservation Service (NRCS):

Table 2.1: Existing Soil Information

Soil Unit Symbol	Soil Name / Description	Hydrologic Soil Group (HSG)
602	Urban Land	N/A

Onsite soil testing was performed by GZA GeoEnvironmental, Inc. on June 11th, 2021. Refer to **Appendix C** for additional information.

Existing Collection and Conveyance

Generally, the northeastern portion of the site is located at a relative high point on Washinton and Ash Streets. Whereas the southeastern portion of the site is located at a crest in Spruce Street. In the existing condition, stormwater initially flows into either Ash, Washington, or Spruce Streets and is picked up by the existing drainage infrastructure in said streets. Then, stormwater is conveyed into a combined sewer system located in Madison Street and ultimately discharged into the existing underground Mill Brook drainage conduit.

Existing Watersheds and Design Point Information

For the purposes of this analysis, the pre- and post-development drainage conditions were analyzed at one (1) “design point” as described below where stormwater runoff currently drains to under existing conditions. The existing site was subdivided into one (1) separate sub

catchment, as described below, to analyze existing and proposed flow rates at each design point. The minimum time of concentration for all proposed areas is calculated as 6 minutes (0.1 hr).

Design Point #1 (DP1) is the existing Madison Street drainage infrastructure located to the south of the site. Under existing conditions, this design point receives stormwater flows from all ±1.26 acres of land within the Site, designated as watershed "EX1.1". Refer to Table 2.1 below for additional detail.

Table 2.2: Existing Sub-Catchment Summary

Sub-catchment Name	Total Area (acres)	Cover Description	Curve Number (CN)	Time of Concentration (Tc, minutes)
EX1.1	1.43±	Rooftops & paved parking	98	6.0

Refer to **Table 1.1, 1.2, 6.1, and 6.2** for the existing conditions peak rates of runoff and volumes. Refer to **Appendix D** and the Drainage Area Maps in the appendices of this report for a graphical representation of the existing drainage areas.

III. PROPOSED SITE CONDITIONS

Proposed Development Description

The proposed project consists of the redevelopment of Parcel 3A into a residential-use building, providing 185 residential units on the top five levels and 231 parking spaces located below on the bottom two levels of the seven level building. In addition to the building, the proposed project consists of the construction of associated utilities, amenity courtyards, and landscaping areas. Utility connections are proposed to connect to the previously constructed and capped utilities within Spruce Street and surrounding infrastructure. Rooftop runoff has been designed to be captured and piped into the existing drainage infrastructure located within the adjacent streets. With the implementation of the associated landscaping areas, the post-development reduces impervious area when compared to the existing conditions. Said landscaping areas will increase water quality, reduce peak rates, and boost the overall groundwater recharge volume from the site as a whole.

Proposed Development Collection and Conveyance

The best management practices (BMPs) incorporated into the proposed stormwater management system have been designed to meets, or exceeds, the standards set forth in the Massachusetts Department of Environmental Protection Stormwater Handbook standards. Refer to **Section V** for additional information.

Proposed Watersheds and Design Point Information

The project has been designed to maintain existing drainage watersheds to the greatest extent possible, with the same design points described in **Section II** above. The site was subdivided into one (1) separate sub catchment for the proposed conditions as described below. The minimum time of concentration for all proposed areas is calculated as 6 minutes (0.1 hr).

Under proposed conditions DP#1 receives stormwater flows from approximately ±1.26 acres of land, designated as watershed “DP1.1”. Refer to Table 3.1 below for additional detail. Refer to Table 3.1 below for additional detail.

Table 3.1: Proposed Sub-catchment Summary

Sub-catchment Name	Total Area (acres)	Cover Description	Curve Number (CN)	Time of Concentration (Tc, minutes)	Hydrologic Routing
DP1.1	1.43±	Rooftops, pavement, gravel & grass	96	6.0	DPP1

Refer to **Table 1.1, 1.2, 6.1, and 6.2** for the calculated proposed conditions peak rates of runoff and volumes. For additional hydrologic information, refer to **Appendix D** and the Drainage Area Maps in the appendices of this report for a graphical representation of the proposed drainage areas.

IV. METHODOLOGY

Peak Flow Calculations

Methodology utilized to design the proposed stormwater management system includes compliance with the guidelines set forth in the latest edition of the Massachusetts DEP Stormwater Handbook. The pre- and post-development runoff rates being discharged from the site were computed using the HydroCAD computer program. The drainage area and outlet information were entered into the program, which routes storm flows based on NRCS TR-20 and TR-55 methods. The other components of the model were determined following standard NRCS procedures for Curve Numbers (CNs) and times of concentrations documented in the appendices of this report. The rainfall data utilized and listed below in table 4.1 below for stormwater calculations is based on NOAA. Refer to **Appendix F** for more information.

Table 4.1: Worcester County NOAA Rainfall Intensities

Frequency	2 year	10 year	25 year	100 year
Rainfall* (inches)	3.81	5.96	7.68	10.60

Values derived from NOAA ATLAS on 12/03/2024

The proposed stormwater management as designed will provide a decrease in peak rates of runoff from the proposed facility for the 2-, 10-, 25- and 100-year design storm events. Additionally, the proposed project meets, or exceeds, the MADEP Stormwater Management standards. Compliance with these standards is described further below.

V. STORMWATER MANAGEMENT STANDARDS

Standard #1: No New Untreated Discharges

No new untreated discharges are proposed as part of this project. Instead, approximately 5,460 sf of landscaping area will be created as part of this project. This results in a reduction in the impervious area from the pre- to post-development conditions.

Standard #2: Peak Rate Attenuation

As outlined in **Table 1.1** and **Table 6.1**, the development of the site and the proposed stormwater management system, have been designed so that post-development peak rates of runoff are below pre-development conditions for the 2-, 10-, 25- and 100-year storm events.

Standard #3: Recharge

The stormwater runoff from the project will be collected and diverted to the existing stormwater infrastructure located in the adjacent streets. The proposed project will result in a reduction in the impervious cover on site. Existing on site drainage systems and patterns will be maintained as part of this project. Refer to **Appendix F** of this report for calculations documenting required and provided recharge volumes.

Standard #4: Water Quality

The proposed project will result in a reduction in the impervious cover on site. Existing on site drainage systems and patterns will be maintained as part of this project. Refer to **Appendix F** of this report for calculations documenting required and provided water quality volumes.

Standard #5: Land Use with Higher Potential Pollutant Loads

Not Applicable for this project.

Standard #6: Critical Areas

Not Applicable for this project.

Standard #7: Redevelopment

As part of this project, approximately 5,460 sf of landscaping area will be created. This will reduce impervious cover in the post development and has been designed accordingly to comply with the standards as applicable to the maximum extent practicable.

Standard #8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

The proposed project will provide construction period erosion and sedimentation controls as indicated within the site plan set provided for this project. This includes a proposed construction exit, protection for stormwater inlets, protection around temporary material stock piles and various other techniques as outlined on the erosion and sediment control sheets. Additionally, the project is required to file a Notice of Intent with the US EPA and implement a Stormwater Pollution Prevention Plan (SWPPP) during the construction period. The SWPPP will be prepared prior to the start of construction and will be implemented by the site contractor under the guidance and responsibility of the project's proponent. Refer to **Appendix H**.

Standard #9: Operation and Maintenance Plan (O&M Plan)

An Operation and Maintenance (O&M) Plan for this site has been prepared and is included in **Appendix G** of this report. The O&M Plan outlines procedures and time tables for the long term operation and maintenance of the proposed site stormwater management system, including initial inspections upon completion of construction, and periodic monitoring of the system components, in accordance with established practices and the manufacturer's recommendations. The O&M Plan includes a list of responsible parties.

Standard #10: Prohibition of Illicit Discharges

The proposed stormwater system will only convey allowable non-stormwater discharges (firefighting waters, irrigation, air conditioning condensates, etc.) and will not contain any illicit discharges from prohibited sources. An Illicit Discharge Statement is included in **Appendix G** of this report.

VI. SUMMARY

In summary, the proposed redevelopment illustrated on the drawings prepared by Bohler results in a reduction in peak rates of runoff from the subject site when compared to pre-development conditions for the 2-, 10-, 25- and 100-year storm frequencies. In addition, the proposed best management practices will result in an effective removal of total suspended solids from the post-development runoff. The pre-development versus post-development stormwater discharge comparisons are contained in **Table 6.1** and **Table 6.2** below:

Table 6.1: Design Point Peak Runoff Rate Summary

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
DP1	5.31	5.12	**-0.19**	8.35	8.17	**-0.18**	10.78	10.61	**-0.17**	14.90	14.74	**-0.16**

**Flows are represented in cubic feet per second (cfs)*

Table 6.2: Design Point Volume Summary

Point of Analysis	2-Year Storm			10-Year Storm			25-Year Storm			100-Year Storm		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
DP1	0.426	0.408	**-0.018**	0.682	0.661	**-0.021**	0.887	0.864	**-0.023**	1.235	1.210	**-0.025**

**Volumes are represented in acre-feet (af)*

As outlined in the tables above, the proposed stormwater management system as designed will provide a decrease in peak rates of runoff from the proposed facility for the 2-, 10-, 25- and 100-year storm events. Additionally, the project meets or exceeds the MADEP Stormwater Management Standards as described further herein.

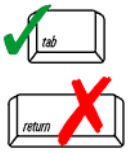
APPENDIX A: MASSACHUSETTS STORMWATER MANAGEMENT CHECKLIST

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

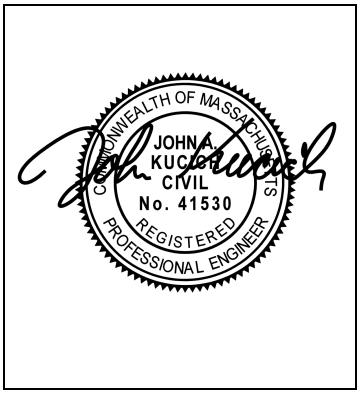
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



12/12/2024

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☒ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- [X] No disturbance to any Wetland Resource Areas
- [ ] Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- [X] Reduced Impervious Area (Redevelopment Only)
- [X] Minimizing disturbance to existing trees and shrubs
- [ ] LID Site Design Credit Requested:
  - [ ] Credit 1
  - [ ] Credit 2
  - [ ] Credit 3
- [ ] Use of "country drainage" versus curb and gutter conveyance and pipe
- [ ] Bioretention Cells (includes Rain Gardens)
- [ ] Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- [ ] Treebox Filter
- [ ] Water Quality Swale
- [ ] Grass Channel
- [ ] Green Roof
- [ ] Other (describe): _____

Standard 1: No New Untreated Discharges

- [X] No new untreated discharges
- [ ] Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- [X] Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

☐ Site is comprised solely of C and D soils and/or bedrock at the land surface

☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000

☐ Solid Waste Landfill pursuant to 310 CMR 19.000

☒ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☐ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

APPENDIX B: PROJECT LOCATION MAPS

- *USGS MAP*
- *FEMA FIRMETTE*

The National Map Advanced Viewer

10/22/2024, 1:18:57 PM

1:18,056

0 0.15 0.3 0.6 mi

0 0.25 0.5 1 km

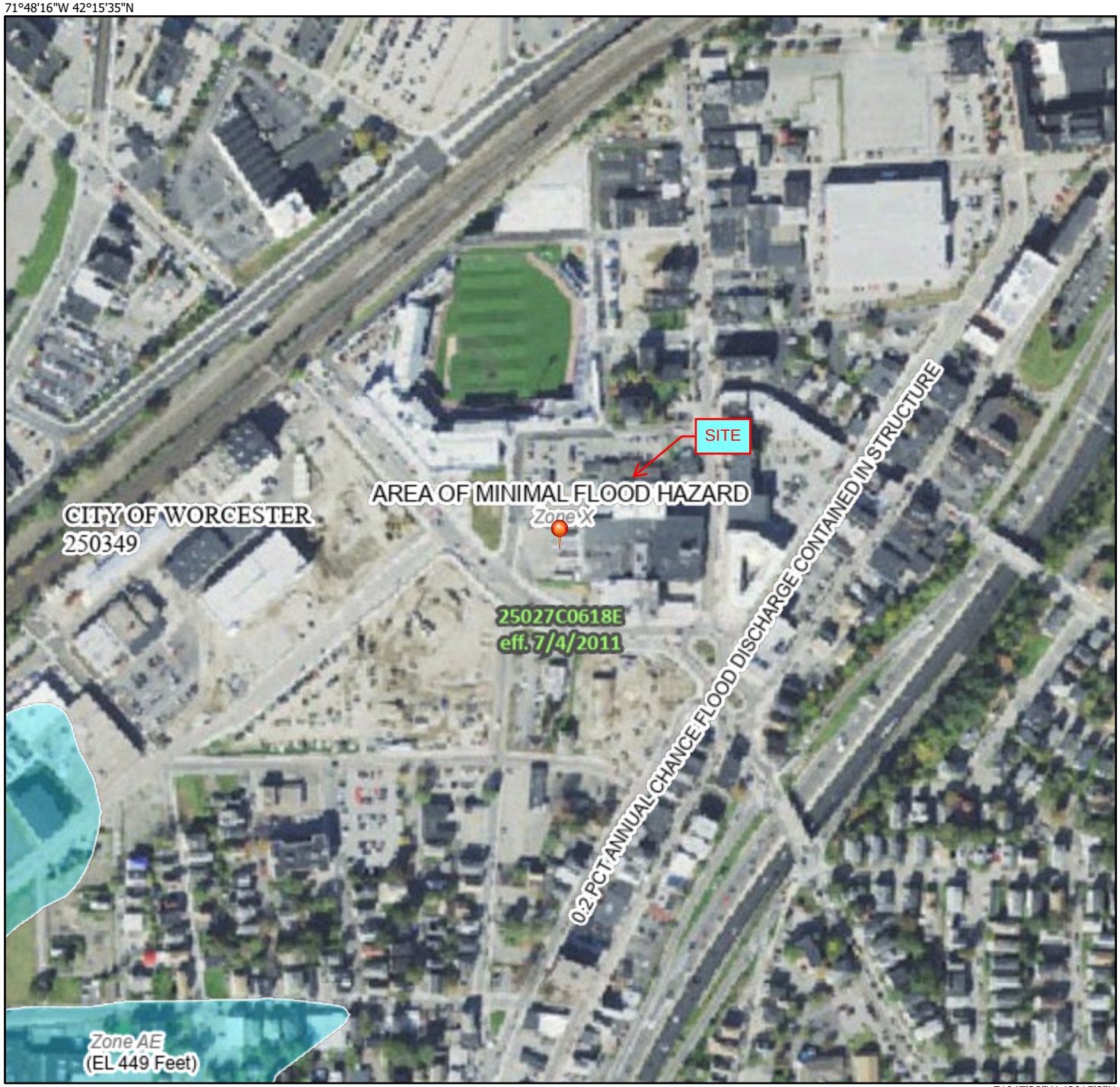
USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S.

USGS
2021 USGS

National Flood Hazard Layer FIRMette

FEMA

71°48'16"W 42°15'35"N



71°47'39"W 42°15'8"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

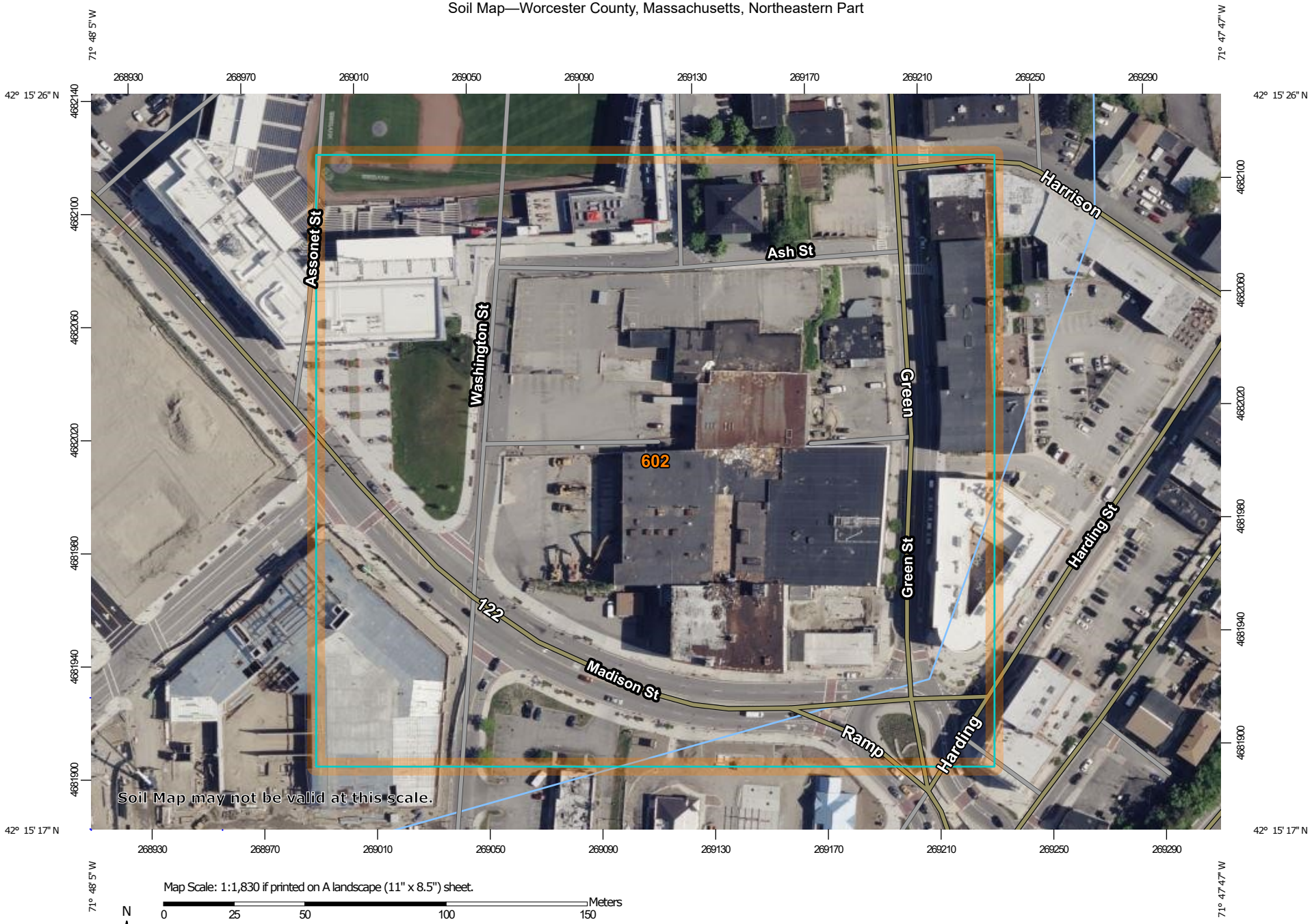
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/3/2024 at 9:14 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX C: SOIL AND WETLAND INFORMATION

- *NCRS CUSTOM SOIL RESOURCE REPORT*
- *REPORT OF GEOTECHNICAL INVESTIGATION*



Map Scale: 1:1,830 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Worcester County, Massachusetts, Northeastern Part
Survey Area Data: Version 19, Aug 27, 2024

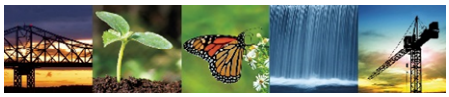
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
602	Urban land	12.9	100.0%
Totals for Area of Interest		**12.9**	**100.0%**



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June 11, 2021
File No. 01.0174850.50

Boston Capital Development, LLC
11 Beacon Street, Suite 325
Boston, Massachusetts 02108

Attention: Mr. Richard D. Mazzocchi, Managing Director

Re: Geotechnical Evaluation
Table Talk Lofts - Building 1 and Parking Garage
153 Green Street, 166 Madison Street, and 120 Washington Street
Worcester, Massachusetts

Dear Mr. Mazzocchi:

In accordance with our Agreement dated January 5, 2021 and Addendum A dated April 16, 2021, GZA GeoEnvironmental, Inc. (GZA) is pleased to submit this geotechnical engineering report for the development of Building 1 and Parking Garage at the above-referenced property (Site) in Worcester, Massachusetts. The objective of our work was to evaluate subsurface conditions at the site and develop geotechnical recommendations for design and construction of the proposed Building 1 and Parking Garage.

Please note that this report is subject to the Limitations attached as **Appendix A**. Refer to the Locus Plan, attached as **Figure 1**, for the site location.

Elevations cited in this report were estimated using available Google Earth imagery, which is based on the World Geodetic System 1984 (WGS84) datum.

BACKGROUND

Project Understanding

Our understanding of the project is based on our communications with you as the project developer, our previous Phase I and Phase II Environmental Site Assessments (ESAs), dated November 5, 2020 and January 2021, respectively, and the concept design plans prepared by Benoit Design Group, PC, dated April 6, 2021.

The Site is approximately 3.91 acres, and the vast majority of the area is either paved or occupied by an existing two-story industrial building with a footprint of 77,933 square feet, currently occupied by Table Talk Pies. The existing building was constructed in 1945 with building additions constructed between 1966 and 1972, based on ESA research. We understand the existing building within the current project limit does not have a basement. The Site is bounded by Madison Street to the south, Green Street to the east, Ash Street to the North, and Washington Street to the west. Surrounding properties are generally used for commercial and residential purposes. Existing site grades vary significantly and range from approximately El. 455 feet in the southwest to 483 feet in the northeast. For purposes of this

report, we have assumed the existing building has a finished floor elevation of El. 465 feet. Existing site conditions are shown on **Figure 2**.

Proposed Development

The proposed Building 1 is located at the northeast corner of Washington Street and Madison Street and has an L-shaped footprint of roughly 14,000 square feet. Building 1 is planned to have five stories above grade with no basement level. The proposed finished floor elevation is on the order of El. 456 to 458 feet. Existing grades at the proposed Building 1 location slope down from north to south from about El. 470 to 455 feet.

The proposed Parking Garage to be located to the east of Building 1 has a rectangular footprint of roughly 13,000 square feet and is planned to have four stories above grade with no basement. The proposed finished floor elevation is about El. 466 feet and will be within 2 feet of the estimated existing slab grade. .

SCOPE OF SERVICES

GZA performed the following scope of services:

1. Executed a two-phase subsurface exploration program consisting of twelve soil borings to evaluate soil and groundwater conditions.

2. Performed laboratory gradation analysis on seven selected soil samples collected from the borings to confirm field classifications and assist in evaluating potential on-site reuse of soils excavated during construction.

3. Evaluated subsurface conditions from the borings, developed geotechnical design and construction recommendations and prepared this report summarizing our findings and recommendations.

SUBSURFACE EXPLORATION PROGRAMS

GZA retained Drilex Environmental, Inc. (Drilex) to perform five soil borings, GZ-1, GZ-2, GZ-3, GZ-4, and GZ-6, on January 7 and 8, 2021. GZ-1 was not used in our evaluation of the subsurface conditions due to its distance from the proposed Building 1 and Parking Garage and was performed as part of the Phase 2 ESA. The borings were advanced to depths ranging from 22 to 44 feet below ground surface (bgs) using a truck-mounted drill rig with hollow stem auger or drive and wash drilling techniques.

GZA retained Drilex to perform seven supplemental soil borings, GZ-7 through and GZ-13, between April 28 and 30, 2021. The borings were advanced to depths ranging from 14 to 32 feet bgs using a truck-mounted drill rig with hollow stem auger or drive and wash drilling techniques. One boring (GZ-13) was performed inside the southeast corner of the existing building. Note that some of the preferred boring locations at proposed Building 1 and the Parking Garage were not accessible for drilling access within the existing active building and at the gasoline station to the southeast of the building.

In general, Standard Penetration Tests (SPT) were performed, and split spoon samples were obtained, continuously in the top 10 to 20 feet and then at 5-foot intervals to the bottom of the borehole. Borings GZ-3 and GZ-4 were completed as monitoring wells with flush-mount road boxes placed in concrete at the pavement surface. Boring GZ-8 was terminated at a depth of 14 feet bgs due to a subsurface void which may be a basement of a previous building. The boreholes not finished as monitoring wells, except for boring GZ-8, were backfilled with drill cuttings to the existing ground surface, and asphalt pavement was patched with cold patch. At boring GZ-8, a small steel plate was placed over the void, and the upper approximately 6 feet of the borehole was backfilled similar to the other borings. A GZA representative observed the

borings, classified the soil samples, and prepared the boring logs included in **Appendix B**. The approximate boring locations (estimated by tape-measuring from existing site and topographic features in the field) are shown on **Figure 2: Exploration Location Plan**. Ground surface elevations at the boring locations were estimated using available Google Earth imagery.

LABORATORY TESTING

Seven soil samples obtained from the borings were submitted to Thielsch Laboratories in Cranston, Rhode Island for gradation analysis to confirm field classifications and assist in evaluating on-site reuse of soils excavated during construction. Geotechnical laboratory test results are attached as **Appendix C.**

SUBSURFACE CONDITIONS

Below the existing pavement or building slab level, subsurface conditions encountered in the borings generally consisted of Fill, underlain by Natural Granular Soils (Sand and Gravel, and/or Fine Sand) and Glacial Till. Clayey Silt was encountered below the Fill and above the Natural Granular Soils in boring GZ-12. Possible weathered bedrock was encountered below the Glacial Till in boring GZ-6. A void was encountered in boring GZ-8 between the depths of 6 to 14 feet. The void was initially thought to be a portion of a previous basement; however, based on discussions with Table Talk personnel, it is believed to be a large abandoned below-grade tank.

The strata encountered in the borings are described below in further detail. The depths and thicknesses referenced herein should be considered approximate. Refer to the boring logs attached in **Appendix B** for more detailed subsurface conditions at specific exploration locations.

Pavement – Approximately 1 to 6 inches of asphalt pavement was encountered at the ground surface in the borings, except for borings GZ-2, GZ-12, and GZ-13. Approximately 6 to 11 inches of concrete were encountered below asphalt in boring GZ-7 and at the ground surface in borings GZ-12 and GZ-13.

Fill – Fill was encountered below the pavement or concrete slab at the ground surface in the borings, except for boring GZ-11, where Glacial Till was encountered immediately below the pavement. The Fill was encountered to depths of about 3 to 11 feet bgs, and possibly up to 16.5 feet bgs in boring GZ-6 where loose granular soils were encountered. Due to the similar consistency of the Fill and natural Sand, the interface between the two layers was not easily identified. The Fill generally consisted of brown, fine to coarse sand, with up to 50 percent gravel, up to 20 percent silt. Trace amounts of debris consisting of brick, coal, and asphalt were observed in borings GZ-6, GZ-7, GZ-8, GZ-10, GZ-12, and GZ-13. SPT N-Values within the Fill ranged from 4 to 70 blows per foot (bpf), indicating that the Fill had a variable density ranging from very loose to very dense.

Clayey Silt – Clayey Silt was encountered below the Fill in boring GZ-12 from approximately 4.5 to 9 feet bgs. The Clayey Silt generally consisted of tan, Clayey Silt, with up to 20 percent fine sand. SPT N-Values within the Clayey Silt were 15 and 18 bpf, indicating a very stiff consistency.

Natural Granular Soils –Natural Granular Soils consisted of Sand and Gravel or Sand Strata, as described below.

> Sand and Gravel was encountered below the Fill and/or Clayey Silt in borings GZ-7, GZ-9, GZ-10, and GZ-12, extending to depths of approximately 8 to 23 feet bgs. The Sand and Gravel generally consisted of brown, fine to coarse sand, with up to 50 percent gravel, and up to 20 percent silt and had a thickness of 4 to 14 feet. SPT N-Values within the Sand and Gravel ranged from 8 bpf to 61 bpf, indicating that the Sand and Gravel had a variable density ranging from loose to very dense.

Sand – Sand was encountered below the Fill and/or Sand and Gravel in borings GZ-2, GZ-4, GZ-6, GZ-7, and GZ-9, at depths of approximately 6 to 23 feet bgs. The Sand layer was approximately 11.5 to more than 13 feet in thickness, terminating between 16.5 feet to 32 feet bgs. Borings GZ-7 and GZ-9 terminated in the Sand layer. The Sand generally consisted of brown, fine Sand or fine to coarse Sand, with up to 35 percent silt , and up to 20 percent gravel. In boring GZ-2, the Sand layer was interbedded with Silt layers. Between depths of 9 and 22 feet in boring GZ-9, Fine Sand with up to 10 percent Silt was encountered. SPT N-Values within the Sand ranged from 7 bpf to 47 bpf, indicating that the Sand was loose to dense.

Glacial Till – Glacial Till was encountered below the Asphalt and Fill in the borings GZ-3, GZ-11, and GZ-13 and below the Sand and Gravel and Sand in borings GZ-2, GZ-4, GZ-6, GZ-10, and GZ-12. Depths to the top of Glacial Till ranged from 0.25 to 29 feet bgs. The Glacial Till was not fully penetrated in the borings, except for boring GZ-6. The Glacial Till generally consisted of brown and gray, fine to coarse sand, with up to 50 percent gravel, up to 20 percent silt, and occasionally clay & silt, silt & clay, or silty clay with up to 20 percent sand and gravel. SPT N-Values within the Glacial Till ranged from 10 bpf to refusal, indicating that the Glacial Till has a medium dense to very dense or stiff to hard consistency.

Weathered Bedrock – Possible weathered bedrock was encountered in boring GZ-6 from a depth of 38 feet to the bottom of boring at 44 feet. The weathered bedrock generally consisted of dark brown, fine to coarse sand and gravel sized particles with up to 35 percent silt and clay. Increased pressure was needed to advance the roller bit through the weathered bedrock. Bedrock coring was not performed.

GROUNDWATER

Groundwater was observed at 12.5 feet bgs upon completion of boring GZ-4, 20.8 feet bgs in boring GZ-6, at 18 feet bgs in boring GZ-7, and at approximately 21 feet in boring GZ-9, corresponding to approximately Elevation 437 to 442 feet. No groundwater was observed in other borings. It should be noted that fluctuations in groundwater levels may occur due to variations in season, rainfall, site features and other factors different from those existing at the time of the explorations and measurements.

GEOTECHNICAL IMPLICATIONS OF SUBSURFACE CONDITIONS

BUILDING 1

The primary geotechnical issues impacting design and construction of the proposed Building 1 are the presence of relatively deep unsuitable Fill, below-grade tank(s), and potential basement slabs and foundation elements from abandoned structures, especially within the western portion of the Building 1 footprint. The existing Fill in its present condition is considered unsuitable for support of the proposed building due to its uncertain composition, uncertain density, and potential compressibility.

The previous below-grade tank(s), and potential basement slab and foundation elements within the bearing zone of the proposed building will require proper demolition and removal. Thus, shallow footings and a slab-on-grade support for the proposed Building 1 would require either: 1) removal and replacement of the unsuitable debris and Fill with compacted Structural Fill; or 2) ground improvement after completely removing existing foundations and replacing the existing fill, with excavated material compacted via excavator bucket; the ground improvement elements would penetrate the replaced fill; 3) penetrating through the Fill with deep foundations (such as piles), or load bearing elements (LBEs) consisting of vertical excavated poured concrete piers bearing in the underlying natural soils. Although the deep foundations and LBE alternatives (option 3) are technically feasible, obstructions will require removal and backfilling at foundation element locations, as well as a structural slab. Based on our experience, options 2 and 3 will likely cost significantly more than option 1, provided the

majority of the excavated existing fill can be reused and compacted adequately, with limited off-site material required for backfilling. Therefore, options 2 and 3 were not considered further in our evaluation.

PARKING GARAGE

Based on the subsurface explorations performed outside of the footprint of the Parking Garage, we anticipate similar geotechnical issues as Building 1; namely, existing fill and existing foundations to be removed.

CONCLUSIONS AND RECOMMENDATIONS

The geotechnical design and construction recommendations presented below are based on our evaluation of the available data and design concepts provided to GZA and are subject to the limitations contained in **Appendix A**. References to the IBC refer to the International Building Code 2015 (IBC) with Massachusetts State Building Code 9th Edition (MSBC) amendments.

FOUNDATION TYPE

After removal of the previous building slab and foundation elements, pavements, existing fill soils, and buried utilities, the proposed Building 1 and Parking Garage may be supported by shallow spread footings bearing on undisturbed natural medium dense Sand or Sand and Gravel, very stiff Clayey Silt, and Glacial Till soils, or on compacted Structural Fill placed over undisturbed natural Sand and Gravel, Sand, Clayey Silt, and Glacial Till. Recommended gradation requirements for Structural Fill are presented in **Table 1**.

The recommended maximum net allowable bearing pressures for footings supported on the undisturbed, natural Sand and Gravel, Sand, Clayey Silt, or Glacial Till, or compacted Structural Fill placed over the undisturbed, natural soils at this site are 3 tons per square foot (tsf) for the proposed Building 1 and Parking Garage structures.

For foundations that are smaller than 3 feet wide, reduce the bearing value to one third of the above value multiplied by the least lateral footing dimension in feet. Continuous wall footings should be at least 18 inches wide and isolated footings at least 24 inches wide.

For frost protection, exterior footings and footings in unheated areas should bear at least 4 feet below final exterior grades. Interior footings in heated areas should bear at least 18 inches below bottom of slab.

BUILDING SLAB

A slab-on-grade constructed over an 8-inch-thick base course of compacted Sand-Gravel is recommended for both Building 1 and the Parking Garage, after removal of existing pavement, slabs, tanks, and deleterious materials. Due to the likely presence of foundation and slab remnants of previous buildings in the footprint of proposed Building 1, compacted Structural Fill should be placed up to bottom of slab base course. If existing fill is left in place below the Parking Garage base slab, overexcavate to 2 feet below slab grade and proof-compact the exposed subgrade with a large vibratory roller (15,000 pound static weight) and backfill to slab base course grade with compacted Structural Fill. Additional subgrade preparation recommendations are presented later in this report.

PAVEMENT DESIGN

The following pavement cross-sections are recommended for new proposed parking areas and access drives:

	Minimum Thicknesses	
	Car Parking	Truck Loading
Finish Course	1½ inches	1½ inches
Binder Course	1½ inches	2½ inches
Sand-Gravel Base Course	8 inches	16 inches

In rigid pavement (exterior concrete slab-on-grade) areas, such as dumpster pad areas, provide at least 14 inches of Sand-Gravel fill or ¾-inch crushed stone (underlain by non-woven filter fabric) base course. Concrete thickness should be at least 6 inches and designed by the project structural engineer.

SEISMIC DESIGN

Soils encountered in the building area are not considered susceptible to liquefaction based on criteria set forth in Section 1806.4 of the MSBC. In accordance with the MSBC, we recommend that Site Class D be used for seismic design assuming that proposed foundations are designed and constructed as recommended herein and existing foundations are bearing on the medium dense natural Glacial Till or natural Sand.

We recommend the following seismic parameters:

S_S =0.180g S_1=0.066g
S_{DS} =0.192g S_{D1}=0.106g

Where:

- S_S and S_{DS} are the spectral acceleration and design spectral response acceleration parameters at 0.2-second period, respectively;
- S_1 and S_{D1} are the spectral acceleration and design spectral response acceleration parameters at 1.0-second period, respectively.

LATERAL EARTH PRESSURES

For the purpose of evaluating lateral earth pressures for retaining walls and below grade walls subjected to unbalanced earth loading conditions, we recommend the following equivalent fluid weights:

- flexible (cantilever) walls 45 pounds/cubic foot
- rigid (fixed) walls 65 pounds/cubic foot

These values are for horizontal backfill and assume that the walls are backfilled with free draining soils such as Granular Fill (provided that it has less than 8 percent passing sieve No. 200) or Sand-Gravel Fill (required within at least 3 feet of the walls) and provided with toe drains so that no water pressure develops behind the wall. Where the calculated earth pressure behind the wall is less than 250 pounds per square foot (psf), it should be increased to 250 psf to account for stresses created by compaction within 5 feet of the wall. In confined areas and against the retaining wall and below grade walls, place only 6-inch layers and compact with manually operated, powered vibratory compactor acceptable to the geotechnical engineer. Walls should also be designed for appropriate sloping backfill, surcharge (for example, floor loads), per Section 1807.2 of the MSBC.

Seismic loads on foundation walls should be calculated based on MSBC Section 1610.2, using the following parameters:

- Total Soil Unit Weight: 130 pcf
- Site Coefficient, F_a = 1.6
- Site Coefficient, F_v = 2.4

The recommended coefficient of friction to resist sliding between mass concrete/formed concrete and natural soils or compacted Structural Fill is 0.4.

The minimum factors of safety for sliding and overturning under static loads should be 1.5. Passive pressure at the toe of the walls should not be included as a resisting force when analyzing for overturning and sliding.

CONSTRUCTION CONSIDERATIONS

Building Footing Subgrade Preparation

We anticipate that the soil encountered at proposed building footing subgrade level will consist of Fill in some areas and natural Glacial Till, Clayey Silt, Sand and Gravel, or Sand in other areas. The existing Fill should be removed from the bearing zone of proposed footings to undisturbed natural Glacial Till, Sand and Gravel, or Sand. The bearing zone is defined as the zone extending at a 1H:1V sloping down and outward from 1 foot horizontally from the bottom exterior edge of the footing. After excavation to the natural soils (except for the natural Clayey Silt) and assuming all work is performed "in the dry", as recommended herein, the subgrade should be proof-compacted with a minimum of six passes of a walk-behind vibratory drum roller or walk-behind heavy vibratory plate compactor (with a static weight of at least 500 pounds) in confined areas. Where subgrades consist of Clayey Silt or are at or near the groundwater level, static proof-compaction methods may be used in lieu of vibratory methods and at the acceptance of the geotechnical engineer. Weak and unstable areas observed during proof-compaction should be over-excavated and replaced with compacted Structural Fill.

Final excavations to footing subgrade should not be made until the areas are ready for fill or concrete placement. Excavation to final subgrade elevation should be performed using a smooth-edged excavator bucket to limit disturbance to the subgrade. Loose or disturbed material should be removed by hand. Since the anticipated subgrade materials are likely to be subject to disturbance from water and/or equipment traffic, we recommend a 4-inch thick protective pad of ¾-inch Crushed Stone or lean concrete be placed to help protect the subgrade prior to footing concrete placement. Crushed Stone layers thicker than 4 inches should be wrapped in non-woven filter fabric (such as Mirafi 140N or equivalent).

Building Slab Subgrade Preparation

Existing inorganic soils (including Fill, provided it does not contain visible organic material, wood, metal, brick, other debris, or cobbles/boulders larger than 6-inches) may be left in place greater than 2 feet below slab grade (outside of the historic building footprints), provided the subgrade is stable when proof-compacted with at least six passes of a large vibratory drum roller (minimum 15,000-pound static weight). Excavate any weak or soft spots identified during proof-compaction and replace with compacted Structural Fill. Recommended gradations of Structural Fill materials are presented in **Table 1**.

Materials and Placement

Recommended gradations for off-site fill materials are provided in **Table 1**. Structural Fill shall consist of off-site Granular Fill, Sand-Gravel, or Crushed Stone. On-site soils from site excavations may be reused as Granular Fill provided it is free

from deleterious or organic matter, topsoil/subsoil, roots, debris and particles greater than 6 inches in greatest dimension, its moisture content is controlled such that it can be placed in stable lifts and is placed and compacted as recommended herein. Use of ¾-inch Crushed Stone, in lieu of soil fill, at the bottom of excavations will aid in general stability of the silty soils. Crushed Stone greater than 4 inches in thickness should be wrapped in non-woven filter fabric (Mirafi 140N or equivalent).

Place Structural Fill in lifts and compact in accordance with the minimum guidelines presented in **Table 2** and meeting the recommended minimum degrees of compaction presented below. A qualified geotechnical engineer should be on site during fill placement and compaction, particularly given the sensitivity of the natural soils and existing fill to moisture and disturbance due to construction and worker foot traffic.

The recommended minimum degree of compaction of soils, based on percentage of maximum dry density as defined by ASTM D-1557, is specified below for different areas.

Fill Area	Percent of Maximum Dry Density
Below Foundations and Slabs	95
Behind Retaining Walls	95
Pavement Base Course	95
Utility Trench Backfill	95
Below Pavement Base Course	92
Beneath Landscape Areas	90

Crushed Stone should be placed in lifts, with each lift compacted to an unyielding surface. Recommended maximum loose lift thickness and minimum number of passes of compaction equipment for Structural Fill materials are provided in **Table 2**.

Compaction within 5 feet of building walls and retaining walls (if any) should be performed using a hand-operated vibratory roller or plate compactor. Backfill and compact all fills at approximately similar elevations on each side of foundation walls to avoid unbalanced loading. Concrete footings and slabs, as well as footing and slab subgrades should be protected from frost at all times. Fill should not be placed over frozen soil.

Reuse of Existing Soils

Based on visual and laboratory classifications, we anticipate some of the existing on-site Fill and natural Sand and Gravel and Sand soils may meet gradation and material requirements for Granular Fill, while some of the on-site soils will not, due to excessive fines (silt and clay) content. We anticipate that some of the on-site soils will be able to be reused as a replacement for Granular Fill, provided that the soils are not contaminated, the water content is controlled and the material can be placed in stable lifts to the minimum degree of compaction recommended herein. Excavated Clayey Silt will not be able to be reused as Granular Fill, but it may be able to be reused in landscape areas. It may be difficult to reuse excavated Glacial Till soils due to their relatively high fines (silt and clay) content. Handling, placement, and compaction of soil with a silt and/or clay content above about 15 percent will likely be difficult, especially during cold temperatures or when wet.

Excess excavated soil from the site may need to be exported off-site depending on the overall site cut/fill balance and should be disposed of in accordance with applicable local, state and federal regulations. Off-site disposal of soil will require chemical precharacterization testing to assess disposal options, as required by the receiving facility. Based on the environmental testing performed for the Phase II Environmental Site Assessment, soil disposal at an in-state landfill or RCS-1 facility is likely to be appropriate for the work proposed in this phase of the project.

Concrete from the removal of previous building slab and foundation elements may be reused below paved areas and in non-structural portions of the site provided the concrete has been crushed and screened to meet gradation requirements of Structural Fill materials in **Table 1**, and the reinforcing steel has been removed. An alternate gradation for the crushed concrete may be allowed, provided the material is well graded, less than 6 inches in largest dimension, and the material is choked on all sides with Crushed Stone or Mirafi 180N filter fabric (or equivalent).

Construction Dewatering

Although groundwater is not anticipated in foundation excavations, it is recommended that temporary control measures be implemented to reduce the amount of surface water (from precipitation runoff) from potentially entering and ponding in the excavations. Temporary measures should include, but not be limited to, construction of drainage ditches and berms to divert and/or reduce the amount of surface water flowing over exposed subgrades during construction.

In addition, during and following periods of heavy precipitation construction dewatering may be required to conduct all below-grade construction work "in the dry". We anticipate groundwater and storm water can be controlled by pumping from sump pumps. Sump pumps should be surrounded by ¾-inch Crushed Stone wrapped in filter fabric to limit the migration of fines.

Excavation Slopes and Temporary Earth Support

Where space is not available to safely lay back excavations, a temporary earth support system will be required. Temporary earth support systems, if required, should be selected by the Contractor and be designed by an experienced Professional Engineer registered in the Commonwealth of Massachusetts and retained by the Contractor. Based on the site grades, an earth support system may be required for constructing some building footings, depending on the final base slab elevations and proximity to existing structures, utilities, and roadways to remain.

The Owner and the Contractor should make themselves aware of and become familiar with applicable local, state, and federal safety regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards. Construction site safety generally is the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. We are providing this information solely as a service to our Client. Under no circumstances should the information provided below be interpreted to mean that GZA is assuming responsibility for construction site safety or the Contractor's activities; such responsibility is not being implied and should not be inferred.

The Contractor should be aware that slope height, slope inclination, or excavation depths (including utility trench excavations) should in no case exceed those specified in local, state, or federal safety regulations, e.g.; OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations. Such regulations are strictly enforced and, if they are not followed, the Owner, Contractor, and/or earthwork and utility subcontractors could be liable for substantial penalties.

As a safety measure, it is recommended that all vehicles and soil piles be kept a minimum lateral distance from the crest of the slope equal to no less than the slope height. Exposed slope faces should also be protected against the elements.

FINAL DESIGN AND CONSTRUCTION

We trust the information presented herein is sufficient for your use in the design of the proposed residential building and parking garage. It is recommended that GZA be retained for the following additional services during final design and construction:

- Review of near-final foundation design and grading plans for conformance with our recommendations and understanding of the project after the proposed building and parking garage plans are further in the design process.
- Review of Contractor's geotechnical-related submittals for general conformance with our recommendations and the project foundation plans and geotechnical specifications.
- Observation and documentation earthwork and footing subgrade preparation for general conformance with our report recommendations and the project foundation plans and geotechnical specifications. The MSBC requires that a Professional Engineer (P.E.) registered in Massachusetts (or the P.E.'s representative) observe foundation installation and fill placement in building areas.

We thank you for the opportunity to work on this project and would look forward to our continued involvement. Please do not hesitate to contact the undersigned if you have any questions.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Heather Audet, P.E.
Senior Project Manager

Bruce W. Fairless, P.E.
Consultant/Reviewer

Martin A. Rodick, P.E.
Associate Principal

Attachments: Tables
Figures
Appendix A – Limitations
Appendix B –Boring Logs
Appendix C –Geotechnical Laboratory Test Results

TABLES

Table Talk Lofts - Building 1 and Parking Garage
Worcester, MA

TABLE 1
RECOMMENDED USE AND GRADATION CRITERIA FOR FILL MATERIALS

Granular Fill: For use as Structural Fill, within building area below slab-on-grade base course, and within 2 feet of pavement base course.

Sand-Gravel: For use as Structural Fill, and as slab-on-grade base course and below footings.

Crushed Stone: For use in bottom of excavations to aid in construction, maintaining subgrade stability during wet conditions, and below footings.

Ordinary Fill: General landscape areas, or more than 2 feet below pavement.

GRADATION REQUIREMENTS

Sieve Size	Percent Finer by Weight
Granular Fill shall be free from ice and snow, roots, sod, rubbish and other deleterious or organic matter. Granular Fill shall conform to the following gradation requirements:	
⅔ of the loose lift thickness	100
No. 10	30 - 90
No. 40	10 - 70
No. 200	*0 - 15 * 0 -8 for backfill behind walls
Sand-Gravel shall consist of durable sand and gravel and shall be free from ice and snow, roots, sod, rubbish and other deleterious or organic matter. Sand-Gravel shall conform to the following gradation requirements:	
3 inch	100
½ inch	50 - 85
No. 4	40 - 75
No. 40	10 - 35
No. 200	0 - 8
Crushed Stone shall consist of durable crushed rock or durable crushed gravel stone and shall be free from ice and snow, clay, loam and other deleterious material. Crushed Stone shall conform to the following gradation requirements:	
1 inch	100
3/4 inch	90 - 100
1/2 inch	10 - 50
3/8 inch	0 - 20
No. 4	0 - 5
Ordinary Fill shall be free from trash, ice, snow, tree stumps, roots, organic materials, and other deleterious matter. Ordinary Fill shall contain no stone greater than two-thirds (⅔) the loose lift thickness with a maximum stone size of six (6) inches in diameter and contain no more than 30% passing the No. 200 sieve. It shall have physical properties such that it can be readily spread and compacted during filling.	

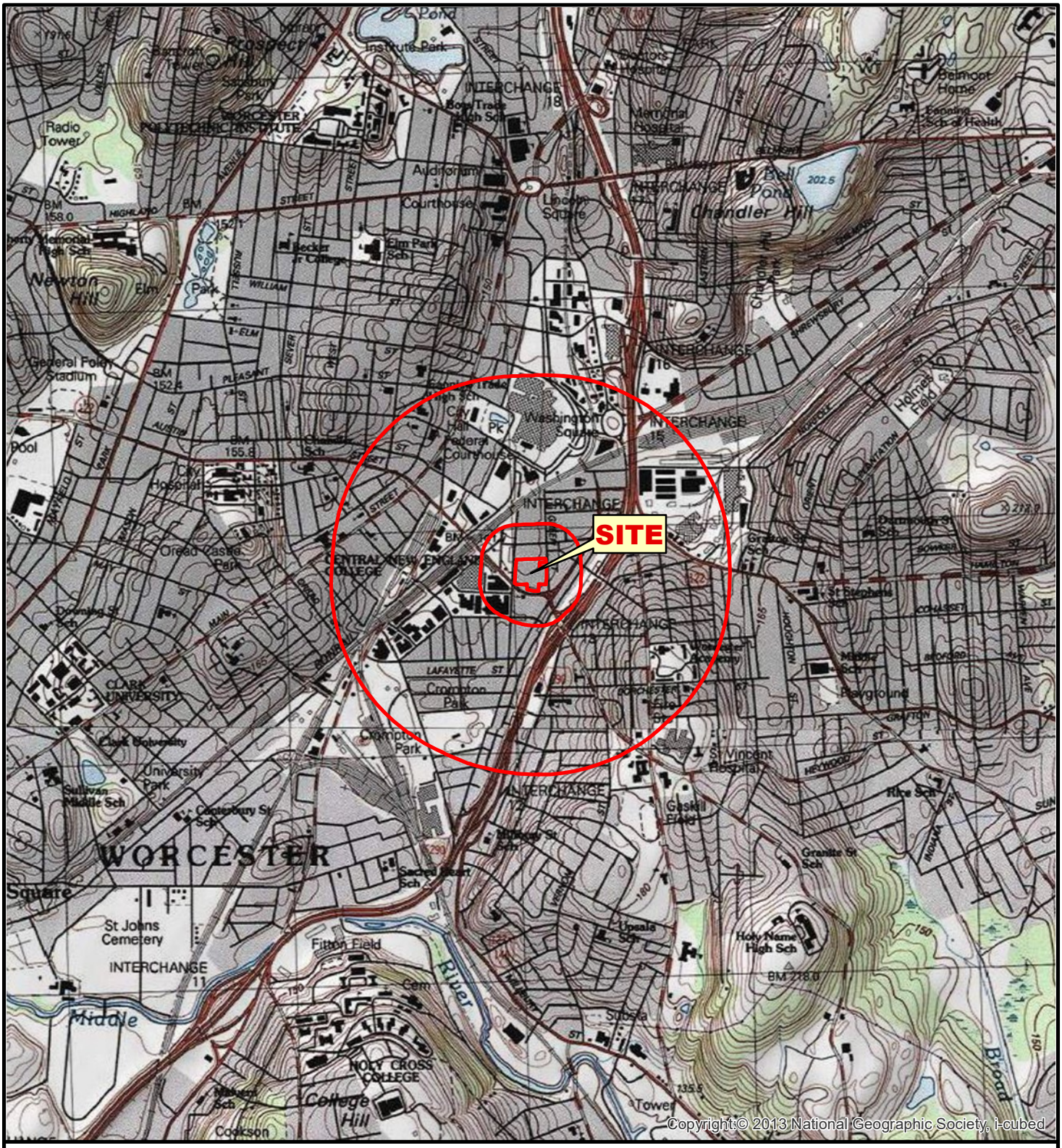
TABLE 2

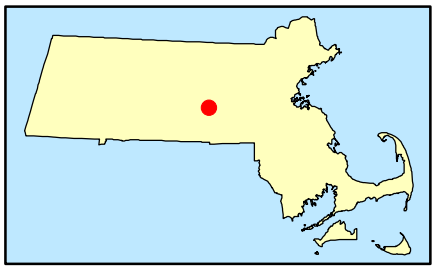
COMPACTION METHODS
Table Talk – Building 1 and Parking Garage
Worcester, Massachusetts

Compaction Method	Maximum Stone Size*	Maximum Loose Lift Thickness		Minimum Number of Passes	
		Below Structures and Pavement	Less Critical Area	Below Structures and Pavement	Less Critical Area
GRANULAR FILL, SAND-GRAVEL FILL, CRUSHED STONE					
Hand-operated vibratory plate or light roller in confined areas	4"	6"	8"	4	4
Hand-operated vibratory drum rollers weighing at least 1,000 lb in confined areas	6"	10"	12"	4	4
Light vibratory drum roller minimum weight at drum 3,000 lb minimum dynamic force 10,000 lb	8"	12"	18"	4	4
Medium vibratory drum roller minimum weight at drum 10,000 lb minimum dynamic force 20,000 lb	8"	18"	24"	6	6

And no more than two-thirds (2/3) loose lift thickness.

FIGURES





SOURCE : THIS MAP CONTAINS THE ESRI ARCGIS ONLINE USA TOPOGRAPHIC MAP SERVICE, PUBLISHED DECEMBER 12, 2009 BY ESRI ARCIMS SERVICES AND UPDATED AS NEEDED. THIS SERVICE USES UNIFORM NATIONALLY RECOGNIZED DATUM AND CARTOGRAPHY STANDARDS AND A VARIETY OF AVAILABLE SOURCES FROM SEVERAL DATA PROVIDERS.

0 1,000 2,000 4,000 6,000

SCALE IN FEET

Data Supplied by : esri

N W E S

PROJ. MGR.: HA
DESIGNED BY: CT
REVIEWED BY: CT
OPERATOR: AJP

DATE: 06-04-2021

SITE LOCUS
SHOWING 500 FOOT & 1/2 MILE OFFSETS

JOB NO. 01.0174853.50

TABLE TALK LOFTS
BUILDING 1 AND PARKING GARAGE
WORCESTER, MASSACHUSETTS

FIGURE NO. 1

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- GZ-3 — MONITORING WELLS INSTALLED BY DRILEX ENVIRONMENTAL ON 1/7/2021 AND 1/8/2021 OBSERVED BY GZA
- B-2 — HISTORIC MONITORING WELLS INSTALLED BY OTHERS
- GZ-6 — APPROXIMATE SOIL BORING LOCATIONS INSTALLED BY DRILEX ENVIRONMENTAL ON 1/7/2021, 1/8/2021, AND APRIL 28 TO 30, 2021 OBSERVED BY GZA
- APPROXIMATE LOCATIONS OF HISTORIC BUILDINGS DIGITIZED FROM HISTORIC SANBORN MAP OF 1950
- APPROXIMATE LOCATION OF PROPOSED BUILDING 1 FOOTPRINT AND PARKING GARAGE COMPILED FROM AN ELECTRONIC PLAN: "W211004-ca0-Concept Plan - 2021.04.06.pdf" DESIGNED BY BOHLER ENGINEERING

SOURCE

1) THIS MAP CONTAINS THE ESRI ArcGIS ONLINE WORLD IMAGERY (CLARITY) MAP SERVICE, CREATED JUNE 11, 2020 BY ESRI ATLAS AND UPDATED OFTEN. THIS SERVICE USES UNIFORM NATIONALLY RECOGNIZED DATUM AND CARTOGRAPHY STANDARDS AND A VARIETY OF AVAILABLE SOURCES FROM SEVERAL DATA PROVIDERS.

2) BORING AND MONITORING WELL LOCATIONS WERE BASED ON TAPE MEASURMENTS FROM EXISTING SITE FEATURES.

3) LOCATIONS SHOWN SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.

0 25 50 100
SCALE IN FEET

N W E S

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

TABLE TALK LOFTS - BUILDING 1 & PARKING GARAGE

WORCESTER, MASSACHUSETTS

SUBSURFACE EXPLORATION PLAN

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		BOSTON CAPITAL DEVELOPMENT, LLC. BOSTON, MASSACHUSETTS	
PROJ MGR: HA	REVIEWED BY: CT	CHECKED BY: CT	FIGURE 2
DESIGNED BY: HA	DRAWN BY: AJP	SCALE: 1 " = 50 FEET	
DATE: 06/04/2021	PROJECT NO. 01.0174853.50	REVISION NO.	

APPENDIX A - LIMITATIONS

USE OF REPORT

1. GZA GeoEnvironmental, Inc. (GZA) prepared this report on behalf of, and for the exclusive use of our Client for the stated purpose(s) and location(s) identified in the Proposal for Services and/or Report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not expressly identified in the contract documents, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

STANDARD OF CARE

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in Proposal for Services and/or Report, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. If conditions other than those described in this report are found at the subject location(s), or the design has been altered in any way, GZA shall be so notified and afforded the opportunity to revise the report,as appropriate, to reflect the unanticipated changed conditions .

3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

4. In conducting our work, GZA relied upon certain information made available by public agencies, Client and/or others. GZA did not attempt to independently verify the accuracy or completeness of that information. Inconsistencies in this information which we have noted, if any, are discussed in the Report.

SUBSURFACE CONDITIONS

5. The generalized soil profile(s) provided in our Report are based on widely-spaced subsurface explorations and are intended only to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs. The nature and extent of variations between these explorations may not become evident until further exploration or construction. If variations or other latent conditions then become evident, it will be necessary to reevaluate the conclusions and recommendations of this report.

6. In preparing this report, GZA relied on certain information provided by the Client, state and local officials, and other parties referenced therein which were made available to GZA at the time of our evaluation. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

7. Water level readings have been made in test holes (as described in this Report) at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this Report. Fluctuations in the level of the groundwater however occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, the presence of subsurface utilities, and/or natural or artificially induced perturbations. The water table encountered in the course of the work may differ from that indicated in the Report.

8. Recommendations for foundation drainage, waterproofing, and moisture control address the conventional geotechnical engineering aspects of seepage control. These recommendations may not preclude an environment that allows the infestation of mold or other biological pollutants.

COMPLIANCE WITH CODES AND REGULATIONS

9. We used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

ADDITIONAL SERVICES

10. GZA recommends that we be retained to provide services during any future: site observations, design, implementation activities, construction and/or property development/redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.

APPENDIX B – TEST BORING LOGS

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-1
SHEET: 1 of 1
PROJECT NO: 01.0174853.20
REVIEWED BY: HLA

Drilling Co.: Drilex Environmental, Inc.
Foreman: Jamie Hastings
Logged By: Matthew McGavick

Type of Rig: Track Mounted
Rig Model: CME-55
Drilling Method: HSA

Boring Location: See Plan
Ground Surface Elev. (ft.): 481
Final Boring Depth (ft.): 27
Date Start - Finish: 1/8/2021 - 1/8/2021

H. Datum: NAD 83
V. Datum: WGS 84

Auger/Casing Type: HSA
I.D./O.D.: 4.25"/8.125"
Hmr Weight (lb.): N/A
Hmr Fall (in.): N/A
Other: N/A

Sampler Type: Split Spoon
I.D./O.D (in.): 1.375"/2"
Sampler Hmr Wt: 140
Sampler Hmr Fall: 30
Other: Auto Hammer

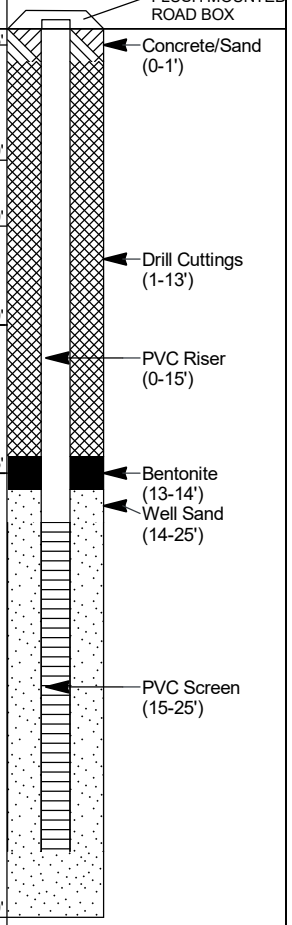
Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
1/8/21		25	HSA	0

Depth (ft)	Casing Blows/ Core Rate Min/ft	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description Modified Burmister	Remark	Field Test Data
		S-1	0-2	24	12	14 13 12	25	S-1A: ASPHALT. S-1B: Gray to brown, fine to medium SAND,some Gravel, little Silt.	1 2	0.5
		S-2	2-4	24	12	3 4 5 4	9	S-2A: (1-7") Gray to brown, fine to medium SAND,some Gravel, little Silt.	3	0.1
5		S-3	4-6	24	11	5 5 4 5	9	S-2B: (7-11") Gray, fine to coarse SAND, little Silty Gravel.		0.1
		S-4	6-8	24	24	14 19 25 34	44	S-3: Tan, fine SAND and SILT, little Gravel. S-4: Tan, SILT, little fine Sand, little Gravel.		0.1
10		S-5	10-12	24	7	40 44 33 38	77	S-5: Tan, GRAVEL, little fine to medium Sand.		0.1
15		S-6	15-17	24	19	22 31 40 38	71	S-6: Tan, Clayey SILT, little fine Sand, little Gravel.		
20		S-7	20-22	24	24	26 36 38 55	74	S-7: Tan, SILT & CLAY, little Gravel, trace fine to coarse Sand.		ND
25		S-8	25-27	24	21	31 44 46 38	90	S-8A: (0-8") Gray-tan, CLAY & SILT, little fine to medium Sand, little Gravel. S-8B: (8-21") Gray-tan, Silty CLAY, little fine to medium Sand, trace Gravel.		ND
30								Bottom of boring at 27 feet.		
35										

Depth (ft)	Stratum Description	Elev. (ft)
0.5'	ASPHALT	480.5'
4'	FILL	477.0'
6'	SILTY SAND	475.0'
9'	SILT	472.0'
13.5'	GRAVEL	467.5'
27'	GLACIAL TILL	454.0'

Equipment Installed



REMARKS

1. Ground surface estimated from Google Earth.
2. Soil sample collected from 2 to 6 feet below ground surface (bgs) interval.
3. Field testing results represent total organic vapor levels, referenced to a benzene standard, measured in the headspace of sealed soil sample jars using an organic vapor meter (OVM) equipped with a photoionization detector (PID) and 10.6 eV lamp. Results in parts per million by volume (ppmv). ND indicates nothing detected (<0.1 ppmv).

See log key for explanation of sample descriptions and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-1

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-2
SHEET: 1 of 2
PROJECT NO: 01.0174853.20
REVIEWED BY: HLA

Drilling Co.: Drilex Environmental, Inc.
Foreman: Jamie Hastings
Logged By: Matthew McGavick

Type of Rig: Track Mounted
Rig Model: CME-55
Drilling Method: HSA

Boring Location: See Plan
Ground Surface Elev. (ft.): 475
Final Boring Depth (ft.): 37
Date Start - Finish: 1/8/2021 - 1/8/2021

H. Datum: NAD 83
V. Datum: WGS 84

Auger/Casing Type: HSA
I.D./O.D.: 4.25"/8.125"
Hmr Weight (lb.): N/A
Hmr Fall (in.): N/A
Other: N/A

Sampler Type: Split Spoon
I.D./O.D (in.): 1.375"/2"
Sampler Hmr Wt: 140
Sampler Hmr Fall: 30
Other: Auto Hammer

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
Not	measured.			

Depth (ft)	Casing Blows/ Core Rate Min/ft	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum Description	Elev. (ft)	Equipment Installed
0		S-1	0-2	24	7	6 5 5 8	10	S-1: Brown, fine to medium SAND, little Silt, little Gravel.	1 2	ND			No Equipment Installed
		S-2	2-4	24	10	2 3 2 4	5	S-2A: (0-4") Brown, fine to medium SAND, little Silt, little Gravel.	3	ND	FILL		
5		S-3	4-6	24	0	5 4 8 11	12	S-2B: (4-10") Black-gray, fine to medium SAND and SILT, little Gravel. S-3: No recovery.		0.1		6' 469.0'	
		S-4	6-8	24	12	16 23 20 16	43	S-4A: (0-5") Brown-tan, fine to coarse SAND, little Gravel, trace Silt.		ND	SAND	7' 468.0'	
		S-5	8-10	24	14	12 12 11 12	23	S-4B: (5-12") Tan, fine to medium SAND, some Gravel, little Silt.		0.1	SILT	8.5' 466.5'	
10								S-5A: (0-5") Brown, SILT, some fine to medium Sand, little Gravel. S-5B: (5-14") Tan, fine to medium SAND, little Gravel, trace Silt.			SAND	12.5' 462.5'	
15		S-6	15-17	24	15	25 25 22 27	47	S-6A: (0-5") Tan, SILT, some Gravel, little fine Sand. S-6B: (5-15") Tan, fine to medium SAND, some Silt, little Gravel.		0.1	SILT	15.5' 459.5'	
											SAND	18.5' 456.5'	
20		S-7	20-22	24	24	18 32 30 38	62	S-7: Tan, CLAY & SILT, little fine Sand, little Gravel.		0.1			
25		S-8	25-27	24	8			S-8: Gray, SILT & CLAY, little fine Sand, little Gravel.		0.1	GLACIAL TILL		
30		S-9	30-32	24	5	60/5"	R	S-9: Gray, SILT & CLAY, little fine Sand, little Gravel.		ND			
35													

REMARKS

1. Ground surface estimated from Google Earth.
2. Soil sample collected from 6 to 8 feet below ground surface (bgs) interval.
3. Field testing results represent total organic vapor levels, referenced to a benzene standard, measured in the headspace of sealed soil sample jars using an organic vapor meter (OVM) equipped with a photoionization detector (PID) and 10.6 eV lamp. Results in parts per million by volume (ppmv). ND indicates nothing detected (<0.1 ppmv).

See log key for explanation of sample descriptions and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-2

TEST BORING LOG

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-2
SHEET: 2 of 2
PROJECT NO: 01.0174853.20
REVIEWED BY: HLA

Depth (ft)	Casing Blows/ Core Rate Min/ft	Sample No.	Sample Depth (ft.)	Sample Pen. (in)	Sample Rec. (in)	Sample Blows (per 6 in.)	Sample SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum Depth (ft)	Stratum Description	Stratum Elev. (ft)	Equipment Installed
		S-10	35-37	24	18	30 37 50	87	S-10: Tan, Silty CLAY, little Gravel.			37'	GLACIAL TILL	438.0'	
								Bottom of boring at 37 feet.	4					
40														
45														
50														
55														
60														
65														
70														
75														

REMARKS

4. Borehole was backfilled with soil cuttings and pavement repaired with cold patch asphalt flush with ground surface.

See log key for explanation of sample descriptions and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-2

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-3
SHEET: 1 of 1
PROJECT NO: 01.0174853.20
REVIEWED BY: HLA

Drilling Co.: Drilex Environmental, Inc.
Foreman: Brandon Williams
Logged By: Chris Tsinidis

Type of Rig: Truck Mounted
Rig Model: B-57 Mobile
Drilling Method: HSA

Boring Location: See Plan
Ground Surface Elev. (ft.): 470
Final Boring Depth (ft.): 32
Date Start - Finish: 1/7/2021 - 1/7/2021

H. Datum: NAD 83
V. Datum: WGS 84

Auger/Casing Type: HSA
I.D./O.D.: 4.25"/8.125"
Hmr Weight (lb.): N/A
Hmr Fall (in.): N/A
Other: N/A

Sampler Type: Split Spoon
I.D./O.D (in.): 1.375"/2"
Sampler Hmr Wt: 140
Sampler Hmr Fall: 30
Other: Safety Hammer

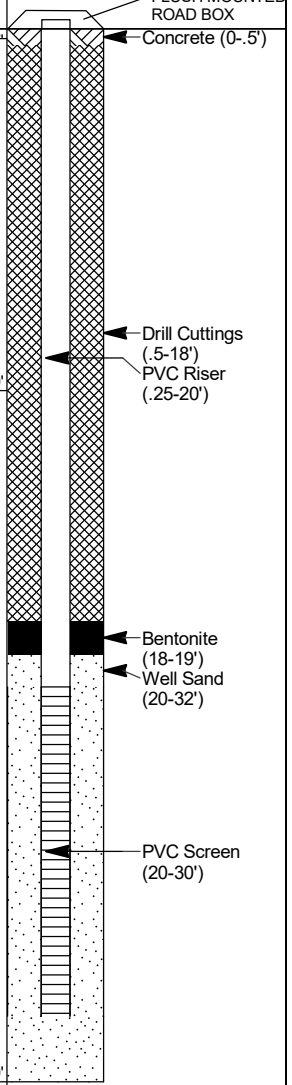
Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
Not	encountered.			

Depth (ft)	Casing Blows/ Core Rate Min/ft	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description Modified Burmister	Remark	Field Test Data
		S-1	0.5-2.5	24	9	12 8 7 6	15	S-1: Medium dense, brown, fine to coarse SAND, some Gravel, little Silt.	1	ND
		S-2	2.5-4.5	24	10	12 13 23 23	36	S-2: Dense, brown, fine to coarse SAND and GRAVEL, trace Silt.		ND
5		S-3	4-6	24	15	14 28 23 32	51	S-3: Very dense, brown, fine to coarse SAND and GRAVEL, trace Silt.	2	ND
		S-4	6-8	24	13	20 21 22 25	43	S-4: Dense, light brown, fine to coarse SAND, some Gravel, trace Silt.		ND
		S-5	8-10	24	12	23 40 30 36	70	S-5: (Top 6") Light brown, fine to coarse SAND and GRAVEL, trace Silt.	3	ND
10		S-6	10-12	24	10	13 20 61 73	81	S-5: (Bottom 6") Gray, Clayey SILT, some fine Sand.		ND
		S-7	12-14	24	8	50 53 50 60	R	S-6: Very dense, grayish brown, fine to coarse SAND and GRAVEL, little Silt.		
15		S-8	15-16.4	17	10	49 63 60/5"	R	S-7: Very dense, grayish brown, fine to coarse SAND, little Gravel, little Silt. S-8: Very dense, grayish brown, fine to coarse SAND, little Gravel, little Silt.		
20		S-9	20-20.7	5	0	60/5"	R	S-9: No recovery.		
									4	
25		S-10	25-26.4	21	10	26 60 75 50/3"	R	S-10: Very dense, brown, fine to coarse SAND and GRAVEL, little Silt.		
30		S-11	30-32	24	1	21 42 48 51	90	S-11: Very dense, fine to medium SAND, some Silt, trace Gravel.		
								Bottom of boring at 32 feet.	5	
35										

Depth (ft)	Stratum Description	Elev. (ft)
0.3'	ASPHALT	469.7'
	FILL	
11'		459.0'
	GLACIAL TILL	
32'		438.0'

Equipment Installed



REMARKS

1. Ground surface estimated from Google Earth.
2. Analytical sample obtained from sample S-3. Field testing results represent total organic vapor levels, referenced to a benzene standard, measured in the headspace of sealed soil sample jars using an organic vapor meter (OVM) equipped with a photoionization detector (PID) and 10.6 eV lamp. Results in parts per million by volume (ppmv). ND indicates nothing detected (<0.1 ppmv).
3. Augers grinding between 8 and 10 feet below ground surface (bgs). Cobbles observed in soil cuttings. Applying down pressure from 10 feet bgs and beyond.
4. Augers grinding from 23 to 25 feet bgs.
5. Upon completion, borehole was converted to a monitoring well with screen set at 30 feet bgs.

See log key for explanation of sample descriptions and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-3

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-4
SHEET: 1 of 1
PROJECT NO: 01.0174853.20
REVIEWED BY: HLA

Drilling Co.: Drilex Environmental, Inc.
Foreman: Brandon Williams
Logged By: Chris Tsinidis

Type of Rig: Truck Mounted
Rig Model: B-57 Mobile
Drilling Method: HSA

Boring Location: See Plan
Ground Surface Elev. (ft.): 455
Final Boring Depth (ft.): 22
Date Start - Finish: 1/7/2021 - 1/7/2021

H. Datum: NAD 83
V. Datum: WGS 84

Auger/Casing Type: HSA
I.D./O.D.: 4.25"/8.125"
Hmr Weight (lb.): N/A
Hmr Fall (in.): N/A
Other: N/A

Sampler Type: Split Spoon
I.D./O.D (in.): 1.375"/2"
Sampler Hmr Wt: 140
Sampler Hmr Fall: 30
Other: Safety Hammer

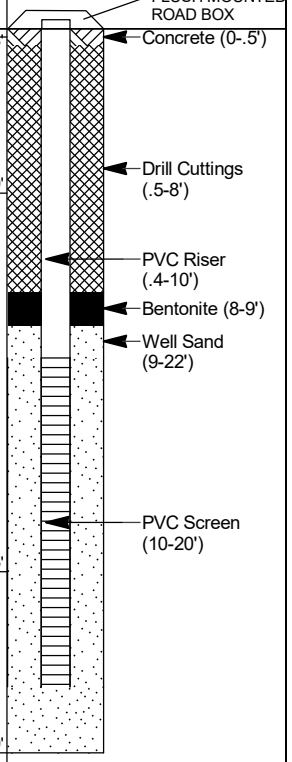
Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
1/7/21	1630	12.5		6.5 hrs.

Depth (ft)	Casing Blows/ Core Rate Min/ft	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description Modified Burmister	Remark	Field Test Data
0		S-1	1-3	24	8	30 22 19 16	41	S-1: Dense, brown, fine to coarse SAND and GRAVEL, little Silt.	1 2 3	0.2
		S-2	3-5	24	0	15 13 15 13	28	S-2: No recovery.		ND
5		S-3	5-7	24	12	3 5 6 6	11	S-3: Medium dense, light brown, fine to medium SAND, trace Silt.		ND
		S-4	7-9	24	14	6 7 5 6	12	S-4: Medium dense, light brown, fine to medium SAND, trace Silt.		ND
10		S-5	9-11	24	8	6 7 8 9	15	S-5: Medium dense, light brown, fine to medium SAND, trace Silt, trace Gravel.		ND
15		S-6	15-17	24	20	4 7 7 8	14	S-6: (Top 14') Brown, fine to medium SAND, trace Silt. S-6: (Bottom 6") Brown, fine Silty SAND, little Clay.	4	ND
20		S-7	20-22	24	17	7 10 14 18	24	S-7: Very stiff, brown, Silty CLAY. Tv=0.1		0.5
								Bottom of boring at 22 feet.	5	
25										
30										
35										

Depth (ft)	Stratum Description	Elev. (ft)
0.25'	ASPHALT	454.8'
	FILL	
5'		450.0'
	SAND	
16.5'		438.5'
	GLACIAL TILL	
22'		433.0'

Equipment Installed



REMARKS

1. Ground surface estimated from Google Earth.
2. Directly beneath the asphalt layer, augers were grinding and driller advanced auger to approximately 1 foot below ground surface (bgs) to begin sampling beyond the possible gravel base course layer.
3. Analytical sample obtained from sample S-1. Field testing results represent total organic vapor levels, referenced to a benzene standard, measured in the headspace of sealed soil sample jars using an organic vapor meter (OVM) equipped with a photoionization detector (PID) and 10.6 eV lamp. Results in parts per million by volume (ppmv). ND indicates nothing detected (<0.1 ppmv).
4. Soil plug appeared wet at 14 feet bgs upon removal.
5. Upon completion, borehole was converted to a monitoring well with screen set at 20 feet bgs.

See log key for explanation of sample descriptions and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-4

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-6
SHEET: 1 of 2
PROJECT NO: 01.0174853.20
REVIEWED BY: HLA

Drilling Co.: Drilex Environmental, Inc.
Foreman: Brandon Williams
Logged By: Shiv Bhardwaj

Type of Rig: Truck Mounted
Rig Model: B-57 Mobile
Drilling Method: HSA

Boring Location: See Plan
Ground Surface Elev. (ft.): 458
Final Boring Depth (ft.): 44
Date Start - Finish: 1/7/2021 - 1/8/2021

H. Datum: NAD 83
V. Datum: WGS 84

Auger/Casing Type: HSA
I.D./O.D.: 4.25"/8.125"
Hmr Weight (lb.): N/A
Hmr Fall (in.): N/A
Other: N/A

Sampler Type: Split Spoon
I.D./O.D (in.): 1.375"/2"
Sampler Hmr Wt: 140
Sampler Hmr Fall: 30
Other: Safety Hammer

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
1/7/21	1528	22.7	24	5 min.
1/8/21	0723	20.8	24	16 hrs.

Depth (ft)	Casing Blows/ Core Rate Min/ft	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum Description (Depth (ft) / Elev. (ft))	Equipment Installed
		S-1	1-3	24	14	9 13 25 16	38	S-1: Dense, dark brown, fine to coarse SAND, some Gravel, trace Silt, trace Asphalt.	1	0.1	0.3' ASPHALT 457.7'	No Equipment Installed
		S-2	3-5	24	16	12 14 22 32	36	S-2: Dense, brown, fine to coarse SAND, some Gravel, trace Silt.		0.1		
5		S-3	5-7	24	9	10 35 13 8	48	S-3: Dense, brown, fine to coarse SAND, some Gravel, trace Silt.		0.1	FILL	
		S-4	7-9	24	10	7 5 5 6	10	S-4: Loose, brown, fine to coarse SAND, little Gravel, trace Silt.		0.1		
10		S-5	9-11	24	13	6 4 4 5	8	S-5: Loose, brown, fine to coarse SAND, trace Silt, trace Brick, trace Asphalt, trace Coal.	2 3	0.1	11' 447.0'	
		S-6	11-13	24	13	5 3 2 6	5	S-6: Loose, light brown, fine to coarse SAND, some Gravel, trace Silt.		0.1		
		S-7	13-15	24	3	4 3 2 6	5	S-7: Loose, light brown, fine to coarse SAND, some Gravel, trace Silt.		0.1	POSSIBLE FILL	
15												
		S-8	16-18	24	12	7 4 5 13	9	S-8: (Top 5") Brown, fine to coarse SAND, some Gravel, trace Silt.	4	0.1	16.5' 441.5'	
		S-9	18-20	24	12	14 13 11 12	24	S-8: (Bottom 7") Brown, fine to coarse SAND, little Silt.		0.1		
20								S-9: Medium dense, brown, fine to coarse SAND, little Gravel, trace Silt.			SAND	
25		S-10	24-26	24	21	4 6 5 9	11	S-10: Medium dense, brown, fine to medium SAND, trace Silt. Top 3" contained Silt seam with little fine Sand.	5	0.1		
									6		29' 429.0'	
30		S-11	30-32	24	11	4 5 5 6	10	S-11: Stiff, gray, CLAY & SILT, trace fine to medium Sand.	7	0.1	GLACIAL TILL	
35												

REMARKS

1. Ground surface estimated from Google Earth.
2. Analytical sample obtained from sample S-5. Field testing results represent total organic vapor levels, referenced to a benzene standard, measured in the headspace of sealed soil sample jars using an organic vapor meter (OVM) equipped with a photoionization detector (PID) and 10.6 eV lamp. Results in parts per million by volume (ppmv). ND indicates nothing detected (<0.1 ppmv).
3. The HSA was grinding on cobbles between 10 and 11 feet below ground surface (bgs).
4. Driller overdrilled (advanced HSA too far) to 16 feet bgs after taking sample S-7.
5. Finished drilling on 1/7/21 after taking sample S-10. HSA was left in the borehole. The remainder of the boring was drilled using a CME-55 track-mounted drill rig on 1/8/21.
6. Wash color was gray at approximately 29 feet bgs.
7. Started drilling on 1/8/21 by advancing 3-inch casing (NW) to approximately 30 feet bgs through HSA. Switched to drive and wash method after pulling out HSA. Rest of drilling was open hole.

See log key for explanation of sample descriptions and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-6

TEST BORING LOG

GZA
GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-6
SHEET: 2 of 2
PROJECT NO: 01.0174853.20
REVIEWED BY: HLA

Depth (ft)	Casing Blows/ Core Rate Min/ft	Sample No.	Sample Depth (ft.)	Sample Pen. (in)	Sample Rec. (in)	Sample Blows (per 6 in.)	Sample SPT Value	Sample Description Modified Burmister	Remark	Field Test Data	Stratum Depth (ft)	Stratum Description	Stratum Elev. (ft)	Equipment Installed
		S-12	35-37	24	14	6 5 13 13	18	S-12: (Top 9") Gray, CLAY & SILT, trace fine to medium Sand. S-12: (Bottom 5") Brown, fine to coarse SAND, some Clay & Silt.	8	0.1		GLACIAL TILL		
											38'		420.0'	
40		S-13	40-42	24	5	16 18 16 14	34	S-13: Dense, brown, GRAVEL and fine to coarse SAND, little Silt.	9	0.1		POSSIBLE WEATHERED BEDROCK		
											42.5'		415.5'	
											44'	WEATHERED BEDROCK	414.0'	
45								Bottom of boring at 44 feet.	10 11 12					
50														
55														
60														
65														
70														
75														

REMARKS

8. Drill rig required slightly increased drill effort at approximately 38 feet bgs using roller cone bit.
9. Driller noted an increase in drill effort at approximately 42.5 feet bgs using roller cone bit.
10. Driller drilled to 44 feet bgs using roller cone bit to conclude possible bedrock surface.
11. Upon completion, borehole caved in to approximately 41 feet bgs.
12. Borehole was backfilled with soil cuttings from approximately 41 to 0.5 feet bgs and pavement repaired with cold patch asphalt flush with ground surface.

See log key for explanation of sample descriptions and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-6

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-7
SHEET: 1 of 2
PROJECT NO: 01.0174853.50
REVIEWED BY:

Drilling Co.: Drilex Environmental, Inc.	**Type of Rig:** Truck Mounted	**Boring Location:** See Plan	**H. Datum:** NAD 83
Foreman: Joe	**Rig Model:** CME 75	**Ground Surface Elev. (ft.):** 458	
Logged By: Leonard Kilmartin	**Drilling Method:** HSA	**Final Boring Depth (ft.):** 32	**V. Datum:** WSG84
		Date Start - Finish: 4/28/2021 - 4/28/2021	

Auger/Casing Type:	HSA
I.D/O.D.(in):	4.25"/7.625"
Hammer Weight (lb.):	
Hammer Fall (in.):	
Other:	

Sampler Type:	Split Spoon
I.D./O.D. (in.):	1.375"/2"
Sampler Hmr Wt (lb):	140
Sampler Hmr Fall (in):	30
Other:	Auto Hammer

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
4/28/21	1300	18		0

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Sample Pen. (in)	Sample Rec. (in)	Sample Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
									1		0.1	ASPHALT	457.9'
											1	CONCRETE	457.0'
		S-1	1-3	24	13	2 2 3 3	5	S-1: (Top 1") CONCRETE. S-1: (Middle 6") Loose, brown, fine to coarse SAND. S-1: (Bottom 6:) Loose, brown, medium to coarse SAND, little Gravel.	2				
		S-2	3-5	24	10	2 2 2 2	4	S-2: Very loose, fine to coarse SAND, little Gravel.					
5		S-3	5-7	24	13	2 2 3 2	5	S-3: Loose, brown, fine to coarse SAND, little Gravel, little Silt, trace Brick, trace Asphalt.				FILL	
		S-4	7-9	24	14	3 4 4 5	8	S-4: Loose, brown, fine to coarse SAND, some Gravel, trace Silt, trace Brick, trace Concrete.					
10		S-5	9-11	24	13	4 2 2 7	4	S-5: Very loose, brown, fine to coarse SAND, little Gravel.					
											11		447.0'
		S-6	11-13	24	15	7 7 5 7	12	S-6: Medium dense, brown, fine to coarse SAND, some Gravel.					
15		S-7	15-17	24	12	8 13 13 10	26	S-7: Medium dense, brown, fine to coarse SAND and GRAVEL.				SAND AND GRAVEL	
20		S-8	20-22	24	20	2 3 5 7	8	S-8: Loose, wet, brown, medium to coarse SAND, trace Gravel.					
											23.5		434.5'
25		S-9	25-27	24	16	3 4 7 8	11	S-9: Medium dense, wet, brown, fine SAND.				FINE SAND	
30													

REMARKS

1. Elevation estimated using Google Earth.
2. Driller cored through approximately 1.5 inches of asphalt and 10 inches of concrete.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-7

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-7
SHEET: 2 of 2
PROJECT NO: 01.0174853.50
REVIEWED BY:

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Sample Pen. (in)	Sample Rec. (in)	Sample Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Depth (ft.)	Stratum Description	Elev. (ft.)
		S-10	30-32	24	24	2 6 8 9	14	S-10: Medium dense, wet, brown, fine SAND.				FINE SAND	
											32		426.0'
								Bottom of boring at 32 feet.	3				

35
40
45
50
55
60
65

REMARKS

3. Upon completion, borehole backfilled with cuttings and pavement repaired using cold patch asphalt.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-7

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-8
SHEET: 1 of 1
PROJECT NO: 01.0174853.50
REVIEWED BY:

Drilling Co.: Drilex Environmental, Inc.	**Type of Rig:** Truck Mounted	**Boring Location:** See Plan	**H. Datum:** NAD 83
Foreman: Joe	**Rig Model:** CME 75	**Ground Surface Elev. (ft.):** 457	
Logged By: Leonard Kilmartin	**Drilling Method:** HSA	**Final Boring Depth (ft.):** 14	**V. Datum:** WSG84
		Date Start - Finish: 4/28/2021 - 4/28/2021	

Auger/Casing Type: HSA	**Sampler Type:** Split Spoon	
I.D/O.D.(in): 4.25"/7.625"	**I.D./O.D. (in.):** 1.375"/2"	
Hammer Weight (lb.):	**Sampler Hmr Wt (lb):** 140	
Hammer Fall (in.):	**Sampler Hmr Fall (in):** 30	
Other:	**Other:** Auto Hammer	

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
Not	measured			

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Sample Pen. (in)	Sample Rec. (in)	Sample Blows (per 6 in.)	Sample SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
		S-1	0-2	24	15	11 9 9 9	18	S-1: Medium dense, brown, fine to coarse SAND, some Gravel, trace Silt.	1		0.1	ASPHALT	456.9'
		S-2	2-4	18	18	10 11 14 R	25	S-2: (Top 12") Medium dense, brown, fine to coarse SAND and GRAVEL, trace Silt.				FILL	
5		S-3	4-5.5	9	9	15 35 R		S-2: (Bottom 6") Medium dense, light brown, medium to coarse SAND.					
								S-3: Medium dense, brown, fine to coarse SAND and GRAVEL, some Asphalt. Metal plate at top of void.			5.7		451.3'
									2		5.8	METAL PLATE	451.2'
10												VOID	
									3		14		443.0'
15								Bottom of boring at 14 feet.	4 5		14.01	CONCRETE	442.9'
20													
25													
30													

REMARKS

1. Elevation estimated using Google Earth.
2. Obstruction at 5 feet, 9 inches below ground surface (bgs). Auger having difficulty, grinding. Driller went through a thin metal plate and into void below.
3. Lost auger plug; used weighted tape to measure depth of hole. Tape measured 14 feet bgs.
4. Test boring terminated due to large void.
5. Upon completion, metal at top of void repaired using a steel plate and borehole backfilled with cuttings and pavement repaired using cold patch asphalt.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-8

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-9
SHEET: 1 of 1
PROJECT NO: 01.0174853.50
REVIEWED BY:

Drilling Co.: Drilex Environmental, Inc.	**Type of Rig:** Truck Mounted	**Boring Location:** See Plan	**H. Datum:** NAD 83
Foreman: Joe	**Rig Model:** CME 75	**Ground Surface Elev. (ft.):** 461	
Logged By: Leonard Kilmartin	**Drilling Method:** HSA	**Final Boring Depth (ft.):** 22	**V. Datum:** WSG84
		Date Start - Finish: 4/28/2021 - 4/28/2021	

Auger/Casing Type:	HSA
I.D/O.D.(in):	4.25"/7.625"
Hammer Weight (lb.):	
Hammer Fall (in.):	
Other:	

Sampler Type:	Split Spoon
I.D./O.D. (in.):	1.375"/2"
Sampler Hmr Wt (lb):	140
Sampler Hmr Fall (in):	30
Other:	Auto Hammer

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
See Note 4				

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Sample Pen. (in)	Sample Rec. (in)	Sample Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
		S-1	0-2	18	13	9 9 20 R	29	S-1: (Top 1.25") ASPHALT. S-1: (Bottom 11.75") Medium dense, brown, coarse to fine SAND and GRAVEL, trace Silt.	1 2		0.1	ASPHALT	460.9'
		S-2	2-4	24	14	8 8 8 4	16	S-2: Medium dense, brown/gray, coarse to fine SAND and GRAVEL, trace Silt.				FILL	
5		S-3	5-7	24	12	4 4 4 8	8	S-3: Loose, light brown, coarse to medium SAND, little Gravel, trace Silt.	3		5		456.0'
		S-4	7-9	24	17	6 9 7 7	16	S-4: Medium dense, light brown, coarse to fine SAND, some (+) Gravel, trace Silt.				SAND AND GRAVEL	
10		S-5	9-11	24	15	3 5 5 5	10	S-5: Medium dense, light brown, fine SAND, trace Silt.			9		452.0'
15		S-6	15-17	24	24	3 5 6 8	11	S-6: Medium dense, light brown, fine SAND.				FINE SAND	
20		S-7	20-22			2 4 3 5	7	S-7: Loose, wet, light brown, fine SAND.	4		22		439.0'
								Bottom of boring at 22 feet.	5				
25													
30													

REMARKS

1. Elevation estimated using Google Earth.
2. Obstruction at 1.5 feet below ground surface (bgs). Offset boring 3 feet west.
3. Obstruction at 4 feet bgs. Driller was through obstruction at 5 feet bgs.
4. Groundwater encountered in sample S-7.
5. Upon completion, borehole backfilled with cuttings and pavement repaired using cold patch asphalt.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-9

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-10
SHEET: 1 of 1
PROJECT NO: 01.0174853.50
REVIEWED BY:

Drilling Co.: Drilex Environmental, Inc.	**Type of Rig:** Truck Mounted	**Boring Location:** See Plan	**H. Datum:** NAD 83
Foreman: Joe	**Rig Model:** CME 75	**Ground Surface Elev. (ft.):** 476	
Logged By: Leonard Kilmartin	**Drilling Method:** HSA	**Final Boring Depth (ft.):** 17	**V. Datum:** WSG84
		Date Start - Finish: 4/28/2021 - 4/28/2021	

Auger/Casing Type: HSA	**Sampler Type:** Split Spoon	
I.D/O.D.(in): 4.25"/7.625"	**I.D./O.D. (in.):** 1.375"/2"	
Hammer Weight (lb.):	**Sampler Hmr Wt (lb):** 140	
Hammer Fall (in.):	**Sampler Hmr Fall (in):** 30	
Other:	**Other:** Auto Hammer	

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
Not	encountered			

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Sample Pen. (in)	Sample Rec. (in)	Sample Blows (per 6 in.)	Sample SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
									1		0.33	ASPHALT	475.7'
		S-1	1-3	24	17	12 13 15 9	28	S-1: Medium dense, brown/black, fine to coarse SAND, some Gravel, little Asphalt, trace Silt.				FILL	
		S-2	3-5	24	18	13 20 41 31	61	S-2: Very dense, brown, fine to coarse SAND and GRAVEL, trace (+) Silt.	2		4		472.0'
5		S-3	5-7	24		20 32 21 26	53	S-3: Very dense, brown, fine to coarse SAND and GRAVEL, trace Silt.				SAND AND GRAVEL	
		S-4	7-9			10 24 13 18	37	S-4: Dense, brown, fine to coarse SAND and GRAVEL, little Silt.			8		468.0'
10		S-5	10-12	22	22	13 47 65 R	R	S-5: Very dense, brown/tan, fine to coarse SAND, some Gravel, little (+) Silt.				GLACIAL TILL	
15		S-6	15-17	24	24	84 35 46 56	81	S-6: Very dense, brown/tan, fine to coarse SAND, some Gravel, little Silt.			17		459.0'
								Bottom of boring at 17 feet.	3				
20													
25													
30													

REMARKS

1. Elevation estimated using Google Earth.
2. Only one representative sample was obtained in samples S-2 and S-4.
3. Upon completion, borehole backfilled with cuttings and pavement repaired using cold patch asphalt.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-10

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-11
SHEET: 1 of 1
PROJECT NO: 01.0174853.50
REVIEWED BY:

Drilling Co.: Drilex Environmental, Inc.	**Type of Rig:** Truck Mounted	**Boring Location:** See Plan	**H. Datum:** NAD 83
Foreman: Joe	**Rig Model:** CME 75	**Ground Surface Elev. (ft.):** 470	
Logged By: Leonard Kilmartin	**Drilling Method:** HSA	**Final Boring Depth (ft.):** 27	**V. Datum:** WSG84
		Date Start - Finish: 4/29/2021 - 4/29/2021	

Auger/Casing Type: HSa	**Sampler Type:** Split Spoon	
I.D/O.D.(in): 4.25"/7.625"	**I.D./O.D. (in.):** 1.375"/2"	
Hammer Weight (lb.):	**Sampler Hmr Wt (lb):** 140	
Hammer Fall (in.):	**Sampler Hmr Fall (in):** 30	
Other:	**Other:** Auto Hammer	

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
Not	encountered			

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
									1		0.25	ASPHALT	469.8'
		S-1	1-3	24	20	3 7 9 10	16	S-1: Medium dense, brown fine to coarse SAND, some Silt, little Gravel.	2				
5		S-2	3-5	24	18	8 12 14 37	26	S-2: Medium dense, brown, fine to coarse SAND, some Silt, little Gravel.					
10		S-3	10-12	24	24	7 17 22 23	39	S-3: Dense, brown, fine to coarse SAND, some Silt, some (-) Gravel.				GLACIAL TILL	
15		S-4	15-17	24	24	13 29 28 47	57	S-4: Very dense, brown/gray, fine to coarse SAND, some Gravel, some (-) Silt.					
20		S-5	20-22	24	20	44 69 52 66	R	S-5: Very dense, gray, fine to coarse SAND, some Gravel, some (-) Silt.					
25		S-6	25-27	24		65 66 43 65	R	S-6: Very dense, gray, fine to coarse SAND, some Gravel, little Silt.			27		443.0'
								Bottom of boring at 27 feet.	3				
30													

REMARKS

1. Elevation estimated using Google Earth.
2. Driller augered through asphalt pavement. Asphalt cuttings observed at the top of sample S-1.
3. Upon completion, borehole backfilled with cuttings and pavement repaired using cold patch asphalt.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-11

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-12
SHEET: 1 of 2
PROJECT NO: 01.0174853.50
REVIEWED BY:

Drilling Co.: Drilex Environmental, Inc.	**Type of Rig:** Truck Mounted	**Boring Location:** See Plan	**H. Datum:** NAD 83
Foreman: Chris	**Rig Model:** CME 75	**Ground Surface Elev. (ft.):** 461	
Logged By: Leonard Kilmartin	**Drilling Method:** HSA	**Final Boring Depth (ft.):** 32	**V. Datum:** WSG84
		Date Start - Finish: 4/29/2021 - 4/29/2021	

Auger/Casing Type: HSA	**Sampler Type:** Split Spoon	
I.D/O.D.(in): 4.25"/7.625"	**I.D./O.D. (in.):** 1.375"/2"	
Hammer Weight (lb.):	**Sampler Hmr Wt (lb):** 140	
Hammer Fall (in.):	**Sampler Hmr Fall (in):** 30	
Other:	**Other:** Auto Hammer	

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
Not	encountered			

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Depth (ft.)	Stratum Description	Elev. (ft.)
		S-1	0.5-2.5	24	8	3 2 2 2	4	S-1: Loose, dark brown, fine to coarse SAND, little Gravel, trace Silt.	1 2		0.58	CONCRETE	460.4'
		S-2	2.5-4.5	24	12	3 2 5 6	7	S-2: Loose, dark brown, fine to coarse SAND, trace Gravel, trace Silt, trace Asphalt.				FILL	
5		S-3	4.5-6.5	24	20	5 9 9 8	18	S-3: Medium dense, tan, Clayey SILT, little fine Sand.			4.5		456.5'
		S-4	6.5-8.5	24	21	6 5 10 12	15	S-4: Medium dense, tan, Clayey SILT, little fine Sand.				CLAYEY SILT	
10		S-5	10-12	24	18	13 21 18 14	39	S-5: Dense, brown/light brown, fine to coarse SAND, some Gravel, trace Silt.			9.3	SAND AND GRAVEL	451.7'
15		S-6	15-17	24	24	14 21 25 39	46	S-6: Dense, gray, fine to coarse SAND, little (+) Gravel, little Silt.			13.5		447.5'
20		S-7	20-22	24	24	10 30 28 37	58	S-7: Very dense, gray, fine to coarse SAND, some Gravel, little Silt.				GLACIAL TILL	
25		S-8	25-27	24	24	10 22 23 57	45	S-8: Dense, gray, fine to coarse SAND, some Gravel, little Silt.					
30													

REMARKS

1. Elevation estimated using Google Earth.
2. The driller cored through 7 inches of concrete at the ground surface.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-12

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-12
SHEET: 2 of 2
PROJECT NO: 01.0174853.50
REVIEWED BY:

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Sample Pen. (in)	Sample Rec. (in)	Sample Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
		S-9	30-32	24	24	12 18 20 31	38	S-9: Dense, gray, fine to coarse SAND, some Gravel, little Silt.				GLACIAL TILL	
											32		429.0'
								Bottom of boring at 32 feet.	3				
35													
40													
45													
50													
55													
60													
65													

REMARKS

3. Upon completion, borehole backfilled with cuttings, the concrete core was placed in the borehole, and concrete repaired using cold patch asphalt.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-12

TEST BORING LOG

GZA GeoEnvironmental, Inc.
Engineers and Scientists

Table Talk Lofts
Green Street
Worcester, Massachusetts

BORING NO.: GZ-13
SHEET: 1 of 1
PROJECT NO: 01.0174853.50
REVIEWED BY:

Drilling Co.: Drilex Environmental, Inc.	**Type of Rig:** Truck Mounted	**Boring Location:** See Plan	**H. Datum:** NAD 83
Foreman: Jamie	**Rig Model:** CME 75	**Ground Surface Elev. (ft.):** 455	
Logged By: Leonard Kilmartin	**Drilling Method:** HSA	**Final Boring Depth (ft.):** 27	**V. Datum:** WSG84
		Date Start - Finish: 4/30/2021 - 4/30/2021	

Auger/Casing Type: HSa	**Sampler Type:** Split Spoon	
I.D/O.D.(in): 4.25"/7.625"	**I.D./O.D. (in.):** 1.375"/2"	
Hammer Weight (lb.):	**Sampler Hmr Wt (lb):** 140	
Hammer Fall (in.):	**Sampler Hmr Fall (in):** 30	
Other:	**Other:** Auto Hammer	

Groundwater Depth (ft.)

Date	Time	Water Depth	Casing	Stab. Time
Not	encountered			

Depth (ft)	Casing Blows/ Core Rate	Sample No.	Sample Depth (ft.)	Pen. (in)	Rec. (in)	Blows (per 6 in.)	SPT Value	Sample Description and Identification (Modified Burmister Procedure)	Remark	Field Test Data	Stratum Depth (ft.)	Stratum Description	Stratum Elev. (ft.)
		S-1	0.5-2	18	12	11 13 15	28	S-1: Medium dense, brown, fine to coarse SAND, little Gravel, little Silt, trace Brick.	1 2		0.5	CONCRETE	454.5'
		S-2	2-4	24	18	15 13 18 17	31	S-2: (Top 9") Dense, brown, fine to coarse SAND, some Gravel, trace Silt.				FILL	
5		S-3	4-6	24	16	11 12 14 17	26	S-2: (Bottom 6") Dense, brown, fine to coarse SAND, little (+) Gravel, little Silt. S-3: Medium dense, brown, fine to coarse SAND, little Gravel, little Silt.			3		452.0'
		S-4	6-8	24	19	15 22 32 46	54	S-4: Dense, brown/gray, fine to coarse SAND, some Gravel, little Silt.					
10		S-5	10-12	24	21	5 26 31 43	57	S-5: Very dense, brown/gray, fine to coarse SAND, some Gravel, little Silt.					
15		S-6	15-17	24	12	9 17 27 24	44	S-6: Dense, brown/white, fine to coarse SAND, some Gravel, little Silt.				GLACIAL TILL	
20		S-7	20-22	4	4	60/4"	R	S-7: Very dense, brown, fine to coarse SAND and GRAVEL, little Silt.	3				
25		S-8	25-27	14	12	37 62 62/4"	R	S-8: Very dense, gray, fine to coarse SAND, some Gravel, little Silt.			27		428.0'
								Bottom of boring at 27 feet.	4				
30													

REMARKS

1. Elevation estimated using Google Earth.
2. The driller cored through the concrete slab.
3. Auger had difficulty drilling at 22 feet below ground surface.
4. Upon completion, borehole backfilled with cuttings and concrete repaired using quick-set concrete.

See Log Key for explanation of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Boring No.: GZ-13

APPENDIX C - GEOTECHNICAL LABORATORY TEST RESULTS

THIELSCH ENGINEERING

195 Frances Avenue
Cranston RI, 02910
Phone: (401)-467-6454
Fax: (401)-467-2398
thielsch.com
Let's Build a Solid Foundation

Client Information:
GZA GeoEnvironemtal
Norwood, MA
PM: Heather Audet
Assigned By: H. Audet
Collected By: Client

Project Information:
Table Talk Lofts
Worcester, MA
GZA Project Number: 01.0174853.40
Summary Page: 1 of 1
Report Date: 01.18.2021

LABORATORY TESTING DATA SHEET, Report No.: 7421-A-B003

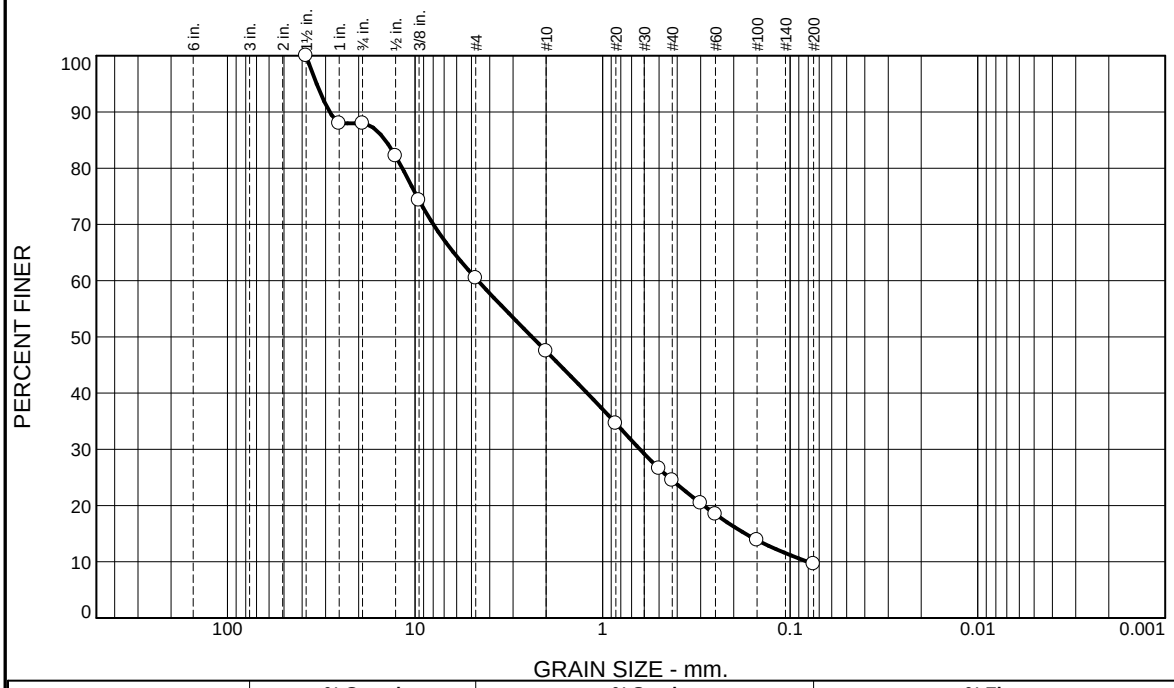
Boring ID	Sample No.	Depth (ft)	Laboratory No.	Identification Tests							Corrosivity Tests							Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	Sulfate (mg/kg)	Chloride (mg/kg)	Sulfide (mg/kg)	Resistivity (Mohms-cm)	pH	Electrical Resist. As Received Ohm-cm @ 60°F	Electrial Resist. Saturated Ohm-cm @ 60°F	
				D2216	D4318		D6913			D2974	EPA					G57		
GZ-3	S-2	2.5-4.5	21-S-B005				39.6	50.8	9.6									Brown f-c SAND and f-c GRAVEL, trace Silt
GZ-4	S-3	5-7	21-S-B006				3.1	93.0	3.9									Brown f-m SAND, trace Silt, trace fine Gravel
GZ-6	S-6	11-13	21-S-B007				28.8	59.4	11.8									Brown f-c SAND, some f-c Gravel, little Silt

Date Received: *01.13.21*

Reviewed By:

Date Reviewed: *01.18.2021*

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.0	27.6	12.9	23.0	14.9	9.6	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5"	100.0		
1"	88.0		
0.75"	88.0		
0.5"	82.2		
0.375"	74.3		
#4	60.4		
#10	47.5		
#20	34.6		
#35	26.6		
#40	24.5		
#50	20.4		
#60	18.5		
#100	13.9		
#200	9.6		

* (no specification provided)

Material Description

Brown f-c SAND and f-c GRAVEL, trace Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SW-SM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 28.4954 D_{85}= 14.4293 D_{60}= 4.6184
D_{50}= 2.3797 D_{30}= 0.6330 D_{15}= 0.1732
D_{10}= 0.0806 C_u= 57.29 C_c= 1.08

Remarks

Date Received: 1.13.21 **Date Tested:** 1.15.21

Tested By: RD

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 2.5-4.5' **Date Sampled:**
Sample Number: GZ-3, S-2

Thielsch Engineering Inc.

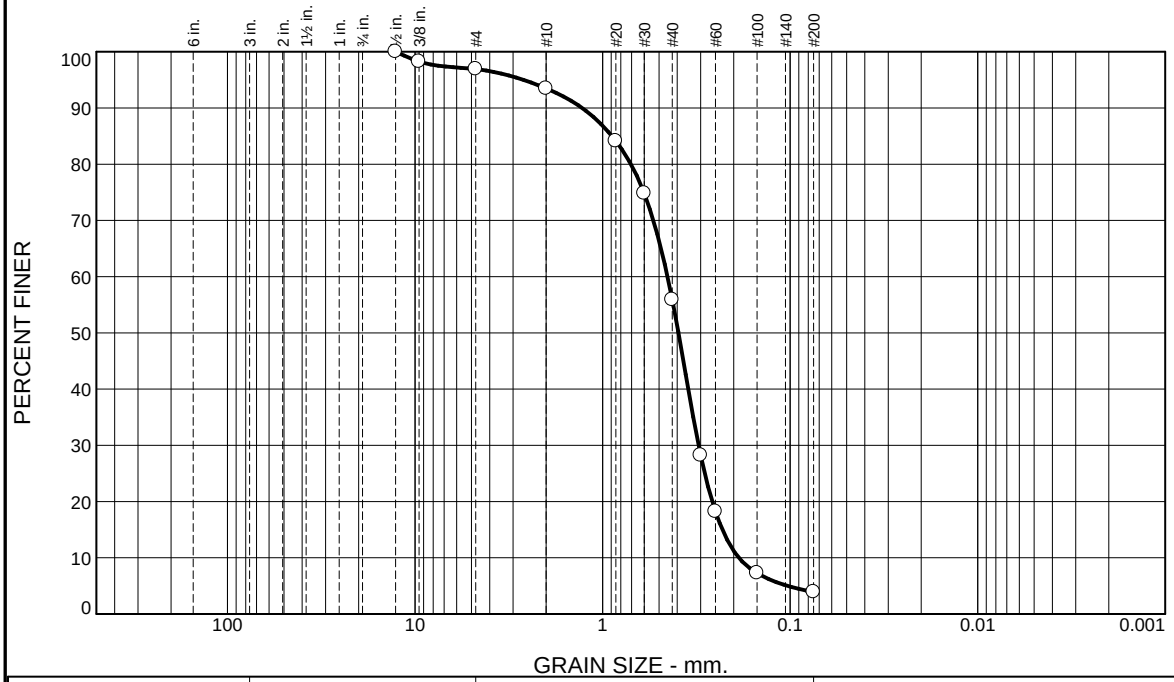
Cranston, RI

Client: GZA GeoEnvironmental

Project: Table Talk Lofts
Worcester, MA

Project No: 01.0174853.40 **Figure** 21-S-B005

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.1	3.4	37.6	52.0	3.9	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.5"	100.0		
0.375"	98.3		
#4	96.9		
#10	93.5		
#20	84.1		
#30	74.8		
#40	55.9		
#50	28.2		
#60	18.2		
#100	7.3		
#200	3.9		

* (no specification provided)

Material Description

Brown f-m SAND, trace Silt, trace fine Gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-3

Coefficients

D_{90}= 1.2839 D_{85}= 0.8924 D_{60}= 0.4503
D_{50}= 0.3940 D_{30}= 0.3077 D_{15}= 0.2298
D_{10}= 0.1877 C_u= 2.40 C_c= 1.12

Remarks

Date Received: 1.13.21 **Date Tested:** 1.15.21

Tested By: RD

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

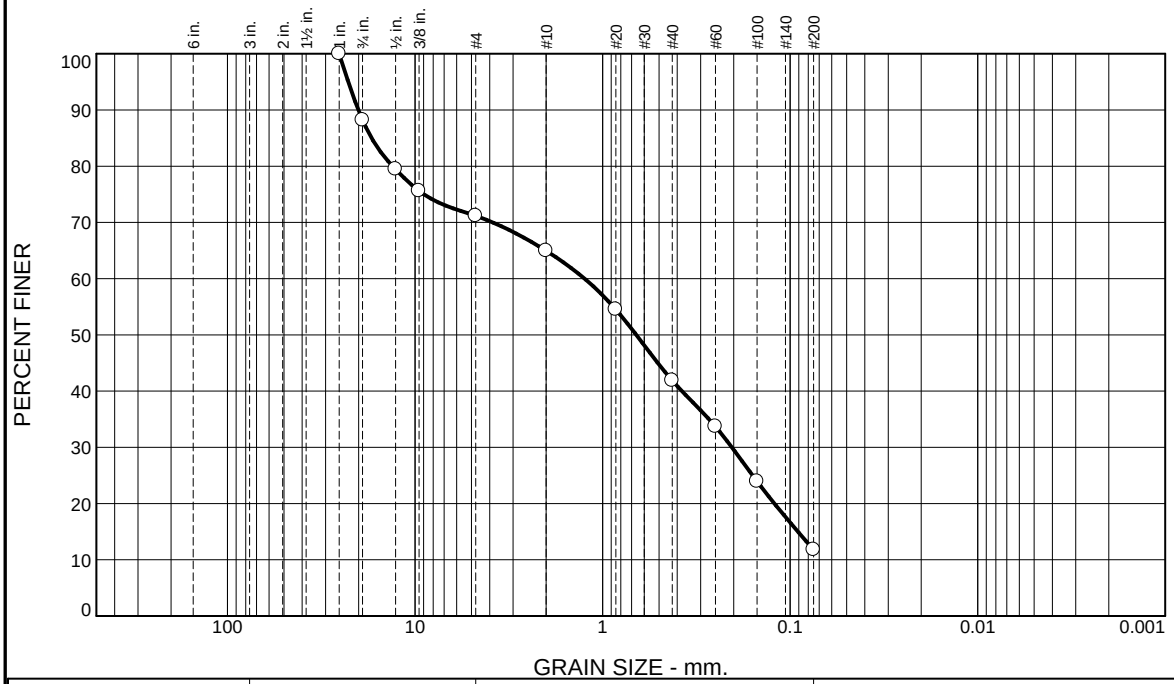
Source of Sample: Boring **Depth:** 5-7' **Date Sampled:**
Sample Number: GZ-4, S-3

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Table Talk Lofts
Worcester, MA
Project No: 01.0174853.40 **Figure** 21-S-B006

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.8	17.0	6.2	23.1	30.1	11.8	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	88.2		
0.5"	79.5		
0.375"	75.6		
#4	71.2		
#10	65.0		
#20	54.5		
#40	41.9		
#60	33.7		
#100	23.9		
#200	11.8		

* (no specification provided)

Material Description

Brown f-c SAND, some f-c Gravel, little Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 20.0518 D_{85}= 17.0587 D_{60}= 1.2470
D_{50}= 0.6615 D_{30}= 0.2044 D_{15}= 0.0909
D_{10}= C_u= C_c=

Remarks

Date Received: 1.13.21 **Date Tested:** 1.15.21

Tested By: RD

Checked By: Ronelle LeBlanc, E.I.T.

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 11-13' **Date Sampled:**
Sample Number: GZ-6, S-6

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Table Talk Lofts
Worcester, MA
Project No: 01.0174853.40 **Figure** 21-S-B007

THIELSCH ENGINEERING
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Let's Build a Solid Foundation

Client Information:
GZA GeoEnvironemtal
Norwood, MA
PM: Heather Audet
Assigned By: H. Audet
Collected By: L. Kilmartin

Project Information:
Table Talk Lofts
Worcester, MA
GZA Project Number: 01.0174853.40
Summary Page: 1 of 1
Report Date: 05.12.21

LABORATORY TESTING DATA SHEET, Report No.: 7421-E-138

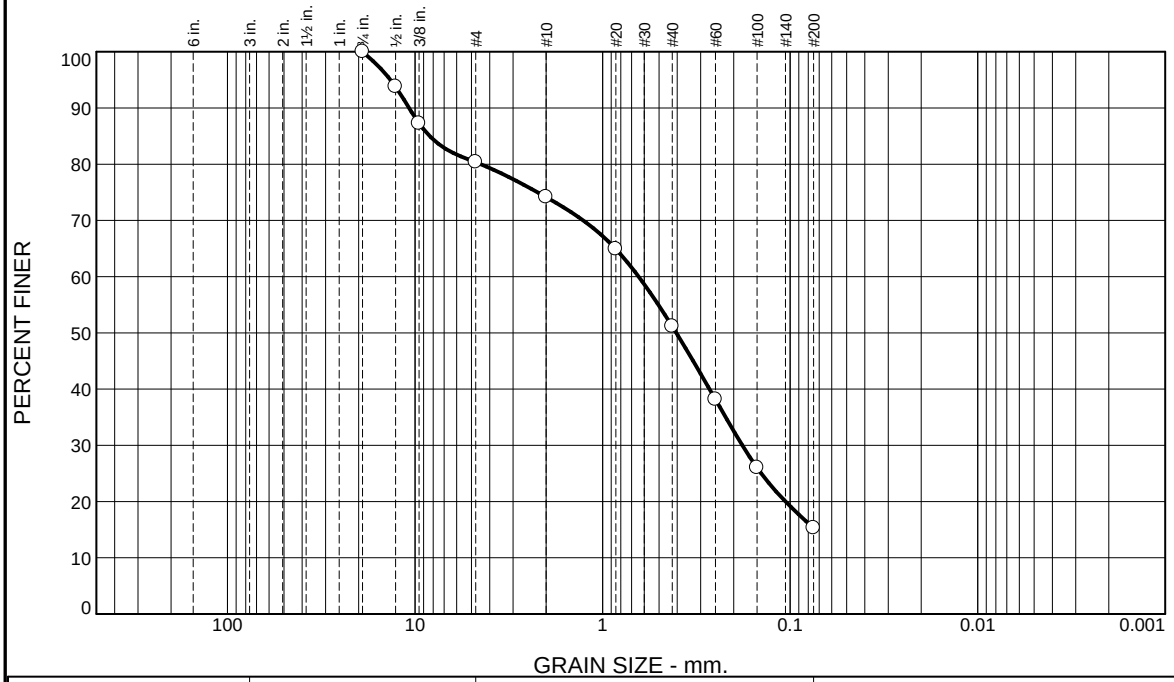
Boring ID	Sample No.	Depth (ft)	Laboratory No.	Identification Tests							Corrosivity Tests							Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Org. %	Sulfate (mg/kg)	Chloride (mg/kg)	Sulfide (mg/kg)	Resistivity (Mohms-cm)	pH	Electrical Resist. As Received Ohm-cm @ 60°F	Electrial Resist. Saturated Ohm-cm @ 60°F	
				D2216	D4318		D6913			D2974	EPA					G57		
GZ-7	S-3	5-7	21-S-1711				19.6	65.1	15.3									Brown f-m SAND, little fine Gravel, little Silt
GZ-9	S-5	9-11	21-S-1712				0.0	97.1	2.9									Light Brown fine SAND, trace Silt
GZ-11	S-2	3-5	21-S-1713				18.8	47.5	33.7									Brown f-c SAND, some Silt, little f-c Gravel
GZ-12	S-3	4.5-6.5	21-S-1714				0.0	10.9	89.1									Brown CLAYEY SILT, little f-m Sand

Date Received: *05.10.21*

Reviewed By:

Date Reviewed: *05.12.21*

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	19.6	6.3	23.0	35.8	15.3	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	93.8		
0.375"	87.3		
#4	80.4		
#10	74.1		
#20	64.9		
#40	51.1		
#60	38.2		
#100	26.0		
#200	15.3		

* (no specification provided)

Material Description

Brown f-m SAND, little fine Gravel, little Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 10.7691 D_{85}= 8.3527 D_{60}= 0.6422
D_{50}= 0.4046 D_{30}= 0.1798 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 05.10.21 **Date Tested:** 05.12.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

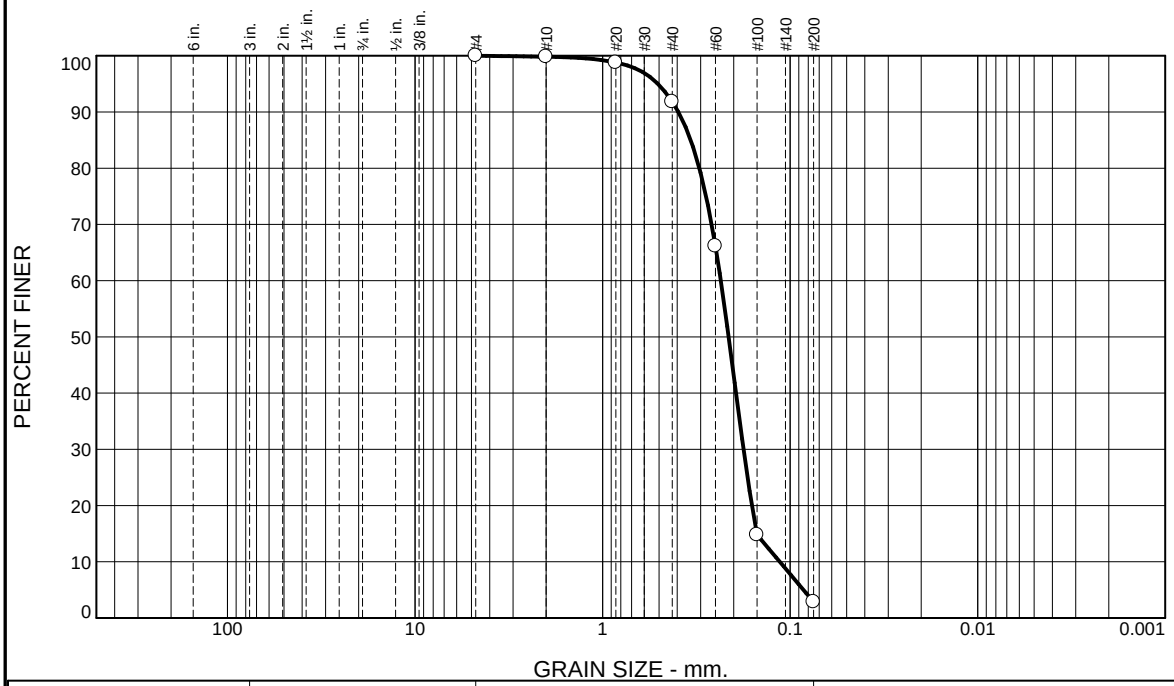
Source of Sample: Boring **Depth:** 5-7' **Date Sampled:**
Sample Number: GZ-7 / S-3

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Table Talk Lofts
Worcester, MA
Project No: 01.0174853.40 **Figure** 21-S-1711

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	8.0	88.9	2.9	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.8		
#20	98.8		
#40	91.8		
#60	66.1		
#100	14.8		
#200	2.9		

* (no specification provided)

Material Description

Light Brown fine SAND, trace Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP **AASHTO (M 145)=** A-3

Coefficients

D_{90}= 0.3944 D_{85}= 0.3389 D_{60}= 0.2342
D_{50}= 0.2128 D_{30}= 0.1771 D_{15}= 0.1504
D_{10}= 0.1136 C_u= 2.06 C_c= 1.18

Remarks

Date Received: 05.10.21 **Date Tested:** 05.12.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 9-11' **Date Sampled:**
Sample Number: GZ-9 / S-5

Thielsch Engineering Inc.

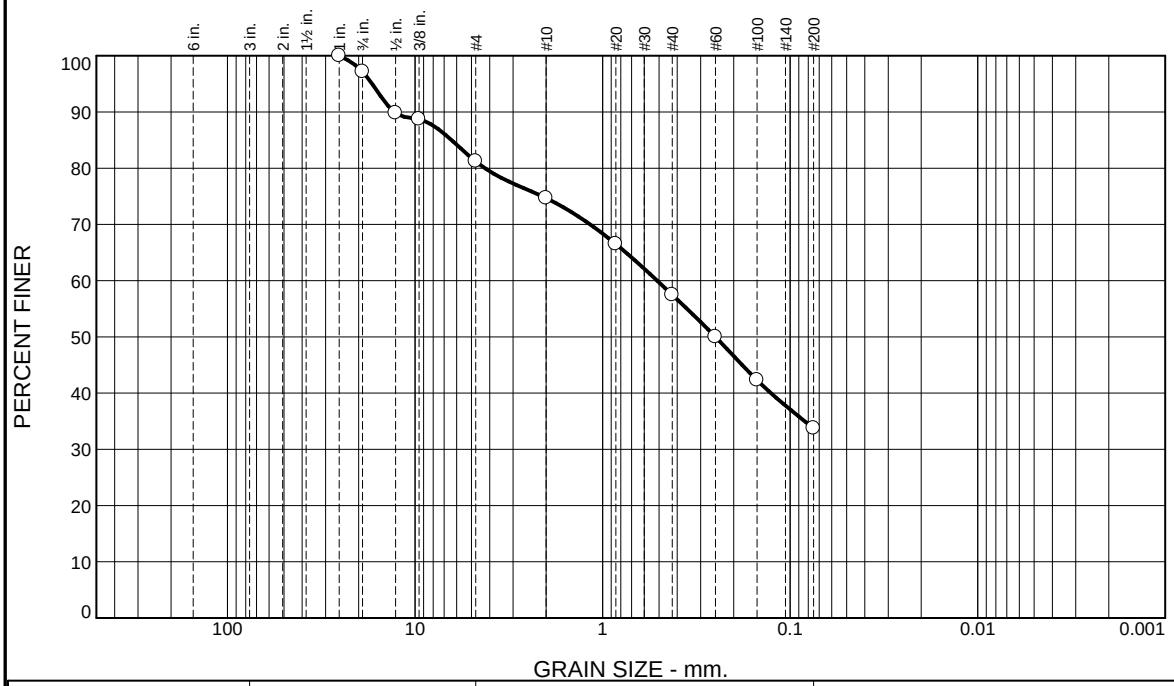
Cranston, RI

Client: GZA GeoEnvironmental

Project: Table Talk Lofts
Worcester, MA

Project No: 01.0174853.40 **Figure** 21-S-1712

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.8	16.0	6.5	17.2	23.8	33.7	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	97.2		
0.5"	89.8		
0.375"	88.7		
#4	81.2		
#10	74.7		
#20	66.5		
#40	57.5		
#60	50.0		
#100	42.3		
#200	33.7		

* (no specification provided)

Material Description

Brown f-c SAND, some Silt, little f-c Gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 12.8996 D_{85}= 6.3826 D_{60}= 0.5118
D_{50}= 0.2501 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as non-plastic.

Date Received: 05.10.21 **Date Tested:** 05.12.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

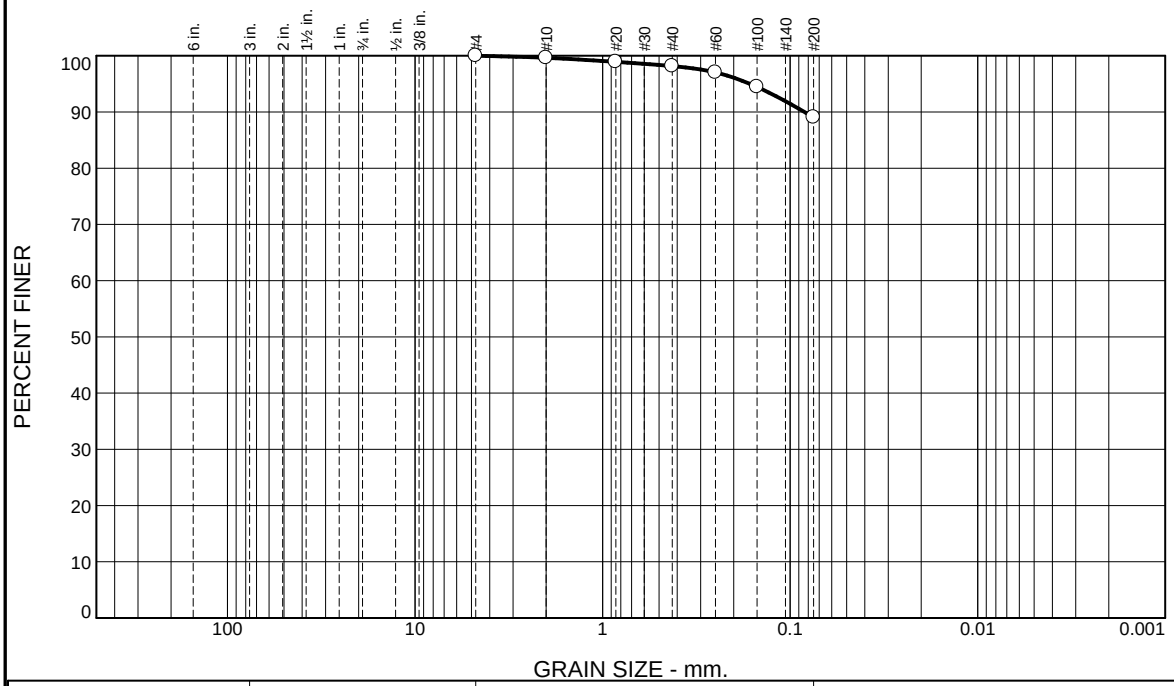
Source of Sample: Boring **Depth:** 3-5' **Date Sampled:**
Sample Number: GZ-11 / S-2

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Table Talk Lofts
Worcester, MA
Project No: 01.0174853.40 **Figure** 21-S-1713

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.4	1.4	9.1	89.1	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.6		
#20	98.9		
#40	98.2		
#60	97.0		
#100	94.5		
#200	89.1		

* (no specification provided)

Material Description

Brown CLAYEY SILT, little f-m Sand

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-4(0)

Coefficients

D_{90}= 0.0839 D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Sample visually classified as plastic. Sample rolled to 1/4".

Date Received: 05.10.21 **Date Tested:** 05.12.21

Tested By: JM

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: Boring **Depth:** 4.5-6.5' **Date Sampled:**
Sample Number: GZ-12 / S-3

Thielsch Engineering Inc.

Cranston, RI

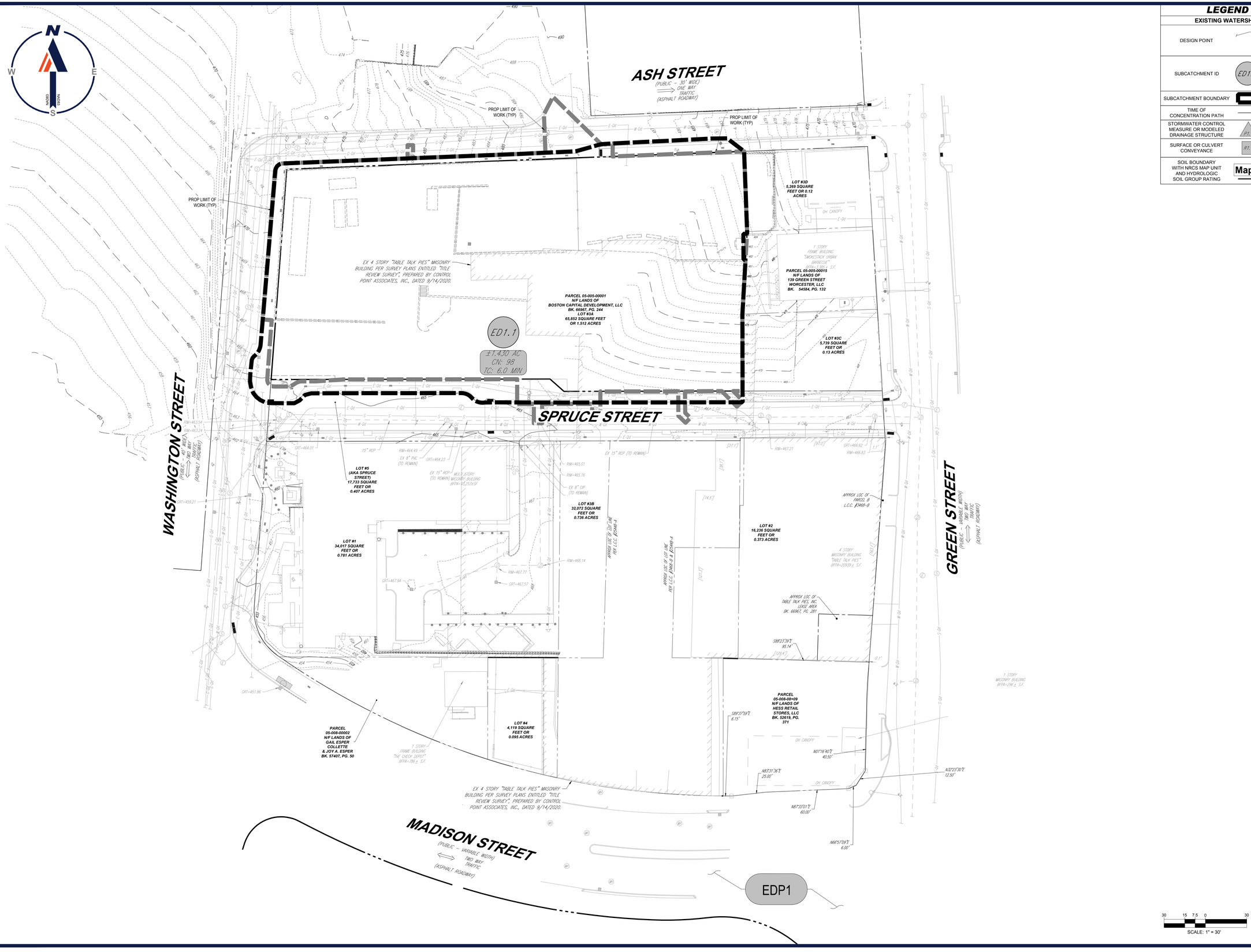
Client: GZA GeoEnvironmental

Project: Table Talk Lofts
Worcester, MA

Project No: 01.0174853.40 **Figure** 21-S-1714

APPENDIX D: EXISTING CONDITIONS HYDROLOGIC ANALYSIS

- *EXISTING CONDITIONS DRAINAGE MAP*
- *EXISTING CONDITIONS HYDROCAD COMPUTATIONS*



LEGEND

EXISTING WATERSHED

DESIGN POINT	DP1
SUBCATCHMENT ID	ED1.1
SUBCATCHMENT BOUNDARY	
TIME OF CONCENTRATION PATH	
STORMWATER CONTROL MEASURE OR MODELED DRAINAGE STRUCTURE	P1.1
SURFACE OR CULVERT CONVEYANCE	R1.1
SOIL BOUNDARY WITH NRCS MAP UNIT AND HYDROLOGIC SOIL GROUP RATING	MapUnit A

BOHLER
SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
ENVIRONMENTAL SERVICES
PERMITTING SERVICES
TRANSPORTATION SERVICES

REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY

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PROJECT No.:	MAA240356.00-0C
DRAWN BY:	OCR
CHECKED BY:	AJS / MMA
DATE:	12/12/2024
CAD I.D.:	P-CIVL-HYDR

PROJECT:

SITE DEVELOPMENT PLANS

FOR

SMC

PROPOSED RESIDENCES AT TABLE TALK SQUARE

MAP: 5 | BLK: 5 | LOT:0003A
120 WASHINGTON STREET
CITY OF WORCESTER
WORCESTER COUNTY
MASSACHUSETTS

BOHLER
352 TURNPIKE ROAD, 3rd FLOOR
SOUTHBOROUGH, MA 01772
Phone: (508) 480-9900
www.BohlerEngineering.com

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JOHN A. KUCICH
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MASSACHUSETTS LICENSE No. 41530
NEW HAMPSHIRE LICENSE No. 15476
CONNECTICUT LICENSE No. 26177
RHODE ISLAND LICENSE No. 9616
MAINE LICENSE No. 12553

SHEET TITLE:

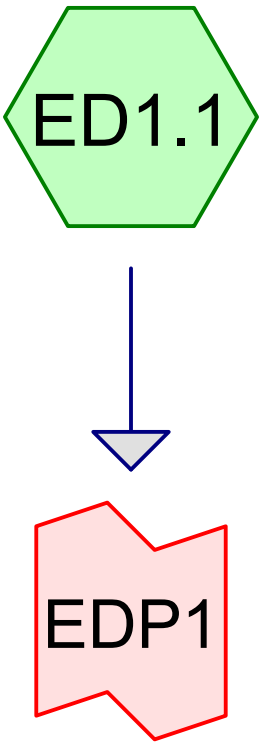
PRE-DEVELOPMENT DRAINAGE MAP

SHEET NUMBER:

C-402

ORG. DATE - 12/12/2024

EXISTING



MADISON STREET
DRAINAGE

Subcat Reach Pond Link

Routing Diagram for MAA240356 - Pre & Post
Prepared by Bohler, Printed 12/11/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.81	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.96	2
3	25-Year	Type III 24-hr		Default	24.00	1	7.68	2
4	100-Year	Type III 24-hr		Default	24.00	1	10.60	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.055	98	Pavement (ED1.1)
0.375	98	Roofs (ED1.1)
1.430	**98**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
1.430	Other	ED1.1
1.430		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	1.055	1.055	Pavement	ED1.1
0.000	0.000	0.000	0.000	0.375	0.375	Roofs	ED1.1
0.000	**0.000**	**0.000**	**0.000**	**1.430**	**1.430**	**TOTAL AREA**	

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED1.1: Runoff Area=62,303 sf 100.00% Impervious Runoff Depth=3.58"
Tc=6.0 min CN=WQ Runoff=5.31 cfs 0.426 af

Link EDP1: MADISON STREET DRAINAGE Inflow=5.31 cfs 0.426 af
Primary=5.31 cfs 0.426 af

Total Runoff Area = 1.430 ac Runoff Volume = 0.426 af Average Runoff Depth = 3.58"
0.00% Pervious = 0.000 ac 100.00% Impervious = 1.430 ac

Summary for Subcatchment ED1.1:

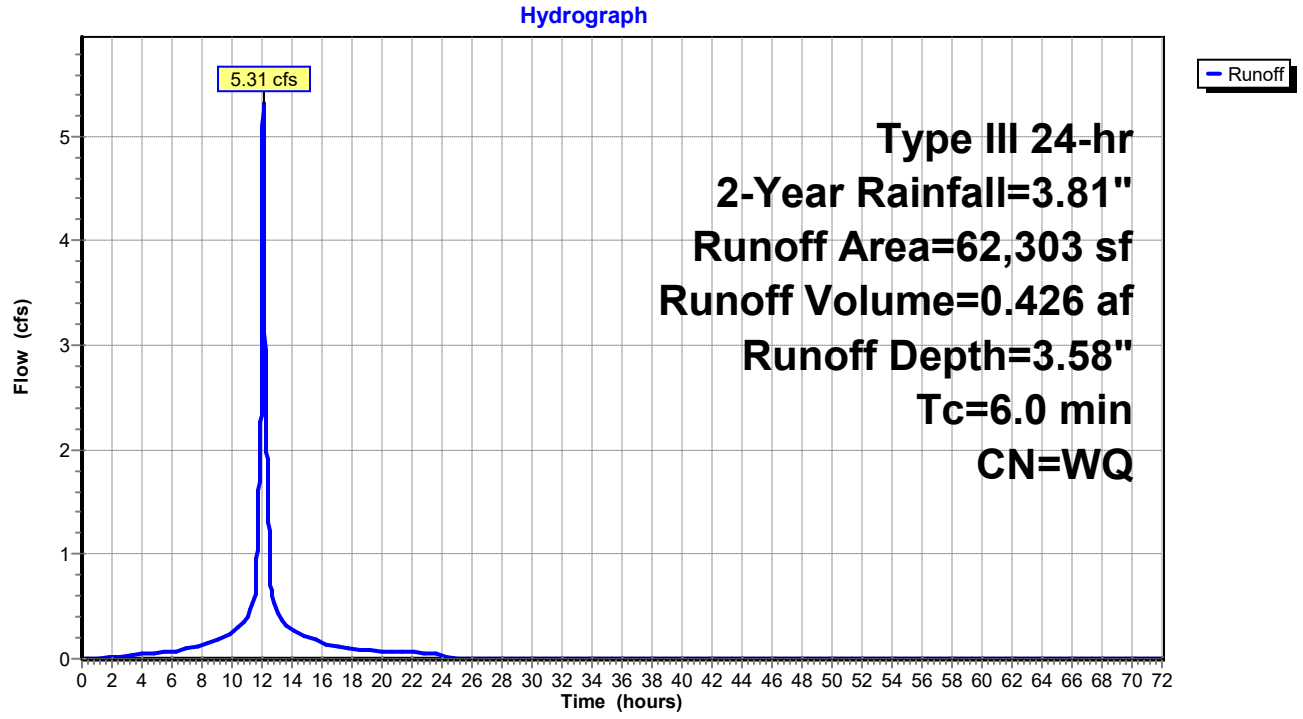
Runoff = 5.31 cfs @ 12.08 hrs, Volume= 0.426 af, Depth= 3.58"
Routed to Link EDP1 : MADISON STREET DRAINAGE

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.81"

	Area (sf)	CN	Description
*	16,356	98	Roofs
*	45,947	98	Pavement
	62,303		Weighted Average
	62,303		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment ED1.1:

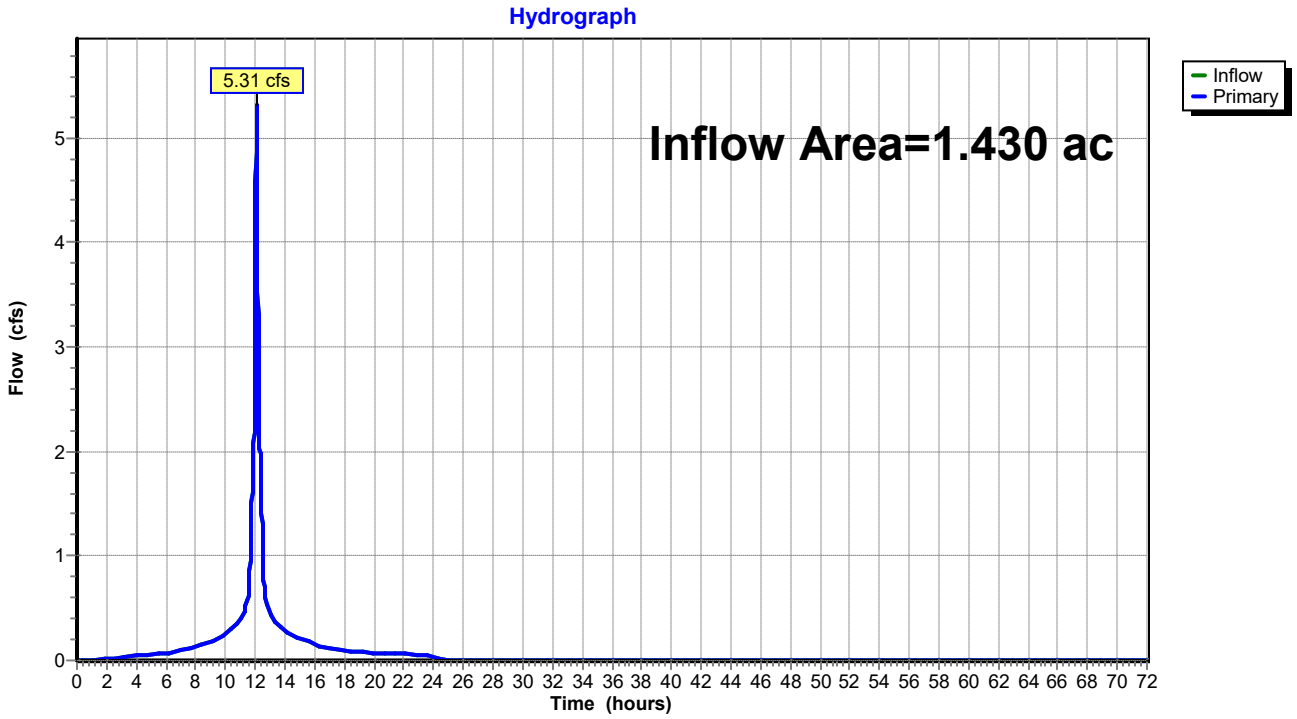


Summary for Link EDP1: MADISON STREET DRAINAGE

Inflow Area = 1.430 ac,100.00% Impervious, Inflow Depth = 3.58" for 2-Year event
Inflow = 5.31 cfs @ 12.08 hrs, Volume= 0.426 af
Primary = 5.31 cfs @ 12.08 hrs, Volume= 0.426 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link EDP1: MADISON STREET DRAINAGE



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED1.1: Runoff Area=62,303 sf 100.00% Impervious Runoff Depth=5.72"
Tc=6.0 min CN=WQ Runoff=8.35 cfs 0.682 af

Link EDP1: MADISON STREET DRAINAGE Inflow=8.35 cfs 0.682 af
Primary=8.35 cfs 0.682 af

Total Runoff Area = 1.430 ac Runoff Volume = 0.682 af Average Runoff Depth = 5.72"
0.00% Pervious = 0.000 ac 100.00% Impervious = 1.430 ac

Summary for Subcatchment ED1.1:

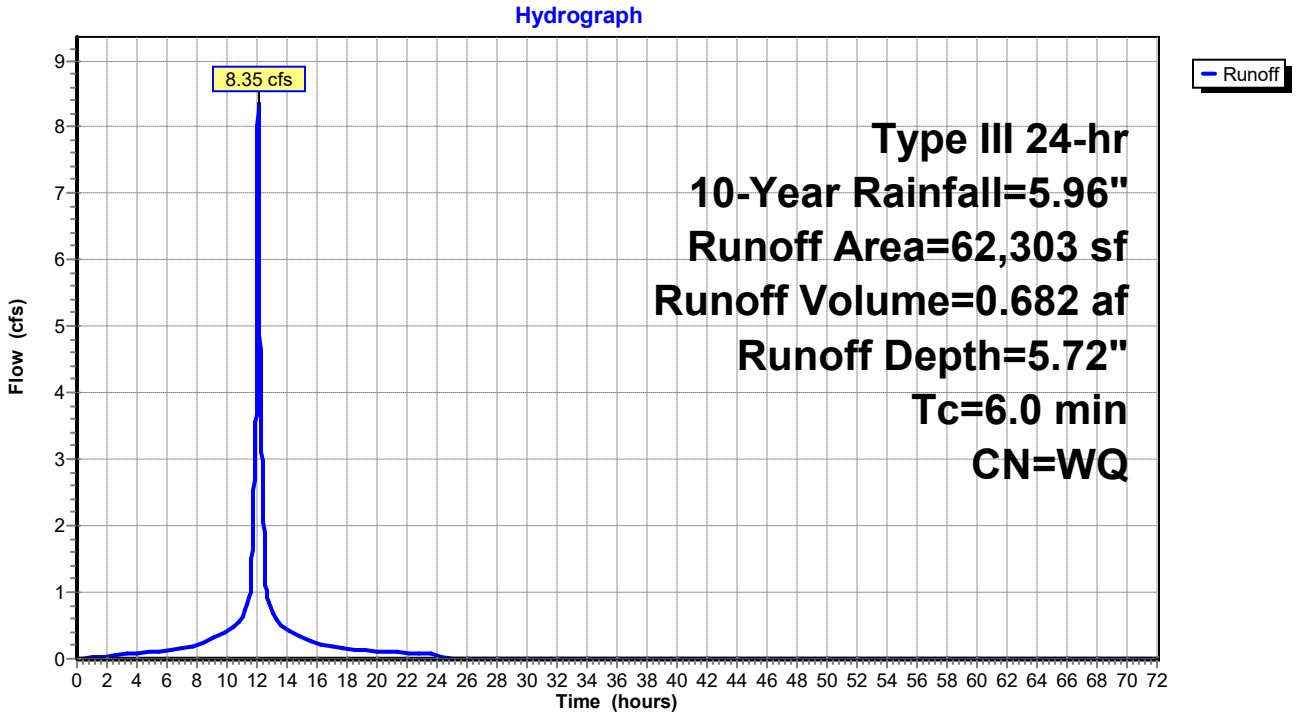
Runoff = 8.35 cfs @ 12.08 hrs, Volume= 0.682 af, Depth= 5.72"
Routed to Link EDP1 : MADISON STREET DRAINAGE

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.96"

	Area (sf)	CN	Description
*	16,356	98	Roofs
*	45,947	98	Pavement
	62,303		Weighted Average
	62,303		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment ED1.1:

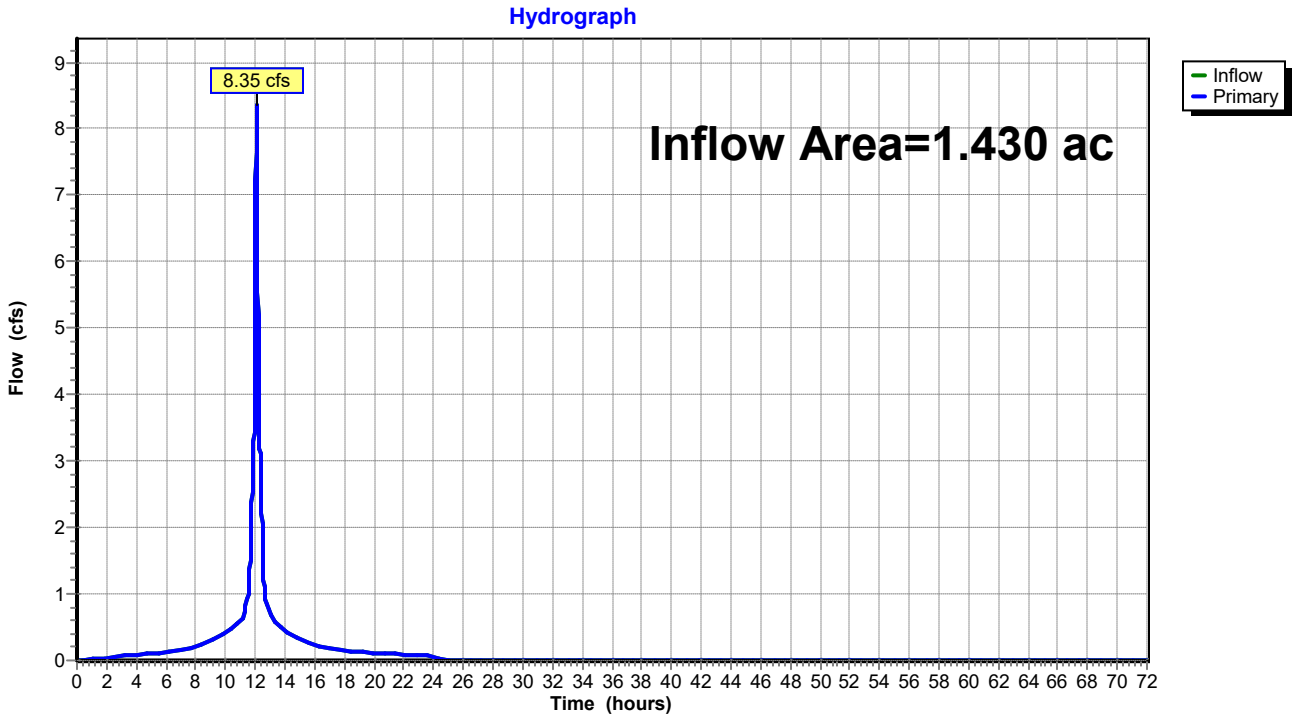


Summary for Link EDP1: MADISON STREET DRAINAGE

Inflow Area = 1.430 ac,100.00% Impervious, Inflow Depth = 5.72" for 10-Year event
Inflow = 8.35 cfs @ 12.08 hrs, Volume= 0.682 af
Primary = 8.35 cfs @ 12.08 hrs, Volume= 0.682 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link EDP1: MADISON STREET DRAINAGE



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED1.1: Runoff Area=62,303 sf 100.00% Impervious Runoff Depth=7.44"
Tc=6.0 min CN=WQ Runoff=10.78 cfs 0.887 af

Link EDP1: MADISON STREET DRAINAGE Inflow=10.78 cfs 0.887 af
Primary=10.78 cfs 0.887 af

Total Runoff Area = 1.430 ac Runoff Volume = 0.887 af Average Runoff Depth = 7.44"
0.00% Pervious = 0.000 ac 100.00% Impervious = 1.430 ac

Summary for Subcatchment ED1.1:

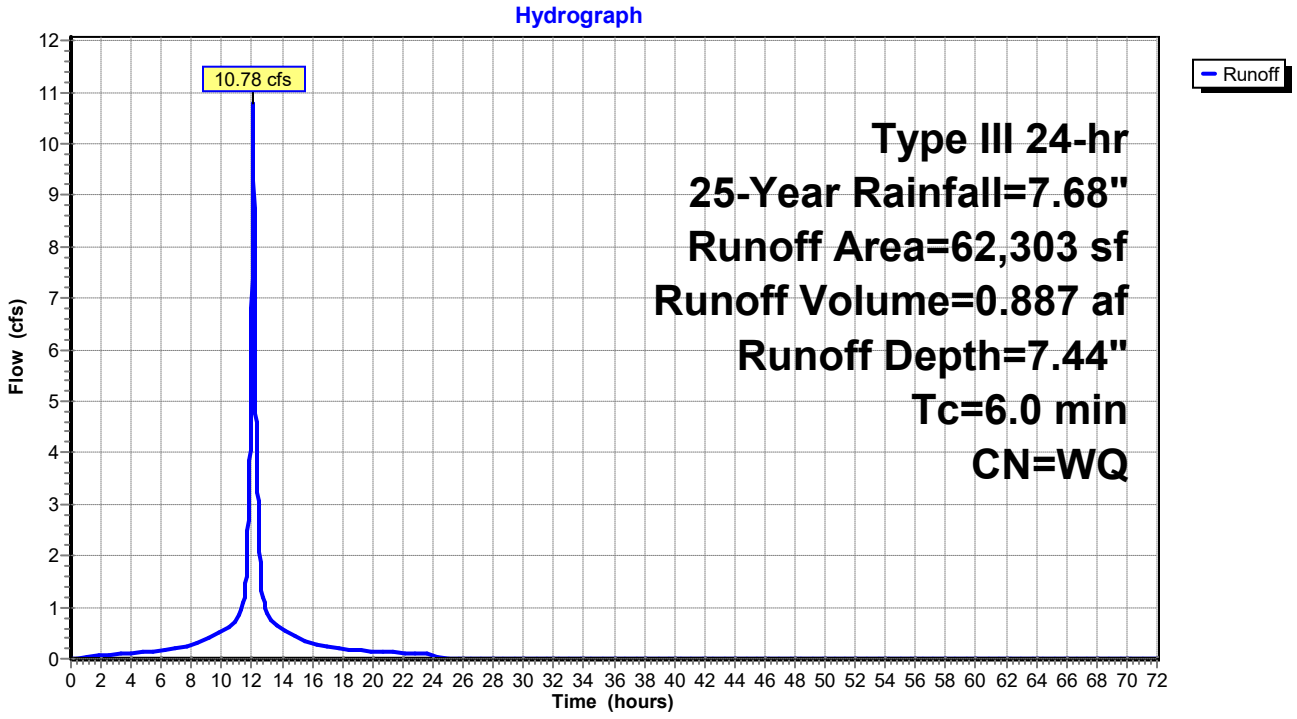
Runoff = 10.78 cfs @ 12.08 hrs, Volume= 0.887 af, Depth= 7.44"
Routed to Link EDP1 : MADISON STREET DRAINAGE

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=7.68"

	Area (sf)	CN	Description
*	16,356	98	Roofs
*	45,947	98	Pavement
	62,303		Weighted Average
	62,303		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment ED1.1:

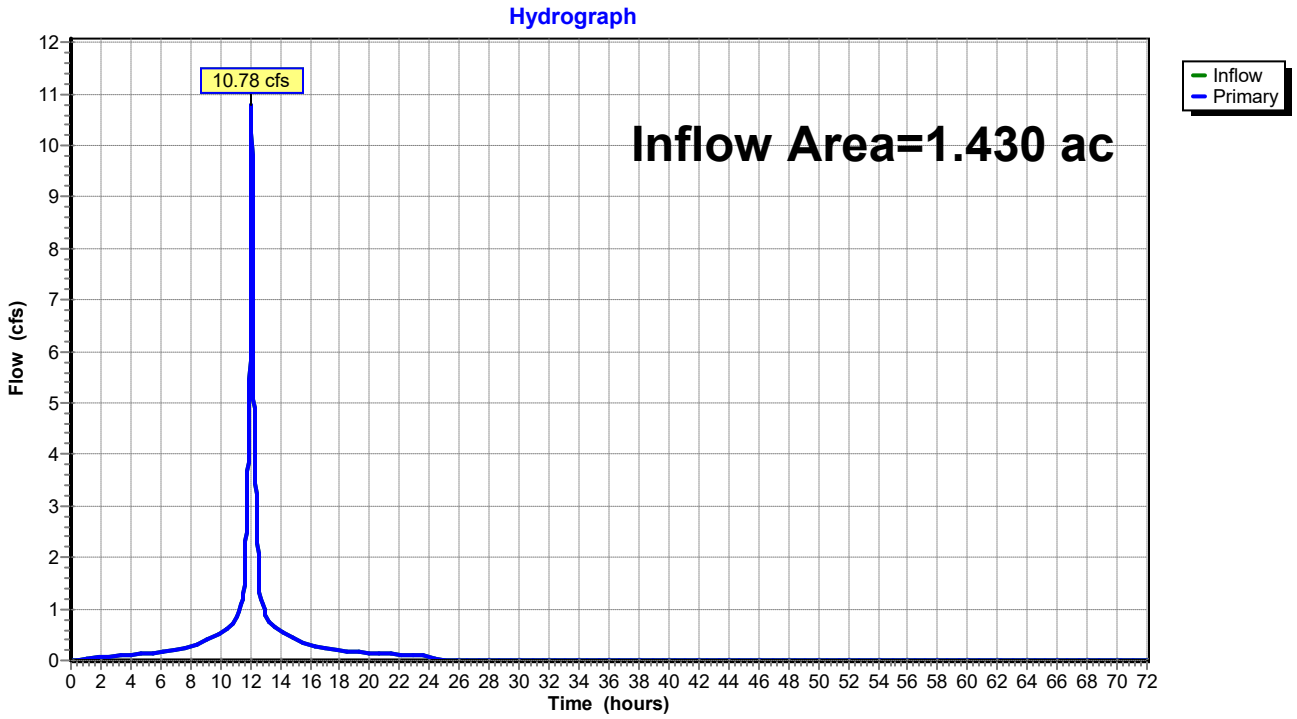


Summary for Link EDP1: MADISON STREET DRAINAGE

Inflow Area = 1.430 ac,100.00% Impervious, Inflow Depth = 7.44" for 25-Year event
Inflow = 10.78 cfs @ 12.08 hrs, Volume= 0.887 af
Primary = 10.78 cfs @ 12.08 hrs, Volume= 0.887 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link EDP1: MADISON STREET DRAINAGE



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment ED1.1: Runoff Area=62,303 sf 100.00% Impervious Runoff Depth=10.36"
Tc=6.0 min CN=WQ Runoff=14.90 cfs 1.235 af

Link EDP1: MADISON STREET DRAINAGE Inflow=14.90 cfs 1.235 af
Primary=14.90 cfs 1.235 af

Total Runoff Area = 1.430 ac Runoff Volume = 1.235 af Average Runoff Depth = 10.36"
0.00% Pervious = 0.000 ac 100.00% Impervious = 1.430 ac

Summary for Subcatchment ED1.1:

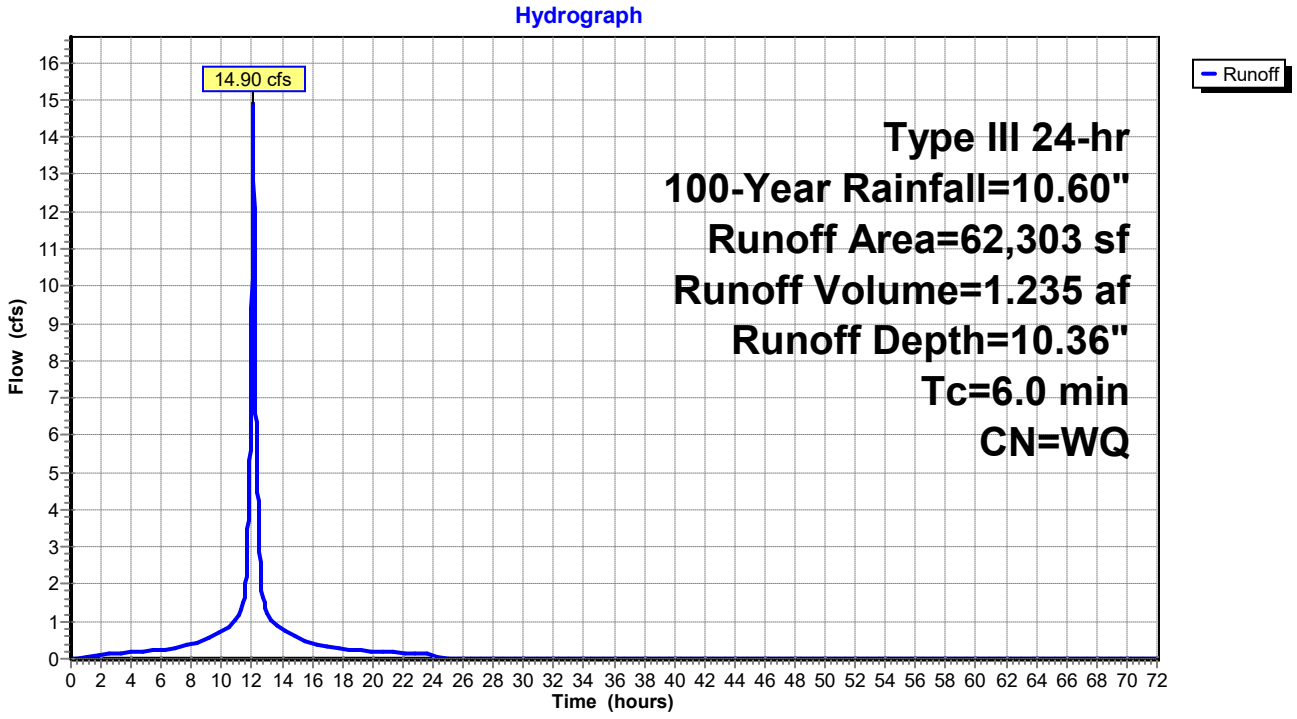
Runoff = 14.90 cfs @ 12.08 hrs, Volume= 1.235 af, Depth=10.36"
Routed to Link EDP1 : MADISON STREET DRAINAGE

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=10.60"

	Area (sf)	CN	Description
*	16,356	98	Roofs
*	45,947	98	Pavement
	62,303		Weighted Average
	62,303		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Subcatchment ED1.1:

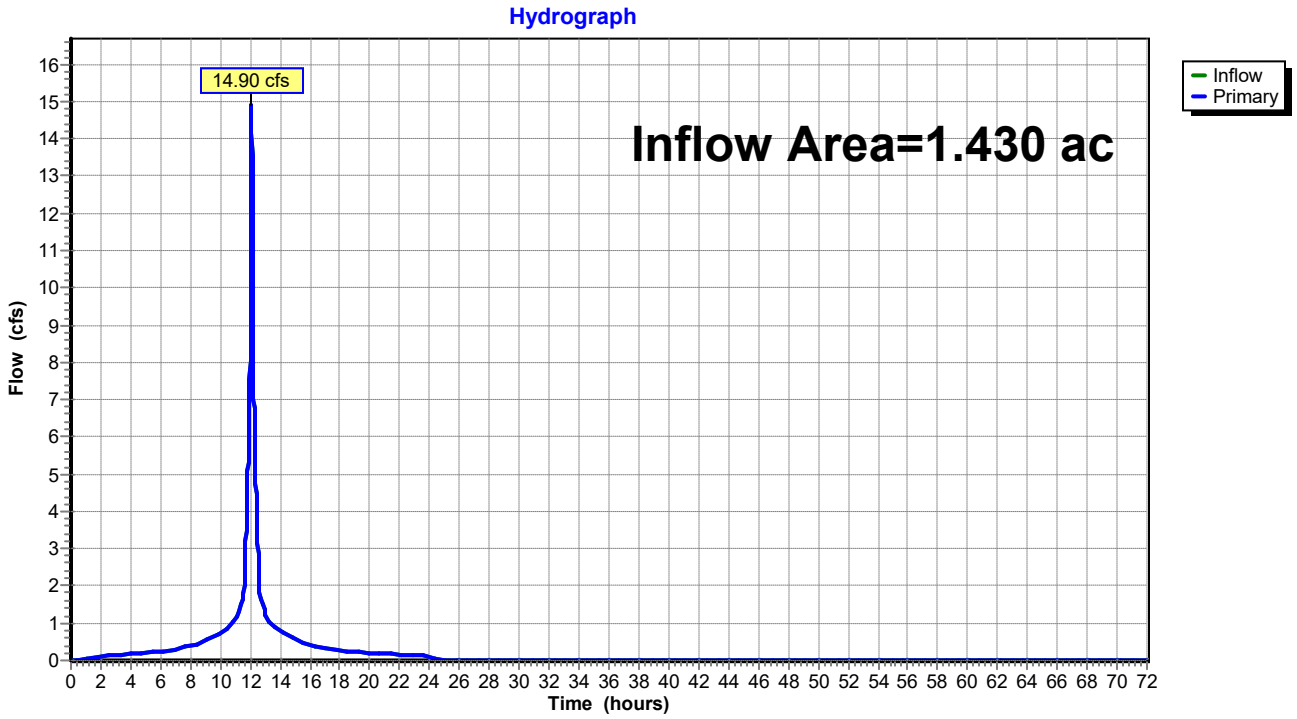


Summary for Link EDP1: MADISON STREET DRAINAGE

Inflow Area = 1.430 ac,100.00% Impervious, Inflow Depth = 10.36" for 100-Year event
Inflow = 14.90 cfs @ 12.08 hrs, Volume= 1.235 af
Primary = 14.90 cfs @ 12.08 hrs, Volume= 1.235 af, Atten= 0%, Lag= 0.0 min

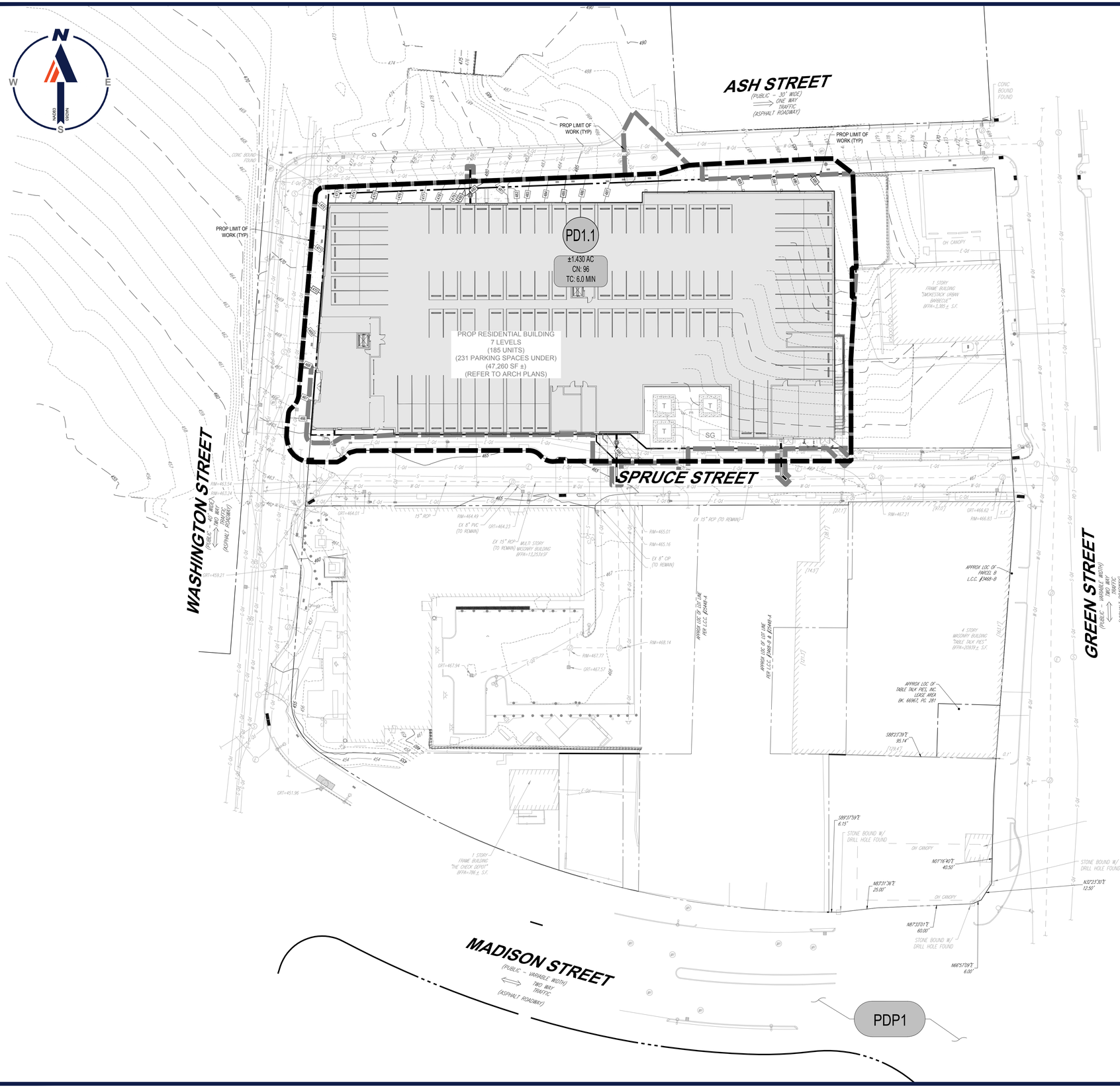
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link EDP1: MADISON STREET DRAINAGE



APPENDIX E: PROPOSED CONDITIONS HYDROLOGIC ANALYSIS

- *PROPOSED CONDITIONS DRAINAGE MAP*
- *PROPOSED CONDITIONS HYDROCAD CALCULATIONS*



LEGEND

PROPOSED WATERSHED

DESIGN POINT	DP1 / DP1
SUBCATCHMENT ID	PD1.1 PD1.1
SUBCATCHMENT BOUNDARY	
TIME OF CONCENTRATION PATH	
STORMWATER CONTROL MEASURE OR MODELED DRAINAGE STRUCTURE	P1.1 P1.1
SURFACE OR CULVERT CONVEYANCE	R1.1 R1.1
SOIL BOUNDARY WITH NRCS MAP UNIT AND HYDROLOGIC SOIL GROUP RATING	MapUnit A

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SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING
PROGRAM MANAGEMENT
LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN
PERMITTING SERVICES
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REVISIONS

REV	DATE	COMMENT	DRAWN BY / CHECKED BY

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DRAWN BY:	OCR
CHECKED BY:	AJS / MMA
DATE:	12/12/2024
CAD I.D.:	P-CIVL-HYDR

PROJECT:

SITE DEVELOPMENT PLANS

FOR

SMC

PROPOSED
RESIDENCES AT TABLE TALK SQUARE

MAP: 5 | BLK: 5 | LOT:0003A
120 WASHINGTON STREET
CITY OF WORCESTER
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SHEET TITLE:

POST-DEVELOPMENT DRAINAGE MAP

SHEET NUMBER:

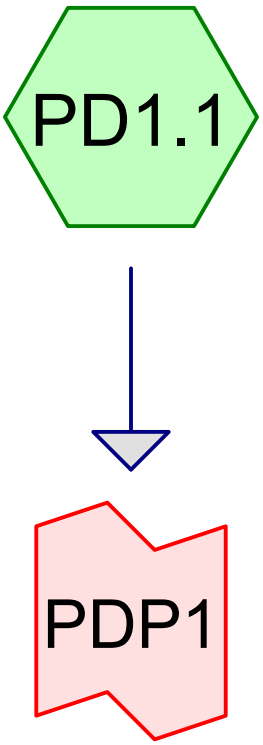
C-403

ORG. DATE - 12/12/2024

30 15 7.5 0 30
SCALE: 1" = 30'

I:\BOHLERENG\-NET\SHARES\MA-PROJECTS\2024\MAA240356.00\CAD\DRAWINGS\PLAN SETS\CIVIL SITE PLANS\P-CIVL-HYDR-MAA240356.00-0C-----LAYOUT: C-403 PSTD

PROPOSED



MADISON STREET
DRAINAGE

Subcat Reach Pond Link

Routing Diagram for MAA240356 - Pre & Post
Prepared by Bohler, Printed 12/11/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.81	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.96	2
3	25-Year	Type III 24-hr		Default	24.00	1	7.68	2
4	100-Year	Type III 24-hr		Default	24.00	1	10.60	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.125	80	>75% Grass cover, Good (PD1.1)
0.033	96	Gravel surface (PD1.1)
0.196	98	Pavement (PD1.1)
1.076	98	Roofs (PD1.1)
1.430	**96**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
1.430	Other	PD1.1
1.430		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.125	0.125	>75% Grass cover, Good	PD1.1
0.000	0.000	0.000	0.000	0.033	0.033	Gravel surface	PD1.1
0.000	0.000	0.000	0.000	0.196	0.196	Pavement	PD1.1
0.000	0.000	0.000	0.000	1.076	1.076	Roofs	PD1.1
0.000	**0.000**	**0.000**	**0.000**	**1.430**	**1.430**	**TOTAL AREA**	

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PD1.1: Runoff Area=62,303 sf 88.93% Impervious Runoff Depth=3.42"
Tc=6.0 min CN=WQ Runoff=5.12 cfs 0.408 af

Link PDP1: MADISON STREET DRAINAGE Inflow=5.12 cfs 0.408 af
Primary=5.12 cfs 0.408 af

Total Runoff Area = 1.430 ac Runoff Volume = 0.408 af Average Runoff Depth = 3.42"
11.07% Pervious = 0.158 ac 88.93% Impervious = 1.272 ac

Summary for Subcatchment PD1.1:

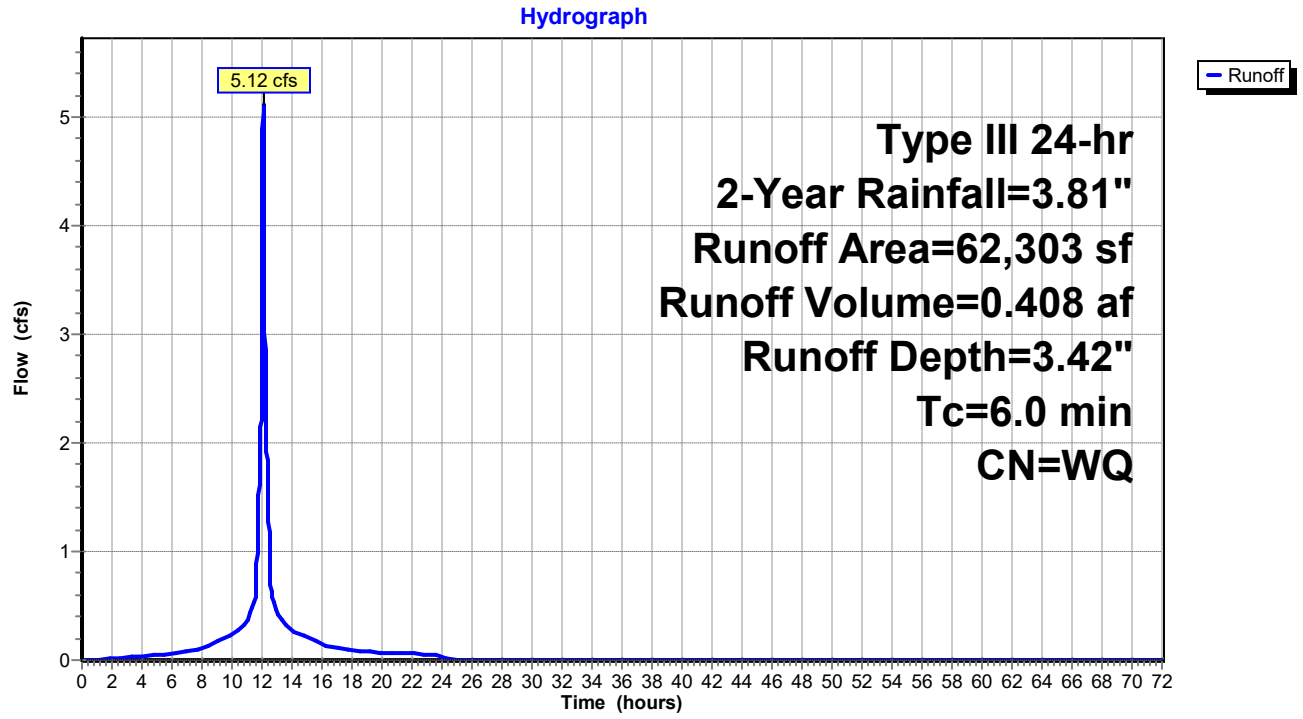
Runoff = 5.12 cfs @ 12.08 hrs, Volume= 0.408 af, Depth= 3.42"
Routed to Link PDP1 : MADISON STREET DRAINAGE

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.81"

	Area (sf)	CN	Description
*	46,855	98	Roofs
*	8,552	98	Pavement
*	5,460	80	>75% Grass cover, Good
*	1,436	96	Gravel surface
	62,303		Weighted Average
	6,896		11.07% Pervious Area
	55,407		88.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PD1.1:

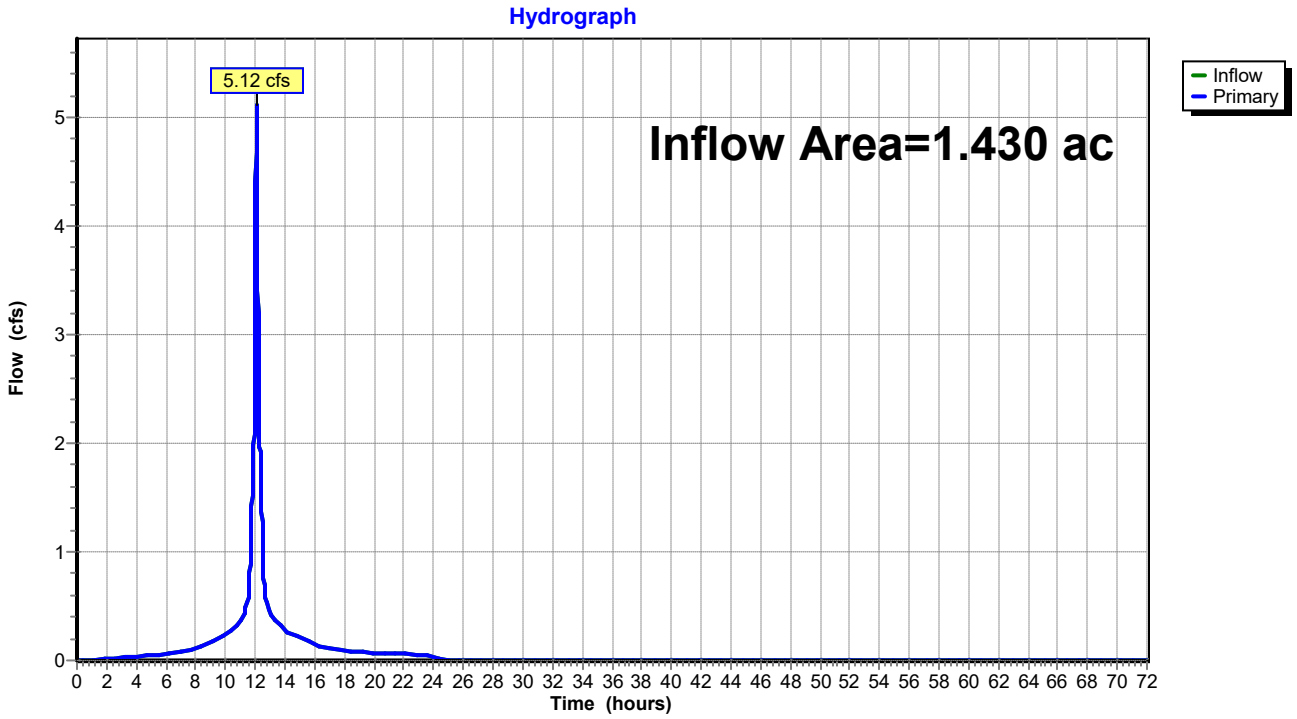


Summary for Link PDP1: MADISON STREET DRAINAGE

Inflow Area = 1.430 ac, 88.93% Impervious, Inflow Depth = 3.42" for 2-Year event
Inflow = 5.12 cfs @ 12.08 hrs, Volume= 0.408 af
Primary = 5.12 cfs @ 12.08 hrs, Volume= 0.408 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link PDP1: MADISON STREET DRAINAGE



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PD1.1: Runoff Area=62,303 sf 88.93% Impervious Runoff Depth=5.54"
Tc=6.0 min CN=WQ Runoff=8.17 cfs 0.661 af

Link PDP1: MADISON STREET DRAINAGE Inflow=8.17 cfs 0.661 af
Primary=8.17 cfs 0.661 af

Total Runoff Area = 1.430 ac Runoff Volume = 0.661 af Average Runoff Depth = 5.54"
11.07% Pervious = 0.158 ac 88.93% Impervious = 1.272 ac

Summary for Subcatchment PD1.1:

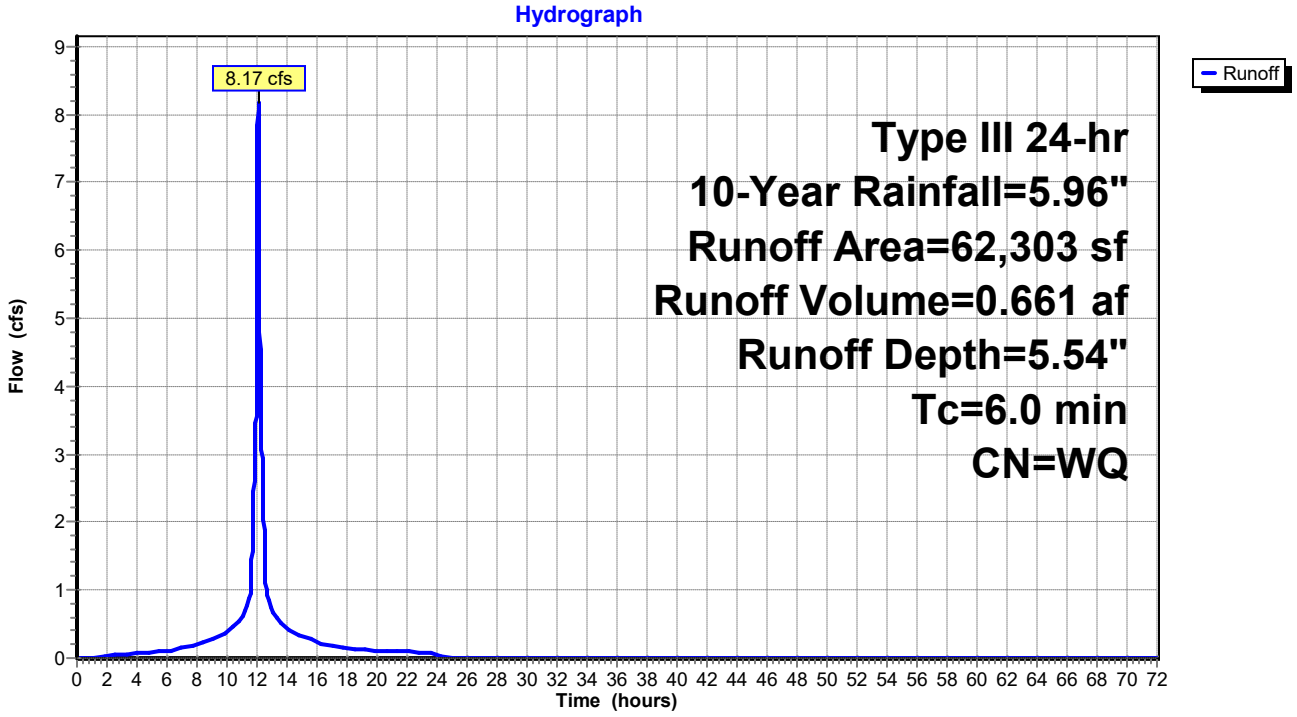
Runoff = 8.17 cfs @ 12.08 hrs, Volume= 0.661 af, Depth= 5.54"
Routed to Link PDP1 : MADISON STREET DRAINAGE

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=5.96"

	Area (sf)	CN	Description
*	46,855	98	Roofs
*	8,552	98	Pavement
*	5,460	80	>75% Grass cover, Good
*	1,436	96	Gravel surface
	62,303		Weighted Average
	6,896		11.07% Pervious Area
	55,407		88.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PD1.1:

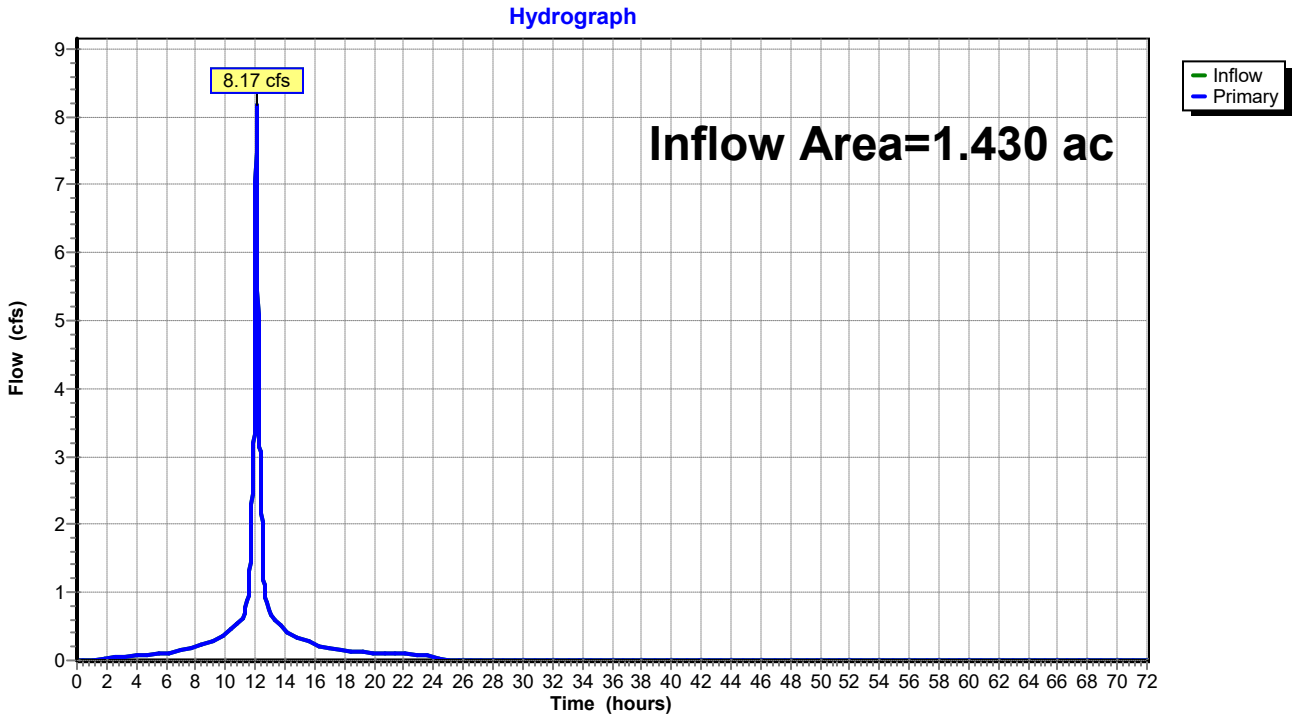


Summary for Link PDP1: MADISON STREET DRAINAGE

Inflow Area = 1.430 ac, 88.93% Impervious, Inflow Depth = 5.54" for 10-Year event
Inflow = 8.17 cfs @ 12.08 hrs, Volume= 0.661 af
Primary = 8.17 cfs @ 12.08 hrs, Volume= 0.661 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link PDP1: MADISON STREET DRAINAGE



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PD1.1: Runoff Area=62,303 sf 88.93% Impervious Runoff Depth=7.25"
Tc=6.0 min CN=WQ Runoff=10.61 cfs 0.864 af

Link PDP1: MADISON STREET DRAINAGE Inflow=10.61 cfs 0.864 af
Primary=10.61 cfs 0.864 af

Total Runoff Area = 1.430 ac Runoff Volume = 0.864 af Average Runoff Depth = 7.25"
11.07% Pervious = 0.158 ac 88.93% Impervious = 1.272 ac

Summary for Subcatchment PD1.1:

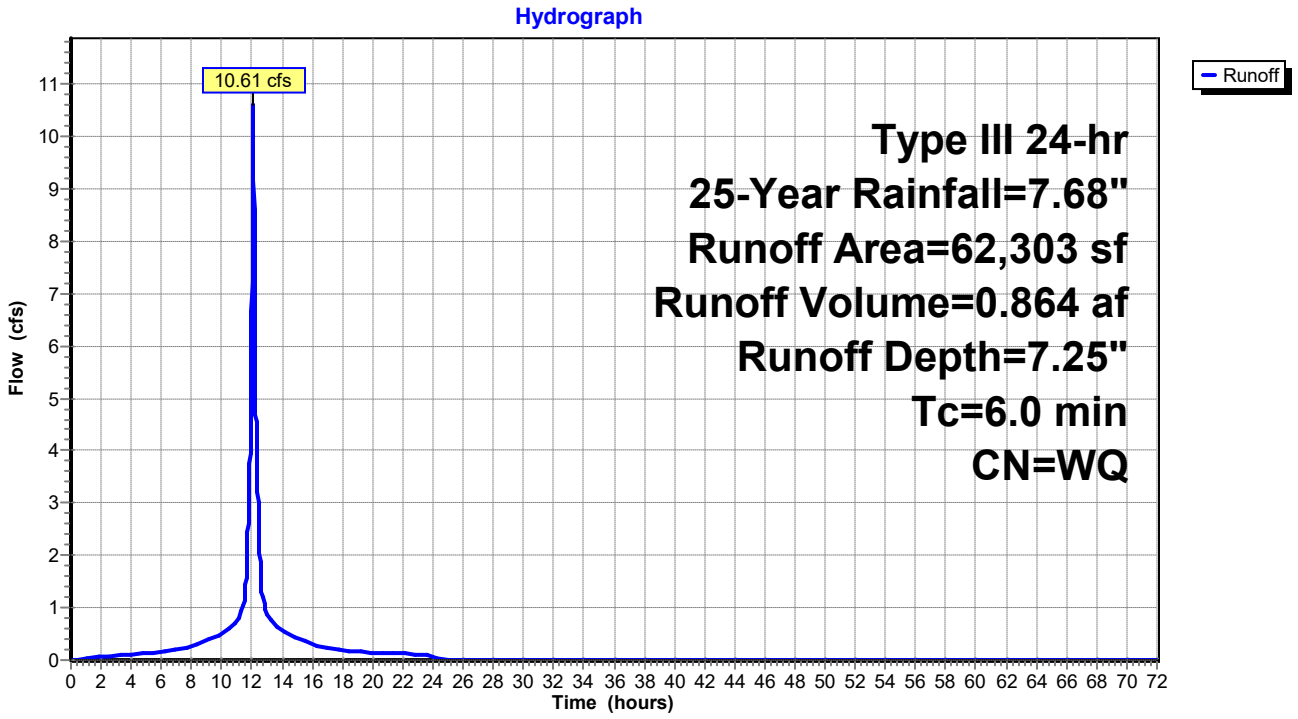
Runoff = 10.61 cfs @ 12.08 hrs, Volume= 0.864 af, Depth= 7.25"
Routed to Link PDP1 : MADISON STREET DRAINAGE

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=7.68"

	Area (sf)	CN	Description
*	46,855	98	Roofs
*	8,552	98	Pavement
*	5,460	80	>75% Grass cover, Good
*	1,436	96	Gravel surface
	62,303		Weighted Average
	6,896		11.07% Pervious Area
	55,407		88.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PD1.1:

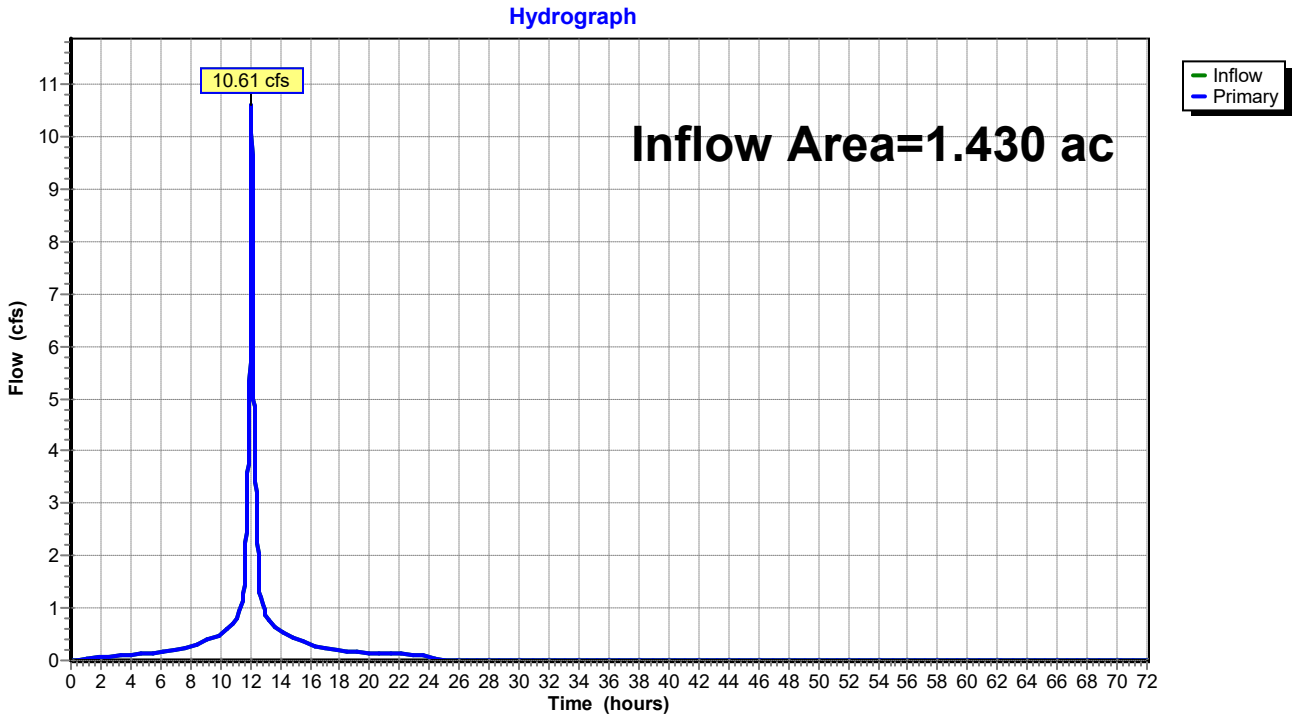


Summary for Link PDP1: MADISON STREET DRAINAGE

Inflow Area = 1.430 ac, 88.93% Impervious, Inflow Depth = 7.25" for 25-Year event
Inflow = 10.61 cfs @ 12.08 hrs, Volume= 0.864 af
Primary = 10.61 cfs @ 12.08 hrs, Volume= 0.864 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link PDP1: MADISON STREET DRAINAGE



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PD1.1: Runoff Area=62,303 sf 88.93% Impervious Runoff Depth=10.16"
Tc=6.0 min CN=WQ Runoff=14.74 cfs 1.210 af

Link PDP1: MADISON STREET DRAINAGE Inflow=14.74 cfs 1.210 af
Primary=14.74 cfs 1.210 af

Total Runoff Area = 1.430 ac Runoff Volume = 1.210 af Average Runoff Depth = 10.16"
11.07% Pervious = 0.158 ac 88.93% Impervious = 1.272 ac

Summary for Subcatchment PD1.1:

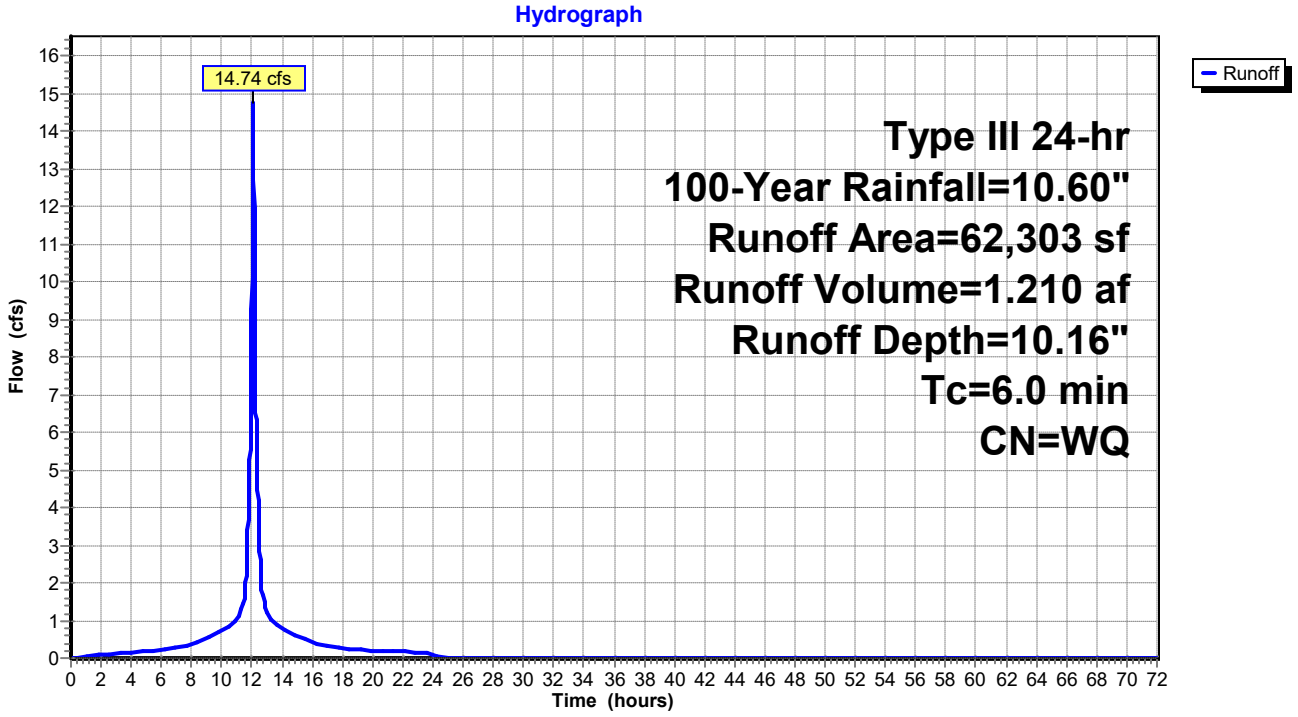
Runoff = 14.74 cfs @ 12.08 hrs, Volume= 1.210 af, Depth=10.16"
Routed to Link PDP1 : MADISON STREET DRAINAGE

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=10.60"

	Area (sf)	CN	Description
*	46,855	98	Roofs
*	8,552	98	Pavement
*	5,460	80	>75% Grass cover, Good
*	1,436	96	Gravel surface
	62,303		Weighted Average
	6,896		11.07% Pervious Area
	55,407		88.93% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment PD1.1:

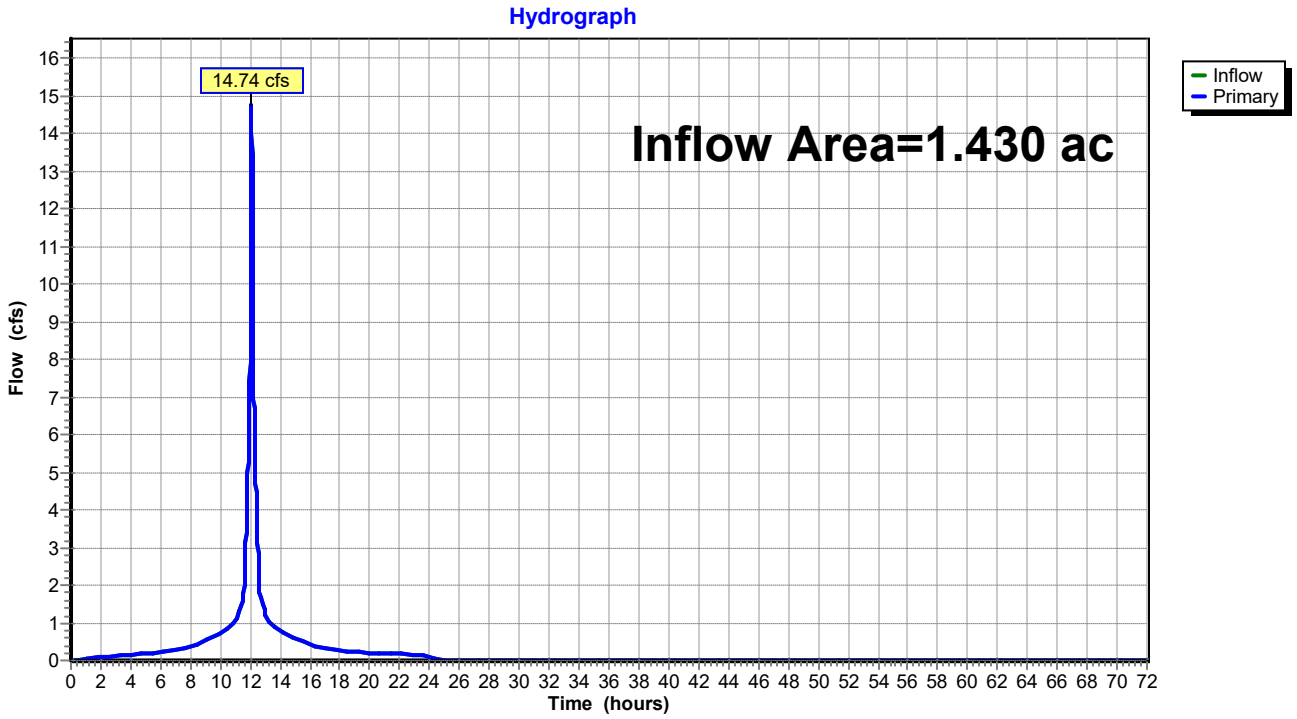


Summary for Link PDP1: MADISON STREET DRAINAGE

Inflow Area = 1.430 ac, 88.93% Impervious, Inflow Depth = 10.16" for 100-Year event
Inflow = 14.74 cfs @ 12.08 hrs, Volume= 1.210 af
Primary = 14.74 cfs @ 12.08 hrs, Volume= 1.210 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link PDP1: MADISON STREET DRAINAGE



APPENDIX F: STORMWATER CALCULATIONS

- *NOAA RAINFALL DATA*
- *MA STANDARD #3 RECHARGE*

NOAA Atlas 14, Volume 10, Version 3
Location name: Worcester, Massachusetts, USA*
Latitude: 42.2559°, Longitude: -71.7993°
Elevation: 463 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.341** (0.273-0.422)	**0.401** (0.320-0.497)	**0.500** (0.398-0.620)	**0.581** (0.459-0.729)	**0.694** (0.528-0.910)	**0.779** (0.579-1.05)	**0.867** (0.621-1.21)	**0.962** (0.653-1.39)	**1.09** (0.711-1.64)	**1.20** (0.759-1.84)
10-min	**0.483** (0.386-0.598)	**0.569** (0.454-0.704)	**0.709** (0.564-0.881)	**0.824** (0.651-1.03)	**0.983** (0.748-1.29)	**1.10** (0.819-1.48)	**1.23** (0.880-1.72)	**1.36** (0.925-1.97)	**1.55** (1.01-2.33)	**1.70** (1.08-2.61)
15-min	**0.569** (0.455-0.703)	**0.669** (0.534-0.828)	**0.833** (0.663-1.04)	**0.969** (0.766-1.21)	**1.16** (0.880-1.52)	**1.30** (0.964-1.74)	**1.44** (1.04-2.02)	**1.60** (1.09-2.32)	**1.82** (1.18-2.74)	**2.00** (1.26-3.07)
30-min	**0.772** (0.617-0.955)	**0.909** (0.726-1.13)	**1.13** (0.901-1.41)	**1.32** (1.04-1.65)	**1.58** (1.20-2.07)	**1.77** (1.31-2.38)	**1.97** (1.41-2.75)	**2.18** (1.48-3.15)	**2.48** (1.62-3.73)	**2.72** (1.72-4.19)
60-min	**0.976** (0.780-1.21)	**1.15** (0.918-1.42)	**1.43** (1.14-1.78)	**1.67** (1.32-2.09)	**1.99** (1.52-2.61)	**2.24** (1.66-3.01)	**2.49** (1.79-3.48)	**2.77** (1.88-3.99)	**3.14** (2.05-4.72)	**3.45** (2.18-5.30)
2-hr	**1.24** (0.995-1.52)	**1.47** (1.18-1.80)	**1.84** (1.48-2.28)	**2.16** (1.72-2.68)	**2.59** (1.98-3.38)	**2.91** (2.18-3.90)	**3.25** (2.36-4.55)	**3.64** (2.48-5.23)	**4.22** (2.75-6.30)	**4.70** (2.98-7.18)
3-hr	**1.41** (1.14-1.73)	**1.69** (1.36-2.07)	**2.13** (1.71-2.62)	**2.50** (2.00-3.10)	**3.01** (2.32-3.93)	**3.39** (2.55-4.54)	**3.79** (2.77-5.31)	**4.27** (2.91-6.11)	**4.98** (3.26-7.42)	**5.58** (3.55-8.50)
6-hr	**1.77** (1.44-2.15)	**2.13** (1.73-2.59)	**2.72** (2.20-3.32)	**3.20** (2.57-3.94)	**3.88** (3.00-5.04)	**4.38** (3.32-5.84)	**4.91** (3.61-6.86)	**5.56** (3.81-7.91)	**6.54** (4.28-9.68)	**7.38** (4.70-11.2)
12-hr	**2.18** (1.78-2.64)	**2.65** (2.16-3.21)	**3.41** (2.78-4.15)	**4.05** (3.27-4.95)	**4.92** (3.84-6.36)	**5.57** (4.24-7.38)	**6.27** (4.63-8.70)	**7.11** (4.89-10.0)	**8.38** (5.51-12.3)	**9.47** (6.06-14.2)
24-hr	**2.59** (2.13-3.11)	**3.17** (2.60-3.81)	**4.11** (3.37-4.97)	**4.90** (3.98-5.96)	**5.98** (4.69-7.68)	**6.78** (5.20-8.94)	**7.65** (5.68-10.6)	**8.70** (6.00-12.2)	**10.3** (6.79-15.0)	**11.7** (7.48-17.4)
2-day	**2.95** (2.45-3.52)	**3.63** (3.01-4.34)	**4.74** (3.91-5.69)	**5.66** (4.63-6.84)	**6.92** (5.47-8.85)	**7.86** (6.06-10.3)	**8.88** (6.64-12.2)	**10.1** (7.02-14.1)	**12.1** (7.98-17.5)	**13.7** (8.85-20.4)
3-day	**3.21** (2.67-3.82)	**3.94** (3.28-4.69)	**5.14** (4.25-6.14)	**6.13** (5.04-7.37)	**7.49** (5.94-9.54)	**8.50** (6.58-11.1)	**9.60** (7.20-13.2)	**11.0** (7.60-15.2)	**13.1** (8.65-18.9)	**14.9** (9.59-22.0)
4-day	**3.45** (2.88-4.09)	**4.21** (3.51-5.00)	**5.47** (4.54-6.52)	**6.51** (5.36-7.81)	**7.94** (6.30-10.1)	**8.99** (6.98-11.7)	**10.1** (7.63-13.9)	**11.6** (8.04-16.0)	**13.8** (9.13-19.8)	**15.7** (10.1-23.1)
7-day	**4.11** (3.45-4.85)	**4.95** (4.14-5.84)	**6.31** (5.26-7.48)	**7.44** (6.16-8.88)	**9.00** (7.17-11.3)	**10.2** (7.90-13.1)	**11.4** (8.58-15.4)	**12.9** (9.01-17.8)	**15.2** (10.1-21.8)	**17.2** (11.1-25.1)
10-day	**4.78** (4.02-5.62)	**5.65** (4.75-6.65)	**7.07** (5.92-8.36)	**8.25** (6.86-9.82)	**9.88** (7.89-12.4)	**11.1** (8.64-14.2)	**12.4** (9.31-16.6)	**13.9** (9.74-19.1)	**16.2** (10.8-23.1)	**18.1** (11.7-26.4)
20-day	**6.82** (5.78-7.97)	**7.75** (6.56-9.06)	**9.26** (7.80-10.9)	**10.5** (8.79-12.4)	**12.2** (9.81-15.1)	**13.6** (10.6-17.1)	**14.9** (11.1-19.6)	**16.3** (11.5-22.2)	**18.3** (12.3-25.9)	**19.9** (13.0-28.9)
30-day	**8.54** (7.26-9.93)	**9.49** (8.06-11.1)	**11.0** (9.35-12.9)	**12.3** (10.4-14.5)	**14.1** (11.3-17.3)	**15.5** (12.1-19.4)	**16.9** (12.6-21.9)	**18.2** (12.9-24.6)	**20.0** (13.5-28.1)	**21.3** (13.9-30.8)
45-day	**10.7** (9.11-12.4)	**11.7** (9.94-13.5)	**13.3** (11.3-15.5)	**14.6** (12.3-17.1)	**16.5** (13.3-20.0)	**17.9** (14.0-22.3)	**19.3** (14.4-24.8)	**20.6** (14.6-27.7)	**22.1** (15.0-31.0)	**23.2** (15.1-33.3)
60-day	**12.4** (10.7-14.4)	**13.5** (11.5-15.6)	**15.1** (12.9-17.6)	**16.5** (14.0-19.3)	**18.4** (14.9-22.3)	**19.9** (15.6-24.7)	**21.4** (15.9-27.2)	**22.6** (16.1-30.3)	**24.0** (16.3-33.5)	**24.9** (16.3-35.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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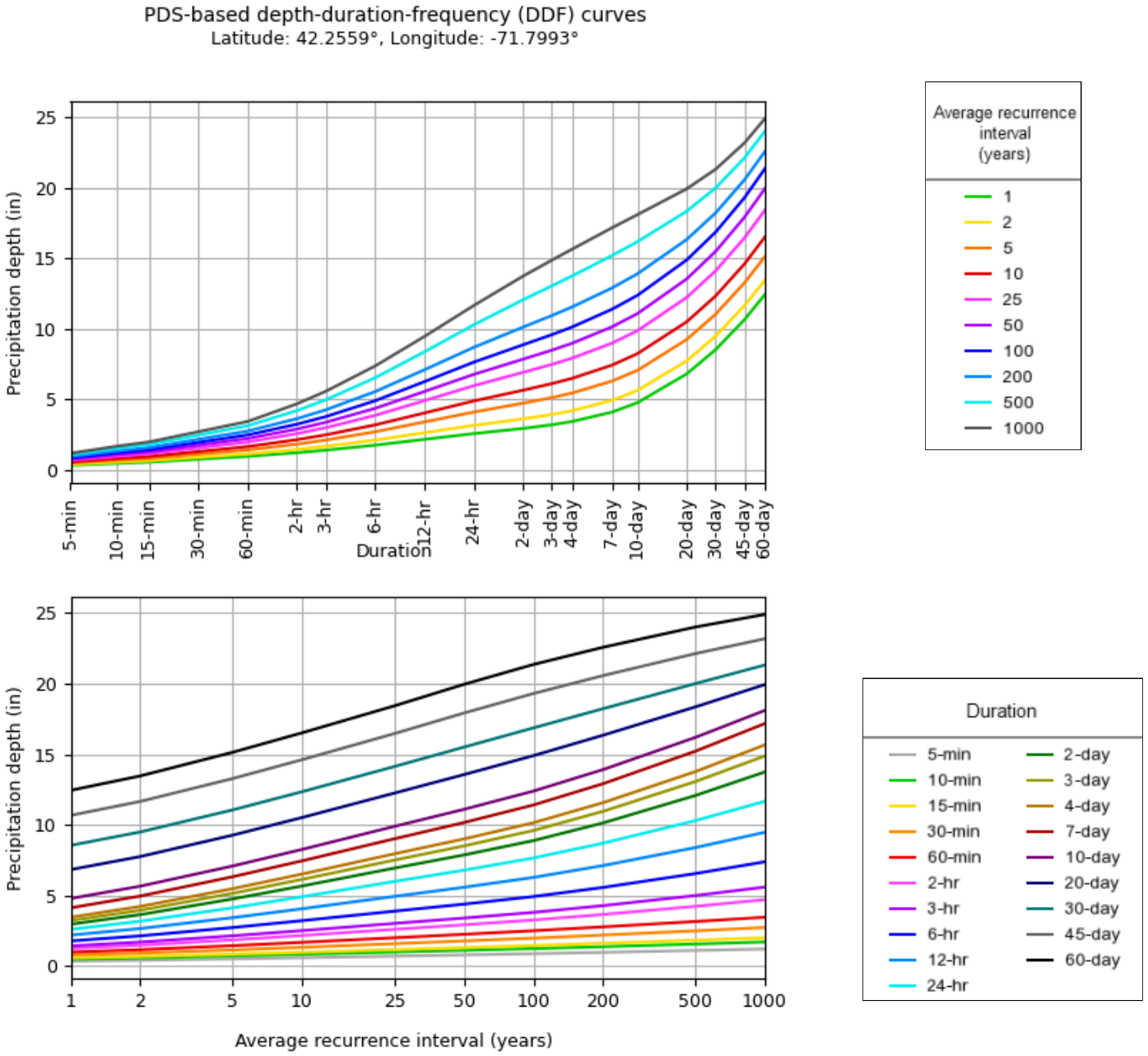
PF graphical



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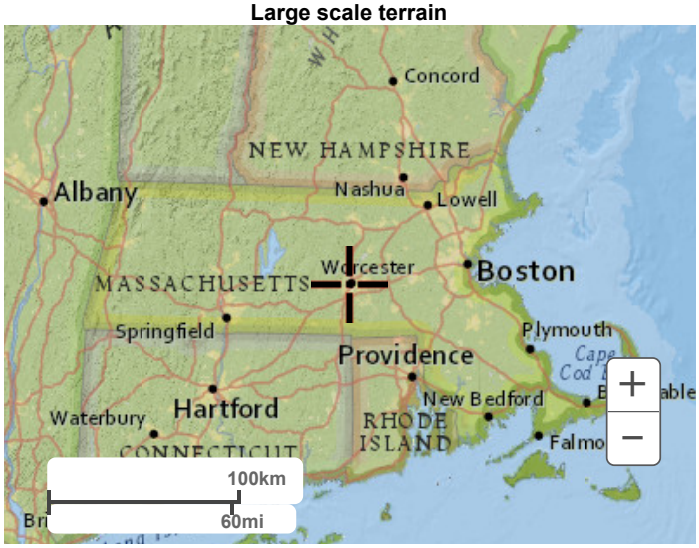
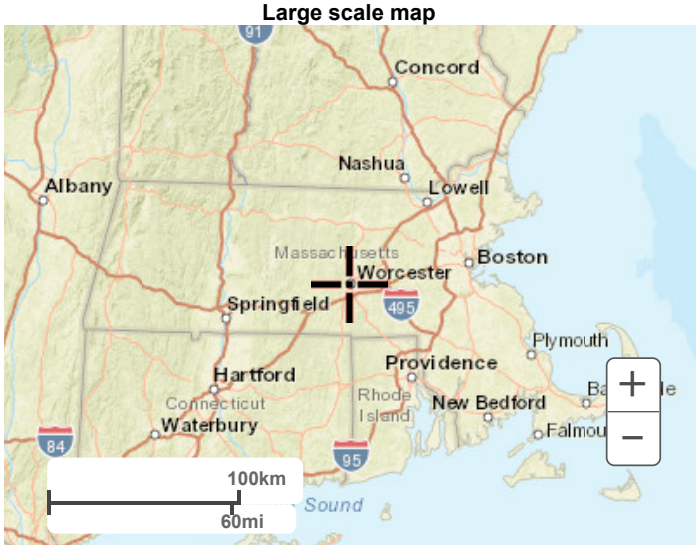
Maps & aerials

Small scale terrain

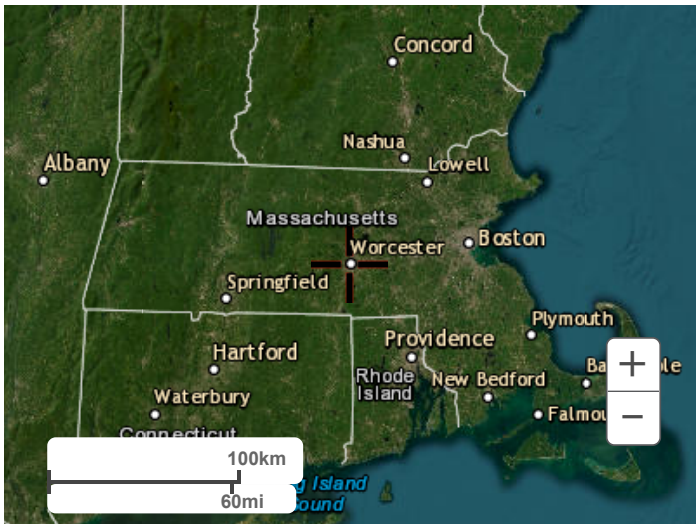
Large scale terrain



Large scale map



Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOAA Atlas 14, Volume 10, Version 3
Location name: Worcester, Massachusetts, USA*
Latitude: 42.2559°, Longitude: -71.7993°
Elevation: 463 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.09** (3.28-5.06)	**4.81** (3.84-5.96)	**6.00** (4.78-7.44)	**6.97** (5.51-8.75)	**8.33** (6.34-10.9)	**9.35** (6.95-12.6)	**10.4** (7.45-14.5)	**11.5** (7.84-16.7)	**13.1** (8.53-19.7)	**14.4** (9.11-22.1)
10-min	**2.90** (2.32-3.59)	**3.41** (2.72-4.22)	**4.25** (3.38-5.29)	**4.94** (3.91-6.19)	**5.90** (4.49-7.73)	**6.62** (4.91-8.89)	**7.37** (5.28-10.3)	**8.17** (5.55-11.8)	**9.29** (6.04-14.0)	**10.2** (6.45-15.7)
15-min	**2.28** (1.82-2.81)	**2.68** (2.14-3.31)	**3.33** (2.65-4.14)	**3.88** (3.06-4.85)	**4.62** (3.52-6.07)	**5.19** (3.86-6.98)	**5.78** (4.14-8.07)	**6.41** (4.36-9.26)	**7.29** (4.74-11.0)	**7.99** (5.06-12.3)
30-min	**1.54** (1.23-1.91)	**1.82** (1.45-2.25)	**2.27** (1.80-2.82)	**2.64** (2.08-3.30)	**3.15** (2.40-4.13)	**3.54** (2.63-4.75)	**3.94** (2.82-5.50)	**4.37** (2.97-6.31)	**4.97** (3.23-7.46)	**5.44** (3.45-8.38)
60-min	**0.976** (0.780-1.21)	**1.15** (0.918-1.42)	**1.43** (1.14-1.78)	**1.67** (1.32-2.09)	**1.99** (1.52-2.61)	**2.24** (1.66-3.01)	**2.49** (1.79-3.48)	**2.77** (1.88-3.99)	**3.14** (2.05-4.72)	**3.45** (2.18-5.30)
2-hr	**0.618** (0.497-0.760)	**0.733** (0.589-0.902)	**0.922** (0.738-1.14)	**1.08** (0.857-1.34)	**1.29** (0.992-1.69)	**1.46** (1.09-1.95)	**1.62** (1.18-2.28)	**1.82** (1.24-2.62)	**2.11** (1.38-3.15)	**2.35** (1.49-3.59)
3-hr	**0.470** (0.379-0.576)	**0.561** (0.452-0.688)	**0.709** (0.570-0.873)	**0.832** (0.664-1.03)	**1.00** (0.771-1.31)	**1.13** (0.849-1.51)	**1.26** (0.921-1.77)	**1.42** (0.970-2.03)	**1.66** (1.08-2.47)	**1.86** (1.18-2.83)
6-hr	**0.295** (0.239-0.359)	**0.355** (0.288-0.432)	**0.453** (0.366-0.554)	**0.535** (0.429-0.658)	**0.647** (0.501-0.841)	**0.730** (0.553-0.974)	**0.820** (0.602-1.14)	**0.928** (0.635-1.32)	**1.09** (0.715-1.62)	**1.23** (0.785-1.86)
12-hr	**0.181** (0.148-0.218)	**0.219** (0.179-0.266)	**0.283** (0.230-0.344)	**0.335** (0.271-0.411)	**0.408** (0.318-0.527)	**0.462** (0.352-0.612)	**0.520** (0.384-0.722)	**0.590** (0.405-0.833)	**0.695** (0.457-1.02)	**0.785** (0.502-1.18)
24-hr	**0.107** (0.088-0.129)	**0.131** (0.108-0.158)	**0.171** (0.140-0.206)	**0.204** (0.166-0.248)	**0.249** (0.195-0.320)	**0.282** (0.216-0.372)	**0.318** (0.236-0.440)	**0.362** (0.249-0.508)	**0.428** (0.282-0.626)	**0.485** (0.311-0.724)
2-day	**0.061** (0.050-0.073)	**0.075** (0.062-0.090)	**0.098** (0.081-0.118)	**0.117** (0.096-0.142)	**0.144** (0.113-0.184)	**0.163** (0.126-0.214)	**0.184** (0.138-0.254)	**0.211** (0.146-0.294)	**0.251** (0.166-0.364)	**0.286** (0.184-0.424)
3-day	**0.044** (0.037-0.053)	**0.054** (0.045-0.065)	**0.071** (0.059-0.085)	**0.085** (0.069-0.102)	**0.104** (0.082-0.132)	**0.118** (0.091-0.154)	**0.133** (0.100-0.182)	**0.152** (0.105-0.211)	**0.181** (0.120-0.262)	**0.206** (0.133-0.305)
4-day	**0.035** (0.029-0.042)	**0.043** (0.036-0.052)	**0.056** (0.047-0.067)	**0.067** (0.055-0.081)	**0.082** (0.065-0.104)	**0.093** (0.072-0.122)	**0.105** (0.079-0.144)	**0.120** (0.083-0.166)	**0.143** (0.095-0.206)	**0.163** (0.105-0.240)
7-day	**0.024** (0.020-0.028)	**0.029** (0.024-0.034)	**0.037** (0.031-0.044)	**0.044** (0.036-0.052)	**0.053** (0.042-0.067)	**0.060** (0.047-0.078)	**0.067** (0.051-0.091)	**0.076** (0.053-0.105)	**0.090** (0.060-0.129)	**0.102** (0.066-0.149)
10-day	**0.019** (0.016-0.023)	**0.023** (0.019-0.027)	**0.029** (0.024-0.034)	**0.034** (0.028-0.040)	**0.041** (0.032-0.051)	**0.046** (0.035-0.059)	**0.051** (0.038-0.069)	**0.057** (0.040-0.079)	**0.067** (0.045-0.096)	**0.075** (0.048-0.110)
20-day	**0.014** (0.012-0.016)	**0.016** (0.013-0.018)	**0.019** (0.016-0.022)	**0.021** (0.018-0.025)	**0.025** (0.020-0.031)	**0.028** (0.022-0.035)	**0.031** (0.023-0.040)	**0.034** (0.023-0.046)	**0.038** (0.025-0.054)	**0.041** (0.027-0.060)
30-day	**0.011** (0.010-0.013)	**0.013** (0.011-0.015)	**0.015** (0.012-0.017)	**0.017** (0.014-0.020)	**0.019** (0.015-0.024)	**0.021** (0.016-0.026)	**0.023** (0.017-0.030)	**0.025** (0.017-0.034)	**0.027** (0.018-0.039)	**0.029** (0.019-0.042)
45-day	**0.009** (0.008-0.011)	**0.010** (0.009-0.012)	**0.012** (0.010-0.014)	**0.013** (0.011-0.015)	**0.015** (0.012-0.018)	**0.016** (0.012-0.020)	**0.017** (0.013-0.022)	**0.019** (0.013-0.025)	**0.020** (0.013-0.028)	**0.021** (0.014-0.030)
60-day	**0.008** (0.007-0.009)	**0.009** (0.007-0.010)	**0.010** (0.008-0.012)	**0.011** (0.009-0.013)	**0.012** (0.010-0.015)	**0.013** (0.010-0.017)	**0.014** (0.011-0.018)	**0.015** (0.011-0.021)	**0.016** (0.011-0.023)	**0.017** (0.011-0.024)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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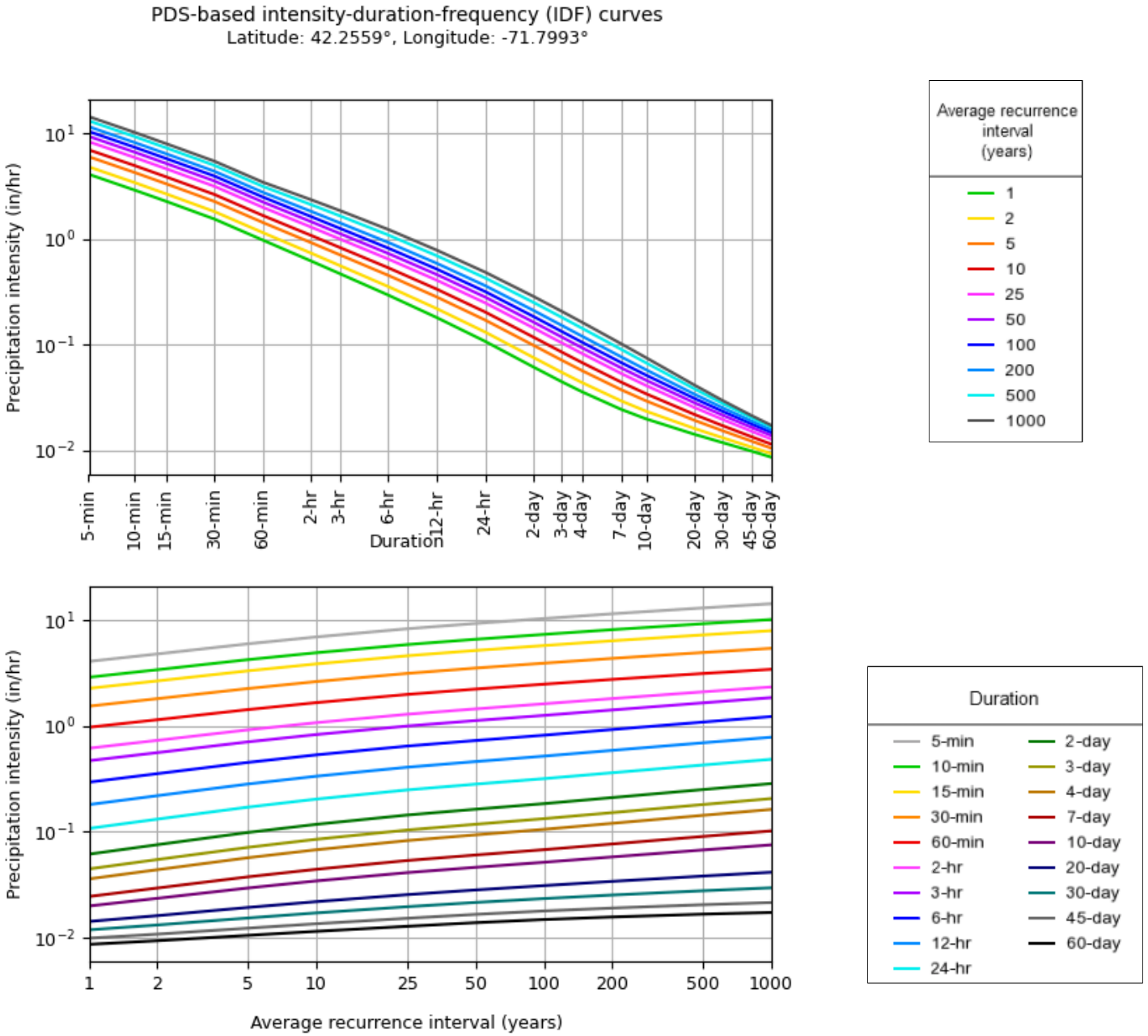
PF graphical



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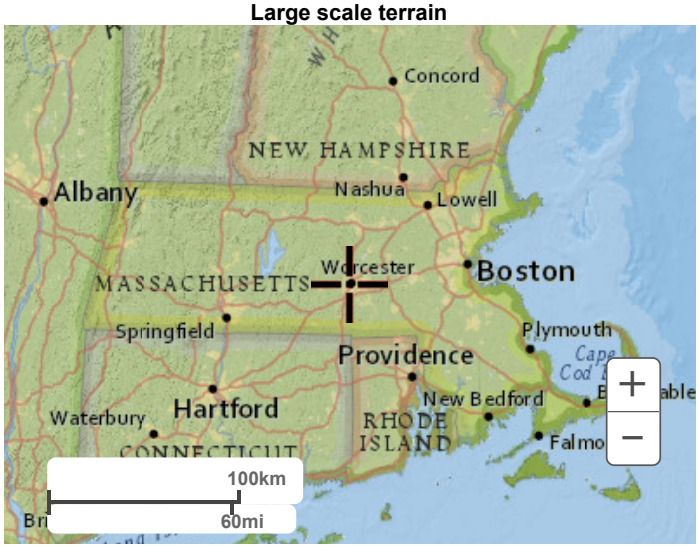
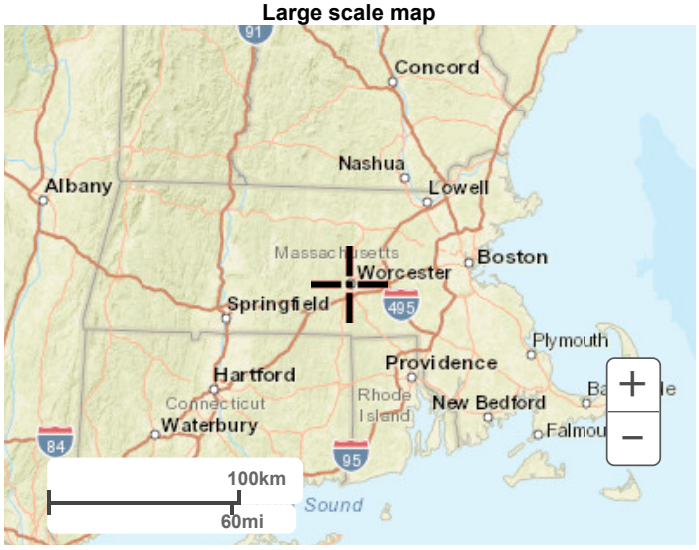
Maps & aerials

Small scale terrain

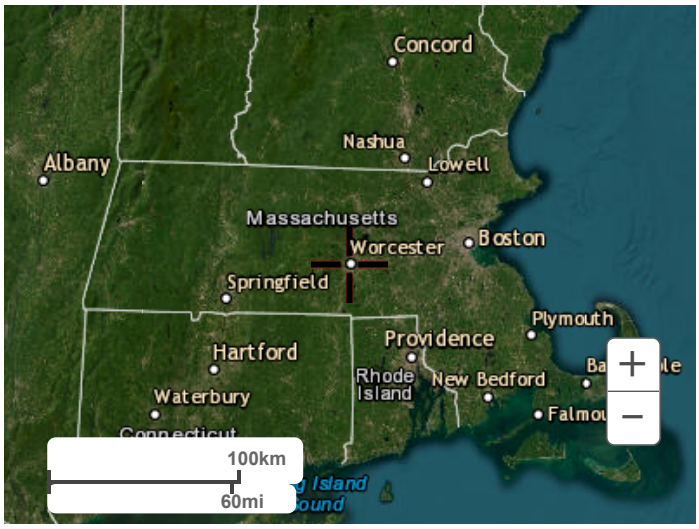
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Residences at Table Talk Square
120 Washington Street
Worcester, MA
Bohler Job Number: MAA240356.00
December 12, 2024

MA DEP Standard 3: Recharge Volume Calculations

Required Recharge Volume - A Soils (0.60 in.)	
Existing Site Impervious Area (ac)	0.000
Proposed Site Impervious Area (ac)	0.000
Proposed Increase in Site Impervious Area (ac)	0.000
Recharge Volume Required (cf)	**0**

Required Recharge Volume - B Soils (0.35 in.)	
Existing Site Impervious Area (ac)	0.000
Proposed Site Impervious Area (ac)	0.000
Proposed Increase in Site Impervious Area (ac)	0.000
Recharge Volume Required (cf)	**0**

Required Recharge Volume - C Soils (0.25 in.)	
Existing Site Impervious Area (ac)	0.000
Proposed Site Impervious Area (ac)	0.000
Proposed Increase in Site Impervious Area (ac)	0.000
Recharge Volume Required (cf)	**0**

Required Recharge Volume - D Soils (0.10 in.)	
Existing Site Impervious Area (ac)	1.430
Proposed Site Impervious Area (ac)	1.272
Proposed Increase in Site Impervious Area (ac)	-0.158
Recharge Volume Required (cf)	**0**

Total Recharge Volume Required (cf)	**0**

Recharge Volume Adjustment Factor	
Impervious Area Directed to Infiltration BMP (ac)	**0.000**
%Impervious Directed to Infiltration BMP	
Adjustment Factor	
Adjusted Total Recharge Volume Required (cf)	

Provided Recharge Volume*	
	0
Total Recharge Volume Provided (cf)	**0**

Input Required

*Volume provided below lowest outlet in cubic feet (cf)

Prepared By:
BOHLER
352 Turnpike Road
Southborough, MA 01772
(508) 480-9900

APPENDIX G: OPERATION AND MAINTENANCE

- *STORMWATER OPERATION AND MAINTENANCE PLAN*
- *INSPECTION REPORT*
- *INSPECTION AND MAINTENANCE LOG FORM*
- *LONG-TERM POLLUTION PREVENTION PLAN*
- *ILLICIT DISCHARGE STATEMENT*
- *SPILL PREVENTION*

STORMWATER OPERATION AND MAINTENANCE PLAN

Residences at Table Talk Square
120 Washington Street
Worcester, MA

RESPONSIBLE PARTY DURING CONSTRUCTION:

TBD

RESPONSIBLE PARTY POST CONSTRUCTION:

SMC Management Corporation
11 Beacon Street, Suite 325, 02108
Boston, MA

Construction Phase

During the construction phase, all erosion control devices and measures shall be maintained in accordance with the final record plans, local/state approvals and conditions, the EPA Construction General Permit and the Stormwater Pollution Prevention Plan (SWPPP) if applicable. Additionally, the maintenance of all erosion / siltation control measures during construction shall be the responsibility of the general contractor. Contact information of the OWNER and CONTRACTOR shall be listed in the SWPPP for this site. The SWPPP also includes information regarding construction period allowable and illicit discharges, housekeeping and emergency response procedures. Upon proper notice to the property owner, the Town/City or its authorized designee shall be allowed to enter the property at a reasonable time and in a reasonable manner for the purposes of inspection.

Post Development Controls

Once construction is completed, the post development stormwater controls are to be operated and maintained in compliance with the following permanent procedures (note that the continued implementation of these procedures shall be the responsibility of the Owner or its assignee):

1. Parking lots: Sweep at least two (2) times per year and on a more frequent basis depending on sanding operations. Swept areas shall include all parking, drive aisles, and access aisles All resulting sweepings shall be collected and properly disposed of offsite in accordance with MADEP and other applicable requirements.

2. Catch basins, yard drains, trench drains, manholes and piping: Inspect two (2) times per year and at the end of foliage and snow-removal seasons. These features shall be cleaned two (2) times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the catch basin or underground system. Accumulated sediment and hydrocarbons present must be removed and properly disposed of off-site in accordance with MADEP and other applicable requirements.

All components of the stormwater system will be accessible by the owner or their assignee.

STORMWATER MANAGEMENT SYSTEM

POST-CONSTRUCTION INSPECTION REPORT

LOCATION:

Residences at Table Talk Square
120 Washington Street
Worcester, MA

RESPONSIBLE PARTY:

SMC Management Corporation
11 Beacon Street, Suite 325, 02108
Boston, MA

NAME OF INSPECTOR:	INSPECTION DATE:
Note Condition of the Following (sediment depth, debris, standing water, damage, etc.):	
Parking Lots:	
Catch basins, yard drains, trench drains, manholes and piping:	
Other:	
Note Recommended Actions to be taken on the Following (sediment and/or debris removal, repairs, etc.):	
Parking Lots:	

Catch basins, yard drains, trench drains, manholes and piping:
Other:
Comments:

STORMWATER INSPECTION AND MAINTENANCE LOG FORM			
Residences at Table Talk Square ***120 Washington Street, Worcester, MA***			
Stormwater Management Practice	Responsible Party	Date	Maintenance Activity Performed

LONG-TERM POLLUTION PREVENTION PLAN

Residences at Table Talk Square
120 Washington Street
Worcester, MA

RESPONSIBLE PARTY DURING CONSTRUCTION:

TBD

RESPONSIBLE PARTY POST CONSTRUCTION:

SMC Management Corporation
11 Beacon Street, Suite 325, 02108
Boston, MA

For this site, the Long-Term Pollution Prevention Plan will consist of the following:

- The property owner shall be responsible for "good housekeeping" including proper periodic maintenance of building and pavement areas, curbing, landscaping, etc.
- Proper storage and removal of solid waste (dumpsters).
- Sweeping of parking lots, drive aisles and access aisles a minimum of twice per year with a commercial cleaning unit. Any sediment removed shall be disposed of in accordance with applicable local and state requirements.
- Regular inspections and maintenance of Stormwater Management System as noted in the "O&M Plan".
- Snow removal shall be the responsibility of the property owner. Snow shall not be plowed, dumped and/or placed in forebays, infiltration basins or similar stormwater controls. Salting and/or sanding of pavement / walkway areas during winter conditions shall only be done in accordance with all state/local requirements and approvals.

OPERATON AND MAINTENANCE TRAINING PROGRAM

The Owner will coordinate an annual in-house training session to discuss the Operations and Maintenance Plan, the Long-Term Pollution Prevention Plan, and the Spill Prevention Plan and response procedures. Annual training will include the following:

Discuss the Operations and Maintenance Plan:

- Explain the general operations of the stormwater management system and its BMPs
- Identify potential sources of stormwater pollution and measures / methods of reducing or eliminating that pollution
- Emphasize good housekeeping measures

Discuss the Spill Prevention and Response Procedures:

- Explain the process in the event of a spill
- Identify potential sources of spills and procedures for cleanup and /or reporting and notification
- Complete a yearly inventory or Materials Safety Data sheets of all tenants and confirm that no potentially harmful chemicals are in use.

ILLICIT DISCHARGE STATEMENT

Certain types of non-stormwater discharges are allowed under the U.S. Environmental Protection Agency Construction General Permit. These types of discharges will be allowed under the conditions that no pollutants will be allowed to come in contact with the water prior to or after its discharge. The control measures which have been outlined previously in this LTPPP will be strictly followed to ensure that no contamination of these non-storm water discharges takes place. Any existing illicit discharges, if discovered during the course of the work, will be reported to MassDEP and the local DPW, as applicable, to be addressed in accordance with their respective policies. No illicit discharges will be allowed in conjunction with the proposed improvements.

Duly Acknowledged:

_____

Name & Title Date

SPILL PREVENTION AND RESPONSE PROCEDURES (POST CONSTRUCTION)

In order to prevent or minimize the potential for a spill of Hazardous Substances or Oil or come into contact with stormwater, the following steps will be implemented:

1. All Hazardous Substances or Oil (such as pesticides, petroleum products, fertilizers, detergents, acids, paints, paint solvents, cleaning solvents, etc.) will be stored in a secure location, with their lids on, preferably under cover, when not in use.

2. The minimum practical quantity of all such materials will be kept on site.

3. A spill control and containment kit (containing, for example, absorbent materials, acid neutralizing powder, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided on site.

4. Manufacturer's recommended methods for spill cleanup will be clearly posted and site personnel will be trained regarding these procedures and the location of the information and cleanup supplies.

5. It is the OWNER's responsibility to ensure that all Hazardous Waste on site is disposed of properly by a licensed hazardous material disposal company. The OWNER is responsible for not exceeding Hazardous Waste storage requirements mandated by the EPA or state and local authorities.

In the event of a spill of Hazardous Substances or Oil, the following procedures should be followed:

1. All measures should be taken to contain and abate the spill and to prevent the discharge of the Hazardous Substance or Oil to stormwater or off-site. (The spill area should be kept well ventilated and personnel should wear appropriate protective clothing to prevent injury from contact with the Hazardous Substances.)

2. For spills of less than five (5) gallons of material, proceed with source control and containment, clean-up with absorbent materials or other applicable means unless an imminent hazard or other circumstances dictate that the spill should be treated by a professional emergency response contractor.

3. For spills greater than five (5) gallons of material immediately contact the MADEP at the toll-free 24-hour statewide emergency number: **1-888-304-1133**, the local fire department (**9-1-1**) and an approved emergency response contractor. Provide information on the type of material spilled, the location of the spill, the quantity spilled, and the time of the spill to the emergency response contractor or coordinator, and proceed with prevention, containment and/or clean-up if so desired. (Use the form provided, or similar).

4. If there is a Reportable Quantity (RQ) release, then the National Response Center should be notified immediately at (800) 424-8802; within 14 days a report should be submitted to the EPA regional office describing the release, the date and circumstances of the release and the steps taken to prevent another release. This Pollution Prevention Plan should be updated to reflect any such steps or actions taken and measures to prevent the same from reoccurring.

SPILL PREVENTION CONTROL AND COUNTERMEASURE FORM

Residences at Table Talk Square
120 Washington Street
Worcester, MA

Where a release containing a hazardous substance occurs, the following steps shall be taken by the facility manager and/or supervisor:

1. Immediately notify The Worcester Fire Department (at **9-1-1**)

2. All measures must be taken to contain and abate the spill and to prevent the discharge of the pollutant(s) to off-site locations, receiving waters, wetlands and/or resource areas.

3. Notify the City of Worcester Health Department at (508) 799-8531

4. Provide documentation from licensed contractor showing disposal and cleanup procedures were completed as well as details on chemicals that were spilled to the Massachusetts Department of Environmental Protection and the City of Worcester Department of Health.

Date of spill:_____ Time:_____ Reported By:_____

Weather Conditions:_____

Material Spilled	**Location of Spill**	**Approximate Quantity of Spill (in gallons)**	**Agency(s) Notified**	**Date of Notification**

Cause of Spill: _____

_____

Measures Taken to Clean up Spill: _____

_____

Type of equipment: _____ Make: _____ Size: _____

License or S/N: _____

Location and Method of Disposal _____

_____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring: _____

_____

_____

Additional Contact Numbers:

- DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) EMERGENCY PHONE: 1-888-304-1133
- NATIONAL RESPONSE CENTER PHONE: (800) 424-8802
- U.S. ENVIRONMENTAL PROTECTION AGENCY PHONE: (888) 372-7341